CHAPTER 4

Environmental Consequences

CHAPTER 4: ENVIRONMENTAL CONSEQUENCES

The "Environmental Consequences" chapter analyzes both beneficial and adverse impacts that would result from implementing any of the alternative elements described in this Draft Supplemental Winter Use Plan / Environmental Impact Statement (draft plan/SEIS). In addition, this chapter includes a summary of laws and policies relevant to each impact topic, intensity definitions (negligible, minor, moderate, and major) and methods used to analyze the direct, indirect, and cumulative impacts. As required by the Council on Environmental Quality (CEQ) regulations implementing the National Environmental Policy Act (NEPA), a summary of the environmental consequences for each alternative is provided in table 10, which can be found in the "Alternatives" chapter. The resource topics presented in this chapter, and the organization of these topics, correspond to the resource discussions contained in the "Affected Environment" chapter.

For a complete discussion of guiding authorities, refer to the section titled "Related Laws, Policies, Plans, and Constraints" in the "Purpose of and Need for Action" chapter.

In addition to the related laws, plans and constraints discussed in chapter 1, section 4.5 of the Director's Order 12 Handbook (NPS 2001) adds to this guidance by stating, "when it is not possible to modify alternatives to eliminate an activity with unknown or uncertain potential impacts, and such information is essential to making a well-reasoned decision, the National Park Service (NPS) will follow the provisions of the CEQ regulations (40 CFR 1502.22)." In summary, the NPS must state in an environmental assessment or impact statement (1) whether such information is incomplete or unavailable; (2) the relevance of the incomplete or unavailable information to evaluating reasonably foreseeable significant adverse impacts on the human environment; (3) a summary of existing credible scientific evidence which is relevant to evaluating the reasonably foreseeable significant adverse impacts on the human environment, and; (4) an evaluation of such impacts based on theoretical approaches or research methods generally accepted in the scientific community. Collectively, these guiding laws and corresponding regulations provide a framework and process for evaluating the impacts of the alternatives considered in this draft plan/SEIS.

GENERAL ASSUMPTIONS

Several guiding assumptions were made to provide context for this analysis. These assumptions are described below.

ANALYSIS PERIOD

For all alternatives, the analysis period is 20 years.

When referring to the level of oversnow vehicle (OSV) use in the park, the timeline (table 37) has been broken into historic use levels (pre-2004), recent use (2004–2009), and the latest winter season for which the park has data (2011/2012 winter season). Because the level of winter use permitted has varied over the years, the analysis of the alternatives discusses various levels of use when referring to past use levels. Table 36 provides the average and peak use levels for OSV during these periods.

TABLE 37: OSV USE LEVELS REFERRED TO IN THE ANALYSIS

	Snowmobiles	Snowcoaches
Historic (pre-2004) Average	765	15
Historic (pre-2004) Peak	1457	35
Recent Use (2004–2009) Average	258	30
Recent Use (2004–2009) Peak	557	60
Last season 2011/2012 Average	188	35
Last season 2011/2012 Peak	261	56
Use Limits by Alternative		
Alternative 1	0	0
Alternative 2	318	78
Alternative 3	318 until phaseout, 0 after phaseout	78 until phaseout, 120 after phaseout
Alternative 4	480 maximum 342 average	106 maximum (if no events are used for guided snowmobiles) 60 (if maximum snowmobile events are used)
Alternative 4: All Snowmobiles and Snowcoaches Meeting enhanced BAT	480 Maximum 368 Average	212 maximum (if no events are used for guided snowmobiles) 120 (if maximum snowmobile events are used)

Historic average and peak (1992–2000) was from the 2000 Environmental Impact Statement (EIS) page G-3 (NPS 2000b).

GEOGRAPHIC AREA EVALUATED FOR IMPACTS

The general geographic study area for this draft plan/SEIS is Yellowstone National Park in its entirety. However, the area of analysis is based on the affected resource topic and may vary in area including areas beyond the boundaries of the park as applicable.

TYPE OF IMPACTS

The following general assumptions are used for all impact topics.

- Direct: Impacts would occur as a direct result of winter use management actions.
- Indirect: Impacts would occur from winter use management actions but would occur later in time or farther removed in distance.
- Beneficial: A positive change in the condition or appearance of the resource or a change that moves the resource toward a desired condition.
- Adverse: A negative change to the appearance or condition of the resource.
- Cumulative: Impacts that occur from past, present, and reasonably foreseeable future actions.

DURATION OF IMPACTS

Where the duration varies for an impact topic, it has been noted in the section "Assumptions, Methodology, and Intensity Definitions."

- Short term: Impacts would be temporary (i.e., they would occur for a matter of hours up to weeks at a time), and would generally last no longer than one season, without lasting effects.
- Long term: Impacts would be continuous throughout the life of the plan, potentially occurring every winter, with potentially permanent effects.

INTENSITY DEFINITIONS

The terms "impact" and "effect" are used interchangeably throughout this document. The impacts are qualitatively and quantitatively assessed using definitions that provide the reader with an idea of the intensity of a given impact on a specific topic. The intensity definition is determined primarily by comparing the effect to a relevant standard based on applicable or relevant/appropriate regulations or guidance, scientific literature and research, or best professional judgment. Because intensity definitions vary by impact topic, they are provided separately for each impact topic analyzed in this document. Intensity definitions provided throughout the analysis are characterized as negligible, minor, moderate, or major. Except for the wildlife and wildlife habitat topic, the intensity definitions are provided for adverse impacts, and beneficial impacts are addressed qualitatively.

FORMAT OF THE ANALYSIS

For each impact topic, the assumptions, methodology, and intensity definitions (described above) for that topic are presented first to provide context for how the resource topic was evaluated. This framework for analysis is followed by a summary of impacts that provides an overview of the analysis that was performed. Each alternative was analyzed against a condition with no winter use, or alternative 1. Comparisons to recent use levels are for illustrative purposes only. The summary is then followed by the detailed impact analysis for each alternative.

NUMBER OF TRANSPORTATION EVENTS

For purposes of comparing the alternatives, the discussion of the maximum number of OSVs allowed under alternatives 2 and 3 includes not only the numbers of OSV allowed daily, but the number of transportation events that those use levels could result in. The following assumptions were made regarding the number of transportation events under each alternative.

- Alternative 2 would allow for up to 318 snowmobiles and 78 snowcoaches each day. Based on average group size over the past three winter seasons of 7 snowmobiles per group, on average this would result in 123 transportation events daily (45 snowmobiles groups consisting of approximately 7 snowmobiles each + 78 snowcoaches). As there is no minimum group size under alternative 2, the maximum number of transportation events daily could be as many as 237. This would occur if each snowmobile group entering the park consisted of one visitor and one guide and all 78 snowmobile allocations were utilized.
- Alternative 3 would initially have the same number of snowmobiles and snowcoaches as alternative 2, and therefore the same number of transportation events (average of 123, maximum of 237). After the transition to all snowcoaches (completed by start of 2020/2021 winter season), there would be up to 120 transportation events each day, one event for each snowcoach permitted.

- Alternative 4 would permit up to 110 transportation events daily. Should OSVs meet additional environmental performance standards, known as enhanced BAT (E-BAT), the sum number of vehicles permitted per group would increase from one to two snowcoaches per event and from an seasonal average of 7 to 8 per snowmobile group but the overall total number of transportation events (110) allowed daily would remain the same.

CUMULATIVE IMPACTS

The CEQ regulations for implementing NEPA require the assessment of cumulative impacts in the decision-making process for federal projects. Cumulative impacts are defined as "the impact on the environment which results from the incremental impact of the action when added to other past, present, and reasonably foreseeable future actions regardless of what agency (federal or non-federal) or person undertakes such other actions" (40 CFR 1508.7). Cumulative impacts are considered for all alternatives, including the no-action alternative.

Cumulative impacts were determined by combining the impacts of the alternative being considered with other past, present, and reasonably foreseeable future actions. Therefore, it was necessary to identify other ongoing or reasonably foreseeable future projects and plans at the park and, if applicable, the surrounding region. Past actions are those that have been occurring since winter use planning efforts began in 1990 and reasonably foreseeable future projects are those that would occur within the life of the plan. Following CEQ guidance, past actions were included, "to the extent that they are relevant and useful in analyzing whether the reasonably foreseeable effects of the agency proposal for the actions and its alternatives may have a continuing, additive, and significant relationship to those effects" (CEQ 2005).

Table 38 summarizes the actions that could affect the various resources at the park. These actions are described in more detail in the "Related Laws, Policies, Plans, and Constraints" section of this document (see chapter 1).

The analysis of cumulative impacts was accomplished using four steps:

Step 1 — Identify Resources Affected

Fully identify resources affected by any of the alternatives. These include the resources addressed as impact topics in chapters 3 and 4 of this document.

Step 2 — Set Boundaries

Identify an appropriate spatial and temporal boundary for each resource. The temporal boundaries are noted above and the spatial boundary for each resource topic is listed under each topic.

Step 3 — Identify Cumulative Action Scenario

Determine which past, present, and reasonably foreseeable future actions to include with each resource. Reasonably foreseeable future actions include those federal and non-federal activities not yet undertaken, but sufficiently likely to occur, that a reasonable official of ordinary prudence would take such activities into account in reaching a decision. These activities include, but are not limited to, activities for which there are existing decisions, funding, or proposals identified. Reasonably foreseeable future actions do not include those actions that are highly speculative or indefinite (43 CFR 46.30).

Past, present and reasonably foreseeable future actions are listed in table 38 and described in chapter 1.

Step 4 — Cumulative Impact Analysis

Summarize impacts of these other actions plus impacts of the proposed action (the alternative being evaluated, to arrive at the total cumulative impact. This analysis is included for each resource in chapter 4.

TABLE 38: CUMULATIVE IMPACT SCENARIO

Impact Topic	Study Area	Past Actions	Present Actions	Reasonably Foreseeable Future Actions
Wildlife and Wildlife Habitat, including Rare, Unique, Threatened, or Endangered Species, and Species of Concern	Park boundary, plus adjacent land	Reconstruction of east entrance road (completed 2010) Construction of west entrance road (completed 2008) Development (2000) and implementation of the Interagency Bison Management Plan (IBMP) Development and implementation of the Northern Rockies Lynx Management Direction FEIS and Amendments (2007) Development and implementation of the Gallatin National Forest Travel Plan revision (2006) Timber harvest on national forest lands Consolidation of checkerboard lands in the Gallatin National Forest Development and implementation of the Beartooth District of Custer National Forest Travel Management Plan (2008) Reclamation of historic mines above Cooke City Active population management of bison and elk herds by the NPS Reintroductions of gray wolves to the greater Yellowstone area	Operation of new facilities at the west entrance Implementation of the IBMP Implementation of the Northern Rockies Lynx Management Direction FEIS and Amendments (2007) Implementation of the Gallatin National Forest Travel Plan revision (2006) Timber harvest on national forest lands Consolidation of checkerboard lands in the Gallatin National Forest Implementation of the Beartooth District of Custer National Forest Travel Management Plan (2008) Gardiner Basin and Cutler Meadows restoration (currently in progress) Reclamation of McClaren Mine tailings (currently in progress) (MTDEQ 2010b) Development of the EIS for remote vaccine delivery for bison	Operation of new facilities at the west entrance Implementation of the IBMP Implementation of the Northern Rockies Lynx Management Direction FEIS and Amendments (2007) Implementation of the Gallatin National Forest Travel Plan revision (2006) Timber harvest on national forest lands Implementation of the Beartooth District of Custer National Forest Travel Management Plan (2008) Implementation of remote vaccine delivery EIS for bison

Impact Topic	Study Area	Past Actions	Present Actions	Reasonably Foreseeable Future Actions
Air Quality	Park boundary, plus adjacent land	Reconstruction of east entrance road (completed 2010) Development and implementation of the Gallatin National Forest Travel Plan revision (2006) Consolidation of checkerboard lands in the Gallatin National Forest. Development and implementation of the Beartooth District of Custer National Forest Travel Management Plan (2008) Oil and gas leasing	Implementation of the Gallatin National Forest Travel Plan revision (2006) Consolidation of checkerboard lands in the Gallatin National Forest Implementation of the Beartooth District of Custer National Forest Travel Management Plan (2008) Oil and gas leasing	Implementation of the Gallatin National Forest Travel Plan revision (2006) Implementation of the Beartooth District of Custer National Forest Travel Management Plan (2008) Oil and gas leasing
Soundscapes and the Acoustic Environment	Park boundary	Reconstruction of east entrance road (completed 2010) Development and implementation of the Gallatin National Forest Travel Plan revision (2006) Development and implementation of the Beartooth District of Custer National Forest Travel Management Plan (2008) Consolidation of checkerboard lands in the Gallatin National Forest Overflights	Implementation of the Gallatin National Forest Travel Plan revision (2006) Implementation of the Beartooth District of Custer National Forest Travel Management Plan (2008) Consolidation of checkerboard lands in the Gallatin National Forest Overflights	Implementation of the Gallatin National Forest Travel Plan revision (2006) Implementation of the Beartooth District of Custer National Forest Travel Management Plan (2008) Overflights
Visitor Use, Experience, and Accessibility	Park boundary, plus adjacent land	Construction of new west entrance (completed 2008) Reconstruction of east entrance road (completed 2010)	Operation of new facilities at the west entrance Other winter use (outside of OSV use) activities occurring in the park	Operation of new facilities at the west entrance Other winter use (outside of OSV use) activities occurring in the park
Health and Safety	Park boundary	Construction of new west entrance (completed 2008) Reconstruction of east entrance road (completed 2010) Consolidation of checkerboard lands in the Gallatin National Forest	Operation of new facilities at the west entrance Consolidation of checkerboard lands on the Gallatin National Forest	Operation of new facilities at the west entrance

Impact Topic	Study Area	Past Actions	Present Actions	Reasonably Foreseeable Future Actions
Socioeconomic Values	Park boundary	Construction of new west entrance (completed 2008) Reconstruction of east entrance road (completed 2010) Development and implementation of the Gallatin National Forest Travel Plan revision (2006) Development and implementation of the Beartooth District of Custer National Forest Travel Management Plan (2008) Consolidation of checkerboard lands in the Gallatin National Forest Timber harvest on national forest lands Oil and gas leasing Reopening of the Sleeping Giant Ski Area near Yellowstone's east entrance (reopened in 2009)	Operation of new facilities at the west entrance Implementation of the Gallatin National Forest Travel Plan revision (2006) Implementation of the Beartooth District of Custer National Forest Travel Management Plan (2008) Consolidation of checkerboard lands in the Gallatin National Forest Operation of the Sleeping Giant Ski Area	Operation of new facilities at the west entrance Implementation of the Gallatin National Forest Travel Plan revision (2006) Implementation of the Beartooth District of Custer National Forest Travel Management Plan (2008) Operation of the Sleeping Giant Ski Area Rendezvous Ski Trail development plan
Park Operations and Management	Park boundary	Construction of new west entrance (completed 2008) Reconstruction of east entrance road (completed 2010)	Operation of new facilities at the west entrance	Operation of new facilities at the west entrance

WILDLIFE AND WILDLIFE HABITAT, INCLUDING RARE, UNIQUE, THREATENED, OR ENDANGERED SPECIES, AND SPECIES OF CONCERN

GUIDING REGULATIONS AND POLICIES

Servicewide NPS regulations and policies, including the NPS Organic Act of 1916, NPS *Management Policies 2006* (NPS 2006a), and the NPS Natural Resource Management Reference Manual 77 (NPS 2011c), direct national parks to provide for the protection of park resources. The Organic Act directs national parks to conserve "wild life" unimpaired for future generations and is interpreted to mean that native animal and plant life is to be protected and perpetuated as part of a park unit's natural ecosystem.

The NPS *Management Policies 2006* state that the NPS "will maintain as parts of the natural ecosystems of parks all plants and animals native to park ecosystems. The term 'plants and animals' refers to all five of the commonly recognized kingdoms of living things and includes such groups as flowering plants, ferns, mosses, lichens, algae, fungi, bacteria, mammals, birds, reptiles, amphibians,

fishes, insects, worms, crustaceans, and microscopic plants or animals" (NPS 2006a). The NPS will achieve this by

- Preserving and restoring the natural abundances, diversities, dynamics, distributions, habitats, and behaviors of native plant and animal populations and the communities and ecosystems in which they occur
- Restoring native plant and animal populations in parks when they have been extirpated by past human-caused actions
- Minimizing human impacts on native plants, animals, populations, communities, and ecosystems, and the processes that sustain them (NPS 2006a).

Section 4.1 of NPS *Management Policies 2006* (NPS 2006a) states,

> Natural resources will be managed to preserve fundamental physical and biological processes, as well as individual species, features, and plant and animal communities. The Service will not attempt to solely preserve individual species (except threatened or endangered species) or individual natural processes; rather, it will try to maintain all the components and processes of naturally evolving park ecosystems, including the natural abundance, diversity, and genetic and ecological integrity of the plant and animal species native to those ecosystems.

The NPS adheres to the North American Wildlife Conservation Model, which focuses on the health and management of wildlife populations. Overall, the goal of the NPS is to minimize human impacts (including impacts to individual wildlife) and avoid significant effects from disturbance to the abundance, diversity, dynamics, distributions, habitats, and behaviors of wildlife populations and the communities and ecosystems in which they occur, pursuant to 36 CFR 2.18 and NPS *Management Policies 2006*, section 4.4.1. Although the focus of the impact analysis is predominantly the impacts to wildlife populations, the NPS acknowledges that adverse impacts to individual animals would likely occur and seeks to minimize them. In addition to NPS management policies, federally listed species in national parks are protected by the Endangered Species Act (ESA). The ESA (16 USC 1531 et seq.) mandates all federal agencies consider the potential effects of their actions on species listed as threatened or endangered. If the NPS determines that an action may affect a federally listed species, consultation with the U.S. Fish and Wildlife Service (USFWS) is required to ensure that the action would not jeopardize the species' continued existence or result in the destruction or adverse modification of critical habitat. NPS *Management Policies 2006* state that the NPS will survey for, protect, and strive to recover all species native to NPS units that are listed under the ESA, and proactively conserve listed species and prevent detrimental effects on these species (NPS 2006a, Section 4.4.2.3). NPS *Management Policies 2006* also state that "[the NPS will] manage state and locally listed species in a manner similar to its treatment of federally listed species to the greatest extent possible" (NPS 2006a, Section 4.4.2.3).

ASSUMPTIONS, METHODOLOGY, AND INTENSITY DEFINITIONS

Assumptions and Methodology

The impact analysis for wildlife and wildlife habitats was conducted separately for species that represent prominent aspects of the winter experience of Yellowstone, and for other species of special management interest. Other species that may be impacted, but at no more than a minor level, are discussed under "Issues and Impact Topics Considered but Dismissed from Further Analysis." For each species, specific assumptions are provided; the impacts to the species from specific indicators are

detailed. Impact findings for all species draw from the Scientific Assessment of Yellowstone National Park Winter Use (available at the Yellowstone Winter Use website at http://www.nps.gov/yell/planyourvisit/winteruse.htm and the Planning, Environment, and Public Comment (PEPC) website at http://parkplanning.nps.gov/yell) as well as other available literature.

When determining impacts under the following alternatives, the data used were generally collected from ongoing monitoring of the bison and elk in Yellowstone rather than through modeling or simulation. However, modeling or simulation are useful tools by which to discuss the long-term implications of certain alternatives, and therefore modeling results are included when useful or applicable.

Intensity Definitions

Negligible: There would be no observable or measurable impacts of consequence to individual native species, populations, or their habitats.

Minor: Impacts on individual native species, populations, or their habitats would occur but would not be readily apparent. Responses by relatively few individuals could be expected. Some impacts might occur during feeding, reproduction, or other critical periods for a species, but would not result in injury or mortality. Small changes to local population numbers, population structure, and other demographic factors might occur but would be difficult to discern from natural population fluctuations. Sufficient habitat in the park would remain functional to maintain a sustainable population in the park.

Moderate: Impacts on individual native species, populations, or their habitats would be small but readily apparent. Responses by individuals could be expected, with some negative impacts during feeding, reproduction, or other critical periods or in key habitats in the park and result in harassment, injury, or mortality to one or more individuals. However, sufficient population numbers and habitat in the park would remain functional to maintain a sustainable population in the park.

Major: Impacts on individual native species, populations, or their habitats would be large-scale and readily apparent. Responses by many individuals would be expected, with negative impacts during feeding, reproduction, or other critical periods or in key habitats in the park. Impacts would occur during critical periods of reproduction or in key habitats in the park and result in direct mortality or loss of habitat. Local population numbers, population structure, and other demographic factors might experience large-scale declines.

Study Area

The study area for assessment of the various alternatives is the park. The study area for the cumulative impacts analysis is the park plus the lands adjacent to the park's boundaries.

SUMMARY OF IMPACTS (ALL SPECIES)

Impacts of actions to wildlife species proposed in each alternative were analyzed below based on four major concerns: displacement impacts (e.g., forced from preferred feeding areas); behavioral responses of wildlife groups to OSVs and associated human activities; physiological responses of individuals to OSVs and associated human activities; and demographic effects at the population level. Each wildlife species section starts with an overall summary of each of the major concern topics and corresponding effects on wildlife, followed by a detailed impact analysis of each alternative.

- Alternative 1 would greatly reduce OSV use in the park, allowing only administrative OSV use. With the reduction in use, no observable impact would occur to the wildlife species analyzed (bison, elk, trumpeter swans, eagles, lynx, wolverines, and wolves); therefore, impacts would be short- and long-term, negligible, adverse for all species under alternative 1. Impacts to lynx and wolverines would be long-term beneficial due to the absence of OSV use and only occasional backcountry skier use at the east entrance.
- Alternative 2 would allow for use levels similar to those allowed under the 2009 to 2012 interim regulations (up to 318 snowmobiles and 78 snowcoaches – an average of 123 daily transportation events, with a possible maximum of 237 daily transportation events) with best available technology (BAT) requirements, guiding regulations, speed limits, and restrictions on OSV access to park roads only. Continued monitoring and assessment would allow for additional changes in use to be established should impacts greater than those predicted in this draft plan/SEIS be observed. Overall impacts under alternative 2 would be short and long-term minor to moderate adverse for bison and elk, because encounters with OSVs would occur, but would not cause population-level impacts. Impacts to lynx and wolverines would be long-term minor adverse because OSV use near the east entrance would be limited to five groups of OSVs a day, reducing the potential for encounters with OSVs, where these two species are known to occur. If these species were to travel outside of the eastern sector of the park, impacts could be long-term moderate adverse due to the possibility of more frequent encounters with OSVs. Trumpeter swans, eagles, and wolves would experience short- to long-term negligible to minor adverse impacts because OSV management, including guiding requirements and use restrictions, would limit encounters between OSVs and these species.
- Under alternative 3, daily use levels would be the same as under alternative 2, but would transition from 318 guided snowmobiles and 78 guided snowcoaches to 0 snowmobiles and 120 guided snowcoaches, after a 3-year phaseout period of snowmobiles once snowcoaches meet BAT requirements (starting the winter season of 2017/2018). Initially the number of transportation events under alternative 3 would be the same as alternative 2, and then reduce to a maximum of 120 transportation events daily. The existing data suggest that a snowcoach may elicit stronger bison and elk behavioral responses than snowmobiles. Therefore, restricting OSVs to just guided snowcoaches would not eliminate adverse effects on wildlife. Under alternative 3, impacts on bison and elk would be short and long-term minor adverse due to the lower number of OSVs in the park. This level of impact would be less than the expected minor to moderate impacts expected under the current level of OSV use (i.e., alternative 2). Impacts to lynx and wolverines would be short-and long-term negligible to minor adverse because the level of OSV use would be expected to have few impacts on reproductive success, dispersal, and overall genetic sustainability of the species, with long-term beneficial impacts from the removal of human presence at Sylvan Pass. Trumpeter swans and eagles would experience short- to long-term negligible adverse impacts and wolves would experience short- to long-term negligible to minor adverse impacts, because OSV management, including guiding requirements and low use limits, would limit encounters between OSVs and these species.

- Alternative 4 would allow for a maximum of 110 transportation events each day; however, no more than 50 events could be snowmobile groups. The daily make-up and number of OSVs in the park could range from zero to 480 snowmobiles and 60 snowcoaches to 106 snowcoaches. At maximum daily snowmobile use, OSVs could increase to a maximum of 540 OSVs (480 snowmobiles and 60 snowcoaches) an increase over existing conditions that allow for 396 OSV (318 snowmobiles and 78 snowcoaches). Should OSVs meet additional environmental performance standards, known as enhanced BAT, each transportation event size would be able to increase (up to two snowcoaches and eight snowmobiles per event), but the overall number of events (110) would remain the same. Allowing two enhanced BAT snowcoaches per transportation event would double the visitor capacity while holding noise impacts constant. Overall impacts from snowcoaches may increase slightly, but would be expected to be similar to pre-increase (non-enhanced BAT) levels because the snowcoaches would travel two to a group in close proximity and act as one "event." Alternative 4 would allow for up to four noncommercially guided snowmobile groups daily. Noncommercial guides would receive guide training; therefore, it is assumed that there would be no difference in impacts between commercial and noncommercial guides. Given that this is the first time noncommercially guided tours would be allowed, noncommercial guides would be clearly marked and would be required to comply with all park requirements and regulations. Compliance with park regulations would be monitored by park law enforcement. Should impacts increase to the resource or infractions of regulations occur under the noncommercial guided program, this program would be altered or ceased.
- Continued monitoring and assessment would allow for the additional changes to use if impacts greater than those predicted in this draft plan/SEIS are observed. Overall, alternative 4 would result in short- and long-term minor to moderate adverse impacts for bison and elk because there would be encounters between the animals and OSVs. Alternative 4 would result in long-term minor adverse impacts to lynx and wolverine because of continued OSV use at Sylvan Pass in the eastern sector, where these two species are known to occur. If these species travel outside of the eastern sector of the park, long-term moderate adverse impacts could result from the possibility of more frequent encounters with OSVs. Trumpeter swans, eagles, and wolves would experience short- to long-term negligible to minor adverse impacts because OSV management, including commercial guiding requirements and use restrictions, would limit encounters between OSVs and these species.

DETAILED IMPACT ANALYSIS

BISON AND ELK

Bison and elk are large ungulates with herds that winter in the park. These two species are more frequently encountered by OSV users than other wildlife species in the park. Both species are readily observed by OSVs and provide ample opportunities for wildlife viewing. These species are combined for analysis because they are similar in habitat preference, winter in Yellowstone's north and central ranges, are herbivorous, are active and mobile during winter, and have been extensively analyzed in relation to winter use.

General Description of Potential Impacts

Displacement of Bison and Elk

As discussed in chapter 3, elk and bison displacement due to OSV use in the park appears to be localized and short term. Even during the highest historical OSV use levels in the park, bison and elk continued to occupy their historical winter range in the Madison and Firehole drainages of Yellowstone. Consequently, the following analyses assume that increases in OSV use would cause short-term localized displacement, but not long-term displacement, in large part because the winter use season lasts less than 90 days. Also, as discussed in chapter 3, particularly in regard to bison, this analysis proceeded with the understanding that groomed roads are not the primary factor influencing bison population dynamics or westward range expansion of bison.

When wildlife is frequently disturbed, animals may demonstrate fewer visible responses to disturbance. It can be difficult to assess whether this represents a diminished impact, because the animals have become "habituated" or accustomed to the disturbance, or if impacts are still occurring but the animals are unable to do anything about it. Animals may tolerate disturbance without response because the activity is too important to interrupt, or because their energy supplies are so limited that they cannot afford a response. Behavioral responses depend upon species, sex, age, behavioral context, nutritional status, resource availability, time of year, animal group size, and predation pressure. An animal's decision to move from a disturbed area depends on a number of factors including the quality of the site, distance to and quality of other sites, relative risk of predation or competition, dominance rank, and investment a given individual has made in its current site."

Behavioral Responses of Bison and Elk

Bison and elk behavioral responses to OSVs in Yellowstone suggest some level of habituation. The level and frequency of observed responses to OSVs are lower than those demonstrated by bison, elk, and other ungulates in areas of North America outside Yellowstone (White et al. 2009; Hardy 2001). These responses are species-specific, and comparison of Yellowstone's bison and elk to other ungulates, or to elk or bison in parks with more variable use or different levels of use is difficult For example, Yellowstone's elk exhibited an increase in the likelihood of a vigilance response as cumulative OSV traffic increased over the course of a winter. In contrast, the likelihood of a vigilance response by bison decreased in winters with high visitation. Movement responses by both bison and elk appeared unchanged at 8–9 percent of observed interactions (White et al. 2009).

A predictable daily pattern of OSV use, such as that which occurs with guided OSV use, would be more likely to decrease overall behavioral responses by bison and elk throughout the winter, because animals are more likely to become habituated to a disturbance if it is predictable in time and space, not directly harmful, and limited in duration (Thompson and Henderson 1998; White et al. 2009). Also, the frequency of exposure to OSV disturbance (which may increase with higher allowable use limits) is an important consideration when assessing the likelihood of habituation, because there appears to be a threshold of disturbance at which wildlife are no longer able to habituate (White and Thurow 1985; Steidl and Anthony 2000). This threshold is generally species-specific and may be reached more quickly if a disturbance is novel, represents a greater threat, or occurs during a time of additional stress, such as increased predation pressure, harsh winters, or low food availability.

An issue raised by commenters in past planning processes is that OSV numbers under the action alternatives would exceed those recommended by wildlife biologists. That is not the case. The current definitive report on this topic is the peer reviewed scientific article entitled "Behavioral Responses of

Bison and Elk in Yellowstone to Snowmobiles and Snow Coaches" (Borkowski et al. 2006) (P.J. White memo of Oct 14, 2009). Borkowski et al. (2006) make it clear that the cumulative monitoring period they are referring to is from 1999–2004 that included average daily OSV use up to 593 per day (2002), maximum daily numbers extended up to 1,874 OSVs (2001), and cumulative OSV entries for the winter season at the west entrance alone up to 46,885 (2002). The results of this paper are considered in the following impact analysis.

Behavioral data indicate that more recreationists produce behavioral responses in a larger number of individual animals, a data-based assumption that is carried forward in the following analyses (White et al. 2009). Guiding requirements directly mitigate wildlife impacts by reducing the number of interactions that result in intense, energetically expensive responses by wildlife. Reducing these interactions also helps foster habituation, in which wildlife reduce their responses because they no longer perceive OSV traffic as a serious threat (NPS 2008a). Guides may be able to recognize and minimize those situations where two or more factors such as distance of the wildlife group to the road and interaction time, may increase wildlife stress and exacerbate behavioral responses. Under all action alternatives, 100% guiding would be required, with alternative 4 allowing for a small number of these guides to be noncommercial. Noncommercial guides would receive guide training. The training would address how to handle interactions with wildlife and the rules regarding wildlife in the park. Therefore, this analysis assumes that generally there would be no difference between the use of commercial and noncommercial guides except that noncommercial guides may have less reliable use patterns and less park guiding experience. In contrast, commercial guides would likely have the benefit of repeated experience in the park. All guides would be monitored by park law enforcement, who would ensure they are complying with all regulations and requirements.

Physiological Reponses of Bison and Elk

The majority of responses by wildlife documented in Yellowstone have been low-intensity vigilance (look and resume) or, more rarely, sustained movement (travel) (Borkowski et al. 2006; White et al. 2009). The fact that an animal exhibits no visible external responses does not mean physiological responses are absent. Apparent habituation, as demonstrated by behavioral studies on bison and elk, may be due to an array of other factors resulting in decreases in visible response. These other factors may adversely affect bison or elk heart rate, stress levels, habitat use, and foraging time. No comprehensive studies have analyzed the energetic effects of bison and elk behavioral responses to OSVs in Yellowstone, due in part to the difficulties associated with separating the energetic costs associated specifically with responses to OSVs from the total daily energy expenditure (Borkowski et al. 2006). Numerous assumptions are required when making energy analyses, and poorly defined parameter estimates can strongly affect research and outcomes. Despite apparent low-level behavioral responses, associated physiological responses by bison and elk could increase the potential impacts of winter stress on some animals and decrease winter survival and spring reproductive rates of animals thus affected (Gill et al. 2001). Given the difficulties with quantitatively analyzing physiological responses to recreationists by wildlife, analyses for this document were made on the qualitative but conservative assumptions that increasing levels of disturbance, including OSV traffic, would likely result in increased stress to wintering wildlife (Hardy 2001; Creel et al. 2002).

Population-level Impacts/Demographics

As discussed in chapter 3, researchers have not observed that OSV use and winter recreation in Yellowstone have affected bison and elk at the population level. An unknown number of individual bison and elk would incur adverse effects when exposed to OSV traffic, and winter recreation under the alternatives of this EIS. Behavioral monitoring (winter 1999 to winter 2009) found that 8–10 percent of bison and elk displayed active responses including travel, flight, alert-attention, and defense

(White et al. 2008). Small numbers or groups of bison and elk may be displaced, demonstrate increased physiological and stress responses and/or demonstrate increased vigilance or active movement responses. Mitigation measures listed under each alternative strive to minimize the frequency and intensity of impacts to individual animals.

Overall, based on the available science and literature and the research summarized in chapter 3, it was assumed for the following analyses that those forms of winter recreation practiced in the park may have cumulative effects on individual animals, but that such impacts have not risen to the level at which they exceed minor adverse impacts on wildlife populations in the park.

Bison and Elk Responses to Non-motorized Users

Bison and elk may occasionally respond to skiers and snowshoers; however, the overall frequency of interactions and behavioral, physiological, and/or displacement effects on bison or elk is quite low. This is primarily because few people travel far from roads, established trails, or other areas of concentrated human activity (e.g., Geyser Basin trails, Old Faithful Visitor Education Center, warming huts). Ski and snowshoe trails in Yellowstone are managed as wilderness in some areas, with groomed tracks set on only a few snow roads. The difficulties associated with non-motorized winter travel in the park (e.g., limited daylight, extreme cold and wind, poor visibility, drifted or deep snow, storms), restrict most of these users to within two miles of motorized-accessible travel corridors and restrict total daily movements of skiers or snowshoers, which further limits the potential for an encounter with bison or elk that are not also exposed to OSVs (NPS 2008a). During periods of extreme weather, areas of the park may be closed to backcountry use to protect wildlife (see chapter 2). Visitors are instructed to maintain a distance of at least 25 yards from bison and elk, and it is illegal to approach bison or elk in a way that precipitates any behavioral response (NPS 2010e). Cassirer et al. (1992) studied bison and elk responses to non-motorized users in Yellowstone backcountry areas. Their study found that elk in Yellowstone demonstrated strong flight and physiological responses to skiers who were travelling in the backcountry. However, the vast majority of winter visitors to the park travel in the front country, and do not visit the backcountry areas where this study was conducted. Thus, non-motorized users in the front country associated with OSV roads generally encounter animals that are also exposed to OSVs and associated human presence.

Wildlife encounters with and responses to pedestrians (i.e., skiers and snowshoers) were noted during monitoring studies of motorized winter recreation at Yellowstone. The monitoring focused on the area within 500 meters of OSV roads. Interactions with skiers or snowshoers accounted for less than 1 percent of all observed wildlife-human interaction events observed during the course of three winter seasons 2006/2007 to 2008/2009 (Davis et al. 2007; McClure et al. 2008; McClure et al. 2009). In contrast to the high level responses Cassirer et al. (1992) observed by elk in the backcountry, observations in the front country, along groomed road corridors, found that bison and elk never showed a visible response to skiers or snowshoers. These studies indicate that there is a higher level of response by elk to pedestrians in the backcountry that in motorized use areas during the winter and in addition interactions between OSV and elk are low; however, the sample size was very low (e.g., six observations in 2008/2009).

Wildlife response monitoring data indicate that bison or elk encounters with skiers and snowshoers were relatively infrequent along OSV routes. Encounters between non-motorized users and wildlife that occur in other areas of the park, such as along groomed ski trails or in backcountry off of the road, have not been monitored, but the number and location of these trails would not vary between alternative, and such encounters with non-motorized users in the backcountry would continue under any alternative. Researchers working outside of Yellowstone observed that non-motorized users elicit similar behavioral responses in bison compared to behavioral responses elicited by OSV users, but this

study was conducted in areas with lower visitor use levels and different use timing and intensity than that occurring at Yellowstone (Fortin and Andruskiw 2003).

Thus, although non-motorized recreationists allowed under any of the proposed alternatives may occasionally elicit movement or vigilance responses from bison and elk, and may cause associated physiological effects, the effects would be minor in the front country along OSV roads and would be infrequent in Yellowstone. Because the number of interactions between non-motorized users and wildlife along OSV roads were infrequent (less than 1 percent) compared to those between OSVs and wildlife non-motorized users are expected to have short-term negligible adverse impacts on bison and elk across all alternatives. NPS notes that effects could exceed negligible from non-motorized use in the backcounty, but would not exceed minor. Therefore, this discussion is not included separately under each alternative.

Vehicle-caused Mortality

Bison and elk OSV collision mortality during both historical and current levels of OSV use in Yellowstone is rare. Most road kill mortalities result from collisions with wheeled vehicles, and occur year-round, not just during the winter months. Few OSV-caused road kills occurred even when the level of use was higher than the current levels (up to a daily average of 950 snowmobiles) (White et al. 2008). During the winters from 1989 to 1998, when winter use was not managed, only 10 bison, 3 elk, 2 coyotes, 1 red fox, and 1 pine marten were reported killed by snowmobiles in Yellowstone. In contrast, 98 bison, 427 elk, 75 coyotes, 84 moose, and 406 other large mammals (e.g., bighorn sheep, deer, pronghorn, wolves) were killed by wheeled vehicles in Yellowstone during the winter and summer seasons from 1989 to 1998 (Gunther et al. 1998). In sum, of the total 1,080 animals killed by motorized vehicles between 1989 and 1998, only 17 animals were killed by OSVs during the winter season. No animals have ever been reported killed by snowcoaches and, since guiding requirements were established, no wildlife deaths have been reported due to collisions with OSVs. Under all action alternatives, the probability of OSVs colliding with bison or elk would be low. Therefore, the impacts to bison and elk from OSV-collision mortality would be negligible adverse under all alternatives; however, in the unlikely event that a collision occurred resulting in mortality the impact would rise to moderate adverse under all alternatives. Given that the likelihood of vehicle collisions/mortality is low, these impacts are not discussed separately under each alternative.

IMPACTS ON BISON AND ELK BY ALTERNATIVE

Impacts of Alternative 1: No Snowmobile/Snowcoach Use

Displacement of Individual Animals

Under alternative 1, OSV traffic through bison and elk ranges would be greatly reduced to a nominal level (fewer than 20 OSVs in the park per day based on administrative needs). Thus, the potential for displacement by individual animals would be decreased to nearly zero. Impacts of displacement of individual animals under alternative 1 would be localized, short-term, negligible, and adverse.

Behavioral and Physiological Responses

Under alternative 1, the number of winter use encounters, or encounters between bison and elk and OSV, would be fewer than 20 per day and the potential for bison and elk to be adversely affected or to have physiological responses would be minimized. This alternative reduces the potential for behavioral responses and would have localized short-term negligible adverse impacts.

Population-level Impacts

After the establishment of the park, bison and elk populations in Yellowstone were actively managed by the park, which attempted to keep their populations at a pre-determined level. At this time bison crossing park boundaries continue to be culled by the state of Montana and the NPS. Because there was never a time without either active management or OSV use, the overall bison and elk populations (as well as individual bison and elk) have been subject to various degrees of direct and indirect human influence since the founding of Yellowstone. Therefore, it is difficult to predict what effect, if any, the absence of groomed roads may have on bison movements. Studies show that elk do not use groomed road corridors for travel to the same extent as bison, and that elk home range and movement patterns have remained stable during the period in which winter recreation became prevalent in Yellowstone (White et al. 2009). Many of the road corridors are in locations that are natural migration paths for bison, such as along riverbanks and in valleys between steep-sided canyons. Thus, road grooming in these areas may not affect bison migration and travel routes, because self-groomed bison trail corridors would likely occur in these areas even in the absence of park roads or road grooming.

There is a vast library of research and modeling on bison population growth and westward range expansion. Most researchers have concluded that bison population growth is based primarily on the active management and culling of the park's bison population, rather than any energetic savings and associated increased survival from travel on groomed OSV routes (Bjornlie and Garrott 2001; Gates et al. 2005; Bruggeman et al. 2009a; Plumb et al. 2009; White et al. 2009). No population-level impacts on bison or elk have been documented from OSV and/or other human-caused disturbance, or the presence of groomed roads. Coughenour (2005) proposed a possible minimal decrease in bison survival, due to increased energetic costs, from travel through deep snow in the absence of groomed roads. With very little OSV travel in the park, the energetic costs associated with movement through deep snow in the absence of groomed roads may be offset by the energy savings due to reduced alert time and flight responses by bison to OSVs. Under this alternative, OSV use in the park would be minimal; therefore, bison and elk would only rarely exhibit flight behavior due to OSVs. Additionally, bison are naturally adapted to travel in deep snow and form self-groomed trails (Gates et al. 2005). Even in the absence of road grooming, many of these trails would likely overlap park roads, because park roads are multi-season wildlife travel corridors. Although it is difficult to differentiate between the additional movement costs that may be associated with travel through deep snow, and the energy savings due to lack of active movement responses, it is likely that costs and benefits would more or less balance out for bison. Therefore, population-level impacts are predicted to be long-term negligible, and adverse; any population changes due to the absence of groomed roads in the park, or to low OSV levels, would likely take place over the course of several decades. The contribution of OSV use on bison mortality is likely very low in the context of impacts of severe winter weather, and bison control measures including culling, or predation pressure.

Cumulative Impacts

Past, current, and future planning efforts by the NPS have affected bison and elk populations in Yellowstone. Prior to 1969, populations were maintained at predetermined levels by park management. These levels were met through lethal control of the herds, resulting in major, short- and long-term impacts on bison and elk. After active population management ceased, bison and elk populations grew rapidly, with approximately 3,100 bison culled by park management or the state of Montana from 1984 to 2000. In 2000, an Interagency Bison Management Plan (IBMP) endorsed by the federal government and the state of Montana, established guidelines for managing the risk of brucellosis transmission from bison to cattle. In 2008, adaptive adjustments to the IBMP were set in place to provide for additional management activities as identified below.

Bison leaving Yellowstone are currently subject to management control at the park boundary, pursuant to the 2008 adaptive adjustments to the IBMP and the 2000 IBMP (NPS 2000b, 2008b). New policies allow untested females or mixed groups of bison to migrate onto and occupy Horse Butte peninsula and the Flats each winter and during spring calving season. Controls include hazing bison back into the park in May, lethal removal, and retaining animals in facilities for brucellosis testing and eventual release or culling. If populations drop below 2,300 bison, the agencies increase implementation of non-lethal measures and, if populations drop below 2,100 bison, agencies cease lethal management and hunting and shift to non-lethal management measures. The IBMP adaptive adjustments to the 2000 IBMP (NPS 2008b) also call for an increase in bison vaccinations via completion of the EIS processes for remote delivery vaccination of bison and to use the outcome of the EIS and NEPA process to determine active management practices. The most recent IBMP "Managing the Abundance of Bison in Yellowstone National Park, Winter 2010," calls for the reduction in the bison herd of 330 animals, with selective culling as one of the management measures (Geremia, White, and Wallen 2011). The goal of the proposed Brucellosis Remote Vaccination Program for Bison is to protect Yellowstone bison by reducing brucellosis infection and, ultimately, further reduce the risk of transmission to cattle outside the park. If this program, and other measures implemented under the 2008 adaptive adjustments are successful, hazing and lethal control of Yellowstone bison that travel beyond the park's border may become unnecessary, or occur less frequently, and bison may continue the westward expansion of their range into Montana. This may have an overall positive impact on the bison population in the greater Yellowstone area and may result in increased range and forage availability, nutritional uptake, and total population growth of bison if they are allowed to access and remain in suitable habitat outside park boundaries. If bison expand their range, there may be decreased population density, and reduced mortality of new-born calves, which are currently subject to hazing (in the Horse Butte area). Decreased population density may result in better body condition and increased reproductive success of cows. However, current management practices limit any western range expansion of Yellowstone bison, which in turn limit natural density dependent dispersal of bison, and the control methods currently used have an overall long-term minor to major adverse impact on bison population and viability. Impacts from these actions would depend on the success of a long-term remote brucellosis vaccination program. Short-term impacts would be adverse, minor to major, (based on how many bison are culled each year, which is a direct result of the number of bison that leave the park, which in turn primarily depends on winter severity and the number of consecutive harsh winters). Long-term impacts may range from negligible to moderate adverse, because implementation of the remote brucellosis vaccine program would likely have some success in reducing the number of infected bison and may in the future limit or eliminate the need for culling.

The Gallatin National Forest has consolidated the checkerboard of private and public holdings in recent years, accompanied by a consolidation of private holdings, including within the Big Sky Area. It is difficult to predict the net effect of these actions on bison and elk, because the consolidated U.S. Forest Service (USFS) lands are less likely to be developed, whereas the private lands are more likely to be developed. Current actions also include reclamation of McClaren Mine tailings (MTDEQ 2010b) and Gardiner Basin and Cutler Meadows restoration. These actions would have variable effects on bison and elk, sometimes stimulating the growth of their preferred forage and habitat and sometimes limiting it, due to providing or fragmenting habitat for these species.

Future highway-and vehicle travel related plans include the Gallatin Travel Plan revision, and the Beartooth District of Custer National Forest Travel Management Plan. Whereas plans in the national forest are designed to minimize adverse impacts on wildlife, regional plans designed to increase the ease of travel for vehicles may not prioritize wildlife. Any increases in traffic, road width, and the number of roads may have long-term adverse impacts on bison and elk in the greater Yellowstone area. Additional roads and vehicles may lead to increased mortality caused by vehicle collisions, limited dispersal and travel of bison or elk to new habitat or preferred habitat locations, and habitat fragmentation. Impacts due to highway plans and road development would be long-term, ranging from minor to moderate adverse.

The reintroduction of gray wolves has contributed to decreases in the elk population in the greater Yellowstone area from the mid 1990s to the present, because elk are the primary prey of wolves in the park (White and Garrott 2005; Christianson and Creel 2010). The driving force behind the elk population decline is unclear, and the decline has been attributed to one or more factors other than wolves, including changes in vegetation, hunting, drought, and other variations in the ecosystem, with grizzly bears, rather than wolves, observed to be the primary predator of elk calves (Creel and Christianson 2008; Barber-Meyer et al. 2008). Regardless of whether they precipitated the elk population decline, the presence of wolves increases the predation pressure on elk. The presence of wolves possibly increases the behavioral and physiological responses of elk to anything perceived as a predation threat, including OSVs, humans, and sound from OSVs (Creel and Christianson 2008). Increased elk responses to winter users may increase stress levels, energy expenditure, and displacement, and decrease energy intake, potentially resulting in poorer body condition, decreased reproductive rates, and an overall decrease in survival (White et al. 2008; Creel 2009; Christianson and Creel 2010). The same is true, but to a much lesser degree, for bison. Bison calves are subject to predation by wolves (Barber et al. 2005), but wolves generally avoid attacking a full-grown bison due to risk of injury and the difficulty in taking down a large adult animal. Therefore, although impacts by wolves on elk populations are unclear, the increase in perceived predation risk may increase the behavioral and physiological responses to winter users by elk and possibly bison.

Major cumulative impacts would occur due to bison management and control measures under the IBMP, which is unrelated to direct impacts of winter use in the park. The long-term negligible to major impacts of these past, present, and reasonably foreseeable future actions, combined with the long-term negligible adverse impacts of alternative 1, would result in long-term minor to major adverse cumulative impacts on bison and elk, of which winter use activities would make up only a very small part.

Conclusion

Based on an analysis of the available data and literature regarding bison and elk in the greater Yellowstone area, the no-action alternative would result in short and long-term negligible adverse impacts on bison and elk in the park, because OSV use would be limited to minimal administrative use and non-motorized use would be more limited, resulting in no observable impacts. Human activity during the winter months would be reduced. Cumulative impacts under alternative 1 would be long-term minor to major adverse. Alternative 1 would contribute minimally to cumulative impacts because there would be no visitor OSVs in the park.

Impacts of Alternative 2: Continue Snowmobile/Snowcoach Use at 2011/2012 Winter Season Interim Regulation Limits

Displacement of Individuals

The level of OSV use under alternative 2 (up to 318 snowmobiles and 78 snowcoaches or an average of 123 daily transportation events with a maximum of 237 transportation events) would be equal to that permitted under the 2009 to 2012 interim regulations. There has not been any observed long-term displacement of bison or elk from 1969 to present, based on observations from winter seasons when similar numbers of OSVs entered the park (winter 2003 to winter 2006, when daily OSV entrance numbers were 250–300), or during winter seasons with higher levels of use prior to 2003 (average 950 OSVs per day) (White et al. 2008; McClure et al. 2009). Bison and elk have continued to use the same core winter ranges during the past three and a half decades, even when OSV use fluctuated dramatically from winter to winter (Craighead et al. 1973; Aune 1981; Hardy 2001). Thus, range-wide displacement of individual bison or elk would be unlikely under alternative 2, because conditions similar to those permitted under the 2009 to 2011 interim regulations and those currently occurring, as well as past conditions would continue (where long-term displacement of individuals has not been observed). Although bison and elk may temporarily avoid areas of OSV use, resulting in short-term displacement, these short-term responses have not caused shifts in core winter habitat use.

No large scale shifts in habitat use have been attributed to OSVs in the park. Studies looking at small-scale shifts show that, both bison and elk have demonstrated flight from OSVs or avoidance of OSV use areas, resulting in temporary shifts in habitat use by bison or elk (White et al. 2008). Although these displacement events are brief and temporary, if they occur frequently over the course of a winter they may decrease the amount of time elk (and to a lesser extent bison), have to feed and may also increase energy demands due to movement. Because elk and bison generally suffer a decline in body condition associated with increased energy demands and poorer forage quality over the course of a winter, these factors may contribute to this energy imbalance. As a result, individual bison and elk that frequently avoid preferred forage areas due to OSV use may demonstrate poorer body condition. However, despite short-term responses to OSVs, overall habitat use by bison and elk does not appear to be affected (Hardy 2001; White et al. 2008). Researchers attribute changes in distribution of elk during the winter primarily to snow mass and heterogeneity (Messer 2003). Researchers attribute changes in distribution of elk during the winter primarily to snow mass and the snow depth, snow type, and melting characteristics that are influenced by Yellowstone's many geothermal features and vary in both timing and location during Yellowstone's severe winters (Messer 2003). Researchers attribute changes in bison distribution primarily to population density, snow characteristics, drought, and other factors affecting resource availability (Bruggeman et al. 2006).

Impacts to individual bison and elk related to displacement under alternative 2 would be localized, short-term moderate adverse. Displacement events may be brief and temporary, and over the course of a winter such events may increase energy consumption by elk, and to a lesser extent, bison, potentially resulting in poorer body condition.

Behavioral and Physiological Responses

Under all action alternatives, guides would maintain buffer zones and instruct visitors to behave in a manner that minimizes the likelihood of a strong, energetically costly behavioral response by bison or elk. Based on the current managed use, guiding would also result in defined morning and evening peaks in OSV traffic, which may result in initial increased behavioral responses by ungulates during that time due to more concentrated OSV use. A predictable daily pattern of OSV use would be more likely to decrease overall behavioral responses by bison and elk throughout the winter. This is because

animals are more likely to become habituated to a disturbance if it is predictable in time and space, not directly harmful, and limited in duration (Thompson and Henderson 1998; White et al. 2008). Depending on the frequency of OSV encounters, active responses by bison and elk (which based on studies would occur during 8–9 percent of encounters (Borkowski et al. 2006; White et al. 2008) may result in relatively small energy costs to individuals. However, no adverse population-level effects would be expected, because there have been no observed impacts on population growth or demographics correlating to increased or decreased OSV use in the park over the last 38 years, including the winters from 2004 to 2012 where daily entrance numbers for OSVs (258 snowmobile and 30 snowcoaches daily, on average) were similar to those proposed under alternative 2. Peak OSV use during the winters from 2004 to 2012 was 488 snowmobiles and 55 snowcoaches, which is well above the daily limits proposed under alternative 2. Daily limits of up to 318 snowmobiles and 78 snowcoaches were not met in winter 2011/2012 after implementation of the 2009 to 2012 interim regulations, with actual averages of only 191 snowmobiles and 36 snowcoaches per day. Based on behavioral observation from winters that had similar levels of use to those proposed under alternative 2 (winters 2006 to 2009), impacts to bison and elk resulting from continued OSV levels are predicted to be localized, short-term minor adverse under alternative 2.

Population-level Impacts

Historically, researchers have not observed population-level effects for bison and elk during periods of un-guided travel, and higher daily numbers of OSVs in the park. During recent wildlife behavioral monitoring, no short-term population-level effects from OSV use were observed for bison and elk, including when an average of 795 snowmobiles and 15 snowcoaches entered the park daily (Fuller 2006; White et al. 2008). Population level impacts have not been observed under historical or recent levels of use; therefore impacts are predicted to be negligible adverse under alternative 2.

Cumulative Impacts

Impacts on bison and elk from other past, present, and reasonably foreseeable future would be the same as described for alternative 1. These impacts are a result of the variety of land and wildlife management activities occurring on lands near or adjacent to the park including Northern Rockies Lynx Management, the Gallatin National Forest and the Beartooth District of Custer National Forest travel management plans, timber harvests on adjoining lands, and reintroduction of gray wolves to the greater Yellowstone area. Within the park, these impacts are a result of active management of the park's elk and bison populations, as well as other wildlife management programs such as the plan/EIS for the remote vaccine delivery to bison. The major impacts stated are a result of bison control measures and management under the IBMP, which is unrelated to winter use in the park. The long-term negligible to major adverse impacts of these cumulative actions, when combined with the long-term minor to moderate adverse impacts of alternative 2, would result in long-term minor to major adverse cumulative impacts on these species. Implementation of alternative 2 would contribute only a small amount to the overall adverse cumulative impacts.

Conclusion

Alternative 2 would allow for use levels similar to the 2009 to 2012 interim regulations, with BAT requirements, guiding regulations, speed limits, and restrictions on OSV access to park roads only. Continued monitoring and assessment would allow for additional restrictions to be established should impacts greater than those predicted in this draft plan/SEIS are observed. Thus, overall impacts on bison and elk under alternative 2 would be short and long-term minor to moderate adverse. Cumulative impacts would be long-term minor to major adverse, of which alternative 2 would contribute minimally.

Impacts of Alternative 3: Transition to Snowcoaches meeting BAT Requirements Only

Displacement of Individuals

Snowmobiles and snowcoaches differ in size of vehicle and group size. They therefore elicit different intensity and amount of responses from bison and elk. Based on recent behavioral monitoring data and modeling, it appears that snowmobiles are more likely to elicit any visible behavioral response from bison or elk (vigilance or movement), but that snowcoaches elicit stronger levels of behavioral responses, such as movement or flight. Use of snowcoaches can reduce the total number of OSVs in the park on a daily basis, but have a higher likelihood of initiating a movement response by bison and elk.

Generally, snowmobiles and snowcoaches elicit slightly different intensities and amounts of responses from bison and elk. Based on recent behavioral monitoring data and modeling, it appears that snowmobiles are more likely to elicit a visible behavioral response from bison or elk (vigilance or movement), but that snowcoaches elicit stronger levels of behavioral responses, such as movement or flight (Borkowski et al. 2006; McClure et al. 2009; White et al. 2008). Although they differ in likelihood of response and intensity, the impacts of these OSV are comparable. Increased OSV group size also has been found to increase response, but group size in snowcoaches reached a maximum effect at three snowcoaches, after which there was no increase (White et al. 2008). Under alternative 3, individual bison and elk may still be locally displaced when snowmobiles are phased out and access is limited to snowcoaches only, but impacts would likely be small and localized under either scenario. Alternative 3, when initially implemented, would have OSV use levels (up to 318 snowmobiles and 78 snowcoaches or an average of 123 daily transportation events with a maximum of 237 transportation events) similar to those permitted under the 2009 to 2011 interim regulations and impacts during this time would be the same as alternative 2.

Once all snowcoaches meet BAT requirements (by the winter season of 2017/2018), a 3-year phaseout would begin resulting in use levels of 120 snowcoaches (or 120 transportation events) and no snowmobiles, which would represent a reduction in the total number of OSVs in the park, and a reduction in transportation events, on a daily basis compared to both the current daily average and current permitted level of use. With the implementation of BAT requirements the total time the animals are exposed to OSV related sounds would likely be reduced slightly. Although snowcoaches have a higher likelihood of initiating a movement response by bison and elk, the total number of OSV groups would be similar to that occurring under the 2009 to 2011 interim regulations. Therefore, impacts under alternative 3 are predicted to be localized, short-term minor to moderate adverse. These impacts would be similar to those occurring under alternative 2. When the transition to snowcoaches occurs, both the number of OSVs and transportation events in the park would be less than those permitted under the 2009 to 2011 interim regulations (alternative 2), likely resulting in similar or reduced movement and associated displacement effects.

Behavioral and Physiological Responses

Behavioral and physiological responses by individual bison and elk would still occur under alternative 3, but such effects are predicted to be long-term minor adverse. This is because, until the phaseout occurs, the frequency of encounters between OSVs would be the same as alternative 2. Based on recent behavioral monitoring data and modeling, it appears that snowmobiles are more likely to elicit a visible behavioral response from bison or elk but snowcoaches elicit stronger levels of behavioral responses, such as movement or flight (Borkowski et al. 2006; McClure et al. 2009; White et al. 2008). Recent behavioral observations found that bison and elk demonstrate a movement response

during 8–9 percent of encounters with snowcoaches (Borkowski et al. 2006; White et al. 2008), which may result in minor to moderate energy costs to individuals. However, no adverse population-level effects would be expected because there have been no observed impacts on population growth or demographics correlating to increased or decreased OSV use in the park over the last 38 years. Behavioral responses and associated physiological effects resulting from exposure to human disturbance would result in localized, short-term minor adverse impacts.

Population-level Impacts

No population-level effects from OSV use have been observed for bison and elk historically, including when an average of 795 snowmobiles and 15 snowcoaches entered the park daily (greater than the level proposed under alternative 3) (Fuller 2006; White et al. 2008). Simulation indicates that long-term population-level impacts could occur due to the presence of groomed roads (Coughenour 2005). However, most researchers have concluded that bison population growth is based primarily on active management and culling of the park's bison population, rather than any energetic savings and associated increased survival from travel on groomed OSV routes (Bjornlie and Garrott 2001; Gates et al. 2005; Bruggeman et al. 2009a; Plumb et al. 2009; White et al. 2008). Behavioral response monitoring indicates movement responses in 8–9 percent of bison and elk observed, and these active travel and flight behaviors may result in small-scale displacement and increased energy expenditure. There have been no data indicating that these responses have resulted in observable impacts on population, but impacts to individuals that eventually lead to population-level impacts may occur over time, or with especially severe winters. Population-level impacts are predicted to be long-term minor adverse under alternative 3, because of the long-term impacts that could occur due to behavioral responses, potentially resulting in small-scale displacement that may lead to observable impacts on the population.

Cumulative Impacts

Impacts on bison and elk from other past, present, and reasonably foreseeable future actions would be the same as described for alternative 1. These impacts are a result of the variety of land and wildlife management activities occurring on lands near or adjacent to the park including Northern Rockies Lynx Management, the Gallatin National Forest and the Beartooth District of Custer National Forest travel management plans, timber harvests on adjoining lands, and reintroduction of gray wolves to the greater Yellowstone area. Within the park, these impacts are a result of active management of the park's elk and bison populations, as well as other wildlife management programs such as the plan/EIS for the remote vaccine delivery to bison. The major impacts stated are a result of bison control measures and management under the IBMP, which is unrelated to winter use in the park. These long-term negligible to major adverse impacts, when combined with the short and long-term minor to moderate adverse impacts of alternative 3 would result in long-term minor to major adverse cumulative impacts. Alternative 3 would contribute little to the cumulative impacts on bison and elk due to low OSV numbers.

Conclusion

The existing data suggest that while intensity and amount of impact to elk and bison from snowmobiles and snowcoaches differ, overall the impact of these OSVs on elk and bison is comparable. Thus, restricting OSVs to just snowcoaches would not eliminate adverse effects on wildlife. However, the available literature on bison and elk indicate that lower OSV numbers reduce wildlife displacement, behavior or physiology-related energy costs, and the potential for adverse demographic impacts, resulting in short and long-term minor to moderate adverse impacts.

Cumulative impacts on bison and elk under alternative 3 would be long-term minor to major adverse, to which alternative 3 would contribute only a small amount.

Impacts of Alternative 4: Manage OSV use by Transportation Events

Displacement of Individuals

Impacts related to displacement of individuals would generally be similar to those described for alternatives 2 and 3, but would be lower because the number of transportation events in the park on a daily basis would be reduced. Alternative 4 would manage OSV use in the park based on transportation events. One event would initially equal one group of snowmobiles (maximum of 10 per group, an average of 7 over the winter season) or one snowcoach. A maximum of 110 transportation events would be allowed each day; however, no more than 50 events could be snowmobile groups. Forty-six of the snowmobile events would be guided groups with a seasonal average size of seven and a maximum of ten snowmobiles. The remaining four snowmobile events would be noncommercially guided groups with a limit of five snowmobiles per group. Operators would decide whether to "spend" their daily allotments of transportation events on snowmobile groups or snowcoaches. As a result, the daily make-up and number of OSVs in the park could range from zero to 480 snowmobiles and 60 to 106 snowcoaches. At maximum daily snowmobile use, OSVs could increase to a maximum of 540 OSVs (480 snowmobiles and 60 snowcoaches), an increase over the most recent interim rule (alternative 2) that allowed for 396 OSVs (318 snowmobiles and 78 snowcoaches); however, this level of OSV use is within the range experienced at the park during historic (pre-2004) and recent (2004–2009) use periods. If snowcoaches were maximized on a given day, their numbers would increase over existing conditions; but total OSVs for that day (106 snowcoaches, zero commercially guided snowmobiles, 20 noncommercially guided snowmobiles) would be less than one-third of the number of vehicles allowed under the most recent interim rule (alternative 2). Regardless of the daily make-up of OSVs, the maximum number of daily transportation events would be less under alternative 4 (110 events) compared to the maximum number currently allowed under the 2009 to 2012 interim regulations (potential for 123 transportation events assuming an average snowmobile group size of seven and a potential for a maximum of 237 transportation events). If technologies were to improve and OSVs meet enhanced BAT standards (which would reduce the sound emissions from OSVs) the total number of snowmobiles would stay the same, with the potential to increase the number of snowcoaches from 106 to 212. If the snowcoach group size were to increase from one to two coaches, the two coaches would travel as close together as possible allowing for safety and would be considered one transportation event for purposes of managing OSV use. Additional impacts are not expected under this scenario, because the number of transportation events would remain the same as allowed under non-enhanced BAT standards.

There has not been any observed long-term displacement of bison or elk from 1969 to present. Bison and elk have continued to use the same core winter ranges during the past three and a half decades, even when OSV use fluctuated dramatically from winter to winter (Craighead et al. 1973; Aune 1981; Hardy 2001). Thus range-wide displacement of individual bison or elk would be unlikely under alternative 4 because conditions similar to the existing condition would continue (where long-term displacement of individuals has not been observed). Although bison and elk may temporarily avoid areas of OSV use, resulting in short-term displacement, these short-term responses have not caused shifts in core winter habitat use.

Alternative 4 would require 100% guided use, with up to four noncommercially guided snowmobile groups daily. As previously stated, noncommercial guides would receive guide training and the number of noncommercially guided groups would be small (maximum of four daily); therefore, it is assumed that there would be no difference in impacts between commercial and noncommercial guides.

Between 1999 and 2003 there were no implemented guiding requirements and daily entrance numbers were 795 snowmobiles and 15 snowcoaches. Noncommercially guided users are likely to travel in a less predictable fashion throughout the day, without the morning/evening peaks observed for guided users. This may limit the potential for wildlife habituation to OSVs. However, noncommercially guided snowmobile groups would make up less than 4 percent of total daily transportation events. Given that this is the first time noncommercially guided tours would be allowed, noncommercial guides would be clearly marked and would be required to comply with all park requirements and regulations. Compliance with park regulations would be monitored by park law enforcement. Should impacts increase to the resource or infractions of regulations occur under the non-commercial guided program, this program would be altered or ceased.

Thus, displacement impacts to individual bison and elk under alternative 4 would be localized, short-term minor to moderate adverse. Displacement events may be brief and temporary, and over the course of a winter such events may increase energy consumption by elk, and to a lesser extent, bison, potentially resulting in poorer body condition.

Behavioral and Physiological Responses

There would be behavioral and physiological responses by individual bison and elk under alternative 4 but such effects are predicted to be long-term minor adverse. This is because daily OSV use would remain within the range that has been experienced over historic and recent periods, with the number of transportation events being reduced by approximately 10% from current permitted use levels (110 under alternative 4 compared to an average of 123 under alternative 2). There could be an increased number of snowcoaches under alternative 4 if operators choose to use their daily allotments for snowcoaches rather than snowmobiles. Based on recent behavioral monitoring data and modeling, it appears that snowmobiles are more likely to elicit a visible behavioral response from bison or elk but snowcoaches elicit stronger levels of behavioral responses, such as movement or flight (Borkowski et al. 2006; McClure et al. 2009; White et al. 2008), with the overall impact of snowmobiles and snowcoaches being comparable. Recent behavioral observations found that bison and elk demonstrate a movement response during 8–9 percent of encounters with snowcoaches (Borkowski et al. 2006; White et al. 2008), which may result in minor to moderate energy costs. However, an increase in snowcoach allotment would result in a corresponding decrease in snowmobile groups, resulting in no change to the overall number of transportation events and no increase in the level of impact to bison and elk, with the number of transportation events under alternative 4 being less than those permitted under the 2009 to 2011 interim regulations (alternative 2). No adverse population-level effects would be expected because there have been no observed impacts on population growth or demographics correlating to increased or decreased OSV use in the park over the last 38 years. Behavioral responses and associated physiological effects resulting from exposure to human disturbance would result in localized, short-term minor adverse impacts. As discussed above, should all OSVs meet enhanced BAT the increase in OSV use would not increase the overall number of transportation events and would not be expected to increase impact levels beyond a minimal level.

Population-level Impacts

No short-term population-level effects from OSV use have been observed for bison and elk historically, including when an average of 795 snowmobiles and 15 snowcoaches entered the park daily, which is greater than the level proposed under alternative 4 (Fuller 2006; White et al. 2008). Simulation indicates that long-term population-level impacts could occur due to the presence of groomed roads (Coughenour 2005). But most researchers have concluded that bison population growth is based primarily on the active management and culling of the park's bison population, rather than any energetic savings and associated increased survival from travel on groomed OSV routes

(Bjornlie and Garrott 2001; Gates et al. 2005; Bruggeman et al. 2009a; Plumb et al. 2009; White et al. 2008). Behavioral response monitoring indicates movement responses in 8–9 percent of bison and elk observed, and these active travel and flight behaviors may result in small-scale displacement and increased energy expenditure. There has been no data indicating that these responses have resulted in observable impacts on the population, but impacts to individuals that eventually lead to population-level impacts may occur over time, or with especially harsh winters. Population-level impacts are predicted to be long-term minor adverse under alternative 4 because of the long-term impacts that could occur due to behavioral responses, potentially resulting in small-scale displacement that may lead to observable impacts on the population. As discussed above, should all OSVs meet enhanced BAT the increase in OSV use would not increase the overall number of transportation events and would not be expected to increase impact levels beyond a minimal level.

Cumulative Effects

Impacts on bison and elk from other past, present, and reasonably foreseeable future actions would be the same as described for alternative 1. These impacts are a result of the variety of land and wildlife management activities occurring on lands near or adjacent to the park including Northern Rockies Lynx Management, the Gallatin National Forest and the Beartooth District of Custer National Forest travel management plans, timber harvests on adjoining lands, and reintroduction of gray wolves to the greater Yellowstone area. Within the park, these impacts are a result of active management of the park's elk and bison populations, as well as other wildlife management programs such as the plan/EIS for the remote vaccine delivery to bison. The major impacts stated are a result of bison control measures and management under the IBMP, which is unrelated to winter use in the park. These long-term negligible to major adverse impacts, when combined with the short and long-term minor to moderate adverse impacts of alternative 4 would result in long-term minor to major adverse cumulative impacts. Alternative 4 would contribute minimally to the cumulative impacts on bison and elk.

Conclusion

Alternative 4 would allow for use levels similar to those permitted under the 2009 to 2011 interim rules, with an approximately 10% reduction in the number of transportation events. Should all OSVs meet enhanced BAT group sizes would increase, but the number of transportation events would stay the same. The allowance for up to four noncommercially guided snowmobile groups per day is not expected to increase in behavioral, physiological, and displacement responses by bison and elk. Continued monitoring and assessment would allow for additional restrictions to be established should impacts greater than those predicted in this draft plan/SEIS be observed. Thus, overall impacts under alternative 4 would be short- and long-term minor to moderate adverse. Cumulative impacts would be long-term minor to major adverse, of which alternative 4 would contribute minimally.

LYNX AND WOLVERINES

Lynx and wolverines use similar habitat in Yellowstone and are primarily found in the eastern sector of the park, crossed by the east entrance road, and containing Sylvan Pass. Both species are highly mobile, with large home ranges and the ability to travel great distances in a day. Lynx and wolverines are rare in the greater Yellowstone area and their populations are limited to sparsely distributed mountainous or wooded habitat, so that the persistence of the species in an area may be dependent on genetic dispersal. Both species generally avoid areas of heavy human use, and are rarely observed by park researchers or visitors. Canada lynx in the lower 48 states were listed as threatened under the ESA in March 2000 (USFWS 2000). Also, in December 2010, the USFWS ruled the wolverine occurring in the contiguous United States was a distinct population segment that warranted being

added to the Lists of Endangered and Threatened Wildlife and Plants (USDI 2010b). However, this listing was precluded by higher priority actions and, instead, the contiguous U.S. distinct population segment of the wolverine was added to the candidate species list.

Impacts of Alternative 1: No Snowmobile/Snowcoach Use

Displacement, Behavioral, and Physiological Effects

Though a few visitors may travel into the park by non-motorized means during the winter, it is unlikely that a large number of visitors would penetrate the backcountry and mountainous areas preferred by lynx and wolverines (due to the distance that would need to be covered by a skier or snowshoer in a harsh winter environment). Under alternative 1, non-motorized use at the east entrance (Sylvan Pass), where lynx are known to occur, would not be expected because this area is an avalanche zone and with Sylvan Pass closed, avalanche mitigation activities would not occur. It is also unlikely that visitors would encounter roaming lynx or wolverines anywhere else in the park due to the animals' scarcity, elusiveness, and propensity for night or dusk travel, when humans are generally not active in the park. Therefore, impacts from displacement would be localized, short-term negligible adverse, under alternative 1, whereas behavioral and physiological effects would be extremely rare and negligible with long-term beneficial impacts due to the elimination of human presence.

Population-level Effects

Under this alternative there would be no population-level effects, due to a nearly complete lack of interaction or encounters between winter users and lynx or wolverines, resulting in long-term negligible adverse impacts.

Cumulative Effects

Wolverines are still trapped in parts of the greater Yellowstone area, and such harvest may result in mortality of critical members of the population, limiting reproduction, genetic dispersal, and long-term viability of the species in the area. Although only a few individuals are trapped each year, the small population of wolverines may suffer long-term moderate adverse impacts from trapping activities (Squires et al. 2007).

Several of the forests in the region are revising their forest plans and/or travel plans, including the Gallatin National Forest Travel Plan Revision, and the Beartooth Custer National Forest Travel Management Plan. Actions associated with these plans could affect lynx and wolverines. The federal and state wildlife management agencies are required to ensure the long-term viability of lynx (for the forests, pursuant to the Northern Rockies lynx amendment to all USFS forest plans). Impacts to lynx as a result of implementation of the Northern Rockies lynx amendment to USFS plans would be long-term beneficial. Also, in December 2010, the USFWS ruled the wolverine occurring in the contiguous United States was a distinct population segment that warranted being added to the Lists of Endangered and Threatened Wildlife and Plants (USDI 2010b). However, this listing was precluded by higher priority actions and, instead, the contiguous U.S. distinct population segment of the wolverine was added to the candidate species list.

The Gallatin National Forest has recently consolidated much of its checkerboard public and private land holdings, accompanied by the consolidation of private lands, particularly in the Big Sky area. This means there are larger tracts of public land that are less likely to be developed, but also large areas of private lands that are more likely to be developed. Many of the private lands are in relatively high altitude areas (in contrast to other areas of rapid subdivision and growth in greater Yellowstone

area), and may once have been, or could be, important range for wolverines and lynx. Impacts from this consolidation would be long-term minor to moderate adverse, because development changes the landscape forever, eliminating habitat for existing lynx or wolverines using these areas and for any future lynx or wolverines dispersing into these areas.

Road construction is a recurring event in the park, including recent projects at the east entrance and Madison to Norris roads. Any activities in the park are undertaken in such a way as to minimize adverse effects on wildlife and wildlife habitat; this is also true for projects in the national forests, as required by the Northern Rockies Lynx Amendment to all USFS plans. For example, most facility construction projects in parks and forests take place at previously disturbed sites and replace existing structures, minimizing new effects on wildlife. The east entrance project within the park involved only minimal realignment of existing roadways. The Madison to Norris construction moved the road about half a mile from its original location, for a distance of about two miles, and restored two miles of road adjacent to the Gibbon River. Impacts on wolverines and lynx from road construction in the park would be long-term negligible adverse, but would range from long-term minor to moderate adverse in the greater Yellowstone area. This is because lynx tend to limit their movements around roads and are prone to road kill mortality. Wolverines also avoid human activity, including roads, and may adjust their dispersal and movements where roads cross their territory (Banci 1994; Copeland 1996; Hornocker and Hash 1981). Additionally, road improvements in critical areas of wolverine or lynx habitat, such as mountain passes, could limit the animals' movements because roads in mountainous areas often occur in natural travel routes where the terrain is less demanding. Because so little is known about how wolverines travel across the landscape, it is difficult to determine the impacts of roads on this species.

The long-term moderate adverse impacts of these past, present, and reasonably foreseeable future actions, combined with the short- and long-term negligible adverse impacts of alternative 1, would result in long-term moderate adverse cumulative impacts on lynx and wolverines, mainly from trapping activities occurring outside of the park. Alternative 1 would contribute minimally, if at all, to cumulative impacts because there would be no visitor OSVs in the park.

Conclusion

Alternative 1 would result in short- and long-term negligible adverse impacts on lynx and wolverines in the park because OSV use would be limited to minimal administrative use and there would be no observable impacts, with long-term beneficial impacts from the removal of human presence. Cumulative impacts of alternative 1 would be long-term minor to major adverse, of which alternative 1 would contribute minimally, if at all.

Impacts of Alternative 2: Continue Snowmobile/Snowcoach Use at 2011/2012 Winter Season Interim Regulation Limits

Displacement, Behavioral, and Physiological Effects

Alternative 2 would continue road grooming and management of Sylvan Pass, the closest OSV route to prime lynx and wolverine habitat in the eastern sector of the park. Wolverine females give birth to young in mid-February, during peak OSV season. Because denning females are likely sensitive to human disturbance (Myrberget 1968; Pulliainen 1968), OSV use and maintenance activities (particularly avalanche control methods) may cause wolverines using the area to leave, and/or cause females to abandon their dens for poorer den sites, increasing kit mortality and decreasing the reproductive success of wolverines. Also, groomed roads in other areas of the park may limit critical dispersal and movements of wolverines between the high-elevation alpine habitats that make up their

range. Wolverines and lynx in Yellowstone are on the southern tip of their range in North America, and suitable habitat for both species in the greater Yellowstone area occur in patches, separated by poor habitat (Brock et al. 2007). There have been documented movements of a dispersing, Global Positioning System (GPS) collared wolverine across the central range of Yellowstone, indicating that disturbance in any area of the park could impact dispersal and movements of wolverines and lynx if disturbances occur outside of areas of ideal habitat for either species (Wildlife Conservation Society 2007).

Behavioral and physiological effects associated with encountering OSVs have never been specifically investigated for these species. However, observations of habitat use indicate that wolverines avoid areas of human activity, including snowmobile routes (Banci 1994; Heinemeyer et al. 2001). Studies conducted on the Rocky Mountain lynx populations have found that lynx may avoid crossing highways, avoid areas of human presence, and use roads as territory boundaries (Apps 1999). Lynx do not appear to avoid crossing logging roads or roads with lower levels of vehicle use (Koehler and Brittel 1990; McKelvey et al. 1999). Mowat et al. (1999), who studied lynx in Canada where habitat is generally less fragmented than lynx habitat in the lower 48 states, observed that lynx appeared to tolerate moderate levels of snowmobile traffic, readily crossed highways, and established home ranges in proximity to roads. Under alternative 2, an average of 5 OSV groups would be expected to travel through Sylvan pass daily (up to 22 OSVs per day). Avalanche control work has been ongoing in Sylvan Pass since 1973 and includes the use of explosives. Impacts to lynx and wolverines under this alternative are predicted to be localized, short-term minor adverse because disturbance from OSVs on the Sylvan Pass road and maintenance activities could adversely impact reproductive success of denning wolverine females. Depending on how far these species travel outside the eastern section of the park, where use would be more limited, impacts have the potential to be moderate adverse, because groomed OSV roads in other areas of the park could limit movements and dispersal of both species based on results from other areas as discussed previously. Specific behavioral and physiological effects are unknown, because habituation by lynx or wolverine to the levels of OSV use that would occur in Yellowstone under alternative 2 has never been observed because it is difficult to determine lynx or wolverine population numbers in Yellowstone, and lynx and wolverines are rarely observed by researchers. However, it is likely that increased human disturbance could possibly result in higher rates of flight or avoidance by wolverines and lynx. Additionally, associated physiological responses would also likely be increased in these species, with exposure to OSVs. Increased physiological responses generally result in increased energy expenditures and during sever winters could increase the risk to individuals.

Population-level Effects

The two recent sightings of lynx in the north-central section of the park, along the popular Norris Geyser Basin to Mammoth Hot Springs route, support the possibility that lynx may travel or may be found outside of the park's east sector. Additionally, radio collar tracking indicates that wolverines may travel up to 50 miles in a 17-hour period, and travel through non-preferred habitat, including the central portion of Yellowstone (Inman et al. 2007a). These travels may result in fairly regular encounters between OSVs or groomed roads and these animals, even if lynx and wolverines are rarely seen by winter users due to their keen senses and general avoidance of human activity. Additionally, road density and associated human activity is proposed as one of the driving factors behind the extirpation of wolverines from formerly occupied wolverine habitat in California, Oregon, and Washington (Ruediger et al. 2000). Based on evidence that road density and human activity can disrupt movement, impacts to highly mobile lynx and wolverines due to groomed roads and human activity would be long-term, minor adverse, because groomed roads and OSV presence under alternative 2 has the potential to disrupt their winter movements.

Wolverines reproduce at slow rates, with females reaching reproductive maturity at about 3 years of age. Wolverines birth only one kit an average of every 2.3 years (Inman et al. 2007b) and female reproductive success is critical to ensuring the long-term viability of the species in the area. Under this alternative Sylvan Pass would remain open, and because wolverine females give birth in mid-February, there could be potential for kit mortality and lower quality parental care by female wolverines, based on studies of wolverine in other areas (Pulliainen 1968), if they are denning in the area and are disturbed by OSVs and Sylvan Pass maintenance activities. Impacts to wolverine reproductive success would be long-term, minor adverse.

The east entrance levels of 20 snowmobiles and 2 snowcoaches per day proposed under alternative 2 would keep snowmobile traffic in the area at low levels. Although lynx appear to be able to adapt to moderate levels of snowmobile use and human disturbance (Mowat et al. 1999), impacts to lynx may be long-term minor adverse because their mating season overlaps OSV use in the park by about 2 weeks, and roaming lynx may be limited by groomed OSV use and disturbance (Copeland 1996; Mowat and Slough 1998).

Population-level impacts on lynx and wolverines under alternative 2 are predicted to be long-term minor adverse because lynx or wolverines may avoid areas of OSV use, or may limit their range and associated genetic dispersal due to the presence of groomed roads in the park and their large home range size and the importance of travel between patchy habitat.

In the event that there is new documented use of lynx and wolverine in the area, monitoring may be necessary. Opportunistic surveillance would also occur. If NPS monitoring indicates that human presence or activities are having impacts greater than those predicted in this draft plan/SEIS that cannot be otherwise mitigated, selected areas of the park (including sections of roads) may be closed to visitor use. However, it is difficult to determine lynx or wolverine population numbers in Yellowstone, and lynx and wolverines are rarely observed by researchers. The park has the authority to close areas of the park for wildlife protection; for example, to prevent disturbance of denning wolverines. If a wolverine or lynx den is found in an area of the park near human activity, where disturbance is likely, the superintendent could implement closures. Trail closures for park management purposes may result in a change in how OSV use is distributed increasing potential impacts in areas open to travel while reducing impacts in areas closed to travel.

Cumulative Effects

Impacts on lynx and wolverines from other past, present, and reasonably foreseeable future actions would be the same as described for alternative 1. These impacts are a result of the variety of land and wildlife management activities occurring on lands near or adjacent to the park including Northern Rockies Lynx Management (which makes up a large part of these impacts), the Gallatin National Forest and the Beartooth District of Custer National Forest travel management plans, timber harvests on adjoining lands, road construction, and trapping of wolverines. The short- and long-term minor to moderate adverse impacts of alternative 2 when combined with, the long-term moderate adverse effects of these other actions, would result in short- and long-term moderate adverse cumulative impacts on these species, mainly from trapping activities occurring outside of the park. Alternative 2 would contribute a minimal amount to cumulative impacts, primarily due to continued OSV use in the park and at Sylvan Pass.

Conclusion

This alternative would maintain and allow OSV use at Sylvan Pass, the area of the park where human-wolverine interactions would be most likely to occur. However, daily entrance limits restrict the east

entrance to just 20 snowmobiles and two snowcoaches per day, (approximately five transportation events), resulting in little use in this area, and minimal disturbance to wolverines. Restrictions on movements of lynx or wolverines during the winter months due to the presence and use of OSV routes in other areas of the park may limit reproductive success, dispersal, and overall genetic sustainability of the species, but such impacts are difficult to predict. Therefore, impacts predicted under this alternative would be short- and long-term minor adverse, with the potential for moderate adverse impacts if lynx and wolverines travel to other areas of the park. Cumulative impacts to lynx and wolverines under alternative 2 would be short-and long-term moderate adverse, of which alternative 2 would contribute a minimal amount.

Impacts of Alternative 3: Transition to Snowcoaches meeting BAT Requirements Only

Displacement, Behavioral, and Physiological Effects

Under this alternative road grooming and management of Sylvan Pass would not continue, and daily use limits would be 120 snowcoaches, or 120 transportation events, per day once BAT requirements are met and the phaseout is complete. The closure of Sylvan Pass after the phaseout is complete under alternative 3 would virtually eliminate any OSV use in the eastern sector of the park, minimizing human travel through prime lynx and wolverine habitat. Therefore, wolverine females denning in Sylvan Pass would not likely be adversely affected by OSV use, and in the long-term closure of the area would result in beneficial impacts from the removal of human presence. Until the phaseout occurs, impacts would be similar to those under alternative 2.

The continued presence of groomed roads in the park may limit critical dispersal and movements of wolverine between the high-elevation alpine habitats that make up their range. However, the lower OSV limits, and lower number of transportation events, proposed under alternative 3 compared to what was permitted under the 2009 to 2011 interim regulations (alternative 2) would decrease the amount of time that OSV sights and sounds are present in the park. Compared to alternative 4, the number of transportation events would be greater under alternative 3 (120 compared to 110). In addition, the reduced frequency at which OSVs traveling the roads may be encountered, compared to the use levels permitted under the 2009 to 2011 interim regulations, would minimize impacts on traveling lynx and wolverines in the central sector of the park. Behavioral and associated physiological effects on lynx and wolverines related to OSV use have never been comprehensively observed because it is difficult to determine lynx or wolverine population numbers in Yellowstone, and lynx and wolverines are rarely observed by researchers, but displacement and movements of wolverine and lynx in relation to habitat and human activity provide an estimate of effects.

Observations and GPS data on habitat use and movements indicate that wolverines avoid areas of human activity, including snowmobile routes (Banci 1994). Lynx appear to be able to adapt to moderate levels of human disturbance (Koehler and Brittel 1990; Mowat et al. 1999). Therefore, impacts to these two species under alternative 3 would be localized, short-term negligible to minor adverse because OSV use in the eastern sector of the park would be eliminated and use in other areas of the park would be similar in terms on the number of daily transportation events (120 under alternative 4 compared to an average of 123 under use levels permitted under the 2009 to 2011 interim regulations) there would still be potential for disruption of winter movements of lynx and wolverine in the central sector of the park. As previously noted, the closure of Sylvan Pass would result in beneficial impacts to lynx and wolverines. Specific behavioral and physiological effects of human disturbance are unknown. However, it is likely that with use levels (specifically number of transportation events) similar to those permitted under the 2009 to 2011 interim regulations, flight or avoidance responses by wolverines and lynx would be similar to alternative 2.

Population-level Effects

Population-level impacts on lynx and wolverine under alternative 3 would be long-term negligible to minor adverse because the levels of OSV presence would likely result in less frequent and lower levels of behavioral responses and displacement effects on lynx and wolverines moving through the central sector of the park. Avoidance of OSV use areas in the central sector of the park may cause lynx or wolverine to limit their movements, decreasing genetic dispersal. The closure of Sylvan Pass would limit OSV impacts on any females and kits using the denning habitat in that area and on lynx using this area of prime subalpine habitat starting in mid-February resulting in beneficial impacts. The lower levels of motorized vehicle use in the rest of the park would limit direct impacts, in turn limiting population-level impacts.

Cumulative Effects

The impacts on lynx and wolverines from past, present, and foreseeable future actions under alternative 3 would be the same as those under alternative 1. These impacts are a result of the variety of land and wildlife management activities occurring on lands near or adjacent to the park including Northern Rockies Lynx Management (which makes up a large part of these impacts), the Gallatin National Forest and the Beartooth District of Custer National Forest travel management plans, timber harvests on adjoining lands, road construction, and trapping of wolverines. The short and long-term negligible to minor adverse impacts of alternative 3, when combined with the long-term minor to major adverse impacts of other actions, would result in long-term moderate adverse cumulative impacts on wolverine and lynx populations in Yellowstone, mainly from trapping activities occurring outside of the park. Alternative 3 would contribute a minimal amount to cumulative impacts due to the low levels of OSV use.

Conclusion

Under this alternative Sylvan Pass would be closed to OSV use and maintenance activities would cease in the area of the park where human-wolverine and lynx interactions are most likely to occur. With a similar number of transportation events to alternative 2, (120 daily transportation events under alternative 3 versus 123 average events under alternative 2) restrictions on movements of lynx or wolverines during the winter months due to the presence and use of OSV routes in other areas of the park may limit reproductive success, dispersal, and overall genetic sustainability of the species, but such impacts are difficult to predict. Therefore, impacts predicted under this alternative would be short- and long-term minor adverse, and long-term beneficial from the removal of human presence at Sylvan Pass. Cumulative impacts to lynx and wolverines under alternative 3 would be long-term moderate adverse, to which alternative 3 would contribute minimally.

Impacts of Alternative 4: Manage OSV use by Transportation Events

Displacement, Behavioral, and Physiological Effects

Alternative 4 would manage OSV use in the park based on transportation events. One event would initially equal one group of snowmobiles (maximum of 10 per group, an average of 7 over the winter season) or one snowcoach. A maximum of 110 transportation events would be allowed each day; however, no more than 50 events could be snowmobile groups. Forty-six of the snowmobile events would be guided groups with a seasonal average size of seven and a maximum of ten snowmobiles. The remaining four snowmobile events would be noncommercially guided groups with a limit of five snowmobiles per group. Operators would decide whether to “spend” their daily allotments of transportation events on snowmobile groups or snowcoaches. As a result, the daily make-up and number

of OSVs in the park could range from zero to 480 snowmobiles and 60 to 106 snowcoaches. At maximum daily snowmobile use, OSVs could increase to a maximum of 540 OSVs (480 snowmobiles and 60 snowcoaches), an increase over the most recent interim rule (alternative 2) that allowed for 396 OSVs (318 snowmobiles and 78 snowcoaches); however, this level of OSV use is within the range experienced at the park during historic (pre-2004) and recent (2004–2009) use periods. If snowcoaches were maximized on a given day, their numbers would increase over existing conditions; but total OSVs for that day (106 snowcoaches, zero commercially guided snowmobiles, and 20 noncommercially guided snowmobiles) would be less than one-third of the number of vehicles allowed under the most recent interim rule (alternative 2). Regardless of the daily make-up of OSVs, the maximum number of daily transportation events would be less under alternative 4 (110 events) compared to the maximum number currently allowed under the 2009 to 2012 interim regulations (potential for 123 transportation events assuming an average snowmobile group size of seven and a potential for a maximum of 237 transportation events). If technologies were to improve and OSVs meet enhanced BAT standards (which would reduce the sound emissions from OSVs) the total number of snowmobiles would stay the same, with the potential to increase the number of snowcoaches from 106 to 212. If the snowcoach group size were to increase from one to two coaches, the two coaches would travel as close together as possible allowing for safety and would be considered one transportation event for purposes of managing OSV use. Additional impacts are not expected under this scenario, because the number of transportation events would remain the same as allowed under non-enhanced BAT standards.

Alternative 4 would continue road grooming and management of Sylvan Pass, the closest OSV route to prime lynx and wolverine habitat in the eastern sector of the park. As a result, impacts to wolverine and lynx would be similar to the impacts described for alternative 2. The potential for disturbance of wolverine denning habitat from OSV use and maintenance activities in the eastern sector of the park would continue. Such disturbance may cause wolverines using the area to leave or cause females to abandon their dens for poorer den sites, and may increase kit mortality and decrease the reproductive success of wolverines, based on studies of wolverine in other areas (Pulliainen 1968). The continued presence of groomed roads in the park may limit critical dispersal and movements of wolverine between the high-elevation alpine habitats that make up their range. A decrease in the number of daily transportation events by approximately 10% would result in reduced frequency of encounters between OSVs and traveling lynx and wolverines in the central sector of the park and exposure to OSV sights and sounds. On average, daily OSV levels would be less than those permitted under the 2009 to 2011 interim regulations, reducing from an average of 124 events to 110 events, a reduction of approximately 10%. Alternative 4 would allow for up to four noncommercially guided snowmobile groups daily; however, only one would be allowed at each entrance resulting in only one noncommercially guided group potentially accessing the east entrance and the area of prime lynx and wolverine habitat. As previously stated, noncommercial guides would receive guide training; therefore, it is assumed that there would be no difference in impacts between commercial and noncommercial guides. Noncommercial guides would be clearly marked and would be monitored to ensure use is consistent with park requirements and impacts are consistent with those expected for guided use.

Behavioral and associated physiological effects have never been comprehensively observed due to the low number of species in the park, but displacement and movements of wolverine and lynx in relation to habitat and human activity provide an estimate of effects. Observations and GPS data on habitat use and movements indicate that wolverines avoid areas of human activity, including snowmobile routes (Banci 1994). Lynx appear to be able to adapt to moderate levels of human disturbance (Koehler and Brittel 1990; Mowat et al. 1999). Impacts to lynx and wolverines under this alternative are predicted to be localized, short-term minor adverse because disturbance from OSVs on the Sylvan Pass road and maintenance activities could adversely impact reproductive success of denning wolverine females. Depending on how far these species travel outside the eastern sector of the park, impacts have the

potential to be moderate adverse because groomed OSV roads in other areas of the park could limit movements and dispersal of both species, but impacts would be less than those under use levels permitted under the 2009 to 2011 interim regulations (alternative 2) because of the reduction in the number of transportation events. Specific behavioral and physiological effects of human disturbance are unknown.

Population-level Effects

Population-level impacts on lynx and wolverine under alternative 4 would be long-term minor adverse because the levels of OSV presence may result in behavioral responses and displacement effects on lynx and wolverines in the area. However, these impacts would be less than those for use levels permitted under the 2009 to 2011 interim regulations (alternative 2) because the number of transportation events would be reduced by approximately 10%. Avoidance of OSV use areas in the central sector of the park may disrupt lynx or wolverine winter movements, decreasing genetic dispersal. Under this alternative Sylvan Pass would remain open, and because wolverine females give birth in mid-February, there is a risk of increased kit mortality and lower quality parental care by female wolverines if they are denning in the area and are disturbed by OSVs and Sylvan Pass maintenance activities (Pulliainen 1968). Impacts to wolverine reproductive success would be long-term, minor adverse. As discussed above, should all OSVs meet enhanced BAT, the increase in OSV use would not increase the overall number of transportation events and would not be expected to increase impact levels beyond a minimal level.

Overall, these impacts would be mitigated under this alternative through monitoring and closures of areas if deemed necessary. Monitoring of human-wildlife interactions would continue under all alternatives. If NPS monitoring indicates that human presence or activities are having impacts greater than those predicted in this draft plan/SEIS that cannot be otherwise mitigated, selected areas of the park (including sections of roads) may be closed to visitor use. However, it is difficult to determine lynx or wolverine population numbers in Yellowstone, and lynx and wolverines are rarely observed by researchers. Therefore, NPS monitoring would require intensive surveys to determine any effects from OSVs on lynx or wolverines, due to the species' scarcity and their propensity to inhabit steep, mountainous areas of the park, limiting the effectiveness of this mitigation measure. The park has the authority to close areas of the park for wildlife protection; for example, to prevent disturbance of denning wolverines. If a wolverine or lynx den is found in an area of the park near human activity where disturbance is likely, the superintendent could implement closures. Trail closures for park management purposes may result in a change in how OSV use is distributed, increasing potential impacts in areas open to travel while reducing impacts in areas closed to travel.

Cumulative Effects

The impacts on lynx and wolverines from past, present, and foreseeable future actions under alternative 4 would be the same as those under alternative 1. These impacts are a result of the variety of land and wildlife management activities on lands near or adjacent to the park including Northern Rockies lynx management (which makes up a large part of these impacts), the Gallatin National Forest and the Beartooth District of Custer National Forest travel management plans, timber harvests on adjoining lands, road construction, and trapping of wolverines. The short and long-term minor to moderate adverse impacts of alternative 4, when combined with the long-term minor to moderate adverse impacts of other actions, would result in long-term moderate adverse cumulative impacts on wolverine and lynx populations in Yellowstone, mainly from trapping activities occurring outside of the park. Alternative 4 would contribute a minimal amount to cumulative impacts.

Conclusion

This alternative would allow OSV use at Sylvan Pass, the area of the park where human-wolverine interactions would be most likely. Furthermore, restrictions on movements of lynx or wolverines during the winter months due to the presence and use of OSV routes in other areas of the park may limit reproductive success, dispersal, and overall genetic sustainability of the species, but such impacts are difficult to predict. Therefore, impacts predicted under this alternative would be long-term minor adverse, with the potential for moderate adverse impacts if lynx and wolverines travel outside the eastern sector of the park. Overall, impacts would be reduced from use levels permitted under the 2009 to 2011 interim regulations, as the number of daily transportation events would be reduced. Should all OSVs meet enhanced BAT, the overall number of transportation events would not increase and impacts would not be expected to increase. Cumulative impacts to lynx and wolverines under alternative 4 would be moderate adverse, of which alternative 4 would contribute a minimal amount.

TRUMPETER SWANS AND EAGLES

Both swans and eagles primarily use riparian or lakeside habitat in the park, and were regularly observed during NPS annual behavioral monitoring. Both are able to fly, limiting barrier impacts of roads in or outside the park, and of ground disturbance to these species outside nesting, hunting, or feeding areas. These areas that are used by swans and eagles occur along lakes or in riparian areas, which are also popular OSV corridors. Therefore impacts by OSVs on these species are similar and therefore they are combined for analysis.

Impacts of Alternative 1: No Snowmobile/Snowcoach Use

Displacement, Behavioral, and Physiological Effects

OSV use in the park would be minimal and limited to administrative use only. Displacement of bald eagles and swans is possible due to this occasional administrative use or to skiers or snowshoers in the park, but such displacement would be infrequent and short term, and a 400-meter no-stopping buffer around roosting or nesting eagles would remain in place for bald eagles in the park, which would reduce the risk of disturbance to eagles. The potential for other behavioral and physiological effects that could occur due to disturbance by foot traffic and low-level administrative traffic would be low, because this traffic would be so minimal under alternative 1. For these reasons, impacts from alternative 1 would be localized, short-term negligible adverse. Long-term impacts would be beneficial because during the majority of the winter season human disturbance would be removed.

Population-level Effects

The vast majority of effects would result from a small number of skiers or snowshoers, who are only rarely expected to encounter trumpeter swans or eagles. Winter users would not be present during the active nesting season for trumpeter swans, and skiers or snowshoers rarely elicit any response from wildlife (McClure et al. 2009; McClure et al. 2008), resulting in no impacts to the critical reproductive periods, mortality, or nesting that could lead to population-level effects. Impacts from population-level effects on swans and eagles under alternative 1 would therefore be long-term negligible adverse.

Mitigation

The park would be managed as a backcountry area for skiers or snowshoers. A 400-meter no stopping buffer would remain in place for bald eagles in the park, limiting the effects of skiers or snowshoers on eagles.

Cumulative Effects

Other past, present, and foreseeable future actions in and around Yellowstone have the potential to impact swans and eagles, particularly because these species are highly mobile during the winter and year-round, and are able to fly outside Yellowstone. Any actions that reduce the ability of swans to produce viable offspring could further contribute to observed regional declines in the species population.

The Gallatin National Forest has consolidated much of its checkerboard holdings in recent years, which has been accompanied by consolidation of private lands, especially in the Big Sky area. The net effect of these consolidations on eagles and swans is difficult to predict, because consolidated USFS lands are less likely to be developed, whereas private lands are more likely to be developed.

Road construction projects in the park, such as the recent projects at the east entrance and Madison to Norris roads, have been or are being constructed in accordance with appropriate environmental reviews and mitigation measures so as to reduce impacts on wildlife in the region. Within the park, construction is also generally designed to minimize effects on wildlife. Overall, all construction projects in the region must minimize the effects of any projects on bald eagles. Swans are similarly protected under the Migratory Bird Treaty Act. Additionally, swans and eagles are rarely killed on roads. Impacts due to road development and construction in the greater Yellowstone area would be localized, long-term negligible to moderate adverse.

The negligible to moderate impacts of these past, present, and reasonably foreseeable future actions, combined with the short- and long-term negligible adverse impacts of alternative 1, would result in long-term moderate adverse cumulative impacts on trumpeter swans and bald eagles. Alternative 1 would not include visitor OSV use in the park and would contribute only a small amount, if at all, to the overall cumulative impacts.

Conclusion

Alternative 1 would result in short- and long-term negligible adverse impacts on swans and eagles in the park because OSV use would be limited to minimal administrative use and there would be no observable impacts. Cumulative impacts would be long-term moderate adverse, and alternative 1 would contribute minimally to the overall cumulative impacts to eagles and swans.

Impacts of Alternative 2: Continue Snowmobile/Snowcoach Use at 2011/2012 Winter Season Interim Regulation Limits

Displacement, Behavioral, and Physiological Effects

Alternative 2 would allow for OSV use up to recently permitted use levels under the 2009 to 2012 interim regulations at 318 guided snowmobiles and 78 snowcoaches per day. For purposes of comparison to alternative 4, this would be result in an average of 123 daily transportation events, with a potential maximum of 237 transportation events. Recent observations of behavior demonstrate few active responses by eagles or swans when exposed to OSVs, with 80 percent of swans and 62 percent of eagles showing no reaction to OSVs, 8 percent of swans and 9 percent of eagles traveling away from OSVs, and no swans and 3 percent of eagles exhibiting a flight response (McClure et al. 2009). The likelihood of an active response by bald eagles and swans increase with decreased distance to the road, longer interaction time, direct approach or harassment by humans, approach by humans on foot, and, for eagles, burned forest habitat compared to open meadow (Grubb et al. 2002; Gonzalez et al. 2006; Borkowski et al. 2006; White et al. 2006). Behavioral observations under use levels during the

2009 interim rule show limited displacement and few energetically costly behavioral responses, which would also likely limit physiological responses in swans and eagles. This indicates that a majority of both swans and eagles are expected to demonstrate limited responses to OSVs under the use limits proposed for alternative 2, which includes the same limits on OSVs as the 2009 to 2012 interim regulations. Also, swans demonstrate some level of habituation to OSV users (Hardy 2001; White et al. 2008), and guiding requirements in alternative 2 would limit actions by humans (e.g., interaction time) that precipitate stronger responses by swans and eagles. For these reasons, impacts on swans and eagles under alternative 2 would be localized, short-term negligible to minor adverse.

Population-level Effects

For bald eagles, increased behavioral responses to OSVs may result in reproductive failure or mortality if eagles avoid accessing prime foraging areas, or are subject to such frequent flight responses that their eggs or young fail to survive. These responses may also require increased energy due to stress and increased activity (Stalmaster and Kaiser 1998; Steidl and Anthony 2000), because their critical breeding and nesting season overlaps with OSV use in the park. Swans nest outside the OSV winter use season, although breeding pairs of swans begin choosing territories as early as February. Increases in the frequency and duration of encounters between OSVs and swans or eagles and increases in duration of encounters could increase the potential for adverse impacts on the related to species displacement but would unlikely affect the overall reproductive success. There are successful swan breeding territories near motorized routes in the greater Yellowstone area outside the park (McEneaney 2006), and OSV have not been shown to be the primary factor in the decline of the resident swan population (Proffitt 2008). Eagle nests may fall within the 250 meter buffer distance specified for protection by the USFWS (USFWS 2008a). For example, foraging or roosting eagles near the Firehole and Madison drainages are often less than 250 meters from the road. Eagles exhibit increased behavioral response frequency and intensity with shorter distance to disturbance, number of vehicles per event, and interaction duration and rates (Gonzalez et al. 2006; White et al. 2008). However, management protocols would include a 400-meter no-stopping buffer, so OSV traffic would not be permitted to stop near any such nest when it is occupied. Thus, population-level impacts under alternative 2 to both swans and eagles would be localized, long-term negligible to minor adverse.

The impacts described above would be mitigated under this alternative in several ways. Monitoring of human-wildlife interactions would continue under all alternatives. If NPS monitoring indicates that human presence or activities have unacceptable effects on swans or eagles that cannot be otherwise mitigated, selected areas of the park (including sections of roads) may be closed to visitor use. Additionally, any area containing a nesting pair of swans would be closed by park management, and there is a mandatory no-stopping requirement in a 400-meter buffer zone from bald eagle nests. The park has the authority to close areas of the park for wildlife protection, such as to prevent disturbance of nesting eagles, or to enforce a buffer zone. Such closures would effectively limit adverse impacts of OSV use. Trail closures for park management purposes may result in a change in how OSV use is distributed increasing potential impacts in areas open to travel while reducing impacts in areas closed to travel.

Cumulative Effects

Impacts on trumpeter swans and bald eagles from other past, present, and reasonably foreseeable future actions would be the same as described for alternative 1. These impacts are a result of the variety of land and wildlife management activities occurring on lands near or adjacent to the park including the consolidation of checkerboard lands in the Gallatin National Forest, the Gallatin National Forest and the Beartooth District of Custer National Forest travel management plans, and timber harvests on adjoining lands. New construction in the park, such as that for roads and new visitor centers, also contributes to these impacts, but mitigation measures are in place to ensure that

these impacts are negligible to these populations. The negligible to moderate adverse effects of these actions, when combined with the short- to long-term negligible to minor adverse impacts of alternative 2, would result in short- and long-term moderate adverse cumulative impacts on these species. Alternative 2 would contribute a minimal amount to the overall adverse cumulative impacts.

Conclusion

Alternative 2 would limit impacts to swans and eagles through use-limits, guiding requirements, and little overlap of OSV use with the active swan nesting season. Given these conditions and the mitigation measures discussed above, impacts to eagles and swans under alternative 2 would be localized short- to long-term negligible to minor adverse. Cumulative impacts would be long-term moderate adverse, and alternative 2 would contribute a small amount to the overall adverse cumulative impacts.

Impacts of Alternative 3: Transition to Snowcoaches meeting BAT Requirements Only

Displacement, Behavioral, and Physiological Effects

Initially impacts under alternative 3 would be the same as alternative 2. Alternative 3 would use levels from the levels permitted under the 2009 to 2011 interim regulations (alternative 2) to 120 guided snowcoaches per day and zero snowmobiles once BAT requirements are met (by the winter season of 2017/1018), resulting in 120 transportation events. Recent wildlife behavioral observations found few active responses by eagles or swans when exposed to OSVs, as described in alternative 2. The slight decrease in transportation events under alternative 3 from use levels permitted under the 2009 to 2011 interim regulations (from an average of 124 under alternative 2 to 120 under alternative 3) would result in a slightly reduced frequency of interactions between OSVs and eagles or swans, overall decreasing interaction duration, and resulting in fewer adverse behavioral, physiological, and displacement effects. The potential for human behavior that precipitates more frequent and higher level responses, such as direct approach, stopping, or increased duration of interaction would also be reduced due to slight reduction in the number of transportation events, and guiding requirements. Although snowcoaches would continue to pass within 250 meters of nests due to road location, fewer overall OSVs would pass by on a daily basis than permitted under the 2009 to 2011 interim regulations. A majority of both swans and eagles would be exposed to fewer groups of OSVs per day, and guiding requirements would limit actions by humans (e.g., increased interaction time) that precipitate stronger responses by swans and eagles. Also, swans demonstrate some level of habituation to OSVs. Because the reduction from current permitted use levels would be slight, only 4 transportation events, impacts on swans and eagles under alternative 3 would be similar to those under alternative 2 and would be localized short-term negligible to minor adverse.

Population-level Effects

For bald eagles and swans, increased behavioral responses to OSVs may result in reproductive failure, mortality, or nest abandonment, as described under alternative 2. The 400-meter no-stopping buffer near eagle nests and regulations on group size and low entrance limits would decrease the duration and frequency of encounters with OSVs. As discussed above under Displacement, Behavioral, and Physiological Effects, the number of transportation events under alternative 3 would be reduced slightly than permitted under the 2009 to 2011 interim regulations (alternative 2) with a reduction of four events. Also, guiding requirements would limit human activities that precipitate stronger responses by swans and eagles. Thus, population-level impacts under alternative 3 would be long-term negligible to minor adverse, with a slight reduction of impacts when compared to alternative 2.

Cumulative Effects

Impacts on trumpeter swans and bald eagles from other past, present, and reasonably foreseeable future actions would be the same as described for alternative 1. These impacts are a result of the variety of land and wildlife management activities occurring on lands near or adjacent to the park including the consolidation of checkerboard lands in the Gallatin National Forest, the Gallatin National Forest and the Beartooth District of Custer National Forest travel management plans, and timber harvests on adjoining lands. New construction in the park, such as that for roads and new visitor centers, also contributes to these impacts, but mitigation measures are in place to ensure that these impacts are negligible to these populations. The negligible to moderate adverse effects of these actions, when combined with the short- to long-term negligible to minor adverse impacts of alternative 3, would result in short- and long-term moderate adverse cumulative impacts on these species. Alternative 3 would contribute a small amount to the overall adverse cumulative impacts.

Conclusion

Alternative 3 would limit the impacts to swans and eagles through use limits, guiding requirements, and little overlap between OSV use and the active swan nesting season. The slight reduction in the number of transportation events when compared to those currently allowed (alternative 2) and guiding requirements would limit impacts to eagles and swans under alternative 3 and result in localized short and long-term, negligible to minor, adverse impacts, with impacts slightly less than alternative 2. Cumulative impacts would be long-term moderate adverse, and alternative 3 would contribute a small amount to the overall adverse cumulative impacts.

Impacts of Alternative 4: Manage OSV use by Transportation Events

Displacement, Behavioral, and Physiological Effects

Alternative 4 would manage OSV use in the park based on transportation events. One event would initially equal one group of snowmobiles (maximum of 10 per group, an average of 7 over the winter season) or one snowcoach. A maximum of 110 transportation events would be allowed each day; however, no more than 50 events could be snowmobile groups. Forty-six of the snowmobile events would be guided groups with a seasonal average size of seven and a maximum of ten snowmobiles. The remaining four snowmobile events would be noncommercially guided groups with a limit of five snowmobiles per group. Operators would decide whether to "spend" their daily allotments of transportation events on snowmobile groups or snowcoaches. As a result, the daily make-up and number of OSVs in the park could range from zero to 480 snowmobiles and 60 to 106 snowcoaches. At maximum daily snowmobile use, OSVs could increase to a maximum of 540 OSVs (480 snowmobiles and 60 snowcoaches), an increase over the most recent interim rule (alternative 2) that allowed for 396 OSVs (318 snowmobiles and 78 snowcoaches); however, this level of OSV use is within the range experienced at the park during historic (pre-2004) and recent (2004–2009) use periods. If snowcoaches were maximized on a given day, their numbers would increase over existing conditions; but total OSVs for that day (106 snowcoaches, zero commercially guided snowmobiles, and 20 noncommercially guided snowmobiles) would be less than one-third of the number of vehicles allowed under the most recent interim rule (alternative 2). Regardless of the daily make-up of OSVs, the maximum number of daily transportation events would be less under alternative 4 (110 events) compared to the maximum number currently allowed under the 2009 to 2012 interim regulations (potential for 123 transportation events assuming an average snowmobile group size of seven and a potential for a maximum of 237 transportation events). If technologies were to improve and OSVs meet enhanced BAT standards (which would reduce the sound emissions from OSVs) the total number of snowmobiles would stay the same, with the potential to increase the number of snowcoaches from 106 to 212. If the snowcoach group size

were to increase from one to two coaches, the two coaches would travel as close together as possible allowing for safety and would be considered one transportation event for purposes of managing OSV use. Additional impacts are not expected under this scenario, because the number of transportation events would remain the same as allowed under non-enhanced BAT standards.

Recent wildlife behavioral observations found few active responses by eagles or swans when exposed to groups of OSVs, as described in alternative 2. A decrease in the number of transportation events under alternative 4 compared to use levels under the 2009 to 2011 interim regulations (alternative 2) would result in reduced frequency of interactions between OSVs and eagles or swans, overall decreasing interaction duration, and resulting in fewer adverse behavioral, physiological, and displacement effects. The daily ratio of OSVs (snowmobile groups to snowcoaches) would depend on the operators and cannot be predicted at this time; however, there would be a decrease in daily transportation events under alternative 4 (110 events) compared to those permitted under the 2009 to 2011 interim regulations (daily average of 123 with a potential maximum of 237). On average, the daily number of transportation events would be less than those permitted under the 2009 to 2011 interim regulations. Behavioral observations under use levels during the 2009 to 2012 interim regulations show limited displacement and few energetically costly behavioral responses, which would also likely limit physiological responses in swans and eagles. This indicates that a majority of both swans and eagles are expected to demonstrate limited responses to the number of transportation events proposed for alternative 4. Also, swans demonstrate some level of habituation to OSVs. Alternative 4 would allow for up to four noncommercially guided snowmobile groups daily. As previously stated, noncommercial guides would receive guide training; therefore, it is assumed that there would be no difference in impacts between commercial and noncommercial guides. However, noncommercial guides would be clearly marked and the use would be monitored to ensure use is consistent with park requirements and impacts are within those expected for guided use. Noncommercially guided users are likely to travel in a more random fashion throughout the day, without the morning/evening peaks observed for guided users. This may limit the potential for wildlife habituation to OSVs. However, since noncommercially guided snowmobile groups would make up less than 4 percent of total daily transportation events it is not expected that noncommerically guided use would have different impacts from commercially guided use. For these reasons, impacts on swans and eagles under alternative 4 would be localized, short-term negligible to minor adverse, and would be less than alternatives 2 or 3 due to the reduced number of transportation events.

Population-level Effects

For bald eagles and swans, increased behavioral responses to OSVs may result in reproductive failure, mortality, or nest abandonment, as described under alternative 2. The 400-meter no-stopping buffer near eagle nests that would be observed by all guided groups and regulations on group size would decrease the duration and frequency of encounters with OSVs. Daily OSV numbers could be variable but the number of transportation events would be no greater than 110. Daily transportation events would decrease over those permitted under the 2009 to 2011 interim regulations (alternative 2). The OSV use season overlaps with the establishment of nesting territory by breeding pairs of swans. Increased behavioral responses by swans to OSV use under alternative 4 may result in minor to moderate impacts. There is little overlap of OSV use with the active swan nesting season, which would limit impacts to that species. Population-level impacts under alternative 4 would be long-term negligible to minor adverse, and would be less than alternatives 2 or 3 due to the reduced number of transportation events.

Cumulative Effects

Impacts on trumpeter swans and bald eagles from other past, present, and reasonably foreseeable future actions would be the same as described for alternative 1. These impacts are a result of the variety of land and wildlife management activities on lands near or adjacent to the park including the consolidation of checkerboard lands in the Gallatin National Forest, the Gallatin National Forest and the Beartooth District of Custer National Forest travel management plans, and timber harvests on adjoining lands. New construction in the park, such as that for roads and new visitor centers, also contributes to these impacts, but mitigation measures are in place to ensure that these impacts are negligible to these populations. The negligible to moderate adverse effects of these actions, when combined with the short- to long-term negligible to minor adverse impacts of alternative 4, would result in short- and long-term moderate adverse cumulative impacts on these species. Alternative 4 would contribute a small amount to the overall adverse cumulative impacts.

Conclusion

Alternative 4 would limit impacts to swans and eagles through use-limits, providing training for and limiting noncommercially guided snowmobile groups, and little overlap of OSV use with the active swan nesting season. Given these conditions and the mitigation measures that would be implemented, impacts to eagles and swans under alternative 4 would be localized short- to long-term negligible to minor adverse, and would be less than alternatives 2 or 3 due to the reduced number of transportation events. Cumulative impacts would be long-term moderate adverse, and alternative 4 would contribute a small amount to the overall adverse cumulative impacts.

GRAY WOLVES

Since their reintroduction from 1995 to 1997, wolf numbers increased until 2003, when density-dependent factors unrelated to OSV use (including disease) caused declines. Wolves within Wyoming are classified as a non-essential, experimental population by the USFWS, and per the ESA (10(j)), are managed within Yellowstone as a threatened population. Gray wolves rarely encounter OSV users in the park, and it would appear that wolves avoid areas of frequent OSV use (McClure et al. 2009). During winter foraging travels, gray wolves frequent ungulate winter ranges including the Yellowstone northern range and areas of geothermic influence in the park (Green et al. 1997); there are fewer wolves in the interior of the park than on the northern range because there are fewer elk in the interior (Smith et al. 2010; Sacklin pers. comm. 2010). Elk make up 83 percent of their diet, and other ungulates compose most of the remainder. Ungulate carcasses from winter-kill are also consumed during the spring denning season (Creel et al. 2007). During winter, wolves appear to travel primarily at night when in developed areas, with several nocturnal kills documented in these areas. Wolves den in April, after the winter use season has ended (Smith et al. 2010).

Disturbance to wolves from OSV use has been occasionally observed during wildlife monitoring surveys, and the majority of wolf responses to OSV use consisted of “look-resume” or no visible response (McClure et al. 2009). Although higher glucocorticoid levels have been documented in wolves at locations and times with increased snowmobile use, there is no evidence that this has caused population-level effects (Creel et al. 2002). Compacted OSV routes may provide low energy winter travel routes for wolves to access areas of ungulate use, or may direct the movements of wolves along roads, due to the ease of travel.

Wolves in and around Yellowstone rarely pose a threat to humans or demonstrate begging behaviors or approach humans, due to an abundance or native prey animals, general avoidance of humans, and, in part to hazing of any wolves frequenting areas of human use or development, or observed

approaching people. In 2009, the four member Canyon wolf pack was successfully hazed away from a denning site near Mammoth Hot Springs. Although the pack did not approach humans and was not food conditioned, the amount of human use in the area frequented by the wolves was an issue. After hazing, the pack moved on to its summer range in Hayden Valley. During the previous summer, prior to the hazing events of spring 2009, the wolves had approached vehicles, and frequently traveled on the Hayden Valley road. In summer 2009, following hazing, the Canyon wolves did not demonstrate these behaviors. The success of hazing with this pack and other wolf hazing in the park, indicates that hazing is a successful strategy for habituated wolves, and effectively stops unwanted behaviors (Smith et al. 2010). Due to its level of habituation, hazing was not attempted on a yearling wolf from the Gibbons pack; this wolf was lethally removed on May 19, 2009 because of apparent food conditioning and habituation to humans demonstrated by the wolf approaching humans and chasing several park visitors. This wolf had likely been fed by people (Smith et al. 2010). Guiding requirements, education on proper storage of food and behavior around wildlife, and limits to the total number of visitors a day limit the development of habituation in park wolves due to winter use. It appears that wolves generally avoid encounters with OSV users, and may preferentially choose to travel on OSV roads during times of low human activity (Smith et al. 2008, 2009, 2010).

Impacts of Alternative 1: No Snowmobile/Snowcoach Use

Displacement, Behavioral, and Physiological Effects

Though a few visitors might travel into the park on foot (skiers and snowshoers), it is unlikely that they would venture far into the park or into the winter ranges of wolves or that visitors would encounter any roaming wolves anywhere else in the park due to the scarcity and elusiveness of wolves and their propensity for night or dusk travel, when humans are generally not active in the park (Smith et al. 2009). Because no OSV use would be permitted under this alternative, OSVs would not operate in the wolves' winter range. Encounters are possible, but wolves are likely to generally avoid interaction and effects would be short-term and rare. Therefore minimal displacement is expected to occur under this alternative and behavioral and physiological effects would be extremely rare. Displacement, behavioral, and physiological impacts on wolves under alternative 1 would be localized, short-term negligible adverse.

Population-level Effects

Under this alternative there would be negligible population-level effects such as disturbance during denning season, or disruption of hunting success. This is because there would be a nearly complete lack of interaction or encounters between winter users and wolves. Impacts would be long-term negligible adverse.

Cumulative Effects

Wolves in Wyoming were proposed for delisting from the ESA by the USFWS on October 4, 2011. However, until a final rule is published in the *Federal Register*, wolves are still protected under the ESA in Wyoming. Once delisting is final, the State of Wyoming would have management responsibility for wolves outside of the park and the Wind River Reservation, and a 5-year monitoring period would commence during which the state would submit annual reports to the USFWS. The Wyoming Gray Wolf Management Plan (Wyoming Game and Fish Commission 2011) calls for wolves to be managed as a "trophy game animal" within a Wolf Trophy Game Management Area. Outside of the Wolf Trophy Game Management Area wolves would be classified as a "predatory animal." The management plan commits to maintaining at least 10 breeding pairs and at least 100 individuals within the area of the state under its management. It also would establish a wolf hunting

season and hunting areas. Wolves have been delisted in Idaho and Montana and are currently managed by those states under their respective wolf management plans. Both states allow wolf hunting and trapping season depending on population size. During the 2011/2012 season in Idaho, 253 wolves were harvested by hunting and 123 by trapping (Idaho Department of Fish and Game 2012). In Montana, 166 wolves were harvested during the 2011 wolf hunt (Montana Fish Wildlife and Parks 2012). All three states are required to maintain long-term viability of wolves. The reasonably foreseeable delisting of wolves in Wyoming and implementation of a hunting season in areas outside the park, along with active management in the states of Idaho and Montana that includes hunting and trapping of wolves, would result in both long- and short-term minor to moderate adverse impacts on wolf populations in the greater Yellowstone area.

The Gallatin National Forest Travel Plan Revision and the Beartooth Custer National Forest Travel Management Plan are now being implemented. Actions associated with these plans could affect wolves, but negative effects would be minimized because federal and state wildlife management agencies are required to ensure the long-term viability of wolves in their planning efforts and projects. Impacts would be long-term negligible to minor adverse.

The Gallatin National Forest has recently consolidated much of its checkerboard public and private land holdings, accompanied by the consolidation of private lands, particularly in the Big Sky area. This means there are larger tracts of public land that are less likely to be developed, but also large areas of private lands that are more likely to be developed. The net effects of these actions on wolves are difficult to predict.

The Gardiner Basin and Cutler Meadows restoration (currently in progress) would likely benefit wolf prey species, because the prey species preferred browse of native plants would be favored by these restorations, with overall long-term beneficial impacts to wolves.

Impacts of past, present, and foreseeable future actions would be long-term minor adverse. The impacts of these past, present, and reasonably foreseeable future actions, combined with the short and long-term negligible adverse impacts of alternative 1, would result in long-term minor adverse cumulative impacts on wolves. Alternative 1 would contribute a small amount, if at all, to the overall cumulative impacts.

Conclusion

Alternative 1 would result in short- and long-term negligible adverse impacts on wolves in the park because OSV use would be limited to minimal administrative use and there would be no observable impacts. The limited human presence would have long-term beneficial impacts. Cumulative impacts would be long-term, minor, adverse, and alternative 1 would contribute a small amount to the overall cumulative impacts.

Impacts of Alternative 2: Continue Snowmobile/Snowcoach Use at 2011/2012 Winter Season Interim Regulation Limits

Displacement, Behavioral, and Physiological Effects

Alternative 2 would continue use levels under the 2009 to 2012 interim regulations of up to 318 guided snowmobiles and 78 guided snowcoaches per day. For purposes of comparison to alternative 4, this would be result in an average of 123 daily transportation events, with a potential maximum of 237 transportation events. Winter road monitoring crews rarely observed behavioral responses by wolves to OSVs in Yellowstone, due to infrequent encounters, with a total of only 14 sightings of wolf-OSV

interaction over the last seven winter monitoring seasons. Generally, responses by wolves are either look-resume or no visible response (McClure et al. 2009). Glucocorticoid measurements from wolves in Yellowstone and other areas where wolves are exposed to snowmobiles were correlated between and within years during periods of higher OSV activity (Creel et al. 2002). Chronic elevated glucocorticoid levels may result in long-term adverse effects on immune function and body condition, decreasing survival and reproductive rates (Sapolsky 1992). No evidence exists for population-level effects (Creel et al. 2002). Also, frequent exposure to humans may result in habituation by wolves, resulting in possible lethal removal if wolves lose fear of humans and begin to engage in problematic behaviors such as approaching humans or chasing visitors (Smith et al. 2010).

Wolves appear to avoid interaction with OSV users, but there is no evidence from wolf territories in the park of large-scale displacement or habitat avoidance (Smith et al. 2005). Observations of habitat use by radio-collared wolves indicate that wolves frequently travel in the Madison-Firehole-Gibson basin during Winter OSV use, but avoid areas of human activity during the day. Wolf tracks were frequently observed on roads at night, suggesting that wolves travel on roads at night to conserve energy but avoid OSV activity during the day (Smith et al. 2005; Smith et al. 2006). It appears that wolves avoid encounters with OSVs and maintain normal travel activities in the park. Wolves may travel on roads to conserve energy, but they do not appear to follow roads for long distances, or to areas they would not frequent otherwise. Physiological responses would likely be increased with increased numbers of OSVs in the park (or with increased transportation events), but guiding requirements and use-limits under alternative 2 would limit these responses. Therefore, impacts under alternative 2 would be localized, short-term negligible to minor adverse.

Population-level Effects

Wolf populations in the park have grown during periods of much higher OSV use than those occurring under recent conditions (with daily averages of 795 snowmobiles/day), and data suggest that inter-species aggression and natural mortality causes including diseases influence park wolf populations more than disturbance from OSV use. However, in the first few years after wolves were reintroduced to the Lamar Valley in 1995 and 1996, there was little inter-species competition due to the low total number of wolves in the park and large unoccupied territories containing ample available prey species, so it is unknown how OSV use affected population growth. Additionally, wolf hunting success data suggests that wolves are more likely to successfully bring down an elk in areas that are flat, open, and near roads (Creel and Winnie 2005). Such data suggest that avoidance of such areas by wolves during the day, due to OSV use, may limit their hunting success, in turn increasing energy expenditure and mortality and reproductive success. Also the levels of use under alternative 2 could result in some increases in glucocorticoid levels, indicating increased stress, which could eventually affect reproductive and survival rates of this species; however, chronic elevations that result in decreased reproductive survival rates of this species are unlikely. Therefore, population-level impacts under alternative 2 are predicted to be long-term negligible to minor adverse.

The impacts described above would be mitigated under this alternative through several measures. If NPS monitoring indicates that human presence or activities are having unacceptable effects on wolves that cannot be otherwise mitigated, selected areas of the park (including sections of roads) may be closed to visitor use. Additionally, areas within a 1-mile radius of a wolf den are closed to public entry and many of the wolf dens are already within grizzly bear spring closure areas, which are protected from human disturbance.

Cumulative Effects

Impacts on wolves from other past, present, and reasonably foreseeable future actions would be the same as described for alternative 1. These impacts are a result of the variety of land and wildlife management activities occurring on lands near or adjacent to the park including the consolidation of checkerboard lands in the Gallatin National Forest, the Gallatin National Forest and the Beartooth District of Custer National Forest travel management plans, timber harvests on adjoining lands, and reintroduction of gray wolves to the greater Yellowstone area, one of the largest causes of these impacts. Within the park, these impacts are a result of active management of the park's elk and bison populations, as well as other wildlife management programs such as the planned remote vaccine delivery to bison, a minimal contributor to impacts on the gray wolf population. New construction in the park, such as that for roads and new visitor centers, also contributes to these impacts, but mitigation measures are in place to ensure impacts are negligible to these populations. The minor adverse effects of these actions, when combined with the short and long-term negligible to minor adverse impacts of alternative 2, would result in long-term minor adverse cumulative impacts on wolves. Alternative 2 would contribute a small amount to the overall adverse cumulative impacts.

Conclusion

Alternative 2 would result in short- and long-term negligible to minor adverse impacts on wolves in the park because OSV use would be limited to current use levels, which would reduce the frequency of OSV encounters, and limit the duration of interaction and the approach distance of OSV users due to guiding requirements. Cumulative impacts would be long-term minor adverse, and alternative 2 would contribute a small amount to the overall adverse cumulative impacts.

Impacts of Alternative 3: Transition to Snowcoaches meeting BAT Requirements Only

Displacement, Behavioral, and Physiological Effects

Alternative 3 would reduce OSV use levels and the overall number of transportation events (from an average of 123 and 237 maximum permitted under the 2009 to 2011 interim regulations to 120) once all snowcoaches meet BAT requirements (winter season 2015/2016) and the 3-year phaseout of snowmobiles is complete. Once this phaseout is complete OSV numbers would equal 120 guided snowcoaches per day and zero snowmobiles or 120 transportation events. Prior to this phaseout, the impacts of alternative 3 would be the same as alternative 2. Once the 3-year phaseout is completed, lower number of transportation events per day would limit the frequency and duration of OSV presence in the park, and would minimally elevate glucocorticoid levels, potentially resulting in few long-term adverse effects on immune function and body condition (Sapolsky 1992).

Wolves appear to avoid interaction with OSV users, but there is no evidence from wolf territories in the park of large-scale displacement or habitat avoidance (Smith et al. 2005). Observations of habitat use by radio-collared wolves indicate that wolves frequently travel in the Madison-Firehole-Gibson basin during Winter OSV use, but avoid areas of human activity, during the day. Wolf tracks were frequently observed on roads, suggesting that wolves travel on roads at night or when OSVs are not present to conserve energy, but avoid OSV activity during the day, indicating that displacement is short term and directly results from OSV presence (Smith et al. 2005; Smith et al. 2006). Frequent exposure to humans may result in habituation by wolves, resulting in possible lethal removal if wolves lose fear of humans and begin to engage in problematic behaviors such as approaching humans or chasing visitors (Smith et al. 2010). Such habituation behaviors by wolves have not been attributed to OSV visitors following establishment of guiding requirements.

Under alternative 3 the frequency and duration of motorized vehicle presence in the park would decrease to relatively low levels and wolves would need to spend less time avoiding encounters with OSVs, resulting in only small-scale, temporary displacement. Physiological responses would decrease with lower numbers of motorized users in the park. Therefore, impacts would be localized, short-term negligible to minor adverse.

Population-level Effects

Wolf populations in the park have grown during periods of much higher OSV use than that which would occur under alternative 3 (daily averages of 795 snowmobiles per day), and data suggest that inter-species aggression and natural causes influence park wolf populations more than OSV use, as described under alternative 2. Such data suggest that avoidance of such areas by wolves during the day due to OSV use may limit their hunting success, in turn increasing energy expenditure and mortality and reducing reproductive success. Also, it is likely that the levels of use under alternative 3 would result in some increases in glucocorticoid levels, indicating increased stress. However, chronic elevations that would result in decreased reproductive survival rates of this species are unlikely. Therefore, population-level impacts under alternative 3 are predicted to be long-term negligible adverse.

Cumulative Effects

Impacts on wolves from other past, present, and reasonably foreseeable future actions would be the same as described for alternative 1. These impacts are a result of the variety of land and wildlife management activities occurring on lands near or adjacent to the park including the consolidation of checkerboard lands in the Gallatin National Forest, the Gallatin National Forest and the Beartooth District of Custer National Forest travel management plans, timber harvests on adjoining lands, and reintroduction of gray wolves to the greater Yellowstone area, one of the largest causes of these impacts. Within the park, these impacts are a result of active management of the park's elk and bison populations, as well as other wildlife management programs such as the planned remote vaccine delivery to bison, a minimal contributor to impacts on the gray wolf population. New construction in the park, such as that for roads and new visitor centers, also contributes to these impacts, but mitigation measures are in place to ensure that these impacts are negligible to these populations. The minor adverse effects of these actions, when combined with the short and long-term negligible to minor adverse impacts of alternative 3, would result in long-term minor adverse cumulative impacts on wolves. Alternative 3 would contribute a small amount to the overall adverse cumulative impacts.

Conclusion

Alternative 3 would result in short- and long-term negligible to minor adverse impacts on wolves in the park because OSV use, or total number of transportation events, would be slightly reduced from the levels permitted under the 2009 to 2011 interim regulations (alternative 2) and limits duration and approach distance of OSV users when encountering wolves due to guiding requirements. Cumulative impacts would be long-term minor adverse, and alternative 3 would contribute a small amount to the overall adverse cumulative impacts.

Impacts of Alternative 4: Manage OSV use by Transportation Events

Displacement, Behavioral, and Physiological Effects

Alternative 4 would manage OSV use in the park based on transportation events. One event would initially equal one group of snowmobiles (maximum of 10 per group, an average of 7 over the winter

season) or one snowcoach. A maximum of 110 transportation events would be allowed each day; however, no more than 50 events could be snowmobile groups. Forty-six of the snowmobile events would be guided groups with a seasonal average size of seven and a maximum of ten snowmobiles. The remaining four snowmobile events would be noncommercially guided groups with a limit of five snowmobiles per group. Operators would decide whether to "spend" their daily allotments of transportation events on snowmobile groups or snowcoaches. As a result, the daily make-up and number of OSVs in the park could range from zero to 480 snowmobiles and 60 to 106 snowcoaches. At maximum daily snowmobile use, OSVs could increase to a maximum of 540 OSVs (480 snowmobiles and 60 snowcoaches), an increase over the most recent interim rule (alternative 2) that allowed for 396 OSVs (318 snowmobiles and 78 snowcoaches); however, this level of OSV use is within the range experienced at the park during historic (pre-2004) and recent (2004–2009) use periods. If snowcoaches were maximized on a given day, their numbers would increase over existing conditions; but total OSVs for that day (106 snowcoaches, zero commercially guided snowmobiles and 20 noncommercially guided snowmobiles) would be less than one-third of the number of vehicles allowed under the most recent interim rule (alternative 2). Regardless of the daily make-up of OSVs, the maximum number of daily transportation events would be less under alternative 4 (110 events) compared to the maximum number currently allowed under the 2009 to 2012 interim regulations (potential for 123 transportation events assuming an average snowmobile group size of seven and a potential for a maximum of 237 transportation events). If technologies were to improve and OSVs meet enhanced BAT standards (which would reduce the sound emissions from OSVs) the total number of snowmobiles would stay the same, with the potential to increase the number of snowcoaches from 106 to 212. If the snowcoach group size were to increase from one to two coaches, the two coaches would travel as close together as possible allowing for safety and would be considered one transportation event for purposes of managing OSV use. Additional impacts are not expected under this scenario, because the number of transportation events would remain the same as allowed under non-enhanced BAT standards.

Winter road monitoring crews rarely observed behavioral responses by wolves to OSVs in Yellowstone, due to infrequent encounters, with a total of only 14 sightings of wolf-OSV interaction over the last seven winter monitoring seasons. Generally, responses by wolves are either look-resume or no visible response (McClure et al. 2009). Glucocorticoid measurements from wolves in Yellowstone and other areas where wolves are exposed to snowmobiles were correlated between and within years during periods of higher OSV activity (Creel et al. 2002). Chronic elevated glucocorticoid levels may result in long-term adverse effects on immune function and body condition, decreasing survival and reproductive rates (Sapolsky 1992). No evidence exists for population-level effects (Creel et al. 2002). Also, frequent exposure to humans may result in habituation by wolves, resulting in possible lethal removal if wolves lose fear of humans and begin to engage in problematic behaviors such as approaching humans or chasing visitors (Smith et al. 2010).

Wolves appear to avoid interaction with OSV users, but there is no evidence from wolf territories in the park of large-scale displacement or habitat avoidance (Smith et al. 2005). Observations of habitat use by radio-collared wolves indicate that wolves frequently travel in the Madison-Firehole-Gibson basin during Winter OSV use, but avoid areas of human activity during the day. Wolf tracks were frequently observed on roads, suggesting that wolves travel on roads at night or when OSVs are not present to conserve energy, but avoid OSV activity during the day, indicating that displacement is short term and directly results from OSV presence (Smith et al. 2005; Smith et al. 2006). Frequent exposure to humans may result in habituation by wolves, resulting in possible lethal removal if wolves lose fear of humans and begin to engage in problematic behaviors such as approaching humans or chasing visitors (Smith et al. 2010). Such habituation behaviors by wolves have not been attributed to OSV visitors following establishment of guiding requirements. A decrease in OSVs, or transportation events, would result in reduced frequency of interactions between OSVs and wolves resulting in fewer adverse behavioral, physiological, and displacement effects. An increase in OSVs and transportation

events would have the opposite effect. The daily make-up of OSVs would depend on the operators and cannot be predicted at this time; however, the number of transportation events would remain the same and there would be a slight decrease in daily transportation events under alternative 4 compared to those permitted under the 2009 to 2011 interim regulations. On average, daily OSV levels would be reduced from 123 (as allowed under alternative 2) to 110. Alternative 4 would allow for up to four noncommercially guided snowmobile groups daily. As previously stated, noncommercial guides would receive guide training; therefore, it is assumed that there would be no difference in impacts between commercial and noncommercial guides. However, noncommercially guided use would be monitored to ensure use is done consistent with park requirements and impacts are within those expected for guided use. Therefore, impacts under alternative 4 would be localized, short-term negligible to minor adverse, and would be reduced from those under alternatives 2 and 3. As discussed above, should all OSVs meet enhanced BAT the increase in OSV use would not increase the overall number of transportation events and would not be expected to increase impact levels beyond a minimal level.

Population-level Effects

Wolf populations in the park have grown during periods of higher OSV use (daily averages of 795 snowmobiles/day) than those that would occur under alternative 4, and data suggest that inter-species aggression and natural causes influence park wolf populations more than OSV use, as described under alternative 2. Such data suggest that avoidance of such areas by wolves during the day, due to OSV use, may limit their hunting success, in turn increasing energy expenditure and mortality and reducing reproductive success. Chronic elevations that would result in decreased reproductive survival rates of this species are unlikely. Therefore, population-level impacts under alternative 4 are predicted to be long-term minor adverse. As discussed above, should all OSVs meet enhanced BAT the increase in OSV use would not increase the overall number of transportation events and would not be expected to increase impact levels beyond a minimal level.

Cumulative Effects

Impacts on wolves from other past, present, and reasonably foreseeable future actions would be the same as described for alternative 1. These impacts are a result of the variety of land and wildlife management activities occurring on lands near or adjacent to the park including the consolidation of checkerboard lands in the Gallatin National Forest, the Gallatin National Forest and the Beartooth District of Custer National Forest travel management plans, timber harvests on adjoining lands, and reintroduction of gray wolves to the greater Yellowstone area, one of the largest causes of these impacts. Within the park, these impacts are a result of active management of the park's elk and bison populations, as well as other wildlife management programs such as the planned remote vaccine delivery to bison, a minimal contributor to impacts on the gray wolf population. New construction in the park, such as that for roads and new visitor centers, also contributes to these impacts, but mitigation measures are in place to ensure that these impacts are negligible to these populations. The minor adverse effects of these actions, when combined with the short and long-term negligible to minor adverse impacts of alternative 4, would result in long-term minor adverse cumulative impacts on wolves. Alternative 4 would contribute a small amount to the overall adverse cumulative impacts.

Conclusion

Alternative 4 would result in short- and long-term negligible to minor adverse impacts on wolves in the park, with impacts less than those expected under alternatives 2 and 4. OSV use, specifically the number of transportation events, would be reduced from the levels permitted under the 2009 to 2011 interim regulations, which would reduce the frequency of OSV encounters with wolves. Should all

OSVs meet enhanced BAT it would not increase the overall number of transportation events and would not be expected to increase impact levels beyond a minimal level. Cumulative impacts would be long-term minor adverse, and alternative 4 would contribute a small amount to the overall adverse cumulative impacts.

AIR QUALITY

GUIDING REGULATIONS AND POLICIES

Air quality is addressed in NPS *Management Policies 2006*. The *NPS Management Policies 2006* state that NPS will "seek to perpetuate the best possible air quality in parks to (1) preserve natural resources and systems; (2) preserve cultural resources; and (3) sustain visitor enjoyment, human health, and scenic vistas" (NPS 2006a; Section 4.7.1). NPS *Management Policies 2006* further state that the NPS will assume an aggressive role in promoting and pursuing measures to protect air quality related values from the adverse impacts of air pollution.

In addition, in compliance with the Clean Air Act (CAA), the U.S. Environmental Protection Agency (EPA) has promulgated National Ambient Air Quality Standards (NAAQS) and regulations. The standards were enacted for the protection of the public health and welfare, allowing for an adequate margin of safety. To date, EPA has issued standards for six criteria pollutants: carbon monoxide (CO), sulfur dioxide (SO_2), particles with a diameter less than or equal to a nominal 10 micrometers (PM_{10}), particles with a diameter less than or equal to a nominal 2.5 micrometers ($PM_{2.5}$), ozone (O_3), nitrogen dioxide (NO_2), and lead (Pb). Each state and locality has the primary responsibility for air pollution prevention and control. Refer to "Chapter 3: Affected Environment" for more information on each of the criteria pollutants and associated NAAQS, the Prevention of Significant Deterioration program and state-level air quality standards.

Concentrations at or above the NAAQS are not the expected natural condition for a park and could result in a non-attainment designation for a park unit, reflecting unacceptable and polluted air. However, pollutant concentrations below the NAAQS can also have substantial effects on park resources and human health. The EPA has developed an Air Quality Index (AQI) that correlates criteria pollutant concentrations to associated health concern categories. The NPS used the AQI in combination with the policy relevant background (PRB) concentration for each pollutant to develop the air quality intensity definitions shown in table 39 (NPS 2011). The PRB concentration represents the natural background plus human pollution from transport outside North America. The air quality intensity definitions reflect the importance of maintaining excellent air quality in parks, not merely complying with the NAAQS. Even concentrations at 80% of the NAAQS are considered a major impact as discussed further below.

Pollutant concentrations at or above the NAAQS are not the expected natural condition for a park and could result in a non-attainment designation for a park unit, reflecting unacceptable and polluted air. However, pollutant concentrations below the NAAQS can also affect human health, particularly in sensitive individuals or can affect other park features (such as vegetation). Therefore, NPS addresses the potential for air quality impacts when pollutant concentrations are below the NAAQS through intensity definitions established in the Technical Guidance on Assessing Impacts to Air Quality in NEPA and Planning Documents (NPS 2011).

METHODOLOGY

This section provides an overview of the major components of the air quality analysis methodology. For detailed technical information on the development of emissions factors, background

concentrations and other modeling assumptions, refer to the air emissions modeling report found on-line at http://www.nps.gov/yell/parkmgmt/winterusetechnicaldocuments.htm.

Criteria Pollutant Concentrations

The park, in consultation with the NPS Air Resources Division, selected four locations for air quality modeling based on OSV traffic levels. To help compare and contrast different levels of OSV use, the sites were selected to include those areas where the highest pollutant concentrations would be expected and to represent a range of OSV activity levels. The four locations selected for modeling are the west entrance, the west entrance to Madison Junction Road, the Old Faithful staging area, and the Canyon to Fishing Bridge road.

Maximum predicted ambient concentrations of CO, NO_2 and PM_{10} and $PM_{2.5}$ were calculated for each location using EPA-approved air quality models (CAL3QHCR and AERMOD). Impacts for each alternative were assessed with respect to the NAAQS and the 1-hour CO state standard in Montana, which is 23 parts per million (ppm) (compared to the 1-hour CO NAAQS of 35 ppm). The estimates of maximum CO, NO_2, PM_{10} and $PM_{2.5}$ concentrations generated by OSVs take into account emissions data, meteorological phenomena, vehicle traffic/travel conditions, and the physical configurations of roadways and staging areas.

The air quality modeling procedures and assumptions were generally similar to those used for the 2011 Winter Use Plan/EIS. However, for CO, updated emissions data and other changes resulted in a substantial increase in CO concentrations for this draft plan/SEIS relative to the 2011 Winter Use Plan/EIS analysis at the west entrance. One factor that influenced this increase was OSV idling in two lines to enter the park. The snowmobile emissions factors were based on updated emissions testing study conducted in March, 2012 (Ray et al. 2012). The snowcoach CO emission factors were based on the 2012 study and data from the 2006 emissions testing study (Ray et al. 2012). As a result of using the latest test data, the snowmobile CO emission factors for this draft plan/SEIS range from 2 to 17 times higher than the 2011 Winter Use Plan/EIS factors, depending on the travel mode (idle, low or cruise speed), while the gasoline snowcoach CO emission factors for the draft plan/SEIS range from 4 to 7 times higher than the 2011 Winter Use Plan/EIS factors. The 2012 emissions testing study tested newer snowmobile models, but used the same methodology as the 2006 study. The exact cause of the increase in snowmobile CO emissions relative to 2006 (particularly idle emissions for the 2011 Arctic Cat TZ1) is not known, but possible explanations include tuning problems with the specific 2011 Arctic Cat TZ1 that was measured (the study was unable to examine more than one snowmobile of the same model/year to confirm this), or because the manufacturer paid less attention to idle mode emissions or because the model assumed OSV idling at the west entrance, in two lines to enter the park (Ray et al. 2012).

In addition, the draft plan/SEIS assumes a more realistic 80/20 gasoline/diesel snowcoach ratio for the current fleet and a 70/30 gasoline/diesel snowcoach ratio for BAT snowcoaches, compared to the 50/50 ratio assumed for most alternatives in the 2011 Winter Use Plan/EIS. This increased draft plan/SEIS CO emission factors (and modeling results) over the 2011 Winter Use Plan/EIS values, as gas snowcoaches have higher CO emissions than diesel snowcoaches. Refer to the air emissions report (found on-line at http://www.nps.gov/yell/parkmgmt/winterusetechnicaldocuments.htm) for further detailed information regarding the modeling methodology and assumptions.

Emissions Inventory

In addition to the modeling analysis for determining potential short-term CO, NO_2, and particulate concentrations, an emissions inventory for criteria pollutants (CO, particulate matter (PM), and NO_x)

and hydrocarbons (HC) in tons per winter season was completed for each alternative. An emissions inventory of hazardous air pollutants (HAPs) (benzene; 1-3 butadiene; formaldehyde; and acetaldehyde) was also completed. Emissions were calculated using travel estimates of OSVs used on Yellowstone roadways, the roadway lengths, and the modes of operation of the vehicles. Emission factors were combined with daily vehicle traffic levels for each roadway segment for each alternative to determine total parkwide emissions for each pollutant. The winter season was defined as a 90-day period running from mid-December to mid-March.

Because Yellowstone is classified as a federal Class I area, PM_{10} increment comparisons under prevention of significant deterioration (PSD) increments were assessed. PSD increments are the maximum permitted increases in pollutant concentrations over baseline levels for PM_{10}. For Class I areas, the PM_{10} PSD increments are 4 and 8 micrograms per cubic meter for the annual and 24-hour averaging periods, respectively. Winter OSV emissions were considered increment consuming or contributing sources for this analysis. The analysis assessed PSD increments for the 24-hour averaging period only, since the sources of concern are only present during the winter season and an annual average would not be applicable. This assessment is a screening level approach and may indicate that a detailed analysis is required if concentrations are near the PM_{10} PSD increments. Furthermore, because the methodology employed in this analysis is a screening-level analysis, it is not intended for regulatory purposes and does not constitute a regulatory PSD increment consumption analysis.

Visibility Impacts

As required by the visibility protection provision of the CAA, additional requirements apply when a proposed source has the potential to impair visibility in a Class I area (40 CFR 52.27 (d)), such as Yellowstone. Potential visibility impacts for each alternative were assessed using the EPA recommended screening model VISCREEN assuming worst-case meteorological conditions.

Analysis Scenarios

Recent average OSV use (2009-2011) was modeled to provide context for evaluating the alternatives given that the full OSV entrance allocations are not typically fully utilized.

Under alternative 1, OSV use would not be allowed by visitors. Administrative OSV use would continue under alternative 1, but at a reduced level compared to other alternatives because there would be minimal operations within the park. Administrative use air quality effects were estimated based on 20 administrative trips per day per entrance.

Alternatives 2, 3, and 4 were modeled based on the maximum allowed level of OSV use each day of the winter season as described in chapter 2. Two fleet scenarios were modeled for alternative 2: current fleet (prior to the full implementation of BAT for snowcoaches by 2017/2018) and the future BAT snowcoach fleet.

For alternative 3, the condition modeled assumed the complete transition to all BAT snowcoaches and no snowmobiles. The earlier years of alternative 3, prior to the transition to all snowcoaches, was assumed to be the same as alternative 2 (current fleet).

Six different modeling scenarios were used to represent the range of conditions that could occur under alternative 4:

- Alternative 4a assumes the maximum allowable number of transportation events for snowmobiles would be used (50 events). This means 480 snowmobiles and 60 snowcoaches would enter the

park. Alternative 4a was analyzed for the current fleet mix, as well as the future fleet mix of all BAT snowcoaches and the new BAT snowmobiles with a 90 g per kw/hr CO emissions limit.

- Alternative 4b assumes the maximum number of transportation events for snowcoaches would be used, which results in zero commercially guided snowmobiles, 20 noncommerically guided snowmobiles, and 106 snowcoaches entering the park. Alternative 4b was modeled for the current fleet mix, as well as the future fleet mix of all BAT snowcoaches.
- Alternative 4c is similar to alternative 4a, except the number of snowcoaches would be allowed to double from 60 to 120 assuming enhanced BAT was met. The number of snowmobiles would remain 480. Alternative 4c was analyzed for a BAT snowcoach and new BAT snowmobile (90 g per kw/hr CO emissions limit and 66 dBA) fleet mix because all BAT snowcoaches and snowmobiles would be required for this situation to occur.
- Alternative 4d is similar to alternative 4b, except the number of snowcoaches would be allowed to double from 106 to 212 assuming enhanced BAT was met as described under 4c. The number of commercially guided snowmobiles would remain zero, with 20 noncommerically guided snowmobiles. Alternative 4d was modeled for a BAT snowcoach mix because BAT snowcoaches would be required for this situation to occur.

Intensity Definitions

Concentrations at or above the NAAQS are not the expected natural condition for a park and could result in a non-attainment designation for a park unit, reflecting unacceptable and polluted air. However, pollutant concentrations below the NAAQS can also have substantial effects on park resources and human health. The EPA has developed an Air Quality Index (AQI) that correlates criteria pollutant concentrations to associated health concern categories. The NPS used the AQI in combination with the policy relevant background (PRB) concentration for each pollutant to develop the air quality intensity definitions shown in table 39 (NPS 2011). The PRB concentration represents the natural background plus human pollution from transport outside North America. The air quality intensity definitions reflect the importance of maintaining excellent air quality in parks, not merely complying with the NAAQS. Even concentrations at 80% of the NAAQS are considered a major impact.

TABLE 39: AIR QUALITY INTENSITY DEFINITIONS

Impact level	1-hr Carbon Monoxide (ppm)	8-hr Carbon Monoxide (ppm)	24-hr PM_{10} ($\mu g/m^3$)	24-hr $PM_{2.5}$ ($\mu g/m^3$)	1-hr Nitrogen Dioxide (ppb)
Negligible	0–0.2	0–0.2	0–11	0–5	0–1
Minor	0.3–17.5	0.3–4.4	12–77	6–20	2–49
Moderate	17.6–27.9	4.5–7.1	78–119	21–28	50–79
Major	28.0–35.0	7.2–9.0	120–150	29–35	79–100

Source: Technical Guidance on Assessing Impacts to Air Quality in NEPA and Planning Documents (NPS 2011).

A negligible impact is defined as the range of concentrations for each pollutant that is the highest estimated PRB concentration, as determined by EPA in its criteria pollutant documents and pollutant assessments. Concentrations in this range are indistinguishable from variations in the background concentrations that are of natural and long-range transport origin. The minor impact level follows the AQI scale and corresponds to concentrations from the PRB up to an additional 50% of the difference between the PRB and the NAAQS. The moderate impact level is from 51% to 79% of the NAAQS.

The major impact level in table 39 corresponds to 80% to 100% of the NAAQS for each pollutant. EPA often uses 80% as a threshold warning for approaching the NAAQS.

Qualitative visibility impact thresholds are defined separately from the air quality definitions (table 40).

TABLE 40: VISIBILITY INTENSITY DEFINITIONS

Impact level	Description
Negligible	No perceptible visibility impacts are likely (no visible smoke, plume, or haze).
Minor	Perceptible visibility impacts occur, but are only visible from a small area of the park, are of short duration (less than one day per year) and visible to only a few park visitors on the days that they occur.
Moderate	Perceptible visibility impacts occur and are visible from several areas of the park, occur between one and several days per year, and many park visitors may observe them on the days that they occur.
Major	Perceptible visibility impacts occur and are visible from many areas of the park, occur many days over the course of a year, or are visible to a majority of park visitors on the days that they occur.

Source: Technical Guidance on Assessing Impacts to Air Quality in NEPA and Planning Documents (NPS 2011).

Study Area

The study area for the assessment of the various alternatives is the park. The study area for the cumulative impacts analysis is the park plus the lands adjacent to the park boundaries.

Criteria Pollutant Concentrations

Tables 41 and 42 show the maximum predicted 1- and 8-hour average CO concentrations for each of the action alternatives. The modeling results indicate that winter use vehicle emissions would not result in any exceedence of the CO NAAQS, or Montana's stricter 1-hr CO standard of 23 ppm, under any of the alternatives. The maximum predicted 1-hour CO concentrations are above background levels, but less than 50% of the difference between background levels and the NAAQS, resulting in minor impacts under any of the alternatives. Under alternatives 1, 2, 3, 4b, 4c and 4d, the maximum predicted 8-hour CO concentrations are above background levels, but less than 50% of the difference between background levels and the NAAQS (minor impacts). Moderate impacts for the CO 8-hr concentrations would occur under alternative 4a based on the current fleet composition, but these would be reduced to minor impacts with BAT snowcoaches and stricter BAT requirements for snowmobiles by 2017/2018. For both 1-hr and 8-hr CO, the minor to moderate impacts would occur at the west entrance to Madison site, with negligible impacts at all other sites evaluated.

Table 43 shows the maximum predicted 1-hour NO_2 concentrations for each of the alternatives. For all alternatives, the modeling results indicate that the maximum 1-hour NO_2 concentrations would be well below the NAAQS. For alternatives 1, 2 (with BAT snowcoaches), 3, 4b and 4d, the predicted maximum NO_2 concentrations would fall into the minor impacts category (above background levels, but less than 50% of the difference between background levels and the NAAQS). Moderate impacts would occur with alternative 2 under current fleet assumptions, alternative 4a (both current fleet and BAT snowcoach scenarios, although concentrations are lower in the BAT snowcoach scenario) and alternative 4c.

TABLE 41: MAXIMUM PREDICTED 1-HOUR CARBON MONOXIDE (CO) CONCENTRATIONS (IN PPM)

Alternative	Fleet Assumption	Site 1: West Entrance	Site 2: West Entrance to Madison	Site 3: Canyon to Fishing Bridge	Site 4: Old Faithful Staging Area	Maximum Impact
Recent Average Conditions (2009-2011)	Current Fleet	8.3	0.4	0.3	0.4	Minor
Alternative 1: No Snowmobile/Snowcoach Use	Administrative Use, Current Fleet	3.4	0.2	0.2	0.2	Minor
Alternative 2: Continue Snowmobile/Snowcoach Use at 2011/2012 Winter Season Interim Regulation Limits	Current Fleet	9.3	0.4	0.4	0.4	Minor
	BAT Snowcoaches	8.6	0.4	0.3	0.4	Minor
Alternative 3: Transition to BAT Snowcoaches Only	BAT Snowcoaches, No Snowmobiles	7.2	0.4	0.3	0.3	Minor
Alternative 4a: Manage OSV Use by Transportation Events (480 snowmobiles/60 snowcoaches)	Current Fleet	13.0	0.4	0.4	0.5	Minor
	BAT Snowcoaches and Snowmobiles*	13.0	0.4	0.4	0.5	Minor
Alternative 4b: Manage OSV Use by Transportation Events (0 snowmobiles/106 snowcoaches)	Current Fleet	6.4	0.4	0.3	0.3	Minor
	BAT Snowcoaches	6.4	0.3	0.2	0.3	Minor
Alternative 4c: Manage OSV Use by Transportation Events (480 snowmobiles, 120 snowcoaches)	BAT Snowcoaches and Snowmobiles*	14.2	0.5	0.4	0.5	Minor
Alternative 4d: Manage OSV Use by Transportation Events (0 snowmobiles/212 snowcoaches)	BAT Snowcoaches	7.2	0.4	0.3	0.3	Minor

Note: The 1-hr NAAQS for CO is 35 parts per million (ppm) and the stricter Montana state standard is 23 ppm.

*Alternative 4 incorporates an additional BAT requirement for snowmobiles beginning with the 2017/2018 season—CO limit of 90 g per kw/hr. This effect of this enhanced BAT for snowmobiles was estimated by reducing the modeled concentrations by 25%.

TABLE 42: MAXIMUM PREDICTED 8-HOUR CARBON MONOXIDE (CO) CONCENTRATIONS (IN PPM)

Alternative	Fleet Assumption	Site 1: West Entrance	Site 2: West Entrance to Madison	Site 3: Canyon to Fishing Bridge	Site 4: Old Faithful Staging Area	Maximum Impact
Recent Average Conditions (2009-2011)	Current Fleet	1.4	0.3	0.2	0.2	Minor
Alternative 1: No Snowmobile/Snowcoach Use	Administrative Use, Current Fleet	1.0	0.2	0.2	0.2	Minor
Alternative 2: Continue Snowmobile/Snowcoach Use at 2011/2012 Winter Season Interim Regulation Limits	Current Fleet	3.4	0.3	0.2	0.2	Minor
	BAT Snowcoaches	3.2	0.3	0.2	0.2	Minor
Alternative 3: Transition to BAT Snowcoaches Only	BAT Snowcoaches, No Snowmobiles	2.3	0.2	0.2	0.2	Minor
Alternative 4a: Manage OSV Use by Transportation Events (480 snowmobiles/60 snowcoaches)	Current Fleet	4.5	0.3	0.2	0.3	Moderate
	BAT Snowcoaches and Snowmobiles*	4.5	0.3	0.2	0.3	Moderate (reduced to Minor once additional CO standards are applied in 2017/2018)
Alternative 4b: Manage OSV Use by Transportation Events (0 snowmobiles/106 snowcoaches)	Current Fleet	2.3	0.2	0.2	0.2	Minor
	BAT Snowcoaches	2.3	0.2	0.2	0.2	Minor
Alternative 4c: Manage OSV Use by Transportation Events (480 snowmobiles, 120 snowcoaches)	BAT Snowcoaches and Snowmobiles*	5.2	0.3	0.2	0.3	Moderate (reduced to Minor once additional CO standards are applied in 2017/2018)
Alternative 4d: Manage OSV Use by Transportation Events (0 snowmobiles/212 snowcoaches)	BAT Snowcoaches	3.2	0.2	0.2	0.2	Minor

Note: The 8-hr NAAQS for CO is 9 parts per million (ppm).

*Alternative 4 incorporates an additional BAT requirement for snowmobiles beginning with the 2017/2018 season—CO limit of 90 g per kw/hr. This effect of this enhanced BAT for snowmobiles was estimated by reducing the modeled concentrations by 25%.

TABLE 43: MAXIMUM PREDICTED 1-HOUR NITROGEN DIOXIDE (NO_2) CONCENTRATIONS (IN PPB)

Alternative	Fleet Assumption	Site 1: West Entrance	Site 2: West Entrance to Madison	Site 3: Canyon to Fishing Bridge	Site 4: Old Faithful Staging Area	Maximum Impact
Recent Average Conditions (2009-2011)	Current Fleet	29.3	55.3	22.3	0.6	Moderate
Alternative 1: No Snowmobile/Snowcoach Use	Administrative Use, Current Fleet	5.3	7.3	2.3	0.4	Minor
Alternative 2: Continue Snowmobile/Snowcoach Use at 2011/2012 Winter Season Interim Regulation Limits	Current Fleet	36.9	53.0	32.3	0.7	Moderate
	BAT Snowcoaches	29.8	47.8	30.3	0.7	Minor
Alternative 3: Transition to BAT Snowcoaches Only	BAT Snowcoaches, No Snowmobiles	16.5	25.5	12.3	0.6	Minor
Alternative 4a: Manage OSV Use by Transportation Events (480 snowmobiles/60 snowcoaches)	Current Fleet	46.9	70.1	40.3	0.8	Moderate
	BAT Snowcoaches	41.2	64.4	39.3	0.7	Moderate
Alternative 4b: Manage OSV Use by Transportation Events (0 snowmobiles/106 snowcoaches)	Current Fleet	21.7	39.3	13.3	0.7	Minor
	BAT Snowcoaches	14.1	25.5	12.3	0.5	Minor
Alternative 4c: Manage OSV Use by Transportation Events (480 snowmobiles, 120 snowcoaches)	BAT Snowcoaches	52.6	71.6	45.3	0.8	Moderate
Alternative 4d: Manage OSV Use by Transportation Events (0 snowmobiles/212 snowcoaches)	BAT Snowcoaches	29.3	43.5	22.3	0.6	Minor

Note: The NAAQS for NO_2 is 100 parts per billion (ppb), for the 1-hour averaging period.

Table 44 shows the maximum predicted 24-hour $PM_{2.5}$ concentrations for each of the alternatives. The modeling results indicate that no winter use vehicle emissions from any of the alternatives would result in exceedences of the 24-hour $PM_{2.5}$ NAAQS. Under all alternatives, 24-hour $PM_{2.5}$ concentrations would be in the range of background concentrations (negligible impacts).

TABLE 44: MAXIMUM PREDICTED 24-HOUR $PM_{2.5}$ CONCENTRATIONS (IN µG/M^3)

Alternative	Fleet Assumption	Site 1: West Entrance	Site 2: West Entrance to Madison	Site 3: Canyon to Fishing Bridge	Site 4: Old Faithful Staging Area	Maximum Impact
Recent Average Conditions (2009-2011)	Current Fleet	1.6	1.4	1.4	1.4	Negligible
Alternative 1: No Snowmobile/Snowcoach Use	Administrative Use, Current Fleet	1.4	1.4	1.4	1.4	Negligible
Alternative 2: Continue Snowmobile/Snowcoach Use at 2011/2012 Winter Season Interim Regulation Limits	Current Fleet	1.7	1.4	1.4	1.5	Negligible
	BAT Snowcoaches	1.7	1.4	1.4	1.5	Negligible
Alternative 3: Transition to BAT Snowcoaches Only	BAT Snowcoaches, No Snowmobiles	1.5	1.4	1.4	1.4	Negligible
Alternative 4a: Manage OSV Use by Transportation Events (480 snowmobiles/60 snowcoaches)	Current Fleet	2.1	1.4	1.4	1.5	Negligible
	BAT Snowcoaches	2.1	1.4	1.4	1.5	Negligible
Alternative 4b: Manage OSV Use by Transportation Events (0 snowmobiles/106 snowcoaches)	Current Fleet	1.4	1.4	1.4	1.4	Negligible
	BAT Snowcoaches	1.4	1.4	1.4	1.4	Negligible
Alternative 4c: Manage OSV Use by Transportation Events (480 snowmobiles, 120 snowcoaches)	BAT Snowcoaches	2.1	1.5	1.4	1.5	Negligible
Alternative 4d: Manage OSV Use by Transportation Events (0 snowmobiles/212 snowcoaches)	BAT Snowcoaches	1.4	1.4	1.4	1.4	Negligible

Note: The NAAQS for $PM_{2.5}$ is 35 micrograms per cubic meter (µg/m^3), for the 24-hour averaging period.

Prevention of Significant Deterioration Increment Analysis

Since Yellowstone is a Class I area, PM_{10} PSD increment consumption was assessed. For Class I areas, the PM_{10} PSD increment is 8 micrograms per cubic meter for the 24-hour averaging period, which the EPA has determined to be the largest "allowable" incremental increase for PM_{10} in these areas. This increment is evaluated in reference to the previously established baseline date of 1979 for Yellowstone (NPS 2000c), which was used to determine baseline concentrations. For this study, a screening level approach was employed in comparing predicted PM_{10} increments (no background contribution) with estimated 1979 baseline concentrations to determine the increment for the alternatives.

Snowmobile traffic in the park increased from 1979 until the early 2000s and then decreased to levels less than the late 1970s, whereas snowcoach travel has seen a steady increase, almost doubling in 10 years. It is expected that the BAT snowmobiles required by the proposed alternatives would generally result in a net decrease in 24-hour PM_{10} levels compared to the established baseline data. The 1979 baseline levels were estimated as part of the 2007 Yellowstone Winter Use Plan FEIS. The methodology used to develop the 1979 baseline levels involved adjusting 1999 Historical Conditions Scenario modeled PM_{10} levels based on the maximum daily snowmobile levels (from Yellowstone

entry records) for 1979 and 1999. Because the methodology employed in this study is a screening-level analysis, it is not intended for regulatory purposes and does not constitute a regulatory PSD increment consumption analysis. Typically, detailed analysis would be required if concentrations are near or "consume" the allowable Class I PM_{10} PSD increment.

The predicted 24-hour PM_{10} PSD increment consumption values are shown in table 45 for each of the alternatives. The PSD increment is below the applicable PSD increment threshold of 8 micrograms per cubic meter for all alternatives and analysis sites. Therefore, further detailed analysis of PM_{10} increment consumption is not required.

TABLE 45: 24-HOUR PM_{10} PSD INCREMENT CONSUMPTION IN MICROGRAMS PER CUBIC METER ($\mu G/M^3$)

Alternative	Fleet Assumption	Site 1: West Entrance	Site 2: West Entrance to Madison	Site 3: Canyon to Fishing Bridge	Site 4: Old Faithful Staging Area
Recent Average Conditions (2009-2011)	Current Fleet	0.24	0.02	0.01	0.05
Alternative 1: No Snowmobile/Snowcoach Use	Administrative Use, Current Fleet	0.01	0.01	0.00	0.01
Alternative 2: Continue Snowmobile/Snowcoach Use at 2011/2012 Winter Season Interim Regulation Limits	Current Fleet	0.32	0.03	0.02	0.07
	BAT Snowcoaches	0.32	0.03	0.02	0.06
Alternative 3: Transition to BAT Snowcoaches Only	BAT Snowcoaches, No Snowmobiles	0.07	0.02	0.00	0.02
Alternative 4a: Manage OSV Use by Transportation Events (480 snowmobiles/60 snowcoaches)	Current Fleet	0.66	0.04	0.03	0.09
	BAT Snowcoaches	0.66	0.04	0.03	0.09
Alternative 4b: Manage OSV Use by Transportation Events (0 snowmobiles/106 snowcoaches)	Current Fleet	0.02	0.02	0.00	0.02
	BAT Snowcoaches	0.02	0.02	0.00	0.02
Alternative 4c: Manage OSV Use by Transportation Events (480 snowmobiles, 120 snowcoaches)	BAT Snowcoaches	0.70	0.05	0.03	0.09
Alternative 4d: Manage OSV Use by Transportation Events (0 snowmobiles/212 snowcoaches)	BAT Snowcoaches	0.03	0.02	0.01	0.02
1999 Historical Unregulated Scenario	N/A	191.47	40.18	5.85	3.76
PSD Baseline Year: 1979 Historical Condition	N/A	42.46	8.91	1.13	0.72

Note: Baseline Year concentrations are based on the ratio of 1979 to 1999 snowmobile levels at the modeling locations. Class I PSD Increment for 24-hour average PM10 is 8 $\mu g/m^3$.

Emissions Inventory

The total maximum potential winter season emissions in the park in tons per winter season are shown for each action alternative in table 46. To help put the emissions inventory in perspective; annual OSV emissions information for the year 2000 is also presented. Comparing the 2000 conditions with the

recent average conditions scenario shows a substantial decrease in carbon monoxide emissions and particulate matter attributable to implementation of snowmobile BAT and reductions in the number of snowmobiles. At the same time, NO_x emissions have increased with the replacement of many two-stroke snowmobile engines with four-stroke engines and the increase in the number of snowcoaches.

TABLE 46: PARKWIDE TOTAL WINTER SEASON MOBILE SOURCE EMISSIONS IN POUNDS PER DAY (LB/DAY) AND TONS PER YEAR (TPY)

Alternative	Fleet Assumption	Carbon Monoxide (CO)		Hydrocarbon (HC)		Nitrogen Oxides (NO_x)		Particulate Matter (PM)	
		lbs/day	tpy	lbs/day	tpy	lbs/day	tpy	lbs/day	tpy
Recent Average Conditions (2009-2011)	Current Fleet	3,072	138	120	5	611	28	2	0.1
Alternative 1: No Snowmobile/Snowcoach Use	Administrative Use, Current Fleet	502	23	20	1	108	5	0.3	0.02
Alternative 2: Continue Snowmobile/Snowcoach Use at 2011/2012 Winter Season Interim Regulation Limits	Current Fleet	4,969	224	195	9	934	42	3	0.1
	BAT Snowcoaches	3,874	174	114	5	850	38	3	0.1
Alternative 3: Transition to BAT Snowcoaches Only	BAT Snowcoaches, No Snowmobiles	2,306	104	38	2	335	15	1	0.04
Alternative 4a: Manage OSV Use by Transportation Events (480 snowmobiles/60 snowcoaches)	Current Fleet	5,594	252	213	10	1,184	53	4	0.2
	BAT Snowcoaches	4,719	212	153	7	1,117	50	4	0.2
Alternative 4b: Manage OSV Use by Transportation Events (0 snowmobiles/106 snowcoaches)	Current Fleet	3,663	165	147	7	435	20	1	0.1
	BAT Snowcoaches	2,173	98	37	2	322	14	1	0.04
Alternative 4c: Manage OSV Use by Transportation Events (480 snowmobiles, 120 snowcoaches)	BAT Snowcoaches	5,519	248	161	7	1,200	54	4	0.2
Alternative 4d: Manage OSV Use by Transportation Events (0 snowmobiles/212 snowcoaches)	BAT Snowcoaches	3,645	164	51	2	474	21	1	0.1
Historical Yellowstone OSV Emissions (circa 2000)	N/A	N/A	1,730	N/A	N/A	N/A	4	N/A	9.5

Notes: Annual OSV Emissions for 2000 are from the 2000 Air Emissions Inventory, Yellowstone National Park (final March 2003) (NPS 2003b).

The report inventoried volatile organic compounds (VOCs) but not HC.

All of the action alternatives would result in substantially greater emissions than the no action alternative. Of the action alternatives, alternatives 3 and 4b (BAT snowcoach scenario) generally have the lowest emissions, while alternatives 4a (current fleet) and 4c have the highest emissions. Impacts for all alternatives are minor, with the exception of 8-hour CO for alternative 4 which would meet moderate. However, that moderate impact would be reduced to minor starting in the 2017/2018 winter season when additional CO requirements would be implemented. The completion of the transition to BAT snowcoaches substantially lowers emissions for the BAT snowcoach scenario compared to the current fleet scenario under alternatives 2, 4a and 4b.

Hazardous Air Pollutant Emissions

Total winter season mobile source emissions of HAPs for the action alternatives are summarized in table 47. HAP emissions, such as benzene, would be highest under alternative 4a (current fleet) and lowest under alternatives 3 and 4b (BAT snowcoach scenario).

TABLE 47: PARKWIDE TOTAL WINTER SEASON MOBILE SOURCES HAPS EMISSIONS (TONS PER YEAR)

Alternative	Fleet Assumption	Benzene (tpy)	1-3 Butadiene (tpy)	Formaldehyde (tpy)	Acetaldehyde (tpy)
Recent Average Conditions (2009-2011)	Current Fleet	0.17	0.01	0.13	0.05
Alternative 1: No Snowmobile/Snowcoach Use	Administrative Use, Current Fleet	0.03	0.00	0.02	0.01
Alternative 2: Continue Snowmobile/Snowcoach Use at 2011/2012 Winter Season Interim Regulation Limits	Current Fleet	0.28	0.03	0.20	0.07
	BAT Snowcoaches	0.14	0.00	0.14	0.05
Alternative 3: Transition to BAT Snowcoaches Only	BAT Snowcoaches, No Snowmobiles	0.05	0.00	0.04	0.02
Alternative 4a: Manage OSV Use by Transportation Events (480 snowmobiles/60 snowcoaches)	Current Fleet	0.29	0.02	0.23	0.09
	BAT Snowcoaches	0.18	0.00	0.19	0.07
Alternative 4b: Manage OSV Use by Transportation Events (0 snowmobiles/106 snowcoaches)	Current Fleet	0.24	0.03	0.12	0.04
	BAT Snowcoaches	0.05	0.00	0.04	0.01
Alternative 4c: Manage OSV Use by Transportation Events (480 snowmobiles, 120 snowcoaches)	BAT Snowcoaches	0.20	0.00	0.20	0.07
Alternative 4d: Manage OSV Use by Transportation Events (0 snowmobiles/212 snowcoaches)	BAT Snowcoaches	0.07	0.01	0.05	0.02

Notes: Four-stroke snowmobile HAPs estimated as a fraction of measured HC emissions based on data reported in SwRI's Laboratory Testing of Snowmobile Emissions, Lela and White, July 2002.

Snowcoach HAPs were estimated as a fraction of HC emissions based on MOBILE6.2 modeling of HC and air toxics emission factors for light- and heavy-duty vehicles.

Visibility

As described above under Visibility Impacts, potential visibility impacts for each alternative were assessed using the EPA recommended screening model VISCREEN assuming worst-case meteorological conditions. The results of the VISCREEN modeling showed no potential for perceptible visibility impacts under any of the action alternatives. Therefore, further detailed analysis of visibility impacts was not warranted.

SUMMARY OF IMPACTS

This section summarizes the impact analysis results for each alternative, discusses cumulative effects, and provides conclusions regarding the effects of each alternative on air quality and visibility. The air quality impacts for each alternative are representative of the maximum level of impact that could occur from emissions of CO, NO_2 and $PM_{2.5}$. This section is followed by the detailed impact analysis of each alternative.

- Recent average conditions would have short-term moderate adverse impacts on air quality as a result of the predicted maximum 1-hour NO_2 concentration of 55.3 ppb at the west entrance to Madison, with minor adverse impacts at all other sites analyzed. Recent average conditions would result in long-term minor adverse on air quality as a result of the predicted maximum 1-hour CO and 8-hr CO 8.3 ppm and 1.4 ppm, respectively. No exceedences of the NAAQS would occur. No perceptible visibility impacts would be likely, resulting in long-term negligible adverse impacts.
- Limited administrative OSV use under alternative 1 would have long-term minor adverse impacts on air quality as a result of the predicted maximum 1-hour CO, 8-hour CO and 1-hour NO_2 concentrations of 3.4 ppm, 1.0 ppm and 7.3 ppb, respectively. No exceedences of the NAAQS would occur. No perceptible visibility impacts would be likely, resulting in long-term negligible adverse impacts.
- Prior to transition to BAT snowcoaches in 2017/2018, alternative 2 would have short-term moderate adverse impacts on air quality as a result of the predicted maximum 1-hour NO_2 concentration of 53 ppb at the west entrance to Madison, with minor adverse impacts at all other sites analyzed. After the transition to BAT snowcoaches, alternative 2 would result in long-term minor adverse on air quality as a result of the predicted maximum 1-hour CO, 8-hr CO and 1-hour NO_2 concentrations of 8.6 ppm, 3.2 ppm and 47.8 ppb, respectively. No exceedences of the NAAQS would occur before, during or after the transition to BAT snowcoaches. No perceptible visibility impacts would be likely, resulting in long-term negligible adverse impacts before, during and after the transition to BAT snowcoaches.
- Following the transition to all BAT snowcoaches, alternative 3 would result in long-term minor adverse impacts to air quality as a result of the predicted maximum 1-hour CO, 8-hour CO and NO_2 concentrations of 7.2 ppm, 2.3 ppm and 25.5 ppb, respectively. Prior to the transition, impacts would be similar to alternative 2 (current fleet scenario) or short-term moderate adverse due to concentrations at the west entrance to Madison, with minor adverse impacts at all other sites analyzed. No exceedences of the NAAQS would occur. No perceptible visibility impacts would be likely, resulting in long-term negligible adverse impacts before, during and after the transition to BAT snowcoaches.
- Alternative 4 would have long-term moderate adverse impacts on air quality as a result of the predicted maximum 1-hr NO_2 concentrations and 8-hr CO concentrations under conditions 4a and 4c (the analysis scenarios where transportation event allocations are used to maximize the number of snowmobile entries). This condition would occur at the west entrance only, where modeling assumed idling OSV waiting in two lines to enter the park. The 8-hour CO concentrations would be reduced to minor adverse starting the 20187/2018 winter season when new CO standards take effect. If snowcoach entries were maximizes (conditions 4b and 4d), air quality impacts would long term minor adverse. The impact of alternative 4 could vary between minor adverse and moderate adverse season to season depending on the allocation of transportation events. No exceedences of the NAAQS would occur, and the NAAQS would be 80% or less of the exceedence level. No perceptible visibility impacts would be likely, resulting in long-term negligible adverse impacts under all analysis conditions.

DETAILED IMPACT ANALYSIS

Recent Average Conditions

Recent average conditions would have short-term moderate adverse impacts on air quality as a result of the predicted maximum 1-hour NO_2 concentration of 55.3 ppb at the west entrance to Madison, with minor adverse impacts at all other sites analyzed. Recent average conditions would result in long-term minor adverse on air quality as a result of the predicted maximum 1-hour CO and 8-hr CO 8.3 ppm and 1.4 ppm, respectively. No exceedences of the NAAQS would occur. No perceptible visibility impacts would be likely, resulting in long-term negligible adverse impacts.

Impacts of Alternative 1: No Snowmobile/Snowcoach Use

Limited administrative OSV use under alternative 1 would have long-term minor adverse impacts on air quality as a result of the predicted maximum 1-hour CO, 8-hour CO and 1-hour NO_2 concentrations of 3.4 ppm, 1.0 ppm and 7.3 ppb, respectively. No exceedences of the NAAQS would occur. No perceptible visibility impacts would be likely, resulting in long-term negligible adverse impacts.

Cumulative Impacts

Past, present, and reasonably foreseeable future actions that have the potential to impact air quality are summarized below. Substantial impacts to air quality and visibility in the park are not expected due to the protections granted under the CAA as a Class I area. The impacts of past, present, and reasonably foreseeable future actions, combined with the long-term negligible impacts of alternative 1, would result in long-term minor adverse impacts on air quality. Under alternative 1, the past, present, and reasonably foreseeable future actions would be the primary contributors to the cumulative impacts. The contribution of the low levels of administrative OSV use under this alternative to overall cumulative impacts would be minimal.

Wheeled vehicle and OSV use outside the boundaries of the park has the potential to impact regional winter season air quality, including the background pollutant levels in the park. Unlike in Yellowstone, the use of BAT snowmobiles (which result in lower CO and HC emissions) is not required on adjacent federal lands. Future trends in the emissions from wheeled vehicles and OSVs operating outside the park will be influenced by the travel management plans of the adjacent national forests. The potential implications of two such travel plans are summarized below—the Gallatin National Forest Travel Plan Revision and the Beartooth District of Custer National Forest Travel Management Plan.

Gallatin National Forest is adjacent to Yellowstone's northern border and part of its western border. The 2006 Record of Decision for the Gallatin National Forest Travel Plan Revision decreased the area of the Gallatin National Forest open to snowmobile use (outside of wilderness areas) from 84% to about 55% (USFS 2006). Snowmobile routes would be concentrated in the areas surrounding West Yellowstone and Cooke City. The FEIS for the Gallatin National Forest Travel Plan Revision concluded that air quality was not a significant issue for the evaluation of the travel plan alternatives and that no violations of the Montana ambient air quality standards or NAAQS would occur (USFS 2006). Therefore, it can be concluded that the impacts of the Gallatin Travel Plan on air quality in Yellowstone would be long-term negligible adverse because it would be less than the effect within Gallatin National Forest itself.

The Beartooth District of Custer National Forest is adjacent to the northeast corner of Yellowstone. A Record of Decision for the Beartooth District Travel Management Plan was issued in 2008 (USFS 2008b). The travel management plan addressed motorized vehicle routes, but OSV regulations were explicitly excluded from the scope of the plan. As a result, OSV use in the Beartooth District remains regulated by a 1986 Forest Plan. OSV use in the small portion of the Beartooth District around Cooke City is administered by the Gallatin National Forest Travel Plan Revision described previously. The 2008 FEIS for the travel management plan concluded that air quality in the Beartooth District would continue to be well under the NAAQS for the following reasons: "(1) good dispersion characteristics across the District, (2) low inversion potential across the District, (3) low emissions from vehicles relative to other potential sources, and 4) reduced or equivalent route miles open to motorized vehicles under all alternatives compared to the existing condition" (USFS 2008b). In addition, the park is generally upwind from the Beartooth District. Therefore, it can be concluded that the impact of the Beartooth District Travel Management Plan on air quality in the park would be long-term negligible adverse because it would be less than the effect within the Beartooth District itself.

Parts of Wyoming and Montana are experiencing record amounts of oil and gas leasing. The pollutant emissions generated by oil and gas drilling include NO_x and SO_2. The emissions from oil and gas drilling can contribute to ozone formation and visibility impacts. Long-term minor adverse impacts to air quality and visibility from oil and gas development in the region can reasonably be expected. Oil and gas development is considered the largest "threat" to air quality in the greater Yellowstone area by the Greater Yellowstone Clean Air Partnership (GYC 2005). Specific areas where oil and gas development is concentrated include the Pinedale Anticline and Jonah II natural gas fields near Pinedale, Wyoming (GYC 2005).

The most recent environmental analyses conducted by the Bureau of Land Management (BLM) for oil and gas development in the Pinedale Anticline is provided in the 2008 Pinedale Anticline Project Area Supplemental Environmental Impact Statement (SEIS) (BLM 2008a). BLM approved up to 600 additional well pads and 4,399 wells in the Pinedale Anticline (BLM 2008b). The air quality analyses conducted for the Pinedale Anticline SEIS concluded that there would be no exceedences of the NAAQS or the applicable PSD increments in the analyzed Class I areas, including Yellowstone. This conclusion remained true even in modeling of a cumulative impacts scenario that included other major industrial sources in the region (BLM 2008c).

In terms of visibility impacts, the Pinedale Anticline SEIS analysis predicted a maximum of three days per year where visibility in Yellowstone would change by 0.5 deciview (approximately a 5% change in light extinction) or more taking into account the cumulative emissions of the Pinedale Anticline development, other emissions sources and IMPROVE network background levels. Based on the direct impacts of the Pinedale Anticline development alone, no exceedences of 0.5 deciview were predicted. The analysis is based on 98th percentile values in accordance with Federal Land Managers' Air Quality Related Values Work Group (FLAG) guidance. The BLM analysis results show that the Pinedale Anticline development would not result in adverse visibility impacts in Yellowstone based on the FLAG thresholds for Class I areas (0.5 deciview change for direct impacts and 1.0 deciview change for cumulative impacts).

Another trend with the potential to result in more development is the consolidation of lands in the Gallatin National Forest. In the last ten years, the Gallatin National Forest has negotiated several land exchanges that have consolidated some previously checkerboarded holdings. Although this has generally positive effects for most wildlife (because consolidated lands are less subject to development), it has the negative side-effect of private land consolidation (especially in the Big Sky area), which has allowed more land subdivision and rural growth to occur there, with consequent effects on traffic and air quality (NPS 2007c). Population and employment growth in the Yellowstone

region affects winter season air quality through emissions from woodstoves, furnaces, industrial point sources (including power plants and oil refineries), on-road vehicles, and off-road recreational vehicles. The major emissions from woodstoves include PM, CO, VOC and NO_x (USEPA 1995). These same pollutants are also emitted by on-road vehicles and off-road recreational vehicles in the winter. Daily vehicle miles travelled on state highways in Park County and Teton County, Wyoming for 2008 were estimated at 587,627 and 622,770, respectively (WDOT 2008). There is insufficient information available to develop a cumulative emissions scenario taking into account all future emissions from population and employment growth in the region. However, given the existing air quality in the area and increasing emissions standards for both mobile and point sources that will lower pollutant emissions, the impacts of these actions on air quality in the park are considered to be long-term minor adverse.

Conclusion

The effects of alternative 1 on air quality and visibility would be long-term minor adverse. Cumulative impacts would result in long-term minor adverse impacts on air quality.

Impacts of Alternative 2: Continue Snowmobile/Snowcoach Use at 2011/2012 Winter Season Interim Regulation Limits

Prior to transition to BAT snowcoaches in 2017/2018, alternative 2 would have short-term moderate adverse impacts on air quality as a result of the predicted maximum 1-hour NO_2 concentration of 53 ppb at the west entrance to Madison, all other sites analyzed would have long-term minor adverse impacts. After the transition to BAT snowcoaches, alternative 2 would result in long-term minor adverse on air quality as a result of the predicted maximum 1-hour CO, 8-hr CO and 1-hour NO_2 concentrations of 8.6 ppm, 3.2 ppm and 47.8 ppb, respectively. No exceedences of the NAAQS would occur before, during or after the transition to BAT snowcoaches. No perceptible visibility impacts would be likely, resulting in long-term negligible adverse impacts before, during and after the transition to BAT snowcoaches.

Cumulative Impacts

Impacts on air quality from other past, present, and reasonably foreseeable future actions would be the same as described for alternative 1. These impacts are a result of generators outside the park's boundaries, such as wheeled vehicle and OSV use outside the park, activities from oil and gas leasing, and the consolidation of lands in the Gallatin National Forest. Implementation of other management plans that address motorized uses such as the Gallatin National Forest Travel Management Plan and the Beartooth District of Custer National Forest Travel Management Plan also would impact air quality in the region. The effects of these actions, when combined with the long-term minor adverse impacts of alternative 2, would result in long-term minor adverse cumulative impacts on air quality.

Conclusion

Alternative 2 would have short-term moderate adverse impacts on air quality prior to 2017/2018, but the long-term effects of alternative 2 would be minor adverse. The effect of alternative 2 on air quality would be long-term moderate adverse. The effect of alternative 2 on visibility would be long-term negligible adverse, before, during and after the transition to BAT snowcoaches. Cumulative impacts to air quality and visibility would be long-term minor adverse.

Impacts of Alternative 3: Transition to Snowcoaches meeting BAT Requirements Only

Following the transition to all BAT snowcoaches, alternative 3 would result in long-term minor adverse impacts to air quality as a result of the predicted maximum 1-hour CO, 8-hour CO and NO_2 concentrations of 7.2 ppm, 2.3 ppm and 25.5 ppb, respectively. Prior to the transition, impacts would be similar to alternative 2 (current fleet scenario) or short-term moderate adverse. No exceedences of the NAAQS would occur. No perceptible visibility impacts would be likely, resulting in long-term negligible adverse impacts before, during and after the transition to BAT snowcoaches.

Cumulative Impacts

Impacts on air quality from other past, present, and reasonably foreseeable future actions would be the same as described for alternative 1. These impacts are a result of generators outside the park's boundaries, such as wheeled vehicle and OSV use outside the park, activities from oil and gas leasing, and the consolidation of lands in the Gallatin National Forest. Implementation of other management plans that address motorized uses such as the Gallatin National Forest Travel Management Plan and the Beartooth District of Custer National Forest Travel Management Plan also would impact air quality in the region. The effects of these actions, when combined with the long-term minor adverse impacts of alternative 3, would result in long-term minor adverse cumulative impacts on air quality.

Conclusion

The effects of alternative 3 on air quality would be long-term minor adverse. The effect of alternative 3 on visibility would be long-term negligible adverse. Cumulative impacts to air quality and visibility would be long-term minor adverse.

Impacts of Alternative 4: Manage OSV Use by Transportation Events

Alternative 4 would have long-term moderate adverse impacts on air quality as a result of the predicted maximum 1-hr NO_2 concentrations under conditions and 8-hr CO concentrations under conditions 4a and 4c (the analysis scenarios where transportation event allocations are used to maximize the number of snowmobile entries). This condition would occur at the west entrance only, where modeling assumed idling OSV waiting in two lines to enter the park. The 8-hour CO concentrations would be reduced to minor adverse starting the 20187/2018 winter season when new CO standards take effect (the analysis scenarios where transportation event allocations are used to maximize the number of snowmobile entries). If snowcoach entries were maximizes (conditions 4b and 4d), air quality impacts would long term minor adverse. The impact of alternative 4 could vary between minor adverse and moderate adverse season to season depending on the allocation of transportation events. No exceedences of the NAAQS would occur and the NAAQS would be 80% or less of the exceedence level. No perceptible visibility impacts would be likely, resulting in long-term negligible adverse impacts under all analysis conditions.

Cumulative Impacts

Impacts on air quality from other past, present, and reasonably foreseeable future actions would be the same as described for alternative 1. These impacts are a result of generators outside the park's boundaries, such as wheeled vehicle and OSV use outside the park, activities from oil and gas leasing, and the consolidation of lands in the Gallatin National Forest. Implementation of other management plans that address motorized uses such as the Gallatin National Forest Travel Management Plan and the Beartooth District of Custer National Forest Travel Management Plan also would impact air quality in the region. The effects of these actions, when combined with the long-term minor to

moderate adverse impacts of alternative 4, would result in long-term minor to moderate adverse cumulative impacts on air quality.

Conclusion

The effects of alternative 4 on air quality would be long-term minor to moderate adverse. The effect of alternative 4 on visibility would be long-term negligible adverse. Cumulative impacts to air quality and visibility would be long-term minor to moderate adverse.

SOUNDSCAPES AND THE ACOUSTIC ENVIRONMENT

GUIDING REGULATIONS AND POLICIES

The NPS Organic Act (16 USC 1) establishes and authorizes the NPS "to conserve the scenery and the natural and historic objects and wild life therein and to provide for the enjoyment of the same in such manner and by such means as will leave them unimpaired for the enjoyment of future generations" (NPS Organic Act (16 USC 1)). The acoustical environment is part of the physical resource that NPS must conserve. An intact natural soundscape enhances visitor experience and allows for natural functioning of wildlife communication.

Regarding general park soundscape management, NPS *Management Policies 2006*, Section 4.9 "Soundscape Management," requires that the NPS "preserve, to the greatest extent possible, the natural soundscapes of parks." Additionally, the NPS "will restore to the natural condition wherever possible those park soundscapes that have become degraded by the unnatural sounds (noise), and will protect natural soundscapes from unacceptable impacts" (NPS *Management Policies 2006* (NPS 2006a, Section 4.9)). Director's Order 47: Soundscape Preservation and Management, was developed to emphasize NPS policies "that will require, to the fullest extent practicable, the protection, maintenance, or restoration of the natural soundscape resource in a condition unimpaired by inappropriate or excessive noise sources." This Director's Order also directs park managers to measure acoustic conditions, differentiate existing or proposed human-made sounds that are consistent with park purposes, set acoustic goals based on the sounds deemed consistent with the park purpose, and determine which noise sources are impacting the parks (NPS 2000d).

SOUNDSCAPES TERMINOLOGY

Refer to "Chapter 3: Affected Environment" for background information on the units used to measure sounds (dBA) and metrics such as percent time audible and L_{eq} (the constant sound level that conveys the same energy as the variable sound levels during the analysis period). Several examples of sound pressure levels in the dBA scale are listed in table 22 in chapter 3, including typical sounds found in Yellowstone.

METHODOLOGY

The NPS Natural Sounds and Night Skies Division conducted acoustic modeling to evaluate the potential impacts of the alternatives on natural soundscapes. A brief overview of the modeling methodology and assumptions is provided below. For additional detailed technical information, refer to the soundscapes modeling report available online at: http://www.nps.gov/yell/parkmgmt/winterusetechnicaldocuments.htm.

The acoustical modeling conducted by the Volpe National Transportation Systems Center for the 2007 Winter Use Plan FEIS used an adapted version of the Federal Aviation Administration's Integrated Noise Model. For the 2011 DEIS and this draft plan/SEIS the NPS adapted the Noise Model Simulation (NMSim) model for analysis of OSVs. NMSim computes the time history of noise as a mobile noise source passes by a receptor location.

Several basic model inputs developed for the 2007 Winter Use Plan FEIS were used for the NMSim analysis, including temperature, relative humidity, snow cover, and natural ambient sound levels. The modeling accounts for the acoustic effects of topography, OSV speeds, and OSV group size. The alternatives were modeled assuming the appropriate snowcoach and snowmobile BAT sound level limits. The maximum number of snowmobiles and snowcoaches allowed under each alternative was allocated to specific link segments throughout the day. The modeling includes the noise generated by administrative vehicles. The modeling framework excludes certain factors such as the effects of vegetation and inversions.

The NMSim outputs were processed with statistical software to generate maps and summary data for the approximately 40,000 locations that were modeled to evaluate the spatial spread of noise throughout the park. The analysis focused on four key indicators of OSV noise effects:

Percent Time Audible—Percent time audible is a measure of the length of time during an nine-hour day (8:00 a.m. to 5:00 p.m.) that OSV vehicles would be audible to humans with normal hearing at the specified location (regardless of the sound level). As discussed in "Chapter 3: Affected Environment," percent time audible constantly varies throughout the day. However, the percent time audible over an 9-hour day provides a useful metric for comparing the alternatives.

Audible Equivalent Sound Level (L_{eq})—Audible L_{eq} measures sound levels experienced at a location during the time that OSVs are audible. L_{eq} is the constant sound level that conveys the same energy as the variable sound levels during the analysis period. Audible L_{eq} differs from the typical calculation of L_{eq} in that it excludes time during which OSVs are not audible.

Peak 4—Peak 4 is the mean of the four loudest sustained sound levels experienced at a location. Peak 4 replaces the maximum sound level (L_{max}) indicator used in previous studies. The modeling interval was 5 seconds, so four values collectively compose at least 15 seconds of exposure. Peak 4 provides a robust indicator of the loudest events, while avoiding modeling anomalies.

8-hour Equivalent Sound Level (L_{eq})—The 8-hour L_{eq} accounts for the magnitude and duration of OSV sound over the 8:00 a.m. to 5:00 p.m. analysis period (including times when no OSV sounds are audible).

Study Area

The study area for assessment of the various alternatives is the park. The study area for the cumulative impacts analysis is the park plus the lands adjacent to the park boundaries.

Analysis Scenarios

Recent average OSV use (2009-2011) was modeled to provide context for evaluating the alternatives given that the full OSV entrance allocations are not typically fully utilized. The modeling data was crossed referenced against monitoring data and found to be consistent.

Alternative 1 was modeled based on administrative OSV use only (no visitor OSV use). Administrative OSV use would continue under alternative 1, but at a reduced level compared to other alternatives because there would be minimal operations within the park. Administrative use was modeled at current levels. Since administrative use would likely decrease from current levels of under alternative 1, the modeling results represent an upper bound of analysis.

Alternatives 2, 3, and 4 were modeled based on the maximum allowed level of OSV use each day of the winter season as described in chapter 2. Two fleet scenarios were modeled for alternative 2: current fleet (prior to the full implementation of BAT for snowcoaches by 2017/2018) and the future BAT snowcoach fleet.

For alternative 3, the condition modeled assumed the complete transition to all BAT snowcoaches and no snowmobiles. The earlier years of alternative 3, prior to the transition to all snowcoaches, was assumed to be the same as alternative 2 (current fleet).

Eight different modeling scenarios were used to represent the range of conditions that could occur under alternative 4:

- Alternative 4a assumes the maximum allowable number of transportation events for snowmobiles would be used (50 events). This means 480 snowmobiles and 60 snowcoaches would enter the park. Alternative 4a was analyzed for the current fleet mix, as well as the future fleet mix of all BAT snowcoaches (75 dBA) and enhanced BAT snowmobiles with a 67 dBA sound level limit.
- Alternative 4b assumes the maximum number of transportation events for snowcoaches would be used, which results in zero commercially guided snowmobiles, 20 non-commercially guided snowmobiles and 106 snowcoaches entering the park. Alternative 4b was modeled for the current fleet mix, as well as the future fleet mix of all BAT snowcoaches.
- Alternative 4c is similar to alternative 4a, except the number of snowcoaches would be allowed to double from 60 to 120 assuming enhanced BAT was met (e.g., 71 dBA sound level limit). The number of snowmobiles would remain 480. Alternative 4c was analyzed for two scenarios—one assuming a BAT snowcoach fleet with the current fleet of snowmobiles; and one assuming a BAT fleet of snowcoaches and a snowmobile fleet voluntarily quieter than required (e.g., 65 dBA instead of 67 dBA). Alternative 4 provides an incentive to snowmobiles to exceed the enhanced BAT requirement by allowing an increase in average group size.[9]
- Alternative 4d is similar to alternative 4b, except the number of snowcoaches would be allowed to double from 106 to 212 assuming enhanced BAT was met (e.g., 71 dBA sound level limit). The number of commercially guided snowmobiles would remain zero with 20 noncommerically guided snowmobiles. Alternative 4d was analyzed for two scenarios—one assuming a BAT snowcoach fleet with the current fleet of snowmobiles; and one assuming a BAT fleet of snowcoaches and a snowmobile fleet voluntarily quieter than required (e.g., 65 dBA instead of 67 dBA). The two scenarios are necessary because alternative 4d would include the non-commercially guided snowmobile events.

[9] Note that because the soundscapes modeling is based on the highest possible daily OSV use levels, the effect of changes in average group size over an entire winter season is not accounted for.

INTENSITY DEFINITIONS

Separate intensity definitions based on the 8-hour L_{eq} metric are established for travel corridors and backcountry areas (table 48). Although natural quiet is important in both settings, the backcountry intensity definitions are more protective than the intensity definitions for the travel corridor. The intensity definitions are based on accepted noise standards and dose-response studies measuring visitor annoyance with vehicle noise in park settings. For a detailed discussion of the rationale for the soundscapes intensity definitions, refer to the soundscapes modeling report available online at: http://www.nps.gov/yell/parkmgmt/winterusetechnicaldocuments.htm.

TABLE 48: INTENSITY DEFINITIONS FOR SOUNDSCAPES

Impact Level	Travel Corridors	Backcountry
Negligible	8-hour L_{eq} < 15 dBA	8-hour L_{eq} < 5 dBA
Minor	8-hour L_{eq} ≥15 dBA and < 25 dBA	8-hour L_{eq} ≥5 dBA and < 15 dBA
Moderate	8-hour L_{eq} ≥ 25 dBA and 8-hour L_{eq} < 35 dBA or 8-hour L_{eq} ≤ 35 dBA in 90% of the travel corridor area	8-hour L_{eq} ≥ 15 dBA and 8-hour L_{eq} < 25 dBA or 8-hour L_{eq} ≤ 25 dBA in 90% of the backcountry area
Major	8-hour L_{eq} ≥ 35 dBA for greater than 10 percent of the total travel corridor area	8-hour L_{eq} ≥ 25 dBA for greater than 10 percent of the total backcountry area

SUMMARY OF MODELING RESULTS

This section provides an overview of the soundscapes analysis results, including summary comparison tables for the action alternatives. Alternative-specific impact descriptions are provided in subsequent sections and include discussion of cumulative effects and the conclusions for each alternative. For all of the following tables (showing modeling results), the recent average condition row represents use levels under the 2009 interim rule that was in effect for the 2009/2010 to 2011/2012 winter seasons.

Percent Time Audible

Percent time audible is a measure of the length of time during an eight-hour day (8:00 a.m. to 5:00 p.m.) that OSV vehicles would be audible to humans with normal hearing (regardless of the sound level). For example, 50 percent time audible means OSV sounds could potentially be heard in specified areas for 50 percent of the day, or four hours during an eight-hour day – not necessarily consecutive hours, but spaced throughout the day. Tables 49 and 50 summarize the percent time audible results for the travel corridor and backcountry areas, respectively.

Under use levels that occurred during the interim rule, OSV sounds are audible to a human with normal hearing between 51% and 80% of the time in 8.4% of the travel corridor area (table 49). In 1.3% of the travel corridor area, OSV sounds are audible over 80% of the time. The areas with longest percent time audible are on and adjacent to roadways. Alternative 1 would eliminate areas of the travel corridor where OSVs audible over 80 percent of the time and reduce the area of the travel corridor with 51-80% time audible to less than one percent.

TABLE 49: TRAVEL CORRIDOR PERCENT TIME AUDIBLE MODELING RESULTS

Alternative	Fleet Assumption	Percent of Travel Corridor by Percent Time Audible Categories				
		0 % Time Audible	1 to 20 % Time Audible	21 to 50% Time Audible	51 to 80% Time Audible	Over 80% Time Audible
Recent Average Conditions (2009-2011)	Current Fleet	14.1	53	23.2	8.4	1.3
Alternative 1: No Snowmobile/Snowcoach Use	Administrative Use, Current Fleet	32.1	52.8	14.3	0.8	0
Alternative 2: Continue Snowmobile/Snowcoach Use at 2011/2012 Winter Season Interim Regulation Limits	Current Fleet	14.1	46.9	22.2	13.2	3.6
	BAT Snowcoaches	14.1	47.5	22.5	12.5	3.4
Alternative 3: Transition to BAT Snowcoaches Only	BAT Snowcoaches, No Snowmobiles	28.1	35.5	21.2	12.1	3.1
Alternative 4a: Manage OSV Use by Transportation Events (480 snowmobiles/60 snowcoaches)	Current Fleet	13.0	47.7	23.5	12.8	3
	BAT Snowcoaches and Snowmobiles (New Snowmobile BAT 67 dBA and Snowcoach BAT 75 dBA)	17.5	46.0	22.4	11.5	2.6
Alternative 4b: Manage OSV Use by Transportation Events (0 snowmobiles/106 snowcoaches)	Current Fleet	17.9	46.2	21.6	11.7	2.6
	BAT Snowcoaches and Snowmobiles (New Snowmobile BAT 67 dBA and Snowcoach BAT 75 dBA)	19.7	44.6	21.5	11.6	2.6
Alternative 4c: Manage OSV Use by Transportation Events (480 snowmobiles, 120 snowcoaches)	Enhanced BAT for Snowcoaches (71 dBA) and New BAT for Snowmobiles (67 dBA)	12.8	46.0	23.8	13.8	3.6
	Enhanced BAT for Snowcoaches (71 dBA) and Snowmobiles Voluntarily Quieter than BAT (65 dBA)	17.7	45.7	22.3	11.8	2.5
Alternative 4d: Manage OSV Use by Transportation Events (0 snowmobiles/212 snowcoaches)	Enhanced BAT for Snowcoaches (71 dBA) and New BAT for Snowmobiles (67 dBA)	17.1	44.9	22.4	12.6	3
	Enhanced BAT for Snowcoaches (71 dBA) and Snowmobiles Voluntarily Quieter than BAT (65 dBA)	18.9	43.5	22.3	12.4	2.9

Notes: Percent time audible calculated for the 8-hour period from 8:00 a.m. to 5:00 p.m.

TABLE 50: BACKCOUNTRY PERCENT TIME AUDIBLE MODELING RESULTS

Alternative	Fleet Assumption	Percent of Backcountry Area by Percent Time Audible Categories				
		0% Time Audible	1 to 20% Time Audible	21 to 50% Time Audible	51 to 80% Time Audible	Over 80% Time Audible
Recent Average Conditions (2009-2011)	Current Fleet	93.3	6.3	0.3	0.1	0
Alternative 1: No Snowmobile/Snowcoach Use	Administrative Use, Current Fleet	97.2	2.7	0.1	0	0
Alternative 2: Continue Snowmobile/Snowcoach Use at 2011/2012 Winter Season Interim Regulation Limits	Current Fleet	93.3	6.0	0.5	0.2	0
	BAT Snowcoaches	93.3	6.0	0.5	0.2	0
Alternative 3: Transition to BAT Snowcoaches Only	BAT Snowcoaches, No Snowmobiles	96.8	2.8	0.3	0.1	0
Alternative 4a: Manage OSV Use by Transportation Events (480 snowmobiles/60 snowcoaches)	Current Fleet	92.8	6.5	0.5	0.2	0
	BAT Snowcoaches and Snowmobiles (New Snowmobile BAT 67 dBA and Snowcoach BAT 75 dBA)	95.2	4.3	0.4	0.1	0
Alternative 4b: Manage OSV Use by Transportation Events (0 snowmobiles/106 snowcoaches)	Current Fleet	95.2	4.4	0.3	0.1	0
	BAT Snowcoaches and Snowmobiles (New Snowmobile BAT 67 dBA and Snowcoach BAT 75 dBA)	96.2	3.4	0.3	0.1	0
Alternative 4c: Manage OSV Use by Transportation Events (480 snowmobiles, 120 snowcoaches)	Enhanced BAT for Snowcoaches (71 dBA) and New BAT for Snowmobiles (67 dBA)	92.7	6.4	0.7	0.2	0
	Enhanced BAT for Snowcoaches (71 dBA) and Snowmobiles Voluntarily Quieter than BAT (65 dBA)	95.2	4.2	0.5	0.1	0
Alternative 4d: Manage OSV Use by Transportation Events (0 snowmobiles/212 snowcoaches)	Enhanced BAT for Snowcoaches (71 dBA) and New BAT for Snowmobiles (67 dBA)	94.7	4.6	0.5	0.2	0
	Enhanced BAT for Snowcoaches (71 dBA) and Snowmobiles Voluntarily Quieter than BAT (65 dBA)	95.6	3.8	0.5	0.1	0

Notes: Percent time audible calculated for the 8-hour period from 8:00 a.m. to 5:00 p.m.

The maximum OSV use levels modeled under all the action alternatives would increase the area of the travel corridor where OSV sounds are audible over 80% of the time, relative to alternative 1 and recent average conditions. The largest increases in OSV time audible would be under alternatives 2

and 4c (up to 3.6% of the travel corridor with OSVs audible over 80% of the time). The remainder of the action alternatives would result in OSVs being audible over 80% of the time in between 2.6% and 3.1% of the travel corridor area.

As shown in table 50, OSVs are not audible in 93% or more of the backcountry area under the current average conditions and any of the alternatives. None of the alternatives would result in areas of backcountry with OSV time audible over 80%. As would be expected, the primary influence of the alternatives on OSV audibility is within the travel corridors. However, some changes in the area of the backcountry with OSVs audible between 51% and 80% of the time do occur. For example, the area of the backcountry with OSVs audible between 51% and 80% of the time would increase from 0% under alternative 1 to 0.2% under alternative 2 and some of the alternative 4 analysis conditions, representing a doubling of the area in this audibility category relative to recent average conditions. The areas of the backcountry where the audibility of OSVs would increase are generally adjacent to the boundary between the travel corridor and backcountry management zones.

Audible L_{eq}

Whereas percent time audible describes whether or not OSVs are audible, audible L_{eq} describes how high the sound levels are during those times that OSVs are audible. Audible L_{eq} is expressed as an equivalent sound level—the constant sound level conveying the same energy as all the varying sound levels over the 8:00 a.m. to 5:00 p.m. analysis period (excluding those times when OSVs are not audible). Tables 51 and 52 summarize the audible L_{eq} results for the travel corridor and backcountry areas, respectively.

Under recent average use levels, audible L_{eq} is between 1 and 35 dBA in approximately 80% of the travel corridor. American National Standards Institute (ANSI) standard 2.12 specifies 35 dBA as the desired background condition for many indoor spaces where quiet and outstanding listening conditions are important (bedrooms, auditoria, theaters, conference rooms). Only 6.6% of the travel corridor area has an audible L_{eq} between 36 and 60 dBA, and 0.2% exceeds 60 dBA. Background sound levels of 50 to 60 dBA begin to interfere with conversation, causing the speakers to raise their voices. Under alternative 1, 6.7% of the travel corridor would have an audible L_{eq} over 35 dBA and 0.3% exceeds 60 dBA. Alternative 3 would result in slightly less of the travel corridor area with an audible L_{eq} over 35 dBA than the no action alternative (4.8% compared to 4.9% under alternative 1). The OSV use levels modeled under the remaining action alternatives would increase the percentage of the travel corridor with an audible L_{eq} over 35 dBA compared to the no-action alternative. The largest increases would occur under alternative 4a (current fleet, 9.1% of travel corridor over 35 dBA audible L_{eq}) and alternative 4c (enhanced BAT snowcoach and current snowmobile fleet, 9.6% of travel corridor over 35 dBA audible L_{eq}).

Table 52 shows that OSV audible L_{eq} sound levels in over 90 percent of the backcountry area are very low under recent average conditions, the no-action alternative, and any of the action alternatives. Small differences in backcountry audible L_{eq} are shown in the range of 11 to 20 dBA. Under any of the alternatives, backcountry audible L_{eq} would not exceed 20 dBA.

TABLE 51: TRAVEL CORRIDOR AUDIBLE L_{EQ} MODELING RESULTS

Alternative	Fleet Assumption	Percent of Travel Corridor Area by Audible L_{eq} Categories				
		0 dBA or Less	1 to 20 dBA	21 to 35 dBA	36 to 60 dBA	Over 60 dBA
Recent Average Conditions (2009-2011)	Current Fleet	13.4	44.5	35.2	6.6	0.3
Alternative 1: No Snowmobile/Snowcoach Use	Administrative Use, Current Fleet	31.1	39.4	24.6	4.8	0.1
Alternative 2: Continue Snowmobile/Snowcoach Use at 2011/2012 Winter Season Interim Regulation Limits	Current Fleet	13.4	41.8	36.9	7.5	0.4
	BAT Snowcoaches	13.4	40.1	38.1	8.0	0.4
Alternative 3: Transition to BAT Snowcoaches Only	BAT Snowcoaches, No Snowmobiles	27.9	40.5	26.8	4.8	0
Alternative 4a: Manage OSV Use by Transportation Events (480 snowmobiles/60 snowcoaches)	Current Fleet	12.6	39.1	39.2	8.6	0.5
	BAT Snowcoaches and Snowmobiles (New Snowmobile BAT 67 dBA and Snowcoach BAT 75 dBA)	16.8	44.3	32.7	6.0	0.2
Alternative 4b: Manage OSV Use by Transportation Events (0 snowmobiles/106 snowcoaches)	Current Fleet	15.3	50.0	29.3	5.3	0.1
	BAT Snowcoaches and Snowmobiles (New Snowmobile BAT 67 dBA and Snowcoach BAT 75 dBA)	18.1	48.2	28.5	5.1	0.1
Alternative 4c: Manage OSV Use by Transportation Events (480 snowmobiles, 120 snowcoaches)	Enhanced BAT for Snowcoaches (71 dBA) and New BAT for Snowmobiles (67 dBA)	12.4	38.5	39.5	9.1	0.5
	Enhanced BAT for Snowcoaches (71 dBA) and Snowmobiles Voluntarily Quieter than BAT (65 dBA)	16.8	42.3	34.3	6.4	0.2
Alternative 4d: Manage OSV Use by Transportation Events (0 snowmobiles/212 snowcoaches)	Enhanced BAT for Snowcoaches (71 dBA) and New BAT for Snowmobiles (67 dBA)	14.9	43.2	35.2	6.4	0.3
	Enhanced BAT for Snowcoaches (71 dBA) and Snowmobiles Voluntarily Quieter than BAT (65 dBA)	17.9	40.8	34.7	6.4	0.2

TABLE 52: BACKCOUNTRY AUDIBLE L_{EQ} MODELING RESULTS

Alternative	Fleet Assumption	Percent of Backcountry Area by Audible L_{eq} Categories			
		0 dBA or Less	1 to 10 dBA	11 to 20 dBA	Over 20 dBA
Recent Average Conditions (2009-2011)	Current Fleet	93	7	0	0
Alternative 1: No Snowmobile/Snowcoach Use	Administrative Use, Current Fleet	97.1	2.9	0	0
Alternative 2: Continue Snowmobile/Snowcoach Use at 2011/2012 Winter Season Interim Regulation Limits	Current Fleet	93.0	6.9	0.1	0.0
	BAT Snowcoaches	93.0	6.9	0.1	0.0
Alternative 3: Transition to BAT Snowcoaches Only	BAT Snowcoaches, No Snowmobiles	96.7	3.3	0.0	0.0
Alternative 4a: Manage OSV Use by Transportation Events (480 snowmobiles/60 snowcoaches)	Current Fleet	92.4	7.5	0.1	0.0
	BAT Snowcoaches and Snowmobiles (New Snowmobile BAT 67 dBA and Snowcoach BAT 75 dBA)	94.9	5.1	0.0	0.0
Alternative 4b: Manage OSV Use by Transportation Events (0 snowmobiles/106 snowcoaches)	Current Fleet	94.2	5.8	0.0	0.0
	BAT Snowcoaches and Snowmobiles (New Snowmobile BAT 67 dBA and Snowcoach BAT 75 dBA)	95.5	4.5	0.0	0.0
Alternative 4c: Manage OSV Use by Transportation Events (480 snowmobiles, 120 snowcoaches)	Enhanced BAT for Snowcoaches (71 dBA) and New BAT for Snowmobiles (67 dBA)	92.3	7.5	0.2	0.0
	Enhanced BAT for Snowcoaches (71 dBA) and Snowmobiles Voluntarily Quieter than BAT (65 dBA)	94.8	5.2	0.0	0
Alternative 4d: Manage OSV Use by Transportation Events (0 snowmobiles/212 snowcoaches)	Enhanced BAT for Snowcoaches (71 dBA) and New BAT for Snowmobiles (67 dBA)	93.9	6.1	0	0
	Enhanced BAT for Snowcoaches (71 dBA) and Snowmobiles Voluntarily Quieter than BAT (65 dBA)	95.3	4.7	0	0

Peak 4

Percent time audible and audible L_{eq} do not provide information on short-duration peaks in OSV sound levels that can be important to understanding impacts on natural soundscapes. Peak 4 is the mean of the four loudest sustained sound levels (at least 15 seconds in duration) during the 8:00 a.m. to 5:00 p.m. analysis period. The peak 4 results are determined by the loudest vehicle in use, regardless of how often it is used. Tables 53 and 54 summarize the peak 4 results for the travel corridor and backcountry areas, respectively. Mapping of the peak 4 results for each alternative is provided in appendix D.

TABLE 53: TRAVEL CORRIDOR PEAK 4 MODELING RESULTS

Alternative	Fleet Assumption	Percent of Travel Corridor Area by Peak 4 Categories					
		0 dBA or Less	1 to 20 dBA	21 to 35 dBA	36 to 60 dBA	61 to 80 dBA	Over 80 dBA
Recent Average Conditions (2009-2011)	Current Fleet	7	21.8	35.5	33.1	2.5	0.1
Alternative 1: No Snowmobile/Snowcoach Use	Administrative Use, Current Fleet	17.8	22.3	31.7	26.2	2	0
Alternative 2: Continue Snowmobile/Snowcoach Use at 2011/2012 Winter Season Interim Regulation Limits	Current Fleet	7.0	21.8	35.5	33.1	2.5	0.1
	BAT Snowcoaches	7.0	21.8	35.5	33.1	2.5	0.1
Alternative 3: Transition to BAT Snowcoaches Only	BAT Snowcoaches, No Snowmobiles	15.0	22.8	33.4	26.8	2	0
Alternative 4a: Manage OSV Use by Transportation Events (480 snowmobiles/60 snowcoaches)	Current Fleet	7.0	21.8	35.5	33.1	2.5	0.1
	BAT Snowcoaches and Snowmobiles (New Snowmobile BAT 67 dBA and Snowcoach BAT 75 dBA)	7.0	21.8	35.5	33.1	2.5	0.1
Alternative 4b: Manage OSV Use by Transportation Events (0 snowmobiles/106 snowcoaches)	Current Fleet	7.0	21.8	35.5	33.1	2.5	0.1
	BAT Snowcoaches and Snowmobiles (New Snowmobile BAT 67 dBA and Snowcoach BAT 75 dBA)	7.0	21.8	35.5	33.1	2.5	0.1
Alternative 4c: Manage OSV Use by Transportation Events (480 snowmobiles, 120 snowcoaches)	Enhanced BAT for Snowcoaches (71 dBA) and New BAT for Snowmobiles (67 dBA)	7.0	21.8	35.5	33.1	2.5	0.1
	Enhanced BAT for Snowcoaches (71 dBA) and Snowmobiles Voluntarily Quieter than BAT (65 dBA)	7.0	21.8	35.5	33.1	2.5	0.1
Alternative 4d: Manage OSV Use by Transportation Events (0 snowmobiles/212 snowcoaches)	Enhanced BAT for Snowcoaches (71 dBA) and New BAT for Snowmobiles (67 dBA)	7	21.8	35.5	33.1	2.5	0.1
	Enhanced BAT for Snowcoaches (71 dBA) and Snowmobiles Voluntarily Quieter than BAT (65 dBA)	7	21.8	35.5	33.1	2.5	0.1

TABLE 54: BACKCOUNTRY PEAK 4 MODELING RESULTS

Alternative	Fleet Assumption	Percent of Backcountry Area by Peak 4 Categories					
		0 dBA or Less	1 to 10 dBA	11 to 20 dBA	21 to 30 dBA	31 to 35 dBA	Over 35 dBA
Recent Average Conditions (2009-2011)	Current Fleet	86	7.5	4.7	1.7	0.1	0
Alternative 1: No Snowmobile/Snowcoach Use	Administrative Use, Current Fleet	88.1	6.4	4.1	1.3	0.1	0
Alternative 2: Continue Snowmobile/Snowcoach Use at 2011/2012 Winter Season Interim Regulation Limits	Current Fleet	86.0	7.5	4.7	1.7	0.1	0
	BAT Snowcoaches	86.0	7.5	4.7	1.7	0.1	0
Alternative 3: Transition to BAT Snowcoaches Only	BAT Snowcoaches, No Snowmobiles	87.8	6.6	4.2	1.3	0.1	0
Alternative 4a: Manage OSV Use by Transportation Events (480 snowmobiles/60 snowcoaches)	Current Fleet	86.0	7.5	4.7	1.7	0.1	0
	BAT Snowcoaches and Snowmobiles (New Snowmobile BAT 67 dBA and Snowcoach BAT 75 dBA)	86.0	7.5	4.7	1.7	0.1	0
Alternative 4b: Manage OSV Use by Transportation Events (0 snowmobiles/106 snowcoaches)	Current Fleet	86.0	7.5	4.7	1.7	0.1	0
	BAT Snowcoaches and Snowmobiles (New Snowmobile BAT 67 dBA and Snowcoach BAT 75 dBA)	86.0	7.5	4.7	1.7	0.1	0
Alternative 4c: Manage OSV Use by Transportation Events (480 snowmobiles, 120 snowcoaches)	Enhanced BAT for Snowcoaches (71 dBA) and New BAT for Snowmobiles (67 dBA)	86	7.5	4.7	1.7	0.1	0
	Enhanced BAT for Snowcoaches (71 dBA) and Snowmobiles Voluntarily Quieter than BAT (65 dBA)	86	7.5	4.7	1.7	0.1	0
Alternative 4d: Manage OSV Use by Transportation Events (0 snowmobiles/212 snowcoaches)	Enhanced BAT for Snowcoaches (71 dBA) and New BAT for Snowmobiles (67 dBA)	86	7.5	4.7	1.7	0.1	0
	Enhanced BAT for Snowcoaches (71 dBA) and Snowmobiles Voluntarily Quieter than BAT (65 dBA)	86	7.5	4.7	1.7	0.1	0

Under recent average use levels, 64.3% of the travel corridor area experiences peak 4 levels of 35 dBA or less (table 53). In 33.1% of the travel corridor, peak 4 sound levels are between 36 and 60 dBA and in 2.5% of the travel corridor peak 4 sound levels are between 61 and 80 dBA. Only 0.1% of the travel corridor experiences peak 4 sound levels over 80 dBA under the recent average conditions. A background sound level of 80 dBA requires people to shout to be understood, even when the listener is nearby (see table 22 in chapter 3). Alternative 1 and alternative 3 would eliminate peak 4 levels over 80 dBA and reduce the area of the travel corridor in the 61-80 dBA peak 4 range relative

to recent average conditions. The remaining action alternative would not substantially change the area of the travel corridor in each of the peak 4 categories relative to the recent average condition.

Table 54 shows that even peak sound levels in the backcountry are relatively quiet. Peak 4 sound levels in the backcountry do not exceed 35 dBA under the recent average condition, the no-action alternative, or any of the action alternatives. All of the action alternatives (except for alternative 3) would increase the area of the backcountry with peak 4 sound levels over 30 dBA compared to alternative 1. Alternative 3 would reduce the area of the backcountry with peak 4 sound levels over 30 dBA compared to the recent average condition.

8-Hour L_{eq}

The 8-hour L_{eq} analysis results for the travel corridor and backcountry areas are provided in tables 55 and 56, respectively. The 8-hour L_{eq} results are presented graphically in appendix D.

Within the travel corridors, the highest 8-hour L_{eq} levels (≥ 35 dBA) occur on and adjacent to roadways. Under recent average conditions, approximately 4% of the travel corridor area experiences 8-hour L_{eq} sound levels greater than or equal to 35 dBA (table 55). Under alternative 1, the area of the travel corridor with 8-hour L_{eq} sound levels greater than or equal to 35 dBA would be reduced to 2.2%. All the action alternatives increase the area of travel corridor with 8-hour L_{eq} sound levels greater than or equal to 35 dBA compared to the no-action alternative. The alternatives with the largest impact are alternative 4c with enhanced BAT snowcoaches and current fleet snowmobiles (6.3% ≥ 35 dBA) and alternative 4a with the current fleet (5.9% ≥ 35 dBA).

Under alternative 1, all of the backcountry area would have 8-hour L_{eq} sound levels less than 15 dBA. Alternatives 2, 4a (current), 4c and 4d would result in 0.2% or less of the area of backcounty in the 15-25 dBA range. The 8-hour L_{eq} sound level in the backcountry would not exceed 25 dBA. Under all alternatives, 98.5% or more of the backcountry area would have an 8-hour L_{eq} of less than 5 dBA, representing exceptional natural quiet conditions.

SUMMARY OF IMPACTS

This section summarizes the impact analysis results for each alternative, discusses cumulative effects and draws conclusions regarding the effect of each alternative on soundscapes. A detailed discussion of each alternative follows.

- Recent average conditions would have a long-term, moderate adverse impact on soundscapes in travel corridors and backcountry areas.
- Alternative 1 would have long-term moderate adverse impacts on soundscapes in travel corridors and long-term minor adverse impacts in backcountry areas.
- Alternative 2 would have long-term moderate adverse impacts on soundscapes in both the travel corridor and backcountry areas.
- Alternative 3 would have long-term moderate adverse impacts on soundscapes in travel corridors and long-term minor adverse impacts in backcountry areas. Impacts could vary from season to season under alternative 4 depending on the distribution of transportation events and whether or not operators choose to use quieter vehicles to take advantage of an increase in the allowable average group size. Regardless of these factors, alternative 4 would have long-term moderate adverse impacts on soundscapes in travel corridors. In the backcountry areas, the impact of alternative 4 be long-term minor adverse to moderate adverse.

TABLE 55: TRAVEL CORRIDOR 8-HOUR L_{EQ} MODELING RESULTS

Alternative	Fleet Assumption	Percent of Travel Corridor Area by 8-hour L_{eq} Categories			
		< 15 dBA (Negligible)	≥ 15 and < 25 dBA (Minor)	≥ 25 and < 35 dBA (Moderate)	≥ 35 dBA (Major)*
Recent Average Conditions (2009-2011)	Current Fleet	64.5	22	9.5	4
Alternative 1: No Snowmobile/Snowcoach Use	Administrative Use, Current Fleet	79.6	14	4.2	2.2
Alternative 2: Continue Snowmobile/Snowcoach Use at 2011/2012 Winter Season Interim Regulation Limits	Current Fleet	60.2	23.5	11.3	5
	BAT Snowcoaches	60	23.7	11.2	5.1
Alternative 3: Transition to BAT Snowcoaches Only	BAT Snowcoaches, No Snowmobiles	70.2	18.5	8	3.3
Alternative 4a: Manage OSV Use by Transportation Events (480 snowmobiles/60 snowcoaches)	Current Fleet	58	23.7	12.4	5.9
	BAT Snowcoaches and Snowmobiles (New Snowmobile BAT 67 dBA and Snowcoach BAT 75 dBA)	65.6	21.2	9.3	3.9
Alternative 4b: Manage OSV Use by Transportation Events (0 snowmobiles/106 snowcoaches)	Current Fleet	69.1	19.1	8.4	3.4
	BAT Snowcoaches and Snowmobiles (New Snowmobile BAT 67 dBA and Snowcoach BAT 75 dBA)	69.8	18.9	8	3.3
Alternative 4c: Manage OSV Use by Transportation Events (480 snowmobiles, 120 snowcoaches)	Enhanced BAT for Snowcoaches (71 dBA) and New BAT for Snowmobiles (67 dBA)	56.6	24.3	12.9	6.3
	Enhanced BAT for Snowcoaches (71 dBA) and Snowmobiles Voluntarily Quieter than BAT (65 dBA)	64.5	21.7	9.7	4
Alternative 4d: Manage OSV Use by Transportation Events (0 snowmobiles/212 snowcoaches)	Enhanced BAT for Snowcoaches (71 dBA) and New BAT for Snowmobiles (67 dBA)	63.8	22	10	4.3
	Enhanced BAT for Snowcoaches (71 dBA) and Snowmobiles Voluntarily Quieter than BAT (65 dBA)	64.4	21.6	9.9	4.1

*Overall impacts of an alternative were considered to be moderate if less than 10 percent of the travel corridor area had an 8-hour L_{eq} ≥ 35 dBA, see table 48 for the intensity definitions.

TABLE 56: BACKCOUNTRY 8-HOUR L_{EQ} MODELING RESULTS

Alternative	Fleet Assumption	Percent of Backcountry Area by 8-hour L_{eq} Categories			
		< 5 dBA (Negligible)	≥ 5 and < 15 dBA (Minor)	≥ 15 and < 25 dBA (Moderate)	≥ 25 dBA (Major)*
Recent Average Conditions (2009-2011)	Current Fleet	99.3	0.7	0.1	0
Alternative 1: No Snowmobile/Snowcoach Use	Administrative Use, Current Fleet	99.8	0.2	0	0
Alternative 2: Continue Snowmobile/Snowcoach Use at 2011/2012 Winter Season Interim Regulation Limits	Current Fleet	98.9	0.9	0.1	0
	BAT Snowcoaches	98.9	1.0	0.1	0
Alternative 3: Transition to BAT Snowcoaches Only	BAT Snowcoaches, No Snowmobiles	99.6	0.4	0	0
Alternative 4a: Manage OSV Use by Transportation Events (480 snowmobiles/60 snowcoaches)	Current Fleet	98.6	1.2	0.2	0
	BAT Snowcoaches and Snowmobiles (New Snowmobile BAT 67 dBA and Snowcoach BAT 75 dBA)	99.4	0.6	0	0
Alternative 4b: Manage OSV Use by Transportation Events (0 snowmobiles/106 snowcoaches)	Current Fleet	99.5	0.5	0	0
	BAT Snowcoaches and Snowmobiles (New Snowmobile BAT 67 dBA and Snowcoach BAT 75 dBA)	99.6	0.4	0	0
Alternative 4c: Manage OSV Use by Transportation Events (480 snowmobiles, 120 snowcoaches)	Enhanced BAT for Snowcoaches (71 dBA) and New BAT for Snowmobiles (67 dBA)	98.5	1.3	0.2	0
	Enhanced BAT for Snowcoaches (71 dBA) and Snowmobiles Voluntarily Quieter than BAT (65 dBA)	99.3	0.7	0.1	0
Alternative 4d: Manage OSV Use by Transportation Events (0 snowmobiles/212 snowcoaches)	Enhanced BAT for Snowcoaches (71 dBA) and New BAT for Snowmobiles (67 dBA)	99.2	0.7	0.1	0
	Enhanced BAT for Snowcoaches (71 dBA) and Snowmobiles Voluntarily Quieter than BAT (65 dBA)	99.2	0.7	0.1	0

*Overall impacts of an alternative were considered to be moderate if less than 10 percent of the backcountry area had an 8-hour L_{eq} ≥ 25 dBA, see table 48 for the intensity definitions.

DETAILED IMPACT ANALYSIS

Impacts of Recent Average Use

Under recent average conditions, within the travel corridors, 4% of the area had an 8-hour L_{eq} greater than or equal to 35 dBA. In the backcountry, 0.1% of the area had an 8-hour L_{eq} greater than or equal to 15 dBA. OSVs were audible over 50% of the time in approximately 9.7% of the travel corridor area. Recent average use had moderate adverse impacts on soundscapes in travel corridors and backcountry areas.

Impacts of Alternative 1: No Snowmobile/Snowcoach Use

Under alternative 1, within the travel corridors, 2.2% of the area would have an 8-hour L_{eq} greater than or equal to 35 dBA (compared to 4% in the recent average condition). In the backcountry, 0% of the area would have an 8-hour L_{eq} greater than or equal to 15 dBA (compared to 0.1% in the recent average condition). Administrative OSVs would be audible over 50% of the time in approximately 0.8% of the travel corridor area, compared to 9.7% of the travel corridor area under recent average conditions. Alternative 1 would have long-term moderate adverse impacts on soundscapes in travel corridors and long-term minor adverse impacts backcountry areas.

Cumulative Impacts

Past, present, and reasonably foreseeable future actions both outside and within the park have the potential to impact soundscapes in the park. Aircraft overflights (including commercial jets, research flights in low-flying propeller planes, corporate and general aviation aircraft, and medical rescue helicopters) cause motorized sounds that are audible at sound levels which range from very quiet to levels that mask other sounds. Relative to snowmobile- and snowcoach-related sounds, the duration of audible aircraft overflights is short. The 2005-2010 observational study found that in total, motorized sounds were audible 56% of the time. Aircraft accounted for 6.7% of the duration of motorized sounds (Burson 2010a). As shown in table 57, jets are responsible for the majority of the duration of audible aircraft sounds.

TABLE 57: AIRCRAFT TIME AUDIBLE, 2005-2010 OBSERVATIONAL STUDY

	Time Audible (Hours: Minutes: Seconds)	Percent out of the Total Duration of Motorized Sounds	Percent out of the Total Duration of the Observational Study
Jets	6:30:41	4.5%	2.5%
Propeller aircraft	2:39:10	1.8%	1.0%
Helicopters	0:32:43	0.4%	0.2%
Total	9:42:34	6.7%	3.8%

The observational study results reported above are based on monitoring in developed and travel corridor locations. Aircraft overflights are audible approximately 6% of the average day in backcountry areas such as Fern Lake (Burson 2007). Taking into account both natural and non-natural sounds, hourly L_{eq} sound levels were generally between 20 and 30 dBA at Fern Lake and maximum hourly sound levels were 60 dBA. No OSV sounds were audible at Fern Lake, which is 8 miles from the nearest OSV corridor (the road between Fishing Bridge and Canyon). In the winter, aircraft are about the only source of non-natural sounds in backcountry areas far from roadways.

Despite recent slowing in the growth in air travel mirroring the recession-related slowdown in overall economic activity, long-term growth is still expected according to Federal Aviation Administration forecasts (FAA 2010). As a result, aircraft overflights are expected to continue to result in short and long-term minor adverse impacts, particularly in backcountry areas and on days with low wind levels.

Due to the attenuation of sound with increasing distance from the source, OSV use outside the park boundaries is unlikely to affect substantial portions of the interior of the park. However, in some areas within a few miles of the park boundary, OSV use outside the park is a major source of non-natural sounds. For example, snowmobiles operating outside Yellowstone's western boundary in Gallatin National Forest and possibly in West Yellowstone, Montana were commonly audible at the West Yellowstone 3.1 site (three miles from the park boundary) during 2004/2005 monitoring (Burson 2005). The distinctive sounds of two-stroke snowmobiles over three miles away were clearly distinguishable in recordings and while visiting the site. The percent time audible at West Yellowstone of OSVs traveling only on the groomed road between the west entrance and Madison Junction was estimated to be 36%. However, OSV use outside the park raised the total percent time audible at West Yellowstone 3.1 to 66% (Burson 2005).

There is insufficient monitoring information available to quantify the audibility of OSVs outside the park in locations other than West Yellowstone 3.1. The audibility of OSVs outside the park has not been specifically noted at any monitoring site other than West Yellowstone 3.1 (Burson 2004-2010). One trend with the potential to result in more OSV activity outside the park is the consolidation of lands in the Gallatin National Forest. In the last 10 years, the Gallatin National Forest has negotiated several land exchanges that have consolidated some previously checkerboarded holdings. Although this has generally positive effects for most wildlife (because consolidated lands are less subject to development), it has the negative side-effect of private land consolidation (especially in the Big Sky area), which has allowed more land subdivision and rural growth to occur there, with consequent effects on traffic and natural soundscapes (NPS 2007c).

Future trends in the audibility of OSVs operating outside the park will be influenced by the travel management plans of the adjacent national forests. The potential implications of two such travel plans are summarized below—the Gallatin National Forest Travel Plan Revision and the Beartooth District of Custer National Forest Travel Management Plan.

Gallatin National Forest is adjacent to Yellowstone's northern border and part of its western border. The 2006 Record of Decision for the Gallatin National Forest Travel Plan Revision decreased the area of the Gallatin National Forest open to snowmobile use (outside of wilderness areas) from 84% to about 55% (USFS 2006). The travel plan was designed to cluster motorized use areas to reduce the total area potentially affected by noise from snowmobiles. As a result, the USFS expected noise levels would increase in those concentrated use zones and decrease elsewhere. The largest concentration of designated snowmobile trails in the Gallatin National Forest in the vicinity of the park is around West Yellowstone. There is a smaller number and length of snowmobile trails around Cooke City. Snowmobile use is prohibited in most of the remaining areas along the border between Gallatin National Forest and Yellowstone National Park (e.g., the Lee Metcalf Wilderness Area to the west and the Absaroka Beartooth Wilderness to the north). It can be reasonably expected that the audibility of OSVs in use outside the park will increase in the future within a few miles of the trails around West Yellowstone and Cooke City. Other areas of Yellowstone adjacent to wilderness areas would not be affected by OSV use.

The Beartooth District of Custer National Forest is adjacent to the northeast corner of Yellowstone. A Record of Decision for the Beartooth District Travel Management Plan was issued in 2008 (USFS 2008b). The travel management plan addressed motorized vehicle routes, but OSV regulations were

explicitly excluded from the scope of the plan. As a result, OSV use in the Beartooth District remains regulated by a 1986 Forest Plan. OSV use in the small portion of the Beartooth District around Cooke City is administered by the Gallatin National Forest Travel Plan Revision described previously. The motorized routes allowed by the 2008 Travel Management Plan are all at least 15 miles from the boundary of Yellowstone. As a result, it can be concluded that motorized vehicle routes in the Beartooth District would have no effect on natural soundscapes in Yellowstone. Motorized vehicle use (including OSVs) is prohibited in the Absaroka Beartooth Wilderness Area, which covers much of the Beartooth District where it is adjacent to the park.

The impacts of past, present, and reasonably foreseeable future actions, combined with the long-term minor to moderate impacts of alternative 1, would result in long-term minor to moderate adverse cumulative impacts on natural soundscapes. In backcountry areas, other past, present, and reasonably foreseeable future actions (e.g., airplanes, OSV use outside the park) would be the primary contributors to the cumulative impacts. Administrative OSV use would be the main contributor to the cumulative impacts within the travel corridors.

Conclusion

The effects of alternative 1 on soundscapes would be long-term, minor to moderate, and adverse due to administrative OSV use. Moderate impacts would be limited to travel corridors. Cumulative impacts to soundscapes would be long-term, minor to moderate and adverse.

Impacts of Alternative 2: Continue Snowmobile/Snowcoach Use at 2011/2012 Winter Season Interim Regulation Limits

Under alternative 2, within the travel corridors, 5% of the area would have an 8-hour L_{eq} greater than or equal to 35 dBA (compared to 4% under recent average conditions). In the backcountry, 0.1% of the area would have an 8-hour L_{eq} greater than or equal to 15 dBA (compared to 0.1% in the recent average condition). Assuming the maximum allowed use levels, OSVs would be audible over 50% of the time in approximately 16.8% of the travel corridor area with the current fleet and 15.9% of the corridor following the transition to the all-BAT snowcoach fleet, compared to 9.7% of the travel corridor area under recent average conditions. Alternative 2 would have long-term moderate adverse impacts on soundscapes in both the travel corridor and backcountry areas, before, during and after the transition to all BAT snowcoaches. The all BAT snowcoach scenario results are very similar to the current fleet results because the existing snowcoach mix is already very close to meeting the proposed snowcoach BAT level (75 dBA).

Cumulative Impacts

Impacts on soundscapes from other past, present, and reasonably foreseeable future actions would be the same as described for alternative 1. These impacts are a result of other noise generators outside the park's boundaries. A large contributor is aircraft overflights (including commercial jets, research flights in low-flying propeller planes, corporate and general aviation aircraft, and medical rescue helicopters). Other large contributors include OSV use on adjacent lands (within a few miles of the park boundary). Planning efforts on lands surrounding the park could also contribute to these impacts, including the Gallatin National Forest Travel Management Plan and the Beartooth District of Custer National Forest Travel Management Plan. The long-term minor adverse effects of these actions, when combined with the long-term moderate adverse impacts of alternative 2, would result in long-term moderate adverse cumulative impacts on natural soundscapes.

Conclusion

The effects of alternative 2 on soundscapes would be long-term, moderate and adverse due to the level of OSV use permitted. Cumulative impacts to soundscapes would be long-term, moderate and adverse.

Impacts of Alternative 3: Transition to Snowcoaches meeting BAT Requirements Only

Prior to the transition to all BAT snowcoaches, the impacts of alternative 3 would be the same as described above for alternative 2 (moderate and adverse), except that the duration would be short-term instead of long-term.

Following the transition to all BAT snowcoaches, within the travel corridors, 3.3% of the area would have an 8-hour L_{eq} greater than or equal to 35 dBA (compared to 4% under recent average conditions). In the backcountry, 0% of the area would have an 8-hour L_{eq} greater than or equal to 15 dBA (compared to 0.1% in the recent average condition). Assuming the maximum allowed use levels, OSVs would be audible over 50% of the time in approximately 15.2% of the travel corridor area, compared to 9.7% of the travel corridor area under recent average conditions. Alternative 3 would have long-term moderate adverse impacts on soundscapes in the travel corridor areas and long-term minor adverse impacts on soundscapes in backcountry areas.

Cumulative Impacts

Impacts on soundscapes from other past, present, and reasonably foreseeable future actions would be the same as described for alternative 1. These impacts are a result of other noise generators outside the park's boundaries. A large contributor is aircraft overflights (including commercial jets, research flights in low-flying propeller planes, corporate and general aviation aircraft, and medical rescue helicopters). Other large contributors include OSV use on adjacent lands (within a few miles of the park boundary). Planning efforts on lands surrounding the park could also contribute to these impacts, including the Gallatin National Forest Travel Management Plan and the Beartooth District of Custer National Forest Travel Management Plan. The long-term minor adverse impacts of these actions, when combined with the long-term minor to moderate adverse impacts of alternative 3, would result in long-term minor to moderate adverse cumulative impacts on natural soundscapes.

Conclusion

The effects of alternative 3 on soundscapes would be long-term, minor to moderate and adverse, both before and after the phaseout to BAT snowcoaches only. Cumulative impacts to soundscapes would be long-term, minor to moderate and adverse.

Alternative 4: Manage OSV Use by Transportation Events

Impacts under alternative 4 would vary season to season. Within the travel corridors, 3.3% to 6.3% of the area would have an 8-hour L_{eq} greater than or equal to 35 dBA (compared to 4% under recent average conditions). In the backcountry, 0% to 0.2% of the area would have an 8-hour L_{eq} greater than or equal to 15 dBA (compared to 0.1% in the recent average condition). Assuming the maximum allowed use levels, OSVs would be audible over 50% of the time in approximately 14.1% to 17.4% of the travel corridor area, compared to 9.7% of the travel corridor area under recent average conditions. Alternative 4 would have long-term moderate adverse impacts on soundscapes in travel corridors. In the backcountry areas, the impact of alternative 4 would be long-term minor adverse to moderate adverse.

Cumulative Impacts

Impacts on soundscapes from other past, present, and reasonably foreseeable future actions would be the same as described for alternative 1. These impacts are a result of other noise generators outside the park's boundaries. A large contributor is aircraft overflights (including commercial jets, research flights in low-flying propeller planes, corporate and general aviation aircraft, and medical rescue helicopters). Other large contributors include OSV use on adjacent lands (within a few miles of the park boundary). Planning efforts on lands surrounding the park could also contribute to these impacts, including the Gallatin National Forest Travel Management Plan and the Beartooth District of Custer National Forest Travel Management Plan. The long-term minor adverse impacts of these actions, when combined with the long-term minor to moderate adverse impacts of alternative 4, would result in long-term minor to moderate adverse cumulative impacts on natural soundscapes.

Conclusion

The effects of alternative 4 on soundscapes would be long-term, minor to moderate and adverse. Cumulative impacts to soundscapes would be long-term, minor to moderate and adverse.

VISITOR USE, EXPERIENCE, AND ACCESSIBILITY

Current laws and NPS policies indicate the following desired conditions in the park with regard to visitor use and experience relative to the presence and operation of OSVs in the park:

- Opportunities are and should continue to be provided for appropriate, high-quality public enjoyment.
- Visitors will have the opportunity to enjoy the superlative natural resources found in the park.

Such opportunities will create ample opportunity for inspiration, appreciation, and enjoyment through personalized experiences.

NPS Management Policies 2006, Section 8.2.4 states that:

> "All reasonable efforts will be undertaken to make NPS facilities, programs, and services accessible to and usable by all people, including those with disabilities. This policy reflects the commitment to provide access to the widest cross section of the public, and to ensure compliance with the intent of the Architectural Barriers Act of 1968 and the Rehabilitation Act of 1973. The Service will also comply with section 507 of the Americans with Disabilities Act (42 USC 12207), which relates specifically to the operation and management of federal wilderness areas. Specific guidance for implementing these laws is found in the Secretary of the Interior's regulations regarding enforcement of nondiscrimination on the basis of disability in Department of the Interior programs (43 CFR Part 17, Subpart E), and General Service Administration regulations adopting accessibility standards for the Architectural Barriers Act (41 CFR Part 102-76, Subpart C)."

Other mandates include the requirement for providing reasonable accommodation for known disabilities of qualified applicants and employees (Director's Order 16A, Reasonable Accommodation for Applicants and Employees with Disabilities) and to ensure that facilities are readily accessible to and usable by individuals with disabilities, including individuals who use wheelchairs (Director's Order 42, Accessibility for Visitors with Disabilities in National Park Service Programs and Services).

In addition, the NPS requires that those providing commercial services in the parks share the NPS responsibility to provide employees and visitors with the greatest degree of access to programs, facilities, and services that is reasonable, within the terms of existing contracts and agreements (see NPS *Management Policies 2006*, Section 10.2.6.2 "Accessibility of Commercial Services"). This analysis considers whether these opportunities are provided and if they are the desired experiences of those visitors.

ASSUMPTIONS, METHODOLOGY, AND INTENSITY DEFINITIONS

This section includes an analysis of the opportunities to view and experience park resources in the winter. Such opportunities are different than those experienced in the summer. Resources considered in the analysis include opportunities to view wildlife and scenery, behavior of other visitors and safety, quality of road surfaces, availability of information, quiet and solitude, air quality, and stakeholder values.

To evaluate the level of impact to the visitor experience under each alternative, the following types of information were referenced:

- Visitor surveys
- Assessment of visitation patterns
- Assessment of opportunities historically available.

This section also includes an analysis of changes to accessibility for the very young, the elderly, and those with mobility impairments. For the very young and the elderly, mobility issues were not considered to be of primary concern; rather, exposure to winter weather, including cold temperatures and high winds, and the need for protection from these elements were considered. Resources considered in the analysis include opportunities to view wildlife and scenery in a safe environment. In addition to providing a safe environment, the analysis considered if the opportunity provided for these visitors is their desired visitor experience.

For the analysis of visitor accessibility under alternatives 2, 3 and 4, it is assumed that those providing commercial tours in the park are in compliance with NPS accessibility requirements as mentioned above. This includes larger capacity snowcoaches offering wheelchair accessibility and/or ramps.

INTENSITY DEFINITIONS

The following definitions for evaluating impacts to visitor use and experience were used for assessing the potential impacts of each alternative.

Negligible: Visitors would be able to experience a wide range of park resources and participate in a wide range of winter use activities, although may be prevented from a few experiences and/or activities because of limited access, technical difficulty, and/or cost. Visitors would typically be able to fulfill the purpose of their visit. Accessibility for the very young, the elderly, and individuals with disabilities would not be affected, or effects would not be noticeable or measurable. There would be minimal effects on safe opportunities to view wildlife and scenery and for these visitors to fulfill the purpose of their visit.

Minor: Visitors would be able to experience a range of park resources and participate in a range of winter use activities, but would be prevented from some experiences and/or activities because of limited access, technical difficulty, and/or cost. Most visitors would be able to fulfill the purpose of their visit. Changes in accessibility would be noticeable, but would affect only a small portion of the very young, the elderly, and individuals with mobility-related disabilities who visit the park. Impacts would be slight without appreciably limiting critical characteristics of opportunities to safely view wildlife and scenery. Most of these visitors would be able to fulfill the purpose of their visit.

Moderate: Visitors would be able to experience some park resources and participate in some winter use activities, but would be prevented from some experiences and/or activities because of limited access, technical difficulty, and/or cost. Some visitors may not be able to fulfill the purpose of their visit. Changes in accessibility would be readily apparent to many of the very young, the elderly, and individuals with mobility-related disabilities who use the park. Visitors would have some difficulty finding available, safe opportunities to view wildlife and scenery. Some of these visitors may not be able to fulfill the purpose of their visit.

Major: Visitors would be able to experience some park resources and participate in some winter use activities, but would be prevented from most experiences and/or activities because of limited access, technical difficulty, and/or cost. Few visitors would be able to fulfill the purpose of their visit. The effects on accessibility would be readily apparent to most of the very young, the elderly, and individuals with mobility-related disabilities who use the park, and would substantially change their ability to access park features. Visitors would frequently have substantial difficulty finding available, safe opportunities to view wildlife and scenery. Few visitors with mobility impairments would be able to fulfill the purpose of their visit.

Study Area

The geographic study area for the visitor use and experience analysis, including visitor accessibility, includes the entire area within the park boundary.

SUMMARY OF IMPACTS

Impacts to visitor use and experience under the alternatives ranged from long-term major adverse under the no-action alternative, to long-term beneficial under the action alternatives because the levels and types of OSV use permitted in the park would be increased, when compared to the no-action alternative. Impacts under each alternative were as follows:

- Alternative 1 would have long-term major adverse impacts on visitor use and experience because winter access to the interior of the park would not be provided for visitors. Non-motorized visitors would be permitted, but due to the distance into the park and harsh weather conditions, very few visitors would be able to reach features in the interior such as Old Faithful. Winter visitors desiring either or both non-motorized and motorized experiences would be affected by this loss of access. Alternative 1 would have long-term major adverse impacts to visitor accessibility by restricting winter access to the interior of the park to non-motorized methods.

- Alternative 2 would have long-term beneficial impacts to visitor use and experience because permitted use levels would be similar to those allowed from 2009 to 2012 (through the 2011/2012 winter seasons) and would provide for both motorized and non-motorized (accessing trail heads by motorized means) access into the interior of the park. This use level would meet the demand for winter visitation that has occurred for the 2009/2010 winter season and it would provide limited opportunities for growth. Resource conditions (i.e., wildlife, soundscapes, and air quality) that support a quality visitor experience would experience limited effects. This alternative would have long-term beneficial impacts to accessibility because allowing a mix of OSV types into the interior of the park would provide various opportunities for accessibility.
- Alternative 3 would have long-term beneficial impacts to visitor use and experience because motorized access to the interior of the park would continue and, until the transition to snowcoaches only, access would be the same as that from 2009 to 2012. For some snowmobile users, the opportunity to experience a specific, individual snowmobile experience as offered in the past would be lost. After the transition, some park users would be able to obtain their desired experience (snowcoach use) while others would not (snowmobile use) resulting in an overall long-term moderate adverse impact, because the same range of experiences as currently offered may not be available. This alternative would have long-term beneficial impacts to accessibility because allowing a mix of OSV types into the interior of the park until the winter season 2020/2021, and snowcoach access after that, which would provide various opportunities for accessibility.
- Alternative 4 would have the greatest ability to meet winter visitor expectations by including guided snowmobile and snowcoach tours, and by management of OSV use of the park's interior by transportation events. Visitor opportunities would increase, resulting in parkwide, long-term beneficial impacts compared to the no-action alternative. Both motorized and non-motorized winter users would experience the benefits of continued access to the park's interior, and operators would have the ability to choose the type of service they provide. Resource conditions would remain unchanged from recent years or would improve as improvements to BAT OSVs are implemented.

DETAILED IMPACT ANALYSIS

Impacts of Alternative 1: No Snowmobile/Snowcoach Use

Under alternative 1, all visitor snowmobile and snowcoach use in the park would end. Vehicle access would continue along the route from Cooke City to Gardiner (U.S. Highways 212 and 89), which is plowed during the winter months; however, other roadways in the park would be closed to vehicular traffic. Two separate groups of park visitors would be affected by the change in management policies – motorized OSV users and non-motorized winter users.

Under alternative 1, opportunities to experience the park's interior by either snowmobile or snowcoach, an opportunity that has existed at various levels since the 1950s, would cease. For these visitors—who average more than 60,000 people per year— their desired winter visitor experience would no longer be available. Facilities in the interior of the park would be expected to close because reduced visitation would not be able to support the operation of lodges and the provision of other services. Guides would no longer be needed, the visitor center at Old Faithful would be closed, and there would be no need for warming huts to support visitor safety and experience.

Some visitors may choose to use a vehicle to access northern areas of the park for backcountry uses, such as snowshoeing and cross-country skiing. However, because the two uses differ greatly, the percentage of winter visitors likely to adapt to such a change in management is unknown. For the

majority of Yellowstone winter visitors, ending access via snowmobile and snowcoach would result in parkwide, long-term major adverse impacts on visitor use and experience.

Non-motorized users would likely experience both adverse and beneficial effects under alternative 1. By eliminating OSV access to the interior of the park, it is anticipated that the experiences of skiers and snowshoers would generally be focused on the fringes of the park or along the highway corridor in the northern part of the park. This reduced access would restrict opportunities to experience the park's geyser field, the Yellowstone River and Yellowstone Falls, iconic wildlife, and peace and solitude associated with the winter season. This would result in parkwide, long-term moderate to major adverse effects on visitor use and experience.

Benefits to non-motorized users may include increased opportunities to enjoy natural sounds and view wildlife. Noise and disturbance generated by snowmobile and snowcoach activities would be limited to those associated with park management and administration personnel. Therefore, such effects would generally be eliminated from the majority of the park and increase the chance to experience natural sounds. However, non-motorized visitors do not generally concentrate their activities in areas frequented by snowmobiles and snowcoaches, but rather in the backcountry where they can experience the natural sights and sounds of the park. Therefore, the benefits of reduced motorized use for non-motorized users would be limited, localized, and long-term.

Because access to the winter range would require long treks on skis or snowshoes, the frequency of human intrusion into this area would be infrequent. Visitors capable of making the trip to the winter range may have an increased wildlife experience, which would result in limited long-term benefits to their visitor experience.

Under alternative 1, the interior of the park would be closed to vehicular movements, thereby eliminating possible experiences for most visitors (though skiers and snowshoers could still access northern areas of the park but would have difficulty accessing the interior). This would result in long-term major adverse effects on visitor use and experience.

In terms of visitor accessibility, access for all visitors—both those with and without accessibility needs—to the park's interior would be limited to those capable of snowshoeing or cross-country skiing into the park. In addition, visitor services and amenities within the park would be severely reduced or eliminated. For the very young, elderly, and those with mobility impairments, this would result in a loss of opportunity to experience the park's iconic features of Old Faithful, Geyser Basin, and Yellowstone River and Yellowstone Falls, among others. This would result in long-term, major adverse impacts for users with accessibility needs.

Cumulative Impacts

Winter visitors to the park often enjoy a variety of experiences and include other destinations in their plans for visiting the area. In the greater Yellowstone area, there are numerous opportunities for winter users to recreate in national forests, view wildlife in wildlife refuges, and visit local communities such as Jackson and Cody, Wyoming, West Yellowstone, Gardiner, and Cooke City Montana, and Island Park and Ashton, Idaho.

Although such destinations may be included in a visitor's itinerary, the experiences inside Yellowstone are not available elsewhere. A wide range of activities exist in Yellowstone in the winter that includes photography, wildlife viewing, walking, skiing, and snowshoeing. Yellowstone has 35 miles of groomed trails, or for the adventurous, many miles of backcountry trails available for skiing or snowshoeing. Park concessioners operate lodging accommodations at Mammoth Hot Springs and

Old Faithful and provide other services, including evening programs, snowmobile and snowcoach tours, guided ski and snowshoe tours, wildlife tours, a ski shop and repair center, massage therapy, hot tub rentals, and ice skating rinks. In addition, a yurt camp is available at Canyon, which is operated by one of the park's snowcoach outfitters. The NPS also provides ranger-led winter programs that offer insight into the history, culture, and geography of Yellowstone National Park. Winter programs begin when the park opens for the winter season December 15 and ends on March 15. Until expiration of the 2009 to 2012 interim regulations, the availability of these services and experiences supported long-term benefits to winter visitor understanding and appreciation of park resources and values and provided access to those with mobility impairments. These experiences have provided long-term beneficial impacts to visitors and would continue to provide beneficial impacts if continued into the future.

However, under alternative 1, only the northern portions of the park—Mammoth Hot Springs and Highways 212 and 89—would be accessible by motorized methods, and all OSV access would end. Visitor services at Old Faithful, Canyon, and other interior park locations would be closed because OSVs serve as the conduit to these experiences. Thus, under alternative 1, because access would be limited for all visitors, the availability and accessibility of the experiences would be eliminated. The impacts of past, present, and reasonably foreseeable future winter experiences, combined with the long-term major adverse impacts of alternative 1, would result in long-term major adverse cumulative impacts on visitor use and experience, of which alternative 1 would constitute a large part.

Conclusion

Restricting winter access to the interior of the park by non-motorized means would result in long-term major adverse impacts on the visitor use and experience to all visitors, including those with mobility impairments. Winter visitors desiring either or both non-motorized and motorized experiences would be affected by loss of access. Overall cumulative effects would be long-term major adverse.

Impacts of Alternative 2: Continue Snowmobile/Snowcoach Use at 2011/2012 Winter Season Interim Regulation Limits

Under alternative 2, the level of winter access permitted would remain the same as under the 2009 to 2012 interim regulations. Primary park roads would continue to be used for motorized access with up to 318 snowmobiles and 78 snowcoaches permitted per day, the level of use permitted under the 2009 to 2012 interim regulations. Assuming a maximum of 2.0 riders per snowmobile and maximum average capacity of 12.3 visitors per snowcoach (based on a recent census of snowcoaches) the maximum number of visitors entering the park per day would be approximately 1,595. Commercial guides and BAT OSVs would be required. Because visitor use in the interior of the park would continue, the Old Faithful Snow Lodge, warming huts, and other winter amenities that help support a safe and high-quality visitor experience would continue to be offered, which would support all visitors, including those with accessibility needs. Access would be provided by snowcoaches equipped with ramps/lifts to accommodate wheelchairs. Visitors with mobility impairments who are capable of operating snowmobiles would have access to this traditional winter activity, and wheelchairs can be transported via snowmobile. In addition, small children could be accommodated on snowmobiles with their parents, providing an exciting and cost effective way for families to experience Yellowstone in winter. While touring by snowcoach and snowmobile, the Canyon can be viewed from accessible locations on the South Rim Drive at Artist Point and at Uncle Tom's Overlook. In addition, Fishing Bridge is partially wheelchair accessible.

Compared to alternative 1, alternative 2 would offer a markedly improved visitor experience—with the exception of the small group of people who could ski the long distances between park entrances

and attractions—because it would allow motorized access in the park to continue, which would increase the number of visitors able to access the park's interior features in the winter. For those with mobility impairments, the continued ability to tour the park by OSV would offer a variety of opportunities to have a safe, informative, and enjoyable experience. The ability to tour the park by OSV would offer a variety of opportunities to enhance visitor experience, particularly where many park attractions would not otherwise be accessible. Requirements for using guides and BAT snowmobiles under this alternative would support opportunities to view wildlife and scenery, generally safe touring conditions, access to park information, opportunities for quiet and solitude, and clean air, similar to the conditions that have prevailed in the park since the 2004 winter season. For visitors with mobility impairments, as of the 2011/2012 season, the demand for snowcoach ramp/lift capabilities was being met by service providers with equipment suitable to meet these needs. It is anticipated that service providers would expand equipment capabilities to meet an increase in demand should it be necessary in the future.

Guides are familiar with those areas where wildlife viewing is particularly good and routinely make impromptu stops to view wildlife and park scenery. They enforce proper touring behavior and usually provide informative commentary to their clients. Other information would continue to be available at warming huts, contact stations, visitor centers and entrance stations. Because guided groups travel together and many such groups adhere to schedules that leave large periods of time free from OSV noise, periods of quiet and opportunities for solitude would continue. The requirement for using BAT technology would mean that good air quality in the park would also continue. For the majority of winter visitors, alternative 2 would provide long-term beneficial effects for visitor use and experience.

The presence of OSVs could cause wildlife to retreat from corridors where OSVs are used with the possibility of slightly reducing viewing opportunities. However, as described above under "Wildlife and Wildlife Habitat" the level of mechanized access proposed under alternative 2 would not be expected to result in large-scale changes in winter range use by park wildlife, and viewing opportunities would continue.

Visitors seeking non-motorized uses in the park would experience both beneficial and adverse effects. Users would benefit from continued access to the park's interior, maintenance of 35 miles of trails, and use of visitor services and amenities resulting in long-term beneficial effects on visitor experience and access. Localized adverse effects would occur from periodic exposure to OSV sounds and sights. As described in chapter 3 ("Soundscapes and the Acoustic Environment" and "Visitor Use, Experience, and Accessibility"), these intrusions would not be expected to result in measurable reductions in visitor satisfaction or understanding and appreciation of park resources and values. Therefore, impacts to visitor use and experience for those seeking a non-motorized experience would be long-term, negligible to minor adverse.

The daily allocation of OSVs would be fixed under alternative 2. Although the daily allocations for snowmobiles and snowcoaches may not be met on a daily basis, capacity may be reached during traditionally busy periods. Fixed use limits could affect peak season winter visitors, especially on holidays and weekends. During periods of high visitation, some visitors may not be able to enter the park or have the experience they desire at a particular entrance, whereas capacity may be available at another entrance that they cannot access. This could occasionally diminish benefits associated with alternative 2.

Although some visitor expectations for OSV access to the park may not be met under alternative 2, implementation of this alternative would provide adequate access to meet OSV demand because permitted use levels would be the same as those maintained under the 2009 to 2012 interim regulations, which have not been met on a parkwide basis. Resource conditions on which visitor

experience is in part dependent, including air quality and natural sounds, would largely be protected (see the "Air Quality" and "Soundscapes and the Acoustic Environment" sections). Although long-term minor adverse impacts associated with unmet expectations for some visitor groups during high visitation periods would persist, alternative 2 would result in long-term benefits to visitor use and experience. For the very young, the elderly, and winter visitors with mobility impairments, alternative 2 would provide parkwide, long-term beneficial impacts for visitor accessibility.

Cumulative Impacts

Impacts on visitor use and experience from other past, present, and reasonably foreseeable future winter visitor experiences would be as described for alternative 1. These impacts are driven by the other recreational opportunities available on lands near the park such as national forests, wildlife refuges, and local communities such as Jackson and Cody, West Yellowstone, Gardiner, Island Park, and Ashton. These long-term beneficial impacts, when combined with the long-term beneficial impacts of alternative 2, would result in long-term beneficial cumulative impacts to visitor use and experience. Alternative 2 would make a large contribution to these impacts by offering traditional winter visitor use and experience opportunities in Yellowstone, a unique recreational opportunity in the area, as well as providing a range of opportunities for visitors with mobility impairments.

Conclusion

Under alternative 2, continuing OSV use and access at the same levels as the 2009 to 2012 interim regulation limits would meet recent demand for winter visitation, including visitors with mobility impairments. Both motorized and non-motorized winter users would experience the benefits of continued access to the park's interior Therefore, alternative 2 would result in long-term benefits to visitor use and experience. Cumulative impacts to visitor use and experience under alternative 2 would be long-term and beneficial.

Impacts of Alternative 3: Transition to Snowcoaches meeting BAT Requirements Only

At the implementation of this alternative, this alternative would have the same use levels as under alternative 2 (up to 318 snowmobiles and 78 snowcoaches) and therefore the impacts would be the same for all park visitors. Beginning in the 2017/2018 winter season, BAT snowcoach access would be allowed to increase over a 3-year period from the 2009 to 2012 interim regulation levels of up to 78 vehicles per day to 120 vehicles per day. Snowmobile use would be correspondingly phased out once all snowcoaches achieve BAT status. Thus, snowmobile use would decrease from up to 318 vehicles per day to zero over a 3-year period. Assuming 12.3 visitors per snowcoach, a total daily visitation rate of 1,475 visitors would be expected when a full snowmobile phaseout occurs. Requirements for BAT snowmobiles and guided activities would continue throughout the transition period with all new snowcoaches required to have BAT. Primary park roads would be groomed for OSV use, with the exception of the Sylvan Pass road, which would be closed to OSV use. Because visitor use in the park's interior would continue, the Old Faithful Snow Lodge, warming huts, and other winter amenities that help support a safe, high-quality visitor experience would continue to be offered. These accessible facilities in the park would continue to be available to support safe and informative park experiences for the very young, the elderly, and visitors with mobility impairments.

Compared to alternative 1, alternative 3 would offer an improved visitor experience. Although attractions and destinations would remain accessible and interpretation provided through guides, the experience of riding a snowmobile, which includes being exposed to the winter weather with no barrier between the visitor and the environment, would be lost. After the transition, some park users would be able to obtain their desired experience (snowcoach use) while others would not (snowmobile

use) resulting in an overall long-term moderate adverse impact, because the same range of experiences as currently offered would not be available.

During the 3-year transition period, the requirements for using commercial guides and BAT snowmobiles would support opportunities to view wildlife and scenery, generally safe touring conditions, ready availability of information, good opportunities for quiet and solitude, and clean air. This would be similar to the conditions that have prevailed in the park since the 2004 winter season. Guides are familiar with typical wildlife viewing locations and routinely make impromptu stops to view wildlife and park scenery. They enforce proper touring behavior and usually provide informative commentary to their clients. Other information would continue to be available at warming huts, contact stations, visitor centers, and entrance stations. Requirements for BAT technology for snowcoaches would support good air quality.

After full implementation, visitors seeking non-motorized uses inside the park would experience limited beneficial effects. The total number of OSVs in the park would be reduced to 110 snowcoaches. Visitors may notice a reduction in OSV sounds exceeding 35 decibels (A-weighted) (dBA) in the travel corridor under a snowcoach only condition, as compared to the combined presence of snowmobiles and snowcoaches. As a result, backcountry visitors would experience quiet and solitude similar to that currently available in the park. However, non-motorized visitors would continue to benefit from access to the park's interior, maintenance of 35 miles of trails, and use of visitor services and amenities such as warming huts. Limited adverse effects would continue to occur from periodic exposure to snowcoach sounds and sights. As described in the Affected Environment (see "Soundscapes and the Acoustic Environment" and "Wildlife and Wildlife Habitat"), these intrusions would be considered minimal.

The daily allocation of snowcoaches provided under alternative 3 would be fixed at 120 maximum when full phaseout occurs and this level may not meet demand during traditionally busy periods or allow for increased visitation. This could affect peak season winter visitors, particularly on holidays and weekends. As a result, some potential visitors may not be able to enter the park or have the experience they desire, possibly diminishing overall benefits associated with alternative 3 for those potential visitors. Visitors would be able to engage in OSV use in other areas in the region, but the specific experience of OSV use in Yellowstone would be more limited. Given that there had been unused capacity under the 2009 to 2012 interim regulations for accessible snowcoach tours, the increase would allow for substantial growth in services of accessible snowcoaches, if demand increases.

Some visitor expectations, for visitors both with and without mobility impairments, for the type and amount of OSV access to the park may not be met under alternative 3. Additionally, the implementation of this alternative may not meet demand (based on use levels for the 2011/2012 winter season) or allow for increased winter visitation to the park. In addition, with only the option of snowcoach touring, alternative 3 would have the potential to increase the cost of winter use experiences for families with small children. This would result in long-term, minor to moderate adverse effects to the visitor use and experience. Alternative 3 offers the greatest potential for the very young, the elderly, and visitors with mobility impairments to experience an informative "over the snow" adventure in the winter landscape of the park via snowcoach. However, the opportunity to use snowmobiles would be eliminated over the long term. Although there would be long-term minor to moderate adverse effects to visitor use and experience from the removal of the snowmobile experience in the park, alternative 3 would result in parkwide, long-term beneficial impacts to accessibility when compared to the no-action alternative.

Resource conditions that contribute to visitor experience (e.g., air quality and natural sounds) would largely be protected under this alternative. Although long-term minor adverse impacts associated with unmet expectations of some visitor groups would continue or increase with the elimination of snowmobile use, when compared to alternative 1, alternative 3 would result in long-term benefits to visitor use and experience with long-term moderate adverse impacts to users who can no longer have a snowmobile experience in the park. For the very young, the elderly, and winter visitors with mobility impairments, alternative 3 would provide parkwide, long-term beneficial impacts for visitor accessibility.

Cumulative Impacts

Impacts on visitor use and experience from other past, present and reasonably foreseeable future actions would be as described for alternative 1. These impacts are driven by the other recreational opportunities available on lands near the park such as national forests, wildlife refuges, and local communities such as Jackson and Cody, West Yellowstone, Gardiner, Island Park, and Ashton. These long-term beneficial impacts, when combined with the long-term moderate adverse impacts and long-term beneficial impacts of alternative 3, would result in long-term moderate adverse impacts and long-term beneficial cumulative impacts to visitor use and experience. Alternative 3 would make a large contribution to these impacts by supporting traditional winter visitor use and experience opportunities in Yellowstone, a unique recreational opportunity in the area, as well as providing a range of opportunities for those with mobility impairments.

Conclusion

Under alternative 3, changes in visitor experience created by the transition to snowcoach access only would result in parkwide, long-term benefits compared to the no-action alternative. Both motorized and non-motorized winter users would experience the benefits of continued access to the park's interior. However, the opportunity to experience the park by snowmobile would be lost for all park users, including those with mobility impairments. This would result in some visitors' expectations not to be met and result in long-term minor to moderate adverse impacts. Overall, alternative 3 would result in long-term beneficial impacts to visitor experience and access, with long-term moderate adverse impacts from the phaseout of the snowmobile experience but the maintenance of other winter experiences in the park. Cumulative impacts to visitor use and experience would be long-term beneficial and long-term moderate adverse.

Impacts of Alternative 4: Manage OSV Use by Transportation Events

Under alternative 4, OSVs would be managed by transportation events. Guided winter OSV access would continue, and a limited number of noncommercially guided, group snowmobile opportunities would be added.

Alternative 4 would offer a spectrum of opportunities and an increase in total numbers of OSVs compared to those allowed under the 2009 to 2011 interim regulations. Full allocation of snowmobile use would result in 50 snowmobile and 60 snowcoach tours per day. Using a maximum of 10 sleds per snowmobile group (with an average of 7 over the season), up to 480 snowmobiles could enter the park each day, with 60 snowcoaches. On the other end of the spectrum, snowcoach tours could potentially increase from the current 78 to the full allocation of 106 transportation events, if none of the commercial transportation events on a given day were used for snowmobile access. Four transportation events would continue to be made available to noncommercially guided snowmobile access. As operators would be able to choose how to use their events, it is possible that a visitor's desired mode of access may not be available, depending on how the operators spend their

transportation event allocations. This would result in potential long-term moderate impacts if a visitors chosen experience is not available, but they would still be able to have another type of winter experience.

Alternative 4 also offers the opportunity for additional numbers of visitors to access the park via OSV should OSVs meet enhanced BAT (E-BAT) standards. If snowmobiles meet E-BAT, the seasonal average group size would be able to increase from seven to eight, with the maximum group size remaining at 10. If snowcoaches meet E-BAT the group size for snowcoaches could increase from one to two. For snowcoaches, if all meet E-BAT daily limits could rise from 106 (if all commercial snowmobile transportation events allocations are being used) to 212 (if no snowmobile allocations are being used). Overall, the increase in number of visitor opportunities should OSVs meet E-BAT would have long-term beneficial impacts. With the reduced sound emissions, this single transportation event would be expected to have similar impacts to 1 snowcoach that does not meet E-BAT. Since impacts would be similar, it is not expected that there would be adverse impacts to visitor experience from the increase in snowcoach group size.

A maximum of 2,344 visitors per day could be expected under this alternative when there is maximum use of all snowmobile allocations and all snowcoach events are E-BAT and had two snowcoaches in each event. A maximum of 2,647 visitors per day could be expected if all commercial transportation events were E-BAT and had two snowcoaches per event and four events were noncommercially guided snowmobiles. The amount of OSVs allowed in the park could increase or decrease, based on changes in technology. The ability to allow for increases in visitation with improved technology, without increasing impacts to park resources, would result in long-term beneficial impacts.

Under alternative 4, the addition of noncommercially guided tours would increase the variety of winter experiences and create opportunities for those wishing to enter the park without a commercial guide. Operators would have choice in determining use of OSV type to meet the demand of their clients. Depending on visitor or operator preference, up to half of these visitors would tour the park on snowmobile. All guides would be required to complete a snowmobile education and safety course, but level of interpretation provided by noncommercial guides, who enter the park no more than twice per season, may not be as thorough or in-depth as that offered by commercial guides entering the park daily. The non-commercially guided program would be monitored and if impacts to visitor use and experience increased, from lack of interpretation or other guide training, adjustments would be made to the program. The ability to ride your own sled in the park is likely to appeal to a portion of winter visitors, providing beneficial effects to visitor use and experience.

Because visitor use in the park's interior would continue, the Old Faithful Snow Lodge, warming huts, and other winter amenities that help support a safe and high-quality visitor experience would continue to be offered. These accessible facilities in the park would continue to be available to support a comfortable and informative park experience for the very young, the elderly, and visitors with mobility impairments. As described for alternative 2, the park's accessible facilities would support a comfortable and educational experience.

It is anticipated that this alternative would meet the expectations of most OSV visitors and provide operators options in providing winter tour services. For visitors with mobility challenges, snowcoaches would be able to accommodate demand and would likely be able to meet the increased need for such services, as necessary. If the number of snowcoaches increases as they meet enhanced BAT further beneficial impacts would be realized. Those seeking snowmobile experiences would have access to two types of this activity. The very young, the elderly, and visitors with mobility impairments could continue to visit the park during winter.

It is not expected that visitors would notice much reduction in OSV sounds exceeding 35 dBA in the travel corridor (from an average of 123 and a maximum of 237 transportation events allowed under the 2009 to 2011 interim regulations to 110 events per day). As a result, backcountry visitors would experience quiet and solitude similar to that currently available in the park. However, non-motorized visitors would continue to benefit from access to the park's interior, maintenance of 35 miles of trails, and use of visitor services and amenities such as warming huts. Limited adverse effects would continue to occur from periodic exposure to snowcoach sounds and sights. As described in chapter 3 (see "Soundscapes and the Acoustic Environment" and "Wildlife and Wildlife Habitat"), these intrusions would be considered minimal. Should OSVs meet enhanced BAT, the number of transportation events would not increase and impacts to visitor use, experience, and accessibility would not be expected to increase impact levels beyond a minimal level.

Alternative 4 has the greatest potential to meet expectations of OSV visitors to the park and to allow operators to meet client demand by choosing how to use their transportation events, as well as for a potential increase in visitor opportunities. Also associated with this alternative would be a significant reduction in total number of transportation events (compared to conditions allowed under the 2009 to 2011 interim regulations which would allow for an average or 123 events and a maximum of 237 events) and associated numbers of disturbances to wildlife and the soundscape as a result of these disturbances. Compared to alternative 1, overall impacts on visitor use and experience would be long-term beneficial.

Cumulative Impacts

Impacts on visitor use and experience from other past, present and reasonably foreseeable future actions would be as described for alternative 1. These impacts are driven by the other recreational opportunities available on lands near the park such as national forests, wildlife refuges, and local communities such as Jackson and Cody, West Yellowstone, Gardiner, Island Park, and Ashton. These long-term beneficial impacts, when combined with the long-term beneficial impacts of alternative 4 would result in long-term beneficial cumulative impacts to visitor use and experience. Alternative 4 would make a large contribution to these impacts by supporting traditional winter visitor use and experience opportunities in Yellowstone, options for operators, and a range of opportunities for visitors with mobility impairments.

Conclusion

Under alternative 4, management by transportation event and inclusion of noncommercially guided snowmobile tours would increase visitor opportunities, resulting in parkwide, long-term beneficial impacts compared to the no-action alternative for visitor use and experience and visitor accessibility. If visitors are able to experience winter use, but not in the mode they desire due to how operators user their allocations, there would be the potential for long-term moderate adverse impacts. The amount of access into the park would remain around current levels, with the potential to increase, and they types of experiences available would increase while impacts to all resources, including visitor use, experience, and accessibility, would remain the same or decrease due to a decrease in the number of transportation events compared to the conditions allowed under the 2009 to 2011 interim regulations. Both motorized and non-motorized winter users would experience the benefits of continued access to the park's interior, and operators would have the ability to choose the type of service they provide. Resource conditions would remain largely unchanged from recent years. Overall, alternative 4 would result in long-term benefits to visitor experience and access. Cumulative impacts would be beneficial.

HEALTH AND SAFETY

GUIDING REGULATIONS AND POLICIES

NPS *Management Policies 2006* address providing a safe and healthful environment for visitors and employees, as further described below. *Management Policies 2006* also state, "the Service will reduce or remove known hazards and apply other appropriate measures, including closures, guarding, signing, or other forms of education" (NPS 2006a, section 8.2.5.1). For Yellowstone winter use, this would relate to the air and sound emissions, avalanche danger, and safety concerns between different modes of winter transportation (including conflicts between users and safety concerns related to motorized use in winter driving conditions) experienced by staff and visitors.

Air Emissions. The Occupational Safety and Health Administration (OSHA) sets enforceable permissible exposure limits (PELs) to protect workers against the health effects of exposure to hazardous substances. PELs are regulatory limits on the amount or concentration of a substance in the air, and are based on an 8-hour time weighted average exposure (OSHA 2006). Table 58 shows the PELs established by OSHA. In addition to these standards, studies at Yellowstone also consider the limits of the American Conference of Industrial Hygienists (ACGIH), which is an industry standard setting organization. ACGIH details threshold limit values (TLVs) for various air emissions, which are also presented in table 38.

TABLE 58: OSHA AND ACGIH LIMITS FOR AIR CONTAMINANTS

Substance	8-hour time weighted average OSHA Permissible Exposure Limit	ACGIH Threshold Limit Value
Acetone	1000 ppm	500 ppm
Benzene	1.0 ppm	0.5 ppm
Carbon Monoxide	50 ppm	25 ppm
Ethyl Alcohol	1000 ppm	1000 ppm
Ethyl Benzene	100 ppm	100 ppm
Formaldehyde	0.75 ppm/2.0 ppm [a]	0.3 ppm [b]
Isopropyl Alcohol	400 ppm	400 ppm
Naphtha	100 ppm	—
Petroleum Distillates	500 ppm	—
Toluene	200 ppm	50 ppm
Xylene	100 ppm	100 ppm

[a] Short-term exposure limit.

[b] Ceiling limits.

Source: 29 CFR § 1910, Radtke 2008 and 2009.

— Data not available.

Noise Emissions. Various standards exist for occupational exposure to noise including the OSHA permissible exposure levels (PELs), Environmental Protection Agency (EPA) standards, and the National Institute for Occupational Safety and Health (NIOSH) standards, each discussed below.

In order to protect the hearing of employees, OSHA has established maximum noise levels for occupational exposure, beyond which mitigation measures or personal protective equipment is required. Table 59 shows the permissible noise exposures established by OSHA. The action level at which a hearing conservation program for employees is warranted, has been identified by OSHA as 85 dBA. The permissible exposure limit (PEL) for noise exposure as identified by OSHA is 90 dBA. The below analysis considers the 8-hour standard for all agencies, for purposes of comparison.

TABLE 59: OSHA PERMISSIBLE NOISE EXPOSURES

Duration per day, hours	Sound level dBA slow response
8	90
6	92
4	95
3	97
2	100
1 ½	102
1	105
½	110
¼ or less	115

Source: OSHA 2006.

Although primary responsibility for control of noise rests with state and local governments, federal action is essential to deal with major noise sources in commerce, control of which requires national uniformity of treatment (EPA 2010m). Directed by Congress, the EPA retains authority to investigate and study noise and its effects, disseminate information to the public regarding noise pollution and its adverse health effects, respond to inquiries on matters related to noise, and evaluate the effectiveness of existing regulations for protecting the public health and welfare, pursuant to the Noise Control Act of 1972 and the Quiet Communities Act of 1978 (EPA 2010n). Noise levels necessary to protect public health and welfare against hearing loss, annoyance, and activity interference have been identified and published in a new EPA document, "Information on Levels of Environmental Noise Requisite to Protect Public Health and Welfare with an Adequate Margin of Safety." The document identifies a 24-hour exposure level of 70 decibels as the level of environmental noise which will prevent any measurable hearing loss over a lifetime. Likewise, a level of 55 decibels outdoors is identified as preventing activity interference and annoyance (EPA 2010o).

In the Occupational Safety and Health Act of 1970, NIOSH is charged with recommending occupational safety and health standards, including noise exposure, and describing exposure concentrations that are safe for various periods of employment. By means of criteria documents, NIOSH communicates these recommended standards to regulatory agencies, including OSHA and others in the occupational health and safety community. In 1972, NIOSH published *Criteria for a Recommended Standard: Occupational Exposure to Noise*, which provided the basis for a recommended standard to reduce the risk of developing permanent hearing loss as a result of occupational noise exposure. In 1998 NIOSH issued revised recommendations, which go beyond attempting to conserve hearing by focusing on preventing occupational noise-induced hearing loss (NIOSH 1998). The American National Standards Institute (ANSI) is a private, non-profit membership organization that serves as administrator and coordinator of the U.S. private sector voluntary standardization system. It facilitates the development of American National Standards by accrediting the procedures of organizations that develop standards. These groups work cooperatively

to develop voluntary national consensus standards. ANSI empowers its members and constituents to strengthen the U.S. marketplace position in the global economy while helping to assure the safety and health of consumers and the protection of the environment (ANSI n.d.). The NIOSH and ANSI recommended exposure limit for occupational noise exposure is 85 decibels as an 8-hour time-weighted average (Noise Pollution Clearinghouse n.d.). With a 40-year lifetime exposure at the 85 decibel recommended exposure limit, the excess risk of developing occupational noise-induced hearing loss is eight percent, which is considerably lower than the 25 percent excess risk at the 90 decibel PEL currently enforced by OSHA (NIOSH 1998). Table 60 shows a comparison of noise exposure standards set by OSHA, EPA, NIOSH, and ANSI.

TABLE 60: COMPARISON OF NOISE EXPOSURE STANDARDS SET BY DIFFERENT ORGANIZATIONS

	EPA	ANSI and NIOSH	OSHA
dBA	Hours	Hours	Hours
70	24		
73	12		
76	6		
79	3		
82	1		
85		8	
88		4	
90			8
91		2	
92			6
94		1	
95			4
97			3
100			2
102			1

Source: Noise Pollution Clearinghouse n.d.

Avalanche Danger. On August 10, 11, and 12, 2010, seven internal NPS and external avalanche control experts and observers undertook a detailed, systematic review of agency winter operations on Sylvan Pass at Yellowstone, called an Operational Risk Management Assessment (ORMA). This review was a secondary follow-up to the initial ORMA conducted in 2007. The ORMA focused on the following four principles:

1. Accept no unnecessary risk.
2. Accept risk when benefits outweigh the cost.
3. Anticipate and manage risk by planning.
4. Make risk decisions at the right level.

A key feature is that ORMA does not tell you what to do, it gives you an accurate assessment of all risks and asks the question: "What is acceptable to you?" As part of the ORMA, the panel assessed

possible operating conditions for Sylvan Pass, including current operations, and scored these various scenarios under the green-amber-red scale. The green-amber-red scale is shown in figure 32. For reference, current Sylvan Pass operations received a green-amber-red score of 34.67, or approximately 35, the high end of green.

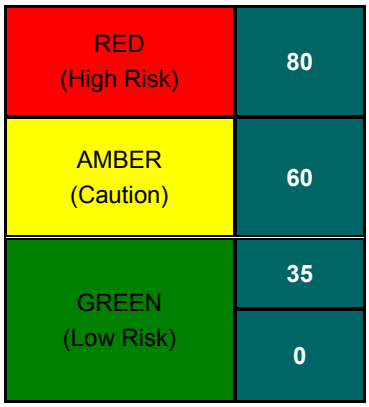

FIGURE 32: GREEN-AMBER-RED SCALE FOR THE ORMA PROCESS

Visitor Use Conflict/Exposure to the Elements. NPS *Management Policies 2006* address health and safety for both NPS staff and visitors. For NPS staff, section 1.9.1.4 "Employee Safety and Health" states,

> The safety and health of employees, contractors, volunteers, and the public are core Service values. In making decisions on matters concerning employee safety and health, NPS managers must exercise good judgment and discretion and, above all, keep in mind that the safeguarding of human life must not be compromised. The Service must ensure that all employees are trained and informed on how to do their jobs safely, and that they have the necessary clothing, materials, and equipment to perform their duties with minimal personal risk.

In relation to visitor safety, section 8.2.5.1, in part, states in part that

> While recognizing that there are limitations on its capability to totally eliminate all hazards, the Service and its concessioners, contractors, and cooperators will seek to provide a safe and healthful environment for visitors and employees. The Service will work cooperatively with other federal, tribal, state, and local agencies; organizations; and individuals to carry out this responsibility. The Service will strive to identify and prevent injuries from recognizable threats to the safety and health of persons and to the protection of property by applying nationally accepted codes, standards, engineering principles, and the guidance contained in Director's Orders #50B, #50C, #58, and #83 and their associated reference manuals. When practicable and consistent with congressionally designated purposes and mandates, the Service will reduce or remove known hazards and apply other appropriate measures, including closures, guarding, signing, or other forms of education. In doing so, the Service's preferred actions will be those that have the least impact on park resources and values.
>
> The Service recognizes that the park resources it protects are not only visitor attractions, but that they may also be potentially hazardous. In addition, the recreational activities of some visitors may be of especially high-risk, high-adventure types, which pose a

significant personal risk to participants and which the Service cannot totally control. Park visitors must assume a substantial degree of risk and responsibility for their own safety when visiting areas that are managed and maintained as natural, cultural, or recreational environments.

ASSUMPTIONS, METHODOLOGY, AND INTENSITY DEFINITIONS

The area of analysis is the park. To assess the level of impact to employee and public health and safety for each alternative, the following types of information were used:

- Safety policies and guidelines
- Results of air monitoring near the west entrance in Yellowstone
- Results of personal exposure and sound monitoring
- Reports from employees and guides
- Past and current avalanche analyses and the result of recent ORMA proceedings.

Overall impacts to health and safety, including impacts for avalanche control in the Sylvan Pass area of Yellowstone, are defined below. Because personal and occupational exposure to air quality and noise contaminants has been monitored in Yellowstone, the alternatives are compared qualitatively, using the monitored data (Jensen and Meyer 2006; Spear et al. 2006; Radtke 2008; Radtke 2009).

Intensity Definitions

The following intensity definitions for evaluating impacts on health and safety were defined.

Negligible: Air and noise emissions would be well below applicable standards. There would be limited risk to employees conducting avalanche control activities during the winter use season at Sylvan Pass (green as defined by the ORMA). There would be no to minimal risks to visitors as a result of conflicts with other uses, as well as from the harsh winter elements.

Minor: Air and noise emissions would remain below applicable standards. If mitigation were needed, it would be relatively simple and would likely be successful. There would be limited to moderate risk to employees conducting avalanche control activities during the winter use season at Sylvan Pass (green as defined by ORMA). There could be occasional risks to visitors as a result of conflicts with other uses, as well as from the harsh winter elements, but reported incidents of these conflicts to law enforcement would remain infrequent.

Moderate: Applicable air and noise standards may be approached occasionally. Mitigation measures would probably be necessary and would likely be successful. There would be a moderate to high risk to employees conducting avalanche control activities during the winter use season at Sylvan Pass (amber as defined by ORMA). There could be occasional to frequent risks to visitors, reported to law enforcement, as a result of conflicts with other uses, as well as from the harsh winter elements.

Major: Applicable standards for air and noise would be exceeded at least rarely, and could not be mitigated with simple measures. Extensive mitigation measures would be needed, and their success would not be guaranteed. There would be a high risk to employees conducting avalanche control activities during the winter use season at Sylvan Pass (red as defined by ORMA). There could be frequent risks to visitors, reported to law enforcement, as a result of conflicts with other uses, as well as from the harsh winter elements.

Study Area

The geographic study area for health and safety for the impact analysis and cumulative impact analysis is within the boundary of the park.

SUMMARY OF IMPACTS

Impacts to health and safety under the alternatives ranged from long-term moderate adverse, under alternatives 2 and 4 from potential use conflicts and the operation of Sylvan Pass, to long-term and beneficial for alternatives that include the closure of Sylvan Pass (alternatives 1 and 3). Impacts under each alternative were as follows:

- Alternative 1 would have long-term negligible adverse impacts to health and safety from noise and air emissions because air pollution and noise levels would be limited to administrative OSV use and would be minimal. There would also be long-term beneficial impacts to health and safety from the closure of Sylvan Pass. Long-term minor adverse impacts would occur from the possibility of non-motorized users being out in harsh winter conditions with minimal support facilities.
- Alternatives 2 and 4 would have long-term negligible adverse impacts to health and safety from air and noise emissions because levels would be well below all regulatory standards for human health. Because all of these alternatives would include the operation of Sylvan Pass, there would long-term moderate adverse impacts due to the inherent risk of staff working in a known avalanche zone. Use levels and types (both snowmobile and snowcoach use) under these alternatives would result in long-term minor to moderate adverse impacts from user conflicts and exposure to the elements.
- Alternative 3 would have long-term negligible adverse impacts to health and safety from air and noise emissions because levels would be well below all regulatory standards for human health. The closure of Sylvan Pass would have long-term beneficial impacts because staff would not be working in a known avalanche zone. Because more users would be in snowcoaches, exposure to the elements would be reduced and long-term minor adverse impacts from user conflicts and exposure to the elements would occur.

DETAILED IMPACT ANALYSIS

Impacts of Alternative 1: No Snowmobile/Snowcoach Use

Under alternative 1, snowmobile use would be limited to administrative uses. The few administrative snowmobiles used in the park would meet BAT guidelines, with road grooming being completed on an as-needed basis (greatly reduced from current operations). Non-motorized uses would continue in the park, but would likely be limited to the outer edges due to the distance between the park entrance and Old Faithful, because many park visitors would not have the physical ability to cover this distance.

Because no recreational or administrative OSV use would occur, Sylvan Pass would be closed to visitor use and would not require staff for daily avalanche control operations.

With this minimal level of use, exposure to air pollutants would be limited. As noted above under "Air Quality," emissions levels would be well below OSHA PELs and ACGIH TLVs. Likewise, employees at the entrances would not be exposed to benzene or formaldehyde since recreational OSVs would no longer be going through the park entrances. As a result, there would be long-term negligible adverse impacts to health and safety in terms of air emissions.

Under the no-action alternative, noise would also be limited to administrative use. As described above under "Soundscapes and the Acoustic Environment," these noise levels would be minimal and well below OSHA, NIOSH, and EPA noise standards. As a result, there would be long-term negligible adverse impacts to health and safety in terms of sound emissions and there would be an improvement in air emissions over the recent average conditions.

With the closure of Sylvan Pass, avalanche control operations would not be necessary and park employees would not be exposed to the inherent risks of avalanche control operations (as described in chapter 3). During the 2010 ORMA, existing operations were considered, with the panel ranking them in the green category, but at the very high end. With the closure of Sylvan Pass, these operations would no longer be required, resulting in long-term beneficial impacts to staff health and safety, because they would no longer be forecasting in this area on a daily basis, reducing the amount of risk they would encounter. The 2010 ORMA also addressed the spring opening of Sylvan Pass in the context of winter avalanche management at Sylvan Pass, and additional challenges were identified for the spring opening of Sylvan Pass if avalanche forecasting and control operations did not occur in the winter.

Visitor use in the park would be limited to non-motorized use, the majority of which would occur on the periphery of the park. Non-motorized users may encounter administrative OSV use, but this use would be limited to a few trips a day and these encounters would be infrequent. In general, there would be long-term negligible adverse impacts, because the potential for conflict between uses would be minimal. However, non-motorized users could face increased risks in the interior of the park, because there would be limited facilities or other users to assist should weather conditions change, resulting in long-term minor adverse impacts. In addition, the limited staff that would be in the park during the winter season would not have back up should an emergency occur, because staffing within the park would be extremely limited.

Overall, air pollution and noise levels would be limited to administrative OSV use and would be minimal, and the closure of Sylvan Pass would reduce the avalanche risk to staff. Therefore, impacts would be long-term negligible adverse and long-term beneficial to health and safety, with the potential for long-term minor adverse impacts from the possibility of non-motorized users being out in harsh winter conditions with minimal support facilities.

Cumulative Impacts

Past, present, and reasonably foreseeable future actions that could impact health and safety include recreation occurring on adjacent lands (including use in consolidated forest lands). This recreation would require the use of vehicles or other equipment which create air and/or noise emissions in the region, but would not create any avalanche danger to be mitigated. All of these actions occur on lands outside of the park and do not extend into the park, would result in long-term negligible adverse impacts.

Multiple construction projects currently occurring or planned in the park would also contribute to impacts on health and safety. These projects would include construction of the new west entrance and reconstruction of the east entrance road (underway). Overall, although construction sites could have temporary adverse impacts to park visitors related to health and safety, construction would not be occurring during the winter months and would not impact park staff and visitors during this time. Some of these projects would have beneficial impacts related to winter use because the reconstruction of the east entrance road has moved the road farther away from avalanche slide areas, and construction of new facilities at the west entrance has included new staff kiosks with improved ventilation systems, if needed. Overall, these construction projects would have long-term beneficial impacts to health and safety.

The long-term negligible adverse impacts and long-term beneficial impacts of these past, present, and reasonably foreseeable future actions, combined with the long-term negligible to minor adverse impacts and long-term beneficial impacts of alternative 1, would result in long-term negligible adverse cumulative impacts on health and safety. Alternative 1 would contribute a minimal amount to the overall cumulative impacts because many of these actions occur across a larger region of which Yellowstone is a part.

Conclusion

Overall, air pollution and noise levels would be limited to administrative OSV use and would be minimal, and the closure of Sylvan Pass would reduce the avalanche risk to staff. Therefore, impacts to health and safety would be long-term negligible adverse and long-term beneficial to health and safety, with the potential for long-term minor adverse impacts from the possibility of non-motorized users being out in harsh winter conditions with minimal support facilities. Cumulative impacts would be long-term, negligible adverse.

Impacts of Alternative 2: Continue Snowmobile/Snowcoach Use at 2011/2012 Winter Season Interim Regulation Limits

Under alternative 2, use levels in the park would allow for up to 318 snowmobiles per day and 78 snowcoaches, the level of use permitted under the 2009 to 2012 interim regulations. Existing OSV management measures that include BAT guidelines for snowmobiles, guiding requirements, and hour of operation restrictions would continue. In addition to the current management measures employed, BAT guidelines would be developed and implemented for snowcoaches by the 2017/2018 season. Further, if the EPA adopts standards for any class of OSV that are more stringent than the requirements resulting from this draft plan/SEIS, the EPA standards would become the NPS standards. Non-motorized uses would continue in the park, throughout the interior as currently occurring. Under alternative 2, Sylvan Pass would be open to visitor use and would require staff for daily avalanche control operations.

Staff exposure to air and noise emissions in the winter was measured during an exposure assessment conducted at the entrance stations during Presidents' Day weekend of 2008 (a peak use period). Use volume over the three-day weekend was 691 snowmobiles and 71 snowcoaches total (Radtke 2008). A similar exposure assessment was again conducted during President's Day weekend of 2009. During the 2009 assessment, use volumes were 635 snowmobiles and 64 snowcoaches total for the three-day weekend. In addition to a slightly lower level of use, the 2009 study differed from the 2008 study with a new entrance station configuration and during one day of the assessment (February 15), the emissions from snowcoaches were separated from snowmobiles to determine whether exposure levels would differ (Radtke 2009).

The 2008 and 2009 exposure assessments looked at air emissions through the measurement of carbon monoxide, hydrocarbons, and aldehydes. At these use levels, the exposure assessments found that results for all volatile organic compounds (VOCs), aldehydes, and carbon monoxide were well below the occupational exposure limits (for OSHA and ACGIH) and in most cases were below the detection limits of the analytical method (Radtke 2008). In the 2008 assessment, results for VOCs showed that most were below the detection limit, with the relative highest exposure being to benzenes, which was approximately 2 percent of the PEL. Employees on snowmobiles did show measurable carbon monoxide exposures, but those levels were still below applicable standards (approximately 10 percent of the PEL). During this survey, three of nine aldehyde had detectable levels of formaldehyde (limit of detection was 1 ug/sample). Although detectable, these measurements were still only 2–3 percent of the PEL and 5–7 percent of the ACGIH TLV. No other aldehydes, such as acrolein or acetaldehyde were above the detection limit (Radtke 2008). In the 2009 assessment, similar results occurred with personal exposures to these contaminants well below OSHA PELs and ACGIH TLVs, with most being below detectable limits. In looking at the separation of snowcoaches and snowmobiles in 2009, these vehicles were separated by lane at the west entrance with 19 snowcoaches in lane B and 241 snowmobiles in lane A over the three-day weekend. Results of this separation showed that carbon monoxide was slightly higher over the sampling period for the snowmobile lane, but the peak reading was higher for snowcoaches (although the peak reading did not reach the NIOSH ceiling of 200 ppm). There was no difference evident in aldehydes or VOCs between the two vehicle types.

Results showing that air emissions were well within all applicable standards from the 2008 and 2009 assessments are due, in part, to the OSV management occurring in Yellowstone. Requirements for BAT, as well as required guides and limits on the number of OSVs in the park, contribute to keeping emissions well within regulatory levels. Also contributing to these low levels are the kiosk ventilation systems, where the employees work. Under alternative 2, use levels would be lower than those assessed in the 2008 and 2009 exposure assessments and management measures that have kept emissions low, described above, would be continued. With lower levels of use (up to 318 snowmobiles and 78 snowcoaches, compared to over 600 snowmobiles and a similar level of snowcoach use), it is expected that air emissions under alternative 2 would continue to be well below the detection limit and within OSHA PELs and ACGIH TLVs. As shown in the 2009 study, peak levels of carbon monoxide would likely be higher for snowmobiles than snowcoaches, but still within established levels. Because use would likely be within OSHA PELs and ACGIH TLVs with no exceedences, based on past monitoring, impacts on health and safety from air emissions would be long-term negligible adverse.

The 2008 and 2009 assessments looked at noise emissions at the west entrance as well as for employees using OSVs on a daily basis. In both 2008 and 2009, personal noise exposures in the two kiosks at the west entrance ranged from 67.1 dBA to 70.6 dBA. These levels are below the OSHA action level/PEL as well as EPA and NIOSH standards (Radtke 2008, 2009). The 2008 assessment also monitored a maintenance employee riding a four-stroke snowmobile for a full shift, and found that the full shift exposure was close to the OSHA action level (85 dBA) (Radtke 2008). Under alternative 2, use levels would be lower than those assessed in the 2008 and 2009 exposure assessments, and management measures that have kept noise emissions low, such as BAT and set use levels, would be continued. With lower levels of use, it is expected that noise emissions under alternative 2 would continue to be below the OSHA action level, and impacts on health and safety from noise emissions would be long-term negligible adverse.

Alternative 2 would provide for the continued operation of Sylvan Pass, with avalanche control operations continuing at their current levels. As described in chapter 3, avalanche work is inherently dangerous and risks to employees may be greater than those generally posed to visitors because (1) employees conducting avalanche hazard mitigation spend more time in the pass, and (2) avalanche

control work, by its very nature, is hazardous. Under alternative 2, the risk would be addressed through implementation of a strict safety-based, risk reduction program, continuing the program that is currently in place and was rated in a recent ORMA on the high end of green, getting close to amber. The pass would not be open unless safety criteria are met and, in the professional judgment of park managers, operations can be conducted within acceptable levels of risk.

When park staff perform avalanche mitigation, a combination of avalanche mitigation techniques could be used, including risk assessment analyses as well as forecasting and helicopter and howitzer dispensed explosives. Area staff would use whichever tool is the safest and most appropriate for a given situation, with the full understanding that safety of employees and visitors comes first. Employees in the field would make the operational determination of when safety criteria have been met, and operations can be conducted with acceptable levels of risk. The NPS would not take unacceptable risks. When safety criteria have been met, the pass would be open; when they have not been met, the pass would remain closed. As with past winters, extended closures of the pass may occur. Also, during the winter season, the pass would not be open for administrative travel unless it is also open to public travel, further reducing employee exposure to risk. Because current operations were rated by the ORMA as green (at the high end, getting close to amber) (NPS 2010n), impacts to NPS staff from avalanche operations would be long-term moderate adverse.

Visitor use in the park would include both motorized and to non-motorized use. As noted in chapter 3 (figure 23), since OSV management that has included guiding requirements was implemented, the number of OSV moving violations and arrests has continued to decline. Alternative 2 would continue OSV management measures put in place since 2004, including requiring guided use of all OSVs. Guided use also ensures that guides have been trained (as part of their agreement with the NPS) in operation in winter conditions and in avoiding conflict with non-motorized users. The continuation of guiding requirements would have long-term beneficial impacts to health and safety. Alternative 2, as with all action alternatives, would not advise non-essential work/OSVs travel at below −20°F, which would reduce the amount of time both visitors and staff would spend in harsh winter conditions. Because OSV use would still occur, and staff and visitors would still be exposed to the winter elements, impacts would be long-term minor adverse, because OSV management and park practices would minimize both user conflict and risk from the elements.

Overall air pollution and noise levels would be below applicable standards, and conflicts between users and exposure to harsh winter conditions would be minimized through OSV management measures under alternative 2. NPS employees working in Sylvan Pass would still be exposed to avalanche risk, which has been rated at the high end of green, getting close to the amber (caution) level in a recent ORMA process (NPS 2010n). Under alternative 2, impacts to human health and safety would be long-term negligible adverse from air and noise emissions, long-term moderate adverse from the operation of Sylvan Pass, and long-term minor adverse from user conflicts and exposure to the elements.

Cumulative Impacts

The long-term negligible adverse impacts and long-term beneficial impacts on the health and safety of NPS staff and visitors from other past, present, and reasonably foreseeable future actions would be the same as described for alternative 1. These impacts are a result of recreational activities on adjacent lands that contribute to noise and air emissions, although these contributions are minimal because the activities do not extend into the park. Construction projects occurring within the park that improve roadways and other facilities contribute to beneficial impacts of these actions. The effects of these actions, when combined with the long-term negligible to moderate adverse impacts of alternative 2, would result in long-term minor adverse cumulative impacts on health and safety. Alternative 2 would

contribute a minimal amount to the overall cumulative impacts because many of these actions occur across a larger region of which Yellowstone is a part.

Conclusion

Under alternative 2, impacts to human health and safety would be long-term negligible adverse from air and noise emissions, long-term moderate adverse from the operation of Sylvan Pass, and long-term minor adverse from user conflicts and exposure to the elements. Cumulative impacts under alternative 2 would be long-term minor adverse.

Impacts of Alternative 3: Transition to Snowcoaches meeting BAT Requirements Only

Under alternative 3, until all snowcoaches in the current fleet meet BAT requirements use levels and their impacts to health and safety would be the same as under alternative 2, long-term negligible adverse from air and noise emissions, long-term moderate adverse from the operation of Sylvan Pass, and long-term minor adverse from user conflicts and exposure to the elements.

After all snowcoaches have met BAT requirements, OSV use would transition to snowcoach use only after three years and would result in use levels at 120 snowcoaches and zero snowmobiles at the end of the transition. During this transition, existing regulations on OSV use would continue that include BAT guidelines for snowmobiles, guiding requirements, and hour of operations restrictions. In addition to the current management measures employed, BAT guidelines would be developed and implemented for snowcoaches by the 2017/2018 season. Further, if the EPA adopts standards for any class of OSV that are more stringent than the requirements resulting from this draft plan/SEIS, the EPA standards would become the NPS standards. Non-motorized uses would continue within the park, throughout the interior as currently occurring. Under alternative 3, Sylvan Pass would be closed to visitor use and would not require staff for daily avalanche control operations.

As described above under alternative 2, exposure assessments were conducted over Presidents' Day weekend 2008 and 2009. These assessments found that at use levels between 635 and 691 snowmobiles and 64 and 71 snowcoaches over a three-day weekend, exposures to air emissions were below all occupational exposure limits (Radtke 2008, 2009). Because use levels for OSV would be lower (approximately one-sixth of less than the measured use), it is expected that air emissions exposure from OSV for alternative 3 would continue to be below all occupational exposure limits. As shown in the 2009 study, peak levels of carbon monoxide were higher for snowmobiles than snowcoaches, but still within established levels. As the number of snowcoaches permitted increases above the levels studied, additional exposure assessments would occur to ensure emission levels stay below occupational exposure limits. However, since the additional 42 snowcoaches would be offset by a reduction of 318 snowmobiles, it is expected that these limits would be not be exceeded. Because use would likely be within OSHA PELs and ACGIH TLVs with no exceedences, based on past monitoring, impacts on health and safety from air emissions would be long-term negligible adverse.

The 2008 and 2009 assessments also looked at noise emissions at the west entrance as well as for employees using OSV on a daily basis. As described in alternative 2, personal noise exposures within the two kiosks at the west entrance were below the OSHA action level/PEL as well as EPA and NIOSH (Radtke 2008, 2009). With lower levels of total OSV use proposed after the transition to snowcoaches only than assessed in 2008 and 2009, it is expected that noise emissions under alternative 3 would continue to be below the OSHA action level and impacts on health and safety from noise emissions would be long-term negligible adverse.

With the closure of Sylvan Pass under alternative 3, avalanche control operations would not be necessary and park employees would not be exposed to the inherent risks of avalanche control operations (as described in chapter 3). During the 2010 ORMA, existing operations were considered, with the panel ranking them in the high end of green, getting close to the amber category, or caution (NPS 2010n). With the closure of Sylvan Pass, these operations would no longer be required, resulting in long-term beneficial impacts to staff health and safety, because they would no longer be forecasting in this area on a daily basis reducing the amount of risk they encounter. The 2010 ORMA also addressed the spring opening of Sylvan Pass in the context of winter avalanche management at Sylvan Pass, and additional challenges were identified for the spring opening at Sylvan Pass if avalanche forecasting and control operations did not occur in the winter.

Visitor use in the park would include both motorized and to non-motorized use. As noted in chapter 3 (figure 23), as guiding requirements were implemented, the number of OSV moving violations and arrests has continued to decline. Alternative 3 would continue OSV management measures put in place since 2004, including requiring guided use of all OSVs and after the transition would include snowcoaches only. Guided use also ensures that guides have been trained (as part of their agreement with the NPS) in operation in winter conditions and in avoiding conflict with non-motorized users. The continuation of guiding requirements would have long-term beneficial impacts to health and safety. Alternative 3, as with all action alternatives, would not advise non-essential work/OSVs travel at below −20°F, which would reduce the amount of time both visitors and staff would spend in harsh winter conditions. Because OSV use would still occur, and staff and visitors would still be exposed to the winter elements, impacts would be long-term minor adverse, because OSV management and park practices would minimize both user conflict and risk from the elements.

Overall, air pollution and noise levels would be expected to be below applicable standards, and conflicts between users and exposure to harsh winter conditions would be minimized through OSV management measures under alternative 3. NPS employees working in Sylvan Pass would not be exposed to avalanche risk because Sylvan Pass would be closed. Under alternative 3, impacts to human health and safety would be long-term negligible adverse from air and noise emissions, long-term beneficial from the closure of Sylvan Pass and long-term minor adverse from user conflicts and exposure to the elements.

Cumulative Impacts

The long-term negligible adverse impacts and long-term beneficial impacts on the health and safety of NPS staff and visitors from other past, present, and reasonably foreseeable future actions would be the same as described for alternative 1. These impacts are a result of recreational activities on adjacent lands that contribute to noise and air emissions, although these contributions are minimal because the activities do not extend into the park. Construction projects within the park that improve roadways and other facilities would contribute to beneficial impacts of these actions. The effects of these actions, when combined with the long-term negligible to minor adverse and long-term beneficial impacts of alternative 3, would result in long-term negligible adverse cumulative impacts on health and safety. Alternative 3 would contribute a minimal amount to the overall cumulative impacts because many of these actions occur across a larger region of which Yellowstone is a part.

Conclusion

Under alternative 3, impacts to human health and safety would be long-term negligible adverse from air and noise emissions, long-term beneficial from the closure of Sylvan Pass, and long-term minor adverse from user conflicts and exposure to the elements, both before and after the transition to snowcoach only. Cumulative impacts would be long-term negligible adverse.

Impacts of Alternative 4: Manage OSV Use by Transportation Events

Alternative 4 would manage OSV use in the park based on transportation events. One event would initially equal one group of snowmobiles (maximum of 10 per group, an average of 7 over the winter season) or one snowcoach. A maximum of 110 transportation events would be allowed each day; however, no more than 50 events could be snowmobile groups. Forty-six of the snowmobile events would be guided groups with a seasonal average size of seven and a maximum of ten snowmobiles. The remaining four snowmobile events would be noncommercially guided groups with a limit of five snowmobiles per group. Operators would decide whether to "spend" their daily allotments of transportation events on snowmobile groups or snowcoaches. As a result, the daily make-up and number of OSVs in the park could range from zero to 480 snowmobiles and 60 to 106 snowcoaches. At maximum daily snowmobile use, OSVs could increase to a maximum of 540 OSVs (480 snowmobiles and 60 snowcoaches), an increase over the most recent interim rule (alternative 2) that allowed for 396 OSVs (318 snowmobiles and 78 snowcoaches); however, this level of OSV use is within the range experienced at the park during historic (pre-2004) and recent (2004–2009) use periods. If snowcoaches were maximized on a given day, their numbers would increase over existing conditions; but total OSVs for that day (106 snowcoaches, zero commercially guided snowmobiles, and 20 noncommercially guided snowmobiles) would be less than one-third of the number of vehicles allowed under the most recent interim rule (alternative 2). Regardless of the daily make-up of OSVs, the maximum number of daily transportation events would be less under alternative 4 (110 events) compared to the maximum number currently allowed under the 2009 to 2012 interim regulations (potential for 123 transportation events assuming an average snowmobile group size of seven and a potential for a maximum of 237 transportation events). If technologies were to improve and OSVs meet enhanced BAT standards (which would reduce the sound emissions from OSVs) the total number of snowmobiles would stay the same, with the potential to increase the number of snowcoaches from 106 to 212. If the snowcoach group size were to increase from one to two coaches, the two coaches would travel as close together as possible allowing for safety and would be considered one transportation event for purposes of managing OSV use. Additional impacts are not expected under this scenario, because the number of transportation events would remain the same as allowed under non-enhanced BAT standards.

In addition, if snowmobiles meet enhanced BAT the average group size would be able to increase from 7 to 8. If snowcoaches meet enhanced BAT the group size for snowcoaches could increase from 1 to 2. This would result in larger overall snowmobile groups, with no increase in the overall number of snowmobiles. For snowcoaches, if all meet enhanced BAT daily limits could rise to 120 (if all snowmobile allocations are being used) to 212 (if no snowmobile allocations are being used). While an increase in snowcoach group size from 1 to 2 may result in a very slight increase in impacts, the 2 coaches would be traveling close together in a group and would still be a single transportation event. With the reduced sound, this single transportation event would be expected to have similar impacts to 1 snowcoach that does not meet enhanced BAT.

As stated above, up to four groups of noncommercially guided snowmobiles would be permitted each day. Each group would have a noncommercial guide, who would go through NPS training and would ensure the group follows all rules and regulations, and would be trained to handle emergency situations. With this training, no additional impacts, beyond those occurring with commercial guiding, would be expected to occur as a result of noncommercial guiding as all use would be guided. The NPS notes that commercial guides are trained and regulated by concession contracts with the park that ensure compliance with all park regulations. Noncommercial guides are not governed by such contracts. Although they do not have this contractual method of regulation enforcement, noncommercial guides would be monitored by park law enforcement, who would ensure they are complying with all regulations. Should impacts increase to the resource or infractions of regulations

occur under the noncommercial guided program, this program would be altered or ceased through adaptive management.

Non-motorized uses would continue in the park, throughout the interior as currently occurring. Under alternative 4, Sylvan Pass would be open to visitor use and would require staff for daily avalanche control operations.

As described above under alternative 2, exposure assessments were conducted over Presidents' Day weekend 2008 and 2009. These assessments found that at use levels between 635 and 691 snowmobiles and 64 and 71 snowcoaches over a three-day weekend, exposures to air emissions were below all occupational exposure limits (Radtke 2008, 2009). Snowmobile numbers under alternative 4 could range from zero to 480, and snowcoach numbers from 60 to 106. Under any scenario, snowmobile numbers would be lower than measured in 2008 and 2009. Although snowcoach numbers could be higher, this would result in a decrease in snowmobile use; therefore, it is expected that air emissions exposure from OSVs for alternative 4 would continue to be below all occupational exposure limits. As shown in the 2009 study, peak levels of carbon monoxide were higher for snowmobiles than snowcoaches, but still within established levels, and this would be expected to continue. Because use would likely be within OSHA PELs and ACGIH TLVs with no exceedences, based on past monitoring, impacts on health and safety from air emissions would be long-term negligible adverse.

The 2008 and 2009 assessments also looked at noise emissions at the west entrance as well as for employees using OSVs on a daily basis. As described in alternative 2, personal noise exposures in the two kiosks at the west entrance were below the OSHA action level/PEL as well as EPA and NIOSH standards (Radtke 2008, 2009). With lower levels of total OSV use proposed than those assessed in 2008 and 2009, even if OSV levels increase, it is expected that noise emissions under alternative 4 would continue to be below the OSHA action level and impacts on health and safety from noise emissions would be long-term negligible adverse.

Alternative 4 would provide for the continued operation of Sylvan Pass, with avalanche control operations continuing at their current levels, as described in detail under alternative 2. These operations were rated by the recent ORMA at the high end of green, getting close to amber, or caution in terms of the risk to NPS staff (NPS 2010n); therefore, impacts to NPS staff from avalanche operations would be long-term moderate adverse.

Visitor use in the park would include both motorized and to non-motorized use, as well as the introduction of noncommercially guided snowmobile use. As noted in chapter 3 (figure 23), as requirements for guiding were implemented, the number of OSV moving violations and arrests has continued to decline. Alternative 4 would continue OSV management measures put in place since 2004, including requiring guided use of most OSVs. Guided use also ensures that guides have been trained (as part of their agreement with the NPS) in operation in winter conditions and in avoiding conflict with non-motorized users. In addition, alternative 4 would allow for noncommercially guided use. Under a noncommerically guided program, all noncommercial guides also receive training. The NPS notes that commercial guides are trained and regulated by concession contracts with the park that ensure compliance with all park regulations. Non-commercial guides are not governed by such contracts. Although they do not have this contractual method of regulation enforcement, non-commercial guides would be monitored by park law enforcement. Should impacts increase to the resource or infractions of regulations occur under the non-commercial guided program, this program would be altered or ceased through adaptive management.

Alternative 4, as with all action alternatives, would not advise non-essential work/OSVs travel at below −20°F, which would reduce the amount of time both visitors and staff would spend in harsh

winter conditions. Because OSV use would still occur, and staff and visitors would still be exposed to the winter elements, impacts would be long-term minor adverse, because OSV management and park practices would minimize both user conflict and risk from the elements.

Overall air pollution and noise levels would be expected to be below applicable standards and conflicts between users and exposure to harsh winter conditions would be minimized through OSV management measures under alternative 4. NPS employees working in Sylvan Pass would still be exposed to avalanche risk, which has been rated at the high end of green, getting close to amber (caution) level in a recent ORMA process (NPS 2010n). Under alternative 4, impacts to human health and safety would be long-term negligible adverse from air and noise emissions, long-term moderate adverse from the operation of Sylvan Pass and long-term minor 4 adverse from user conflicts and exposure to the elements. These impacts would be expected to stay the same should all OSVs meet enhanced BAT and OSV use levels increase.

Cumulative Impacts

The long-term negligible adverse impacts and long-term beneficial impacts on the health and safety of NPS staff and visitors from other past, present, and reasonably foreseeable future actions would be the same as described for alternative 1. These impacts are a result of recreational activities on adjacent lands that contribute to noise and air emissions, although these contributions are minimal because the activities do not extend into the park. Construction projects occurring within the park that improve roadways and other facilities contribute to beneficial impacts of these actions. The effects of these actions, when combined with the long-term negligible to minor adverse impacts of alternative 4, would result in long-term minor adverse cumulative impacts on health and safety. Alternative 4 would contribute a minimal amount to the overall cumulative impacts because many of these actions occur across a larger region of which Yellowstone is a part.

Conclusion

Under alternative 4, impacts to human health and safety would be long-term negligible adverse from air and noise emissions, long-term moderate adverse from the operation of Sylvan Pass, and long-term minor adverse from user conflicts and exposure to the elements. Cumulative impacts would be long-term minor adverse.

SOCIOECONOMIC VALUES

GUIDING REGULATIONS AND POLICIES

The NPS Director's Order 12 Handbook (NPS 2001) requires analysis of economic and social impacts as part of the NEPA process. The document specifies that economic and social analysis includes "employment, occupation, income changes, tax base, infrastructure" (NPS 2001, Appendix 1). Indirect effects on concessioners and other businesses that may be affected by the alternatives must be considered.

ASSUMPTIONS, METHODOLOGY, AND IMPACT DEFINITIONS

This section analyzes how winter use management alternatives would likely impact recreational use in the greater Yellowstone area and how change in recreational use would impact economic activity (expenditures and employment) within the area. Past reports including Duffield and Neher (2006 and 2007) and the 2008 environmental assessment prepared by NPS (NPS 2008a) present a host of results on the economic impacts of different alternatives, along with the data on recreational use and visitor

expenditure levels used in the analysis. The current analysis draws on these past reports, updating the results with more recent visitation and economic data. The impacts were estimated using the most recent version of IMPLAN (IMPLAN 2008). The analysis looks at impacts for five geographic regions: the three state area (Idaho, Montana, and Wyoming), the five county area (Fremont County in Idaho, Gallatin and Park counties in Montana, and Park and Teton counties in Wyoming), and three individual communities (Cody and Jackson, Wyoming, and West Yellowstone, Montana). The community regions are approximated using zip code boundaries.

IMPLAN Modeling

As in the previous reports, the socioeconomic analysis relies on IMPLAN modeling. The 2008 EA (NPS 2008a) describes IMPLAN as follows: IMPLAN is an "input/output" economic model designed by the USFS and is commonly used by state and federal agencies for planning and evaluation purposes. For example, Dean Runyan and Associates (2006) used IMPLAN modeling in a report to the State of Wyoming on the economic impact of travel in Wyoming. Among other outputs, IMPLAN generates estimates of output and employment. Output is the total business revenue generated by a given activity such as park visitation, and employment is the resulting number of jobs (all jobs – full and part time) associated with that activity.

There are five important caveats that are relevant to the interpretation of the IMPLAN model estimates generated for this analysis. First, the model is static in nature and measures only those effects resulting from a specific activity change at one point in time. Thus, IMPLAN does not account for any subsequent behavioral adjustments that may occur in the economy. For example, a change in the NPS plan for snowmobile management within the park may encourage local businesses to diversify or modify their operations. These changes could thereby abate potential reductions in output and employment, a change not captured by IMPLAN. Further, IMPLAN does not estimate any potential re-employment of the labor force that may be displaced by management changes (for example the increased employment opportunity provided by guiding). Therefore, the long-run net output and employment impacts resulting from the modeled changes in winter use management would likely be smaller than those estimated by the model. The second caveat to the interpretation of the IMPLAN model estimates generated for this analysis is that they rely on the economic relationships derived from the latest data available, which are from 2008 (prior analyses relied on earlier IMPLAN data sets). Third, IMPLAN information is based on year-round data; winter seasonal information may not be as accurate. Fourth, for small analysis areas (West Yellowstone, Montana, for example) the IMPLAN data may not be an accurate representation of the actual local economy due to lack of information in IMPLAN. Finally, the multipliers contained in 2008 IMPLAN data that define the relationship between spending in one industry and spending in another industry are assumed to be constant over the range of economic activity encompassed by the full set of alternatives. However, the most powerful use for economic modeling is in the comparisons between alternatives. The impacts of the three action alternatives on economic resources can be modeled and compared and the decision maker can understand the effects of the different alternatives relative to each other.

IMPLAN Model Application

The modeling of the regional economic impacts associated with changes in visitation (and associated visitor spending) on an economic area requires several types of information.

1. **The change in the number of visitors to the different analysis areas in the greater Yellowstone area**. The percentage of visitors to the park who did not live in each of the economic analysis areas was taken from the results of the 1997-1998 survey of winter park visitors (Duffield and Neher 2000). Specifically, 82.5 percent of visitors lived outside of the

five-county area, 65.5 percent lived outside the three-state region, and 99 percent lived outside each of the three communities (Cody, Jackson, and West Yellowstone). Only non-local visitation was included in the IMPLAN model since only their spending drives local economic growth. In addition, assumptions about how visitation to the communities of Cody, Jackson and West Yellowstone will change are needed. Assumptions about the distribution of visitors across the communities were updated for this analysis using data on snowmobile and snowcoach riders provided by businesses that offer these services from the last 3 years (2009/2010, 2010/2011 and 2011/2012). Based on this data, it was assumed that 64.5 percent of the change in visitation would occur in West Yellowstone and 25.1 percent would occur in Jackson and 0.3 percent for Cody. The east entrance is closed to motorized oversnow traffic under alternative 3.

2. **The change in visitation is multiplied by the average spending per visitor**. As in past reports, the analyses assume spending of $175.33 per visitor per day (Duffield and Neher 2006). Duffield and Neher estimated per-visit expenditures using a time series model of West Yellowstone resort tax collections and NPS data on west entrance visits (Duffield and Neher 2006). This regression model of winter visitation and tax receipts estimates that for every west entrance winter visit, $175.33 is spent on taxable goods and services in the community of West Yellowstone, which is applied to all park visitors. This spending does not represent total trip spending for an individual because he or she may visit the park more than once on a trip or may visit other areas in the vicinity such as national forest lands.
3. **The IMPLAN model divides economic activity into industry categories, so the per visitor spending must be divided between categories**. The distribution of spending across economic sectors is also drawn from the 1997-1998 winter visitor survey (Duffield and Neher 2006). That survey asked winter park visitors to detail their spending patterns within the greater Yellowstone area. Based on these responses, visitor spending was allocated as 27.5 percent lodging, 24.6 percent automotive and gas stations, 17.1 percent miscellaneous retail expenditures, 14.3 percent eating and drinking establishments, 11.5 percent scenic and recreational transportation, and 5 percent other amusement services.

Using the change in visitation, per visitor spending, and the distribution of spending across industry categories, an estimate is calculated for direct changes in non-resident visitor spending for an action alternative and relative to the no-action alternative. The direct spending changes by sector are then input into the IMPLAN program.

The IMPLAN program estimates total output and employment impacts, including indirect and induced impacts arising from the initial direct spending impact, and allocates these impacts across the sectors of the analysis area. Direct impacts reflect the initial spending at local businesses by visitors from outside the greater Yellowstone area (the change in direct spending described above). Indirect impacts reflect the ripple effect of this spending, as businesses pay for the inputs they need such as capital and labor. The induced effects reflect the resulting changes in household income for local residents.

At its most aggregated level, IMPLAN modeling applies output and employment multipliers to the initial visitor spending to arrive at estimated total output and employment impacts. In general, the smaller and less diverse the analysis area is, the closer its expenditure multiplier is to 1.0. Conversely, the larger and more diverse an economy, the larger are its multipliers.

Current Use Levels

Recent visitation data and trends are presented in the "Visitor Use, Experience, and Accessibility" section of chapter 3. For the economic impact estimates, the average visitation for the years 2009/2010

and 2010/2011 (a total of 91,332) was selected as the baseline level of use for the current alternative (alternative 2).

Assumptions for Recreational Use Levels by Alternative

Table 61 summarizes upper and lower bound visitation estimates for each alternative. For all the upper bounds, 2 people per snowmobile and 12.3 people per snowcoach (based on the current fleet capacity) were assumed for a 90 day season.

TABLE 61: LOWER AND UPPER BOUND VISITATION FORECASTS AND VISITOR SPENDING PER DAY ASSUMPTIONS

	Lower Bound Estimate	Upper Bound Estimate	Visitor Spending per day
Alternative 1	48,925	48,925	$175.33
Alternative 2	88,968	192,511	$175.33
Alternative 3	66,451	181,765	$175.33
Alternative 4 (current technology)	88,968	152,820	$175.33
Alternative 4 (all OSVs meet enhanced BAT)	88,968	219,240	$175.33

Alternative 1 would allow no snowmobile or snowcoach access. Historically, motorized oversnow use has made up more than 70 percent of the total winter visitation in the park. Nearly all visitors entered via the west, south, and north entrances. An analysis of the distribution of recreational use since the winter use management plan changes began in 2001 suggests little evidence of substitution between park entrances. Additionally, an analysis of snowmobile use on national forest land near the west entrance suggests that snowmobile use in national forests is possibly a complement to snowmobiling in the park rather than a direct substitute. For these reasons, the level of recreational use under the no-action conditions represented by alternative 1 was assumed to be equal to the average of north entrance wheeled vehicle entries plus average entries by skiers park wide during the last 3 winters (2009/2010, 2010/2011 and 2011/2012) for a total of 48,925 visits.

For alternative 2, current management in the park, the lower bound was set at the average visitation for the past 3 years (a total of 88,968). The upper bound is the maximum number of visitors possible under the alternative (318 snowmobiles and 78 snowcoaches per day plus the average over the last 3 winters for wheeled vehicle passengers at the north entrance and skiers park wide).

Under alternative 3, winter visitation would transition to snowcoach only over a 3-year period starting in the 2017/2018 season. The upper and lower bounds on visitation are based on the period after the transition when visitation is by snowcoach only. The lower bound assumes no change in snowcoach visitors compared to recent average conditions and uses average visitation for the last 3 winters for snowcoaches (2009/2010, 2010/2011 and 2011/2012) plus the average over the last 3 winters for wheeled vehicle passengers at the north entrance and skiers park wide. The upper bound is again the maximum possible visitors, which is 120 snowcoaches per day plus the average over the last 3 winters for wheeled vehicle passengers at the north entrance and skiers park wide.

Finally, under alternative 4 there would be a mix of up to 480 snowmobiles and 60 snowcoaches per day or up to 120 snowcoaches per day if the snowcoaches meet stricter noise thresholds. These limits exceed current visitation, so current visitation is defined as alternative 2 for the lower bound. Two

upper bounds were modeled for alternative 4. The first upper bound (current technology upper bound) assumes that the snowcoaches do not meet the stricter noise thresholds, and it equals the maximum possible visitation under this assumptions (480 snowmobiles and 60 snowcoaches per day plus the average over the last 3 winters for wheeled vehicle passengers at the north entrance and skiers park wide). The second upper bound (low noise technology upper bound) assumes 480 snowmobiles and 120 snowcoaches per day plus the average over the last 3 winters for wheeled vehicle passengers at the north entrance and skiers park wide.[10]

IMPLAN Results by Alternative

The resulting IMPLAN estimates for output and employment impacts relative to alternative 1 are presented in tables 62 and 63 for the lower and upper bounds, respectively, for the three-state and five-county areas. Table 64 presents the results of the analyses for the communities of Cody and Jackson, Wyoming, and West Yellowstone, Montana. The size of the impacts in each area depend on the size of the multipliers used by the IMPLAN model, which can change over time based on changes in interrelationships between sectors of the economy and assumptions about the size of the revenue change within the region of interest. Because visitation from outside the region of interest is driving the regional economic impacts, the distribution of changes in visitation between resident and non-resident visitors is a key determinant of estimated impacts. Past visitor surveys found that the non-resident visitor population increases relative to the resident visitor population as the size of the region of interest decreases. Since 66 percent of the total of new visitors comes from outside the three state area, only 66 percent of the new visitor spending is assumed to be new spending in the region that flows through the entire three-state economy. In the county model, the assumption was made that 82.5 percent of the visitors live outside the five counties, so 82.5 percent of the total new visitor spending is circulated within the smaller five-county region. Similarly, 99 percent of the total new visitor spending is injected into the each of the three individual communities. Although the multipliers are larger at the three-state level than the five-county level, the amount of new money injected into the five-county economy is larger than the amount of new money injected into the three-state economy. In some cases, the result is larger total impacts for the smaller geographic areas even though the multipliers are smaller. The same holds for the analysis at the community level.

TABLE 62: IMPACTS OF ACTION ALTERNATIVES RELATIVE TO NO-ACTION ALTERNATIVE (ALTERNATIVE 1) AND PERCENT CHANGE FROM TOTAL FOR THE 3-STATE AND 5-COUNTY REGIONS, LOWER BOUND VISITATION

Lower Bound	5-County Area		3-State Area	
	Total Output	Total Employment	Total Output	Total Employment
Alternative 2	$6,242,026	97	$5,661,755	87
% change	0.036%	0.074%	0.002%	0.004%
Alternative 3	$2,732,007	43	$2,478,034	38
% change	0.016%	0.033%	0.001%	0.002%
Alternative 4 (current technology and all OSVs meet enhanced BAT)	$6,242,026	97	$5,661,755	87
% change	0.036%	0.074%	0.002%	0.004%

[10] For snowmobiles, if the snowmobiles meet stricter technology standards there could be an additional snowmobile in each group, but the total daily maximum number of snowmobiles would not change.

TABLE 63: IMPACTS OF ACTION ALTERNATIVES RELATIVE TO NO-ACTION ALTERNATIVE (ALTERNATIVE 1) AND PERCENT CHANGE FROM TOTAL FOR THE 3-STATE AND 5-COUNTY REGIONS, UPPER BOUND VISITATION

Upper Bound	5-County Area		3-State Area	
	Total Output	Total Employment	Total Output	Total Employment
Alternative 2	$22,382,628	349	$20,301,894	313
% change	0.128%	0.267%	0.007%	0.016%
Alternative 3	$20,707,509	323	$18,782,498	289
% change	0.118%	0.247%	0.006%	0.015%
Alternative 4 (current technology)	$16,195,421	252	$14,689,862	226
% change	0.093%	0.193%	0.005%	0.012%
Alternative 4 (all OSVs meet enhanced BAT)	$35,708,833	426	$31,668,663	384
% change	0.204%	0.326%	0.010%	0.020%

TABLE 64: AVERAGE IMPACTS OF ACTION ALTERNATIVES RELATIVE TO NO-ACTION ALTERNATIVE (ALTERNATIVE 1) AND PERCENT CHANGE FROM TOTAL FOR THREE GATEWAY COMMUNITIES

Average	Cody, Wyoming		Jackson, Wyoming		West Yellowstone, Montana	
	Total Output	Total Employment	Total Output	Total Employment	Total Output	Total Employment
Alternative 2	$46,749	1	$3,920,618	52	$9,383,322	173
% change	0.003%	0.007%	0.115%	0.230%	4.805%	9.968%
Alternative 3	0	0	$3,210,428	43	$7,683,605	142
% change	0	0	0.094%	0.188%	3.934%	8.163%
Alternative 4 (current technology)	$36,644	1	$3,073,178	41	$7,355,121	136
% change	0.002%	0.006%	0.090%	0.180%	3.766%	7.812%
Alternative 4 (all OSVs meet enhanced BAT)	$68,606	1	$5,813,396	41	$13,939,039	201
% change	0.004%	0.008%	0.171%	0.180%	7.137%	11.543%

Cost of Meeting New Standards for Snowcoaches

As of December 15, 2017, every snowcoach will be required to have EPA Tier 2 compliant engines and exhaust emission controls. *Tier 2 Rule* (65 FR 6697, February 10, 2000) instituted a comprehensive regulatory program designed to significantly reduce the emissions from new passenger cars and light trucks, including pickup trucks, vans, minivans, and sport-utility vehicles. These reductions provide for cleaner air and greater public health protection, primarily by reducing ozone and PM pollution. The program treats vehicles and fuels as a system, combining requirements for much cleaner vehicles with requirements for much lower levels of sulfur in gasoline. The program phases in a single set of tailpipe emission standards that apply to all passenger cars, light trucks, and larger passenger vehicles operated on any fuel. Tier 2 engines and emission control equipment include vehicle computers, full complement of sensors including engine control module (ECM) computers, be onboard diagnostics system (OBD) equipped, and have exhaust after treatment equipment that is standard original equipment manufacturer (OEM) equipment included with on-road vehicles or engines. The emissions standards for BAT snowcoaches would therefore be based on technology

specifications (technical standard). Technical standard specifications would differ depending on whether the vehicle was gasoline or diesel powered and in the case of gasoline snowcoaches, the GVWR of the vehicle.

This requirement would not apply to alternative 1 (with no OSV use). Under the action alternatives, between 60 and 212 snowcoaches would be allowed to operate in Yellowstone per day.

This requirement could involve replacing engine and emission control systems so that the vehicle is in compliance with Tier 2 technical standards, or purchase new vehicles that are Tier 2 compliant. Coaches would also need to meet a sound emission requirement. Once approved, a snowcoach could operate for 10 years without being upgraded or replaced. See appendix B for a full discussion of BAT standards for snowcoaches.

During the winter season 2011/12, out of the 78 snowcoaches that were in operation, 22 were Bombardiers (28% of the fleet), 37 were full size vans and SUVs (47.4% of the fleet), and 19 were small and mid-sized coaches such as Glavals, Krystals, and Vanterras (24.4% of the fleet).

To calculate the cost of the snowcoach upgrades required by the alternatives, NPS assumed the following:

- The 22 Bombardiers would continue to operate and their engine and emission control systems would be upgraded to meet 2007 EPA Tier 2 requirements for spark ignition engines. The cost would be approximately $35,000 per vehicle for a total of $770,000.
- Of the current 37 standard size vans and SUVs, 30 would be 10 or more years old by December 2017 (model year 2006 or older) and would be replaced through normal replacement. No additional cost is assumed because these vehicles would need to be replaced anyhow. Of the remaining 7 vehicles in this class which are 2007 or newer, 6 are gasoline and would therefore meet EPA Tier 2 standards and not need to be replaced. The remaining vehicle, a 2009 diesel van, would not meet the 2010 Tier 2 standard and would need to be replaced. The cost of replacement of this vehicle and associated track systems would be approximately $125,000.
- Of the 19 small and mid-sized snowcoaches, 4 would be 10 or more years old by December 2017 (model year 2006 or older) and would be replaced through normal replacement. No additional cost is assumed because these vehicles would need to be replaced anyhow. Of the remaining 15 vehicles in this class which are 2007 or newer, 5 are diesel and model year 2007 to 2009 and would not meet the proposed BAT standard and would therefore need to be replaced. The cost of replacing these 5 vehicles and associated track systems is $825,000 ($165,000/each). Of the remaining 10 vehicles, all would meet EPA Tier 2 standards and would not need to be replaced.

Based on these assumptions, the total cost of converting the current fleet to meet the new requirements would be approximately $1,720,000.

Intensity Definitions

The following intensity definitions for evaluating impacts on socioeconomic values were defined.

Negligible: The impact is at the lower levels of detection (< 5 percent change in either total output or employment).

Minor: The impact is slight, but detectable (5–10 percent change in either total output or employment).

Moderate: The impact is readily apparent and has the potential to become major (10–20 percent change in either total output or employment).

Major: The impact is severe, or if beneficial, has exceptional beneficial effects (>20 percent change in either total output or employment).

Study Area

The geographic area for the socioeconomic analysis includes the three state-area of Wyoming, Montana and Idaho; the five-county area of Fremont County in Idaho, Gallatin and Park counties in Montana, and Park and Teton counties in Wyoming; and the communities of Cody and Jackson, Wyoming, and West Yellowstone, Montana.

SUMMARY OF IMPACTS

A brief summary of the impacts to socioeconomic values is presented below, followed by the detailed impact analysis.

- Under alternative 1, the impacts would be long-term negligible adverse for the three-state area, the five-county area, and Cody and Jackson, Wyoming. West Yellowstone is projected to experience long-term minor adverse impacts. The adverse impacts would be most directly felt by communities and businesses near the park, especially in areas that have a higher proportion of business tied directly to park visitation. At the north entrance, Gardiner, Montana, might experience beneficial impacts if visitors who would have visited the other entrances switch to the North.
- Under alternative 2 there would be long-term beneficial impacts for the three-state area, the five county area, and the communities of Cody and Jackson. In West Yellowstone, the long-term beneficial impacts would be much larger on average).
- Under alternative 3 there would be long-term beneficial impacts for all the geographic regions and communities. In order for the beneficial impacts to approach the upper bound under this alternative, demand for snowcoach tours must increase to more than make up for the eventual phaseout of snowmobiles. In West Yellowstone, the long-term beneficial impacts would be much larger on average.
- Under alternative 4 there would be long-term beneficial impacts for all the geographic regions and communities. The alternative allows for the most snowmobile and snowcoach traffic if snowcoaches achieve low noise technology standards, so the upper bound impacts for the low noise technology standards are the largest of the action alternatives. In West Yellowstone, the long-term beneficial impacts would be much larger on average.

DETAILED IMPACT ANALYSIS

Below, the impacts of each alternative are discussed. The impacts of alternative 1 (the no-action alternative) are described relative to conditions allowable under the 2009 to 2011 interim regulations (which are assumed to be the same as alternative 2). The impacts of alternatives 2, 3, and 4 are described relative to the no-action alternative (alternative 1).

Impacts of Alternative 1: No Snowmobile/Snowcoach Use

Under alternative 1, no oversnow motorized recreational access would occur. Wheeled vehicle access would continue to occur through the north entrance of Yellowstone to as far east as Cooke City, Montana. Of the four entrances, the west entrance and the community of West Yellowstone would experience the largest impacts over time, because the west entrance is the most popular entrance point into Yellowstone for snowmobiles and snowcoaches. Although some visitors would visit the area to snowmobile in the national forests or cross-country ski in Yellowstone and on trails near West Yellowstone, traffic through the entrance would be almost completely shut down. Similarly, traffic through the east and south entrances is almost completely via snowmobiles and snowcoaches in the winter season. With no motorized oversnow access, the Old Faithful Snow Lodge and the yurt camp at Canyon would be closed for the winter. The north entrance would experience the smallest change in visitation, since visitors could still drive in by car.

If visitation is low enough, the resulting reduction in business in the affected communities would lead to a loss of year-round population. A year-round population provides a more stable tax base and gives the community the ability to provide public services that may not be possible with a very small year-round population.

Alternative 1 represents what would happen if no new rule is passed, and oversnow motorized access for visitors were prohibited. Compared to the levels permitted under the 2009 interim rule and alternative 2, alternative 1 would result in lower visitation. Table 61 lists the visitation projections under each alternative. Visitation under alternative 1 is projected to be about half of 2009/2010 levels. This projection assumes that the north entrance would continue to receive approximately the same number of visitors, but the other entrances would service the small number of non-motorized visitors to the park. The number of cross-country skiers and other non-motorized visitors might increase if new visitors who want a non-motorized experience start visiting, but the increase is not expected to be large.

Based on the visitation numbers in table 61 and the impacts of alternative 2 relative to alternative 1 in tables 62, 63, and 64, the impact of alternative 1 over time would be a reduction in output and employment from the levels expected under alternative 2. The impacts are estimated to be negligible, adverse, and long term for Cody and Jackson, Wyoming. West Yellowstone is projected to experience minor, adverse, long-term impacts. At the north entrance, Gardiner, Montana, might experience beneficial impacts if visitors who would have visited the other entrances switch to the North. The five-county and three-state regions would experience negligible, adverse, long term impacts.

The terms negligible and minor represent the thresholds defined above, and are not subjective descriptions of how the impacts would feel to individuals who experience a loss of business or employment. For those individuals, the effects may not seem negligible or minor. For example, the 2008 EA reported that business owners along the North Fork of the Shoshone River stated that if the east entrance is closed under alternative 1, most of them would close their businesses in the winter. Further exacerbating their situation is the downturn in visitation starting in the winter of 2008/2009 that has already caused some of the businesses to curtail operations or close entirely in the winter (NPS 2008a). The IMPLAN modeling captures the indirect and induced effects as well. As individual businesses are adversely affected, they would reduce purchases of other goods and services from suppliers. Conversely, if individual businesses are beneficially affected they would increase the purchase of goods and services from suppliers. These feedback effects impact sectors of the economy beyond those that are influenced directly by visitors.

Cumulative Impacts

Increasing population, oil and gas leasing, and economic opportunities over time should provide beneficial impacts to the economy of the greater Yellowstone area. As long as the growth and economic activity are managed in a way that does not harm park resources and potentially park visitation, these trends should boost economic growth. Road construction in the area may depress visitation in the short-term, but should be beneficial once the construction is completed. Plans for improvements to nearby attractions such as ski resorts could also bring additional visitors into the area.

For example, the Sleeping Giant Ski Resort near the east entrance to the park reopened in 2009. In addition, there is a development plan for the Rendezvous Ski Trail. Activities in the surrounding national forests also impact greater Yellowstone area. These plans should improve the management of the forests and contribute to the overall wellbeing of the greater Yellowstone area. The Gallatin National Forest Travel Plan, revised in 2006, is being implemented along with the Beartooth District of Custer National Forest Travel Management Plan and thee Gallatin National Forest Travel Plan. Over time, consolidating the checkerboard lands on the Gallatin National Forest should also benefit the forest and the surrounding area. Specific projects in the park that have (or would have) a generally beneficial bearing on socioeconomics include the construction of a new west entrance and reconstruction of the east entrance road. These longer-term beneficial projects may depress visitation in their implementation phase. For example, road construction projects are aggravating to most drivers, some of whom may avoid the portion of the park (and nearby communities) where road work is occurring. Similarly, replacing visitor centers often means a temporary facility is provided (construction activities may also result in disturbance). This may also be discouraging to some visitors.

Finally, the current economic recession is having a dampening effect on the national and local economy; however, despite the poor economic conditions visitation to Yellowstone increased somewhat in the winter of 2010 compared to 2009. As discussed in chapter 3, unemployment has increased in the counties and states that border Yellowstone. Timber harvesting on USFS land has also been decreasing.

With the prohibition of motorized oversnow recreational use, and the lack of access to the interior of the park, alternative 1 would likely discourage out-of-state visitors from traveling to the area and contributing to local regional economies. It is likely that this alternative would represent an overall negligible adverse impact on regional economic trends. In the current economic conditions, a decline in winter visitors would contribute to the overall weaker economy. When the economy recovers, a reduction in park visitation would be somewhat offset by the beneficial regional economic trend related to resource extraction, residential growth, other recreation opportunities, and wildlife and other natural environment attractions.

The impacts of these past, present, and reasonably foreseeable future actions, combined with the long-term negligible adverse impacts of alternative 1, would result in long-term negligible adverse impacts in the towns of Jackson and Cody. In West Yellowstone, as long as the economic downturn continues, the long-term minor adverse impacts expected from alternative 1 could result in long-term negligible to minor adverse cumulative impacts, of which alternative 1 would contribute a large part.

Conclusion

The impacts are estimated to be negligible, adverse, and long term for the three-state area, the five-county area and Cody and Jackson, Wyoming. West Yellowstone is projected to experience minor,

adverse, long-term impacts. As described earlier, the adverse direct impacts would be most directly felt by communities and businesses near the park, especially in areas that have a higher proportion of business tied directly to park visitation. At the north entrance, Gardiner, Montana, might experience beneficial impacts if visitors who would have visited the other entrances switch to the North. The IMPLAN modeling captures the indirect and induced effects as well. As individual businesses are adversely affected, they would reduce purchases of other goods and services from suppliers. Conversely if individual businesses are beneficially affected they would increase the purchase of goods and services from suppliers. These feedback effects impact sectors of the economy beyond those that are influenced directly by visitors. Cumulative impacts would be long-term negligible adverse or beneficial cumulative impacts on the socioeconomic environment. In West Yellowstone cumulative negligible to minor adverse impacts could result.

Impacts of Alternative 2: Continue Snowmobile/Snowcoach Use at 2011/2012 Winter Season Interim Regulation Limits

Alternative 2 continues the current management, which allows up to 318 snowmobiles per day and 78 snowcoaches. The visitation estimate is based on the average of winter visitation in the last 3 seasons (2009/2010, 2010/2011 and 2011/2012). For the past three seasons, the daily limit of 318 snowmobiles has not been reached. The peak day for snowmobiles in 2011/2012 saw 261 snowmobiles and the peak day for snowcoaches saw 56 coaches. As discussed in chapter 3, after an initial drop-in visitation after the new rules were implemented, visitation increased for the first three winters. Visitation has gone up and down since 2003/2004, but in general, snowmobile visitation has dropped somewhat, while the number of snowcoach passengers and automobiles have increased somewhat. Although winter visitation dropped when the new rules went into place, most communities still saw rising tax revenues through 2006. The exception is West Yellowstone, where tax revenues dropped along with visitation. Alternative 2 was put in place in the 2009/2010 season, and visitation in the last 3 winters has been within the range of visitation since the new rules were implemented in 2003/2004.

Compared to alternative 1, alternative 2 would result in beneficial, long-term impacts for the three-state area, the five-county area, and the three communities. In West Yellowstone, the average beneficial impacts shown in table 64 are larger than the other areas (reaching the threshold of minor). Alternative 2 provides for continued growth in visitation, especially through the use of snowcoaches. The beneficial impacts would be tempered by the cost of upgrading the existing snowmobile fleet to meet new requirements by December 2017.

Cumulative Impacts

The impacts of these past, present, and reasonably foreseeable future actions would be the same as under alternative 1. These impacts are a result of actions that contribute to the local economies such as oil and gas leasing throughout the area, and the offering of other tourist attractions, such as the reopening of the Sleeping Giant Ski Resort near the east entrance of the park. Actions that contribute to negative impacts include the current economic recession and increasing unemployment. The impacts of these actions combined with the long-term beneficial impacts of alternative 2, would result in long-term beneficial impacts (of which alternative 2 would contribute a large part) in the towns of Jackson, Cody, and West Yellowstone.

Conclusion

In conclusion, compared to alternative 1, alternative 2 would result in beneficial, long-term impacts for the three-state area, the five county area, and the communities of Cody and Jackson. In West

Yellowstone, the beneficial, long-term impacts would be larger on average. Alternative 2 continues current management, under which there has been some increase in visitation, especially for snowcoach use. Cumulative impacts would be long-term beneficial.

Impacts of Alternative 3: Transition to Snowcoaches meeting BAT Requirements Only

Alternative 3 would transition to BAT snowcoaches over a 3-year period starting in the 2017/2018 season. Snowcoach limits would increase, while snowmobile limits were reduced during the 3-year phaseout. It also calls for the closure of Sylvan Pass, which would eliminate visitation from the east entrance by snowmobile or snowcoach. Until the phaseout begins, alternative 3 would have similar impacts to alternative 2, except in the town of Cody, which would lose all the economic benefits associated with motorized oversnow winter visitors using the east entrance (an average of 118 visitors over the last 3 winters). After the phaseout, visitation is expected to be higher than under alternative 1, but lower than under alternatives 2 and 4. Compared to alternative 1, alternative 3 is expected to bring beneficial, long-term impacts for all the communities of West Yellowstone and Jackson, as seen in table 64. Again, West Yellowstone is expected to experience the largest benefits of the different communities included in the analysis (reaching the threshold of minor). There would be no change for the community of Cody relative to alternative 1. The larger beneficial impacts closer to the upper bound limits would only materialize if visitor demand for snowcoach tours increases, because over time snowmobiles would be phased out. Tables 62 and 63 show a similar pattern for the three-state area and the five-county area. At the same time, greater use of snowcoaches would increase the cost to businesses that would be required to upgrade the existing snowmobile fleet to meet new requirements by December 2017.

Cumulative Impacts

The impacts of these past, present, and reasonably foreseeable future actions would be the same as under alternative 1. These impacts are a result of actions that contribute to the local economies such as oil and gas leasing throughout the area, and the offering of other tourist attractions, such as the reopening of the Sleeping Giant Ski Resort near the east entrance of the park. Actions that contribute to negative impacts include the current economic recession and increasing unemployment. The impacts of these actions, combined with the long-term beneficial impacts of alternative 3, would result in long-term beneficial impacts (of which alternative 3 would contribute a large part) in the towns of Jackson, Cody, and West Yellowstone.

Conclusion

Compared to alternative 1, alternative 3 is expected to have on average beneficial, long-term impacts for all the communities except Cody, as seen in tables 62, 63, and 64. In order to generate larger beneficial impacts under this alternative, demand for snowcoach tours must increase to more than make up for the eventual phaseout of snowmobiles. Cumulative impacts would be long-term beneficial.

Impacts of Alternative 4: Manage OSV Use by Transportation Events

Alternative 4 attempts to control the level of noise in the park from both snowmobiles and snowcoaches. The alternative allows commercial operators permits for a transportation event defined as either one snowmobile tour of no more than 10 snowmobiles (with an average group size of 7 over the season) or one snowcoach tour. It also allows for one noncommercially guided tour with up to five snowmobiles from each entrance each day. The maximum number of transportation events is set at 110, with the maximum number of snowmobile groups set at 50. If snowcoaches can meet stricter

technology requirements to reduce noise, a transportation event could include 2 snowcoaches, instead of just 1.[11] If all snowcoaches met the technology requirement, then maximum visitation would be 120 snowcoaches (assuming the maximum number of snowmobiles). If snowcoaches meet the new technology standards, then alternative 4 would for the most visitors, although in the short term visitation is expected to be similar to conditions under the 2009 to 2011 interim regulations. The methodology for the economic analysis considers how many visitors could be accommodated by an alternative and the subsequent spending, regardless of how they enter the park (commercially guided snowmobile, noncommercially guided snowmobile or snowcoach). However, the option for non-commercially guided tours should appeal to visitors who want to ride a snowmobile, but do not want to be on a guided tour. For this reason, NPS expects that the non-commercially guided tour would be popular and would draw additional visitors to the park.

Compared to alternative 1, alternative 4 will result in beneficial, long-term impacts for the three-state area, the five-county area, and three communities. In West Yellowstone, the average beneficial impacts shown in table 64 are larger than the other areas (reaching the threshold of minor to moderate). Alternative 4 allows for the highest daily maximums, so the long run potential is higher under this alternative than the others. The beneficial impacts would be tempered by the cost of upgrading the existing snowmobile fleet to meet new requirements by December 2017.

Cumulative Impacts

The impacts of these past, present, and reasonably foreseeable future actions would be the same as under alternative 1. These impacts are a result of actions that contribute to the local economies such as oil and gas leasing throughout the area, and the offering of other tourist attractions, such as the reopening of the Sleeping Giant Ski Resort near the east entrance of the park. Actions that contribute to negative impacts include the current economic recession and increasing unemployment. The impacts of these actions, combined with the long-term beneficial impacts of alternative 4, would result in long-term beneficial impacts (of which alternative 4 would contribute a large part) in the towns of Jackson, Cody, and West Yellowstone.

Conclusion

Compared to alternative 1, alternative 4 is expected to have on average beneficial, long-term impacts for all the communities, as seen in tables 62, 63, and 64. Cumulative impacts would be long-term beneficial.

PARK OPERATIONS AND MANAGEMENT

GUIDING REGULATIONS AND POLICIES

The NPS, park concessioners, contractors, researchers, and other duly permitted parties depend on snowmobiles and snowcoaches for their administrative functions. In essence, because administrative use of OSVs can adversely impact park resources and values, it is to be limited to the level necessary for management of public use or to conduct emergency operations, construction, and resource protection activities that cannot be accomplished by other means.

[11] For snowmobiles, if the snowmobiles meet stricter technology standards there could be an additional snowmobile in each group, but the total daily maximum number of snowmobiles would not change.

ASSUMPTIONS, METHODOLOGY, AND INTENSITY DEFINITIONS

The topic of park management and operations, for the purpose of this analysis, refers to the quality and effectiveness of park staff in maintaining and administering park resources and providing for an appropriate visitor experience during the winter season. The impact analysis is based on the current description of park operations presented in chapter 3 of this document.

To assess the level of impact to winter operations for each alternative, the following were considered:

- NPS staffing requirements
- Available funding to implement the plan
- Operating environment and conditions.

Intensity Definitions

The following are intensity definitions for evaluating impacts on park management and operations.

Negligible: Park operations would not be affected or the effect would be at or below the lower levels of detection and would not have an appreciable effect on park operations.

Minor: The effect would be detectable, but would be of a magnitude that would not have an appreciable effect on park operations. If changes are needed to offset adverse effects, they would be relatively simple and likely successful.

Moderate: The effects would be readily apparent and would result in a change in park operations in a manner noticeable to staff and the public. Changes would probably be necessary to offset adverse effects and would likely be successful.

Major: The effects would be readily apparent and would result in a change in park operations in a manner noticeable to staff and the public and markedly different from existing operations. Changes to offset adverse effects would be needed, would be extensive, and their success could not be guaranteed.

Assumptions

The cost of implementing the alternatives in this draft plan/SEIS includes the operational costs that would occur if an alternative were implemented. This information can help the reader see the cost differences among the alternatives. For example, the cost of conducting avalanche control on Sylvan Pass, or not, is illustrated in the alternatives.

The costs in this analysis are the total costs of operating the park in the winter at current operational levels, including areas accessible by wheeled vehicles (Gardiner to the northeast entrance). The baseline year for analyses was FY2011 (December 15, 2010 to March 15, 2011). In FY2011, total wintertime operational costs parkwide were $5,586,858 (both base and non-base sources). This cost figure includes all costs related to wintertime operations for all park areas including Gardiner/Mammoth, Tower/Northeast, Lake/east entrance, Grant/South, Old Faithful, Madison/West, and general park expenses. These costs include roads and OSV, maintenance of interior park

buildings, visitor information and interpretation, resource monitoring, administration, life safety, resources, and infrastructure protection, entrance station operations, and concession management.

Study Area

The study area for park operations is the boundaries of Yellowstone and areas where winter use occurs.

SUMMARY OF IMPACTS

- Alternative 1 would have long-term negligible adverse impacts to park operations because staffing and resource requirements would be covered by existing funding, as well as long-term benefits from the potential reallocation of staff to other areas of the park during the winter season. In addition, fuel requirements and greenhouse gas emissions would be reduced from current levels as the number of staff needed in the interior of the park, and therefore use of OSVs, would be reduced.
- Alternatives 2 and 4 would result in long-term negligible to minor adverse impacts because the staffing and resource requirements would be similar to those currently funded, and this level of funding would be expected to continue. Any additional required resources may impact park operations, but through other funding sources or reallocation of resources, would not have a noticeable impact on park operations. Under alternative 4, there would be no additional costs incurred due to new management scheme because it is less number of discrete transportation events than the current management paradigm and the noncommerically guided use program would be covered using existing staff and the fees generated from the noncommercial guide program. No additional staff resources or OSVs would be required.
- Alternative 3 would result in long-term negligible to minor adverse impacts to park operations and management because the staffing and resource requirements for implementation of the alternative would be slightly less than current operations, and would likely be met with existing funding sources. This alternative would represent a slight cost savings (approximately $124,868) over conditions permitted under the 2009 to 2011 interim regulations from the closure of Sylvan Pass.

DETAILED IMPACT ANALYSIS

Impacts of Alternative 1: No Snowmobile/Snowcoach Use

Under alternative 1, OSV use would be limited to minimal administrative use. No recreational OSV use would be permitted in the park in the winter. With the minimal level of OSV use, the amount of staff resource and funding needed to implement winter management in the park would decrease from current levels. To implement alternative 1, staff would be needed at each developed area for operation of the housing, garage/office, water treatment plant, and the wastewater treatment plant and to groom roads to facilitate administrative travel. Winter upkeep, oversight of contracted work, and protection of life, safety, and property would require staff time and the resources to house staff for the winter. Buildings in the interior of the park may need to be operational to allow concessionaires to carry out winter keeping of structures. In total, approximately 77 NPS staff would be needed in the park at different developed areas to provide seven-day-per-week coverage and an adequate margin of safety under alternative 1. This includes 18 staff based in Mammoth and six staff based in Tower/Northeast who directly support wintertime park operations. Grooming an access route between each developed area would occur as needed, approximately once per week. The south and east entrance roads would

not be groomed. A complete shutdown of some buildings, even if they are not being used (such as the newer visitor centers) is not feasible due to the electronics and other systems that were not designed for total shutdown. Costs under alternative 1 would be approximately $3,239,907 (base and non-base sources), therefore ample funds and staff resources would be available for implementing this alternative. Long-term benefits would also occur as staff currently assigned to winter use activities in the park could be reassigned to other areas, taking additional burden off park staff and resources in other areas of the park.

Cumulative Impacts

Actions with the potential to impact park operations include the activities within the park that require additional time and resources from NPS staff during the winter months. These activities include past construction projects (the construction of a new west entrance and of the east entrance road) as well as the current and future operation of these projects. In addition to these construction projects, visitor activities occurring outside of the interior of the park would require staff time and resources. One example of this type of activity includes managing the park concessioners that operate lodging accommodations at Mammoth Hot Springs and provide other services such as evening programs, guided ski and snowshoe tours, wildlife tours, ski shop and repair center, massage therapy, hot tub rentals, and ice skating rinks. In addition, a yurt camp is available at Canyon, which is currently operated by one of the park's snowcoach outfitters. NPS staff also provides ranger-led winter programs that offer insight into the history, culture, and geography of the park. Winter programs begin when the park opens for the winter season December 15 and end on March 15. All of these actions would require various levels of staff time and resources, however, the funds for these activities are part of annual funding cycles and would be accommodated with existing and expected budgets. If additional resources are needed for these activities, such as operating a new facility, they would be accommodated by existing funding or by the reallocation of existing staff. The impacts of these actions would have no to little effect on park operations, and if detectable, would not be of a magnitude that would not have an appreciable effect on park operations, resulting in long-term negligible to minor impacts.

The impacts of these past, present, and reasonably foreseeable future actions, combined with the long-term negligible adverse impacts of alternative 1, would result in long-term negligible to minor adverse cumulative impacts on park operations and maintenance. Alternative 1 would contribute a large amount to these actions because the reduction in the need for OSV management during the winter season would impact a large portion of the park's budget during this time.

Conclusion

Alternative 1 would have long-term negligible adverse impacts to park operations because staffing and resource requirements would be covered by existing funding, as well as long-term benefits from the potential reallocation of staff to other areas of the park during the winter season. In addition, fuel requirements and greenhouse gas emissions would be reduced from current levels because the number of staff needed in the interior of the park, and therefore OSV use, would be reduced. Cumulative impacts under alternative 1 would be long-term, negligible to minor adverse, of which alternative 1 would contribute a large part.

Impacts of Alternative 2: Continue Snowmobile/Snowcoach Use at 2011/2012 Winter Season Interim Regulation Limits

Alternative 2 would continue to allow for use levels permitted under the limits in the 2009 to 2012 interim regulations, which allowed up to 318 snowmobiles per day and 78 snowcoaches. As a result,

staffing levels needed under alternative 2 would be similar to those observed over the 2009/2010 to 2011/2012 winter seasons, and would represent the cost of park winter operations in recent years. Sylvan Pass would be open and avalanche control activities would continue. Approximate 131 employees would continue to remain duty stationed in interior locations, including the west entrance, to execute winter management activities (the other 37 employees are based at Gardiner/Mammoth or Tower/Northeast. Approximately 118 snowmobiles are in the park's administrative fleet, including 8 snowmobiles suitable for operations in deep snow, along with 14 tracked vehicles and these OSVs would be expected to continue operating using fuel expenditures similar to those in the 2009 to 2012 interim regulations. To further accommodate winter use activities in the park, the park would continue to groom 180 miles of snow roads, currently an average of every third day. In terms of greenhouse gas emissions and fuel consumption, park staff would be kept at levels similar to the 2009/2010 to 2011/2012 winter seasons, and would continue to consume approximately 23,000 gallons of biodiesel and 14,000 gallons of ethanol over the winter season.

In total, costs for operation would be approximately $5,586,858, which reflects the operating costs for the 2011/2012 winter season. Because costs under alternative 2 would be similar to those currently funded for the past three winter seasons (2009/2010 to 2011/2012), it would be expected that the needed funds and staff resources would be available for implementing this alternative. Additional one-time costs could occur that could require additional resources, but it is expected that the impacts from additional costs would have little to no effect on park management and operations. If an effect is detectable, it would not be of a magnitude that would have an appreciable effect on park operations. Therefore, under alternative 2 impacts to park operations and management would be long-term, negligible to minor adverse.

Cumulative Impacts

Impacts on park operations and management from other past, present, and reasonably foreseeable future actions would be the same as described for alternative 1. These impacts would result from activities within the park that require additional time and resources from NPS staff during the winter months. These activities include past construction projects (the construction of a new west entrance and the east entrance road) as well as the current and future operation of these projects. In addition to these construction projects, visitor activities occurring outside of the interior of the park would require staff time and resources (managing the park concessioners and other services and providing ranger-led winter programs). The impacts of these past, present, and reasonably foreseeable future actions, combined with the long-term negligible to minor adverse impacts of alternative 2, would result in long-term negligible to minor adverse cumulative impacts, of which alternative 2 would contribute a large amount because winter use management activities constitute a large portion of the park's operating budget during the winter season.

Conclusion

Alternative 2 would result in long-term negligible to minor adverse impacts because the staffing and resource requirements would be similar to those currently funded, and this level of funding would be expected to continue. Any additional resources required may impact park operations, but through other funding sources or reallocation of resources, would not have a noticeable impact on park operations. Cumulative impacts under alternative 2 would be long-term negligible to minor adverse, of which alternative 2 would constitute a large part.

Impacts of Alternative 3: Transition to Snowcoaches meeting BAT Requirements Only

Alternative 3 would transition OSV use in the park to BAT snowcoaches starting in the 2017/2018 season. Snowcoach limits would increase and snowmobile limits would be reduced during a 3-year phaseout. Until the phaseout begins, alternative 3 would have impacts similar to alternative 2 and an approximate operating cost of $5,586,858 (the operating costs of the 2011/2012 winter season). Because alternative 3 would ultimately allow for about 40 additional snowcoaches per day, more visitors could be accommodated under alternative 3 than under alternatives 1 and 2, but less than alternative 4. Although the sum number of OSVs in the park would be reduced, the number and location of routes would stay the same as permitted under the 2009 to 2011 interim regulations with the exception of Sylvan Pass, and grooming requirements would likely increase to every other day because snowcoaches cause more rutting and damage to snow roads than snowmobile use.

Under alternative 3, the number of employees required for winter use management activities in the interior or the park would stay the same as under the 2009–2012 interim regulations minus three positions at the east entrance due to the closure of Sylvan Pass (approximately 128). Sylvan Pass would be closed and avalanche control activities would no longer continue. The closure of Sylvan Pass would represent a cost savings of approximately $124,868.

In terms of greenhouse gas emissions and fuel consumption, park staff and the number of OSVs to support them would be similar to levels required for the 2009/2010 to 2011/2012 winter seasons, and would therefore not result in an increase in fuel consumption and associated emissions.

In total, costs for operation under alternative 3 would be approximately $5,461,990, which reflects the operating costs for the 2011/2012 winter season minus the estimated cost of operating Sylvan Pass. Because fewer park OSV would be required under this alternative, actual costs may be slightly lower, but any reduction would not change the overall impact of these costs to park operations. Cost for implementing alternative 3 would be approximately $124,868) less than funding for the past three winter seasons (2009/2010 to 2011/2012). The necessary funds and staff resources would be available for implementing this alternative. It is expected that the impacts from costs under this alternative would have little to no effect on park management and operations as it of similar costs to current wintertime operations. Therefore, impacts under alternative 3 to park operations and management would be long-term, negligible to minor adverse.

Cumulative Impacts

Impacts on park operations and management from other past, present, and reasonably foreseeable future actions would be the same as described for alternative 1. These impacts would result from activities within the park that require additional time and resources from NPS staff during the winter months. These activities include past construction projects (the construction of a new west entrance and the east entrance road) as well as the current and future operation of these projects. In addition to these construction projects, visitor activities occurring outside of the interior of the park would require staff time and resources (managing the park concessioners and other services and providing ranger-led winter programs).The impacts of these past, present, and reasonably foreseeable future actions, combined with the long-term negligible to minor adverse impacts of alternative 3, would result in long-term negligible to minor adverse cumulative impacts, of which alternative 3 would contribute a large amount because winter use management activities would constitute a large portion of the park's operating budget during the winter season.

Conclusion

Alternative 3 would result in long-term negligible to minor adverse impacts to park operations and management because the staffing and resource requirements for implementation of the alternative would likely be met with existing funding sources and because costs would be slightly less than current operations. Cumulative impacts under alternative 3 would be long-term negligible to minor adverse, of which alternative 3 would constitute a large part.

Impacts of Alternative 4: Manage OSV Use by Transportation Events

Alternative 4 would result in changes to OSV management in the park as use would be managed by transportation events. This management paradigm, while slightly different than current management, would not result in a change in the number of park staff or park OSV required, compared to what was required during the 2009/2010 to 2011/2012 winter seasons. Any changes to operations would be accommodated through existing staff. Managing OSV use by transportation event would not require additional management than is currently occurring, mainly because permitted wintertime concession contract holders would report bi-weekly the number of transportation events each used. These data would be validated by gate counts and the NPS would ensure that the providers are maintaining the required average group size. This additional effort would be addressed in two ways. First, the providers would be responsible for reporting their monthly numbers to the park's Concession office. Although the average would be looked at over the season, the mostly report would assist the operators in keeping track of their ongoing usage. Second, the existing park staff in the Concessions office would be responsible for reviewing the monthly reports and would be able to identify if any provider is exceeding or likely to exceed their average. This function of the Concessions office would be part of the existing function of that office and would represent a minimal increase over their current responsibility.

The noncommercially guided program is not anticipated to increase the amount of management required under alternative 4. The administration of the lottery system would be managed by Recreation.gov. On the ground management of noncommercially guided groups could be handled with existing personnel at the gates. As detailed in appendix C, the noncommercially guided snowmobile access program will be administered by Yellowstone National Park. Entrance permits will be allocated via an online lottery system managed through Recreation.gov. Through this process, applicants for noncommercially guided trips would be required to pay a lottery application fee, lottery selection fee, and a fee for the reduction certificate program. These fees would pay for the necessary staff and additional management for administration of the noncommerically guided program.

Approximate 131 employees would continue to remain duty stationed in interior locations, including the west entrance, to execute winter management activities. Approximately 118 snowmobiles are in the park's administrative fleet, including 8 snowmobiles suitable for operations in deep snow, along with 14 tracked vehicles and these OSVs would be expected to continue operating using fuel expenditures similar to those in the 2009 to 2012 interim regulations. To further accommodate winter use activities in the park, the park would continue to groom 180 miles of snow roads, currently an average of every third day. In terms of greenhouse gas emissions and fuel consumption, park staff would be kept at levels similar to the 2009/2010 to 2011/2012 winter seasons, and would continue to consume approximately 23,000 gallons of biodiesel and 14,000 gallons of ethanol over the winter season.

Under alternative 4, Sylvan Pass would be open and avalanche control activities would continue under the terms and conditions of the Sylvan Pass Working Group Agreement.

Staffing levels needed under alternative 4 would be similar to those observed over the 2009/2010 to 2011/2012 winter seasons, and would represent the cost of park winter operations in recent years. Any additional costs incurred due to the introduction of noncommerically guided use would be recouped via the fees generated from the noncommercial guide program, and no additional staff resources would be required. In total, costs for operation would be approximately $5,586,858, which reflects the operating costs for the 2011/2012 winter season.

Cumulative Impacts

Impacts on park operations and management from other past, present, and reasonably foreseeable future actions would be the same as described for alternative 1. These impacts would result from activities within the park that require additional time and resources from NPS staff during the winter months. These activities include past construction projects (the construction of a new west entrance and the east entrance road) as well as the current and future operation of these projects. In addition to these construction projects, visitor activities occurring outside of the interior of the park would require staff time and resources (managing the park concessioners and other services and providing ranger-led winter programs). The impacts of these past, present, and reasonably foreseeable future actions, combined with the long-term negligible to minor adverse impacts of alternative 4, would result in long-term negligible to minor adverse cumulative impacts, of which alternative 4 would contribute a large amount because winter use management activities would constitute a large portion of the park's operating budget during the winter season.

Conclusion

Alternative 4 would result in long-term negligible to minor adverse impacts to park operations and management because the staffing and resource requirements for implementation of the alternative would likely be met with existing funding sources and because costs would be comparable to current operations. Additional management required under this alternative would be accommodated through existing staff or from lottery fees associated with the noncommercial guiding program. Cumulative impacts under alternative 4 would be long-term negligible to minor adverse, of which alternative 4 would constitute a large part.

UNAVOIDABLE ADVERSE IMPACTS

The NPS is required to consider if the alternative actions would result in impacts that could not be fully mitigated or avoided (NEPA Section 101(c)(ii)).

IMPACTS OF ALTERNATIVE 1: NO SNOWMOBILE/SNOWCOACH USE

Under alternative 1, the minimal level of administrative use would cause a low (negligible) level of unavoidable adverse impacts to park resources such as wildlife (bison/elk, lynx/wolverines, trumpeter swans/eagles, and gray wolves), air quality, and soundscapes due to the occasional disturbance of these resources from administrative OSVs. There would be long-term, unavoidable adverse impacts to visitor use and experience (including visitor accessibility) because winter access to the interior of Yellowstone would be very limited and would be available only to those who could access it by non-motorized means. For those who could access it, visitor services would not be available due to the low levels of visitation without motorized use. There would also be unavoidable adverse impacts to health and safety because those visitors that are able to reach the interior by non-motorized means could be exposed to harsh winter conditions, without any support facilities and less NPS staff to assist them should the need arise. Unavoidable adverse impacts would also be created for socioeconomic values because any resulting decrease in visitation from the discontinuation of OSVs would reduce business

in the communities surrounding the park. Under this alternative, minimal administrative use would occur. This minimal level of administrative use would also result in unavoidable adverse impacts because some level of park staff would be needed to maintain the interior of Yellowstone during the winter.

IMPACTS OF ALTERNATIVE 2: CONTINUE SNOWMOBILE/SNOWCOACH USE AT 2011/2012 WINTER SEASON INTERIM REGULATION LIMITS

Unavoidable adverse impacts under alternative 2 would include impacts to park resources such as wildlife (bison/elk, lynx/wolverines, trumpeter swans/eagles, and gray wolves), air quality, and soundscapes due to continued OSV use in the park during the winter. Visitor use and experience (including visitor accessibility) would also experience unavoidable adverse impacts because at these use levels, visitors may not be able to find the visitor experience they seek, either desiring more or less winter use. Visitors with mobility challenges would be able to experience the interior of the park because some level of OSV use would be available, but it is uncertain if it would be their desired mode. There would be unavoidable adverse impacts to health and safety because visitors and employees would continue to be exposed to air and sound emissions from OSVs, user conflicts (motorized and non-motorized) would still exist, and the operation of Sylvan Pass would still occur, exposing NPS employees in this area to additional risk. Any unavoidable adverse impacts to socioeconomic values under alternative 2 would be greatly reduced compared to alternative 1, because winter use in the interior of Yellowstone would continue and businesses in the neighboring communities would be able to benefit from this economic activity. Impacts to park operations and management would increase compared to alternative 1 due to the increased level of staffing required to carry out winter use management when OSV use is permitted in the interior of the park.

IMPACTS OF ALTERNATIVE 3: TRANSITION TO SNOWCOACHES MEETING BAT REQUIREMENTS ONLY

Unavoidable adverse impacts under alternative 3 would include impacts to park resources such as wildlife (bison/elk, lynx/wolverines, trumpeter swans/eagles, and gray wolves), air quality, and soundscapes due to continued OSV use in the park during the winter. This alternative represents the least impact of all alternatives that allow OSV use because the overall number of OSVs permitted in the park in the winter would decline. Visitor use and experience (including visitor accessibility) would also experience unavoidable adverse impacts because at these use levels, when a complete transition to snowcoaches is made, visitors may not be able to find the visitor experience they seek, either desiring more or less winter use or desiring to use snowmobiles when only snowcoaches are available. Visitors with mobility challenges would be able to experience the interior of the park because some level of OSV use would be available, but it is uncertain if it would be their desired mode because snowmobiles would be phased out. There would be unavoidable adverse impacts to health and safety as visitors and employees would continue to be exposed to air and sound emissions from OSVs, user conflicts (motorized and non-motorized) would still exist. The operation of Sylvan Pass would not occur, reducing unavoidable impacts in this area of the park. Any unavoidable adverse impacts to socioeconomic values under alternative 3 could be increased compared to the other alternatives that allow for OSV use because overall, fewer OSVs would be permitted in the park and some visitors may choose not to recreate if no snowmobiles are available. However, visitation would still occur from snowcoach use and would benefit the businesses in neighboring communities. Impacts to park operations and management would increase compared to alternative 1 due to the increased level of staffing required to carry out winter use management when OSV use is permitted in the interior of the park.

IMPACTS OF ALTERNATIVE 4: MANAGE OSV USE BY TRANSPORTATION EVENTS

Unavoidable adverse impacts under alternative 4 would include impacts to park resources such as wildlife (bison/elk, lynx/wolverines, trumpeter swans/eagles, and gray wolves), air quality, and soundscapes due to continued OSV use in the park during the winter. These impacts would be greater than the other alternatives that allow OSV use due to the high number of OSVs allowed on some days. However, this use would be similar to the level of use permitted under the 2009 to 2011 interim regulations, on average, with only a certain number of days exceeding these levels. The introduction of noncommercial guiding is not expected to increase impacts as these guides would receive training and would ensure their group members follow all rules and regulations put in place to protect park resources. Because noncommercial guiding would be a new use to the park, the program would be monitored to ensure there would be no impacts to visitor use, experience, and accessibility. Should impacts occur, the program would be altered or possibly ceased.

Visitor use and experience (including visitor accessibility) would also experience unavoidable adverse impacts because at these use levels, visitors may not be able to find the visitor experience they seek, either desiring more or less winter use (including more or less noncommercial guiding opportunities). Visitors with mobility challenges would be able to experience the interior of the park because some level of OSV use would be available, but it is uncertain if it would be their desired mode. There would be unavoidable adverse impacts to health and safety because visitors and employees would continue to be exposed to air and sound emissions from OSVs, user conflicts (motorized and non-motorized) would still exist, and the operation of Sylvan Pass would still occur, exposing NPS employees in this area to additional risk. Any unavoidable adverse impacts to socioeconomic values under alternative 4 would be greatly reduced compared to alternative 1 because winter use in the interior of Yellowstone would continue and businesses in the neighboring communities would be able to benefit from this economic activity, with some of the higher use days allowing for more recreational use than is currently occurring. Impacts to park operations and management would increase compared to alternative 1 due to the increased level of staffing required to carry out winter use management when OSV use is permitted in the interior of the park and would be higher than other action alternatives because the administration of a noncommercial guiding program would put additional demands on park staff.

SUSTAINABILITY AND LONG-TERM MANAGEMENT

In accordance with NEPA, and as further explained in NPS Director's Order 12: *Conservation Planning, Environmental Impact Analysis, and Decision-making*, consideration of long-term impacts and the effects of foreclosing future options should be included throughout any NEPA document. According to Director's Order 12, and as defined by the World Commission on Environment and Development, "sustainable development is that which meets the needs of the present without compromising the ability of future generations to meet their needs." For each alternative considered in a NEPA document, considerations of sustainability must demonstrate the relationship between local short-term uses of the environment and the maintenance and enhancement of long-term productivity. This is described below for each alternative. The NPS must consider if the effects of the alternatives involve tradeoffs of the long-term productivity and sustainability of park resources for the immediate short-term use of those resources. It must also consider if the effects of the alternatives are sustainable over the long term without causing adverse environmental effects for future generations (NEPA Section 102(c)(iv)).

All activities analyzed in the draft plan/SEIS alternatives could be considered local and short-term because they are specific to Yellowstone and are reversible actions. Long-term productivity is construed as the continued existence of the natural resources of the park, at a sustainable and high

level of quality, so that they can retain their inherent value and be enjoyed by the public. Depending on the magnitude, extent, and duration of impacts caused by short-term uses, long-term productivity could be affected. The analysis in the draft plan/SEIS has shown few impacts from possible short-term uses that would affect long-term productivity as defined. It is the function of monitoring and mitigation, incorporated into park management, to ensure no such impacts result from implementation.

IMPACTS OF ALTERNATIVE 1: NO SNOWMOBILE/SNOWCOACH USE

Under alternative 1, no OSV use would occur in the park and therefore, the level of the short-term impacts would be negligible to minor. Long-term productivity of the park's resources would not be impacted. Changes in the way visitors use and experience Yellowstone in the winter would occur for the duration of plan implementation, and these changes would be greater under alternative 1 than the other alternatives analyzed.

IMPACTS OF ALTERNATIVE 2: CONTINUE SNOWMOBILE/SNOWCOACH USE AT 2011/2012 WINTER SEASON INTERIM REGULATION LIMITS

Alternative 2 could be considered local and short-term because it is specific to Yellowstone and is a reversible action. Long-term productivity is construed as the continued existence of the natural resources of the park, at a sustainable and high level of quality, so that they can retain their inherent value and be enjoyed by the public. The analysis in the EIS has shown few impacts from possible short-term uses over the 20-year period covered by this alternative. Alternative 2 represents the continuation of use limits under the 2009 to 2012 interim regulations, which monitoring has shown did not affect productivity of the park's resources. In addition, monitoring and mitigation that are part of this alternative would ensure impacts to sustainability and long-term management would not result from implementation. Similar to the other action alternatives, alternative 2 was developed to be implemented adaptively. Alternative 2 would induce short-term effects on a variety of values or resources that would persist for as long as the impacting activity is undertaken. Under alternative 2, a mix of visitor uses would be available, but due to use limits, visitors may not be able to have their desired experience during their visit. These impacts to visitor experience would continue for the duration of plan implementation.

IMPACTS OF ALTERNATIVE 3: TRANSITION TO SNOWCOACHES MEETING BAT REQUIREMENTS ONLY

Alternative 3 could be considered local and short-term because it is specific to Yellowstone and is a reversible action. Long-term productivity is construed as the continued existence of the natural resources of the park, at a sustainable and high level of quality, so that they can retain their inherent value and be enjoyed by the public. The analysis in the draft plan/SEIS has shown few impacts from possible short-term uses during the 20-year time period covered by this alternative that would affect long-term productivity as defined. Alternative 3 represents a level of motorized use in the park that monitoring has shown does not affect productivity of the park's resources. In addition, monitoring and mitigation that are part of this alternative would ensure that impacts to sustainability and long-term management would not result from implementation.

Alternative 3 would induce short-term effects on a variety of values or resources that would persist for as long as the impacting activity is undertaken. Under alternative 3, a mix of visitor uses would be available, but due to the phaseout of snowmobile use, visitors may not be able to have their desired experience during their visit. These impacts to visitor experience would continue for the duration of plan implementation.

IMPACTS OF ALTERNATIVE 4: MANAGE OSV USE BY TRANSPORTATION EVENTS

Alternative 4 could be considered local and short-term because it is specific to Yellowstone and is a reversible action. Long-term productivity is construed as the continued existence of the natural resources of the park, at a sustainable and high level of quality, so that they can retain their inherent value and be enjoyed by the public. The analysis in the draft plan/SEIS has shown few impacts from possible short-term uses during the 20-year life of this plan that would affect long-term productivity as defined. Alternative 4 represents a level of motorized use that is similar to or greater than recent years but would not have increased impacts on the parks resources compared to other action alternatives due to the focus on transportation events. In addition, monitoring and mitigation that are part of this alternative would ensure that impacts to sustainability and long-term management would not result from implementation.

Alternative 4 would induce short-term effects on a variety of values or resources that would persist for as long as the impacting activity is undertaken. Under alternative 4, a mix of visitor uses would be available, including noncommercial guiding. Even with the increased diversity of visitor experiences, use limits would be in place and visitors may not be able to have their desired experience during their visit. These impacts to visitor experience would continue for the duration of plan implementation.

IRREVERSIBLE OR IRRETRIEVABLE COMMITMENTS OF RESOURCES

The NPS must consider if the effects of the alternatives cannot be changed or are permanent (that is, the impacts are irreversible). The NPS must also consider if the impacts on park resources would mean that once gone, the resource could not be replaced; in other words, the resource could not be restored, replaced, or otherwise retrieved (NEPA Section 102(c)(v)).

An irreversible commitment of resources is defined as the loss of future options. The term applies primarily to the effects of using nonrenewable resources, such as minerals or cultural resources, or to those factors such as soil productivity that are renewable only over long periods. It could also apply to the loss of an experience as an indirect effect of a “permanent” change in the nature or character of the land.

An irretrievable commitment of resources is defined as the loss of production, harvest, or use of natural resources. The amount of recreation activities foregone is irretrievable, but the action is not irreversible. If the use changes, it is possible to resume production. An example of such a commitment would be the loss of cross-country skiing opportunities as a result of a decision to allocate an area to snowmobile use only. If the decision were reversed, skiing experiences, though lost in the interim, would be available again.

ALTERNATIVE 1: NO SNOWMOBILE/SNOWCOACH USE

Under alternative 1, the restriction of access to the interior of Yellowstone in the winter would displace those visitors desiring an OSV experience, and would result in an irretrievable loss of this opportunity for all visitors. The displacement of these visitors could also result in the loss of revenue to neighboring communities, resulting in irretrievable losses to socioeconomic values. These losses would be irretrievable, but not irreversible. The losses would also be balanced by benefits to park resources, including reduced disturbance to park wildlife, air quality, and soundscapes. The closure of Sylvan Pass would result in benefits to the health and safety of NPS employees because avalanche

mitigation efforts would no longer be required in that area and NPS resources currently allocated for park operations could be reallocated for other management in the park.

ALTERNATIVE 2: CONTINUE SNOWMOBILE/SNOWCOACH USE AT 2011/2012 WINTER SEASON INTERIM REGULATION LIMITS

Under alternative 2, OSV use in the interior of Yellowstone in the winter would occur at levels that would impact the park's resources such as wildlife, air quality, and soundscapes. These impacts would all be minor or less and would represent irretrievable, but not irreversible, losses to the quality of the resource. The ability of visitors to experience these resources may also be lost to a certain extent. Alternative 2 allows for a mix of uses in the winter including non-motorized and oversnow opportunities, and would not represent a loss in the types of visitor experiences available in the park, but could represent a loss of the specific desired visitor experience. However, OSV use in the winter would provide beneficial impacts to the socioeconomic values of the surrounding communities. Alternative 2 would allow for the continued operation of Sylvan Pass which would continue to put NPS employees working in this area at risk and would continue to expose NPS employees to some level of air and sound pollution, resulting in irretrievable losses. Those NPS resources dedicated to implementing winter use management would also be lost to other management opportunities in the park. For alternative 2, while there would be some irretrievable losses, these would not be irreversible.

ALTERNATIVE 3: TRANSITION TO SNOWCOACHES MEETING BAT REQUIREMENTS ONLY

Under alternative 3, OSV use in the interior of Yellowstone in the winter would occur at levels that would impact the park's resources such as wildlife, air quality, and soundscapes. These impacts would all be minor or less and would represent irretrievable, but not irreversible, losses to the quality of the resource. The ability of visitors to experience these resources may also be lost to a certain extent. Alternative 3 allows for a mix of uses in the winter including non-motorized and oversnow opportunities, but would result in the loss of one specific use (snowmobile use). This alternative would represent a loss of the specific desired visitor experience. However, OSV use in the winter would provide beneficial impacts to the socioeconomic values of the surrounding communities, which may be reduced compared to other action alternatives that allow for a greater mix of uses. The closure of Sylvan Pass would result in benefits to the health and safety of NPS employees because avalanche mitigation efforts would no longer be required in that area and NPS resources currently allocated for park operations could be reallocated for other activities in the park. Those NPS resources dedicated to implementing winter use management would also be lost to other management opportunities in the park. For alternative 3, while there would be some irretrievable losses, these would not be irreversible.

ALTERNATIVE 4: MANAGE OSV USE BY TRANSPORTATION EVENTS

Under alternative 4, OSV use in the interior of Yellowstone in the winter would occur at levels that would impact the park's resources such as wildlife, air quality, and soundscapes. These impacts would all be moderate or less and would represent irretrievable, but not irreversible, losses to the quality of the resource. The ability of visitors to experience these resources may also be lost to a certain extent, with this loss being greater on higher use days than lower use days. Alternative 4 allows for a mix of uses in the winter including non-motorized and oversnow opportunities (including noncommercial guiding), and would not represent a loss in the types of visitor experiences available in the park, but could represent a loss of the specific desired visitor experience. However, OSV use in the winter would provide beneficial impacts to the socioeconomic values of the surrounding communities with this benefit being greater on days where the maximum amount of transportation events are used.

Alternative 4 would allow for the continued operation of Sylvan Pass which would continue to put NPS employees working in this area at risk and would continue to expose NPS employees to some level of air and sound pollution, resulting in irretrievable losses. Those NPS resources dedicated to implementing winter use management would also be lost to other management opportunities in the park. For alternative 4, while there would be some irretrievable losses, these would not be irreversible.

CHAPTER 5

Consultation and Coordination

CHAPTER 5: CONSULTATION AND COORDINATION

Yellowstone National Park staff place a high priority on meeting the intent of public involvement in the National Environmental Policy Act (NEPA) process and providing the public an opportunity to comment on proposed actions. As part of the National Park Service (NPS) NEPA process, issues associated with the Draft Winter Use Plan / Supplemental Environmental Impact Statement (draft plan/SEIS) were identified during scoping meetings with NPS staff (including the Inter-disciplinary Team, coordination with other affected agencies, public meetings, and public comment). For this project, an Inter-disciplinary Team, also called the Project Team, consisted of members from the park, region, and Washington Office.

This chapter describes the consultation that occurred during development of this draft plan/SEIS, including consultation with stakeholders and other agencies. This chapter also includes a description of the public involvement process and a list of the recipients of the draft document.

THE SCOPING PROCESS

The NPS divides the scoping process into two parts: internal scoping and external public scoping. Internal scoping involved discussions among NPS personnel regarding the purpose of and need for management actions, issues, potential management alternatives, mitigation measures, the analysis boundary, appropriate level of documentation, available references and guidance, and other related topics.

Public scoping is the early involvement of the interested and affected public in the environmental analysis process. The public scoping process helps ensure that people are given an opportunity to comment and contribute early in the decision-making process. For this draft plan/SEIS, project information was distributed to individuals, agencies, and organizations early in the scoping process, and people were given a variety of opportunities to express concerns or views and identify important issues or even other alternatives or alternative elements.

Taken together, internal and public scoping are essential elements of the NEPA planning process. All scoping that occurred during the planning process for the 2011 Winter Use Plan/EIS was considered for this supplemental process to prepare the draft plan/SEIS. The internal and public scoping processes for the 2011 Winter Use Plan/EIS are described in detail in the 2011 Final Winter Use Plan/EIS (November 2011). The following sections describe the various ways scoping was conducted for the draft plan/SEIS process.

SCOPING PROCESS FOR THE SUPPLEMENTAL WINTER USE PLAN/EIS

Public scoping for the draft plan/SEIS began on February 8, 2012, with the release of the *Federal Register* publication of the Notice of Intent to prepare an environmental impact statement (EIS) (77 FR 6581). The Notice of Intent summarized the history of winter use management at the park, discussed the recent history of the winter use planning process, listed the project website, and announced the upcoming public scoping meetings. The park posted a public scoping newsletter on the NPS Planning, Environment, and Public Comment (PEPC) website at http://parkplanning.nps.gov/yell, sent copies of the newsletter to a list of park stakeholders, and issued a news release inviting the public to comment at the scoping meetings.

The public was invited to submit comments on the scope of the planning process and potential alternative elements from February 8, 2012, through March 9, 2012. During this time, the park received more than

72,000 documents commenting on the scope of the draft plan/SEIS. Generally, these comments focused on support or opposition for the draft range of alternatives presented during scoping, with requested modifications to the alternatives presented. Public comments included, but were not limited to, increasing oversnow vehicle (OSV) use throughout the park, allowing for a noncommercially guided use program, and the request to transition to snowcoaches only. Other comments received included suggestions/opposition for alternative elements (opposition to requiring operators to provide both snowcoaches and snowmobiles, opposition to restricting use during the first two and last two weeks of season, what defines a sound event, how many noncommercially guided vehicles should be allowed, etc.). Additional comments included general support for sound event management, opposition to sound event management, the operation of Sylvan Pass (should it be opened or closed and the impacts of such an action), development of best available technology (BAT) snowcoaches, and support for a transition year.

Additionally, as with public scoping on the 2011 Winter Use Plan/EIS, many comments were received about the experience the visitor would have depending on changes in winter use. Comments indicated the use of OSVs either contributed to or detracted from visitor experiences at the park. Comments were also received that expressed concern for wildlife and their habitat with the use of OSVs in the park.

A full summary and analysis of the public comments received can be found at http://parkplanning.nps.gov/yell.

During the scoping period, four public scoping open houses were held:

- February 13, 2012: Holiday Inn in Cody, Wyoming
- February 14, 2012: The Virginian in Jackson, Wyoming
- February 15, 2012: Holiday Inn in West Yellowstone, Wyoming
- February 16, 2012: Holiday Inn in Bozeman, Montana

This draft plan/EIS will be posted on the NPS PEPC website (http://parkplanning.nps.gov/yell) and copies distributed to agencies, organizations, elected officials, and other entities or individuals who requested a copy. The publication of the U.S. Environmental Protection Agency (EPA) notice of availability of this draft plan/EIS in the *Federal Register* will initiate a 45-day comment period.

COOPERATING AGENCIES

In January 2012, the NPS sent invitations to federal and state agencies involved in past winter use planning efforts, including the 2011 Winter Use Plan/EIS. The following entities responded that they would serve as cooperating agencies for the draft plan/SEIS: the EPA; State of Idaho; State of Montana; State of Wyoming; Fremont County, Idaho; Gallatin County, Montana; Park County, Montana; Park County, Wyoming; and Teton County, Wyoming. The U.S. Forest Service (USFS) and U.S. Fish and Wildlife Service (USFWS) declined the invitation to be cooperating agencies for the draft plan/SEIS.

As a cooperating agency, most entities signed a Memorandum of Understanding to define the role of each party in the process, including providing technical data and reviews. In addition to the roles stated in the Memorandum of Understanding, the cooperating agencies met during the planning process to provide the NPS information. In addition to the five meetings held as part of the 2011 Winter Use Plan/EIS, for which these groups were also cooperating agencies, the meetings included the following:

- Teleconference, January 12, 2012. During this teleconference, cooperating agencies received the initial range of draft alternatives of the draft plan/SEIS that would be distributed for public comment. Agencies were asked at this time if they had any questions or needed any clarification.
- Teleconference, February 28, 2012. During this teleconference, cooperating agencies received an update on the public scoping meetings and comments received to date.
- Email, March 1, 2012. An email was sent to cooperating agencies from the park requesting information that the agencies would like to see considered in the draft plan/SEIS.
- Teleconference, March 27, 2012. During this teleconference, cooperating agencies were provided the results of the draft plan/SEIS scoping comment analysis, progress to date on the draft plan/SEIS, the revised range of alternatives, and the schedule moving forward.
- Teleconference, June 15, 2012. During this teleconference, cooperating agencies were updated on the range of draft alternatives that were going to be presented in the draft SEIS and informed of when the draft SEIS would be released. Dates and locations for the planned public meetings on the draft SEIS were also discussed.

LIST OF RECIPIENTS

The agencies, organizations, and businesses listed below were notified of the availability of the draft plan/SEIS. This document was also provided to other entities and individuals who requested a copy.

CONGRESSIONAL DELEGATES

- Raúl Labrador, Idaho, U.S. House of Representatives
- Michael K. Simpson, Idaho, U.S. House of Representatives
- Mike Crapo, Idaho, U.S. Senate
- James Risch, Idaho, U.S. Senate
- Denny Rehberg, Montana, U.S. House of Representatives
- Jon Tester, Montana, U.S. Senate
- Max Baucus, Montana, U.S. Senate
- John Barrasso, Wyoming Senator
- Mike Enzi, Wyoming Senator
- Cynthia Lummis, Wyoming U.S. House of Representative

NATIONAL PARK SERVICE

- Big Hole National Battlefield
- Glacier National Park
- Grand Teton National Park
- Grant-Kohrs Ranch NHS
- Little Bighorn Battlefield NM

U.S. Forest Service

- Beaverhead National Forest
- Bridger-Teton National Forest
- Custer National Forest
- Gallatin National Forest
- Shoshone National Forest
- Targhee National Forest

Environmental Protection Agency

- Region 8 – Denver

U.S. Army Corps of Engineers

U.S. Fish and Wildlife Service

Western Federal Lands Highway Division

State of Idaho

- C.L. "Butch" Otter, Governor of Idaho
- Idaho Department of Commerce
- Idaho Department of Parks and Recreation
- Idaho Fish and Game Department
- Idaho State Historic Preservation Office
- Freemont County, Idaho, Commissioners

State of Montana

- Brian Schweitzer, Governor of Montana
- Montana Department of Commerce
- Montana Department of Fish Wildlife and Parks
- Montana Intergovernment Review Clearinghouse
- Town of West Yellowstone
- Gallatin County, Montana, Commissioners
- Park County, Montana, Commissioners

STATE OF WYOMING

- Matt Mead, Governor of Wyoming
- Wyoming Department of Environmental Quality
- Wyoming Department of Transportation
- Wyoming Game and Fish Department
- Wyoming Office of Federal Land Policy
- Wyoming State Clearinghouse
- Wyoming State Historic Preservation Office
- Wyoming State Lands and Investments
- Wyoming Travel Commission
- Park County, Wyoming, Commissioners
- Teton County, Wyoming, Commissioners
- Teton County Certified Local Government

AMERICAN INDIAN TRIBES

- Yellowstone's 26 Associated Indian Tribes:
- Assiniboine & Sioux Tribes
- Blackfeet Tribe
- Cheyenne River Sioux Tribe
- Coeur d'Alene Tribe
- Comanche Tribe of Oklahoma
- Confederated Tribes of the Colville Reservation
- Confederated Tribes of the Umatilla Reservation
- Confederated Salish & Kootenai Tribes
- Crow Tribe
- Crow Creek Sioux Tribe
- Eastern Shoshone Tribe
- Flandreau Santee Sioux Tribe
- Gros Ventre and Assiniboine Tribes
- Kiowa Tribe of Oklahoma
- Lower Brule Sioux Tribe
- Nez Perce Tribe
- Northern Arapaho Tribe

- Northern Cheyenne Tribe
- Oglala Sioux Tribe
- Rosebud Sioux Tribe
- Shoshone-Bannock Tribes
- Sisseton-Wahpeton Sioux Tribe
- Spirit Lake Sioux Tribe
- Standing Rock Sioux Tribe
- Turtle Mountain Band of the Chippewa Indians
- Yankton Sioux Tribe

LIBRARIES

- Billings, Montana Public Library
- Bozeman, Montana Public Library
- Cody, Wyoming Public Library
- Jackson, Wyoming Public Library
- West Yellowstone, Montana, Public Library
- Wyoming State Library
- Yellowstone National Park Research Library

OTHER ORGANIZATIONS AND BUSINESSES

- Alliance for Wild Rockies
- American Fisheries Society
- American Wildlands
- Animal Welfare Institute
- Bear Creek Council
- Beartooth Alliance
- Billings Chamber of Commerce
- Bluewater Network
- Bozeman Area Chamber of Commerce
- Buffalo Bill Historical Center
- Center for Urban Affairs
- Cheyenne High Plains Audubon
- Citizens for Teton Valley
- Coalition of National Park Service Retirees

- Cody Chamber of Commerce
- Cooke City/Silver Gate Chamber of Commerce
- Defenders of the Rockies
- Defenders of Wildlife
- Fremont County Audubon Society
- Fund for Animals
- Gardiner Chamber of Commerce
- Great Bear Foundation
- Greater Yellowstone Coalition
- Delaware North, Inc.
- Humane Society of the United States
- Idaho Falls Chamber of Commerce
- Idaho Wildlife Federation
- Jackson Hole Alliance for Responsible Planning
- Jackson Hole Chamber of Commerce
- Lander Chamber of Commerce
- Livingston Chamber of Commerce
- Montana Audubon Council
- Montana State Preservation Office
- Montana State University
- Montana Wildlife Federation
- National Audubon Society
- National Parks Conservation Association
- National Wildlife Federation
- Natural Resource Conservation Service – Bozeman and Cody
- Nature Conservancy – Idaho Chapter
- Nature Conservancy – Montana Chapter
- Nature Conservancy – Wyoming Chapter
- Northern Plains Resource Council
- Northern Rockies Conservation Cooperative
- Northwestern University
- Park County Environmental Council
- Pinedale Chamber of Commerce

- Red Lodge Chamber of Commerce
- Riverton Chamber of Commerce
- Sacajawea Audubon Society
- Sierra Club Idaho Chapter
- Sierra Club Northern Plains Regional Office
- Sierra Club Teton Group
- Sierra Club Utah Chapter
- Snake River Audubon Society
- Star Valley Development Association
- Stone Fly Society
- Teton County Historic Preservation Board
- University of Colorado
- University of Wyoming
- Upper Missouri Breaks Audubon Society
- Utah Audubon Society
- Utah Wilderness Association
- Utah Wildlife Federation
- West Yellowstone Chamber of Commerce
- Wild Forever
- Wilderness Society
- Wyoming Association of Professional Historians
- Wyoming Heritage Society
- Wyoming Hospitality and Retail Network
- Wyoming Outdoor Council
- Wyoming Wildlife Federation
- Xanterra Parks and Resorts
- Yellowstone Association
- Yellowstone Park Foundation
- Yellowstone Valley Audubon Society

LIST OF PREPARERS AND CONTRIBUTORS

NATIONAL PARK SERVICE – PROJECT TEAM

Staff Member	Position	Education/Experience	Role
Kurt Fristrup	Bioacustics Tech/Wildlife Biologist, Natural Sounds Division Natural Resources, Stewardship and Science	B.A., Biomedical Engineering, University of California, San Diego, 1976; Ph.D., Organismal and Evolutionary Biology, Harvard University, 1985; 7 years NPS.	Soundscape modeling and review of SEIS sections including wildlife and soundscapes.
David Jacob	Project Manager, Environmental Quality Division Natural Resources, Stewardship and Science	B.A., History, Ohio State University, 1999; J.D., Law, University of Denver College of Law, 2002; 9 years NPS.	Project management and coordination, NEPA expertise.
Bruce Peacock	Chief, Environmental Quality Division, Natural Resources, Stewardship and Science	Ph.D. Economics, 14 years NPS, 6 years DOI Office of the Secretary.	Review and comment on economic issues.
Molly Nelson	Planning Assistant, Management Assistant's Office, Yellowstone National Park	Dual B.S. from Georgia Institute of Technology. 1 year NPS.	Statistical analysis, including Chapter 3 Visitation and OSV Transportation Models.
Glenn Plumb	Chief Wildlife Biologist, Biologic Resource Division, Natural Resources, Stewardship and Science	B.S. West Virginia University 1980, MS Texas Tech University 1984, PhD University of Wyoming, 1991; Yellowstone NP Chief Wildlife Biologist, Chief Wildlife and Fisheries, Chief Natural Resources, Acting Chief Yellowstone Center for Resources 1998-2010.	Senior stewardship and science staff at Yellowstone NP 1998-2010, NPS Washington DC office 2010-2012.
John Ray	Air Resources Division, Natural Resources, Stewardship and Science	Ph.D. Chemistry, 19 years NPS.	OSV emission tests, ambient air monitoring, prep of fleet emission numbers for modeling, summary of air quality studies and materials.
Christine L. Turk	Regional Environmental Quality Coordinator, Intermountain Region	B.A. Biological Sciences, 34 years NPS, 5 years U DE College of Marine Studies.	Review of draft documents for environmental compliance. Briefings with NPS official.
Dan Wenk	Superintendent, Yellowstone National Park	35 years NPS. M.S. in Landscape Architecture from Michigan State University.	Review of draft documents. Briefings with NPS and DOI officials. Alternative development and formulation.
Wade Vagias	Management Assistant, Yellowstone National Park	Ph.D. in Human Dimensions of Natural Resource Management. 4 years NPS. 5 years university faculty member.	Coordination and communication with park staff. Review of draft documents, insight on modeling assumptions, etc.

CONTRACTORS

Staff Member	Position	Experience	Role
The Louis Berger Group, Inc.			
Lori Fox, AICP	Senior Environmental Planner	B.S. Environmental Policy, University of Michigan M.C.P. Environmental and Land Use Planning, University of Maryland 12 years environmental compliance experience	Project manager. Responsible for drafting chapters 1 and 2, and review of all resource sections and public comment analysis.
Megan Blue-Sky	Environmental Scientist	B.A. Geography, University of Colorado Denver 3 years environmental planning and cartography experience	Responsible for maps found throughout the document as well as assisting with public comment analysis.
Jacklyn Bryant	Senior Planner	B.S. Natural Resources Management, Colorado State University M.S. Watershed Sciences, Colorado State University 12 years environmental compliance experience	Responsible for visitor experience and accessibility analysis.
Mike Mayer	Senior Regulatory Specialist, J.D. Lewis and Clark College, Certificate in Environmental and Natural Resources Law	B.S. Fish and Wildlife Biology, University of Massachusetts M.S. Fish and Wildlife Conservation, University of Massachusetts 16 years of experience	Deputy project manager. Responsible for coordinating the development of the adaptive management sections and review all sections, providing additional focus on the wildlife section.
Leo Tidd	Soundscapes and Air Quality	B.S. Environmental Studies. SUNY College of Environmental Science and Forestry MPA Environmental Policy. Columbia University 6 years experience with environmental impact analysis	Prepared SEIS air quality and soundscapes sections based on modeling conducted by NPS (soundscapes) and ARS (air quality).
Mike Snyder	Environmental Scientist	B.A. Biology and Geography, University of Delaware M.S. Environmental Sciences (Ecology), University of Virginia 35 years environmental planning and compliance experience	Responsible for drafting and review of portions of chapter 3 and 4, wildlife and species of concern.

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Nancy VanDyke	Senior Environmental Scientist	B.A. Biology and Geography, University of Delaware M.S. Environmental Sciences (Ecology), University of Virginia 35 years environmental planning and compliance experience	Responsible for drafting and review of portions of chapter 3 and 4, wildlife and species of concern.
RTI International (RTI)			
Carol Mansfield	Project Manager	B.A. Economics, Yale University Ph.D. Economics, University of Maryland, College Park 18 years experience as an economist	Responsible for analysis and text for socioeconomic impacts.
Vesall Nourani	Associate Economist	B.A. Political Science and B.A. Economics, University of North Carolina at Chapel Hill 4 years of experience as an associate economist	Responsible for assisting with analysis of socioeconomic impacts.
Air Resource Specialist, Inc (ARS)			
James Wu	Project Manager	B.S.E. Chemical Engineering, Princeton University, 1989 19 years air quality consulting	Air quality project manager. Responsible for directing the technical modeling and analysis effort, project coordination, and report preparation.
Howard Gebhart	Department Manager, Senior Scientist	M.S. Meteorology, University of Utah, 1979 B.S., Professional Meteorology, Saint Louis University, 1976 30 years air quality consulting	Provide overall technical guidance and project review.
Kelly Sutton	Project Scientist II / Modeling Technician	B.S. Environmental Studies and Management, Michigan State University, 2002 8 years air quality consulting	Conduct modeling and technical analysis, review data and results.
Charity Larson	Project Manager II / Modeling Technician	B.S. Environmental Physical Science, Black Hills State University, 1999 7 years air quality consulting	Conduct modeling and technical analysis, review data and results.

Staff Member	Position	Experience	Role
The Final Word			
Juanita Barboa	Technical Editor	B.S. Technical Communication, New Mexico Institute of Mining and Technology 23 years experience	Responsible for editing text.
Sherrie Bell	Technical Editor / Document Designer	Business Management Coursework, New Mexico State University 22 years of experience	Responsible for editing, formatting, and designing text.

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GLOSSARY

adaptive management—A system of management practices based on clearly identified outcomes, monitoring to determine if management actions are meeting outcomes, and, if not, facilitating management changes that will best ensure that outcomes are met or to re-evaluate the outcomes. Adaptive management recognizes that knowledge about natural resource systems is sometimes uncertain and is the preferred method of management in these cases (source: Departmental Manual 516 DM 4.16).

alternatives—Sets of management elements that represent a range of options for how, or whether to proceed with a proposed action. An environmental assessment or environmental impact statement analyzes the potential environmental impacts of the range of alternatives, as required under National Environmental Policy Act (NEPA).

Best Available Technology (BAT)—BAT is a term applied with regulations on limiting pollutant discharges with regard to abatement strategy.

buffer—A protective area or distance surrounding a sensitive resource that limits visitor access.

cumulative effect or impact—The impact on the environment which results from the incremental impact of the action when added to other past, present and reasonably foreseeable future actions regardless of what agency (federal or nonfederal) or person undertakes such other actions. Cumulative impacts can result from individually minor but collectively significant actions taking place over a period of time (40 CFR 1508.6).

dBA—Noise levels measured in decibels, abbreviated dB. An "A" filter is used to approximate how the human ear hears noise. The resulting "A-weighted sound level" is abbreviated dBA and is a widely used metric for assessing noise impacts on people.

ecology—The pattern of relations between organisms and their environment.

environmental consequences—Environmental effects of project alternatives, including the proposed action, any adverse environmental effects which cannot be avoided, the relationship between short term uses of the human environment, and any irreversible or irretrievable commitments of resources which would be involved if the proposal should be implemented (40 CFR 1502.16).

Executive Order—Official proclamation issued by the President that may set forth policy or direction or establish specific duties for federal agencies in connection with the execution of federal laws and programs.

Federal Register—Published by the Office of the *Federal Register*, National Archives and Records Administration (NARA), the *Federal Register* is the official daily publication for rules, proposed rules, and notices of federal agencies and organizations, as well as executive orders and other presidential documents (http://www.gpoaccess.gov/fr/).

federally listed endangered species—An endangered species is one that is in danger of extinction throughout all or a significant portion of its range. Before a species can receive protection under the ESA, it must first be placed on the federal list of endangered species. All actions leading up to and including listing of a species as endangered are published in the *Federal Register* (USFWS Endangered Species Program).

habitat—The environment in which a plant or animal lives (includes vegetation, soil, water, and other factors).

habituation—The psychological process in humans and other organisms in which there is a decrease in psychological and behavioral response to a stimulus after repeated exposure to that stimulus over a duration of time. In some instances, apparent habituation could also mean an animal is under physiological stress and would, under healthy circumstances, respond to the threat.

IMPLAN—An economic impact assessment modeling system that allows the user to build economic models to estimate the impacts of economic changes.

mitigation—"Mitigation" as defined in the National Environmental Policy Act (40 CFR 1508.20), includes: avoiding the impact altogether by not taking a certain action or parts of an action; minimizing impacts by limiting the degree or magnitude of the action and its Implementation; rectifying the impact of repairing, rehabilitating, or restoring the affected environment; reducing or eliminating the impact over time by preservation and maintenance operations during the life of the action; compensating for the impact by replacing or providing substitute resources or environments.

monitoring—A process of collecting information to evaluate if an objective and/or anticipated or assumed results of a management plan are being realized (effectiveness monitoring) or if implementation is proceeding as planned (implementation monitoring).

planning—An interdisciplinary process for developing short- and long-term goals and alternatives for visitor experience, resource conditions, projects, facility type and placement, and other proposed actions.

population (or species population)—A group of individual plants or animals that have common characteristics and interbreed among themselves and not with other similar groups.

preferred alternative— The agency's preferred course of action.

scoping—An early and open process for determining the extent and variety of issues to be addressed and for identifying the significant issues related to a proposed action (40 CFR 1501.7).

soundscape (natural)—The aggregate of all the natural, nonhuman-caused sounds that occur in parks, together with the physical capacity for transmitting natural sounds.

threatened or endangered species—Plants or animals that receive special protection under federal or state laws, including the Endangered Species Act. Species may be listed threatened or endangered in the state, but not by the federal government (USFWS), or vice versa. Some USFWS regional offices also maintain a list of those species of special concern, either nationally or locally, which may be being or may have been previously considered for listing as threatened or endangered.

threatened species—Any species that is likely to become an endangered species within the foreseeable future throughout all or a significant portion of its range.

ungulate—A hoofed, typically herbivorous, animal; includes deer, elk, and bison.

visitor experience—The perceptions, feelings, reactions, and activities of a park visitor in relationship to the surrounding environment.

visitor use—The types of recreation activities engaged in by visitors, including the type of activity, visitor behavior, timing, and distribution of use.

visitor—In this plan, anyone who physically visits a park for recreational, educational or scientific purposes, or who otherwise uses a park's interpretive and educational services.

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Appendices

APPENDIX A: BEST AVAILABLE TECHNOLOGY STANDARDS FOR SNOWCOACHES

Proposed General Best Available Technology (BAT) Parameters

Beginning in the 2017/2018 season, all snowcoaches must meet National Park Service (NPS) established BAT standards, as applicable to the snowcoach type and fuel type.

- No converted (non-historic or non-purpose-built) snowcoaches may be operated for more than ten years past the manufacturing date.
- Individual snowcoaches may be subject to periodic and random inspections to determine compliance with BAT requirements.

Proposed BAT Air Emission Standards

Every snowcoach would be required to have Tier 2 compliant engines and exhaust emission controls. The Tier 2 Rule (65 FR 6697, February 10, 2000) instituted a comprehensive regulatory program designed to significantly reduce the emissions from new passenger cars and light trucks, including pickup trucks, vans, minivans, and sport-utility vehicles. These reductions provide for cleaner air and greater public health protection, primarily by reducing ozone and particulate matter (PM) pollution. The program treats vehicles and fuels as a system, combining requirements for much cleaner vehicles with requirements for much lower levels of sulfur in gasoline. The program phases in a single set of tailpipe emission standards that apply to all passenger cars, light trucks, and larger passenger vehicles operated on any fuel. Tier 2 engines and emission control equipment include vehicle computers, full complement of sensors including engine control module (ECM) computers, be onboard diagnostics system (OBD) equipped, and have exhaust after-treatment equipment that is standard original equipment manufacturer (OEM) equipment included with on-road vehicles or engines. The emissions standards for BAT snowcoaches would therefore be based on technology specifications (technical standard). Technical standard specifications would differ depending on whether the vehicle was gasoline or diesel powered and in the case of gasoline snowcoaches, the gross vehicle weight rating (GVWR) of the vehicle.

- All emission-related exhaust components originally installed by the manufacturer must be in place and functioning properly. Malfunctioning components must be replaced with OEM components. If a new OEM part is unavailable, a functioning, used OEM part may be used. In view of the ten-season operational period noted above for non-historic snowcoaches, used OEM equipment should be available. Modifying or disabling original pollution control equipment is prohibited except for maintenance purposes.
- Beginning with the 2017/2018 winter season, snowcoaches operating in Yellowstone National Park would be subject to unannounced periodic inspections by the NPS to ensure that snowcoaches are meeting the NPS BAT requirements. These unannounced inspections would involve the visual inspection of the Malfunction Indicator Light (MIL) otherwise known as the "Check Engine" light. If the "Check Engine" light is illuminated, the operator /owner of the snowcoach would need to have the vehicle scanned by a trained technician to determine the issue identified by the Diagnostic Trouble Code (DTC). Necessary repairs and/or equipment

replacement would need to be performed within 10 business days of the inspection by the NPS and documented to the NPS[1].

For all gasoline powered snowcoaches less than 10,000 GVWR

BAT emission technology standard for gasoline powered snowcoaches less than 10,000 lbs GVWR would be the functional equivalent of meeting 2007 (or newer) U.S. Environmental Protection Agency (EPA) Tier 2 Model Year engine and emission control technology requirements and having all associated emissions control equipment incorporated into the engine and drive train for the vehicle class as an on-road wheeled vehicle (size and weight). This would include items such as ECM computers, OBD, sensors, and exhaust after-treatment equipment that is standard OEM equipment included with on-road vehicles or engines. The vehicle could be no older than 10 years past the manufacturing date. A vehicle more than 10 years past the manufacturing date would not be acceptable for use in Yellowstone National Park.

If a used gasoline powered vehicle [2] is being converted into a snowcoach, the NPS would require the operator to confirm that the vehicle meets the functional equivalent of 2007 (or newer) EPA Tier 2 Model Year engine and emission control technology requirements and has all associated emissions control equipment incorporated into the engine and drive train for the vehicle class as an on-road wheeled vehicle (size and weight). This would include items such as ECM computers, OBD, sensors, and exhaust after-treatment equipment that is standard OEM equipment included with on-road vehicles or engines. The vehicle could be no older than 10 years past the manufacturing date. A vehicle more than 10 years past the manufacturing date would not be acceptable for use in Yellowstone National Park.

If it is the operator's intention to repower a gasoline vehicle or convert a diesel vehicle to gasoline, the NPS would require the operator to confirm that the vehicle meets the functional equivalent of 2007 (or newer) EPA Tier 2 Model Year engine and emission control technology requirements and has all associated emissions control equipment incorporated into the engine and drive train for the vehicle class as an on-road wheeled vehicle (size and weight). This would include items such as ECM computers, OBD, sensors, and exhaust after-treatment equipment that is standard OEM equipment included with on-road vehicles or engines. The replacement engine could be no older than 10 years past the manufacturing date. A replacement engine more than 10 years past the manufacturing date would not be acceptable for use in Yellowstone National Park.

For all gasoline powered snowcoaches greater than 10,000 GVWR (heavy duty applications)

BAT emission technology standard for gasoline powered snowcoaches greater than 10,000 lbs GVWR would be the functional equivalent of meeting 2008 (or newer) EPA Tier 2 Model Year engine and emission control technology requirements and having all associated emissions control equipment incorporated into the engine and drive train for the vehicle class as an on-road wheeled vehicle (size and weight). This would include items such as ECM computers, OBD, sensors, and exhaust after-treatment equipment that is standard OEM equipment included with on-road vehicles or engines. The vehicle could be no older than 10 years past the manufacturing date. A vehicle more than 10 years past the manufacturing date would not be acceptable for use in Yellowstone National Park.

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[1] Additional time may be granted on a case-by-case basis, at the discretion of the NPS, depending on replacement parts availability and/or corrective work scheduling.

[2] "Used" vehicle in this case is defined as any chassis/frame/body of an on-road vehicle older than Model Year 2017.

If a used gasoline powered vehicle [3] is being converted into a snowcoach, the NPS would require the operator to confirm that the vehicle meets the functional equivalent of 2008 (or newer) EPA Tier 2 Model Year engine and emission control technology requirements and has all associated emissions control equipment incorporated into the engine and drive train for the vehicle class as an on-road wheeled vehicle (size and weight). This would include items such as ECM computers, OBD, sensors, and exhaust after-treatment equipment that is standard OEM equipment included with on-road vehicles or engines. The vehicle could be no older than 10 years past the manufacturing date. A vehicle more than 10 years past the manufacturing date would not be acceptable for use in Yellowstone National Park.

If it is the operator's intention to repower a gasoline vehicle or convert a diesel vehicle to gasoline, the NPS would require the operator to confirm that the vehicle meets the functional equivalent of 2008 (or newer) EPA Tier 2 Model Year engine and emission control technology requirements and has all associated emissions control equipment incorporated into the engine and drive train for the vehicle class as an on-road wheeled vehicle (size and weight). This would include items such as ECM computers, OBD, sensors, and exhaust after-treatment equipment that is standard OEM equipment included with on-road vehicles or engines. The replacement engine could be no older than 10 years past the manufacturing date. A replacement engine more than 10 years past the manufacturing date would not be acceptable for use in Yellowstone National Park.

For all diesel powered snowcoaches

BAT emission standards would be the functional equivalent of meeting 2010 (or newer) EPA Tier 2 Model Year engine and emission control technology requirements and having related emissions control equipment incorporated into the engine and drive train for the vehicle class as an on-road wheeled vehicle (size and weight). This would include items such as ECM computers, OBD, sensors, and exhaust after-treatment equipment that is standard OEM equipment included with on-road diesel powered vehicles. Diesel-powered vehicles must be equipped with applicable operational ceramic particulate filters and afterburners. The vehicle could be no older than 10 years past the manufacturing date. A vehicle more than 10 years past the manufacturing date would not be acceptable for use in Yellowstone National Park.

If a used diesel powered vehicle[4] is being converted into a snowcoach, the NPS would require the operator to confirm that the vehicle meets the functional equivalent of 2010 (or newer) EPA Tier 2 Model Year engine and emission control technology requirements and has all associated emissions control equipment incorporated into the engine and drive train for the vehicle class as an on-road wheeled vehicle (size and weight). This would include items such as ECM computers, OBD, sensors, and exhaust after-treatment equipment that is standard OEM equipment included with on-road vehicles or engines such as operational ceramic particulate filters and afterburners. The engine could be no older than 10 years past the manufacturing date. A replacement engine older than 10 years old would not be acceptable. The vehicle could be no older than 10 years past the manufacturing date. A vehicle more than 10 years past the manufacturing date would not be acceptable for use in Yellowstone National Park.

If it is the operator's intention to repower a diesel vehicle or convert a gasoline vehicle to diesel, the NPS would require the operator to confirm that the vehicle meets the functional equivalent of 2010 (or newer) EPA Tier 2 Model Year engine and emission control technology requirements and has all associated emissions control equipment incorporated into the engine and drive train for the vehicle class as an on-road wheeled vehicle (size and weight). This would include items such as ECM computers, OBD,

[3] "Used" vehicle in this case is defined as any chassis/frame/body of an on-road vehicle older than Model Year 2017.

[4] "Used" vehicle in this case is defined as a chassis/frame/body of an on-road vehicle older than Model Year 2017.

sensors, and exhaust aftertreatment equipment that is standard OEM equipment included with on-road vehicles or engines such as operational ceramic particulate filters and afterburners. The replacement engine could be no older than 10 years past the manufacturing date. A replacement engine more than 10 years past the manufacturing date would not be acceptable for use in Yellowstone National Park.

The NPS requires diesel vehicles with a GVWR of 8,500 pounds or more meet, at a minimum, the EPA 2010 "engine configuration certified" diesel air emission standards. However, if the diesel vehicle has a GVWR between 8,500 and 10,000 pounds, there may be a configuration that meets the technology standards for an EPA Light Duty Tier 2 on-road vehicle which would achieve the best results from an emissions perspective. This particular type of BAT configuration requires review and approval by the NPS.

If the EPA promulgates more restrictive emission technology requirements for any class of vehicle that may be considered for conversion to oversnow use, the NPS would evaluate these new emission technology requirements and may update the NPS BAT provisions as appropriate.

Proposed BAT Sound Emission Standards

- Beginning in the 2017/2018 season, all snowcoaches must meet a sound emissions requirement of no greater than 75 dBA (performance specification) when measured at typical cruising speed (typically approximately 22–25 mph). The procedures would follow those established in Volpe 2010 (*Exterior Sound Level Measurements of Snowcoaches at Yellowstone National Park,* U.S. Department of Transportation, Research and Innovative Technology Administration, John A. Volpe National Transportation Systems Center, April 2010).
- Through contract and permit, the NPS would encourage snowcoach guides and operators to employ snowcoaches that are quieter than this BAT requirement.

Through contract and permit, the NPS would encourage snowcoach guides and operators to equip their snowcoaches with devices to further minimize sound emissions.

Administrative Exceptions

An exception to these requirements would be for limited numbers of Prinoths (or Hägglunds) that are used for administrative functions. They would not be required to meet snowcoach BAT requirements.

APPENDIX B: NONCOMMERCIALLY GUIDED SNOWMOBILE ACCESS PROGRAM

Executive Summary

A noncommercially guided snowmobile access program is under analysis and consideration as part of Alternative 4 in the supplemental environmental impact statement (SEIS). Although the program would allow for noncommercial guides to lead groups of snowmobiles, access to Yellowstone National Park would remain 100 percent guided. The park would continue to prohibit unguided snowmobile access. If selected as an element of the preferred alternative, the program would allow for up to four groups of noncommercially guided snowmobiles – with up to 5 snowmobiles per group – to enter the park daily, one group per entrance. Noncommercial guides would be required to possess a noncommercial snowmobile access permit which would be awarded annually through an online lottery system. Each noncommercial snowmobile operator within the group would be required to have successfully completed an online Yellowstone-specific snowmobile training course that delineates snowmobile rules for the park including interactions with wildlife and other park users, snowmobile maintenance and repair, and first aid. The decision to continue or terminate the noncommercially guided snowmobile access program, or to adjust group size limits, would be based upon predetermined metrics with fixed standards (triggers) to ensure continued protection of park resources and visitor experiences. These standards would be made available to the public prior to implementation of the program. If selected as an element of the preferred alternative, the noncommercially guided snowmobile access program would begin on the first day of the 2014/2015 winter season.

Definitions

Noncommercially Guided Snowmobile Access Program: a program that permits duly authorized parties to enter Yellowstone National Park without the requirements of a commercial snowmobile guide. Individuals would be required to have successfully completed a certification process and possess a noncommercial snowmobile access permit. The noncommercially guided snowmobile access program may be adjusted or terminated based on impacts to park resources and visitor experiences.

Noncommercially Guided Snowmobile Trip: a trip that is led by a noncommercial guide and is not for profit; costs are evenly shared among all participants and no trip member may be paid to participate on the trip and no trip member may pay less than other participants. Trip preparation, costs, and conduct of the trip must be shared by all members of the group, including all logistics, food, fuel, equipment, transportation, vehicle shuttle, and other costs. Noncommercially guided snowmobile trips must be self-guided and may not hire commercial guides. Noncommercially guided snowmobile trips may not be used by any person or organization in any way to obtain a profit and doing so would result in the revocation of the permit and may jeopardize future noncommercially guided access to Yellowstone National Park by the trip leader and trip members.

Noncommercial Snowmobile Access Permit: a permit that allows access to Yellowstone National Park for a single group of up to five snowmobiles for a specific date range (no more than 3 days and 2 nights). These permits would be awarded to through an annual lottery system, administered through www.recreation.gov.

Noncommercial Snowmobile Operator: a person who has successfully completed the Yellowstone Snowmobile Education Certification Program (explained below) and is therefore certified as having the requisite knowledge and skills to operate a snowmobile in Yellowstone National Park. Noncommercial

snowmobile operators must be at least 16 years of age by the day of the trip and be in possession of a valid motor vehicle driver's license before entering the park.

Noncommercial Snowmobile Guide: In addition to stipulations outlined above under noncommercial snowmobile operator, a noncommercial snowmobile guide must obtain and be in possession of a noncommercial snowmobile access permit as awarded and obtained through the lottery system. Noncommercial snowmobile guides are directly responsible for the actions of their group. Each noncommercial guide may lead no more than two trips per winter season, and must be at least 18 years of age by the first day of the trip. Noncommercial guides must have working knowledge of snowmobile safety, general first aid, snowmobile repair, and navigational technique. It is preferable that noncommercial guides, or another member of the trip, be familiar with Yellowstone National Park. Noncommercial snowmobile guides may not advertise for profit and may not accept a fee or any type of compensation for organizing or leading a trip. Collecting a fee (monetary compensation), payable to an individual, group, or organization for conducting, leading, or guiding a noncommercially guided snowmobile trip is not allowed.

Unguided Snowmobile Access: a visitor or group of visitors who enter the park by snowmobile without obtaining certification through the Yellowstone Snowmobile Education Certification Program, who do not possess the necessary entrance permits, or who are not accompanied by a commercial or noncommercial guide.

Yellowstone Snowmobile Education Certification Program: a to-be-developed online snowmobile education program that all noncommercial snowmobile operators must complete before entering the park via snowmobile. Individuals who successfully complete the Yellowstone Snowmobile Certification Program (details below) would receive a certificate of completion, valid for the duration of the season.

Yellowstone Snowmobile Education Certification Program Development

The NPS would work with interested parties and stakeholders to develop an online Yellowstone Snowmobile Education Certification Program. Individuals who successfully complete the program would receive a certificate of eligibility to operate a noncommercially guided snowmobile. The certificate would be valid for the duration of the winter season, and for one year immediately following completion of the course. Noncommercial guides would be permitted to guide up to two trips per winter season. The Yellowstone Snowmobile Education Certification Program would be based on an existing snowmobile education program, such as International Snowmobilers Manufacturing Association (IMSA) SafeRider! Program (www.snowmobilers.org), but would be tailored with information specific to Yellowstone National Park. Participants would be charged a ten dollar, per person course fee. The Yellowstone Snowmobile Education Certification Program would emphasize that operating a snowmobile in Yellowstone National Park is a privilege, and that compliance with park rules and regulations and responsible and safe ridership are the responsibility of the snowmobile operator. Other components of the program would likely include rules and regulations of the park, park values and environmental education, required documentation (documentation of course completion, entrance permit, valid motor vehicle driver's license, and snowmobile registration and insurance), courtesy and ethics when encountering wildlife and other visitors, safety and emergency protocol, accident causes and mitigation techniques, road conditions, snowmobile operations, and mechanical repair. Education components would be reinforced during the onsite orientation session on the day of the trip, and hands-on snowmobile operating training would be provided to all trip participants.

Noncommercially Guided Snowmobile Access Program Administration and Management

The noncommercially guided snowmobile access program would be administered by Yellowstone National Park. Entrance permits would be allocated via an online lottery system managed through www.recreation.gov. Visitors would be able to apply for specific entry dates up to six months in advance of the winter season via www.recreation.gov. Individuals who wish to participate in the noncommercially guided snowmobile access program would be able to rent snowmobiles and equipment from an authorized Yellowstone National Park contract holder (an individual or business with a winter concessions contract or commercial use authorization) or use their own BAT compliant machines. BAT requirements are described below under program rules and regulations. All current winter concessioner / commercial use authorization contract holders would be eligible to apply for a contract to provide services to noncommercially guided park visitors (rentals, etc.). All noncommercial snowmobilers would be required to check in with an NPS ranger at the gate prior to entering the park, regardless of whether they choose to use private BAT snowmobiles or rent from a contract holder.

Lottery system requirements are as follows:

A. The noncommercial snowmobile guide must register for the lottery on www.recreation.gov and meet all of the requirements of a noncommercial guide listed above. Should a noncommercial guide fail to meet these requirements, any trip won through the lottery would be cancelled. The applicant may list an alternate noncommercial guide, but to qualify as a potential replacement for the original noncommercial guide, the alternate noncommercial guide must be listed on the lottery application and be prepared to complete all duties required of a noncommercial guide.

B. Noncommercial trips are not transferable except to an alternate noncommercial guide listed on the lottery application that resulted in the trip.

C. All individuals who would be operating a snowmobile must have successfully completed the Yellowstone Snowmobile Education Certification Program prior to the trip.

D. Individuals can have only one profile in the lottery system. Once a profile is established, an individual can apply for multiple entrance dates.

E. Noncommercial guides and alternate noncommercial guides must be 18 years or older by any requested entrance date. All noncommercial snowmobile operators must be 16 years of age or older by the first day of the trip and be in possession of a valid motor vehicle driver's license.

F. The annual lottery would open on July 1 for the for the following winter season. Lottery results are only valid for the following season and are not transferable between seasons.

G. Successful lottery winners would be sent a trip preparation packet.

Noncommercial guides and all members of their groups would be required to check in with an NPS ranger at the respective park entrance station to receive their entrance permit and on-site training before entering the park. An NPS ranger would provide an orientation session reinforcing the components of the education program detailed above and brief party members on current park road and weather conditions. Visitors may bring their own snowmobile or rent from the concessioner, but all snowmobiles must be BAT compliant.

The NPS ranger would ensure the following:

- Noncommercial guides have not led more than one previous noncommercially guided trip into the park that winter season.

- All group members possess the necessary documentation (documentation of online course completion, entrance permit, valid motor vehicle driver's license, and snowmobile registration and insurance).
- An itinerary is on file with emergency contact information, and that the noncommercial guide's snowmobile has markings making it easily distinguishable from commercial snowmobiles.

Rangers would ensure that snowmobiles are BAT compliant, and the noncommercial guides possess the necessary safety equipment, including but not limited to a radio, tow rope, map, and first aid kit. In the event that a rented snowmobile must be abandoned within the park, the contract / commercial use authorization holder is responsible for retrieval within 24 hours. If a private snowmobile is abandoned within the park, noncommercially guided groups are responsible for removal of the vehicle within 24 hours. If the concessioner fails to fulfill its responsibilities or comply with program rules, the concessioner may lose his or her eligibility to rent snowmobiles to noncommercially guided tours.

Annually, the park would make a report available on the program.

Noncommercially Guided Snowmobile Access Program Rules and Regulations

A. All park rules and regulations are in effect for noncommercial operators.

B. All snowmobiles must be registered and insured and must meet current BAT requirements.

C. All noncommercial snowmobile operators must possess and carry a valid state driver's license.

D. All group members planning to enter the park must have successfully completed the Yellowstone Snowmobile Education Certification Program and be in possession of a Yellowstone Snowmobile Education Certificate Card. All group members must be present for the on-site orientation on the morning of the trip. Trips are required to check-in with NPS staff by 10:30 a.m. the morning of the trip.

E. The minimum age for operating a snowmobile in the park is 16 years of age. Noncommercial guides must be at least 18 years of age by the first day of their trip.

F. Each noncommercial guide can lead up to two trips per winter season. In the event that an alternate noncommercial guide replaces a noncommercial guide, all noncommercial guide requirements would be transferred to the alternate noncommercial guide. Noncommercial Snowmobile Access Permits are nontransferable except as provided for alternate noncommercial guides as explained above. Noncommercial guides or their alternates must be present for the duration of their scheduled trip.

G. All trip dates are final. Noncommercial guides would be allowed to start their trips as planned, pass their trips to the alternate noncommercial guide, or cancel a given trip. Deferment and/or swapping of entrance gate or dates is not allowed. It is the noncommercial guide's responsibility to notify Yellowstone National Park via www.recreation.gov if unable to use his or her scheduled date(s). Only one trip per day per gate would be permitted. The noncommercial guide must have their successful lottery paperwork in their possession the morning of the trip.

H. Fees and deposits are due at the time specified below and are non-refundable.

I. Noncommercial guides may allow for changes in their group on the day of a trip provided that the noncommercial guide – the noncommercial snowmobile access permit holder – ensures that all current participants have completed the Yellowstone Snowmobile Education Certification Program and are listed on the trip participant sheet turned into the NPS ranger at the gate.

Noncommercially Guided Snowmobile Trip Costs

Component	Cost	Payment Due
Lottery Application Fee	$5.00/season	At time of application
Lottery Selection Fee	$10.00/group/trip	At time of lottery award (permit awarded)
Yellowstone Snowmobile Education Certificate Program	$10.00/snowmobile operator	At time of course initiation
Gate Entrance Fee*	$15/machine / one day $20/machine / ≥ 2 days	At the entrance gate

* Gate entrance fee would remain consistent with standard park entrance fee structure, and is subject to change

Noncommercially Guided Snowmobile Access Program Trip Requirements

A. Noncommercial Guide Responsibilities—Noncommercial guides must comply with all portions of the permit application procedure and are directly responsible for the actions of his/her party. Failure to adhere to any of these trip requirements or program rules and regulations, either by a noncommercial guide or a member of his or her party, may result in revocation of the permit and/or future eligibility as a noncommercial guide, citation of the noncommercial guide and/or members of the group, and possible administrative decision that may affect future access to Yellowstone National Park in the winter by noncommercially guided snowmobiles.

B. Accessible Documentation—An NPS ranger may, on occasion, travel with noncommercial groups in order to ensure compliance with permit conditions. Rangers may contact a given party and request information such as a copy of a noncommercial guide's permit and passenger list.

C. Trip Size—Individual noncommercial trips shall carry no more than 10 persons on a maximum of five snowmobiles. It is not permissible to split up the trip at any point other than in an emergency.

D. Check In—Each group must check in at the assigned entrance station by 10:30 a.m.

E. Maximum Stay—Each group may stay a maximum of two nights NPS.

F. Accidents—Accidents must be reported to the contract holder and involving groups operating private snowmobiles must be reported directly to the NPS.

G. Pets—No cats, dogs, or other pets are permitted on a noncommercially guided snowmobile trips.

H. Resource Protection—Natural or historical features such as rocks, old mining artifacts, fossils, flowers, or Indian artifacts may not be removed or disturbed (36 CFR 2.1).

I. Noncommercial guides and all members of their group must adhere to all park rules and regulations.

Hypothetical Scenario for Individuals Wishing to Enter Yellowstone National Park in winter via Noncommercially Guided Snowmobile (without a commercial snowmobile guide)

1. Individuals create a profile on www.recreation.gov and apply for a specific gate and entry date through the online lottery system. Once the annual lottery is open, it would be continuously open through the last day of the winter season (typically March 15). Recreation.gov would electronically notify them of their selection and send trip information to NPS and the contractor

holder if applicable. Noncommercial guides are responsible for confirming their trip with park personnel responsible for oversight of the program and with the contract holder. If desirable, individuals can specify an alternative noncommercial guide.

2. When selected for their chosen gate and dates, all snowmobile operators in the group must successfully complete the Yellowstone Snowmobile Education Certification Program.
3. Upon completion of the Yellowstone Snowmobile Education Certificate Program, www.recreation.gov would send group members certification of successful completion and an electronic pre-trip orientation package. The NPS and contract holder, if applicable, would work with lottery winners to ensure that all necessary paperwork is in place prior to the day of the trip.
4. On the day of the trip, the contract holder would ensure that all snowmobiles are BAT compliant and that all members possess the necessary safety equipment if the group is renting from a concessioner. At the park entrance gate, an NPS ranger would check that privately owned snowmobiles are BAT compliant and that all members possess the necessary safety equipment and documentation. The NPS ranger would conduct an on-site orientation session for all members of the group to reinforce components of the educational program detailed above and familiarize all members of the group with operating a snowmobile.
5. Noncommercial guides /alternate noncommercial guides and their group, in possession of all documentation and safety materials, may then enter the park.

APPENDIX C: WINTER USE COLLABORATIVE ADAPTIVE MANAGEMENT AND MONITORING FRAMEWORK

This appendix provides additional detail to the discussion in chapter 2 regarding adaptive management. It describes the draft Winter Use Plan / Supplemental Environmental Impact Statement's (draft plan/SEIS) adaptive management framework and how new information collected over time may result in changes to future winter use management. This framework can be applied to any of the action alternatives being considered in the draft plan/SEIS.

As described briefly in chapter 2, adaptive management is a management tool. It allows decision-makers to acknowledge the uncertainties surrounding the management of natural systems and helps natural resource managers respond to resource or system conditions over time through the collection and evaluation of additional information. The knowledge that uncertainties exist provides managers the ability to consider them in their planning and allows for the latitude to modify actions to progress towards desired outcomes. Adaptive management has the potential to improve a manager's understanding of ecological systems to better achieve management objectives.

The emphasis in an adaptive approach is first and foremost on resource management. Although the focus is on learning, the ultimate goal of the effort is continuously improving management direction and focus. It is important to recognize that adaptive management is a complex endeavor that includes much more than simply following a sequence of steps. When properly executed, the process involves ongoing, real-time learning. In order for adaptive management to be successful, stakeholders need to be engaged during the formulation of the initial problem and remain engaged throughout implementation (Williams et al. 2009). The adaptive management framework described in this appendix includes an initial process that will be implemented while the National Park Service (NPS) works with stakeholders in developing a long-term, sustainable adaptive management framework for winter use management in Yellowstone National Park.

INITIAL YELLOWSTONE WINTER USE ADAPTIVE MANAGEMENT PROCESS

The NPS recognizes that there are uncertainties surrounding how resources will respond to oversnow vehicle (OSV) use management and the effects to the overall visitor experience. The initial adaptive management framework is meant to begin the process of reducing uncertainties surrounding winter use in Yellowstone National Park. The initial framework identifies some of the affected resources, indicators, and monitoring methods that may be used to collect data during the first two seasons of implementation. Before this initial approach is implemented, the park will initiate discussions with stakeholders and work towards a long adaptive management plan. The approach for developing a long-term framework is described below.

Table 1 outlines an example monitoring framework that may be implemented under the initial approach during the first two seasons of implementation. Several affected resources are identified, as well as potential indicators that could be used to assess changes in those resources. Based on the use levels prescribed in the first two years of alternatives implementation (318 BAT snowmobiles and 78 snowcoaches per day, an element consistent for all three draft plan/SEIS action alternatives), it is unlikely that a change in management would be necessary, unless impacts observed are significantly higher than predicted. Information collected during the first two years of implementation, in combination with data collected over the previous three seasons which were at the 318/78 level (resulting a five-year dataset), will allow a baseline to be established and can be used to help refine monitoring methods through understanding of natural variability

TABLE 1: EXAMPLES OF ADAPTIVE MANAGEMENT MONITORING AFFECTED RESOURCE, INDICATOR, AND MONITORING METHOD IDENTIFICATION

Affected Resources	Potential Indicator(s)	Preliminary Monitoring Methods
Air Quality	Levels of: CO PM10 NO_2	Fixed site monitoring for CO, PM_{10}, and NO_x
Soundscape	Audibility: decibel levels (dBA) in terms magnitude, and duration (constant sound level or L_{eq}) sound is audible over 8 hour period.	Could include audibility logging, digital recordings, and sound pressure level measurement
Visitor Experience	Satisfaction	Visitor survey (pending OMB approval)
Wildlife	Wildlife behavioral responses to OSV use	Observational studies
Health and Safety	Number and severity of reported incidents	Incident reports regarding OSV use

FUTURE LONG-TERM ADAPTIVE MANAGEMENT FRAMEWORK DEVELOPMENT

The adaptive management strategy described in this appendix will provide a structured process, involving the public and interested stakeholders, to continually evaluate the effectiveness of the winter use plan and seek to provide information to inform uncertainties and improve management over time. Engagement of the public in the development of the winter use adaptive management plan is necessary for the ultimate success of the program.

To improve overall management of winter use in the park in the long term, NPS will create and refine the adaptive management and monitoring program during the first two years of implementation. A focused, stakeholder-involved, collaborative approach will help to set long term adaptive management objectives to guide future winter use actions. As part of this process, stakeholders and the public will be engaged to ensure the park fully understands key issues and concerns and to work collaboratively on developing a suite of appropriate metrics to reduce uncertainty. Although there is often a desire to monitor many resource indicators, the adaptive management plan will focus on key uncertainties that if reduced would allow for improved winter use management.

Based on the results of the initial collaborative workshops, monitoring would occur for the resources and associated metrics. The results would be analyzed on an annual basis. Based on the result of analyses, the NPS may choose to adjust management if it determines impacts observed are greater than those predicted. Monitoring may also suggest that the initial objectives should be adjusted. In the event that there is a desire to modify objectives, NPS will incorporate that process into the long-term adaptive management framework and seek additional stakeholder involvement.

The park proposes to convene an adaptive management working group during the fall of 2012 or winter of 2012/2013 and publish a final adaptive management plan in fall of 2013. All interested parties will be encouraged to join the collaborative adaptive management meetings. Upon completion of the long-term adaptive management plan, the park will hold regularly scheduled stakeholder meetings to discuss data, findings, and obtain feedback from stakeholders on recommendations for management. The park will also develop a website to serve as an information portal for the winter use adaptive management program.

Potential Future Management Actions

Results of monitoring may influence future changes in management. As park resources respond to OSV use levels and associated impacts, the park may find it advisable to change OSV use levels or the manner in which OSVs are managed (such as guiding requirements, noncommercial guiding, temporal spacing, etc.). These potential decisions will be based on the monitoring data and the progress of meeting specific adaptive management objectives. For example, if resource response (or impacts) to OSV use levels is well below those expected and the park has exceeded its objectives, park managers may consider increasing the sum number of OSVs or the number of events permitted. Conversely, if resource impacts increase and the progress toward meeting park objectives is reduced, the park may decide to reduce OSV numbers or change other OSV management elements. Potential future actions could, for example, include:

- Requiring lower-emission (sound or air) technologies for OSVs;
- Adjusting sum numbers of daily OSV entries or events permitted;
- Establishing timed-entry requirements or staging at the entrance gates for OSVs;
- Adjusting OSV speed limits in travel corridors or developed areas;
- Phasing out the use of specific technologies or models;
- Increasing recreational and educational opportunities for visitors;
- Adjusting event allowances for noncommercial guiding or discontinuing the noncommercially guided snowmobile access program entirely; and
- Closing or opening certain OSV areas, routes, or entrances.

The management actions listed above have been described and their potential impacts analyzed in this draft plan/SEIS and previous National Environmental Policy Act (NEPA) documents that have been incorporated by reference. Therefore, only a streamlined environmental review may be necessary if the park determines it necessary to adjust its management in the future. Management changes that would conflict with the associated Record of Decision (ROD) may necessitate the need for a new NEPA review and potentially, changes to the associated rule.

NEPA Review

Once it is determined that a potential future management action is necessary and desirable to better achieve adaptive management objectives, an initial environmental screening process will be conducted to determine what, if any, additional environmental compliance may be required. Through this screening process, the NPS will document whether adaptive management adjustments, both individually and cumulatively, are (1) within the range of management actions described for the selected alternative, and (2) fully analyzed in the environmental effects section of this NEPA analysis or those incorporated by reference. The following questions will be used to evaluate if the winter use plan/SEIS and documents incorporated by reference have adequately analyzed impacts for proposed adjustments to winter use management:

- Is the change to the selected action in the ROD a feature of, or essentially similar to, an action or alternative analyzed in the existing NEPA documents? Is the action within the same analysis area, or if the project location is different, are the geographic and resource conditions sufficiently similar to those analyzed in the existing NEPA documents? If there are differences, are they substantial?

- Is the range of alternatives analyzed in the existing NEPA documents appropriate with respect to the new proposed actions, given current environmental concerns, interests, and resource values?
- Is the existing analysis valid in light of any new information or circumstances? Can it be concluded that new information and new circumstances would not be significant as they relate to environmental concerns?
- Are the direct, indirect, and cumulative effects that would result from implementation of the new proposed actions similar (both quantitatively and qualitatively) to those analyzed in the existing NEPA document?
- Does the proposed action alter the conclusions of the no impairment analysis accompanying the Record of Decision?

Some actions could be implemented quickly, as they would be within the scope of the selected alternative and their impacts will have been adequately assessed. However, other actions may require additional environmental review and/or rulemaking.

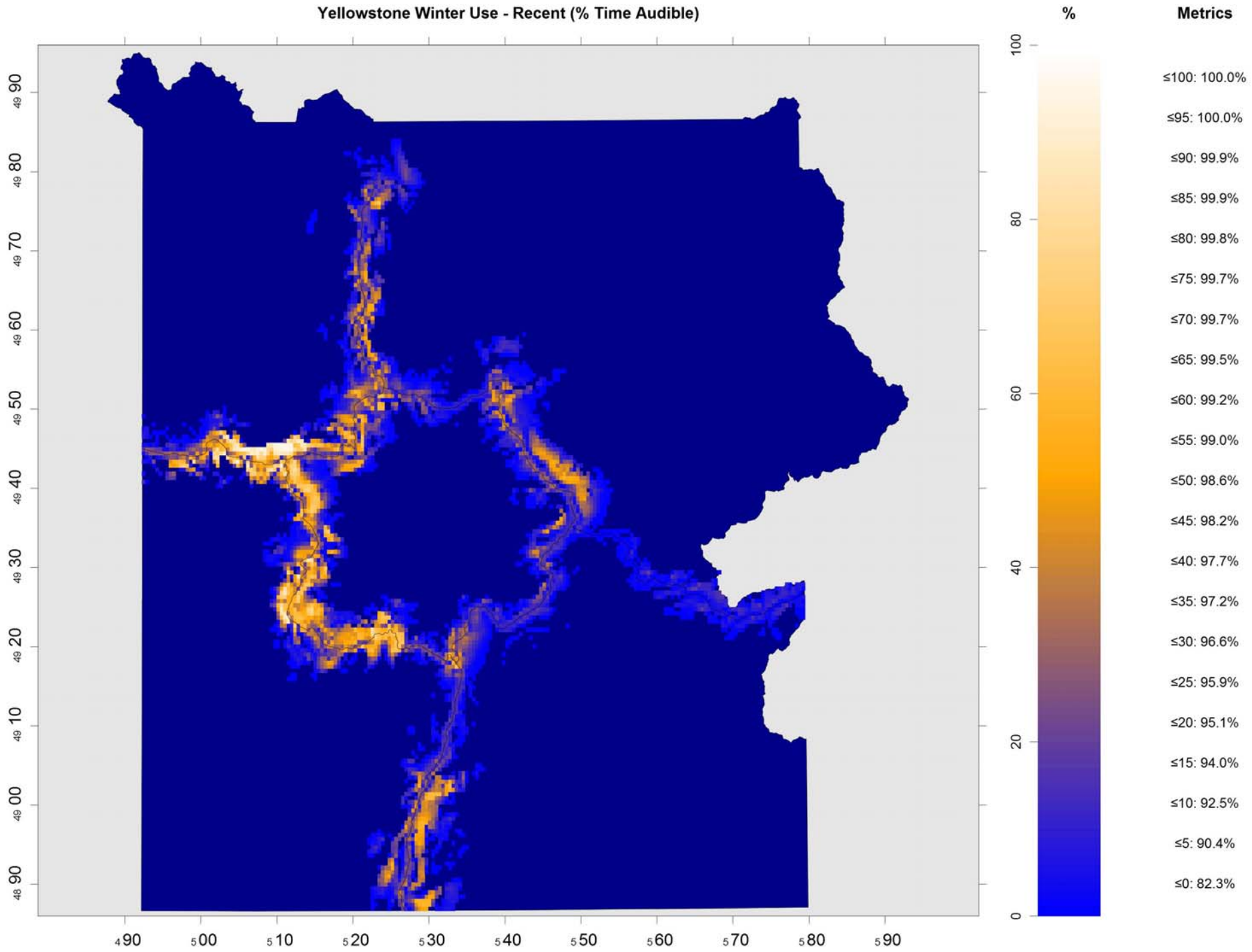
In addition to the stakeholder involvement as part of the adaptive management framework, the appropriate level of public and stakeholder involvement and notification would occur based on the level of environmental analysis required.

APPENDIX D: SOUNDSCAPES MODELING MAPS

List of Contents

- Percent Time Audible (TAUD) maps
- Audible L_{eq} maps
- Peak4 maps
- All metrics (composite of TAUD, audible L_{eq} and peak4) maps
- 8-hour L_{eq}—mapping of 8-hour L_{eq} using the travel corridor and backcountry intensity definition categories

SEIS Alternative	Fleet Assumption	Soundscapes Modeling Run Name
Existing Average Conditions (2009-2011)	Current Fleet	Recent
Alternative 1: No Snowmobile/Snowcoach Use	Administrative Use, Current Fleet	Alt1
Alternative 2: Continue Snowmobile/Snowcoach Use at 2011/2012 Winter Season Interim Regulation Limits	Current Fleet	Alt2r1
	BAT Snowcoaches	Alt2r2
Alternative 3: Transition to Best Available Technology (BAT) Snowcoaches Only	BAT Snowcoaches, No Snowmobiles	Alt3
Alternative 4a: Manage OSV Use by Transportation Events (480 snowmobiles/60 snowcoaches)	Current Fleet	Alt4Ar1
	BAT Snowcoaches and Snowmobiles (new smb BAT 67dBA and BAT sc 75dBA)	Alt4Ar2
Alternative 4b: Manage OSV Use by Transportation Events (0 snowmobiles/110 snowcoaches)	Current Fleet	Alt4Br1
	BAT Snowcoaches and Snowmobiles (new smb BAT 67dBA and BAT sc 75dBA)	Alt4Br2
Alternative 4c: Manage OSV Use by Transportation Events (480 snowmobiles, 120 snowcoaches)	Enhanced BAT for Snowcoaches (71 dBA) and New BAT for Snowmobiles (67 dBA)	Alt4Cr1
	Enhanced BAT for Snowcoaches (71 dBA) and Snowmobiles Voluntarily Quieter than BAT (65 dBA)	Alt4Cr2
Alternative 4d: Manage OSV Use by Transportation Events (0 snowmobiles/220 snowcoaches)	Enhanced BAT for Snowcoaches (71 dBA) and New BAT for Snowmobiles (67 dBA)	Alt4Dr1
	Enhanced BAT for Snowcoaches (71 dBA) and Snowmobiles Voluntarily Quieter than BAT (65 dBA)	Alt4Dr2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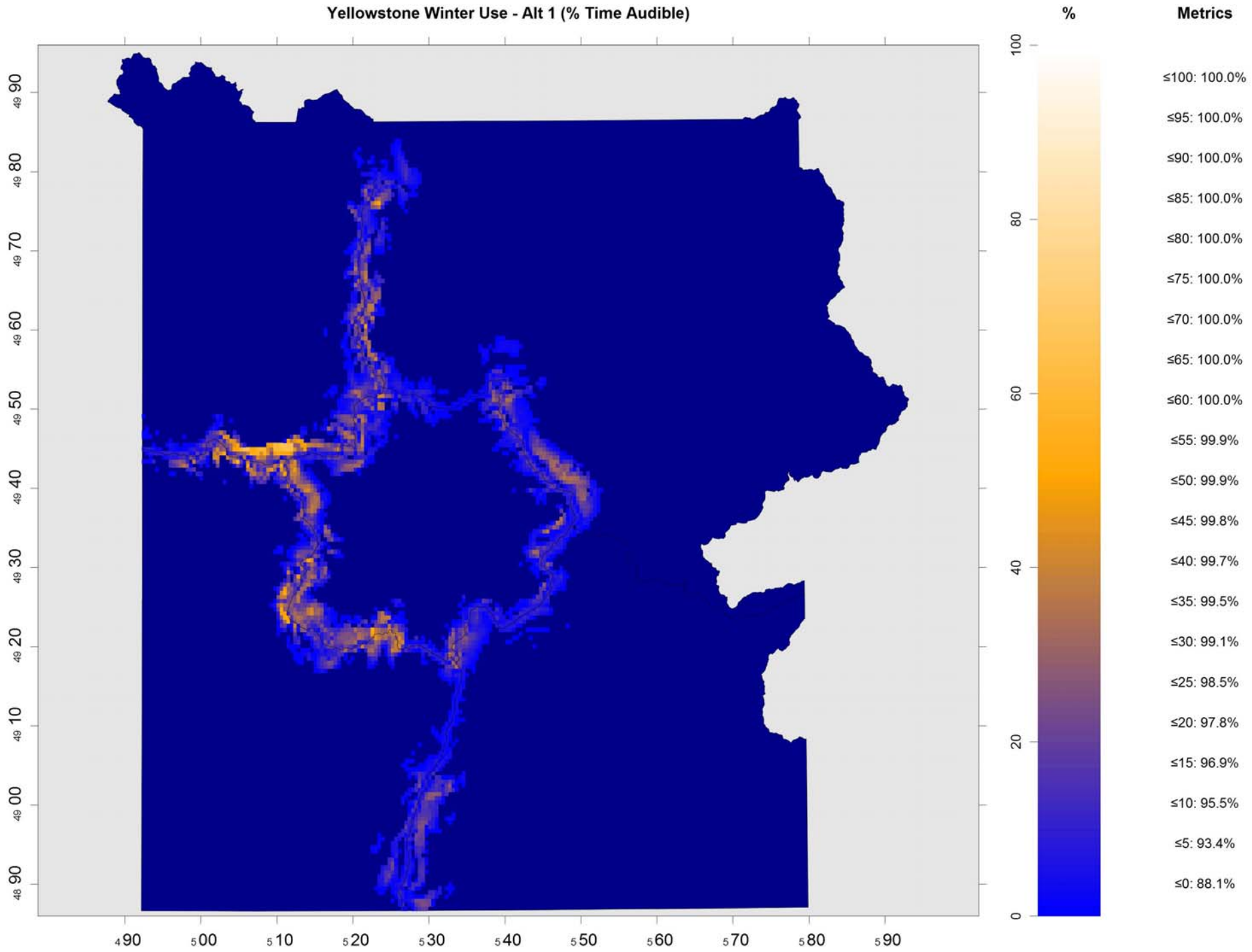
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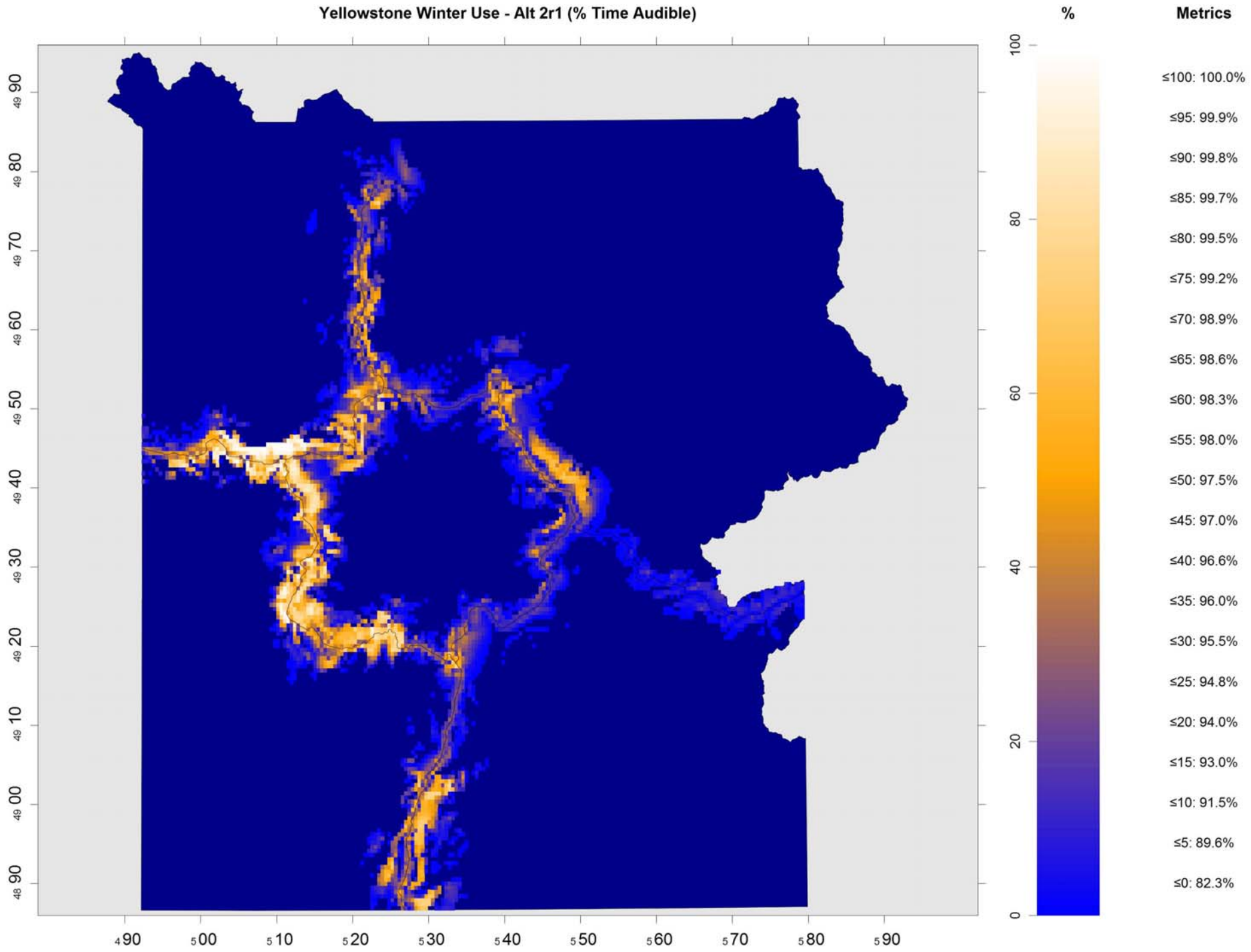
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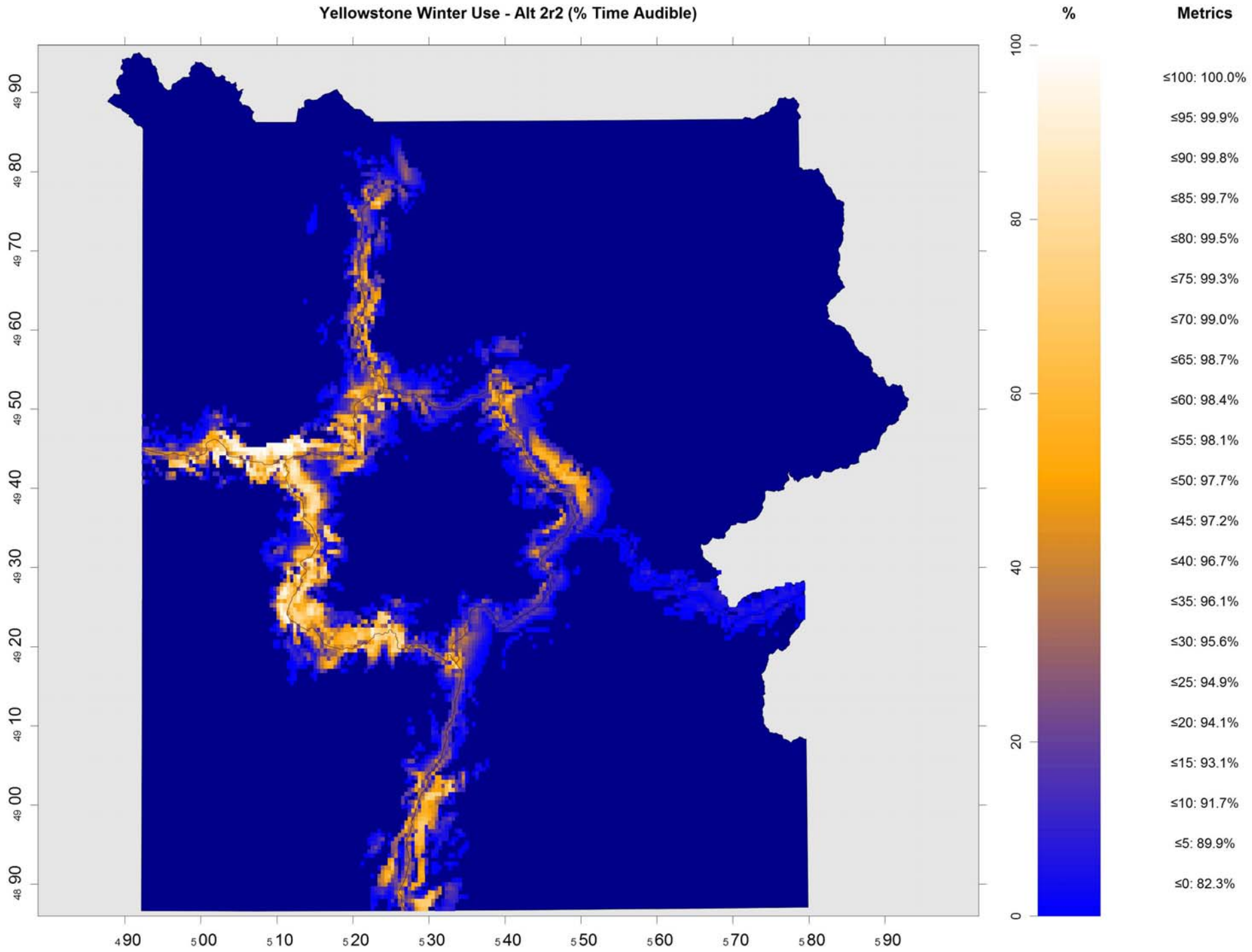
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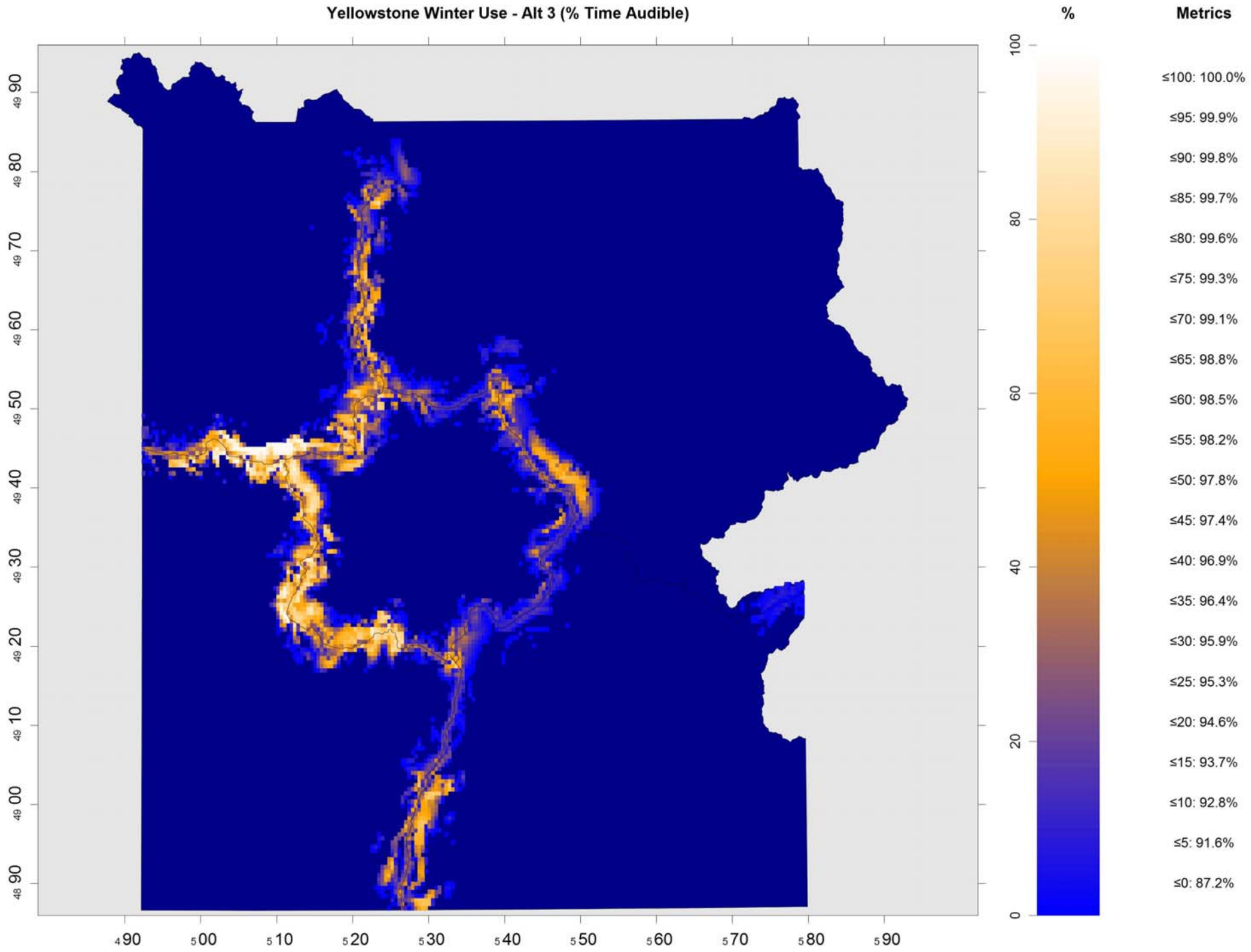
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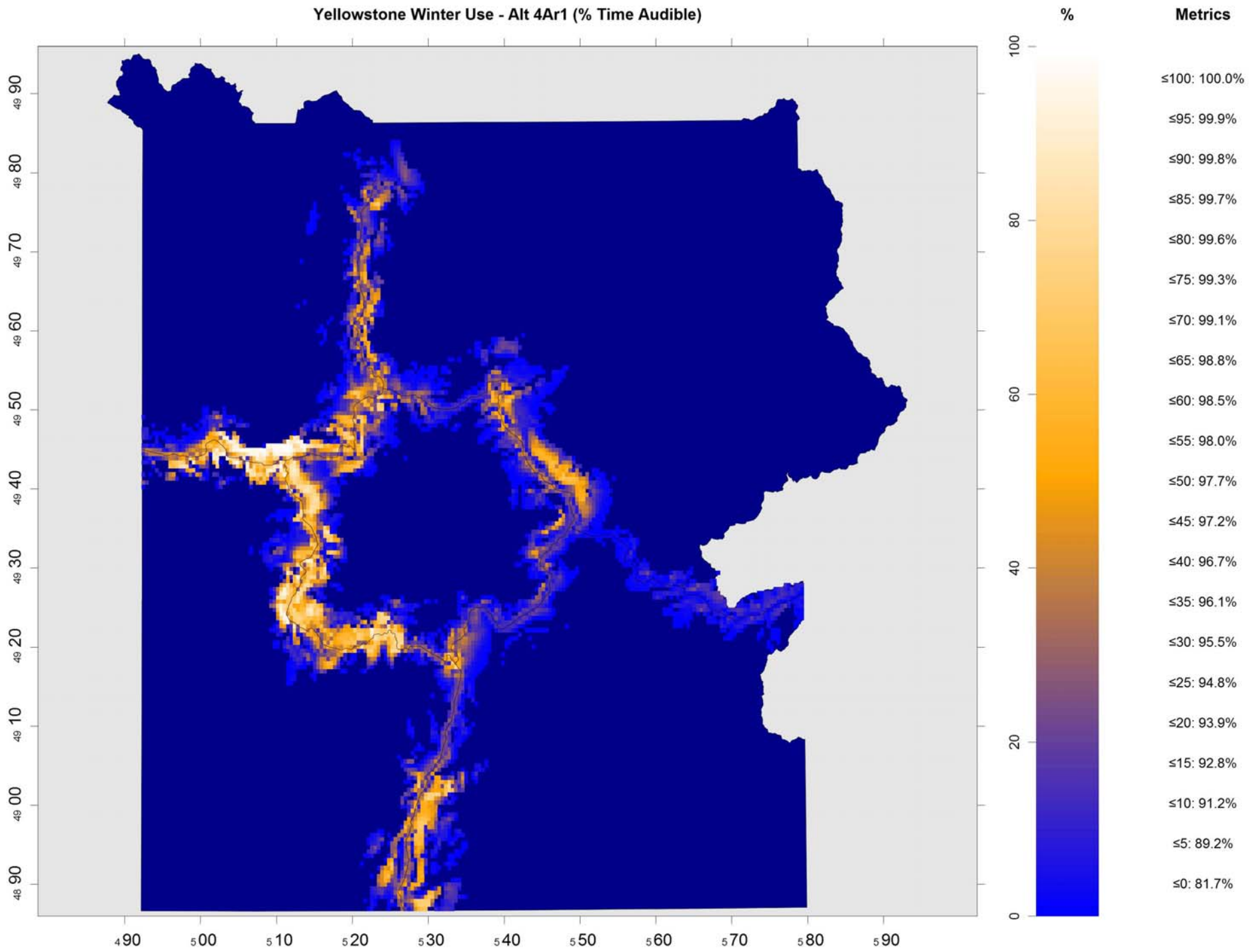
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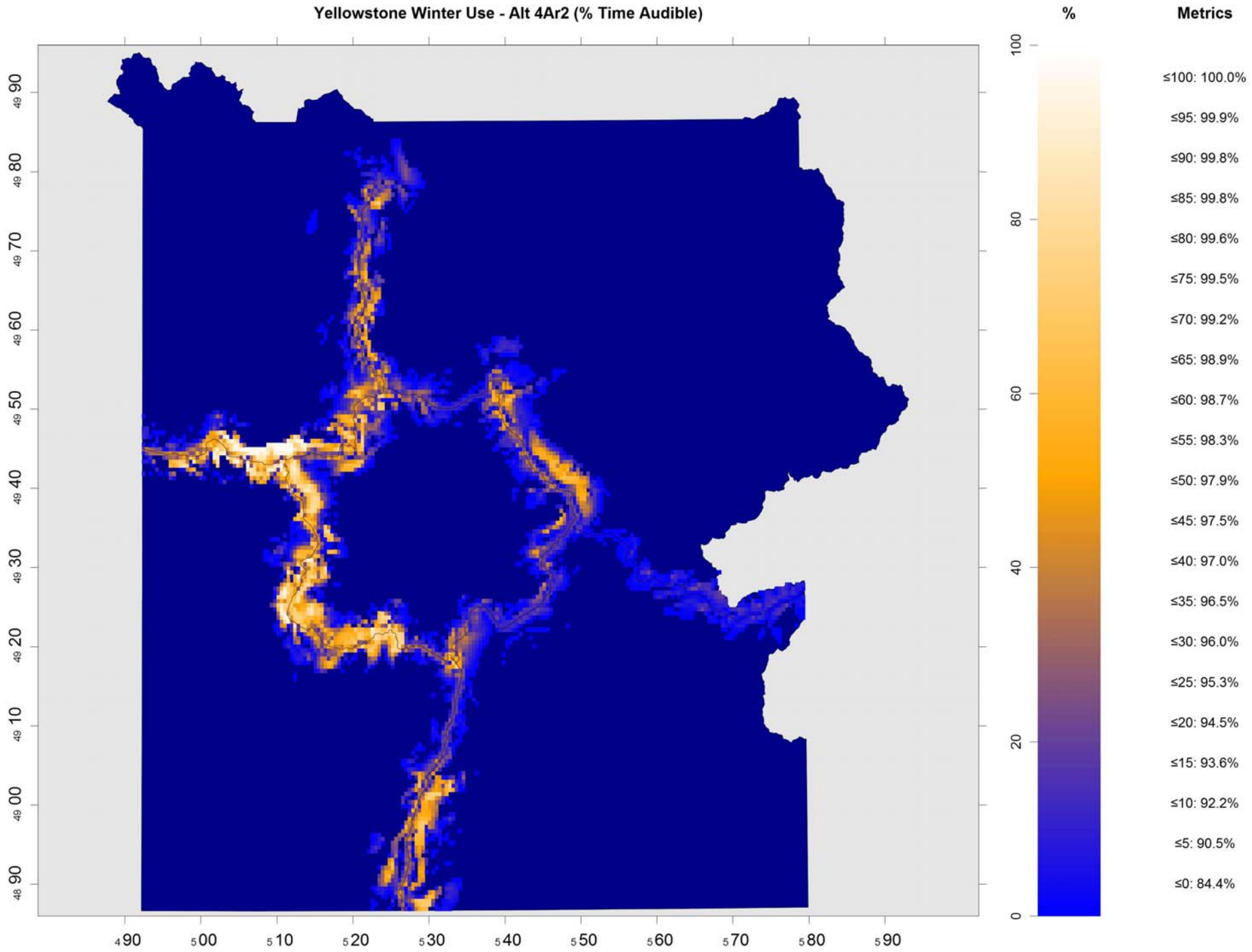
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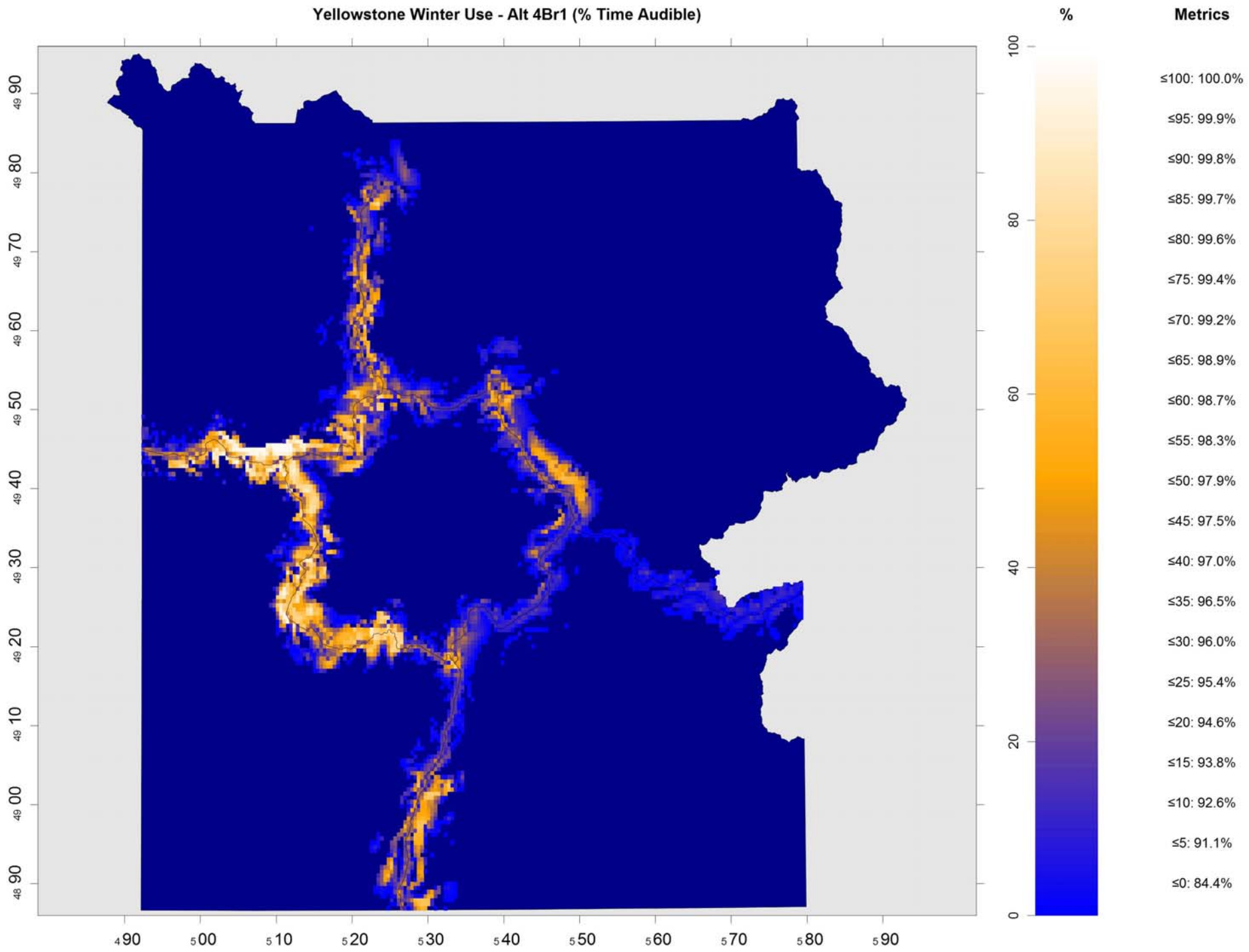
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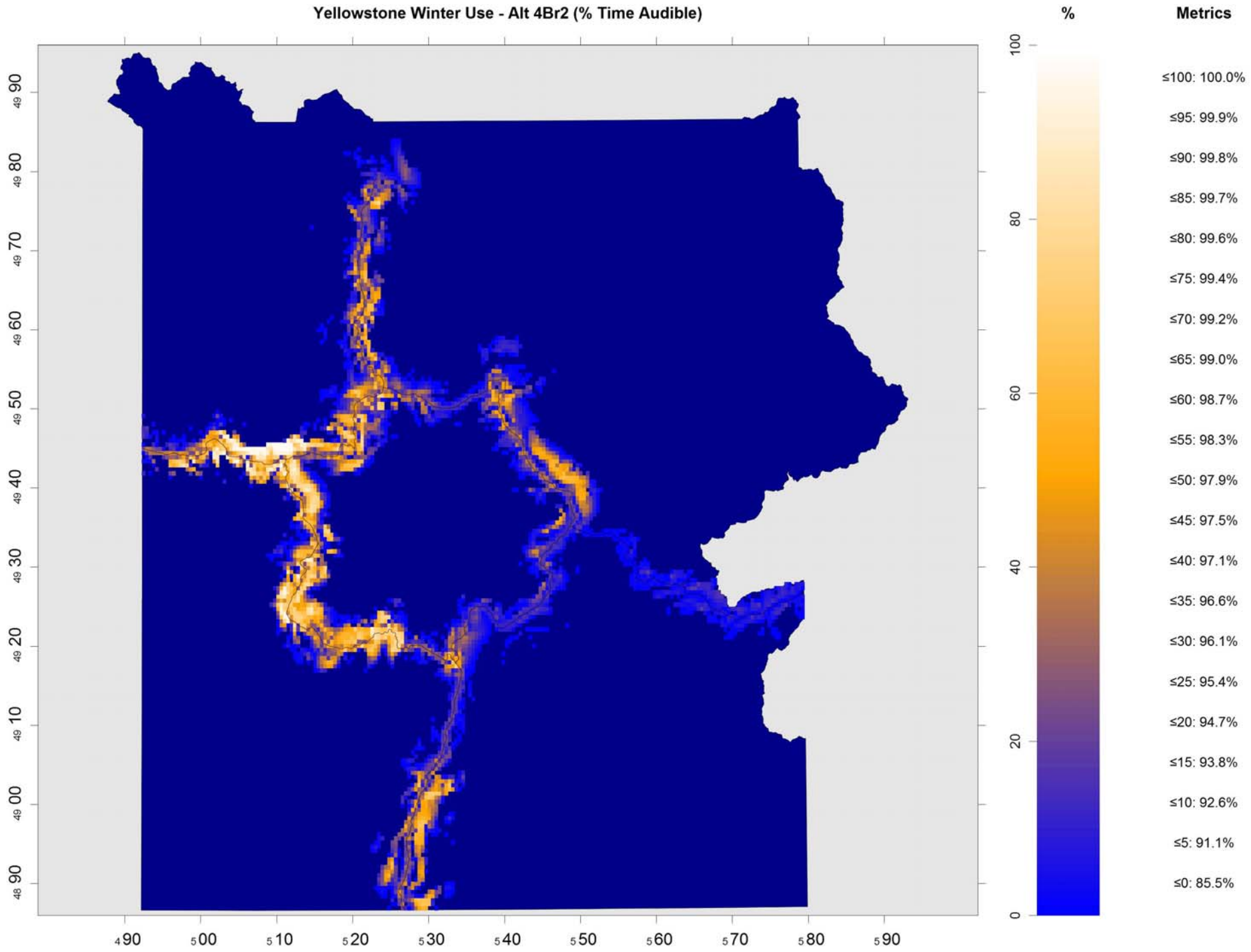
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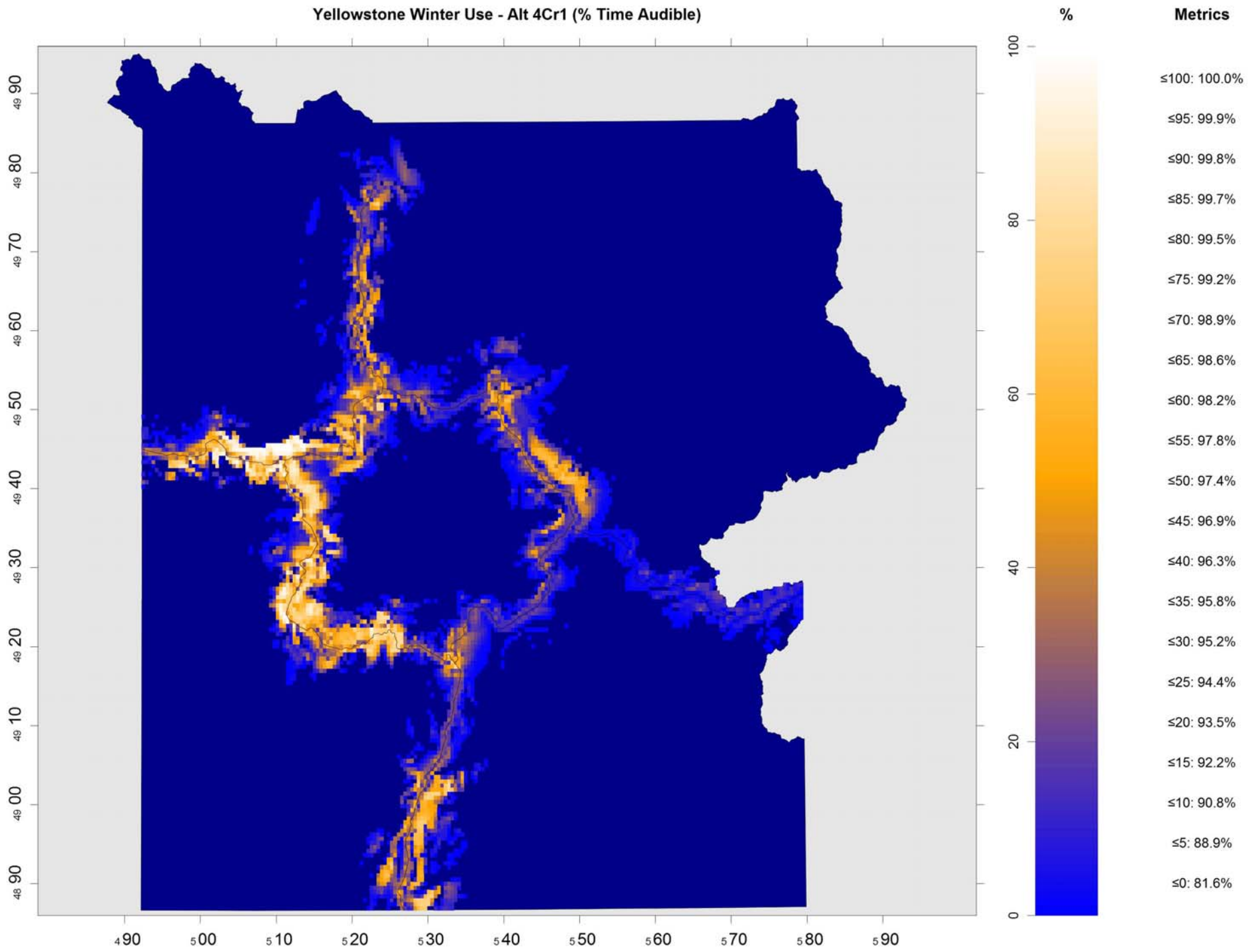
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≤85: 99.7%
≤80: 99.5%
≤75: 99.2%
≤70: 98.9%
≤65: 98.6%
≤60: 98.2%
≤55: 97.8%
≤50: 97.4%
≤45: 96.9%
≤40: 96.3%
≤35: 95.8%
≤30: 95.2%
≤25: 94.4%
≤20: 93.5%
≤15: 92.2%
≤10: 90.8%
≤5: 88.9%
≤0: 81.6%
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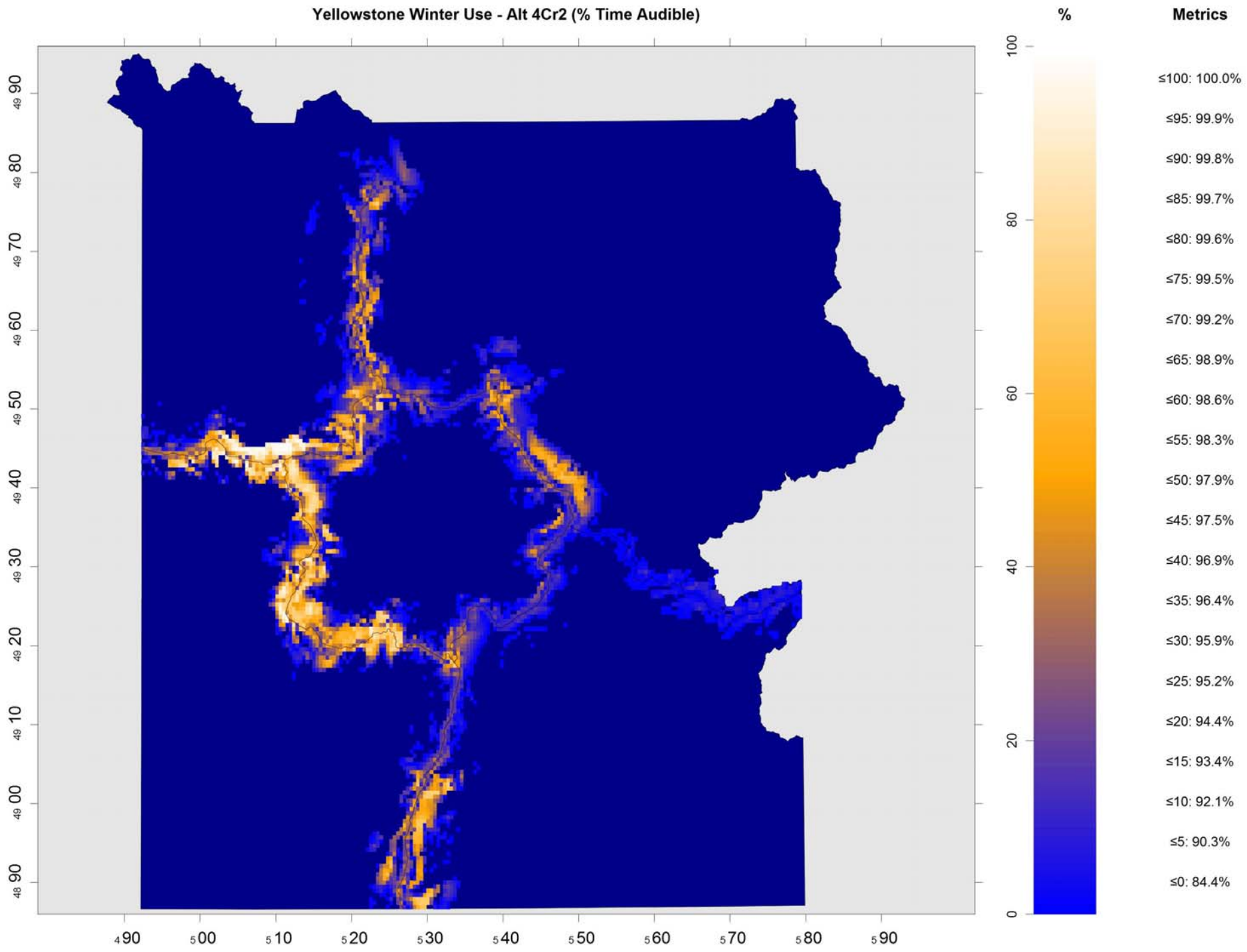
Yellowstone Winter Use - Alt 4Cr2 (% Time Audible)
%
Metrics
100
80
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≤100: 100.0%
≤95: 99.9%
≤90: 99.8%
≤85: 99.7%
≤80: 99.6%
≤75: 99.5%
≤70: 99.2%
≤65: 98.9%
≤60: 98.6%
≤55: 98.3%
≤50: 97.9%
≤45: 97.5%
≤40: 96.9%
≤35: 96.4%
≤30: 95.9%
≤25: 95.2%
≤20: 94.4%
≤15: 93.4%
≤10: 92.1%
≤5: 90.3%
≤0: 84.4%
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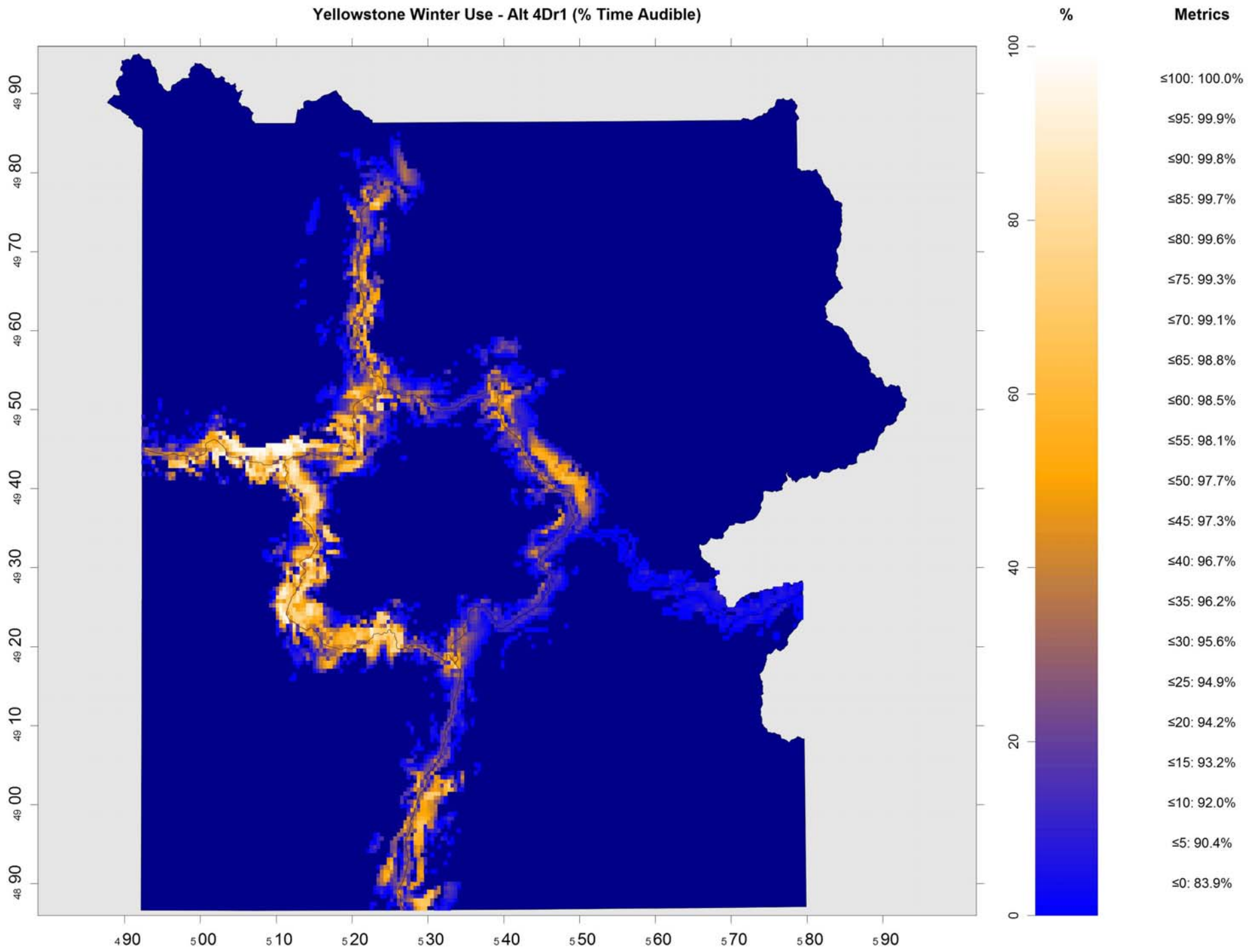
Yellowstone Winter Use - Alt 4Dr1 (% Time Audible)
%
Metrics
100
80
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≤100: 100.0%
≤95: 99.9%
≤90: 99.8%
≤85: 99.7%
≤80: 99.6%
≤75: 99.3%
≤70: 99.1%
≤65: 98.8%
≤60: 98.5%
≤55: 98.1%
≤50: 97.7%
≤45: 97.3%
≤40: 96.7%
≤35: 96.2%
≤30: 95.6%
≤25: 94.9%
≤20: 94.2%
≤15: 93.2%
≤10: 92.0%
≤5: 90.4%
≤0: 83.9%
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540
550
560
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580
590
49 90
49 80
49 70
49 60
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49 40
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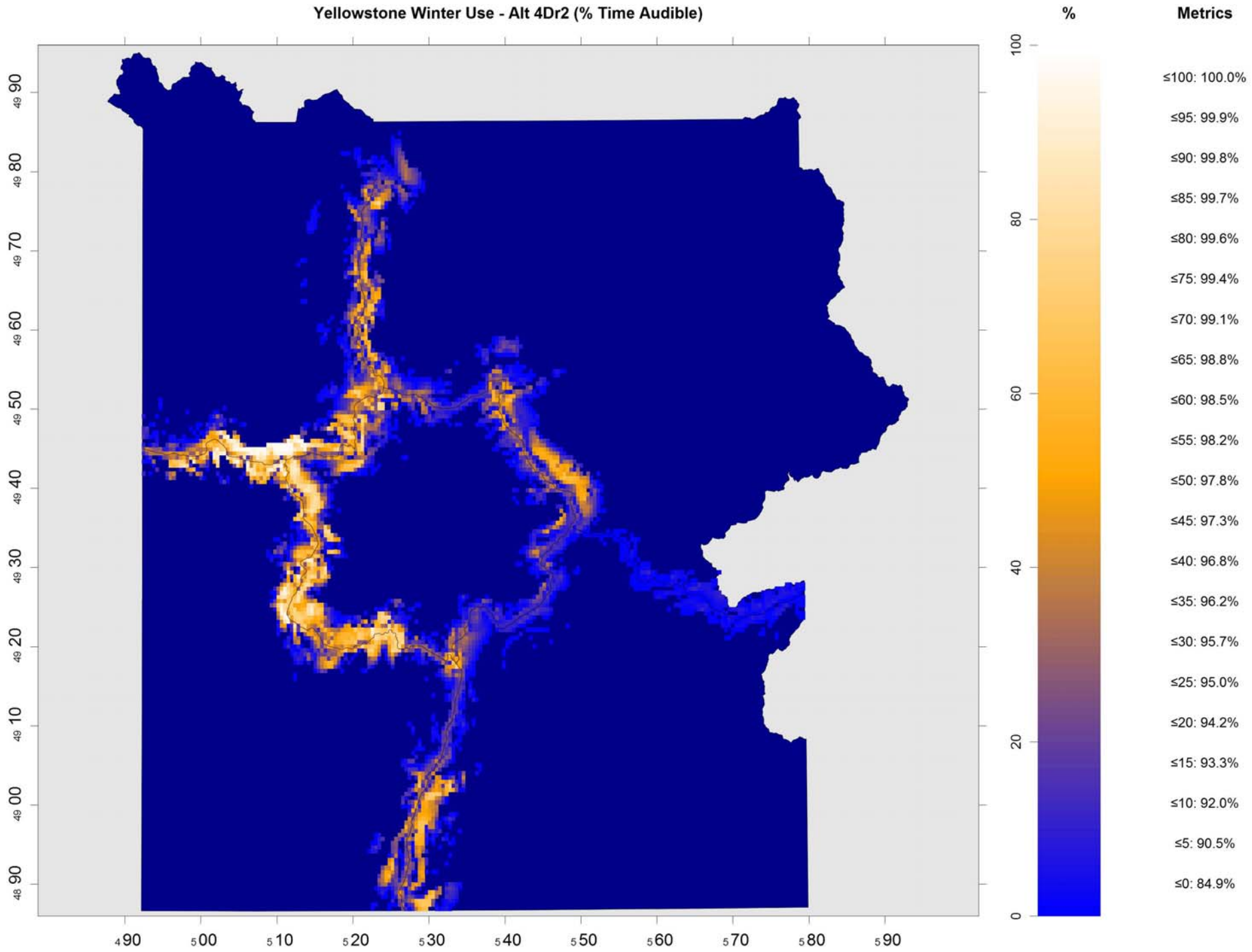
49 20
49 10
49 00
48 90


Yellowstone Winter Use - Alt 4Dr2 (% Time Audible)
%
Metrics
100
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≤100: 100.0%
≤95: 99.9%
≤90: 99.8%
≤85: 99.7%
≤80: 99.6%
≤75: 99.4%
≤70: 99.1%
≤65: 98.8%
≤60: 98.5%
≤55: 98.2%
≤50: 97.8%
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≤35: 96.2%
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≤10: 92.0%
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≤0: 84.9%
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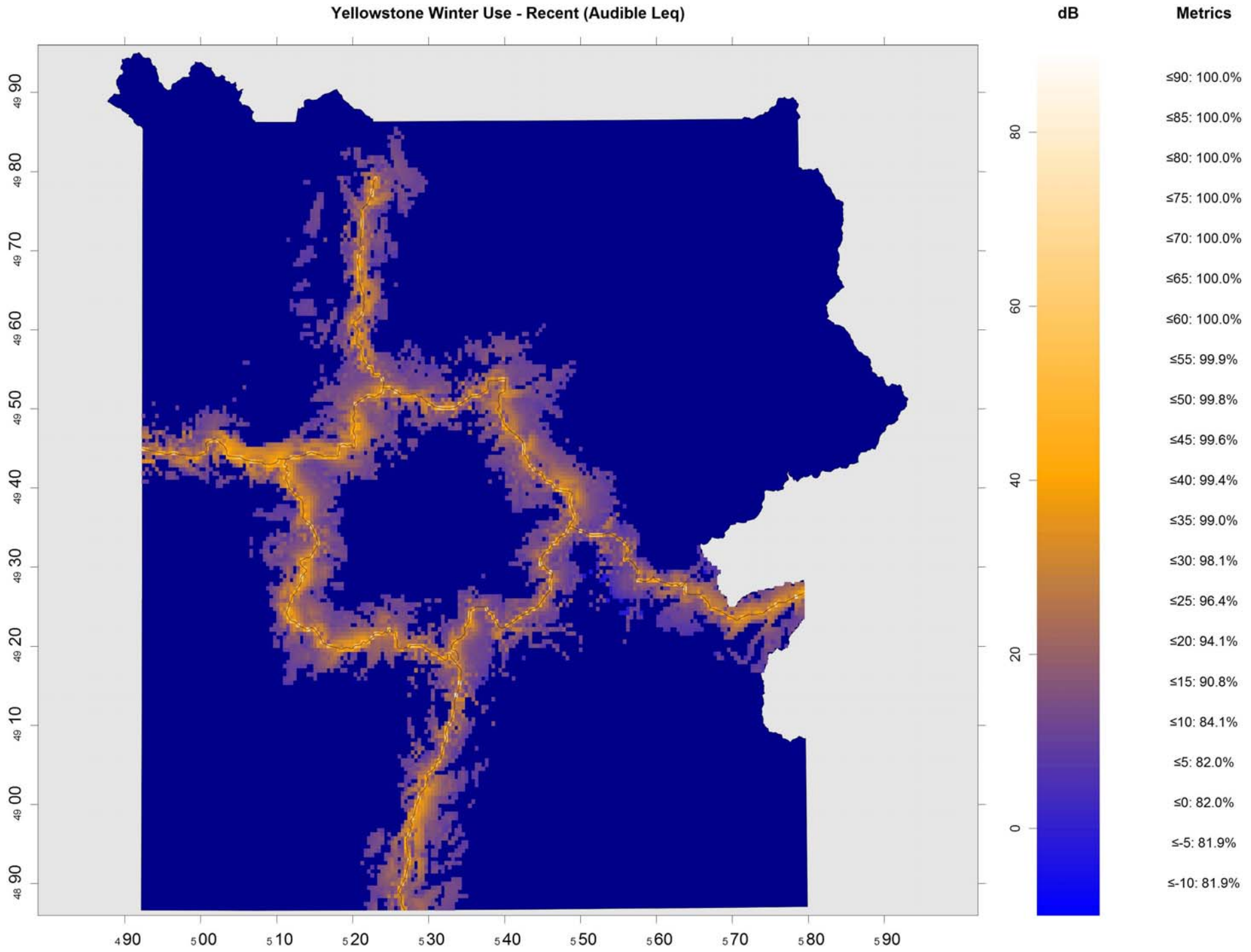
Yellowstone Winter Use - Recent (Audible Leq)
dB
Metrics
≤90: 100.0%
≤85: 100.0%
≤80: 100.0%
≤75: 100.0%
≤70: 100.0%
≤65: 100.0%
≤60: 100.0%
≤55: 99.9%
≤50: 99.8%
≤45: 99.6%
≤40: 99.4%
≤35: 99.0%
≤30: 98.1%
≤25: 96.4%
≤20: 94.1%
≤15: 90.8%
≤10: 84.1%
≤5: 82.0%
≤0: 82.0%
≤-5: 81.9%
≤-10: 81.9%
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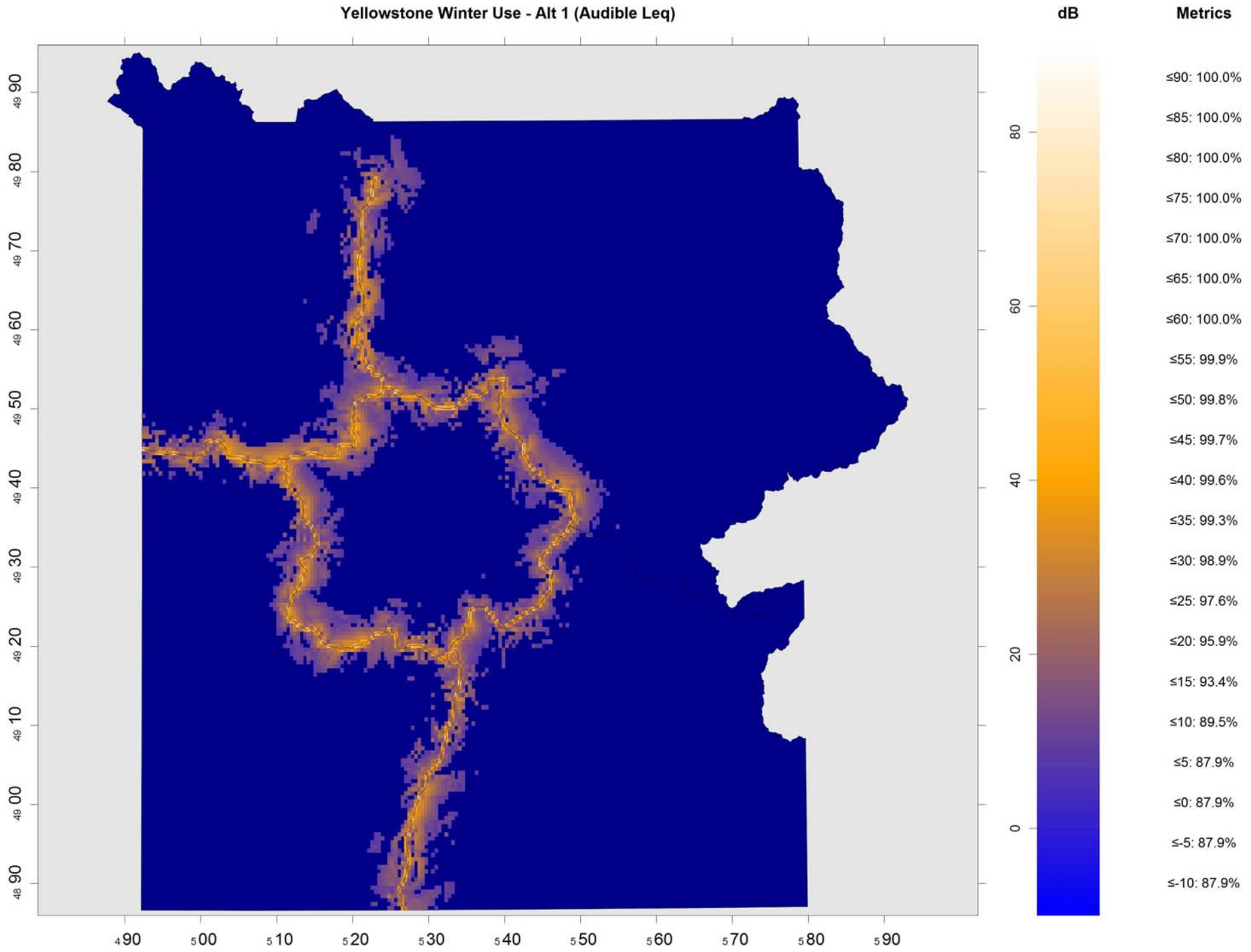
Yellowstone Winter Use - Alt 1 (Audible Leq)
dB
Metrics
≤90: 100.0%
≤85: 100.0%
≤80: 100.0%
≤75: 100.0%
≤70: 100.0%
≤65: 100.0%
≤60: 100.0%
≤55: 99.9%
≤50: 99.8%
≤45: 99.7%
≤40: 99.6%
≤35: 99.3%
≤30: 98.9%
≤25: 97.6%
≤20: 95.9%
≤15: 93.4%
≤10: 89.5%
≤5: 87.9%
≤0: 87.9%
≤-5: 87.9%
≤-10: 87.9%
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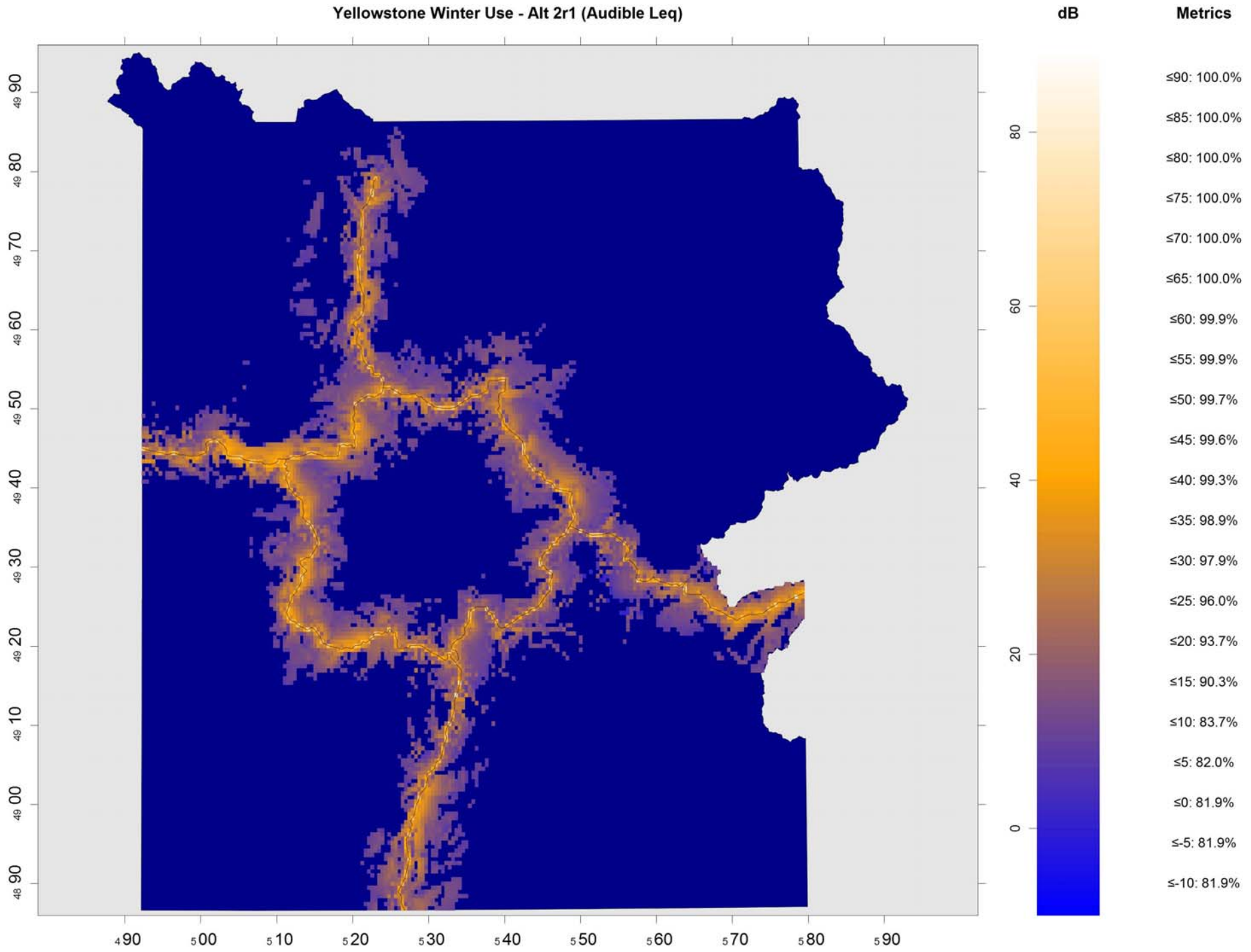
Yellowstone Winter Use - Alt 2r1 (Audible Leq)
dB
Metrics
≤90: 100.0%
≤85: 100.0%
≤80: 100.0%
≤75: 100.0%
≤70: 100.0%
≤65: 100.0%
≤60: 99.9%
≤55: 99.9%
≤50: 99.7%
≤45: 99.6%
≤40: 99.3%
≤35: 98.9%
≤30: 97.9%
≤25: 96.0%
≤20: 93.7%
≤15: 90.3%
≤10: 83.7%
≤5: 82.0%
≤0: 81.9%
≤-5: 81.9%
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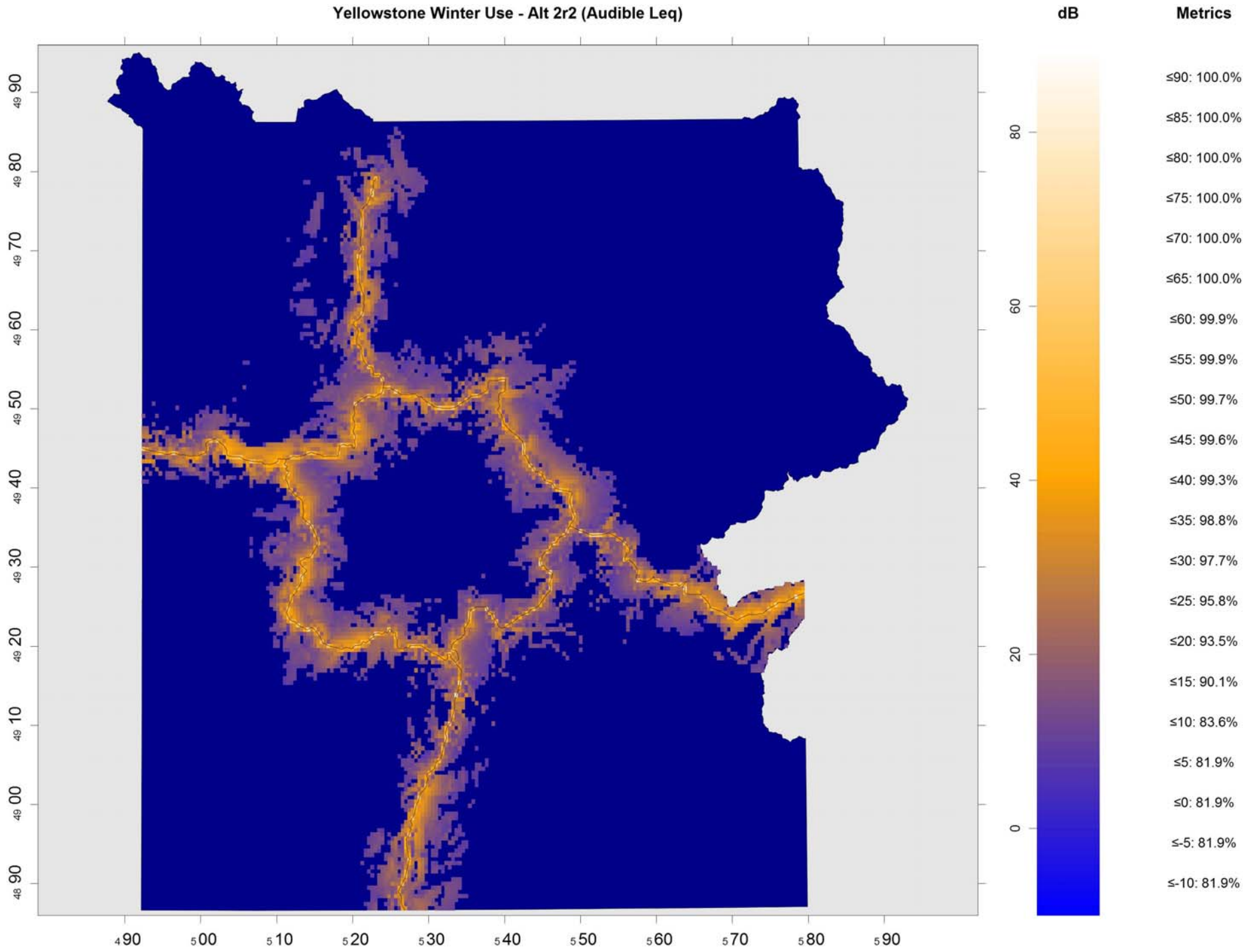
Yellowstone Winter Use - Alt 2r2 (Audible Leq)
dB
Metrics
≤90: 100.0%
≤85: 100.0%
≤80: 100.0%
≤75: 100.0%
≤70: 100.0%
≤65: 100.0%
≤60: 99.9%
≤55: 99.9%
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≤45: 99.6%
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≤35: 98.8%
≤30: 97.7%
≤25: 95.8%
≤20: 93.5%
≤15: 90.1%
≤10: 83.6%
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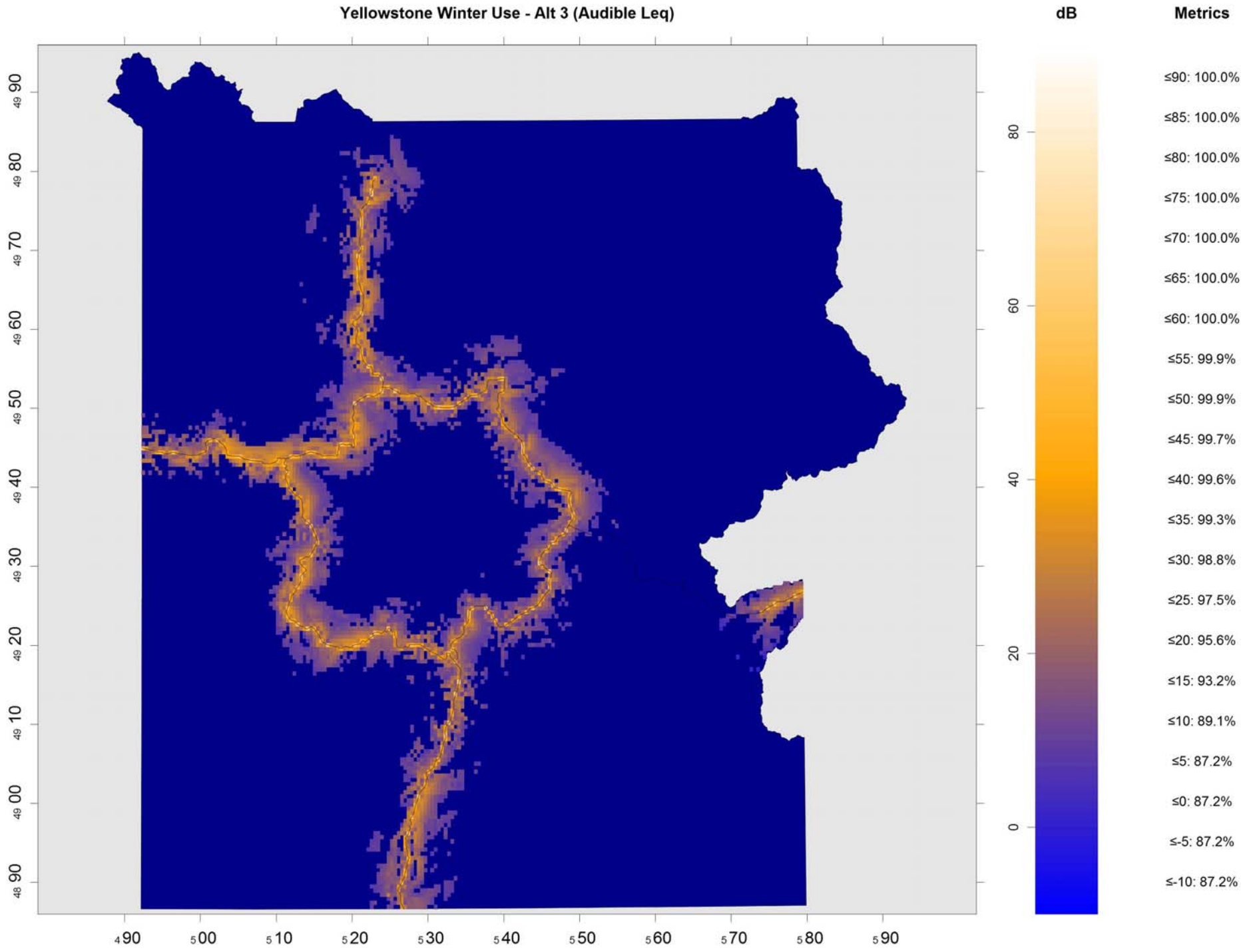
Yellowstone Winter Use - Alt 3 (Audible Leq)
dB
Metrics
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≤90: 100.0%
≤85: 100.0%
≤80: 100.0%
≤75: 100.0%
≤70: 100.0%
≤65: 100.0%
≤60: 100.0%
≤55: 99.9%
≤50: 99.9%
≤45: 99.7%
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≤20: 95.6%
≤15: 93.2%
≤10: 89.1%
≤5: 87.2%
≤0: 87.2%
≤-5: 87.2%
≤-10: 87.2%
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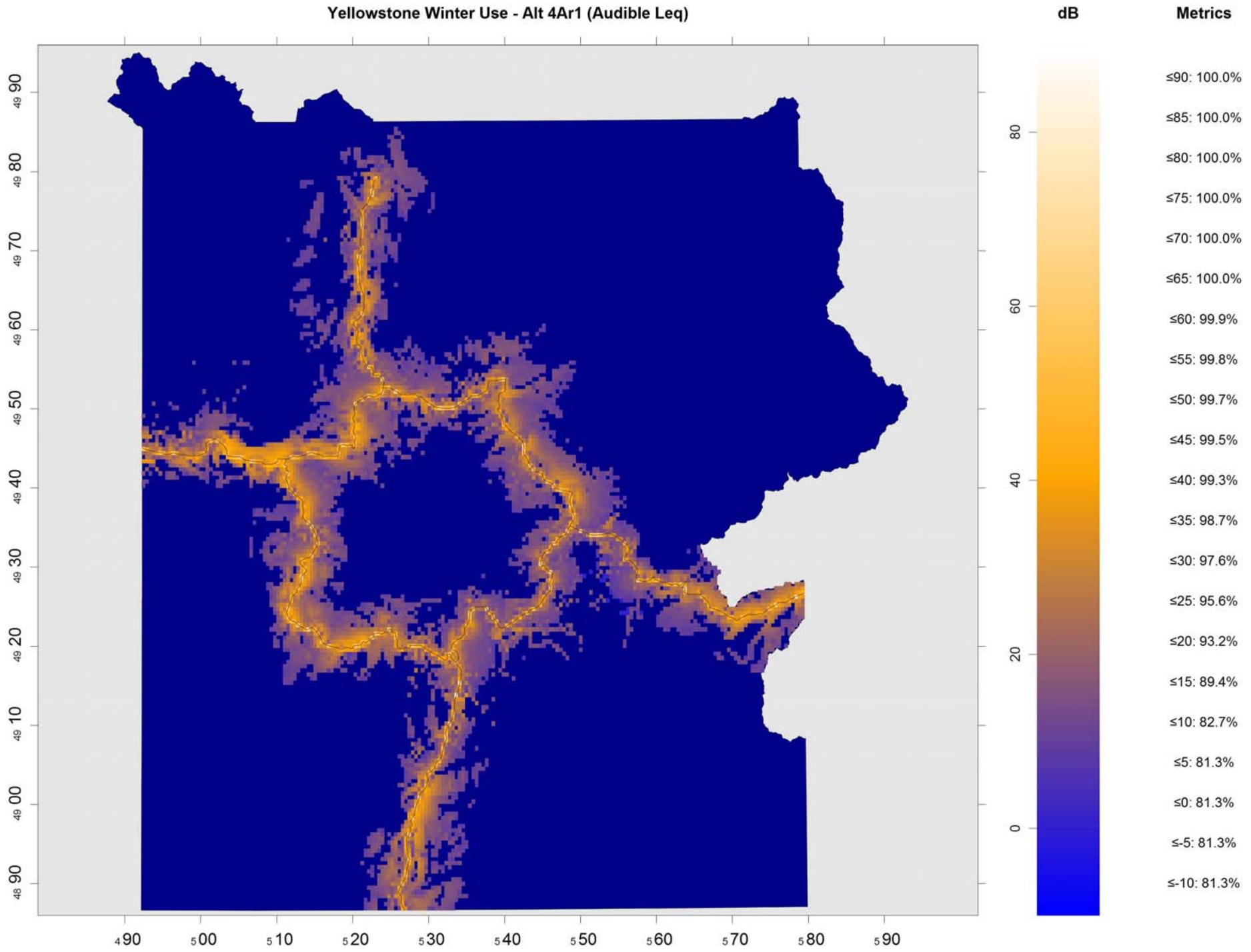
Yellowstone Winter Use - Alt 4Ar1 (Audible Leq)
dB
Metrics
≤90: 100.0%
≤85: 100.0%
≤80: 100.0%
≤75: 100.0%
≤70: 100.0%
≤65: 100.0%
≤60: 99.9%
≤55: 99.8%
≤50: 99.7%
≤45: 99.5%
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≤35: 98.7%
≤30: 97.6%
≤25: 95.6%
≤20: 93.2%
≤15: 89.4%
≤10: 82.7%
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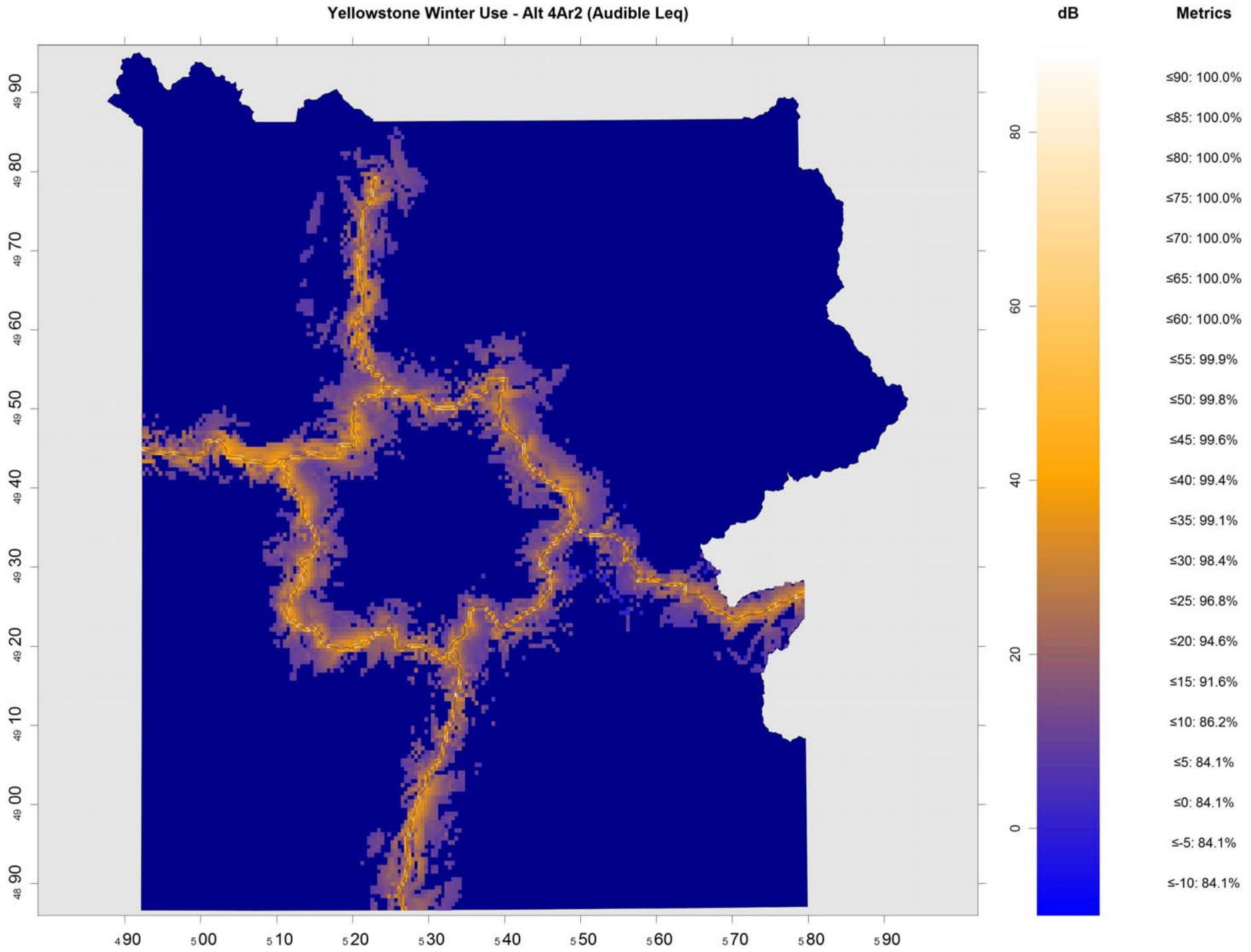
Yellowstone Winter Use - Alt 4Ar2 (Audible Leq)
dB
Metrics
≤90: 100.0%
≤85: 100.0%
≤80: 100.0%
≤75: 100.0%
≤70: 100.0%
≤65: 100.0%
≤60: 100.0%
≤55: 99.9%
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≤35: 99.1%
≤30: 98.4%
≤25: 96.8%
≤20: 94.6%
≤15: 91.6%
≤10: 86.2%
≤5: 84.1%
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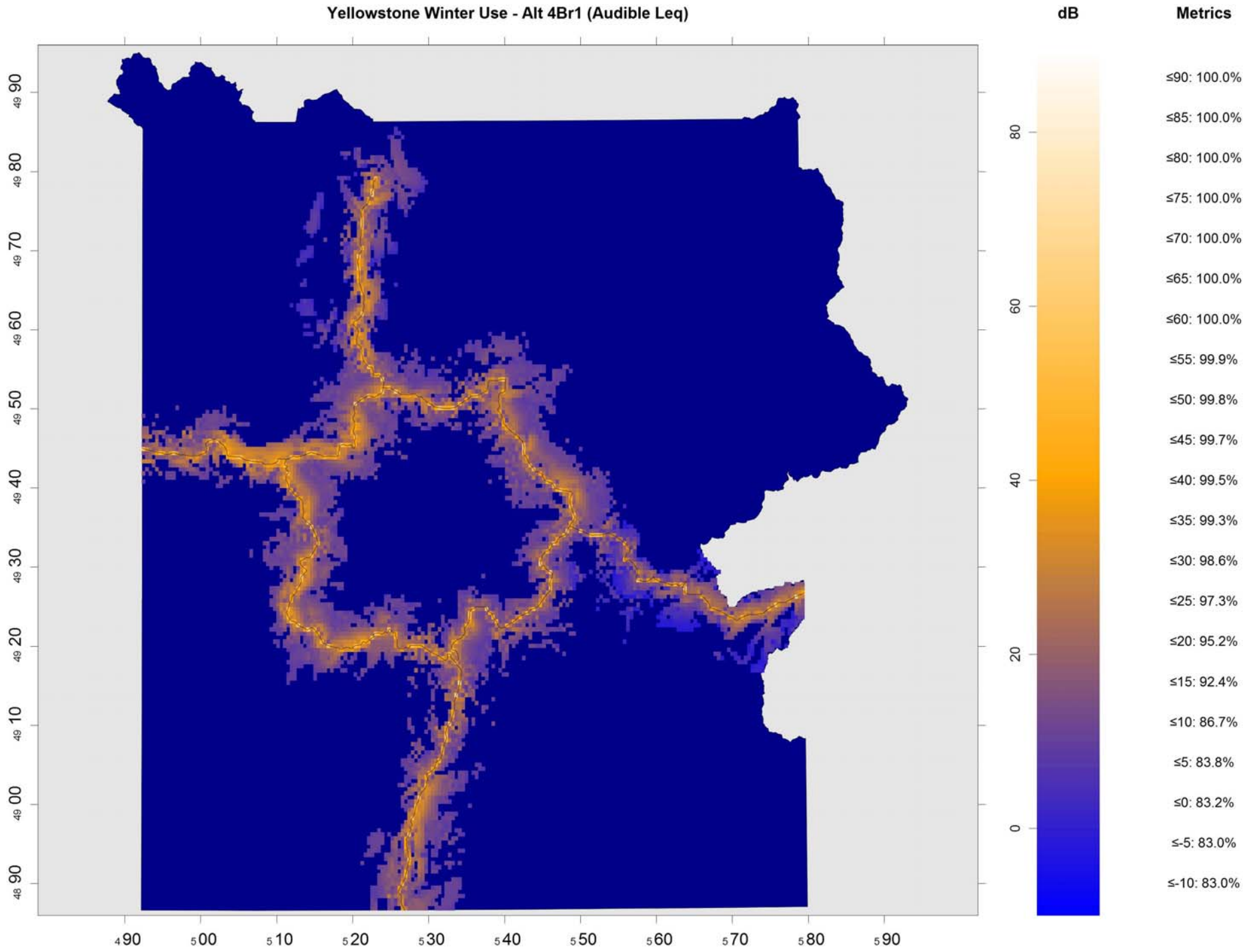
Yellowstone Winter Use - Alt 4Br1 (Audible Leq)
dB
Metrics
≤90: 100.0%
≤85: 100.0%
≤80: 100.0%
≤75: 100.0%
≤70: 100.0%
≤65: 100.0%
≤60: 100.0%
≤55: 99.9%
≤50: 99.8%
≤45: 99.7%
≤40: 99.5%
≤35: 99.3%
≤30: 98.6%
≤25: 97.3%
≤20: 95.2%
≤15: 92.4%
≤10: 86.7%
≤5: 83.8%
≤0: 83.2%
≤-5: 83.0%
≤-10: 83.0%
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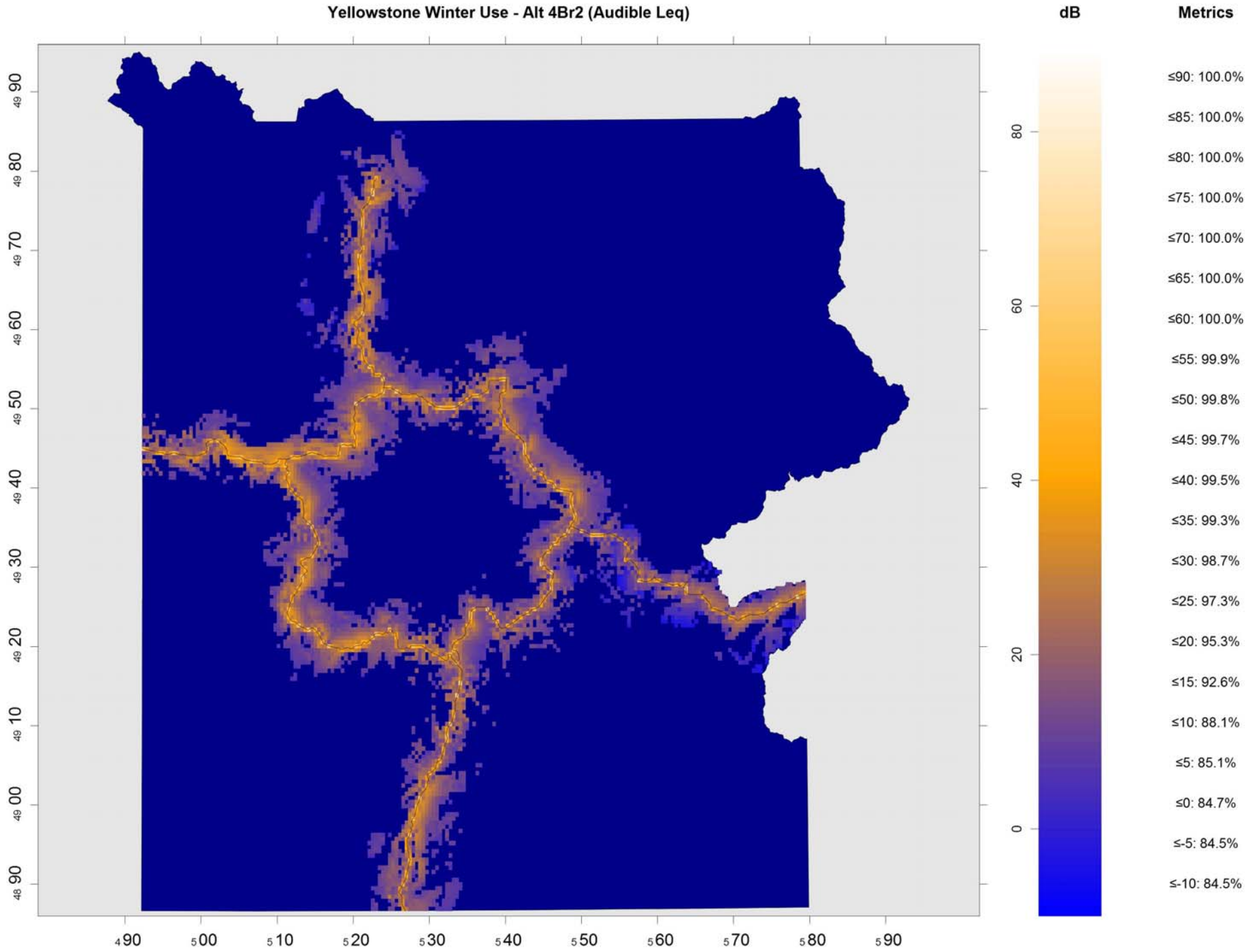
Yellowstone Winter Use - Alt 4Br2 (Audible Leq)
dB
Metrics
≤90: 100.0%
≤85: 100.0%
≤80: 100.0%
≤75: 100.0%
≤70: 100.0%
≤65: 100.0%
≤60: 100.0%
≤55: 99.9%
≤50: 99.8%
≤45: 99.7%
≤40: 99.5%
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≤30: 98.7%
≤25: 97.3%
≤20: 95.3%
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≤10: 88.1%
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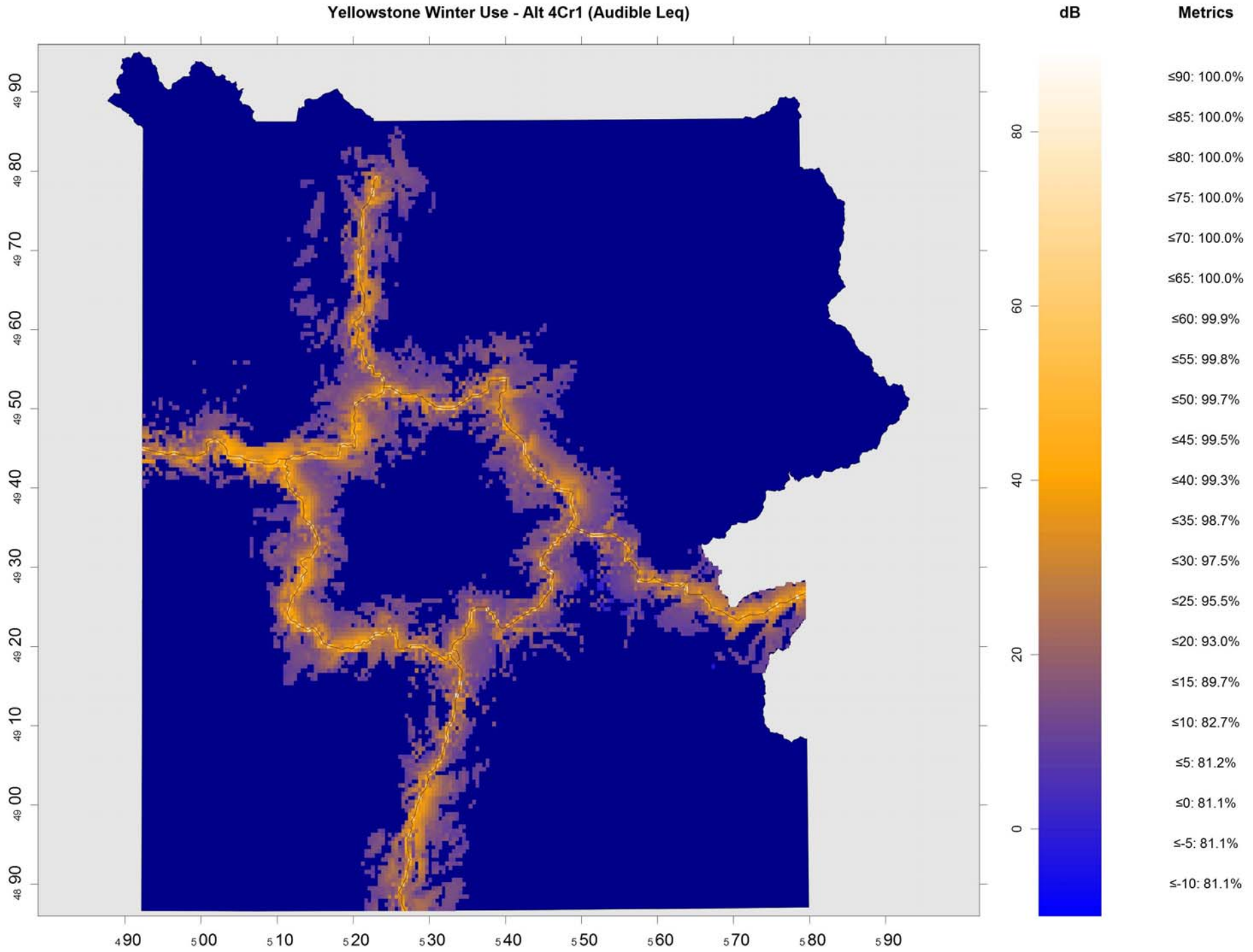
Yellowstone Winter Use - Alt 4Cr1 (Audible Leq)
dB
Metrics
≤90: 100.0%
≤85: 100.0%
≤80: 100.0%
≤75: 100.0%
≤70: 100.0%
≤65: 100.0%
≤60: 99.9%
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≤30: 97.5%
≤25: 95.5%
≤20: 93.0%
≤15: 89.7%
≤10: 82.7%
≤5: 81.2%
≤0: 81.1%
≤-5: 81.1%
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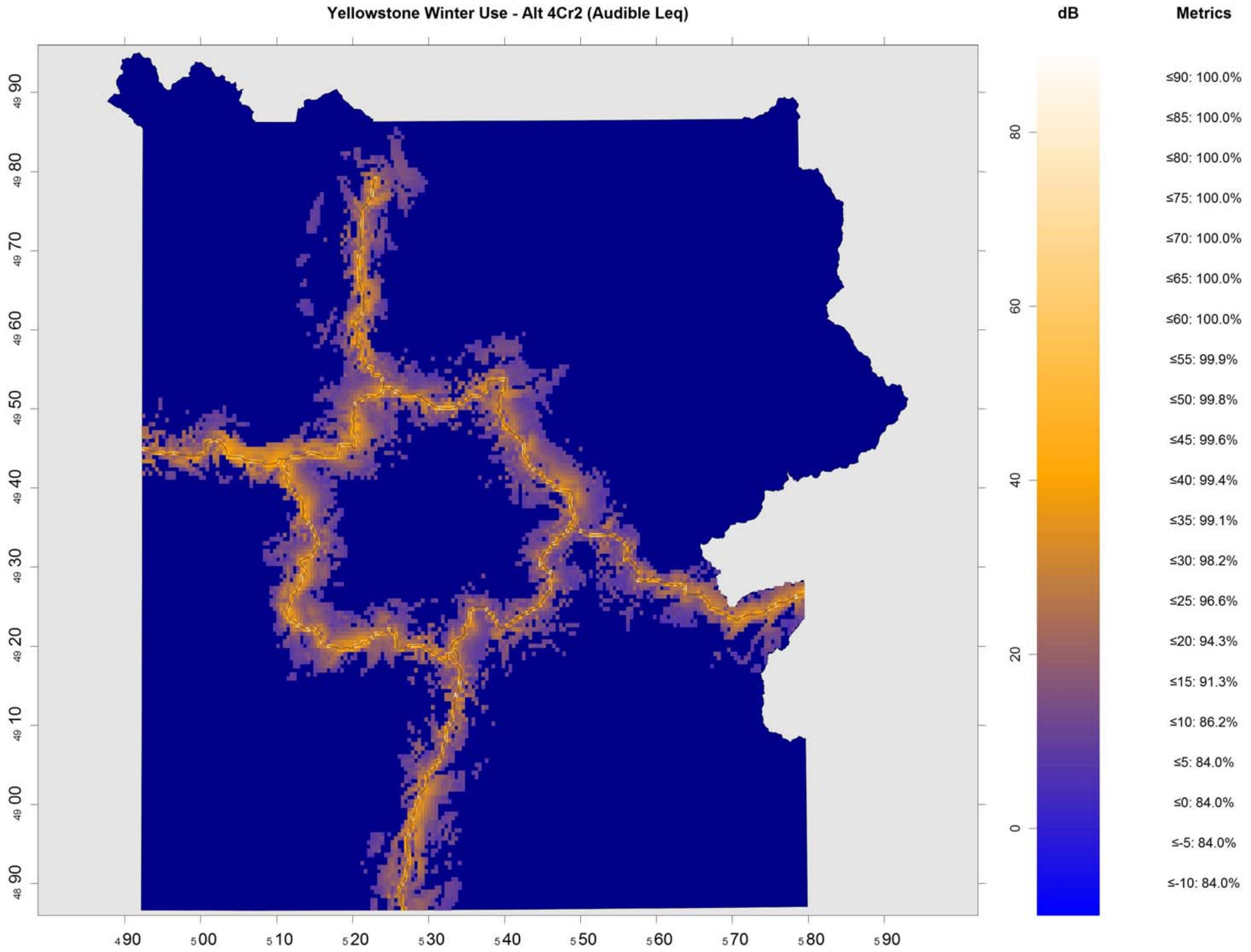
Yellowstone Winter Use - Alt 4Cr2 (Audible Leq)
dB
Metrics
≤90: 100.0%
≤85: 100.0%
≤80: 100.0%
≤75: 100.0%
≤70: 100.0%
≤65: 100.0%
≤60: 100.0%
≤55: 99.9%
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≤10: 86.2%
≤5: 84.0%
≤0: 84.0%
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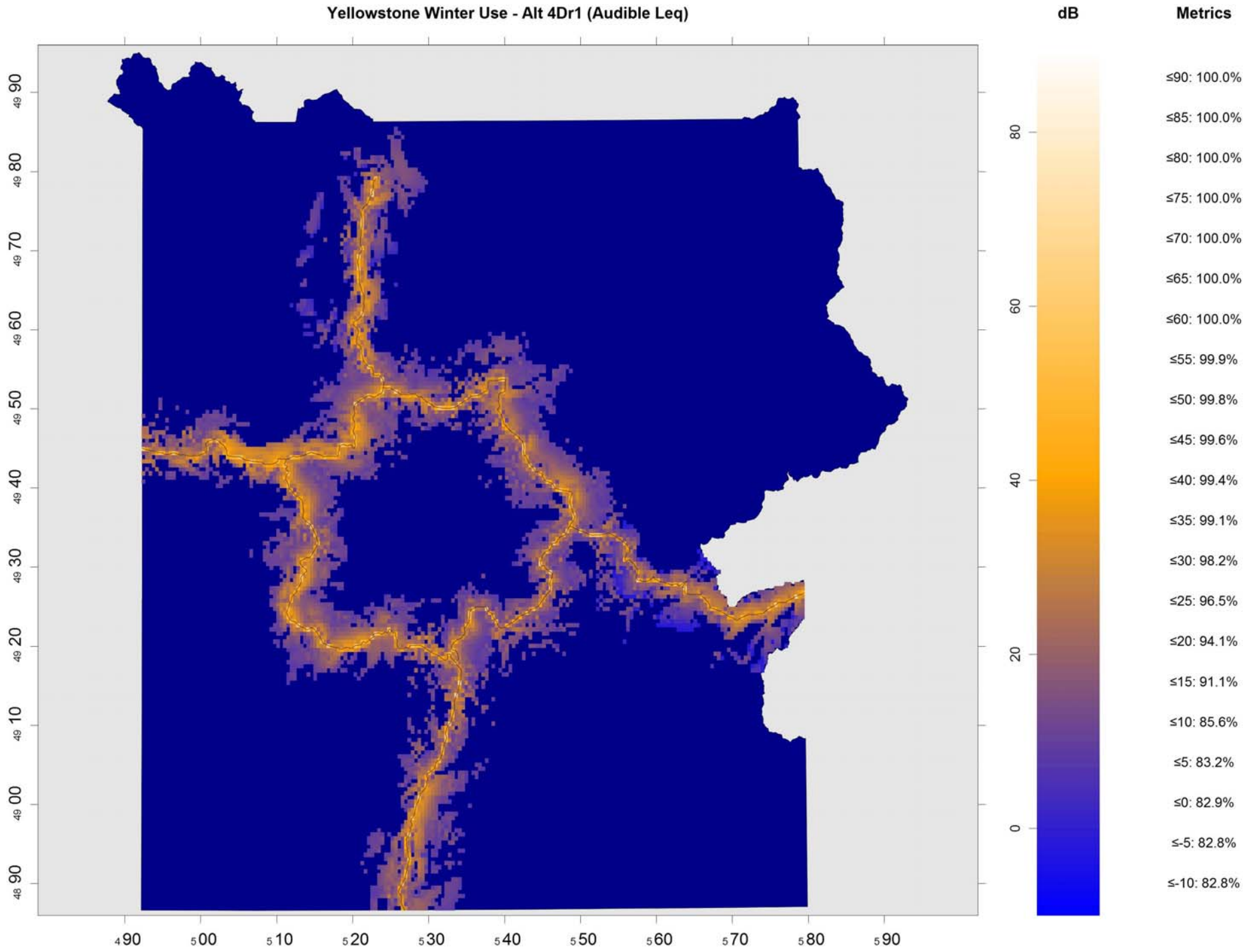
Yellowstone Winter Use - Alt 4Dr1 (Audible Leq)
dB
Metrics
≤90: 100.0%
≤85: 100.0%
≤80: 100.0%
≤75: 100.0%
≤70: 100.0%
≤65: 100.0%
≤60: 100.0%
≤55: 99.9%
≤50: 99.8%
≤45: 99.6%
≤40: 99.4%
≤35: 99.1%
≤30: 98.2%
≤25: 96.5%
≤20: 94.1%
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≤10: 85.6%
≤5: 83.2%
≤0: 82.9%
≤-5: 82.8%
≤-10: 82.8%
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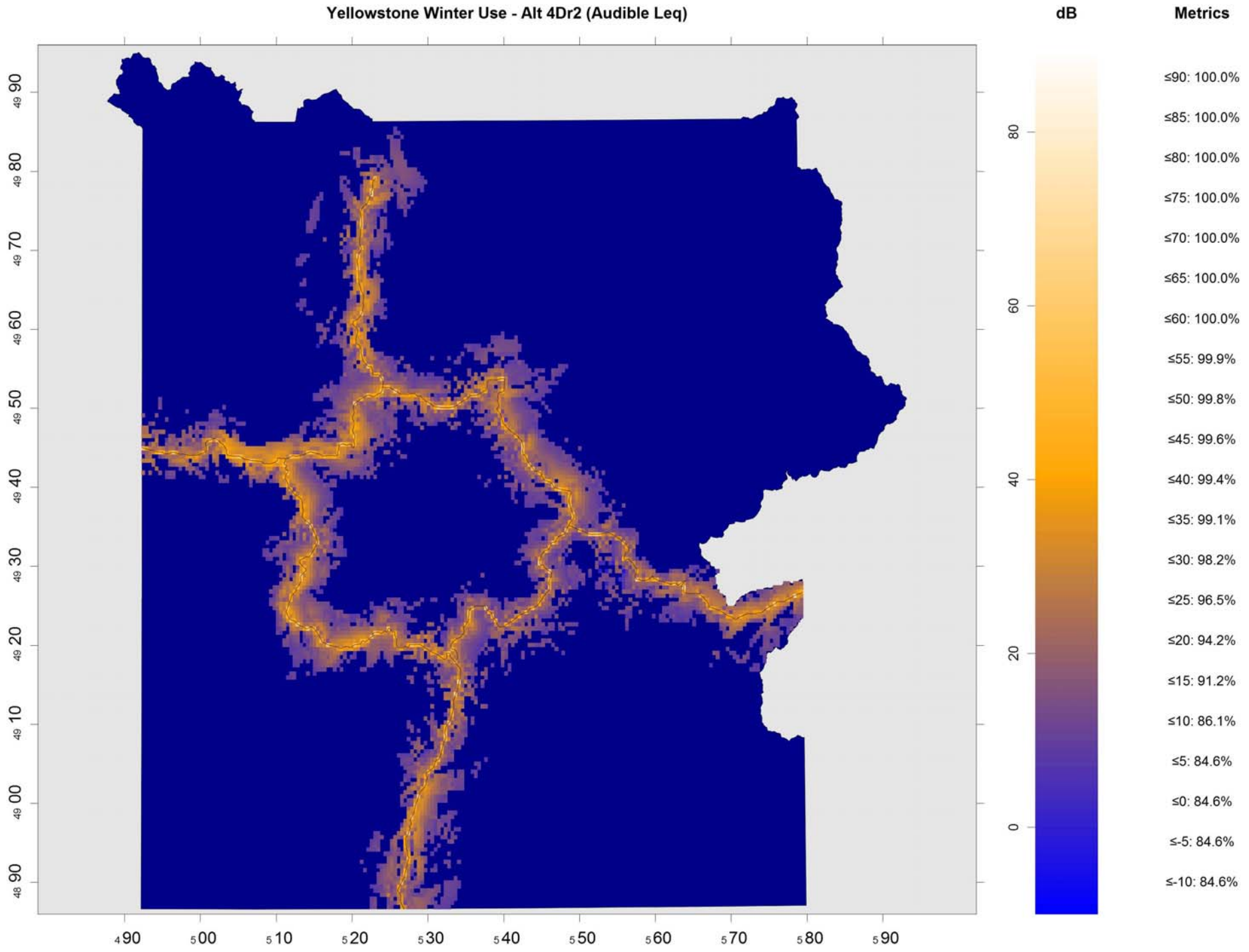
Yellowstone Winter Use - Alt 4Dr2 (Audible Leq)
dB
Metrics
≤90: 100.0%
≤85: 100.0%
≤80: 100.0%
≤75: 100.0%
≤70: 100.0%
≤65: 100.0%
≤60: 100.0%
≤55: 99.9%
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≤35: 99.1%
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≤25: 96.5%
≤20: 94.2%
≤15: 91.2%
≤10: 86.1%
≤5: 84.6%
≤0: 84.6%
≤-5: 84.6%
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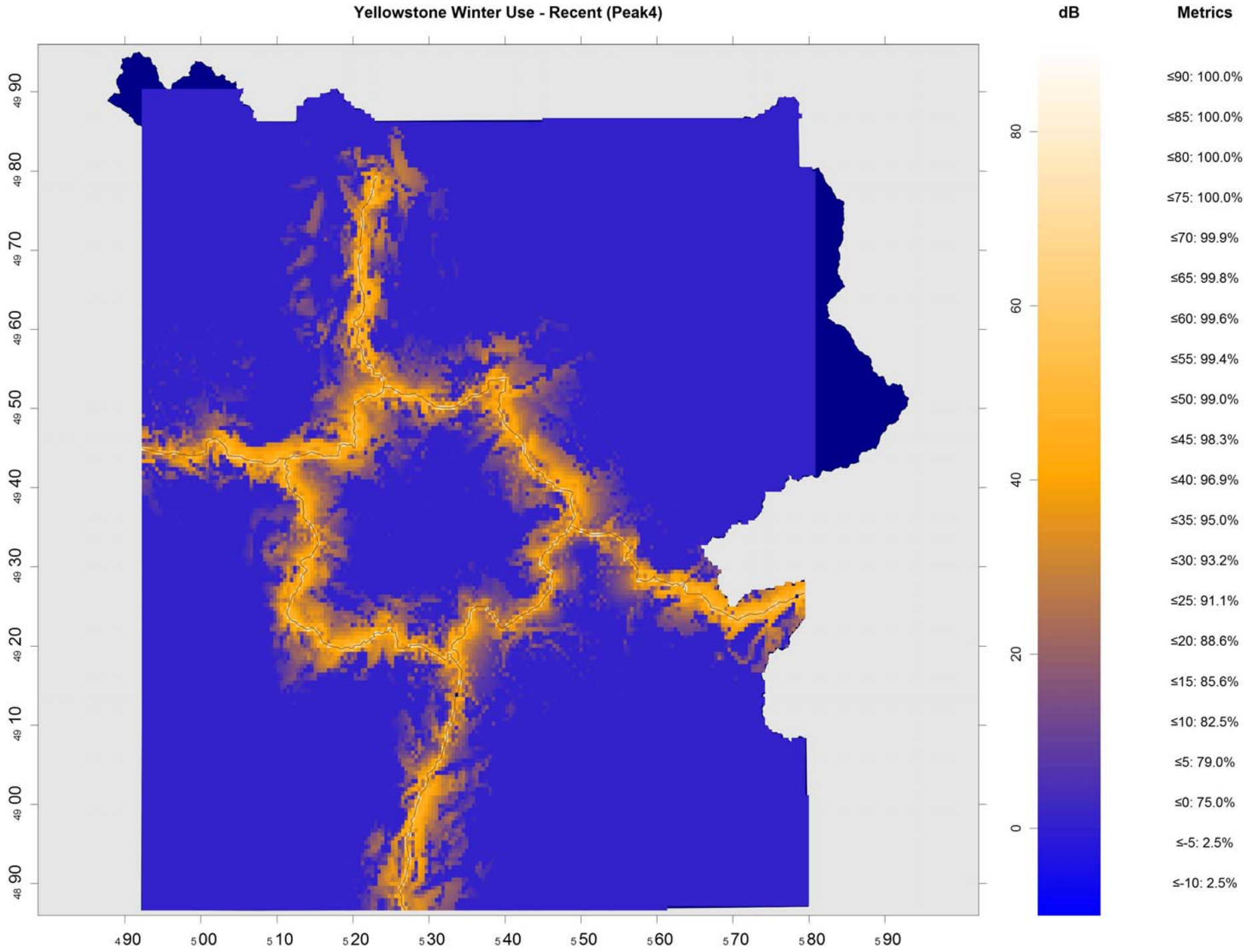
Yellowstone Winter Use - Recent (Peak4)
dB
Metrics
≤90: 100.0%
≤85: 100.0%
≤80: 100.0%
≤75: 100.0%
≤70: 99.9%
≤65: 99.8%
≤60: 99.6%
≤55: 99.4%
≤50: 99.0%
≤45: 98.3%
≤40: 96.9%
≤35: 95.0%
≤30: 93.2%
≤25: 91.1%
≤20: 88.6%
≤15: 85.6%
≤10: 82.5%
≤5: 79.0%
≤0: 75.0%
≤-5: 2.5%
≤-10: 2.5%
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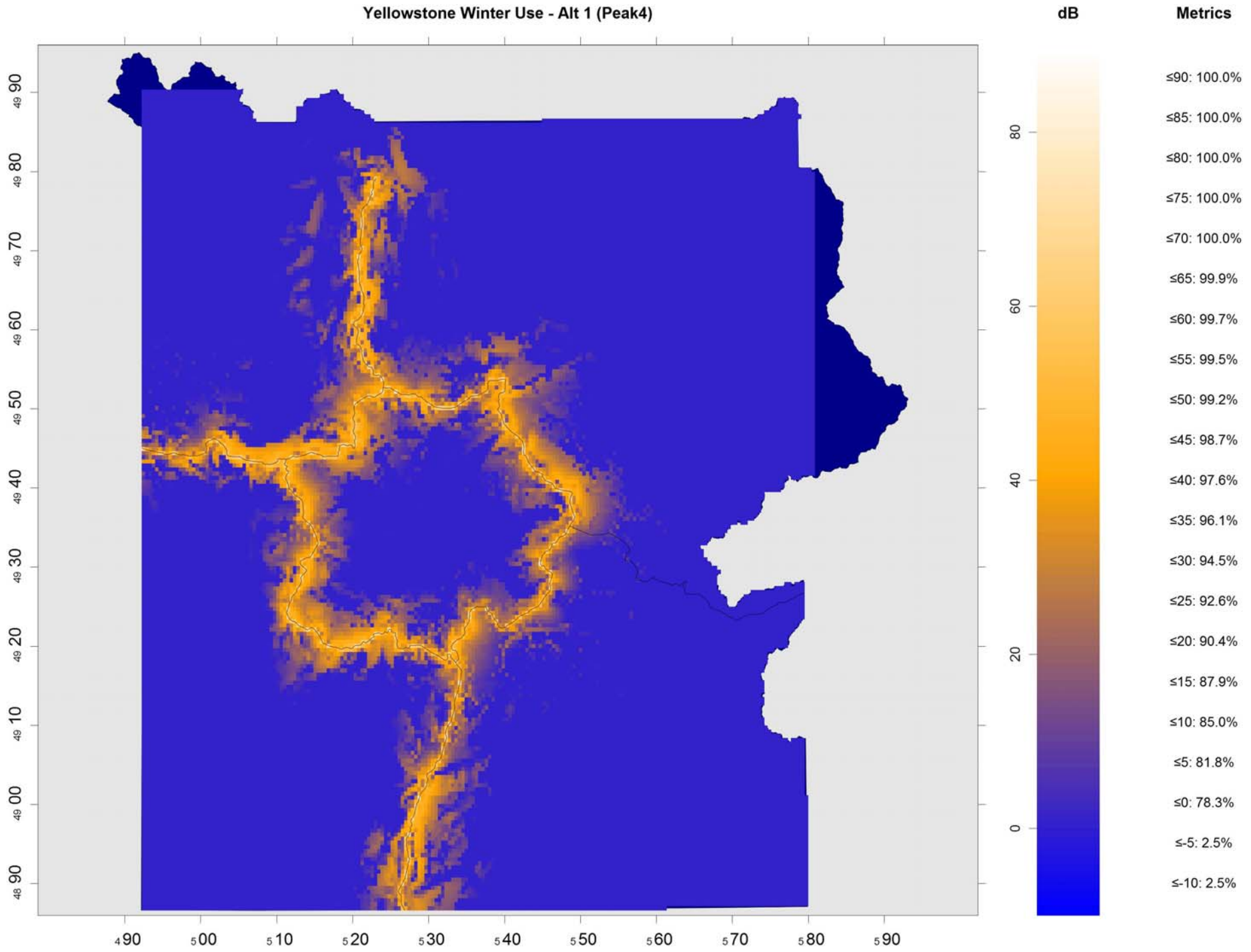
Yellowstone Winter Use - Alt 1 (Peak4)
dB
Metrics
≤90: 100.0%
≤85: 100.0%
≤80: 100.0%
≤75: 100.0%
≤70: 100.0%
≤65: 99.9%
≤60: 99.7%
≤55: 99.5%
≤50: 99.2%
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≤35: 96.1%
≤30: 94.5%
≤25: 92.6%
≤20: 90.4%
≤15: 87.9%
≤10: 85.0%
≤5: 81.8%
≤0: 78.3%
≤-5: 2.5%
≤-10: 2.5%
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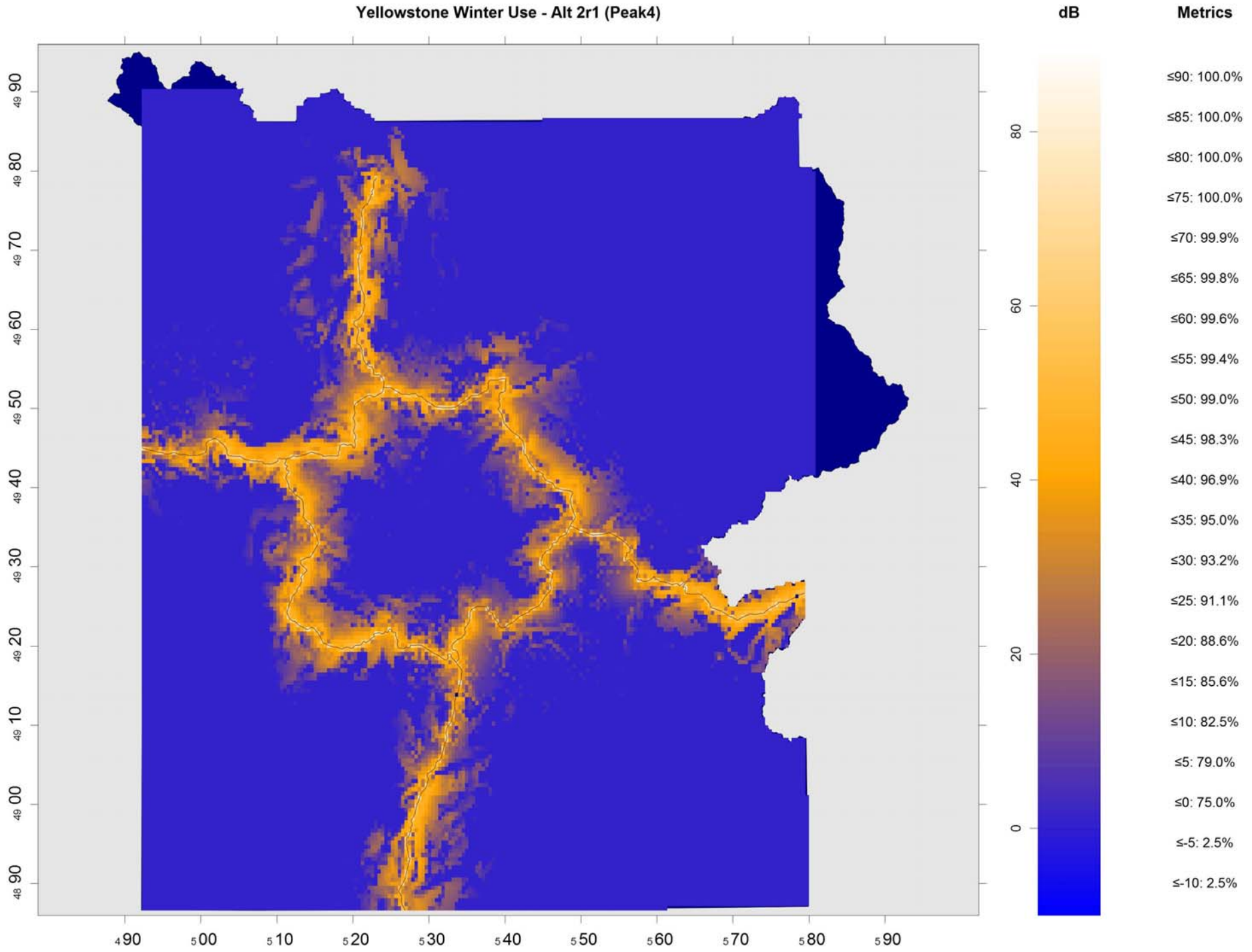
Yellowstone Winter Use - Alt 2r1 (Peak4)
dB
Metrics
≤90: 100.0%
≤85: 100.0%
≤80: 100.0%
≤75: 100.0%
≤70: 99.9%
≤65: 99.8%
≤60: 99.6%
≤55: 99.4%
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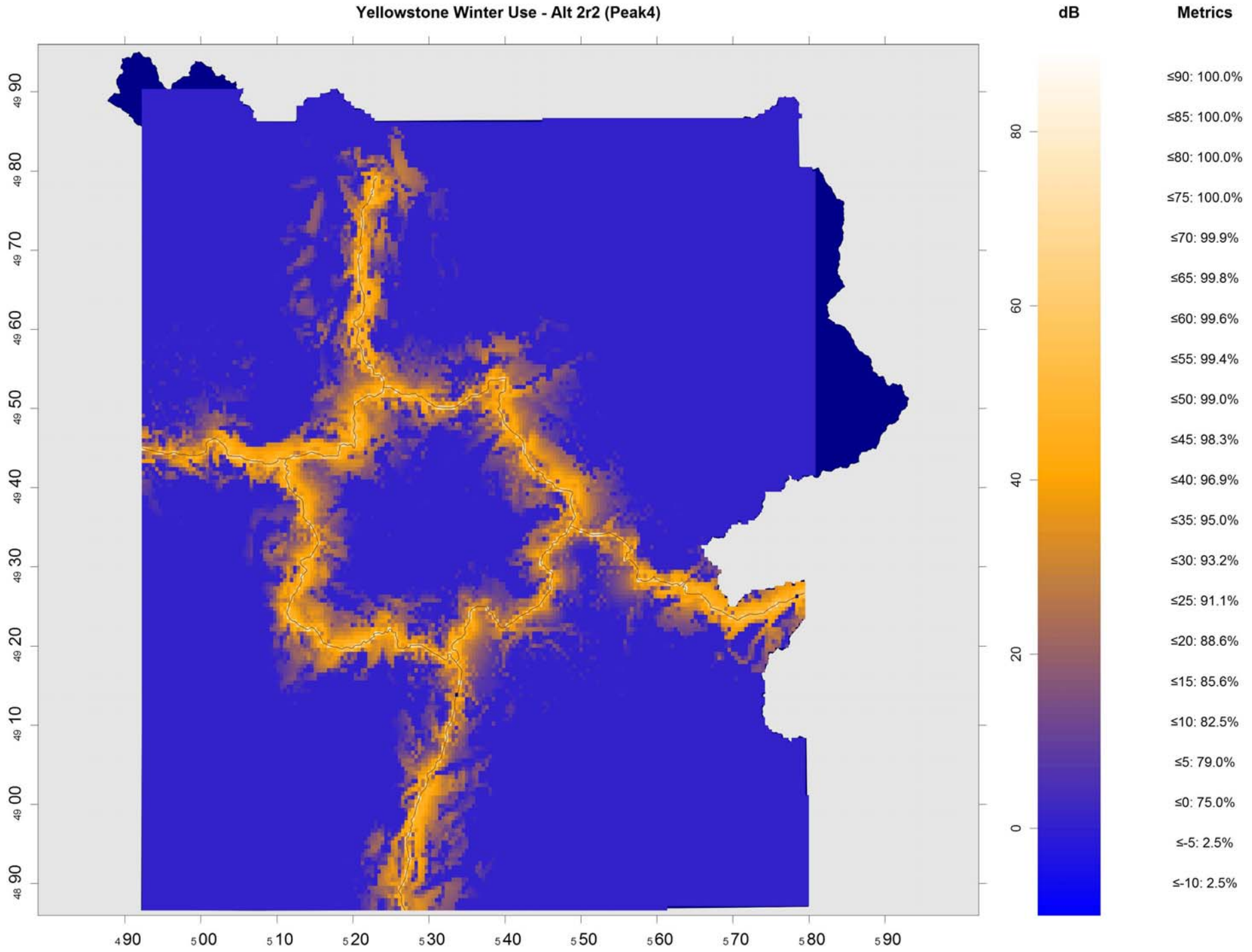
Yellowstone Winter Use - Alt 2r2 (Peak4)
dB
Metrics
≤90: 100.0%
≤85: 100.0%
≤80: 100.0%
≤75: 100.0%
≤70: 99.9%
≤65: 99.8%
≤60: 99.6%
≤55: 99.4%
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≤5: 79.0%
≤0: 75.0%
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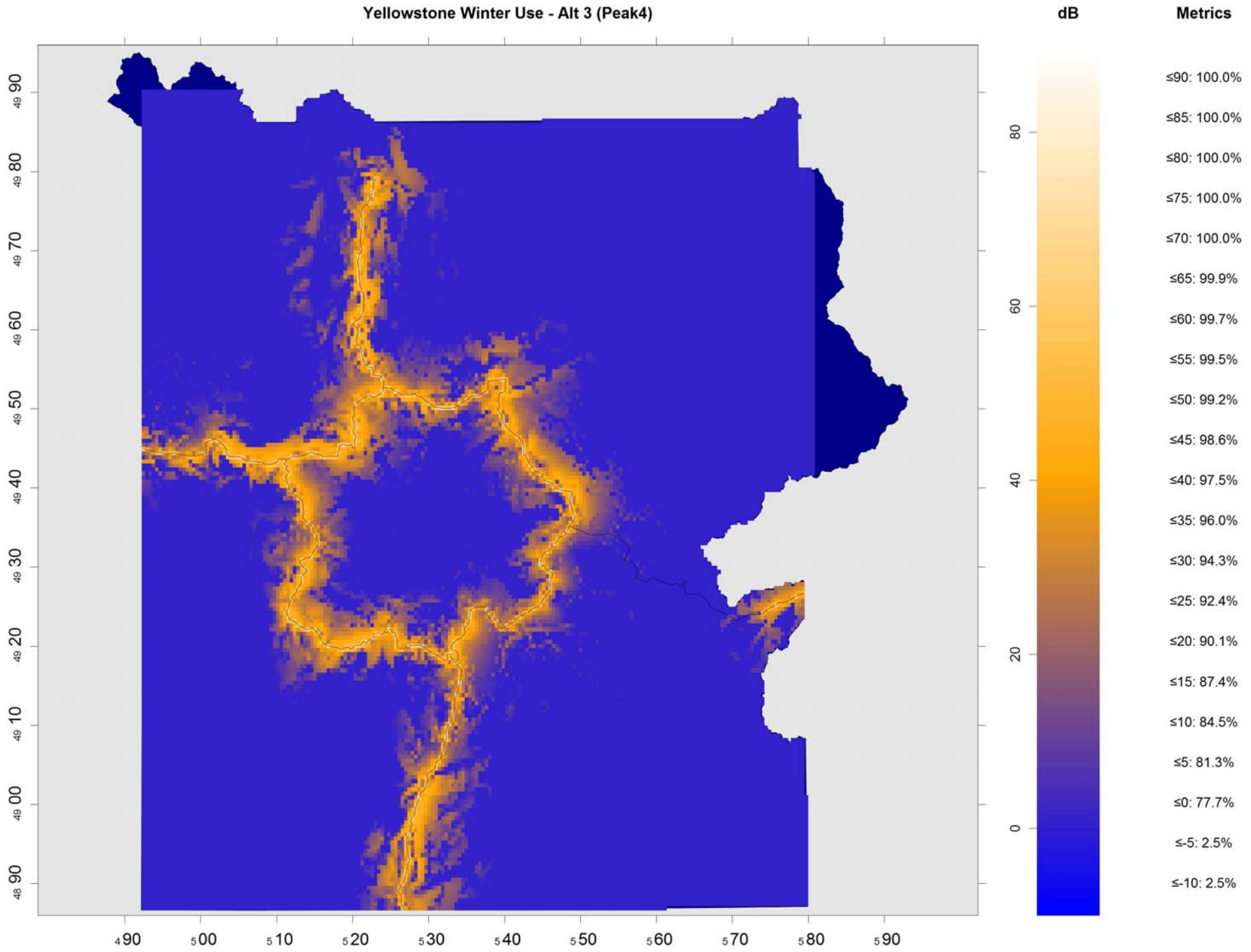
Yellowstone Winter Use - Alt 3 (Peak4)
dB
Metrics
≤90: 100.0%
≤85: 100.0%
≤80: 100.0%
≤75: 100.0%
≤70: 100.0%
≤65: 99.9%
≤60: 99.7%
≤55: 99.5%
≤50: 99.2%
≤45: 98.6%
≤40: 97.5%
≤35: 96.0%
≤30: 94.3%
≤25: 92.4%
≤20: 90.1%
≤15: 87.4%
≤10: 84.5%
≤5: 81.3%
≤0: 77.7%
≤-5: 2.5%
≤-10: 2.5%
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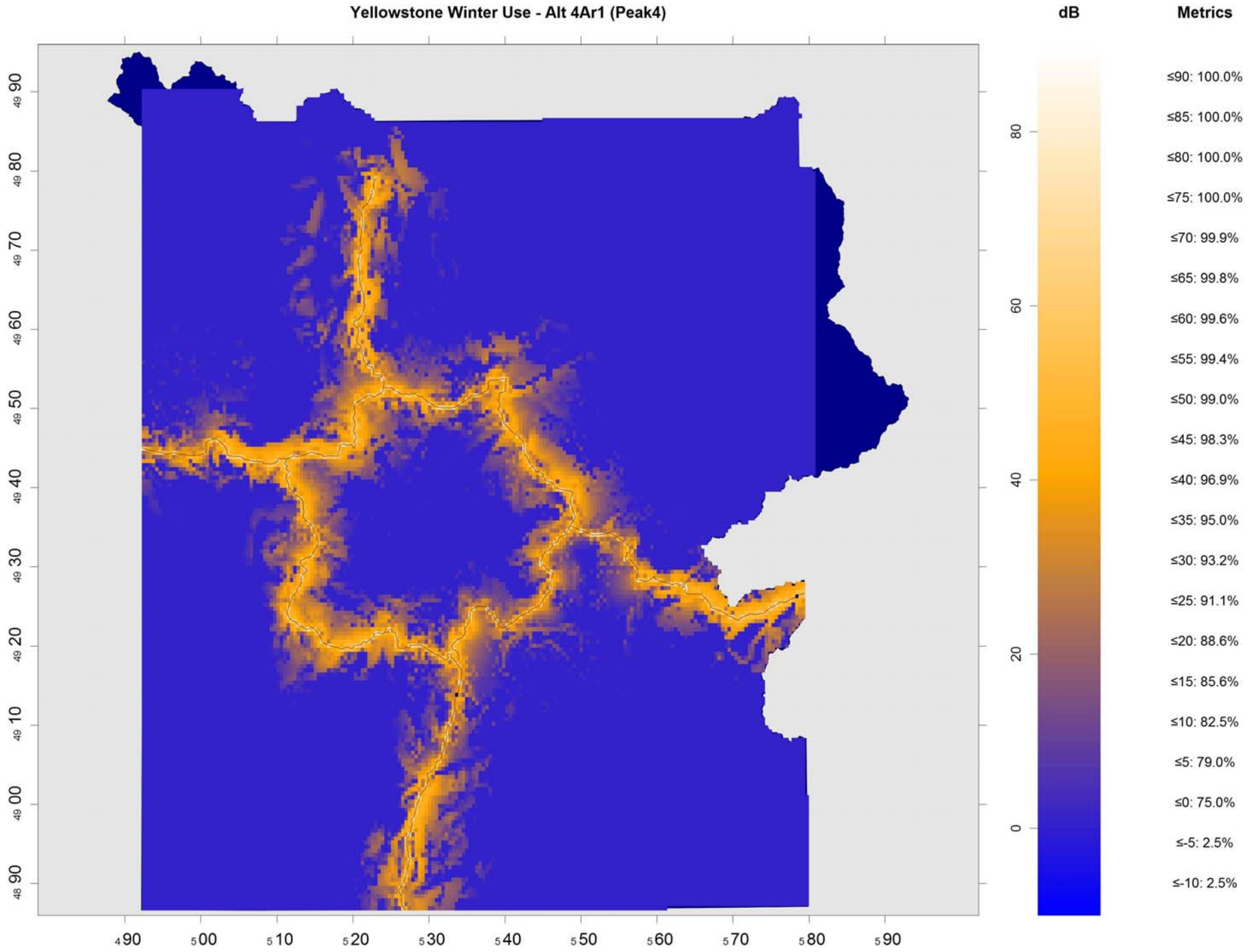
Yellowstone Winter Use - Alt 4Ar1 (Peak4)
dB
Metrics
≤90: 100.0%
≤85: 100.0%
≤80: 100.0%
≤75: 100.0%
≤70: 99.9%
≤65: 99.8%
≤60: 99.6%
≤55: 99.4%
≤50: 99.0%
≤45: 98.3%
≤40: 96.9%
≤35: 95.0%
≤30: 93.2%
≤25: 91.1%
≤20: 88.6%
≤15: 85.6%
≤10: 82.5%
≤5: 79.0%
≤0: 75.0%
≤-5: 2.5%
≤-10: 2.5%
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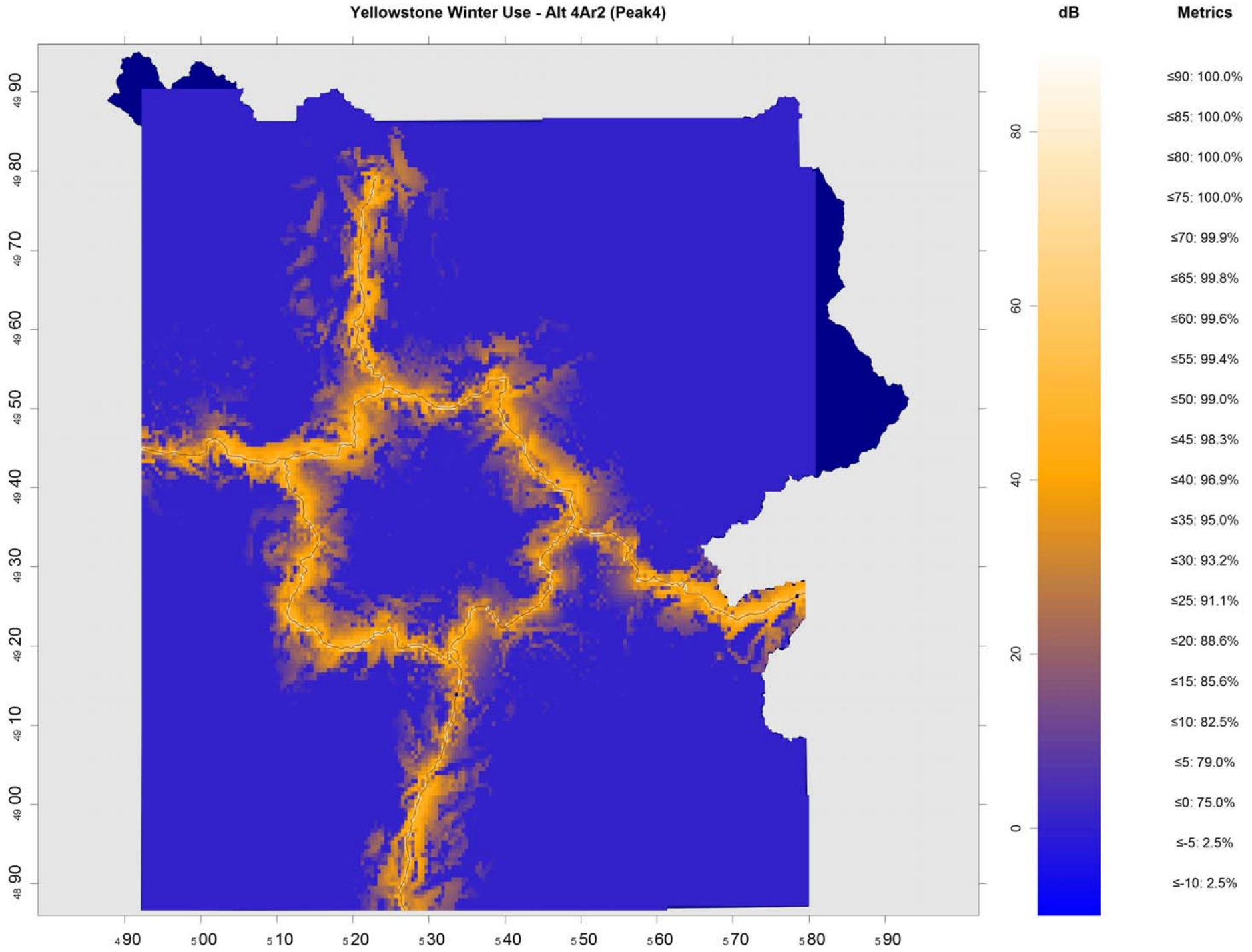
Yellowstone Winter Use - Alt 4Ar2 (Peak4)
dB
Metrics
≤90: 100.0%
≤85: 100.0%
≤80: 100.0%
≤75: 100.0%
≤70: 99.9%
≤65: 99.8%
≤60: 99.6%
≤55: 99.4%
≤50: 99.0%
≤45: 98.3%
≤40: 96.9%
≤35: 95.0%
≤30: 93.2%
≤25: 91.1%
≤20: 88.6%
≤15: 85.6%
≤10: 82.5%
≤5: 79.0%
≤0: 75.0%
≤-5: 2.5%
≤-10: 2.5%
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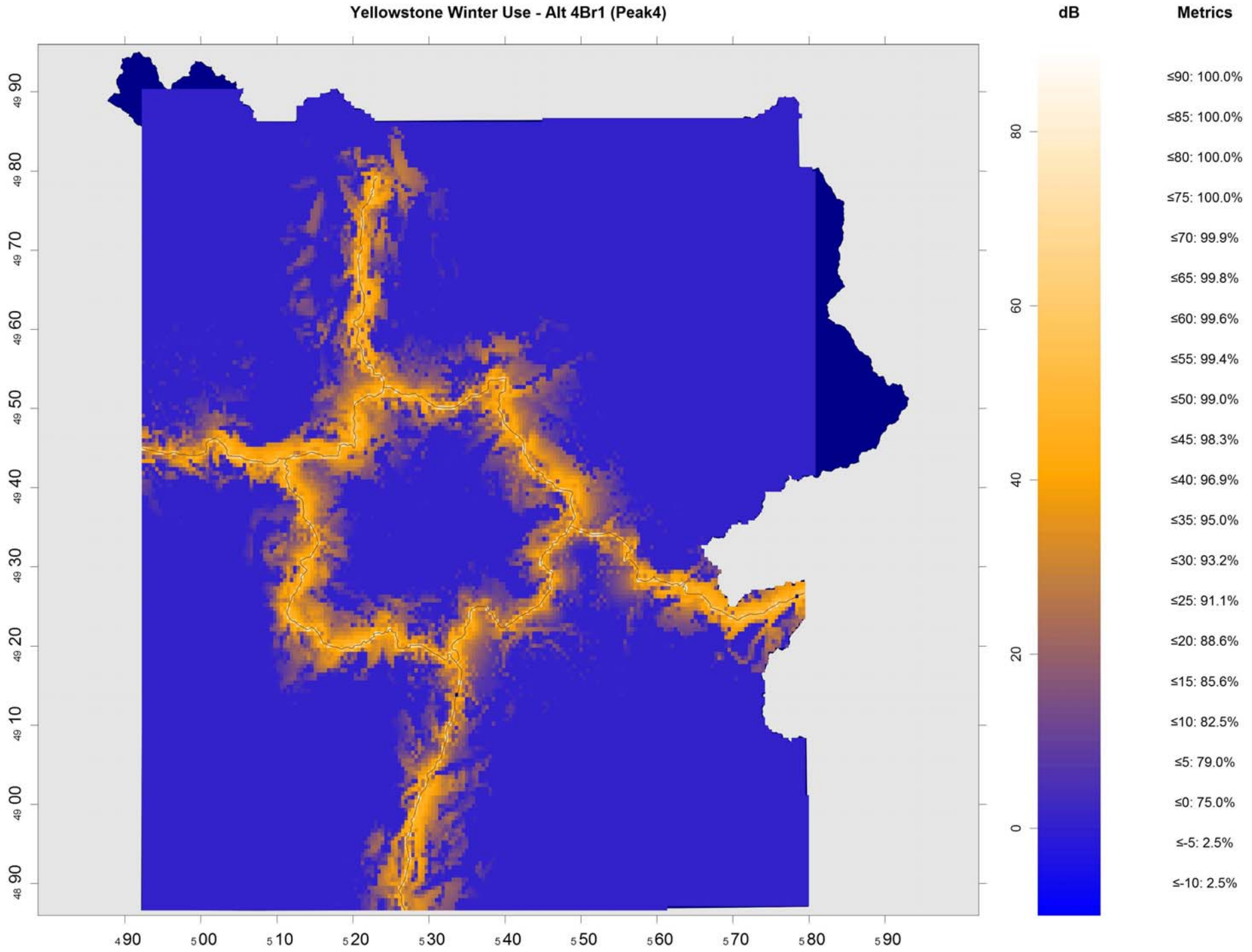
Yellowstone Winter Use - Alt 4Br1 (Peak4)
dB
Metrics
≤90: 100.0%
≤85: 100.0%
≤80: 100.0%
≤75: 100.0%
≤70: 99.9%
≤65: 99.8%
≤60: 99.6%
≤55: 99.4%
≤50: 99.0%
≤45: 98.3%
≤40: 96.9%
≤35: 95.0%
≤30: 93.2%
≤25: 91.1%
≤20: 88.6%
≤15: 85.6%
≤10: 82.5%
≤5: 79.0%
≤0: 75.0%
≤-5: 2.5%
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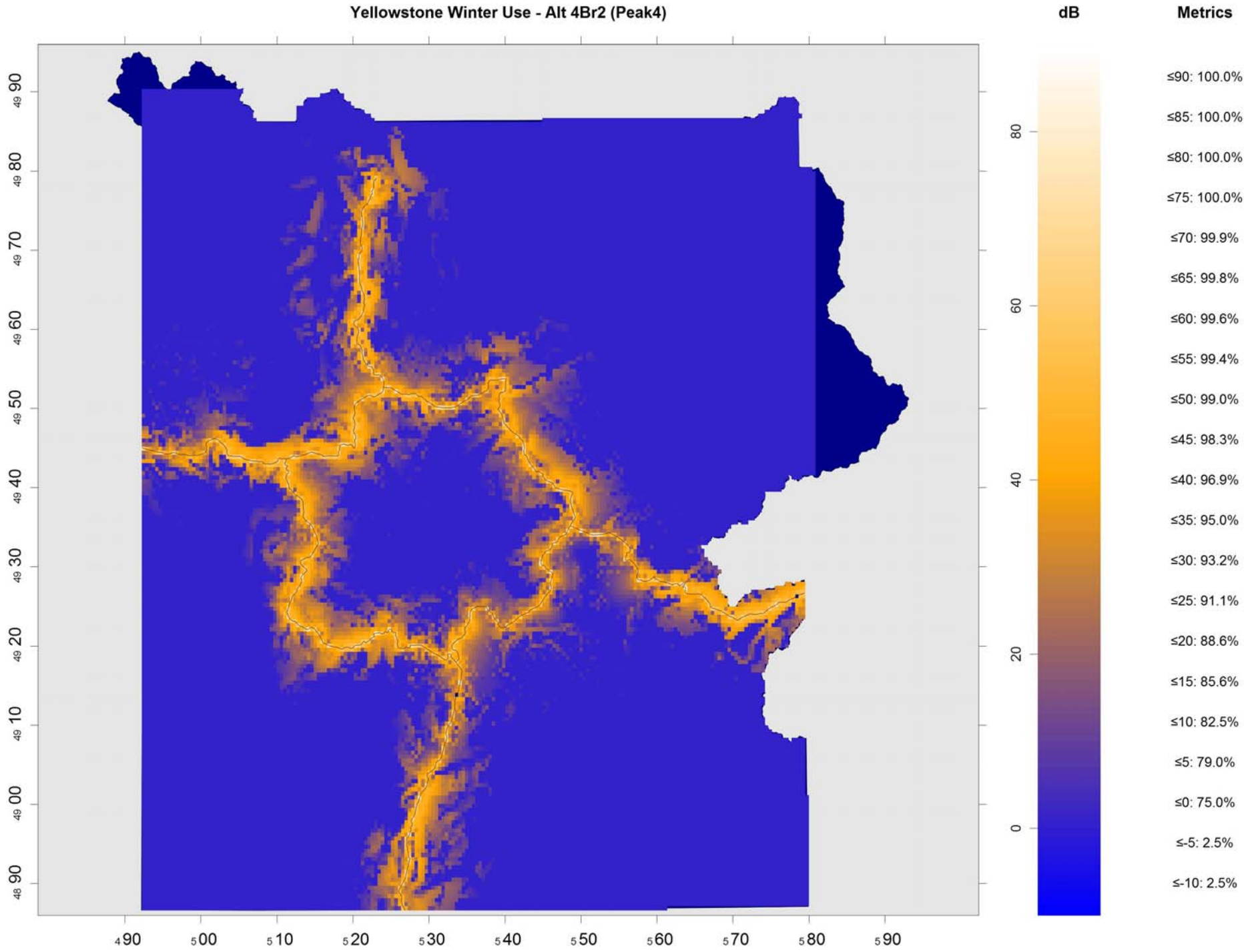
Yellowstone Winter Use - Alt 4Br2 (Peak4)
dB
Metrics
≤90: 100.0%
≤85: 100.0%
≤80: 100.0%
≤75: 100.0%
≤70: 99.9%
≤65: 99.8%
≤60: 99.6%
≤55: 99.4%
≤50: 99.0%
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≤35: 95.0%
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≤25: 91.1%
≤20: 88.6%
≤15: 85.6%
≤10: 82.5%
≤5: 79.0%
≤0: 75.0%
≤-5: 2.5%
≤-10: 2.5%
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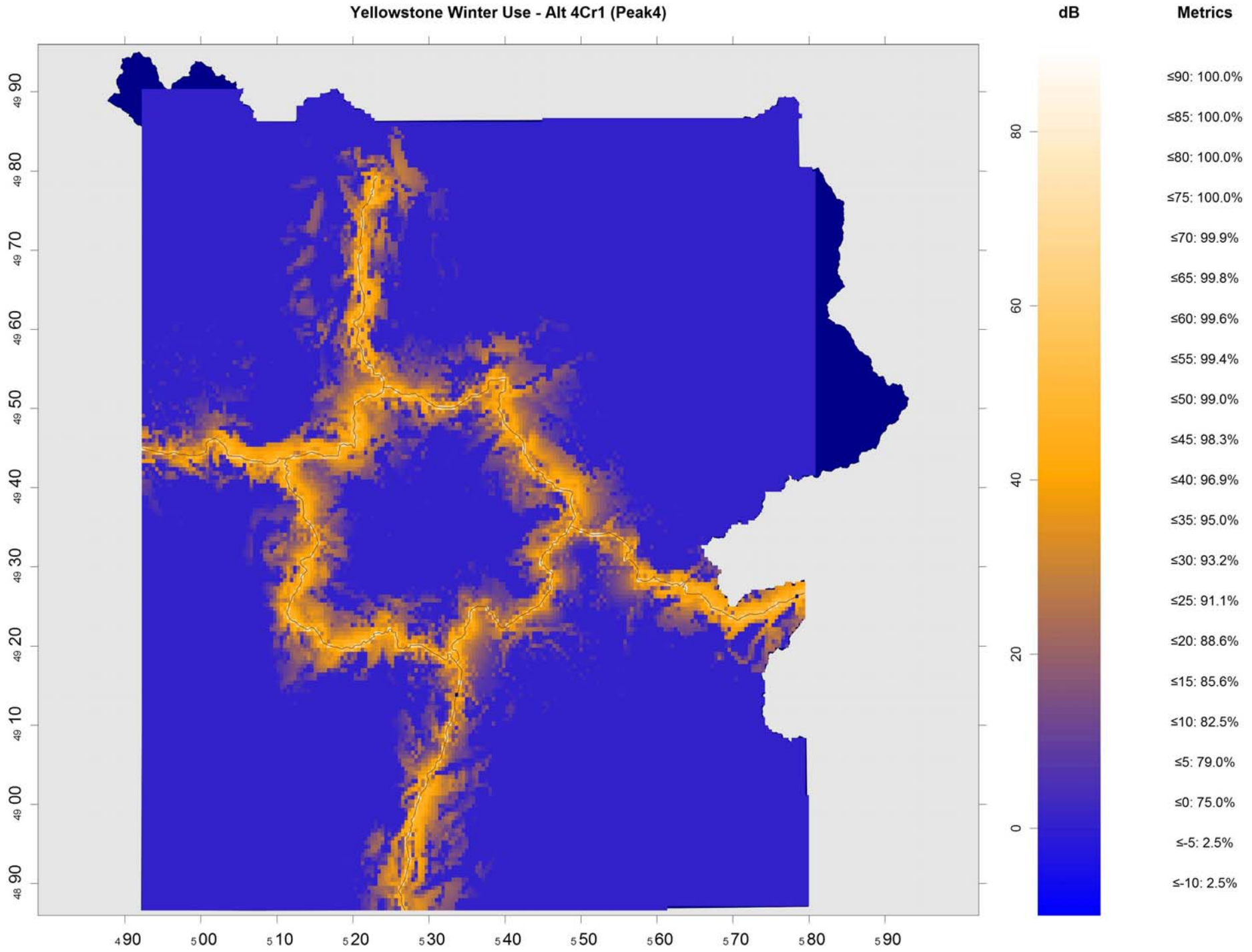
Yellowstone Winter Use - Alt 4Cr1 (Peak4)
dB
Metrics
≤90: 100.0%
≤85: 100.0%
≤80: 100.0%
≤75: 100.0%
≤70: 99.9%
≤65: 99.8%
≤60: 99.6%
≤55: 99.4%
≤50: 99.0%
≤45: 98.3%
≤40: 96.9%
≤35: 95.0%
≤30: 93.2%
≤25: 91.1%
≤20: 88.6%
≤15: 85.6%
≤10: 82.5%
≤5: 79.0%
≤0: 75.0%
≤-5: 2.5%
≤-10: 2.5%
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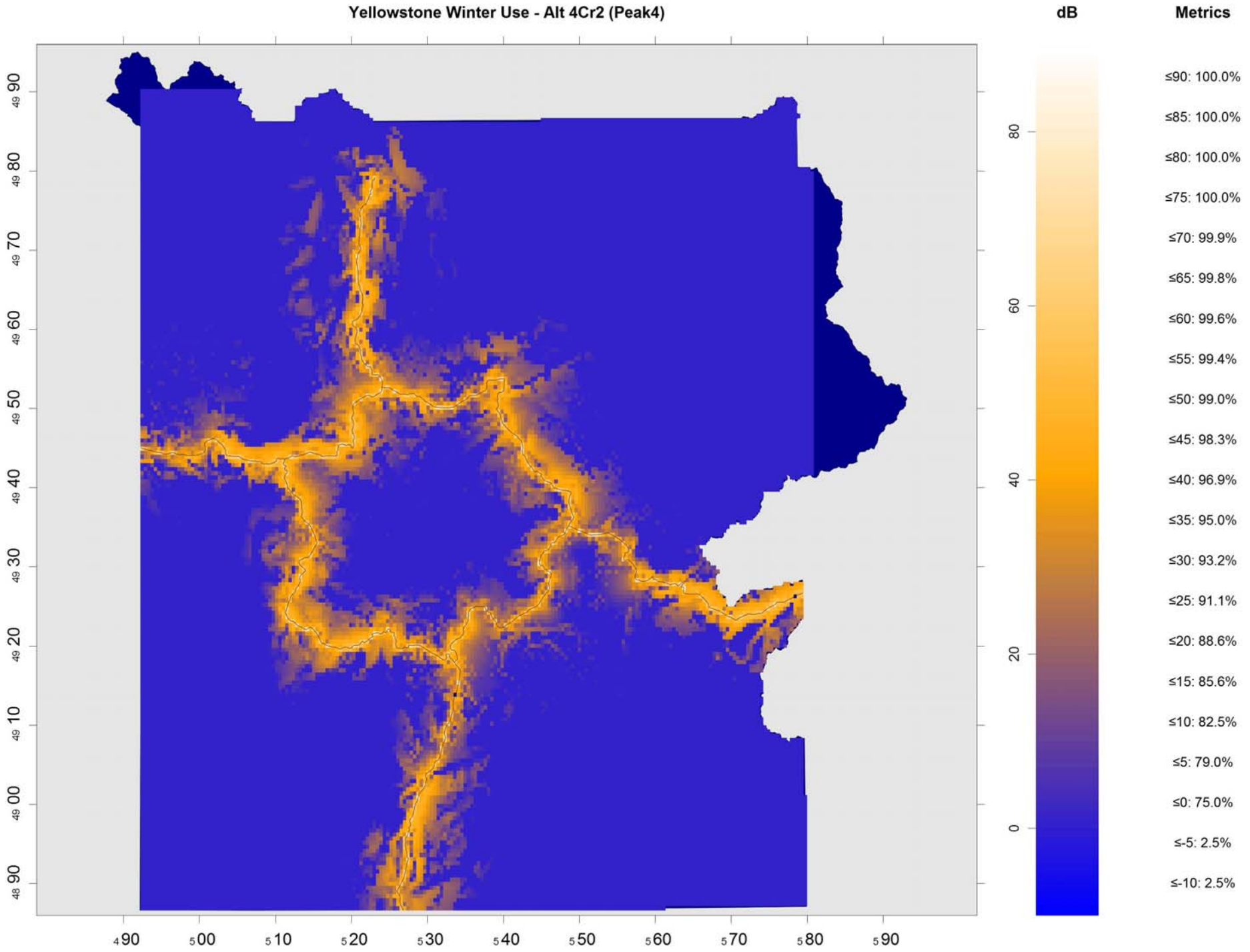
Yellowstone Winter Use - Alt 4Cr2 (Peak4)
dB
Metrics
≤90: 100.0%
≤85: 100.0%
≤80: 100.0%
≤75: 100.0%
≤70: 99.9%
≤65: 99.8%
≤60: 99.6%
≤55: 99.4%
≤50: 99.0%
≤45: 98.3%
≤40: 96.9%
≤35: 95.0%
≤30: 93.2%
≤25: 91.1%
≤20: 88.6%
≤15: 85.6%
≤10: 82.5%
≤5: 79.0%
≤0: 75.0%
≤-5: 2.5%
≤-10: 2.5%
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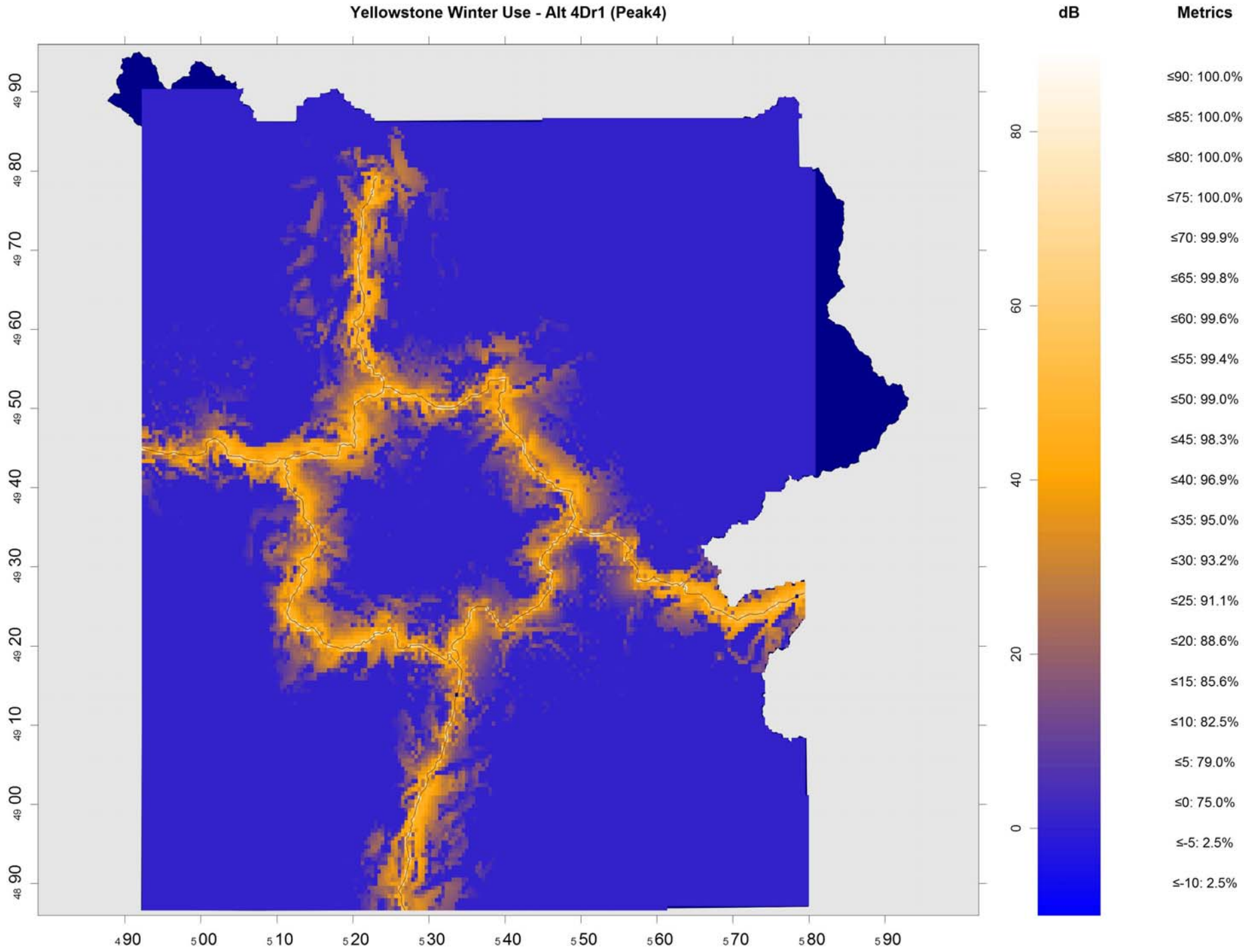
Yellowstone Winter Use - Alt 4Dr1 (Peak4)
dB
Metrics
≤90: 100.0%
≤85: 100.0%
≤80: 100.0%
≤75: 100.0%
≤70: 99.9%
≤65: 99.8%
≤60: 99.6%
≤55: 99.4%
≤50: 99.0%
≤45: 98.3%
≤40: 96.9%
≤35: 95.0%
≤30: 93.2%
≤25: 91.1%
≤20: 88.6%
≤15: 85.6%
≤10: 82.5%
≤5: 79.0%
≤0: 75.0%
≤-5: 2.5%
≤-10: 2.5%
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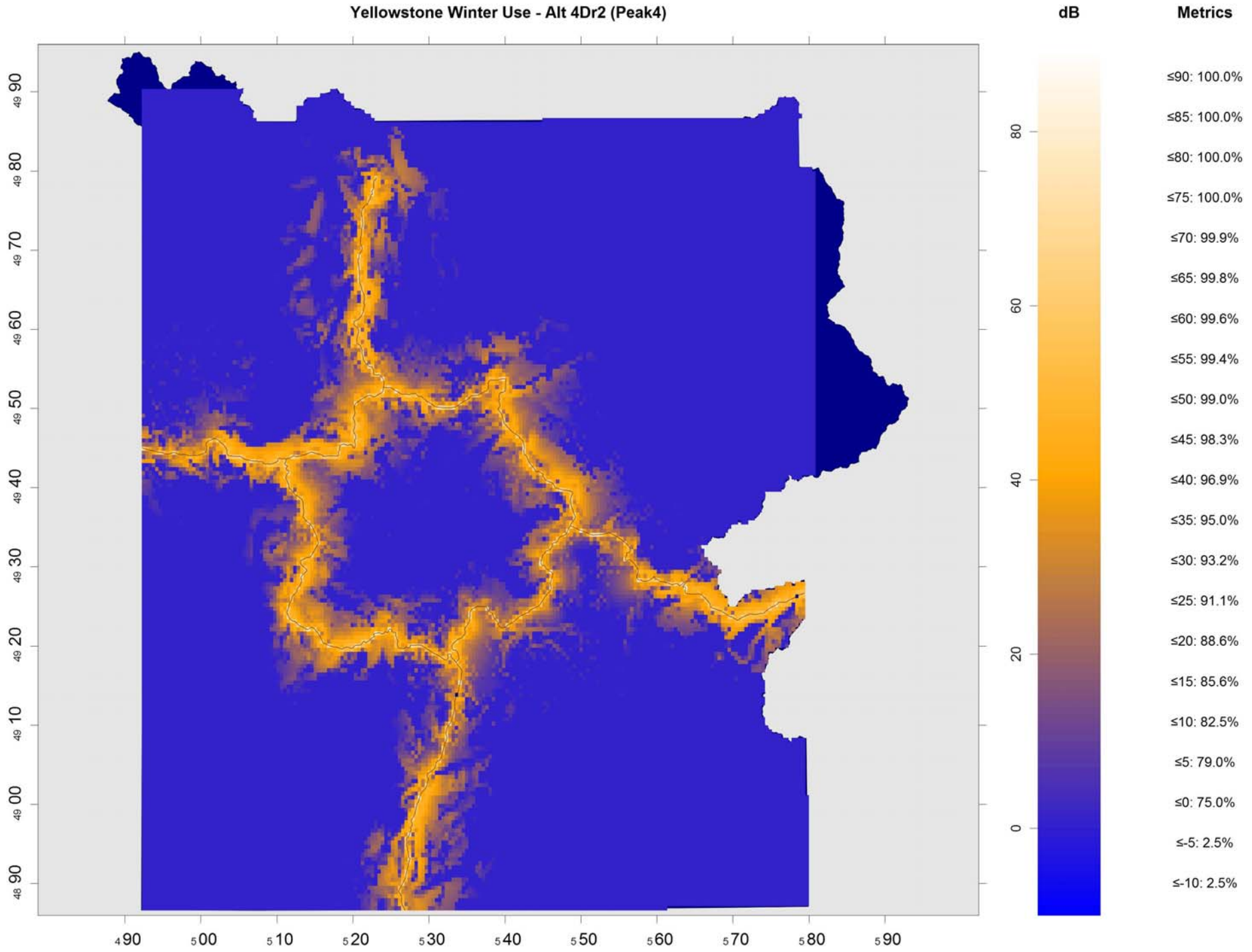
Yellowstone Winter Use - Alt 4Dr2 (Peak4)
dB
Metrics
≤90: 100.0%
≤85: 100.0%
≤80: 100.0%
≤75: 100.0%
≤70: 99.9%
≤65: 99.8%
≤60: 99.6%
≤55: 99.4%
≤50: 99.0%
≤45: 98.3%
≤40: 96.9%
≤35: 95.0%
≤30: 93.2%
≤25: 91.1%
≤20: 88.6%
≤15: 85.6%
≤10: 82.5%
≤5: 79.0%
≤0: 75.0%
≤-5: 2.5%
≤-10: 2.5%
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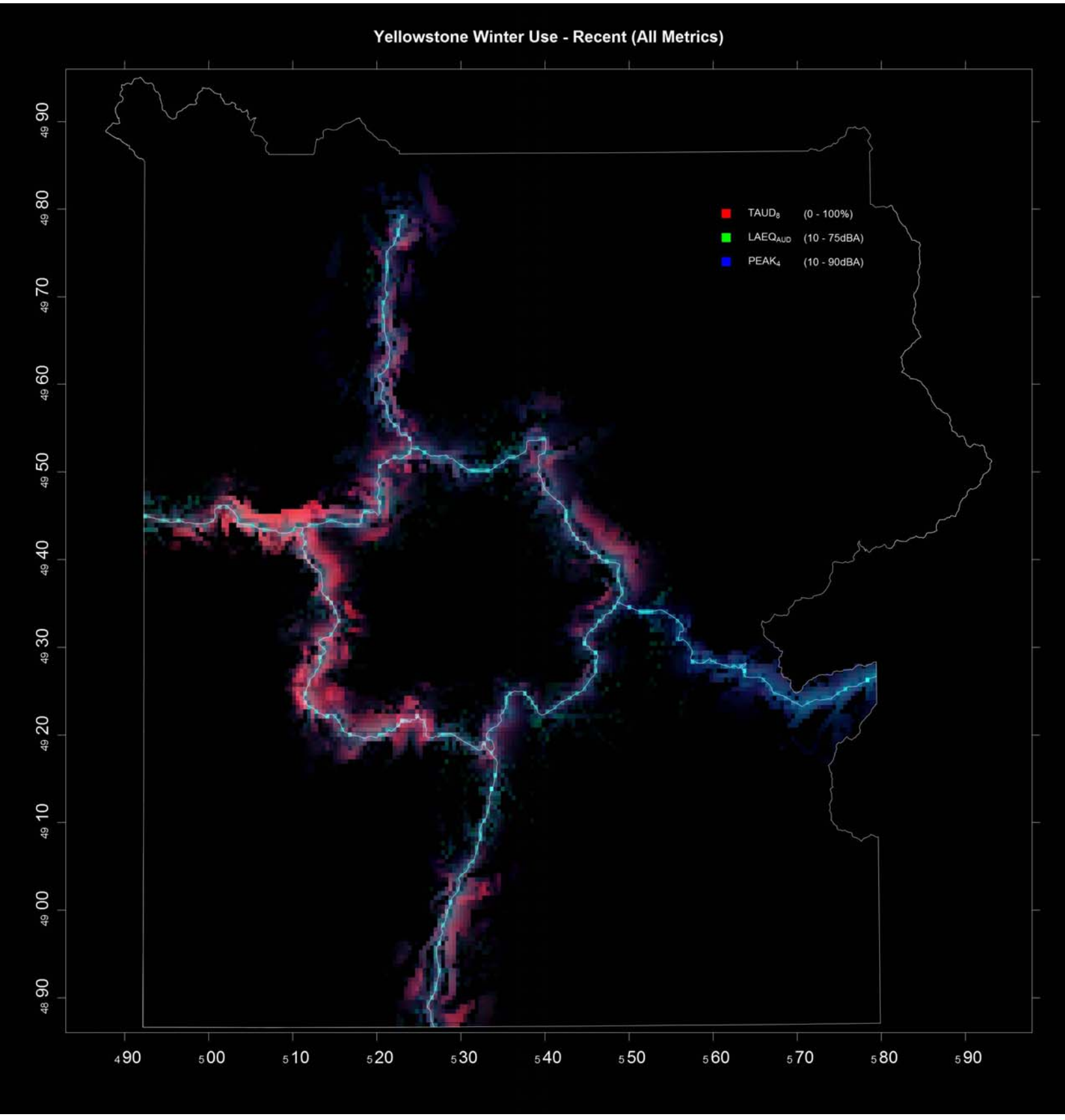
Yellowstone Winter Use - Recent (All Metrics)
TAUD8 (0 - 100%)
LAEQAUD (10 - 75dBA)
PEAK4 (10 - 90dBA)
4990
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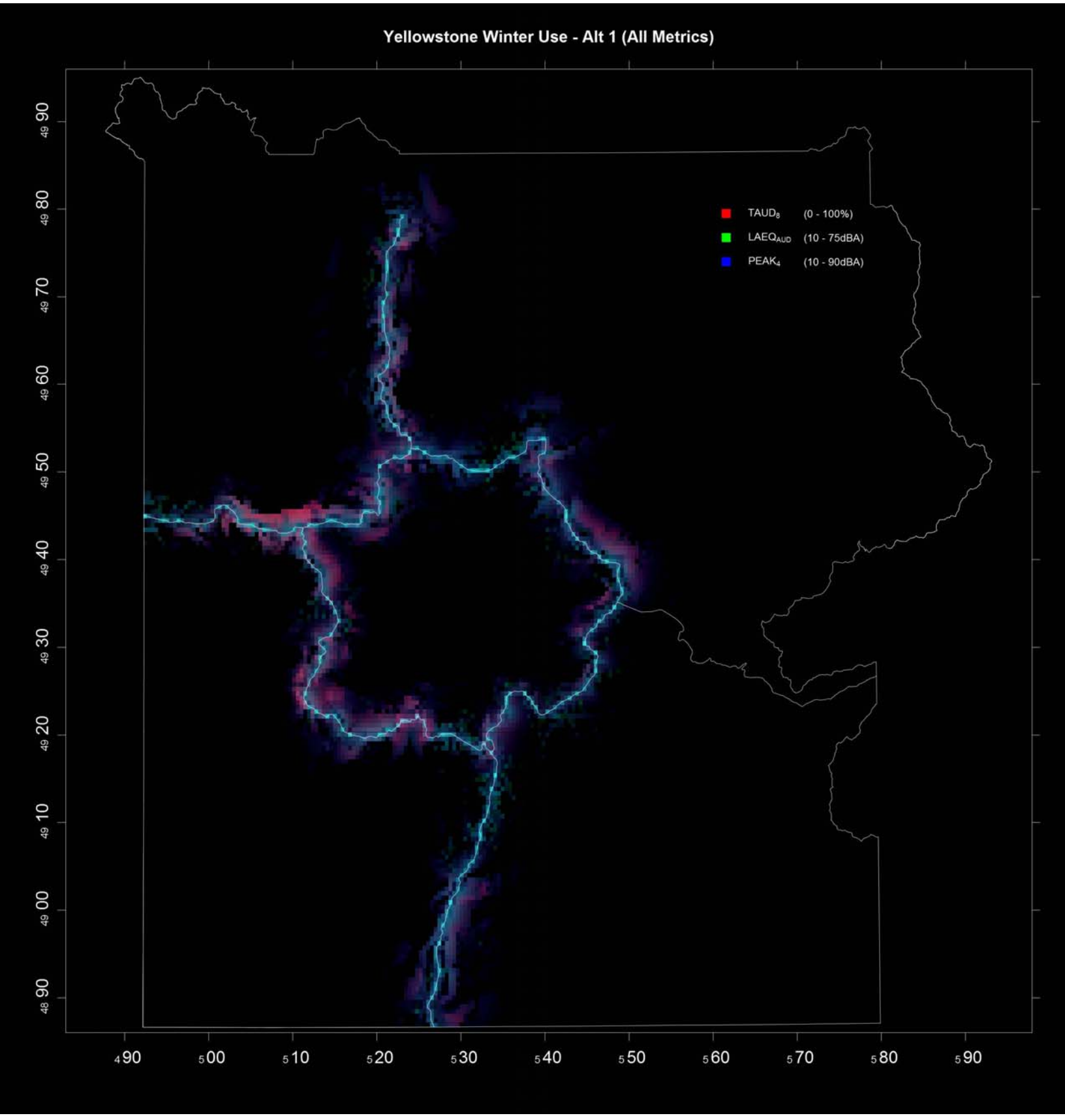
Yellowstone Winter Use - Alt 1 (All Metrics)
TAUD8 (0 - 100%)
LAEQAUD (10 - 75dBA)
PEAK4 (10 - 90dBA)
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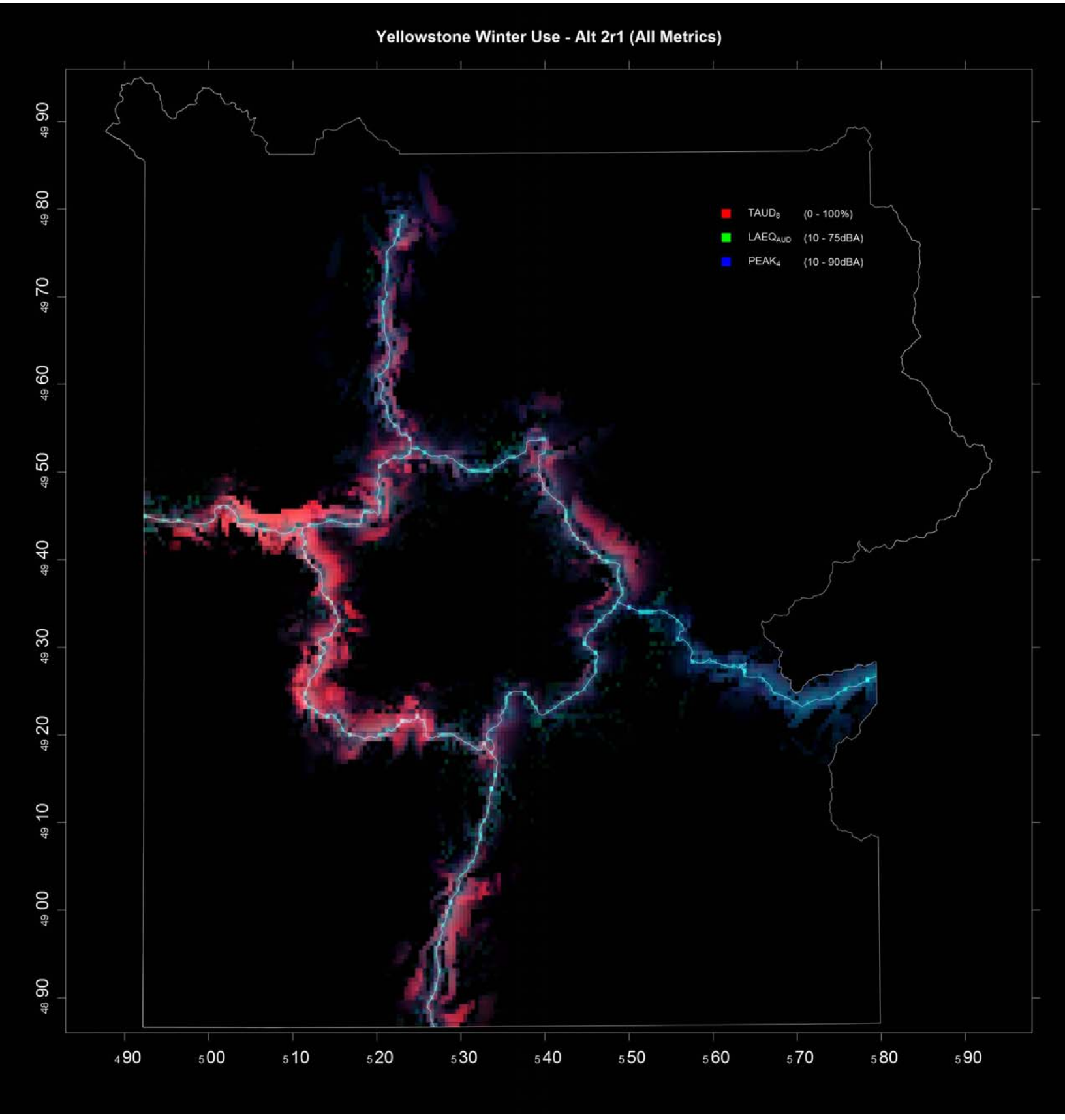
Yellowstone Winter Use - Alt 2r1 (All Metrics)
TAUD8 (0 - 100%)
LAEQAUD (10 - 75dBA)
PEAK4 (10 - 90dBA)
4990
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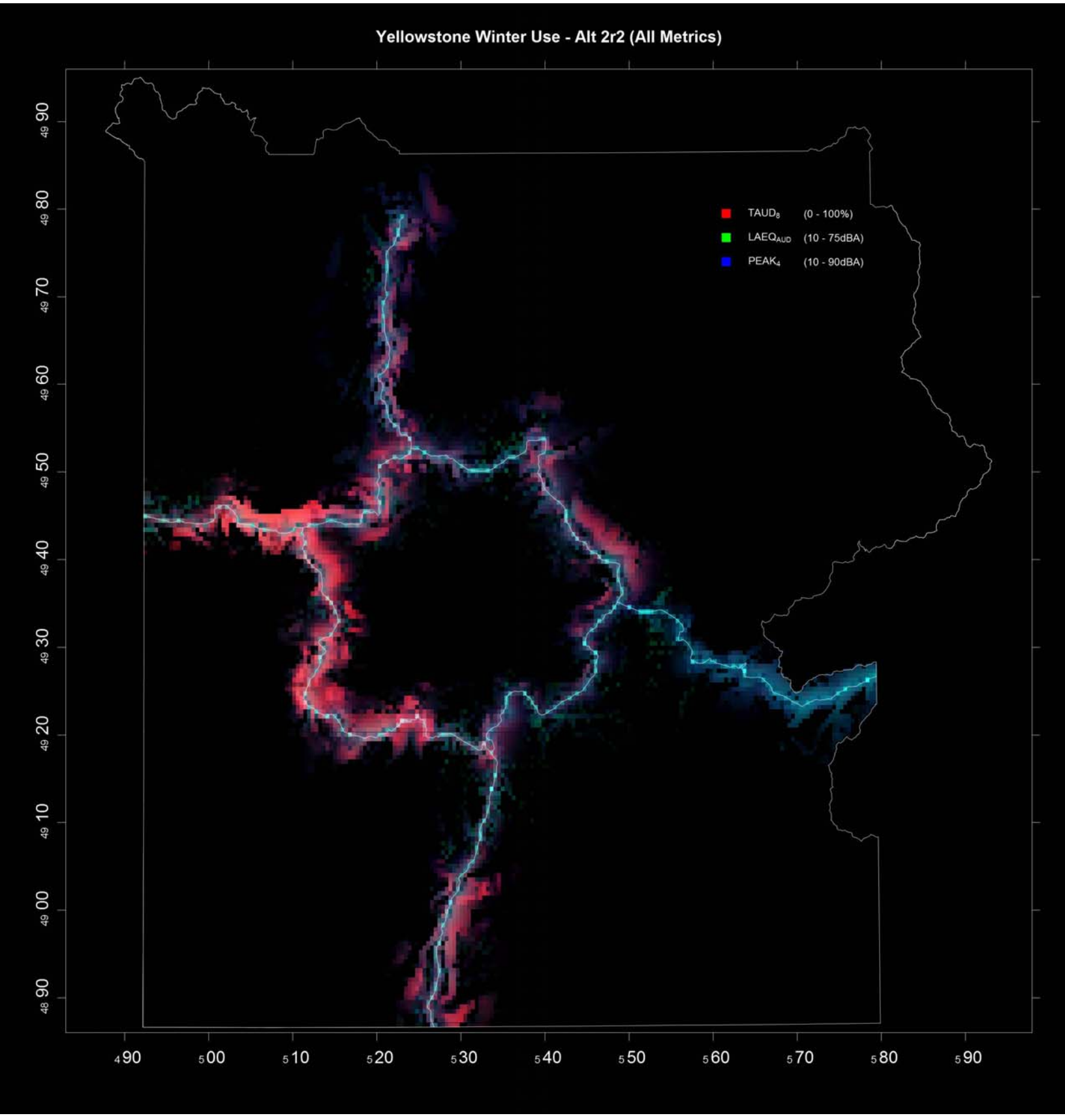
Yellowstone Winter Use - Alt 2r2 (All Metrics)
TAUD8 (0 - 100%)
LAEQAUD (10 - 75dBA)
PEAK4 (10 - 90dBA)
490
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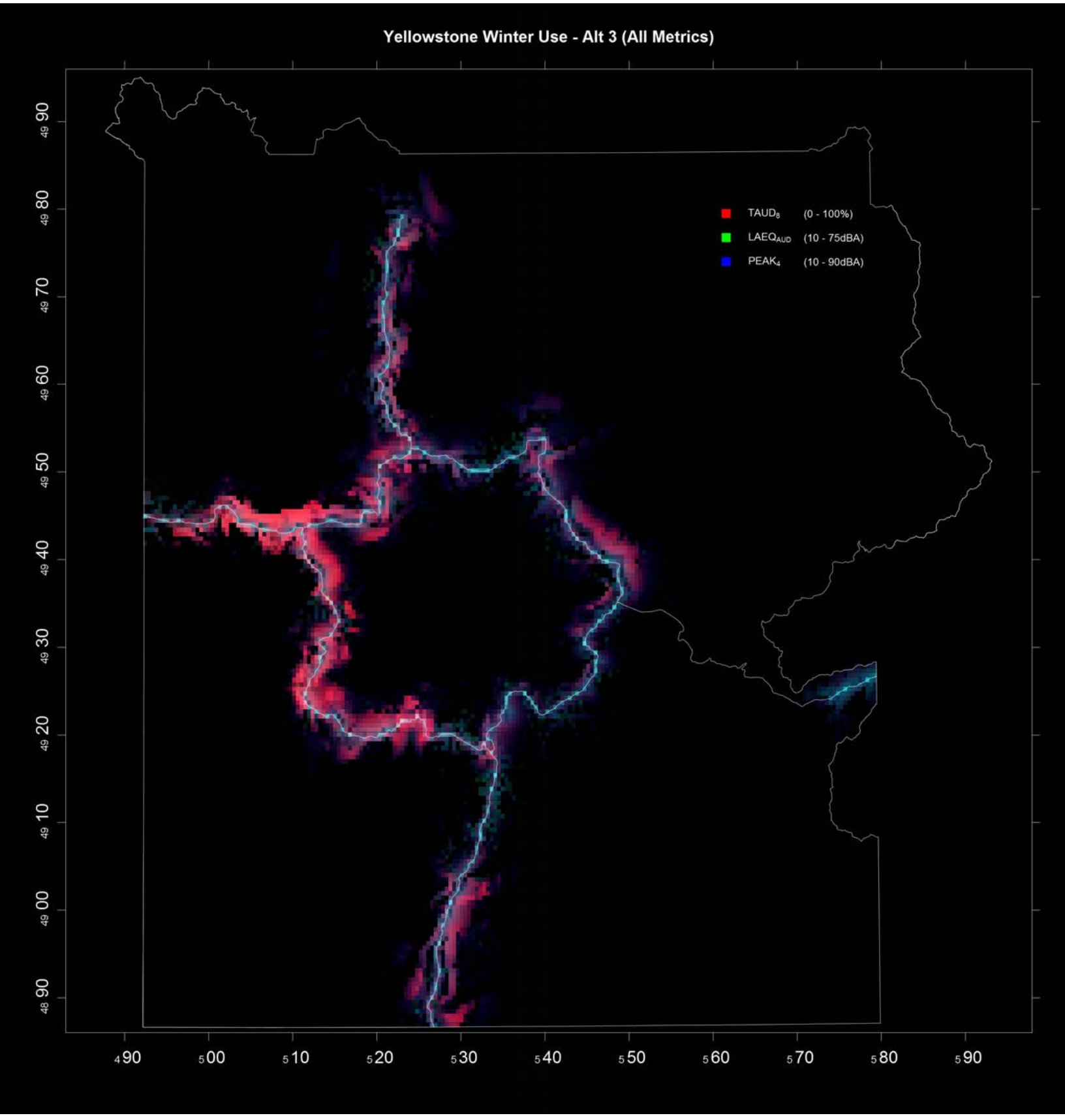
Yellowstone Winter Use - Alt 3 (All Metrics)
TAUD8 (0 - 100%)
LAEQAUD (10 - 75dBA)
PEAK4 (10 - 90dBA)
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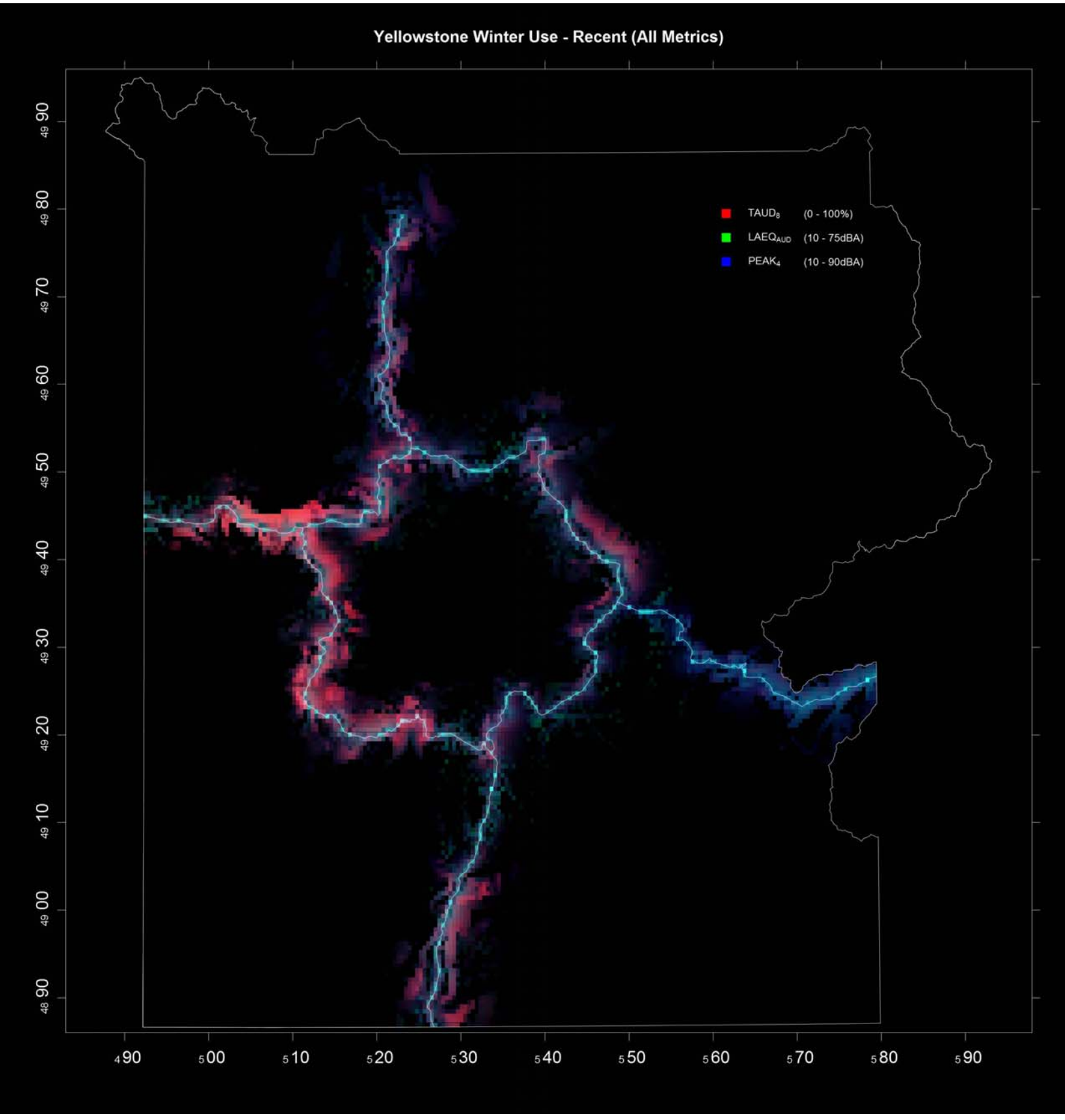
Yellowstone Winter Use - Recent (All Metrics)
TAUD8 (0 - 100%)
LAEQAUD (10 - 75dBA)
PEAK4 (10 - 90dBA)
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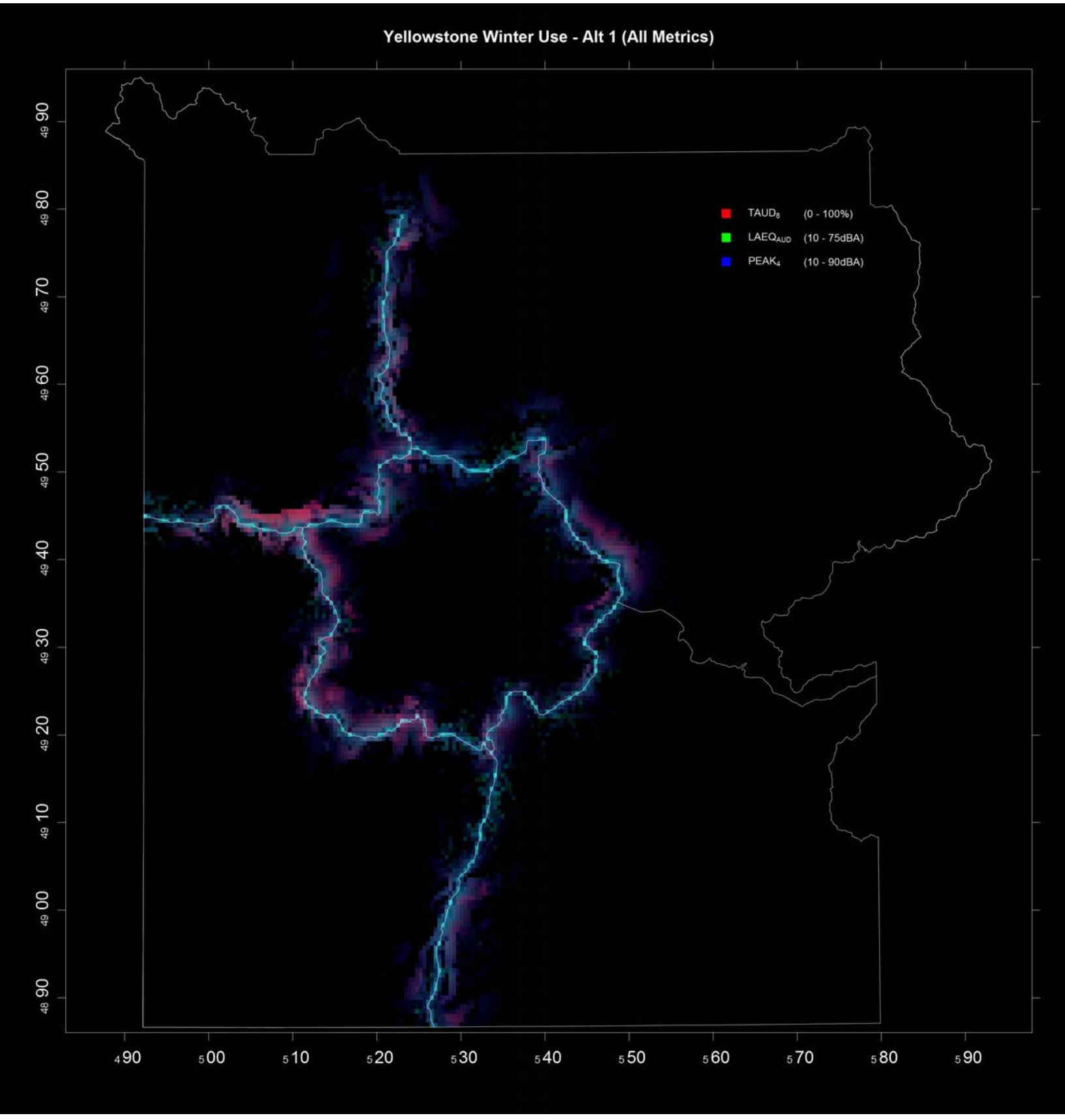
Yellowstone Winter Use - Alt 1 (All Metrics)
TAUD8 (0 - 100%)
LAEQAUD (10 - 75dBA)
PEAK4 (10 - 90dBA)
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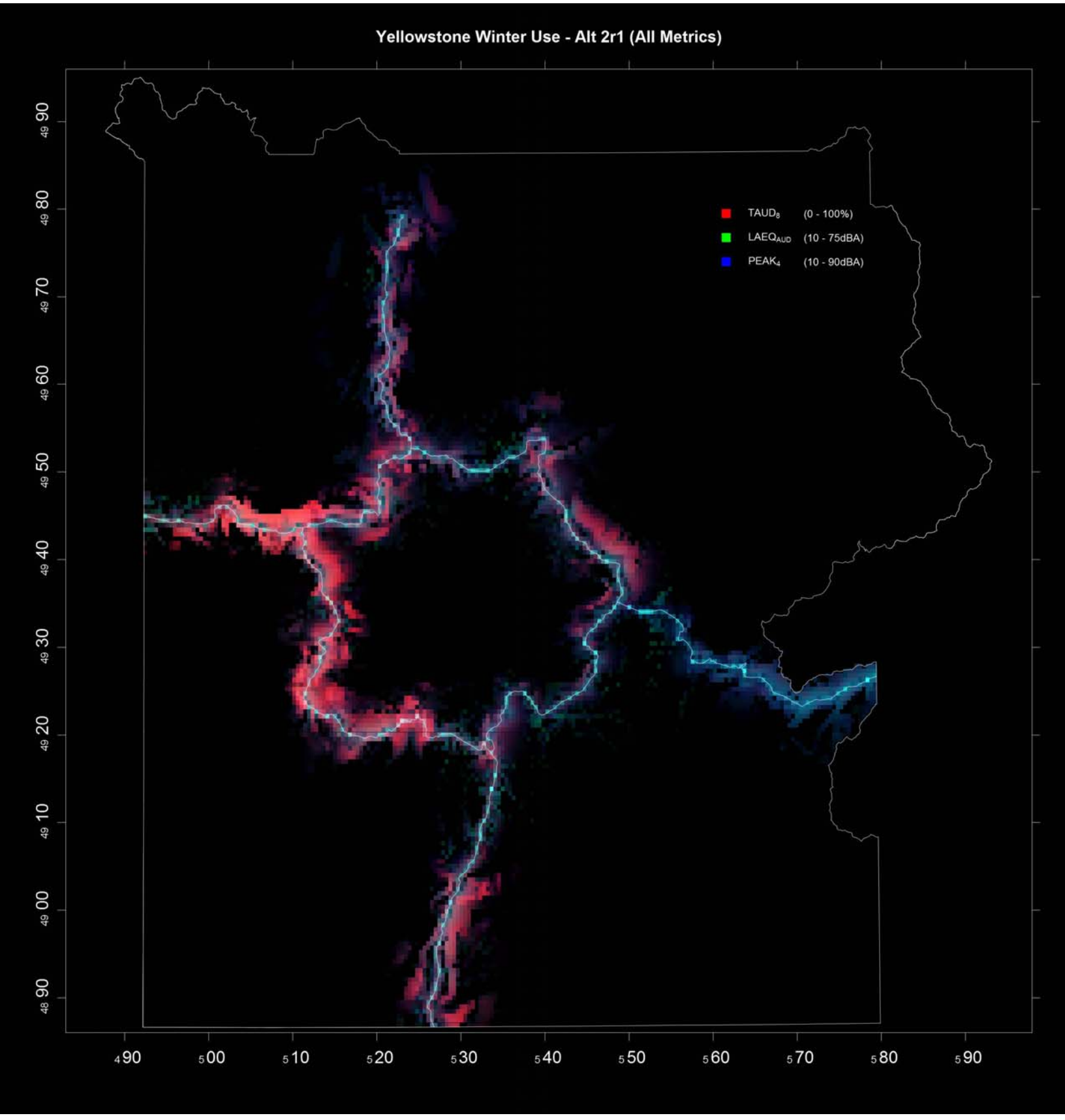
Yellowstone Winter Use - Alt 2r1 (All Metrics)
TAUD8 (0 - 100%)
LAEQAUD (10 - 75dBA)
PEAK4 (10 - 90dBA)
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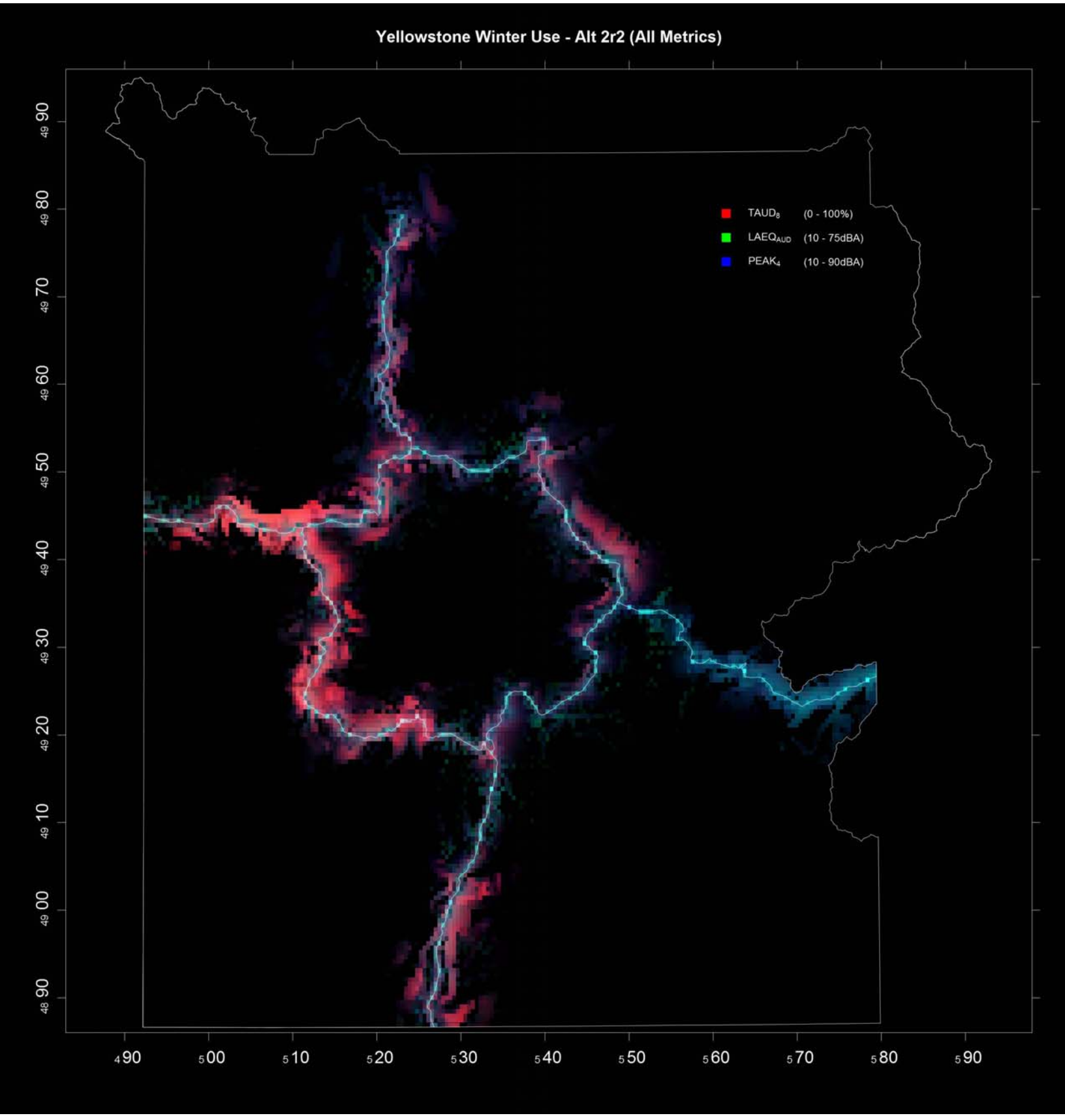
Yellowstone Winter Use - Alt 2r2 (All Metrics)
TAUD8 (0 - 100%)
LAEQAUD (10 - 75dBA)
PEAK4 (10 - 90dBA)
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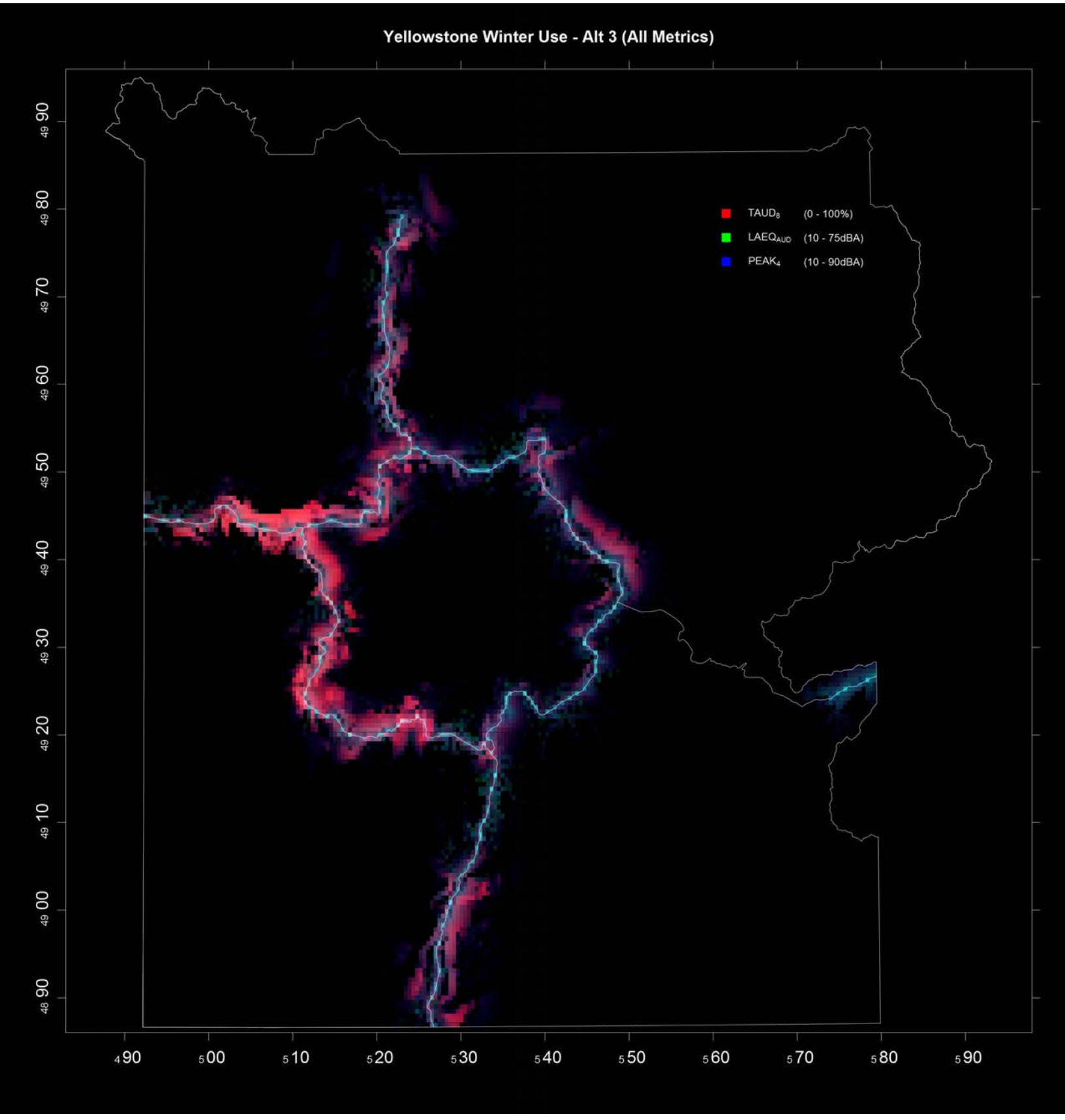
Yellowstone Winter Use - Alt 3 (All Metrics)
TAUD8 (0 - 100%)
LAEQAUD (10 - 75dBA)
PEAK4 (10 - 90dBA)
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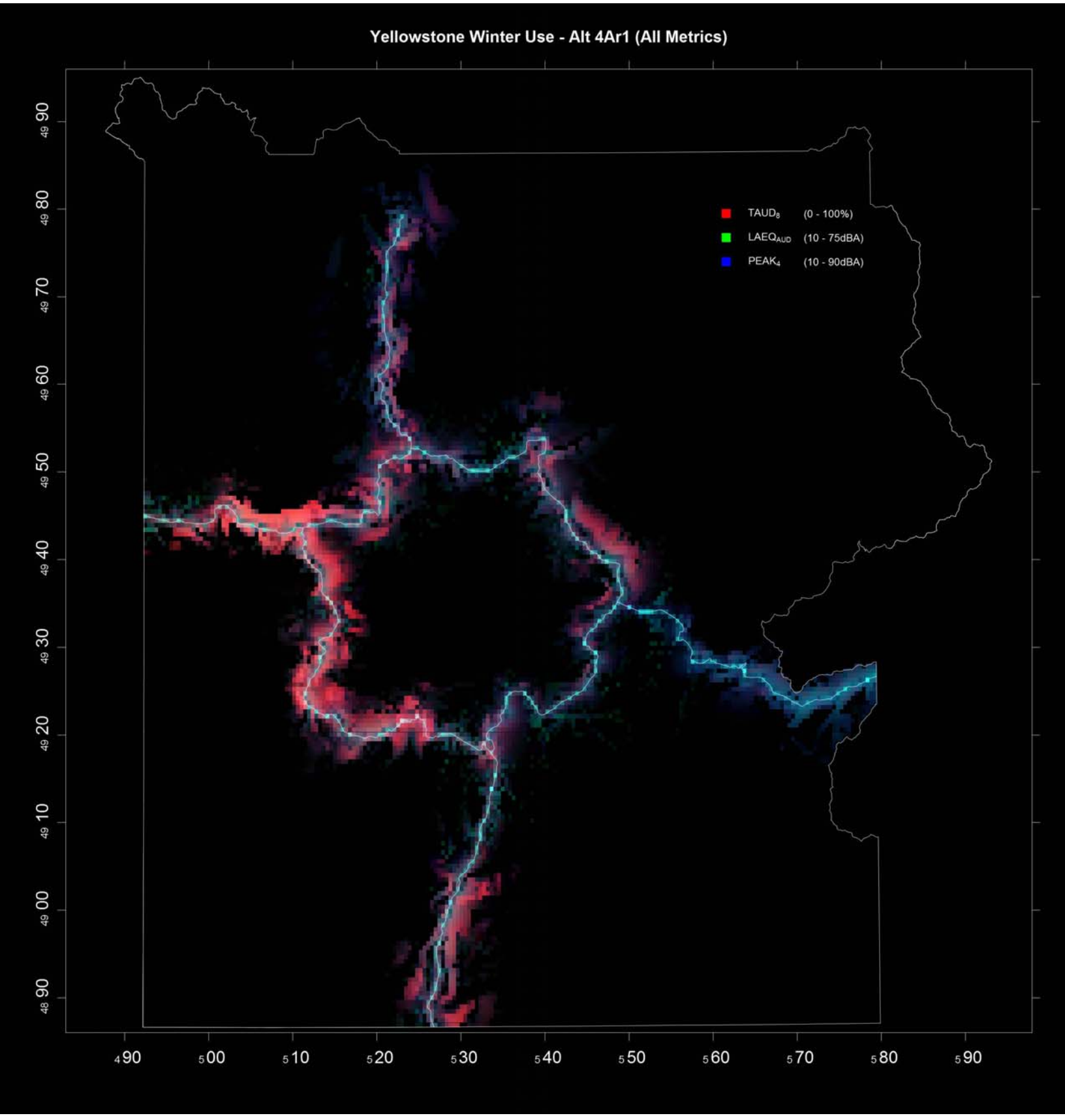
Yellowstone Winter Use - Alt 4Ar1 (All Metrics)
TAUD8 (0 - 100%)
LAEQAUD (10 - 75dBA)
PEAK4 (10 - 90dBA)
49 90
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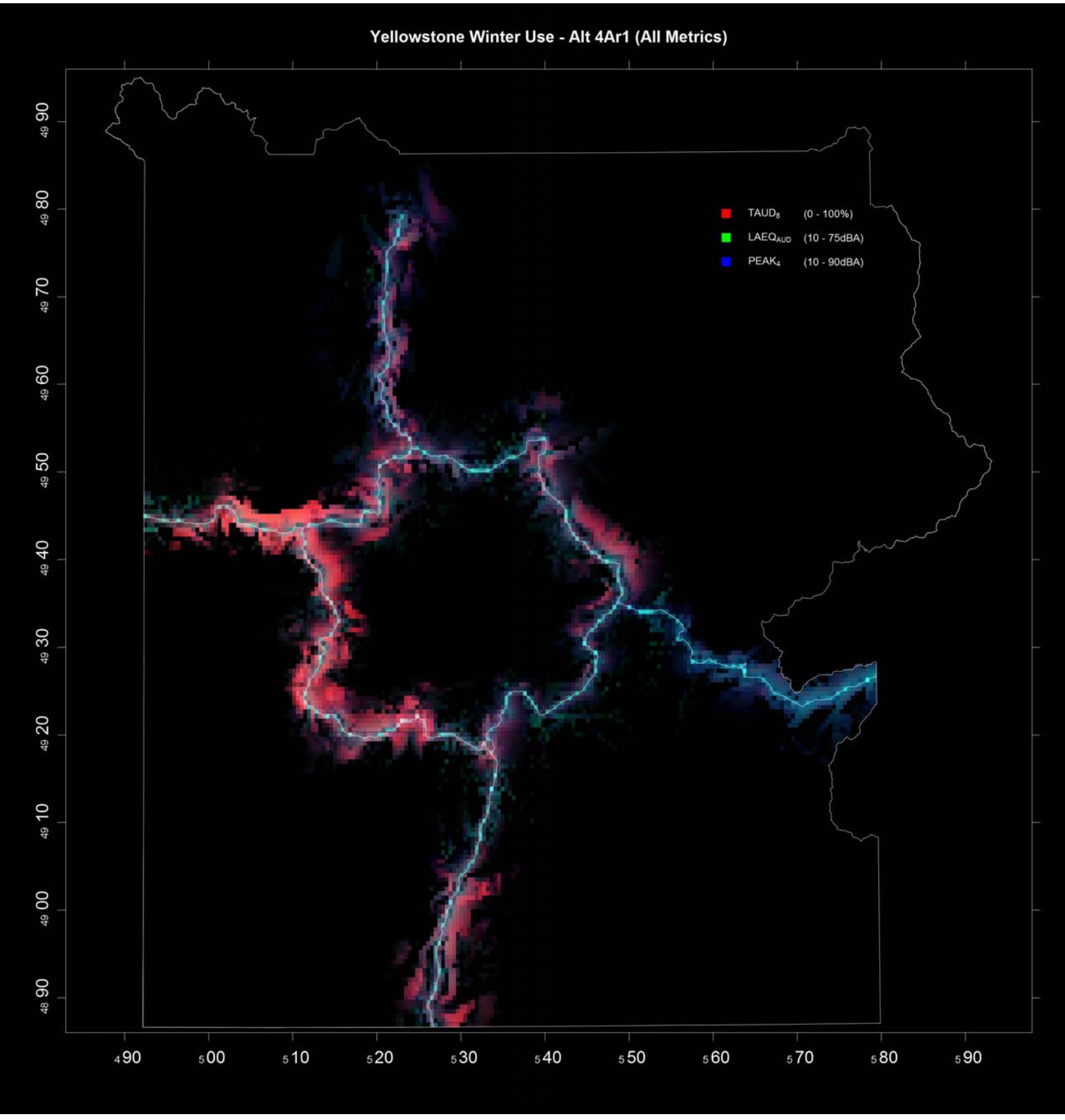
Yellowstone Winter Use - Alt 4Ar1 (All Metrics)
TAUD8 (0 - 100%)
LAEQAUD (10 - 75dBA)
PEAK4 (10 - 90dBA)
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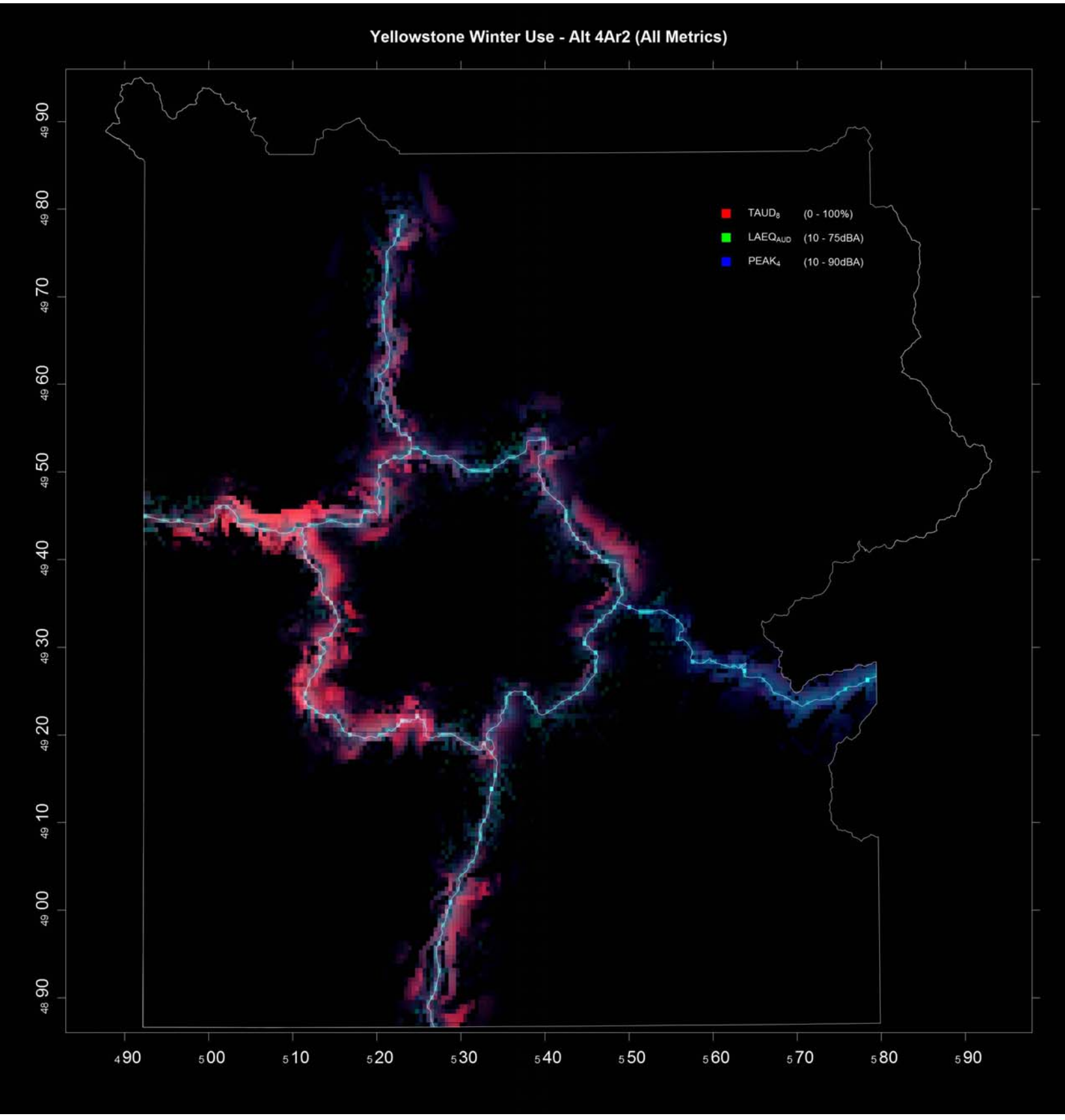
Yellowstone Winter Use - Alt 4Ar2 (All Metrics)
TAUD8 (0 - 100%)
LAEQAUD (10 - 75dBA)
PEAK4 (10 - 90dBA)
4990
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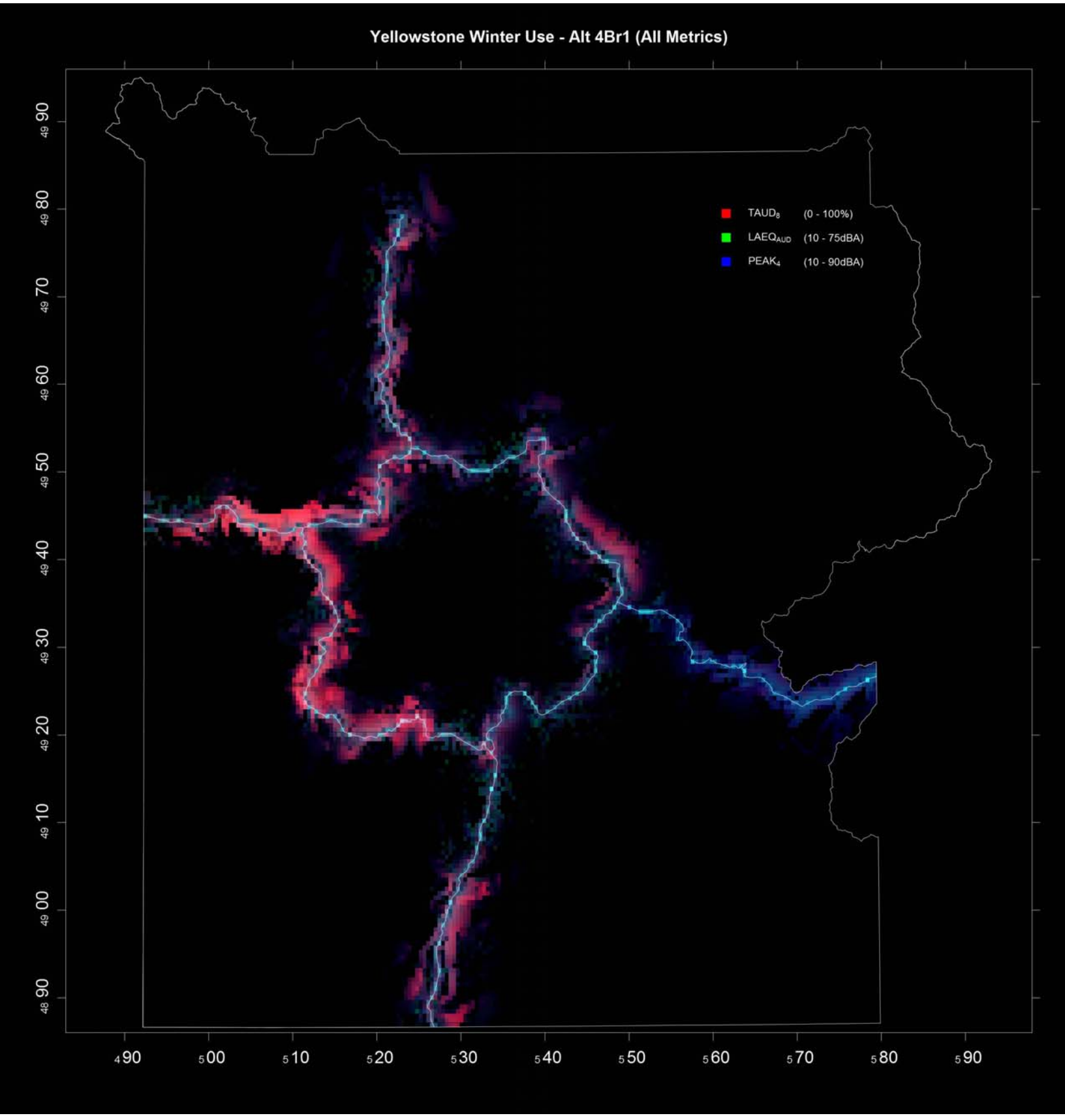
Yellowstone Winter Use - Alt 4Br1 (All Metrics)
TAUD8 (0 - 100%)
LAEQAUD (10 - 75dBA)
PEAK4 (10 - 90dBA)
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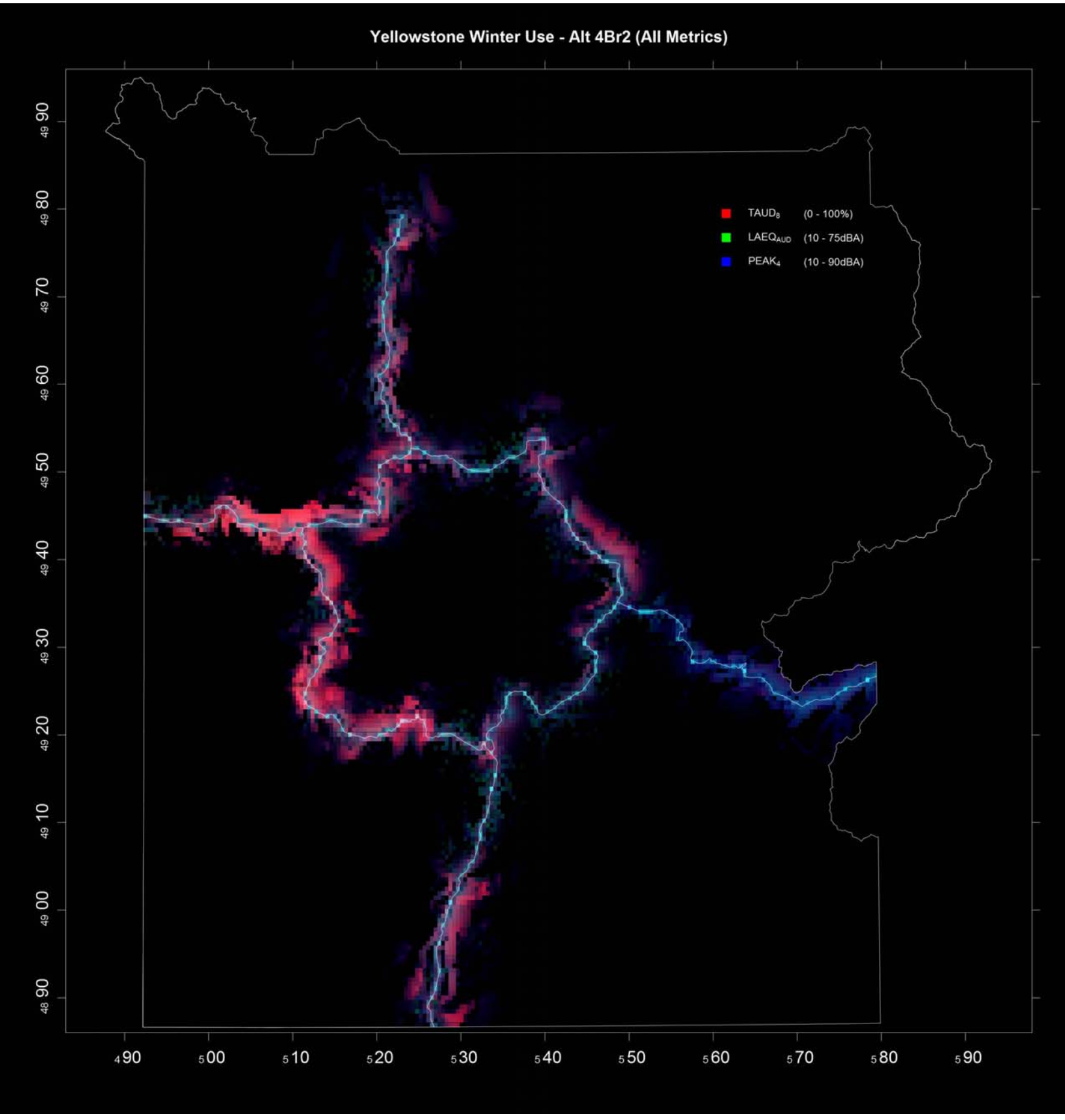
Yellowstone Winter Use - Alt 4Br2 (All Metrics)
TAUD8 (0 - 100%)
LAEQAUD (10 - 75dBA)
PEAK4 (10 - 90dBA)
4990
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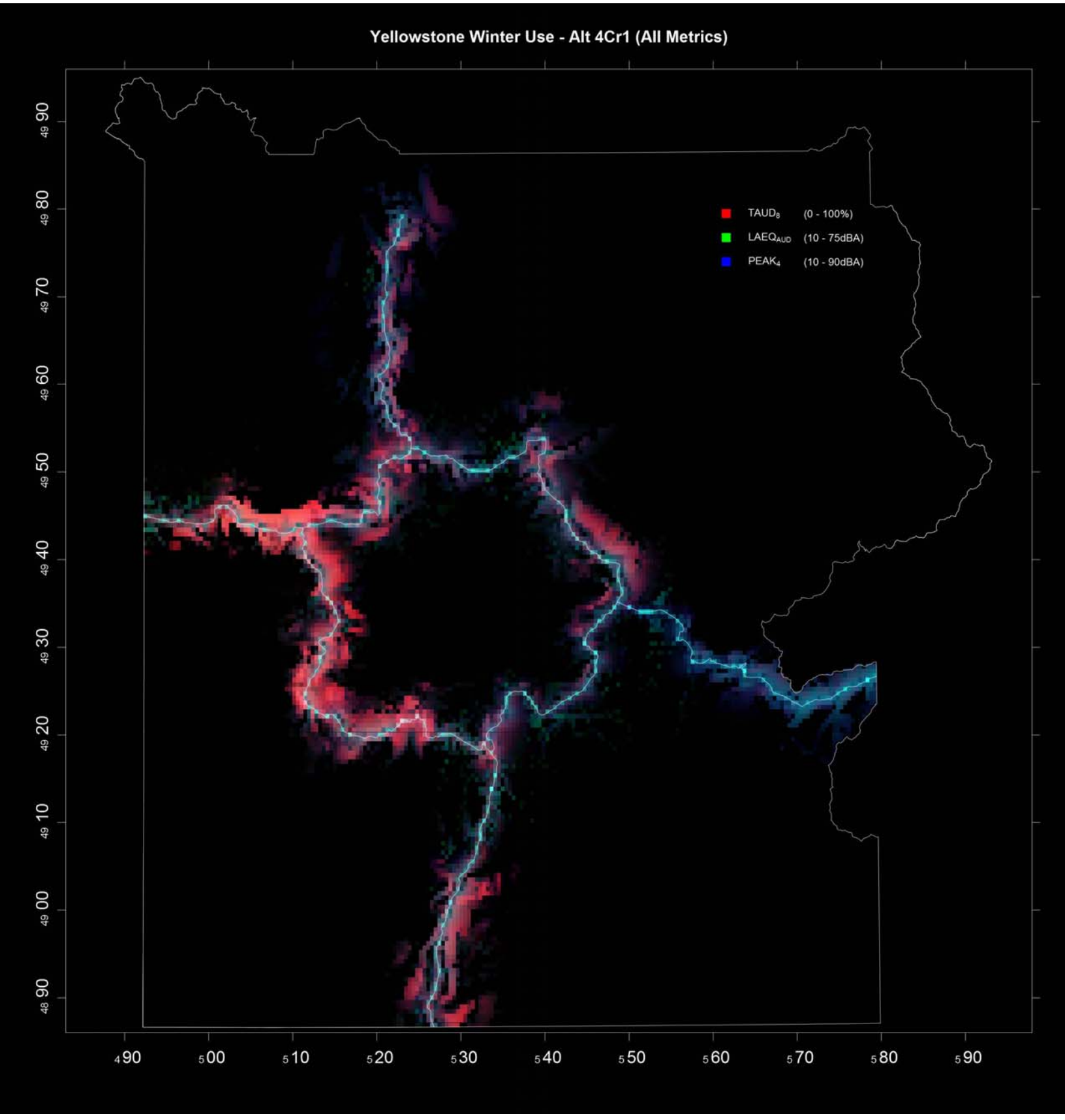
Yellowstone Winter Use - Alt 4Cr1 (All Metrics)
TAUD8 (0 - 100%)
LAEQAUD (10 - 75dBA)
PEAK4 (10 - 90dBA)
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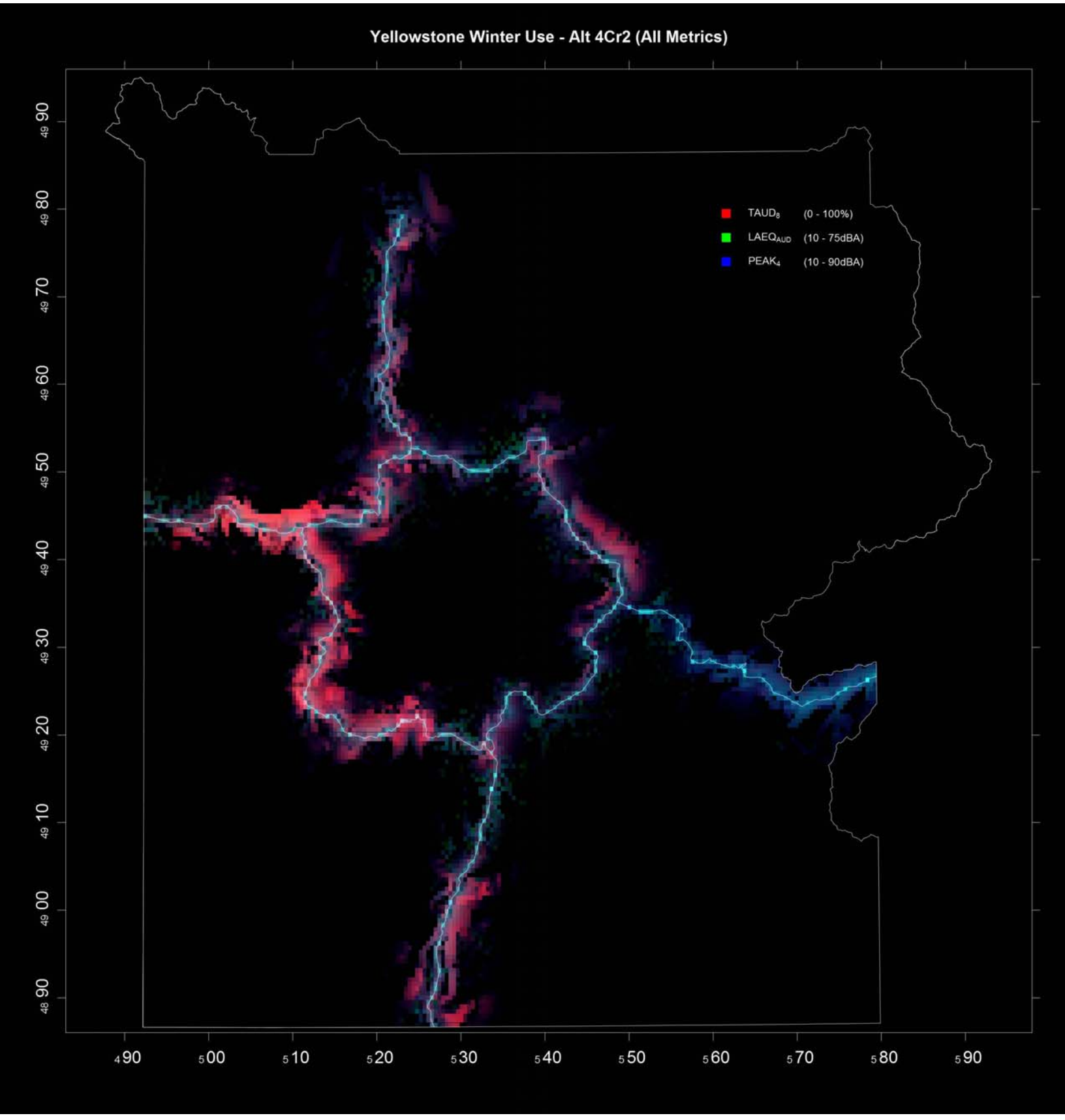
Yellowstone Winter Use - Alt 4Cr2 (All Metrics)
TAUD8 (0 - 100%)
LAEQAUD (10 - 75dBA)
PEAK4 (10 - 90dBA)
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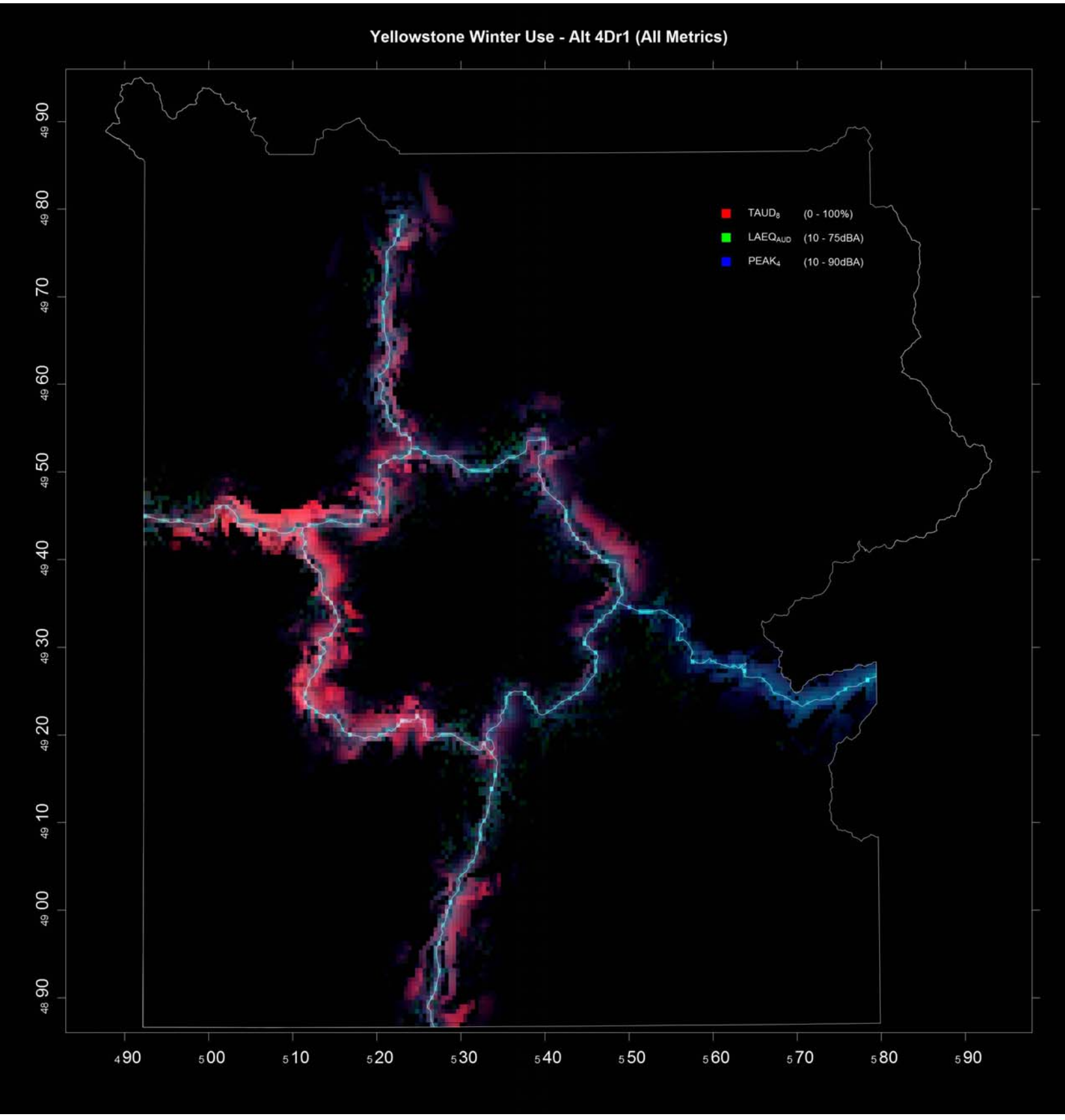
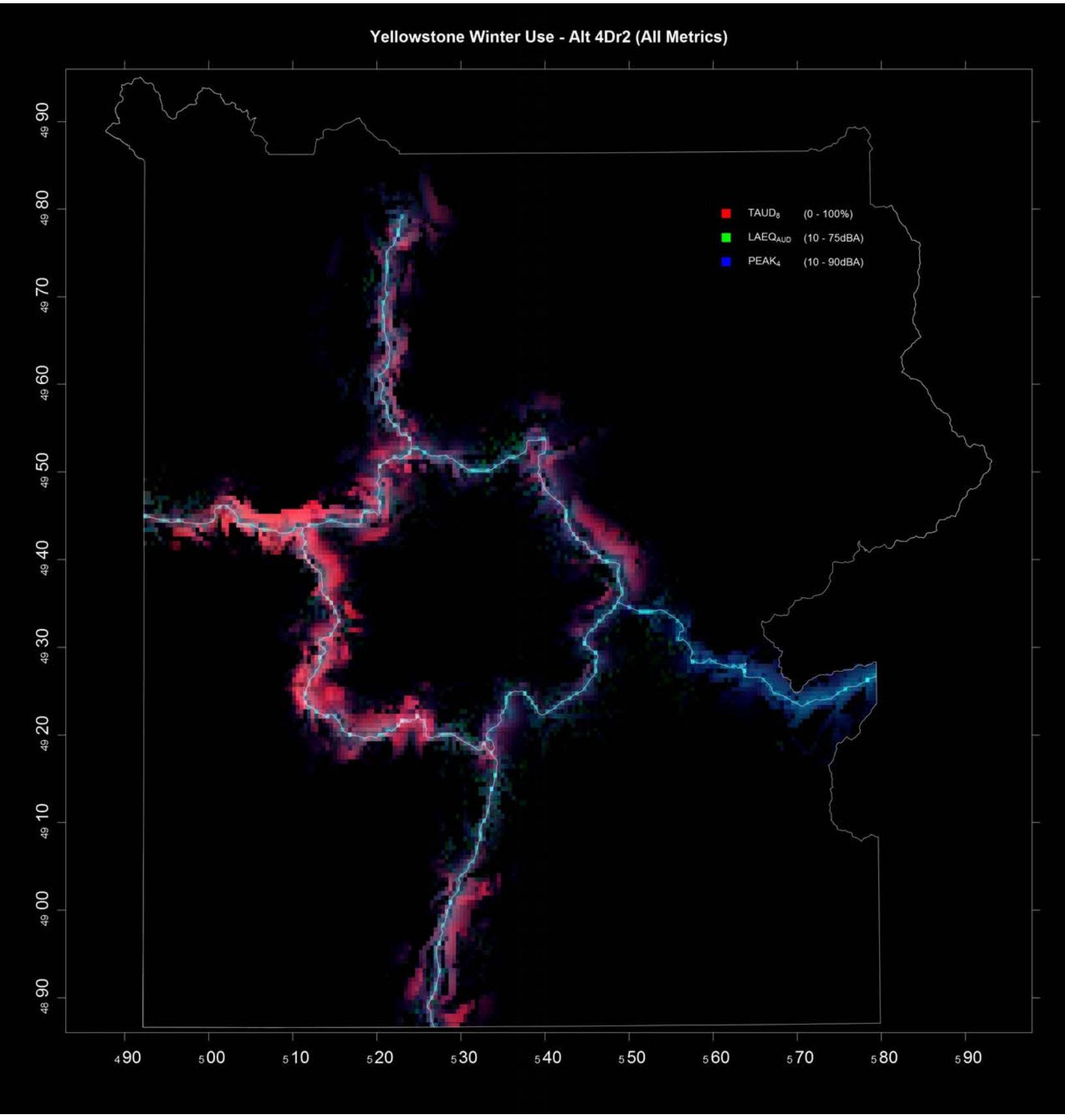
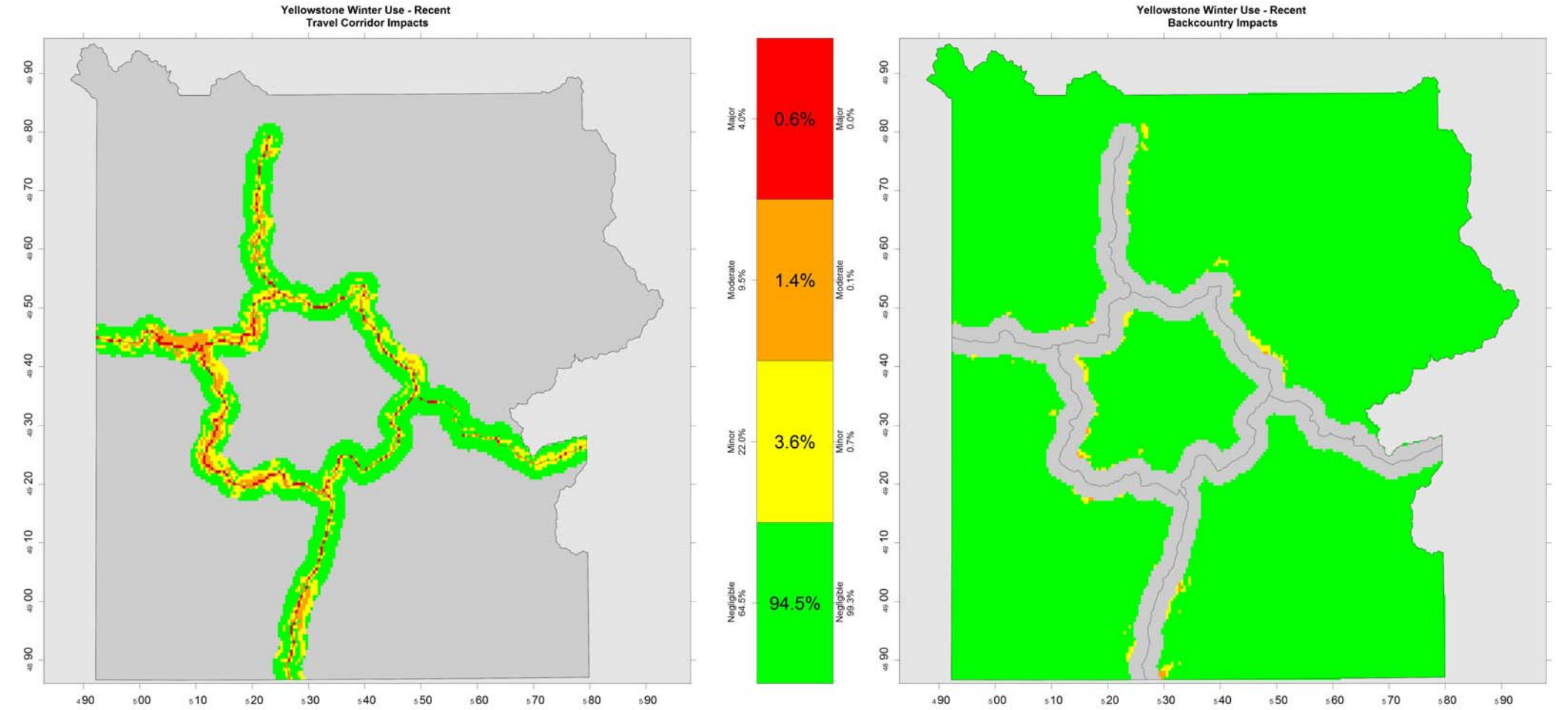
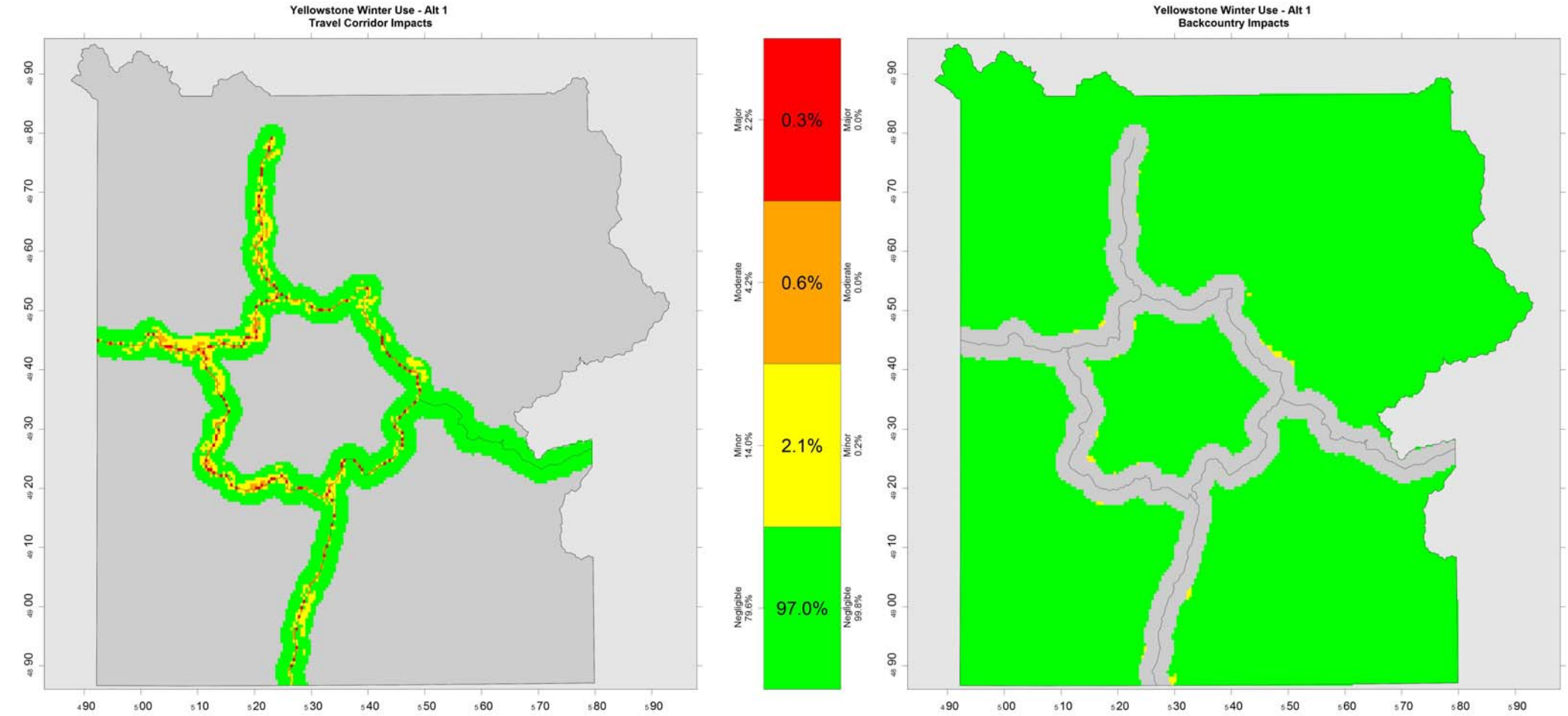
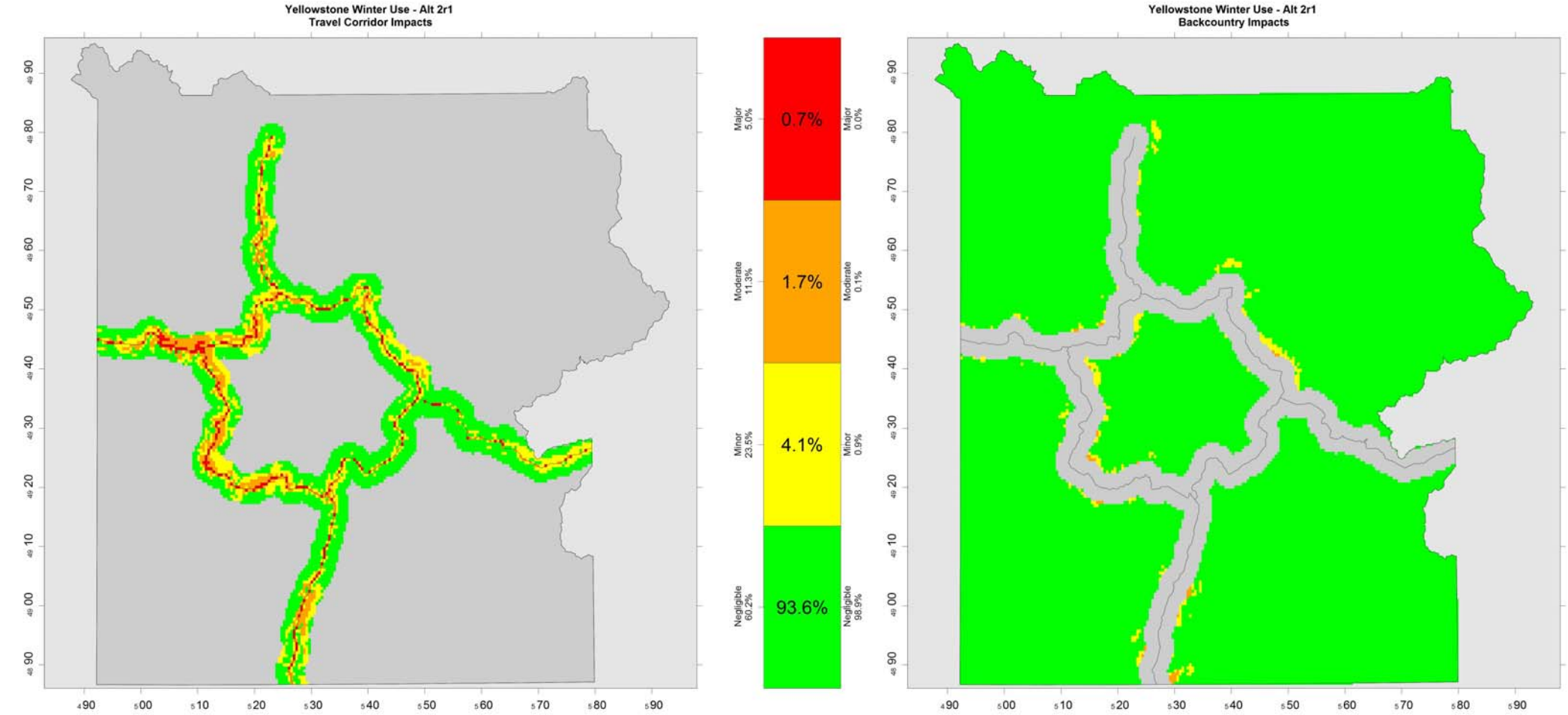
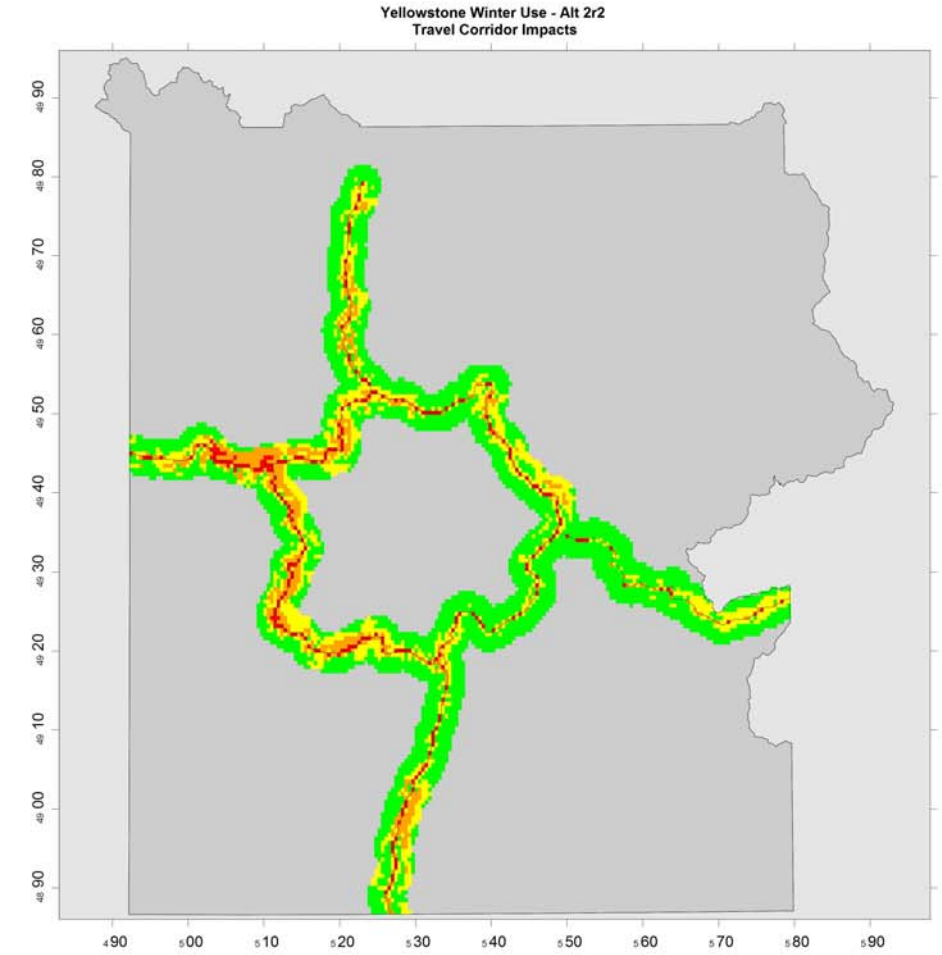

Yellowstone Winter Use - Alt 4Dr1 (All Metrics)
TAUD8 (0 - 100%)
LAEQAUD (10 - 75dBA)
PEAK4 (10 - 90dBA)
4990
5000
5010
5020
5030
5040
5050
5060
5070
5080
5090
4890
4900
4910
4920
4930
4940
4950
4960
4970
4980
4990

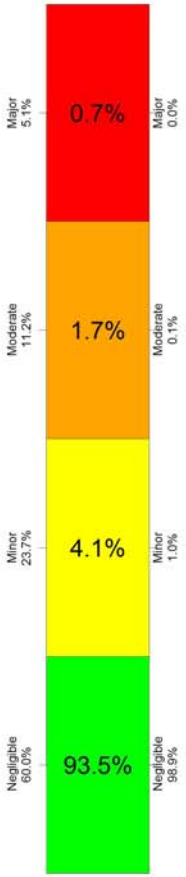

Yellowstone Winter Use - Alt 4Dr2 (All Metrics)
TAUD8 (0 - 100%)
LAEQAUD (10 - 75dBA)
PEAK4 (10 - 90dBA)
4990
5000
5010
5020
5030
5040
5050
5060
5070
5080
5090
4890
4900
4910
4920
4930
4940
4950
4960
4970
4980
4990

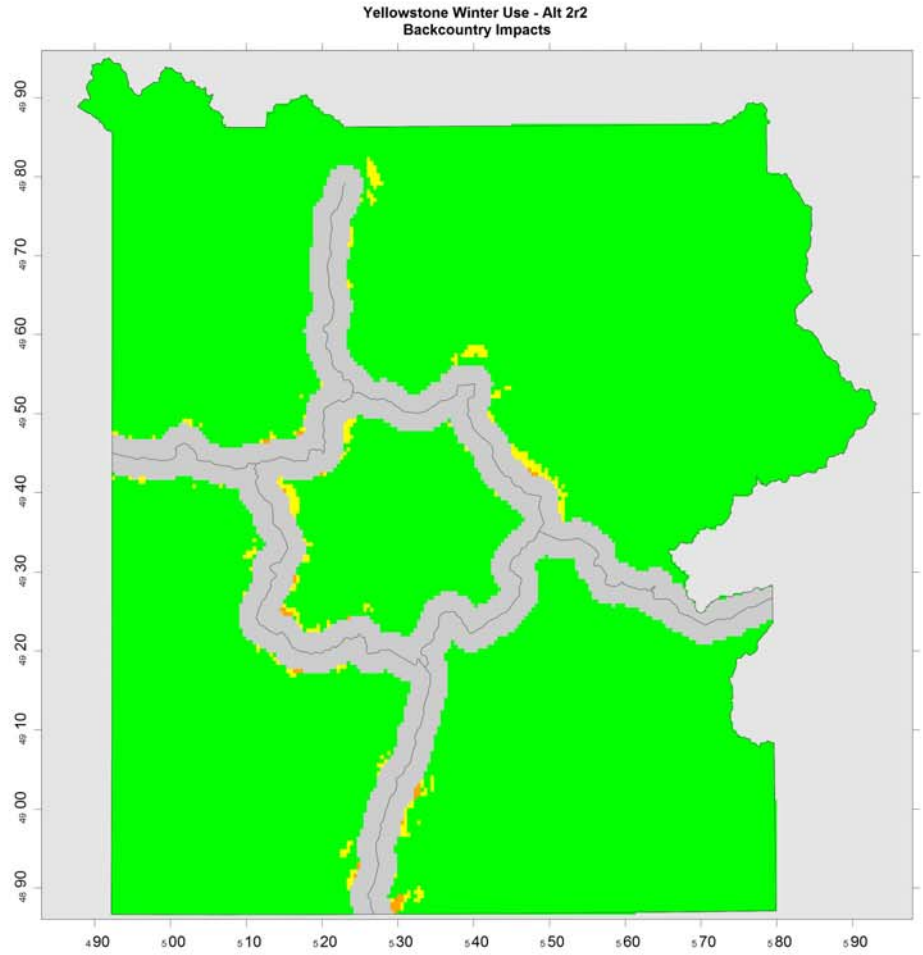

Yellowstone Winter Use - Recent
Travel Corridor Impacts
Major
4.0%
0.6%
Major
0.0%
Moderate
9.5%
1.4%
Moderate
0.1%
Minor
22.0%
3.6%
Minor
0.7%
Negligible
64.5%
94.5%
Negligible
99.3%
Yellowstone Winter Use - Recent
Backcountry Impacts

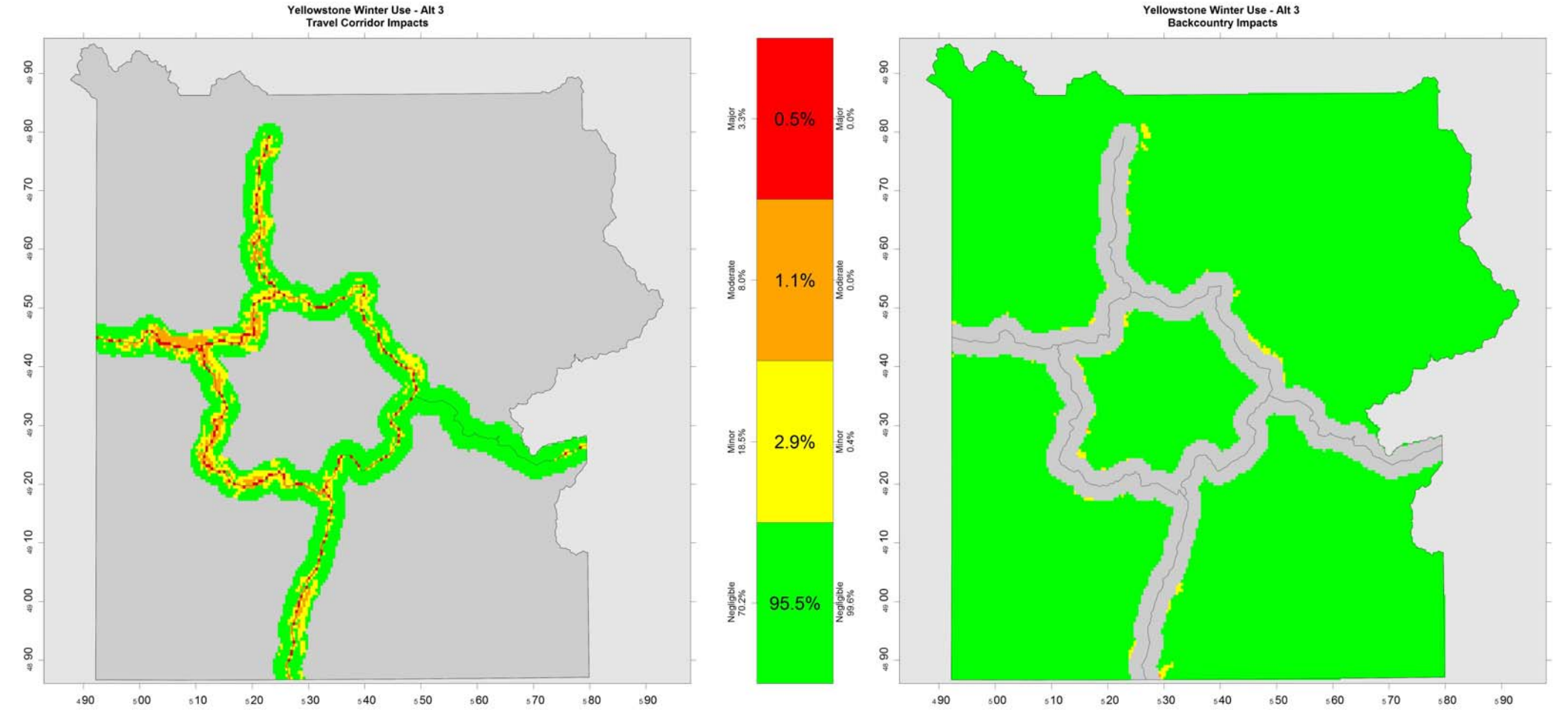

Yellowstone Winter Use - Alt 1
Travel Corridor Impacts
Major
2.2%
0.3%
Moderate
4.2%
0.6%
Minor
14.0%
2.1%
Negligible
79.6%
97.0%
Major
0.0%
Moderate
0.0%
Minor
0.2%
Negligible
99.8%
Yellowstone Winter Use - Alt 1
Backcountry Impacts

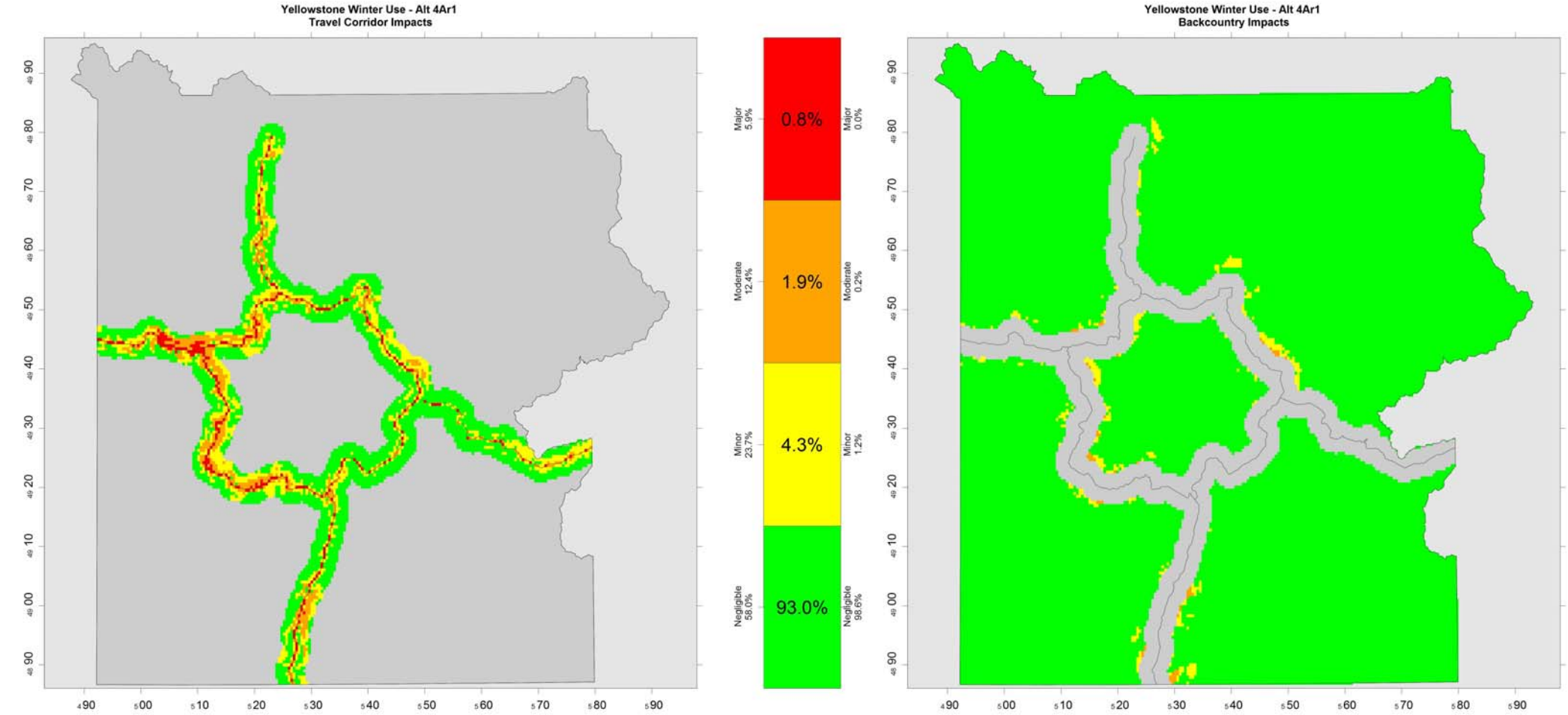

Yellowstone Winter Use - Alt 2r1
Travel Corridor Impacts
Major
5.0%
0.7%
Major
0.0%
Moderate
11.3%
1.7%
Moderate
0.1%
Minor
23.5%
4.1%
Minor
0.9%
Negligible
60.2%
93.6%
Negligible
98.9%
Yellowstone Winter Use - Alt 2r1
Backcountry Impacts

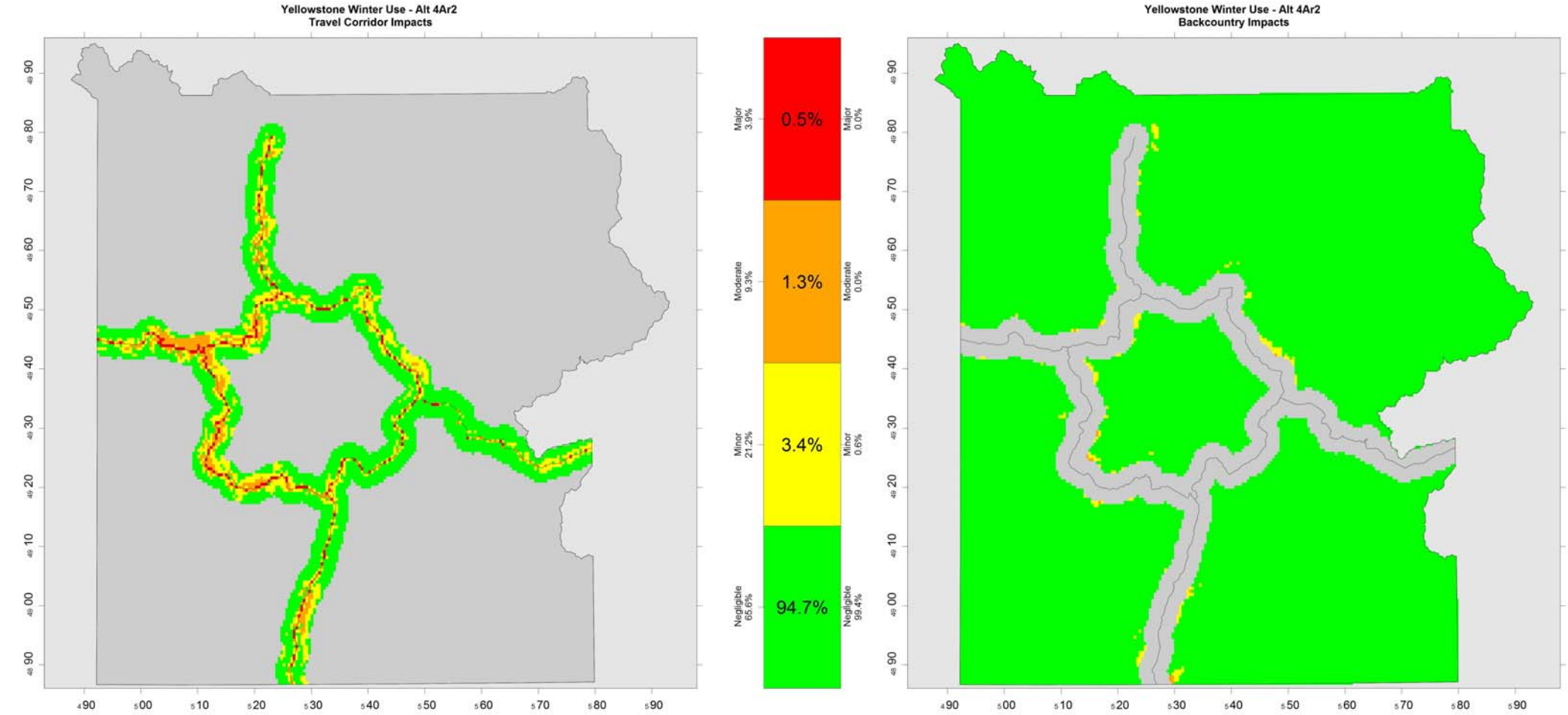

Yellowstone Winter Use - Alt 2r2
Travel Corridor Impacts
490
500
510
520
530
540
550
560
570
580
590
4990
5000
5010
5020
5030
5040
5050
5060
5070
5080
5090

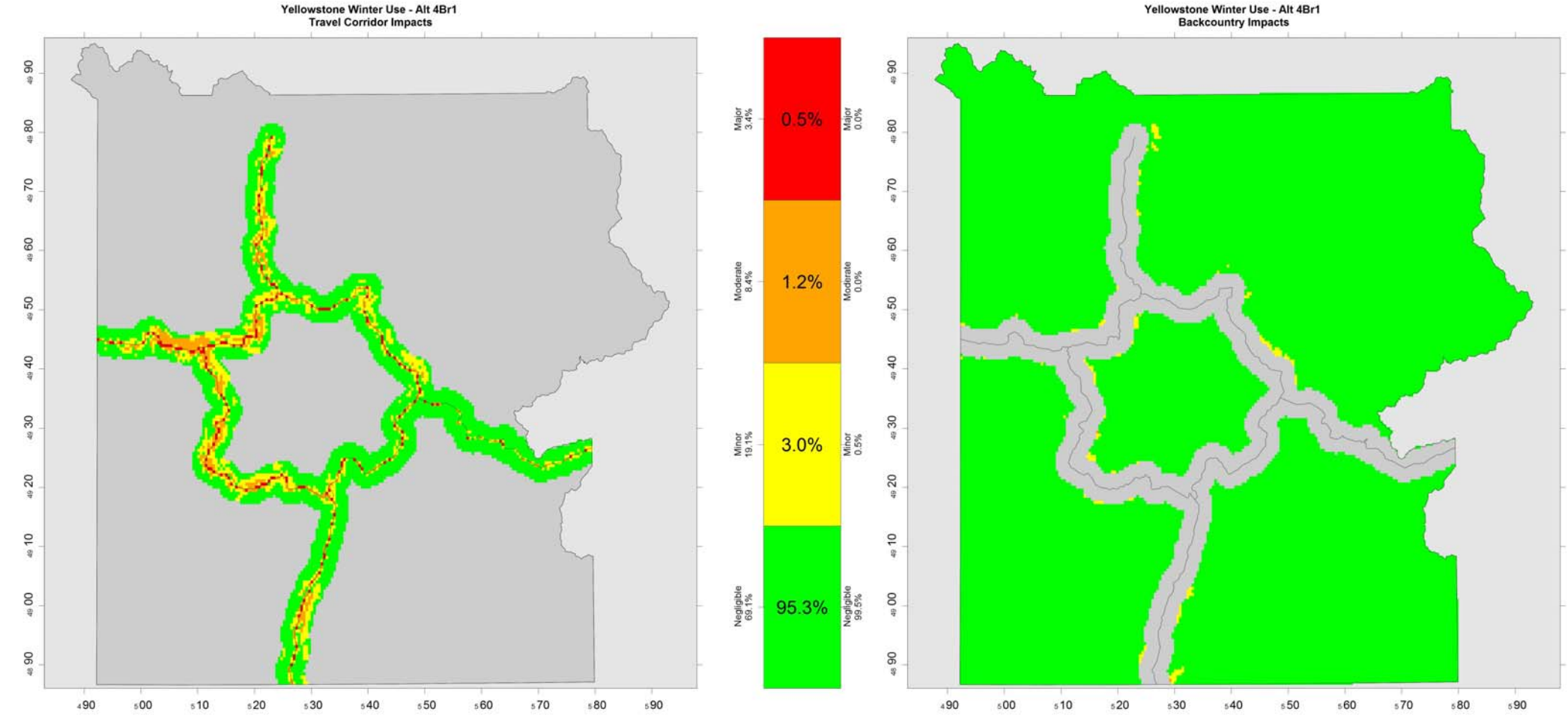

Major
5.1%
0.7%
Major
0.0%
Moderate
11.2%
1.7%
Moderate
0.1%
Minor
23.7%
4.1%
Minor
1.0%
Negligible
60.0%
93.5%
Negligible
98.9%

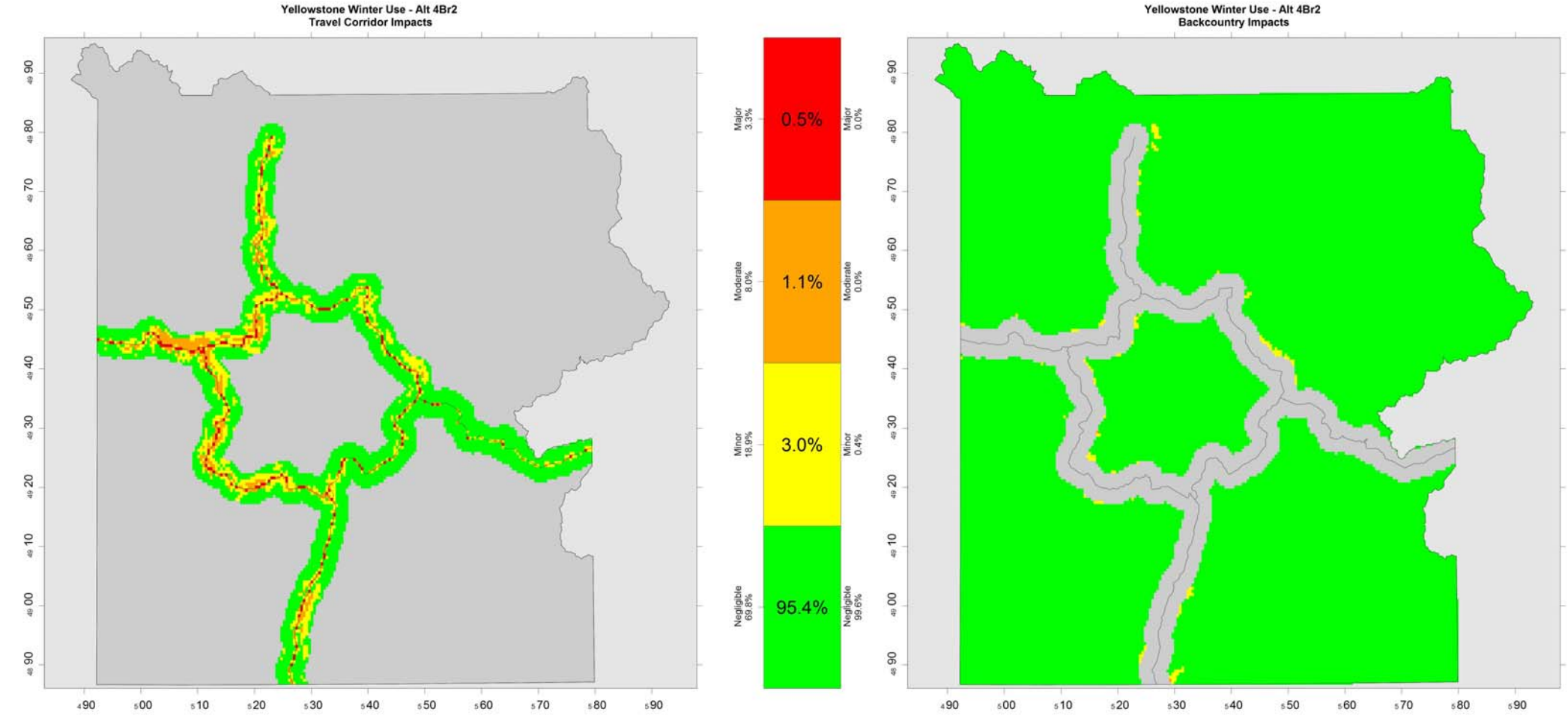

Yellowstone Winter Use - Alt 2r2
Backcountry Impacts
490
500
510
520
530
540
550
560
570
580
590
4990
5000
5010
5020
5030
5040
5050
5060
5070
5080
5090

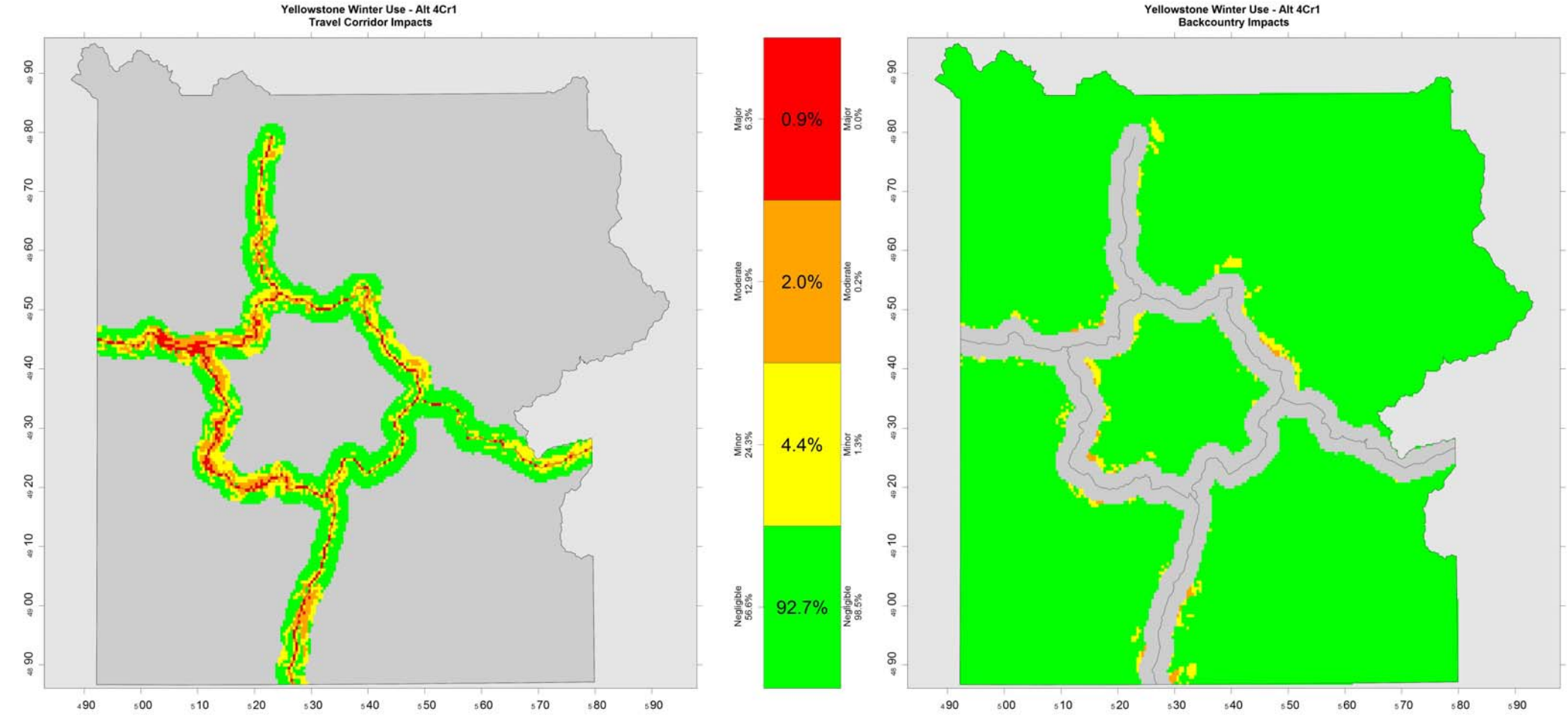

Yellowstone Winter Use - Alt 3
Travel Corridor Impacts
Major
3.3%
0.5%
Major
0.0%
Moderate
8.0%
1.1%
Moderate
0.0%
Minor
18.5%
2.9%
Minor
0.4%
Negligible
70.2%
95.5%
Negligible
99.6%
Yellowstone Winter Use - Alt 3
Backcountry Impacts

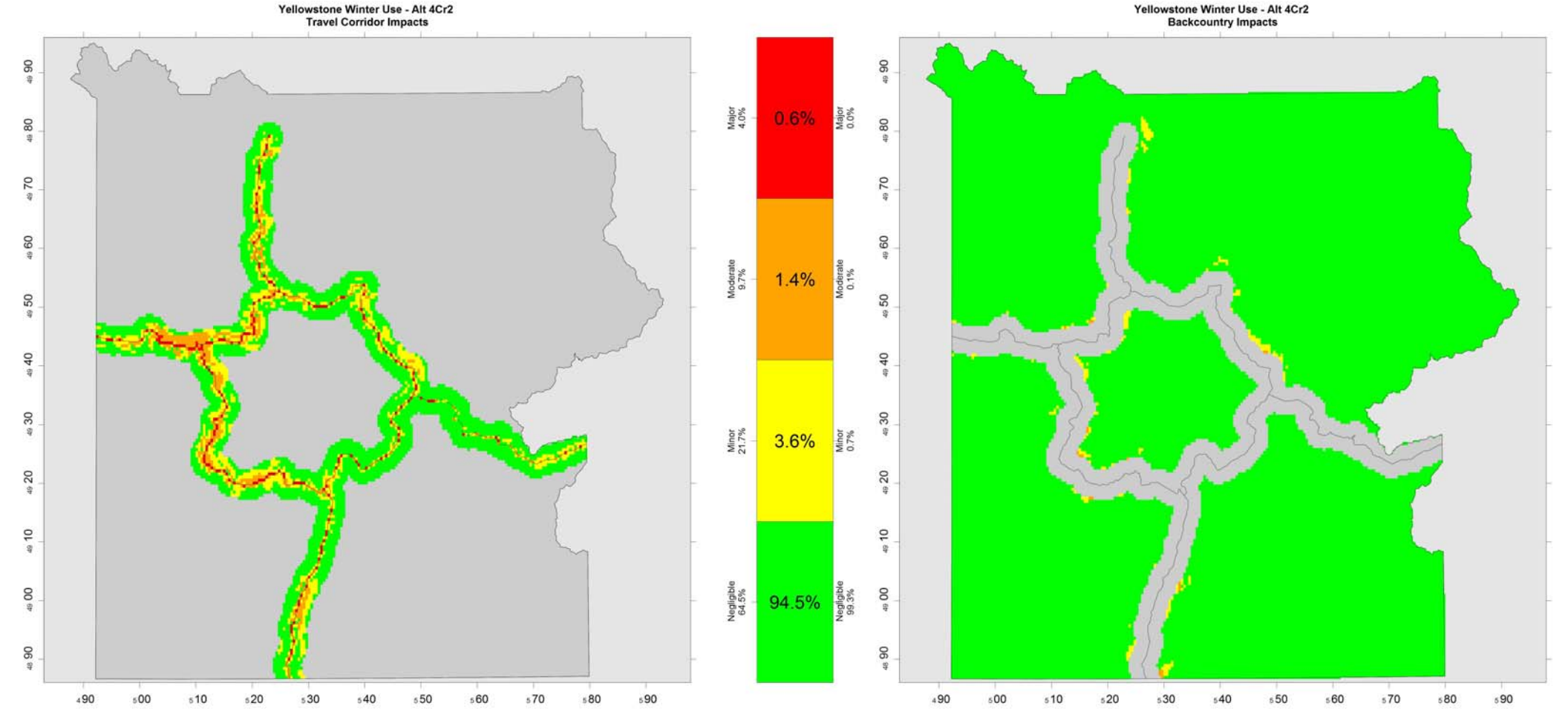

Yellowstone Winter Use - Alt 4Ar1
Travel Corridor Impacts
Major
5.9%
0.8%
Moderate
12.4%
1.9%
Minor
23.7%
4.3%
Negligible
58.0%
93.0%
Major
0.0%
Moderate
0.2%
Minor
1.2%
Negligible
98.6%
Yellowstone Winter Use - Alt 4Ar1
Backcountry Impacts

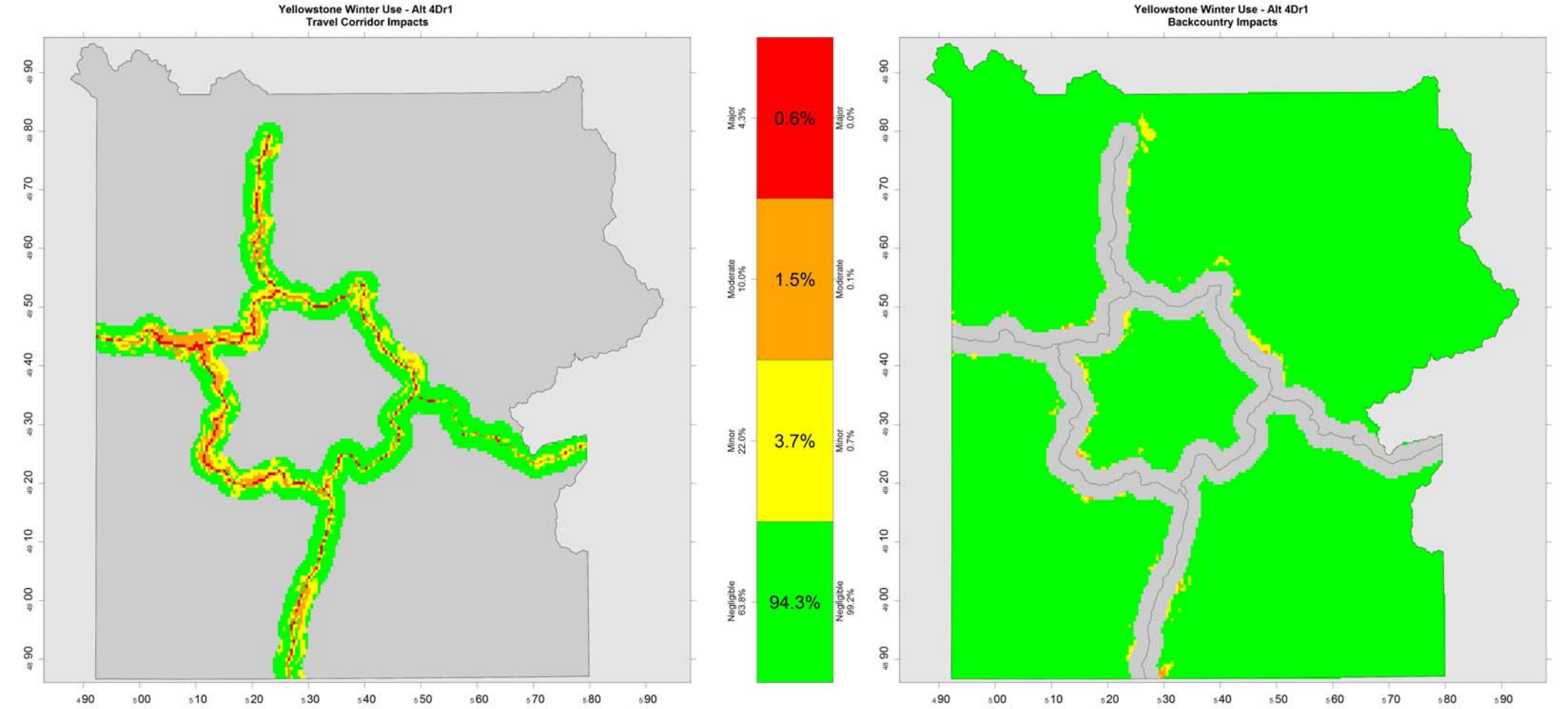

Yellowstone Winter Use - Alt 4Ar2
Travel Corridor Impacts
Major
3.9%
0.5%
Major
0.0%
Moderate
9.3%
1.3%
Moderate
0.0%
Minor
21.2%
3.4%
Minor
0.6%
Negligible
65.6%
94.7%
Negligible
99.4%
Yellowstone Winter Use - Alt 4Ar2
Backcountry Impacts

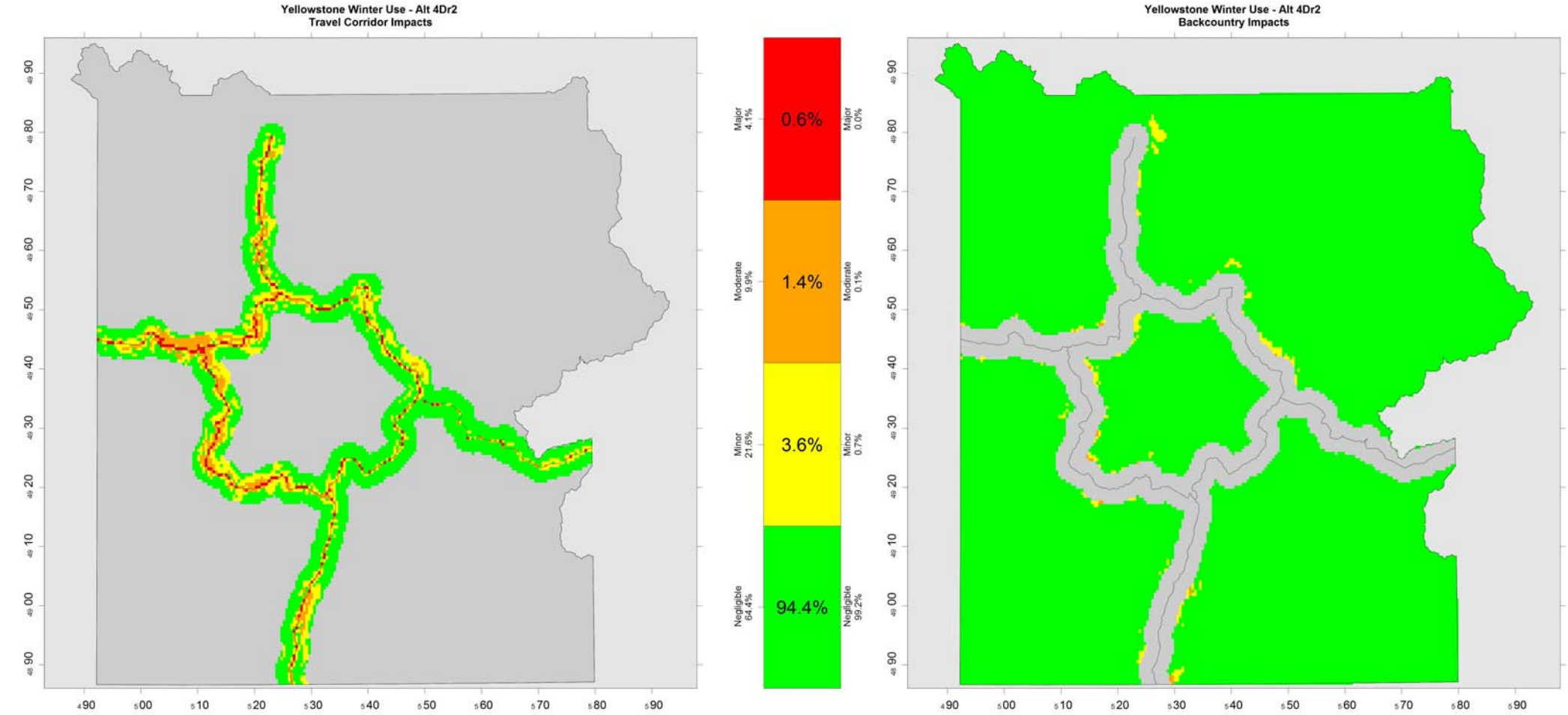

Yellowstone Winter Use - Alt 4Br1
Travel Corridor Impacts
Major
3.4%
0.5%
Moderate
8.4%
1.2%
Minor
19.1%
3.0%
Negligible
69.1%
95.3%
Major
0.0%
Moderate
0.0%
Minor
0.5%
Negligible
99.5%
Yellowstone Winter Use - Alt 4Br1
Backcountry Impacts

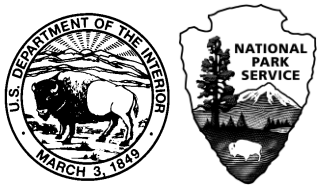

Yellowstone Winter Use - Alt 4Br2
Travel Corridor Impacts
Major
3.3%
0.5%
Major
0.0%
Moderate
8.0%
1.1%
Moderate
0.0%
Minor
18.9%
3.0%
Minor
0.4%
Negligible
69.8%
95.4%
Negligible
99.6%
Yellowstone Winter Use - Alt 4Br2
Backcountry Impacts


Yellowstone Winter Use - Alt 4Cr1
Travel Corridor Impacts
Major
6.3%
0.9%
Moderate
12.9%
2.0%
Minor
24.3%
4.4%
Negligible
56.6%
92.7%
Major
0.0%
Moderate
0.2%
Minor
1.3%
Negligible
98.5%
Yellowstone Winter Use - Alt 4Cr1
Backcountry Impacts


Yellowstone Winter Use - Alt 4Cr2
Travel Corridor Impacts
Major
4.0%
0.6%
Major
0.0%
Moderate
9.7%
1.4%
Moderate
0.1%
Minor
21.7%
3.6%
Minor
0.7%
Negligible
64.5%
94.5%
Negligible
99.3%
Yellowstone Winter Use - Alt 4Cr2
Backcountry Impacts


Yellowstone Winter Use - Alt 4Dr1
Travel Corridor Impacts
Yellowstone Winter Use - Alt 4Dr1
Backcountry Impacts
Major
4.3%
0.6%
Major
0.0%
Moderate
10.0%
1.5%
Moderate
0.1%
Minor
22.0%
3.7%
Minor
0.7%
Negligible
63.8%
94.3%
Negligible
99.2%


Yellowstone Winter Use - Alt 4Dr2
Travel Corridor Impacts
Major
4.1%
0.6%
Major
0.0%
Moderate
9.9%
1.4%
Moderate
0.1%
Minor
21.6%
3.6%
Minor
0.7%
Negligible
64.4%
94.4%
Negligible
99.2%
Yellowstone Winter Use - Alt 4Dr2
Backcountry Impacts



As the nation's principal conservation agency, the Department of the Interior has responsibility for most of our nationally owned public lands and natural resources. This includes fostering wise use of our land and water resources, protecting our fish and wildlife, preserving the environmental and cultural values of our national parks and historic places, and providing for the enjoyment of life through outdoor recreation. The department assesses our energy and mineral resources and works to ensure that their development is in the best interests of all our people. The department also promotes the goals of the Take Pride in America campaign by encouraging stewardship and citizen responsibility for the public lands and promoting citizen participation in their care. The department also has a major responsibility for American Indian reservation communities and for people who live in island territories under U.S. administration.

(2012)