National Park Service
U.S. Department of the Interior
Glacier National Park
Montana

BIOLOGICAL ASSESSMENT

For

THREATENED AND ENDANGERED SPECIES

Rebuild Sperry Chalet for the Next 100 Years

April 2018

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1.0 INTRODUCTION

The Endangered Species Act of 1973 (16 U.S.C. 153 *et seq*.), as amended (ESA or Act) in section 7(a)(1) directs federal agencies to conserve and recover listed species and use their authorities in the furtherance of the purposes of the Act by carrying out programs for the conservation of endangered and threatened species so that listing is no longer necessary (50 CFR §402). Furthermore, the Act in section 7(a)(2) directs federal agencies to consult (referred to as section 7 consultation) with the U.S. Fish and Wildlife Service (USFWS) or National Marine Fisheries Service (NMFS) when their activities "may affect" a listed species or designated critical habitat. Additionally, NPS Management Policy (2006) directs the NPS to "inventory, monitor, and manage state and locally listed species in a manner similar to its treatment of federally listed species to the greatest extent possible."

1.1 Purpose of this Biological Assessment

This biological assessment (BA) analyzes the potential effects of the proposed Rebuild Sperry Chalet for the Next 100 Years on the Glacier National Park (GNP or park) on federally listed threatened, endangered, proposed animal (wildlife, invertebrates, and fish) and plant species, and critical habitats, pursuant to section 7(a)(2) of the ESA. Federally listed threatened and endangered animal and plant species and critical habitat meeting the following criteria are addressed in this assessment:

1. known to occur in the Park based on confirmed sightings;
2. may occur in the Park based on unconfirmed sightings;
3. potential habitat exists for the species in the Park; or
4. potential effects may occur to these species.

1.2 Need for Re-Assessment Based on Changed Conditions

The findings of this Biological Assessment (BA) are based on the best data and scientific information available at the time of preparation. If new information reveals effects that may affect threatened, endangered, or proposed species or their habitats in a manner or to an extent not considered in this assessment, if the proposed action is subsequently modified in a manner that causes an effect that was not considered in this assessment, or if a new species is listed or habitat identified that may be affected by the action, a revised Biological Assessment will be prepared.

1.3 Current Management Direction

Current management direction for federally listed and proposed threatened and endangered species can be found in the following documents, filed at our office:

- Endangered Species Act of 1973, as amended (ESA or Act)
- 1916 NPS Organic Act
- NPS General Authorities Act of 1978
- NPS Management Policies 2006
- Migratory Bird Treaty Act (MBTA)
- National Environmental Policy Act (NEPA)
- Interagency Grizzly Bear Guidelines (USFS 1986), Grizzly Bear Recovery Plan, Bull Trout Recovery Plan, Lynx Conservation and Assessment Strategy

- Bear Management Plan (NPS 2010), Bear Management Guidelines (NPS 2010a), Action Plan to Conserve Bull Trout in GNP

1.4 Species List

In accordance with Section 7(c) of the Endangered Species Act (ESA), the United State Fish and Wildlife Service (USFWS) has determined as of November 17, 2017 (USFWS 2017) that the following threatened, endangered, and proposed candidate species may occur in the vicinity of the proposed action:

Table 1 – Threatened, Endangered, and Proposed Species That May Occur in the Vicinity of the Proposed Action

ESA Status	Species Common Name	Species Scientific Name
Threatened	Bull Trout*	*Salvelinus confluentus*
	Canada Lynx*	*Lynx canadensis*
	Grizzly Bear	*Ursus arctos*
	Spalding's Catchfly	*Silene spaldingii*
	Water Howellia	*Howellia aquatilis*
Proposed Threatened	Wolverine	*Gulo gulo*
	Meltwater Lednian Stonefly	*Lednia tumana*
	Western Glacier Stonefly	*Zapada glacier*
Candidate	Whitebark Pine	*Pinus albicaulis*

*Species associated with designated Critical Habitat

1.5 Threatened, Proposed, and Candidate Species

Implementation of the proposed federal action will have **NO EFFECT** on Spalding's catchfly, water howellia, bull trout, and meltwater lednian and western glacier stoneflies, and is **NOT LIKELY TO JEOPARDIZE** whitebark pine, and North American wolverine. The proposed action **MAY AFFECT, BUT IS NOT LIKELY TO ADVERSELY AFFECT** Canada lynx, and **MAY AFFECT, AND IS LIKELY TO ADVERSELY AFFECT** grizzly bear. Destruction or adverse modification of critical habitat for both the Canada lynx and bull trout is not likely.

1.6 Consultation Requirements and History

In accordance with the ESA, section 7, and NPS Management Policies 4.4.2.3, GNP is required to conduct formal consultation with the USFWS regarding the determination of adverse effects on threatened and endangered species. The park requests formal consultation with the USFWS regarding the determination of "may affect, and is likely to adversely affect" for grizzly bear. By policy, GNP requests written concurrence with respect the determination of "not likely to adversely affect" for Canada lynx and, if required, the determination of "no effect" for meltwater lednian stonefly, western glacier stonefly, and "not likely to jeopardize" for whitebark pine and North American wolverine.

In accordance with section 7 of the Endangered Species Act, the park advised the USFWS on March 2, 2018 about the project. On March 27th, the USFWS was advised about the compressed timeline to complete NEPA and Section 7. The USFWS agreed to meet the compressed schedule. The park determined that grizzly bears would be adversely affected under Section 7 of the ESA

due to the amount of construction activity and helicopter flights at the Sperry Chalet area. The USFWS will prepare a Biological Opinion and Incidental Take.

2.0 PROJECT DESCRIPTION

2.1 Project Purpose and Need

Sperry Chalet has offered an iconic visitor experience for millions of visitors (overnight, day-hikers and guided horse trips) and has been a major contribution to the stewardship and understanding of GNP and recommended wilderness by providing access into the more remote wilderness areas of the park including Sperry Glacier, Comeau and Gunsight Pass.

The chalet has served visitors to GNP continuously since 1914 with only a short break in service during WWII and another break in service between 1992 and 1999. Pre-fire, the Sperry Chalet hosted an average of just under 50 visitors per night, and operated approximately nine weeks each summer (July 10 – Sept 10, this varies annually). The NPS's 2005 Commercial Services Plan for GNP identified the Sperry Chalet visitor experience as a necessary and appropriate visitor service. The current 10-year concession contract is held by Belton Chalets, Incorporated, owned by a family who has operated the both Sperry and Granite Park Chalets for three generations.

The property's designation as an NHL affords the buildings the highest levels of preservation considerations. There is high risk of further damage or loss of this property from weather and weather related events such as avalanches and high snow loads. Taking no action is not a viable option because of the high values of this area (National Historic Landmark, other associated historic properties listed in the National Register of Historic Places and important visitor facilities). This facility also provides an iconic visitor experience that should be continued for the next 100 years.

2.2 Description of the Action Area

GNP is a rugged, mountainous reserve of 1,013,572 acres. Approximately 95% of the park (963,155 acres) has been recommended for inclusion in the National Wilderness Preservation System. NPS policy requires that recommended wilderness land be managed as wilderness until such time as Congress formally designates the land as wilderness or rejects the designation. The overall guiding philosophy for managing GNP is described in the park's General Management Plan (NPS 1999). According to the General Management Plan, most of the park would be managed "for its wild character and for the integrity of the Park's natural heritage, while traditional visitor services and facilities would remain." In 2017, visitation to GNP exceeded three million visitors.

The Sperry Chalet is located six miles by trail (limited to non-motorized access) from the Going-to-the-Sun Road, and below Sperry Glacier and Comeau Pass. It lies within a 25 acre enclave, excluded from the park's recommended wilderness, but surrounded by recommended wilderness. The dining hall and the dormitory contribute to the Great Northern Railway Buildings National Historic Landmark. In addition to the dormitory and the dining hall, the complex includes toilet/washroom facilities and two bunkhouses for NPS utility and trail crew staff (Figure 3). The Great Northern Railway constructed buildings (which include the Sperry Chalet dormitory and dining hall) throughout GNP. Combined, these buildings are the largest collection of Swiss

Chalet-style buildings in the United States. The Sperry Chalet had an overnight capacity of 50 persons, and an operating season of about two months annually.

The chalet is located near tree line at an elevation of 6,640 feet. The buildings are perched near the edge of a rocky ledge that drops approximately 220 feet to an alpine meadow and meandering stream system immediately below. A well-defined bench, perched among steeply sloping rock and vegetated faces, contains the developed area (approximately 10 acres) of the chalet operations. To the north and east of the chalet, a well-developed stand of subalpine fir and Engelmann spruce extends up as steep-sloping hillside form the lower stream bottom to the chalet bench. Approximately 140 yards across the bench, behind and to the east of the chalet, steep, rocky, mountainous terrain protrudes immediately upward toward the ridge crest leading to the 7,500' Lincoln Peak.

The area around Sperry Chalet has a variety of vegetation community types including subalpine fir (*Abies lasiocarpa*)/Englemann spruce (*Picea engelmannii*)/hellebore (*Helleborus*) forest, hellebore/groundsel (*Senecio vulgaris*)/sedge meadow (*Carex praticola*), rush (*Juncaceae*)/penstemon (*Penstemon*)/rock outcropping, dry subalpine fir/mock hazel forest, rocky ledge subalpine fir/krummholz/beargrass (*Xerophyllum tenax*)/penstemon associations.

From the south, a small stream enters the bench upon which the chalet is sitting and flows north across the area to the east of the chalet buildings. The stream passes a patrol cabin approximately50 yards to the east of the dining hall, and eventually drops down into Sprague Creek approximately 288 yards north of the chalet area. A water intake reservoir for chalet facilities captures snowmelt from a small spring a short distance up the hillside, approximately 250 yards to the east of the chalet dormitory. Water is piped under gravity pressure from this location to chlorination facility and a storage tank and then down to the Maintenance building, Comfort Station and the Dining Facility. A backup reservoir and pump vault are located on the stream crossing the bench approximately 60 feet below the tank. There are no wetlands in the immediate vicinity of the chalet other than the small amount of riparian habitat along the stream course.

The action area for the proposed action includes the 25 acre enclave surrounding the Sperry Chalet Complex as well as the helicopter flight path. The helicopter flight path will run from the material staging area through the McDonald Valley to the designated material drop area in the Sperry Complex (Figure 4). The material staging area would be located outside the park at a site to be determined by the contractor, possibly in the Highway 2 area. If a site cannot be found outside the park, helicopter operations would stage out of West Glacier in the vicinity of the NPS Wastewater Treatment Plant. The route would go through the McDonald Valley and could go over Snyder Ridge, up over Lake McDonald and then up Sprague Creek and/or up the Harrison Creek drainage from the Highway 2 area.

The Sprague Fire began as a lightning strike on August 10, 2017. During a critical fire day on August 31, 2017, high winds from the south and west pushed the Sprague fire to the head of the Sprague creek drainage. During the ensuing ember storm firefighters stationed at Sperry Chalet detected fire coming from within the dormitory building. Despite the efforts of on scene firefighters and the four helicopters assigned to the fire, the building was lost. Their efforts,

however, saved the other buildings associated with the complex including the historic dining hall, employee quarters, trails cabin, and the non-historic toilet facility.

Initial structural assessment of the Sperry Chalet Dormitory and Sperry Chalet Dining Hall was performed on September 12, 2017. Contract engineers found the dormitory's remaining four stone masonry walls to have retained their structural integrity after the fire on August 31. The Sperry Chalet Dining Hall sustained minimal damages to the roofing and decking. None of the other structures in the complex suffered damage. The forest around the complex is still green and intact despite the ember shower that was driven by winds from the valley below (Figure 1).

Figure 1. Unburned spruce hemlock forest around Sperry Chalet (2017).

In an effort to preserve the dormitory walls during the winter of 2018 from heavy snow loads that could collapse the walls and give the NPS the opportunity to develop appropriate preservation action plans; emergency stabilization of the ruin was carried out October 4-17, 2017. These temporary measures (based on recommendations from a contract structural engineer, NPS historic preservation specialists and concurred with by the State Historic Preservation Officer (SHPO) shored up masonry features including the remaining walls and chimneys and afforded some protection for the winter (Figure 2). The fire continued to burn late into the fall, and by November 3, 2017 the burn area included an estimated 18,000 acres.


Figure 2. Remaining Sperry dormitory structure (2017).

In two out of the last three years (2015, 2017), the surface water system that has served the Sperry Chalet complex for over 100 years has gone dry due to the disappearance of the nearby snowfields. The system has been rehabilitated over the years to make more efficient use of the meltwater but never reengineered for a new source. Water conservation in operations and pumping from a small pond near the campground (1/4 mile away) have served as interim measures during these low water years.

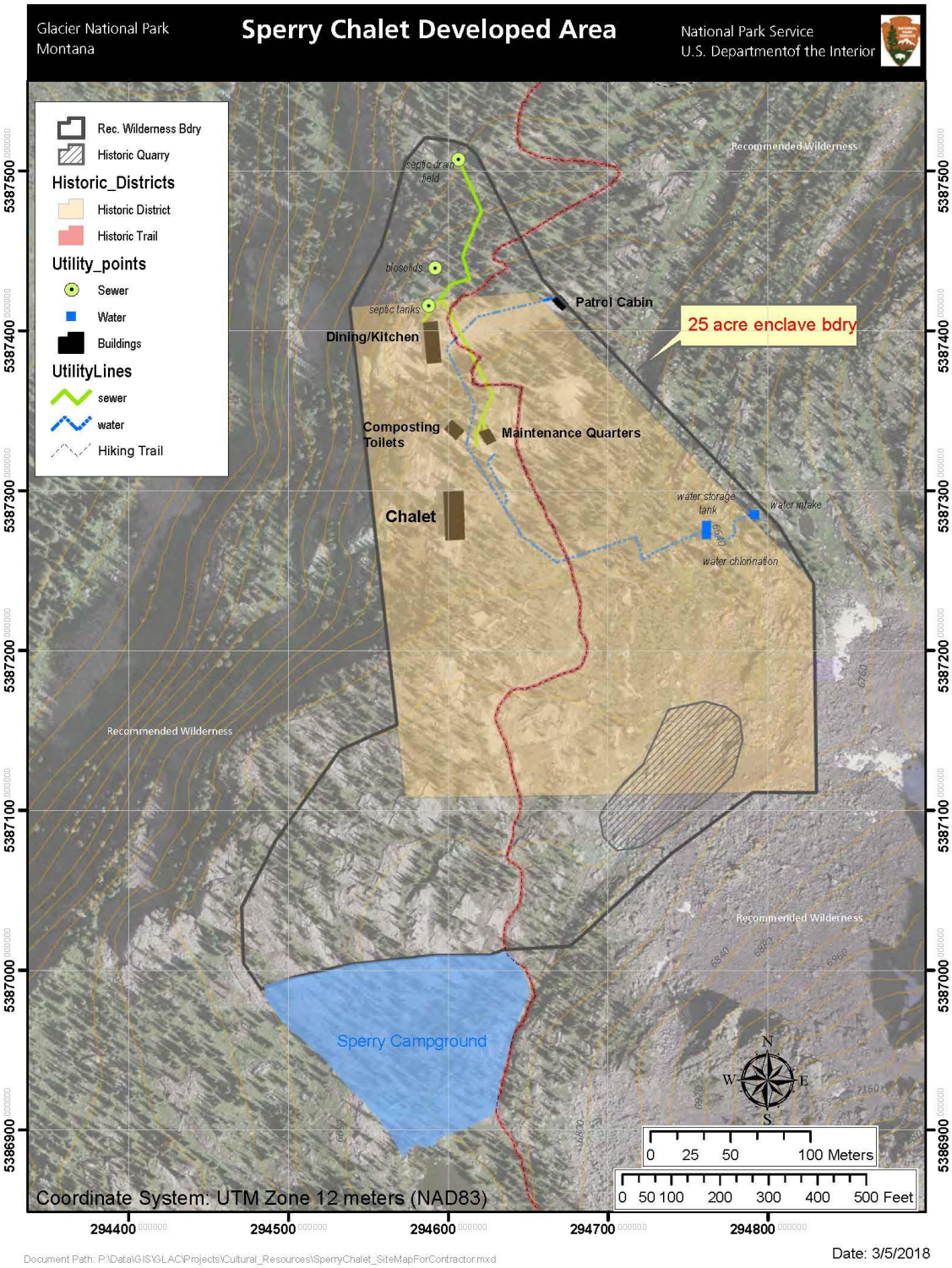

Figure 3. Sperry Chalet Developed Area

2.3 Proposed Action

The proposed action restores the chalet dormitory reflecting its period of significance (1914-1949) using the original walls and site and provides for some critical updates to current building codes and to improve life safety. The visitor experience and use would be very similar to what it has been for decades by using as much of the remaining historic fabric as possible. The Sperry Chalet has been an ongoing draw for visitors. It has provided overnight accommodations and amenities for visitors traveling through the area. The historic capacity and use of the chalet dormitory would be maintained at about 54 overnight guests and 11 staff members during the open season (approximately July 10-Sept 10). The open season is weather dependent and as a result varies from year to year depending on the conditions. Long-term use of the site (open season, number of guests, and types of services) under the proposed action would remain similar to what has been seen at the Sperry Dormitory for the previous 100 years.

Improvements would ensure its use for the next 100 years barring unforeseen events. This would include the installation of seismic walls to the dormitory to increase its ability (as much as possible) to withstand earthquakes and avalanches. Fire resistant materials would be used balanced with the use of historically appropriate finishes. The stairs to the second floor would be modified to reduce their steepness and meet code. Battery operated smoke detectors would be re-installed. One room would be made accessible for visitors with disabilities. Significant historic features still existing after the fire would be maintained/preserved.

Construction would be accomplished in two phases. Phase I would begin in the summer of 2018 and include building roof framing and decking and constructing the seismic lateral walls in the interior. Rock from the nearby original quarry (located within the 25 acre enclave) would be used to repair the remaining historic walls if necessary. Phase II would begin the following summer and complete the reconstruction of the dormitory including finishing the roof, constructing interior floors, framing, finishes and any remaining exterior work. It is anticipated that phase I & II would result in the degradation of approximately one acres of subalpine habitats through trampling and compaction from human use (camp sites, and construction activities) and material storage. The location of the construction crew campsite is in an area that has been previously used for camping by trail and maintenance crews and as a result has already experienced compaction. A nearby rock quarry would be used to provide rock materials for the repair of the external walls resulting in the temporary degradation of less than 0.25 acres of temporary open rock habitat.

During both construction seasons, the Sperry Backcountry Campground and trails from Lake McDonald and Gunsight would remain open to visitors. The Sperry toilet facility would remain open to visitor use. The horse concession may continue to offer day rides to the chalet complex subject to restrictions from construction activity including increased stock use on the trail and frequent helicopter activity. All visitor use of the area may be subject to temporary closures during the 2018 and 2019 seasons for safety reasons. Signs would be placed at the trailheads informing hikers of conditions, restricted areas and temporary closures.

Phase I construction would be accomplished by a 12-25 person crew, including a project manager, resource monitor, sanitation employee and support staff. Crews would live on-site for approximately 12 weeks. Construction activity would occur from July 1 through end of October.

Crew members would camp within the boundaries of the historic district in temporary tents on platforms near the remaining structures (Figure 4). Meals would be prepared and provided either in the dining room or in a hard-sided temporary structure that would be flown up. Construction materials would also be brought in by mule and flown in by helicopter sling loads. Approximately 400,000 pounds or 200 tons of materials and equipment would be flown in. Helicopters carrying crew members and others as required would land at the site in the designated landing zone. To reduce noise impacts on wilderness and other backcountry sites, the transport helicopter would fly over busy roads, at the maximum safe altitude possible while remaining below the surrounding ridge line in the valley where it is flying. Where possible, a minimum 2000 foot altitude would be maintained per FAA Advisory Circular 91-36D Visual Flight Rules (VFR) Flight Near Noise-Sensitive Areas. To reduce noise levels to wildlife, hikers in the area, backpackers camping nearby and wilderness character in the adjacent recommended wilderness, construction materials and other items such as food that don't require helicopter transport, would be carried up by stock. Stock will remain on trail and in designated stock areas (as it standard with current stock use) within the Sperry Complex to minimized the effect of soil compaction and waste accumulation. Stock will not be housed within the Sperry Complex over night as trips can be completed within the day. Approximately 150-220 helicopter trips (depending on the size of the helicopter) would be required for construction materials. Approximately 35-60 pack string trips would bring the remaining construction materials and food for the crews for Phase I during the summer of 2018. A staging area for helicopter operations would be located outside the park at a site to be determined by the contractor. If a site can't be found outside the park, helicopter operations would stage out of West Glacier in the vicinity of the NPS Wastewater Treatment Plant. The helicopter would deliver at a designated landing zone at Sperry Chalet (Figure 4).

Phase II construction activities would result in similar effects to habitats as described in phase I. Construction activities will be located in the same area and no additional areas would be used. Phase II will require a similar size crew and support. The construction period would be from June 1-October 30, 2019. Approximately 200-300 helicopter flights would transport construction materials that could not be brought in by stock and 35-60 pack string trips would bring in the rest of the materials and food. Helicopter operations would be based in the same area as used in Phase I.

Design. The National Park Service is utilizing the comprehensive photo documentation of the building, as well as architectural drawings from 1913, 1940, 1996, 2011, and the 2017 stabilization drawings to complete this rebuild. Much of this information was condensed into the *Sperry Chalet Dormitory Historic Systems and Finishes* (2017). The building's shell provides the outline for interior and exterior reconstruction and preservation treatments.

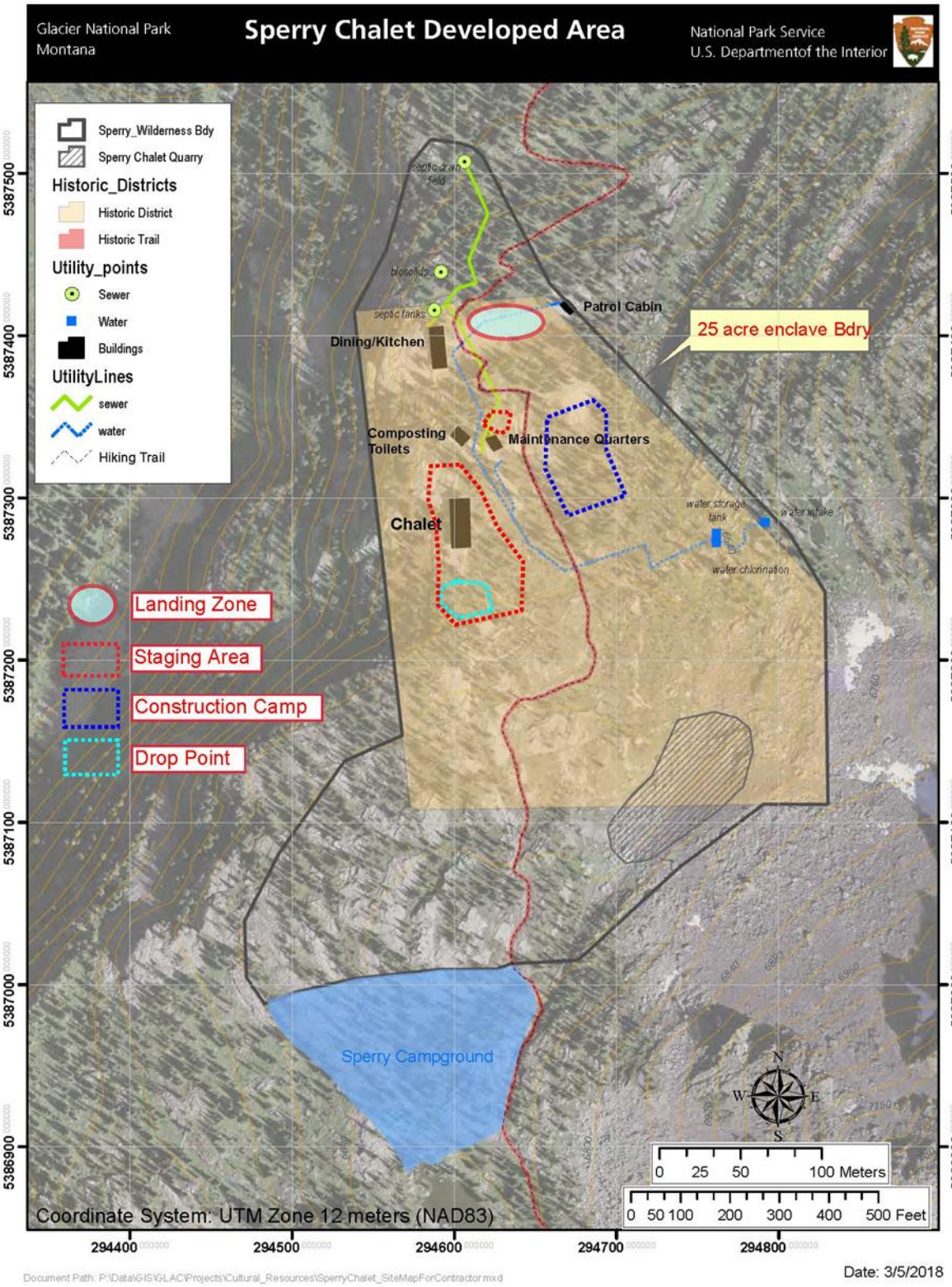

Figure 4. Proposed action site map.

2.4 Best Management Practices and Mitigation Measures

Best Management Practices

To ensure the protection of the Park's fundamental resources and values within GNP, the following set of best management practices (BMPs) would be implemented under the proposed action. These BMPs are grounded in NPS Management Policies 2006 and are intended to provide a practical methodology for routine management of the park. These BMPs are different from mitigation measures described below, which are intended to avoid or minimize potential adverse effects to species and their habitats addressed in this assessment that may result from implementing the proposed actions.

Geology, Soils, and Water Resources

- Mitigate potential effects to adjacent water resources from soil erosion by implementing these techniques.
  - Salvage topsoil whenever possible.
  - Allow the natural geomorphic processes of watersheds to continue to the greatest extent possible.
- Develop and implement revegetation plans and specifications for disturbed areas along and around water features. Revegetation plans would specify native seed/plant sources and mixes, soil preparation, erosion control, etc. Salvaged vegetation would be used to the extent possible.
- Monitor human use areas for signs of disturbance to water features and associated native vegetation and manage use to minimize or avoid vegetation disturbance and spread of nonnative species (e.g., public education, erosion control, and barriers to control potential effects on plants from trail erosion or social trailing).
- Remove and/or minimize the spread of invasive, nonnative aquatic plant and/or wildlife species, and restore native species populations.

Wildlife, Vegetation, and Sensitive Resources

- Monitor populations and extent of various wildlife "indicator" species to assess for possible effects from visitor use.
- Conduct bird surveys to ensure compliance with the Migratory Bird Treaty Act.
- Identify species of concern and coordinate monitoring and protection activities among park units and other federal and state agencies.
- Restore native species, ecological function, and habitat values to disturbed areas when possible.
- Monitor and remove nonnative invasive plant species to the greatest extent possible. Where possible, use an early detection and rapid response strategy to remove invasive species before populations establish themselves and impact native species.
- Provide wildlife-resistant dumpsters and trashcans for garbage and other wildlife attractants where appropriate.
- Encourage and enforce, when possible, appropriate behaviors toward wildlife (e.g., separation distances and food storage requirements). Educate on how to minimize conflicts with, and effects to, wildlife.
- Develop and implement revegetation plans for disturbed areas. Revegetation plans would specify native seed/plant source and mixes, soil preparation, etc.

- Implement best practices to ensure construction equipment and machinery entering the project are free of nonnative plant and aquatic invasive species.
- Take measures to reduce the potential for human-bear conflicts (e.g., property damage, food rewards, human injury/fatality, and bear mortality) by:
    - Educating on appropriate behavior when recreating or working in bear habitat.
    - Providing bear-resistant garbage containers in all developed areas.
    - Providing "bear aware" education to all personnel involved in development and maintenance projects.
    - Alerting visitors to properly store food and other attractants (e.g., food, drinks, garbage, cooking utensils, other odorous items) at all times and pack out all food materials, garbage, and other attractants on a daily basis if they cannot be stored in bear-resistant containers.
    - Monitor and take the necessary corrective steps to address issues as they arise to reduce and avoid conflicts.

Mitigation Measures
The following mitigation measures have been identified to minimize the degree, extent and severity of adverse effects and would be implemented during the proposed project.

Wildlife, Habitat, and Threatened Wildlife Species

- Storage requirements for food, garbage, and other attractants would be strictly enforced during the project. Food and garbage would be loaded or unloaded immediately from stock and helicopters and stored appropriately.
- Project crews would be trained on attractant storage regulations and appropriate behavior in the presence of wildlife. The handbook "*Bear Safety, Site Sanitation and Other Requirements While Working in Glacier National Park: a Handbook for Construction Contractors*" would be provided to all contractors and work crews.
- Park staff (e.g. wildlife technicians and law enforcement rangers) would monitor wildlife, storage of food and attractants, construction staging area and crew sleeping areas during project.
- Fluid from equipment and tools can be a wildlife attractant. Tools and equipment would be inspected for fluid leaks prior to use. Leaking tools and equipment would not be permitted to be used. Any equipment that develops leaks would be repaired immediately or removed from the park. Absorbent materials manufactured specifically for the containment and clean-up of hazardous materials would be kept onsite in case a spill should occur.
- Hand-held tools, gloves and sweaty clothing can be a wildlife attractant from the salts. Equipment and clothing would be properly stored to prevent access by wildlife.
- Helicopter flights beginning in September would be restricted, as much as possible, to early morning hours before 10:00am to avoid interfering with a *major migration route* for approximately 2,000 raptors (hawks, falcons, eagles, and accipiter's). The migration route would be monitored and timing of flights would be adjusted to minimize impacts on birds and improve safety for helicopter trips.
- Use of the toilet facility would be required at all times and strictly enforced to prevent vegetation damage from human waste and urine which is an attractant to wildlife.

- Bald and golden eagle nest sites within the flight path would be identified and buffered by at least ¼ mile for bald eagles and ½ mile for golden eagles to prevent disturbance during nesting and rearing season. These buffers would only be feasible within the flight path and not in areas adjacent to the project area.
- A wildlife log would be maintained on site to document all wildlife activity in the area during the project.

Natural Soundscapes and Air Quality

- To reduce the duration of helicopter noise and impacts to visitors, wildlife and wilderness character, the smallest (lightest) helicopter needed for the task would be chosen where possible. For tasks requiring a heavy lift helicopter, an appropriate model would be used, pending availability, to efficiently carry as much heavy material as possible and reduce the number of trips needed to fly in construction material. More efficient, lower noise models would be preferred (see Table 1).
- To reduce noise impacts on wilderness and other backcountry sites, the transport helicopter would fly over roads, at the maximum safe altitude possible while remaining below the surrounding ridge line in the valley where it is flying. Where possible, a minimum 2,000 foot altitude would be maintained per FAA Advisory Circular 91-36D Visual Flight Rules (VFR) Flight Near Noise-Sensitive Areas.
- Power equipment including generators, saws and other tools, would be used within the walls of the chalet dormitory (as much as possible) to reduce noise levels. More efficient, lower noise models would be preferred (see Appendix 3; NIOSH 2006 and NPS 2010). Nail guns would be used rather than hammers as much as possible to reduce the amount and intensity of impact from noise. Where possible, generators that do not exceed 60 dBA, at 50 feet, would be chosen (36 CFR 2.12; see Appendix 4).
- Construction work would be limited to the hours of 7:00 am - 7:00 pm, to reduce disturbance to backpackers in the nearby campground.

Vegetation and Soils

- Construction personnel and all others would be required to stay on established trails in the historic district. New trails would be developed as needed to new locations, such as the historic quarry and the crew's tent platforms to avoid creation of social trails. These trails would be rehabilitated at the end of the project.
- Construction staging, crew camping area and new trails would be delineated to avoid expansion of the sites.
- After construction for the entire project is complete, rehabilitation efforts would follow to revegetate areas within the developed area that were denuded or damaged by the project.
- After construction, compaction and further erosion would be mitigated by
    - Aerating disturbed ground.
    - Replanting/reseeding with native vegetation, and performing non-native invasive plant control.
    - Applying soil amendments, mulches, organic matter and other measures as appropriate to facilitate revegetation.
- After construction is complete, the trails used by stock would be repaired and restored.

- Native species from genetic stock originating in the park would be used for revegetation seeding and planting efforts. Plant species density, abundance, and diversity would be rehabilitated as nearly as possible to prior conditions for non-woody species.
- Riprap, gravel, and topsoil sources, if needed, would only be obtained from NPS approved sources that are clean and free of noxious weed species.
- Temporary tent platforms for housing construction crew would be required to reduce trampling of vegetation and compaction of soils.
- Rare plant surveys would be conducted prior to occupation including staging and camping areas within the 25 acre enclave. If species are found, they would be flagged and avoided. If absolutely necessary, plants would be salvaged and re-planted in undisturbed areas.

Water Resources

- Temporary barriers (silt fences, coir logs) would be installed to prevent any exposed soil from eroding.
- Fuel and tools would be stored at least 100 feet from any water to prevent contamination in the event of a spill.
- An emergency fuel spill kit would be kept on-site during staging and construction.

3.0 THREATENED AND ENDANGERED SPECIES ASSESSMENTS

3.1 Water Howellia (*Howellia aquatilus*) – Threatened

Habitat for the federally threatened water howellia, a wetland dependent species, may be present in the park, but there are no recorded observations or potential habitats in the action area. However, no species-specific or targeted surveys have been completed to date due to funding limitations. However, a number of wetlands in the park (outside of the action area) have been surveyed during recent field studies. These include Montana Natural Heritage Program surveys of selected wetlands in the North Fork (Cooper et al. 2000), Peter Lesica's plant inventory for the GNP Flora (Lesica 2002), Jerry DeSanto's surveys of Lee Creek fen and other park wetlands (DeSanto 1998), John DeArment's surveys of selected wetlands in developed areas (DeArment 2001), and vegetation mapping surveys (unpublished data on file at GNP). No water howellia were detected during any of these surveys. There have been no water howellia identified within the action area and there are no suitable habitats that will be impacted by the proposed actions. A rare plant survey (including water howellia) would be conducted prior to occupation of the actions area, including staging and camping of new areas, within the 25 acre enclave. If species were found, they would be flagged and avoided. The project actions would have no impacts to individual water howellia or suitable habitats. Implementation of the proposed federal action will have **NO EFFECT** on water howellia.

3.2 Spalding's Catchfly (*Silene spaldingi*) – Threatened

Spalding's catchfly, a federally listed threatened species, has never been reported in the park, nor has potential habitat been identified. A recently completed study of east side grasslands, which included 155 vegetation plots in a wide variety of grasslands under 5,500 ft. (1,676 m) elevation did not result in identification of Spalding's catchfly in any of the surveyed grasslands. The species has not been found in fire effects plots in North Fork grasslands, in inventories for the

park flora, nor in vegetation mapping plots anywhere in the park (unpublished data on file at GNP). There have been no Spalding's catchfly identified within the action area and there are no grassland habitats suitable for use by Spalding's catchfly. A rare plant survey (including Spalding's catchfly) would be conducted prior to occupation of the actions area, including staging and camping of new areas, within the 25 acre enclave. If species were found, they would be flagged and avoided. The project actions would have no impacts to individual Spalding's catchfly or suitable habitats. Implementation of the proposed federal action will have **NO EFFECT** on Spalding's catchfly.

3.3 Whitebark Pine (*Pinus albicaulis*) – Candidate

3.3.1 Baseline for Species Population and Habitat – Whitebark Pine

The whitebark pine is a slow-growing and long-lived tree present at locations often consisting of poor soils, steep slopes, and windy exposures that are predominantly associated with tree line and subalpine communities (Tomback et al. 2001). As a keystone and foundation species, whitebark pine influences ecosystem processes on a landscape level. Whitebark pine has been shown to supply a quality food source relied upon by various wildlife species, including grizzly bears and Clark's Nutcrackers (Kendall and Arno 1990); stabilize soil and snowpack (Arno and Hoff 1989); and subsidizes the establishment and perpetuation of community succession (Arno and Weaver 1990). In terms of ecological succession, whitebark pine occurs broadly as an early successional species, seral species (mid-successional and co-dominant with other tree species), or climax species.

Roughly 87,500 acres have been identified as seral whitebark pine habitat within GNP. The majority of whitebark pine habitat occurs on the east side of the park primarily in the St. Mary, Many Glacier, and Belly River sub districts (Peterson 1999).

Numerous studies examining mortality rates conducted throughout the species' range strongly imply that whitebark pine is in decline across its range. Within the park, the species has suffered an overall 60% decline (Smith et. al. 2008, Keane et. al. 2012). The primary threats to the species include nonnative white pine blister rust (*Cronartium ribicola*), predation inflicted by native mountain pine beetles (*Dendroctonus ponderosae),* habitat loss resulting from climate change, and habitat alteration resulting from fire suppression (USFWS 2014).

The proposed action area includes habitats suitable for whitebark pine. The whitebark pine stands in this area are not found immediately adjacent to the Sperry dormitory but are spread out in the vicinity and continue up towards Lincoln Pass.

Previous and on-going federal actions within the action area have and continue to have effects on whitebark pine. Previous projects include the construction of restroom within the Sperry Complex, the replacement of the Sperry dormitory roof, repairs to the chalet following an avalanche, and improvements to the water system. On-going federal activities within the action area include helicopter flights supporting administrative activities, trail maintenance, waste removal, and increasing visitor use.

3.3.2 Inventories and Surveys – Whitebark Pine

Whitebark Pine GIS Analysis and Modeling - An extensive GIS analysis was developed to model optimal whitebark pine habitat within GNP that would be conducive to regeneration. The model mapped the location of habitat types that supports dominate seral whitebark pine populations. Roughly 87,500 acres were identified as seral whitebark pine habitat within GNP. The majority of the identified habitat occurs on the east side of the park primarily in the St. Mary, Many Glacier, and Belly River sub districts (Peterson 1999).

Additional vegetation surveys will be completed in and around the action area in the spring of 2018 when access is feasible. Locations of whitebark pine will be identified along with other the locations of other vegetation species of concern.

3.3.3 Effects Analysis – Whitebark Pine

The USFWS has identified several threats to the whitebark pine. Principal among them are impacts associated with disease inflicted by nonnative white pine blister rust. Further threats as identified by the USFWS include predation inflicted by native mountain pine beetles, habitat loss resulting from climate change, and habitat alteration resulting from fire suppression (USFWS 2014).

White pine blister rust is a nonnative fungal disease that infects 5-needled pines (*Pinus* spp.) and currants/gooseberry (*Ribes* spp.) species across their range. The disease persists via a complex life cycle exhibited by the fungus, and its virulence varies depending on factors such as habitat, topography, timing, and environmental factors such as temperature and wind patterns (Zambino 2010). Blister rust infections result in the mortality of most infected whitebark pine individuals across all age classes and it is expected that mortality rates attributed to the disease will intensify into the future (USFWS 2014). The proposed actions are not expected to measurably contribute to the spread or intensity of the disease in the action area because the disease is already present and widespread in the park.

Several insect species are known to feed upon whitebark pine, but the native mountain pine beetle alone causes a substantial proportion of mortality to whitebark pine throughout its range (Arno and Hoff 1989). Although the mountain pine beetle is recognized as a natural factor of normal forest disturbance regimes, increasing temperatures and drier weather conditions attributed to climate change have resulted in epidemic levels throughout the beetle's range. The individual and concurrent plagues of both mountain pine beetle and white pine blister rust remain a detrimental threat to whitebark pine via a synergistic effect resulting from the preferential incursion of mountain pine beetles on whitebark pines that are infected with and weakened by white pine blister rust (Bokino and Tinker 2012). The proposed actions are not expected to measurably contribute to the spread or intensity of mountain pine beetle infestation in the proposed action area because the beetle is already present in the park.

Increasing temperatures and other environmental shifts associated with climate change are projected to contribute to widespread direct habitat loss of tree line and subalpine communities where whitebark pine occurs. A large-scale decline in suitable whitebark pine habitat over the next century is predicted by current climate models (USFWS 2014). Loss of habitat due to climate change occurs when warmer temperatures favor competitive species over whitebark pine

as well as when temperatures exceed the thermal tolerance of whitebark pine. Additionally, increasing temperatures also favor the expansion of predacious insects such as mountain pine beetles as well as increasing frequencies of devastating fire events.

Construction and restoration of the Sperry Chalet under the proposed actions would have a small amount of adverse effect to potential whitebark pine habitats. The proposed actions call for the restoration of the Sperry Chalet Dormitory within the existing structure's footprint, which is in habitats that are potentially suitable for whitebark pine. The proposed construction would result in temporary damage to the vegetation in a portion of the proposed action area (approximately one acre) through trampling, and material storage associated with construction activities. The proposed project would not require additional excavation or dirt work. Efforts would be made to keep construction activities, including material storage, on previously disturbed areas or areas that would minimize removal of sensitive vegetation and designed to minimize user impacts. Although these efforts would be made, it is unclear where each individual whitebark pine occurs within the action area at this time. Surveys would be conducted prior to the start of construction to identify whitebark pine in the area where whitebark pine may be directly or indirectly affected by project actions. Every effort would be made to avoid these areas but due to unknown variabilities (e.g. where whitebark pine stands are located, where materials would be stored, and where other project necessities would be located) there would be a risk of mortality to individual whitebark pine within the action area. The adverse effects to individual whitebark pine and their habitats from construction activities under the proposed actions would be insignificant given the small amount of impacted individuals or habitat (approximately one acre) in relation to those available within and adjacent the action area. The anticipated changes would be so small that it would not be of any perceptible consequence to whitebark pine populations or their habitats.

Large-scale, direct habitat loss attributed to past and ongoing fire suppression has imposed a long-term and ever increasing level of effect to whitebark pine (USFWS 2014). Fire suppression has resulted in dense stands of shade tolerant conifer species that were once dominated by whitebark pines under historic cycles of healthy fire disturbance. The disadvantageous shift in forest structure and diversity as paired with climate change has resulted in more frequent and intense wildfires as well as promoting increasing vulnerability to co-occurring disease and insect infestation (Keane et. al. 2012). The proposed actions are not expected to affect GNP's current fire management plan or the proposed actions expected to directly influence current forest structure, composition, disturbance regimes, regional or global climate change, disease virulence, or intensity of insect infestation.

3.3.4 Cumulative Effects

Cumulative effects were determined by combining the effects of the proposed actions with "non-federal" actions reasonably certain to occur in the foreseeable future and in proximity to the proposed action area. The majority of the cumulative effects originate from on-going private concessioner operations. Table 2 outlines "non-federal" foreseeable future actions.

Past, Present, And Reasonably Foreseeable Future Actions In Proximity To The Analysis Area			
Action	**Geographic Location**	**Activity**	**Schedule/Time Period**
Private			
Chalet Operations and Maintenance	GNP lands	Operation and maintenance of concession facilities and activities such as restaurants and lodging	On-going April-November
Horse Concession	GNP lands	Operation of horse concession facilities	On-going April-November
Scenic Air Tours	Airspace above GNP	Helicopter and small aircraft tours of the park	On-going

Table 2. "Non-federal" reasonably foreseeable future actions in proximity to the action area

Cumulative effects to whitebark pine are likely. Several foreseeable future actions located within the proposed action area have collectively altered the habitat and subsequent demography of whitebark pine. The operation and maintenance of the chalet and horse trail ride concessions are the primary cumulative actions that effect whitebark pine within the action area. Chalet operations and horse concessions effect whitebark pine through increased trampling and soil compaction associated with stock and visitor use. The effects of these actions are minimized by keeping visitors and stock in designated areas or on designated trails to the greatest extent possible. The operation of private scenic air tours have no effects to whitebark pine as they only fly over the action area at a flight altitude of 2,000 feet AGL.

When the overall effects of the proposed action are combined with these foreseeable future actions, there is potential for a long-term, cumulative adverse effect on whitebark pine in the action area. However, when the incremental level of impact associated with the proposed actions is added to the adverse effects of the listed cumulative actions, an insignificant overall increase above current levels of adverse effect is expected.

3.3.5 Conservation Measures – Whitebark Pine

Conservation measures are an integral component of the proposed action and would be implemented in conjunction with standard BMPs and mitigation measures (described above) as part of the project. The following conservation measures would be implemented to minimize the effects of the proposed actions to whitebark pine:

- Resource specialists would be involved in inspections and monitoring, and provide recommendations during construction work where applicable.
- Whitebark pine surveys would be conducted prior to construction including staging and camping areas within the 25 acre enclave. If species are found, they would be flagged and avoided. If absolutely necessary plants may be salvaged and re-planted in undisturbed areas.

3.3.6 Effect Determination – Whitebark Pine

The proposed action would **not likely jeopardize** whitebark pine or its habitat based on the following rationale:

1. The limited area affected relative to the availability of suitable habitat located outside of the proposed action area*;*
2. Mortality risk will be small and individual mortality will be avoided to the extent possible;
3. No expansion of the range of competitors or disease would occur as a result of the proposed actions;
4. The proposed action would not be expected to measurably affect whitebark pine at the population level; and
5. Specific conservation measures, identified above, would be implemented to avoid and minimize direct short-term effects from construction activity.
6. Long-term use of the Chalet will remain the same as has been seen in the past 100 years.

3.4 Bull Trout (*Salvelinus confluentus*) – Threatened

There are no bull trout within the proposed action area and it does not overlap with any bull trout critical habitat. All proposed construction activities will be land-based and do not include excavation or dirt work that would contribute to downstream sedimentation. Best management erosion and sediment control measures would be used to prevent introduction of sediments into downstream wetlands and waterways. In general, fish have not been considered at risk from construction activity or aircraft disturbance, as they do not experience terrestrial sound at levels that would influence behavior or cause a physiological response (NPS 1995). The proposed project would not result in any change to critical habitat, mortality risk, prey populations, or the range of competitors and/or predators. Implementation of the proposed federal action will have **NO EFFECT** on bull trout or designated critical habitat.

3.5 Grizzly Bear (*Ursus arctos horribilis*) – Threatened

3.5.1 Baseline for Species Population and Habitat – Grizzly Bear

GNP is part of the Northern Continental Divide Ecosystem (NCDE) Grizzly Bear Recovery Zone. A genetic analysis of hair samples collected from 1998-2000 resulted in a population estimate of 241 grizzly bears in the Greater Glacier Area (Kendall et al. 2008), which encompassed 7,933 km^2 surrounding GNP. No population estimate has been developed exclusively for GNP. Data from the NCDE grizzly bear population trend monitoring project indicates that the ecosystem's grizzly bear population trend is increasing at 2.3% per year (data from 2004-2014; Costello et al. 2016).

Grizzly bear habitat is found throughout the park from the lowest valley bottoms to the summits of the highest peaks. Grizzly bears require large areas of undeveloped habitat, including a mixture of forests, moist meadows, grasslands, and riparian habitats, and a substantial amount of solitude from human interactions (USFWS 1993). They have home ranges of 130 to 1,300 square kilometers (USFWS 1993). Generally, within the NCDE, grizzly bear seasonal movements and habitat use are tied to the availability of different food sources. In spring, grizzly bears feed on winter-killed ungulates and early greening herbaceous vegetation at lower elevations (Martinka 1972). During the summer, some bears move to higher elevations in search of glacier lilies (*Erythronium grandiflorum*) and other roots, berries, and army cutworm moths (*Euxoa*

auxiliaris). Avalanche chutes provide an important source of herbaceous forage for grizzly bears in the early summer and fall (Mace and Waller 1997). In the fall, bears will continue to forage for berries, roots, insects, and carrion and will broaden their search for food considerably in order to build up enough fat reserves for the winter denning period. During the winter, grizzly bears hibernate in dens away from human disturbance, typically at higher elevations on steep slopes where wind and topography cause an accumulation of deep snow. The denning season in the western portion of the NCDE usually begins in early October, and females may linger near dens until late May (Mace and Waller 1997).

During the summer, grizzly bears are often attracted to the riparian and wetland habitat along Sprague Creek, approximately 1/4 mile below Sperry chalet. In addition to foraging habitat, the habitats adjacent to the chalet may provide connectivity, or travel corridors, between foraging sites. Grizzly bears move through the park as they travel to seasonally important habitats in different areas. During the huckleberry (*Vaccinium* spp.) season (late summer and fall), bears often concentrate in the Apgar Mountains, Belton Hills, Snyder Ridge, the Many Glacier Valley, the Two Medicine Valley, and other areas. Current visitor and operation activity in the vicinity of the chalet has resulted in impacts to grizzly bear use of the area. For example, bears have been surprised by hikers along trails, and appear to avoid the areas of highest human use at the chalets and the nearby campground (NPS 1995a).

GNP was placed into grizzly bear management "situations" in accordance with Interagency Grizzly Bear Committee (IGBC) guidelines (USFS 1986), and as directed by the Grizzly Bear Recovery Plan (USFWS 1993). GNP is encompassed by 5 Bear Management Units (BMUs) and 41 internal Bear Management Zones (BMZs). Over one million acres of the park (recommended wilderness) are established as Management Situation 1, in which management decisions favor the needs of the grizzly bear when grizzly habitat and other land-use values compete, and grizzly-human conflicts are resolved in favor of grizzlies unless a bear is determined to be a nuisance (NPS 2010). Maintenance and improvement of grizzly bear habitat and minimizing grizzly-human conflict will receive the highest management priority in these areas. The remainder of the park is developed front-country and established as Management Situation 3, where grizzly habitat maintenance and improvement are not the highest management considerations, grizzly bear presence is actively discouraged, and any grizzly involved in a grizzly-human conflict is controlled (NPS 2010). The proposed action area including the Sperry Chalet Complex is in Management Situation 3 grizzly bear habitat, while the flights associated with the proposed project will fly over lands in Management Situation 1.

A search of the park's grizzly bear sightings database reveals that over 204 grizzly bear observations have occurred in the Sperry Chalet area within the last 18 years, including sightings of both grizzly bear family groups (females with young) and individual bears (NPS files). Grizzly bear sightings in the park are most frequently reported from May through August. The number of reported observations is likely correlated with visitor use, and is not necessarily an indicator of relative grizzly bear presence and habitat use. Some bears have habituated to the high level of human activity during the summer, and continue to use open habitats along roads and within sight of facilities and areas where people are present. Bears that are more sensitive to human disturbance may avoid developed areas entirely or concentrate their activity at night or in remote areas relatively free from human influence.

Grizzly bear/human interaction is a management concern that can threaten bears as well as employee and visitor safety. Bears that are familiar with humans have the potential to become habituated to human presence, leading to further habituation and increased potential for bear/human encounters. Habituated bears are at greater risk of becoming food conditioned and may aggressively seek human food. Habituated bears are usually relocated or hazed from developed areas, and food conditioned bears are usually removed from the population. Bears not habituated to humans are likely displaced from foraging areas and travel routes in proximity to hiking trails and developed areas. These factors often put females with cubs in proximity to quality habitat nearer developed areas and human use areas. Bears that move away from a disturbance risk expending extra energy and may possibly enter an area occupied by another bear. Bears that stay in the area may experience stress (McLellan and Shackleton 1989). While the majority of bears avoid the human disturbance associated with the operation of Sperry Chalet, there have been instances where individual bears have become habituated to human presence and been of concern to bear managers.

Previous and on-going federal actions within the action area have and continue to have effects on grizzly bears. Previous projects include the construction of restroom within the Sperry Complex, the replacement of the Sperry dormitory roof, repairs to the chalet following an avalanche, and improvements to the water system. On-going federal activities within the action area include helicopter flights supporting administrative activities, trail maintenance, waste removal, and increasing visitor use.

3.5.2 Inventories and Surveys – Grizzly Bear

Greater Glacier Bear DNA Study, Katherine Kendall, Northern Rocky Mountain Science Center, USGS Biological Resources Division. Bears identified from hair trap and sign survey collections were used in mark-recapture models to estimate population density, and DNA profiles helped determine genetic variation, relatedness, and structure of the population (Kendall and Waits 2002). Hair trapping was done in 1998 and 2000 throughout GNP and the surrounding ecosystem. Barbed wire was strung around trees at 50-cm height and baited with a non-rewarding, liquid scent lure. After two weeks, hair was collected and the stations were relocated for each of five sessions. Sign surveys were conducted once or twice a month, from May through October, on 1,180 km of trails throughout the park in 1998-2000, and 150 km in the Flathead National Forest in 2000. Hair samples were collected from small lengths of barbed wire placed on established bear rub-trees and scat was collected from the trail surface. Hair samples with 5+ follicles were analyzed for species identification; those determined to be from a grizzly bear were further analyzed for individual identity and gender. Genotyping of hair samples identified 292 individual grizzly bears. The Greater Glacier Bear DNA Study was expanded to include the Northern Continental Divide Ecosystem in 2004. This expanded project estimated the NCDE grizzly bear population to be 765 bears (Kendall et al. 2009).

Glacier National Park Bear Information Management System (BIMS), John Waller, wildlife biologist. BIMS is an electronic database of incidental bear observations submitted by park employees and visitors and used in part to inform managers of bear activity. Records are also analyzed by park wildlife biologists to make annual reports to the USFWS on grizzly bear population trends and management activities (i.e., the number of unduplicated females with cubs

of the year, the distribution of family groups across the landscape, and the number of known human caused mortalities). Sightings are biased as they reflect the distribution of the people submitting the records.

Northern Continental Divide Ecosystem (NCDE) Grizzly bear population trend monitoring project (Cecily Costello, MTFWP). In 2003, state and federal agencies sought to improve structure and information flow of population trends and habitat monitoring of grizzly bears outside the Greater Yellowstone Ecosystem. Funding was given to develop and institutionalize an interagency monitoring team for the NCDE. Yearly reports are submitted which summarize these efforts. Since 2004, the project has monitored radio-marked grizzly bears in GNP. Data from this study were used to estimate population trend, which was found to be increasing at 2.3% per year from 2004-2014 (Costello et al. 2016).

3.5.3 Effects Analysis – Grizzly Bear

The goal for grizzly bear management in GNP is to provide sufficient quality habitat to facilitate grizzly bear recovery. Implementing measures within the authority of the NPS to minimize human caused grizzly bear mortalities is an integral part of this goal. The *Glacier National Park Bear Management Plan* (NPS 2010 and 2010a) guides the management of grizzly bears by prescribing actions that are necessary for the protection of the species and the safety of the park visitor. Methods used elsewhere in the NCDE to determine whether sufficient quality habitat exists to facilitate grizzly bear recovery have not been widely applied in GNP as most park actions do not involve the substantial destruction or alteration of grizzly bear habitat. Standards related to habitat effectiveness, open road density (ORD), opening size, availability of seasonal components, movement corridors, and displacement areas have yet to be adequately described at the BMU scale in the park. Consequently, it is not possible to apply the Cumulative Effects Analysis process to proposed park actions that may affect the condition and availability of grizzly bear habitat in GNP at this time.

The following analysis describes the potential effects of the proposed action and continued use of the chalet by examining how these measures are implemented and, thus, how the objectives relating to grizzly bear recovery are met. Objectives relative to grizzly bear recovery include: 1) provide adequate space to meet the spatial requirements of a recovered grizzly bear population; 2) manage for an adequate distribution of bears across the landscape; 3) manage for an acceptable level of mortality risk; 4) maintain/improve habitat suitability with respect to bear food production; 5) meet the management direction outlined in the Interagency Grizzly Bear Guidelines (51 Federal Register 42863) for Management Situations 1, 2, and 3 (USFS 1986). The following describes the effects of the proposed activity in the context of these objectives, and how the objectives relating to grizzly bear recovery are met:

Objective 1. Provide adequate space to meet the spatial requirements of a recovered grizzly bear population. The project would occur primarily in Management Situation 3 grizzly bear habitat with the majority of helicopter flights occurring over Management Situation 1. Although the proposed construction activities would be contained within an area of existing development and human presence, the level of noise disturbance associated with construction activities would be elevated in comparison to the existing impacts. Additionally, the number of helicopter flights and mule trains required to deliver the materials needed for the proposed project will result in an increase in noise disturbance along the flight path, action area, and in adjacent habitats limiting

the availability of areas free from human disturbance for the duration of the project. The large number of helicopter flights would be expected to result in temporary displacement of bears from the immediate vicinity of the chalet as well as portions of the flight path. Construction activities that would last for four to five months during both phase I and II would be expected to result in individual bears or family groups avoiding the area. Bears would be expected to be displaced out of habitats used primarily for foraging with some denning sites possibly effected in the fall months (late September and October). These effects would only be anticipated during periods of active construction associated activities. Displacement of bears may be temporary and though alternate suitable habitats are available nearby, those habitats will likely be occupied by other bears, potentially resulting in conflicts with other bears. Some bears, especially females with cubs or sub-adults, may be forced through competition with adult males to remain near the construction zones or areas of high human use, thus increasing their risk of habituation or food conditioning. Due to the level of human presence expected during project implementation and the associated risk of habituation, bears will be hazed out of the action area during construction according to established park policy. There would be no loss of grizzly bear habitat as a result of the proposed action as the proposed construction and continued long-term use would occur within the footprint of the former Sperry Chalet and human activity levels and types of activities would remain the same as they have been for 100 years.

Objective 2. Manage for an adequate distribution of bears across the landscape.

GNP provides year-round habitat for more than 200 grizzly bears, and suitable habitat for this species can be found across a broad elevation range. Grizzly bears foraging in open habitats such as meadows, talus fields, and shrub fields could be disturbed by helicopter flights. Helicopters could affect grizzly bears when they descend or approach at a low level, especially in areas lacking cover, such as alpine areas. A portion of the construction activities could take place in the fall (after September 15). This may be one of the most vulnerable times for grizzlies, when available habitats may be most limited and caloric needs greatest. In Yellowstone, grizzly bears were more active during the daytime in spring and fall than in summer; therefore avoiding daytime activities of humans during spring and fall was more stressful than similar avoidance during summer (Mattson et al. 1987*).* Some grizzly bears foraging below the Sperry Chalet Complex will likely be displaced by construction activities that would last several months for the 2018 and 2019 seasons (4-5 months depending on the phase). Grizzly bear selection or use of denning sites near the action area or along the proposed helicopter flight path could be affected by disturbance in the fall (late September to October). These effects would only be anticipated during periods of active construction associated activities. The Sperry Chalet already maintains a level of human disturbance associated with recreation activities, and operation and maintenance of the facility, so some grizzly bears using this area are likely habituated to an existing level of human activity. However, sustained levels of construction activity, increased number of mule trains, and frequent helicopter flights would contribute to increased levels of displacement or habituation of individual bears in and around the proposed action area. Long-term use of the Sperry Chalet and surrounding area including human activity levels and types of activities would remain the same as they have been for 100 years. As a result, there would be no change to the distribution of bears across the landscape in relation to the long-term use of the Sperry Chalet dormitory.

Objective 3. Manage for an acceptable level of mortality risk. Considering the level of noise disturbance and the duration of the project, mortality risk to grizzly bears from the proposed action would be expected to increase. Human activity within the area will increase substantially with construction activities and there will be a large number of helicopter flights, which would likely adversely affect grizzly bear use of suitable habitat in the area by displacing bears for the duration of the work. Bears would be expected to be displaced out of habitats used primarily for foraging with some denning sites possibly effected in the fall months (late September and October). These effects would only be anticipated during periods of active construction associated activities. While the park contains substantial amounts of natural grizzly bear habitat, much of this habitat may be already occupied by other bears. Bears displaced by the project may be forced to compete for the adjacent resources available in occupied habitats. Several authors discuss negative effects of human activities to grizzly bears. Aune (1981) describes a radio-collared bear and her cubs moving to the extreme southern end of her home range at the same time as an increase in exploratory oil and gas drilling activity near her previous location. There was a possibility that she and her cubs were displaced from the area near the drilling site. White et al. (1999) evaluated the potential energetic effects of mountain climbers on bears foraging for army cutworm moths in alpine areas of GNP. Bears that detected climbers spent less time foraging, more time moving, and more time behaving aggressively than when undisturbed.

Jope (1983) suggested that some bears in high-use areas were habituated to people and therefore reacted less aggressively to the presence of people. The Sperry Chalet is a high use area for visitors on foot and on horseback, as well as employees associated with operations and maintenance. The construction activities and associated helicopter flights may result in a shift in visitation, although these shifts would be negligible given the overall human activity associated with the proposed project. Construction crews could inadvertently create attractants through improper waste disposal or feeding of wildlife food storage. Conservation measures (described below) would be executed to avoid and minimize the impacts of attractants and habituation for the duration of the project. During the duration of the construction phases any bears spotted within the action area will be hazed out of the area in accordance with existing park policy in an attempt to reduce the likelihood of habituation. Long-term use of the Sperry Chalet and surrounding area including human activity levels and types of activities would remain the same as they have been for 100 years. As a result, there would be no change to the mortality risk of bears across the landscape in relation to the long-term use of the Sperry Chalet dormitory.

Objective 4. Maintain/improve habitat suitability with respect to bear food production. This project would not negatively affect, nor improve, bear food production in the action area. The area surrounding the Sperry Chalet Complex contains known foraging habitats for grizzly bears. Although the proposed construction actions would mostly occur in areas previously disturbed by human activities, the resulting additional noise disturbance associated with construction and related activities could adversely affect the ability of grizzly bears to forage or travel in habitats adjacent to the chalet. We anticipate that construction activities and associated helicopter flights would temporarily displace grizzly bears from these suitable foraging habitats (4-5 months depending on the phase). This level of noise disturbance for this duration is expected to have an adverse effect by temporarily reducing the quality of habitats and the ability of grizzly bears to forage within the action area and the flight paths. Long-term use of the Sperry Chalet and surrounding area including human activity levels and types of activities would remain

the same as they have been for 100 years. There would be no change in habitat quality and abundance in relation to the long-term use of the Sperry Chalet dormitory.

Objective 5. Meet the management direction outlined in the Interagency Grizzly Bear Guidelines (51 Federal Register 42863) for Management Situations 1, 2, and 3 (USFS 1986).
The proposed activities, both during the construction phases and the long-term use of the chalet, would conform to guidelines contained with the park's *Bear Management Plan* (NPS 2010) and *Bear Management Guidelines* (NPS 2010a), thus meeting the intent of the *Interagency Grizzly Bear Guidelines* (USFS 1986).

3.3.4 Cumulative Effects

Cumulative effects were determined by combining the effects of the proposed actions with "non-federal" actions reasonably certain to occur in the foreseeable future and in proximity to the proposed action area. The majority of the cumulative effects originate from on-going private concessioner operations. Table 2 (above) outlines "non-federal" foreseeable future actions.

Cumulative effects to grizzly bears are likely. Several foreseeable future actions located within the proposed action area have collectively altered the habitat and subsequent demography of grizzly bear. The operation and maintenance of the chalet, horse trail ride concessions, and private scenic air tours are the primary cumulative actions that effect grizzly bear within the action area. Private scenic air tours involving both fixed-wing aircraft and helicopters would likely continue to occur over the action area. For private air tours, aircraft are expected to adhere to a voluntary flight altitude of 2,000 feet AGL, and they generally follow consistent flight paths over the park; flights usually last one half hour or an hour. These flights may displace individual bears if they happen to fly below the voluntary altitude of 2,000 feet especially when in areas of little vegetative cover. Although noise impacts associated with flights are expected to result in some temporary displacement of individuals, the frequency and regularity of aircraft overflights in the park during summer probably results in the habituation of some bears to this activity. The effects of aircraft disturbance to grizzly bears is described in more detail above in the effects analysis. These flights are only anticipated to impact foraging habitats and would not be expected to have impacts to denning habitats or behaviors due to the seasonality (summer) of these actions.

Chalet operations and horse concessions effect grizzly bears through increased human activity and disturbance associated with stock and visitor use. Effects include either displacement of individuals from the action area or attraction and possibly habituation. The effects of human and stock activity and disturbance to grizzly bears are described above in additional detail in the effects analysis. The effects of these actions are minimized by keeping visitors and stock in designated areas or on designated trails to the greatest extent possible, limiting horse trail rides to one a day and, enforcing food and other attractant storage standards.

When the overall effects of the proposed action are combined with these foreseeable future actions, there is potential for a long-term, cumulative adverse effect on grizzly bear in the action area. However, when the incremental level of impact associated with the proposed actions is added to the adverse effects of the listed cumulative actions, an insignificant overall increase above current levels of adverse effect is expected.

3.5.5 Conservation Measures – Grizzly Bear

Conservation measures are an integral component of the proposed action and would be implemented in conjunction with standard BMPs and mitigation measures as part of the project. The following conservation measures would be implemented during the proposed construction activities to minimize the effects of the project on grizzly bears:

- Resource specialists would be involved in inspections and monitoring, and provide recommendations during construction work where applicable.
- Storage requirements for food, garbage, and other attractants would be strictly enforced during both the construction period and as part of standard park policy pertaining to recreation activities in GNP.
- The park will monitor the activity of grizzly bears and enforce storage requirements during construction activities.
- Construction crews would be trained on attractant storage regulations and appropriate behavior in the presence of wildlife. The handbook "*Bear Safety, Site Sanitation, and Other Requirements While Working in Glacier National Park: a Handbook for Construction Contractors*" would be provided to all contractors and work crews.

3.5.6 Effect Determination – Grizzly Bear

This proposed action **may affect, and is likely to adversely affect**, the grizzly bear or its habitat based on the following rationale:

1. The duration and scale of the noise disturbance associated with the proposed actions would adversely affect grizzly bear use of nearby foraging and possible denning habitats;
2. The timing of the activity, i.e. work would be conducted in summer and fall when grizzly bears are known to frequent the proposed action area resulting in adverse effects to individual bears who will likely be displaced from foraging or possibly denning habitats;
3. Mortality risk to the grizzly bear would be expected to slightly increase as a result of the action;
4. Attractants would be minimized, but could inadvertently increase while construction activities are occurring resulting in adverse effect to grizzly bears within the action area; and,
5. Long-term use of the chalet complex will not result in adverse effects to grizzly bears as human activity levels and types of activities would remain the same as they have been for 100 years.

3.6 Canada Lynx (*Lynx canadensis*) – Threatened

3.6.1 Baseline for Species Population and Habitat – Canada Lynx

In April 2000, the Canada lynx was listed as a threatened species in the coterminous United States. The USFWS concluded that the population was threatened by human alteration of forests, low numbers as a result of past overexploitation, expansion of the range of competitors, and elevated levels of human access into lynx habitat. Critical habitat for the species was designated in 2006 and revised in 2014 (USFWS 2015). Preliminary lynx habitat modeling for the park defined moist conifer forest above 4,000 feet elevation as most likely to support lynx. Little is known about lynx habitat use in the park and these criteria are general in nature. Habitat throughout the park meets these criteria and the park's wildlife observation database contains records of Canada lynx including sightings and tracks in the North Fork, McDonald, Saint Mary, Many Glacier, and Two Medicine Valleys. Although no lynx den sites have been documented in

the park, lynx family groups have been observed via remote camera stations, and winter tracking efforts have indicated the presence of resident lynx populations in the North Fork, Middle Fork, Many Glacier, and Two Medicine Valleys and elsewhere on the east side of the Continental Divide. While the park does not have records of lynx observations within the Sperry Chalet Complex or action area, there are several records documenting lynx using habitats that would be part of the helicopter flight path.

Historically, Canada lynx were considered "more or less common" throughout the park (Bailey and Bailey 1918). Sightings declined during the 1970s and 1980s and have increased in recent years (NPS files). Sightings may not be particularly sensitive to population changes, however, and should be interpreted with caution. Systematic lynx surveys via snow tracking in 1994 and hair-snare/DNA sampling in 1999 and 2000 detected lynx in several drainages throughout the park including the St. Mary, Two Medicine, McDonald and Many Glacier Valleys; no population estimates or trends were attempted during these studies. This underscores the importance of protecting potential and occupied habitats. During the winter of 2005 (February 15 – April 1), wildlife surveys were conducted along the John Stevens Canyon where the surveyor observed lynx tracks and collected scat that DNA analysis confirmed was from a genetically pure lynx (not a lynx-bobcat hybrid) (Wollenzien 2005). In 2006 (January 25 – April 8), the survey was continued and resulted in an observation of two lynx calling back and forth during their breeding period (February to March) (Alban 2006). One could conclude from this information that a breeding pair of lynx existed in the area of the John Stevens Canyon. Snowshoe hares (*Lepus americanus*) were also observed during both studies. The only Canada lynx sighting recorded within the GTSR corridor in 2002 was at Logan Pass, outside of the action area (Elze 2002). Twenty-eight sightings were recorded outside the GTSR corridor in 2002 with 22 lynx tracks detected in the Middle Fork of the Flathead River drainage.

Recovery of the lynx in the lower 48 states is contingent upon a substantial increase in lynx population numbers and a repopulation of historic habitat. Few studies have examined how lynx react to human presence. Some anecdotal information suggests that lynx are quite tolerant of humans, although given differences in individuals and contexts, a variety of behavioral responses to human presence may be expected (Staples 1995, Mowat et al. 2000). Some wildlife species have been found to be more sensitive to disturbance when bearing and rearing young than in other times of the year. Olson et al. (2011) noted that lynx dens were located in more remote areas and unlikely to be disturbed by humans.

Previous and on-going federal actions within the action area have and continue to have effects on lynx. Previous projects include the construction of restroom within the Sperry Complex, the replacement of the Sperry dormitory roof, repairs to the chalet following an avalanche, and improvements to the water system. On-going federal activities within the action area include helicopter flights supporting administrative activities, trail maintenance, waste removal, and increasing visitor use.

4.6.2 Inventories and Surveys – Canada Lynx

Glacier National Park Wildlife Observation Report Form (WORF). WORF is an electronic database of incidental wildlife observations and standardized wildlife survey and monitoring results submitted by park employees, visitors, and researchers. Sighting records provide occurrence data used by park biologists to describe wildlife distribution and habitat use patterns in the absence of intensive population level research.

Forest Carnivore Track Surveys. Starting in 1994, systematic winter track surveys for lynx and other forest carnivores were conducted by GNP wildlife technicians as funding allowed (NPS files). Winter distribution and habitat use were analyzed using track survey data and GIS from 1998-2001 (Hahr 2001, NPS files).

National Lynx Detection Protocol (NLDP) Lynx Survey. The NLDP was implemented in GNP in several areas in the summers of 2000 and 2001. A total of 8 lynx hair samples were collected from 7 drainages (Belly River, Kennedy Creek, Jule Creek, Two Medicine Creek, Railroad Creek, Swiftcurrent Creek, and Alder Creek near Granite Park). Six of the 8 samples were analyzed to the level of identifying an individual (GNP files).

Glacier National Park Snowshoe Hare Study. From 2005 to 2007, Cheng et al. (2011) conducted an intensive field survey of snowshoe hares in GNP with 3 primary objectives: 1) identify the distribution and abundance of snowshoe hares in the park and what factors may influence where they occur, and test if infrequent reporting of lynx on GNP's west side may be due to low densities of snowshoe hares; 2) assess how wildfires and post-fire regeneration affect hares, and 3) develop a cost-effective non-invasive genetic approach to abundance estimation (GNP files). They found that hares occur at low densities and are patchily distributed in GNP, with highest densities found in regenerating lodgepole pine forests of the 1988 Red Bench Fire. Overall, hare densities in the park were higher east of the Continental Divide. However, as regenerating forests from GNP's west side 2003 fires (which burned forty times more area than the Red Bench Fire) mature to stages favorable for hares and lynx over the next several decades, GNP may observe a shift in distribution of its hare and lynx populations to take advantage of transiently favorable food and cover conditions west of the Continental Divide.

Within GNP's unburned forested habitats, moderate hare densities occurred most frequently in mature conifer forests along the eastern and southern boundaries of the park—particularly in the areas of Many Glacier, Two Medicine, and Railroad Creek. The regions of moderate hare density identified by random sampling of the park corresponded well with areas of lynx occurrences and also matched areas park biologists had independently identified as snowshoe hare hotspots. The authors found that abundance estimates based on non-invasive genetic sampling were comparable to traditional live capture studies and that non-invasive genetic sampling was more efficient than live-trapping for all but the highest density hare sites.

USFS Rocky Mountain Research Station Lynx Capture and Monitoring. In the winter of 2011-2012, Squires et al. captured and GPS-collared one lynx in GNP's Middle Fork District and three lynx outside the park's southern boundary as part of an extension of an existing study being conducted throughout western Montana in cooperation with Montana Fish, Wildlife and Parks, Montana Department of Natural Resources, USFS Region 1, University of Montana, Bureau of

Land Management and the Nature Conservancy (GNP files). The collars collected data during the winter and early summer and dropped off the animals at the end of the summer. The research is a cross-discipline study that predicts how climate-induced changes to boreal forests affect the persistence of lynx. Using down-scaled climate models to predict changes in the distribution of boreal forests across the Crown of the Continent, the researchers will model changes to the distribution of boreal forests under likely climate change scenarios to define habitat connectivity for lynx based on empirically defined resource use and movement modeling. They will also use lynx GPS data to develop a map of lynx habitat across the species' distribution in western Montana. Data collected from the park will complement existing information by providing a unique opportunity to study how lynx use habitat in a highly bisected topography and in a more pristine landscape. The GPS data collected will also help park managers understand lynx use relative to existing trails and campsites.

3.6.3 Effects Analysis – Canada Lynx

The 2013 Lynx Conservation Assessment and Strategy identify a number of human-caused influences that could affect lynx and lynx habitat (Interagency Lynx Biology Team 2013). These actions include a first "tier" of climate change, vegetation management, wildland fire, and habitat fragmentation, and a second tier that includes incidental trapping, recreation, mineral/energy exploration and development, illegal shooting, forest/backcountry roads and trails, and domestic livestock grazing (Interagency Lynx Biology Team 2013). Within GNP the primary risk factors are wildland fire, climate change, roads and trails, winter recreational trails, and human developments that degrade and fragment lynx habitat. The effects of climate change are outside of the scope of this analysis and will not be affected by this action. The proposed action will not result in any changes to wildland fire management within GNP. The proposed action will not alter the roads, trail, or winter recreational trails within the action area. Use of the trails within the action area are anticipated to remain the same for the long-term. Since these risk factors will not be affected, the remaining effects analysis for lynx focuses on the impacts to the degradation and fragmentation of lynx habitat associated with the reconstruction of the Sperry Dormitory as a human development.

Den sites have been documented in older regenerating stands and mature coniferous and mixed-coniferous stands with the requisite component of coarse, woody debris that provides thermal and hiding cover for kittens (Ruediger et al. 2000). No den sites or evidence of denning activity has been observed within the action area nor have studies been undertaken to document den sites in the area. The proposed actions would result in trampling of vegetation (approximately one acre) within the Sperry Chalet Complex where the existing habitat is not functionally useful for foraging, denning, or sheltering due to existing recreation, and operation and maintenance uses. Conservation measures to avoid trampling of sensitive species (e.g. whitebark pine, alpine glacier poppy (*Papaver pygmaeum*), pale corydalis (*Corydalis sempervirens*), and northern beechfern (*Phegopteris connectillis*) and sensitive habitats (e.g. seeps, and springs) will reduce the overall effect of trampling within the action area, as trampling will limited to previously disturbed areas to the extent possible. Additionally, every effort will be made to rehabilitate areas of vegetation that are trampled through the planting and seeding using native stocks. These effects would not be long-term and would not have any effects to areas that could potentially serve as den sites in the future. Long-term use of the Sperry Chalet and surrounding area including human activity levels and types of activities would remain the same as they have been

for 100 years. As a result, there would be no change to lynx habitats across the landscape in relation to the long-term use of the Sperry Chalet dormitory.

Studies have not examined the effects of human disturbance, such as construction activities and helicopter flights, on lynx behavior, although several authors have suggested that lynx are "generally tolerant of humans" and probably not displaced by human presence, including moderate levels of snowmobile traffic (Ruediger et al. 2000). Though snowmobiles are not allowed in GNP, a general decibel rating for a passing snowmobile is around 85 dB, compared to an approximate decibel rating of 105 dB (depending on the size of the aircraft) for a helicopter. It is not easy to assess the effects of recurring human activities such as aircraft overflights on lynx activity patterns and energetics due to the difficulty of observing lynx in the wild and the limited amount of research available on this subject. It is unlikely that lynx would perceive high elevation (above 2000 ft.) helicopter flyovers to and from the chalet complex as a threat or cause an adverse reaction. However, nearer to the chalet complex, where helicopters are taking off and landing, considerably more noise would be produced during the duration of the project activities (4-5 months depending on the phase). These activities would occur over habitats that may be used for foraging and could potentially overlap with a small amount of the critical denning period (portions of June).

Although the proposed construction activities would be contained within an area of existing development and human presence, the level of noise disturbance associated with construction activities would be elevated in comparison to the existing impacts. Additionally, the number of helicopter flights and mule trains required to deliver the materials needed for the proposed action will result in a substantial increase in noise disturbance along the flight path, action area, and in adjacent habitats limiting the availability of areas free from human disturbance for the duration of the construction phase of this action. Flights would occur over areas identified as suitable lynx habitat and within the known distribution of lynx in the park. Because flights could possibly overlap with the lynx denning period (if flights were completed in June as part of phase II) and the locations of lynx dens within the park are unknown, there is the potential to inadvertently displace lynx from den sites due to persistent low-level flights in areas with suitable lynx habitat. However, the effects of flights on denning lynx are expected to be minimal due to the very small change that denning and flights will overlap, the short-term nature of the flight activity, and the species preference for forested areas for den sites. Forest cover likely provides lynx and other forest interior species with visual and audial insulation from human activities such as construction and aircraft overflights (described above). If a lynx den site is discovered prior to initiation of the administrative flights, aircraft would be advised to avoid the area during the denning period. Long-term use of the Sperry Chalet and surrounding area including human activity levels and types of activities would remain the same as they have been for 100 years. As a result, there would be no change to lynx denning activities or habitats across the landscape in relation to the long-term use of the Sperry Chalet dormitory.

Alteration of vegetation associated with construction and human activity would not be expected to influence prey species population trends or distribution. Construction activities and the associated helicopter flights are not expected to influence small mammal (prey) population trends in distribution or abundance. Use of the park by small mammals during the course of the proposed action is expected to continue at current levels. Construction activities and helicopter

flights would occur during daylight hours when lynx are less active (Ruediger et al. 2000). The likelihood of these impacts increasing the risk of lynx mortality or decreasing lynx populations is very low. Long-term use of the Sperry Chalet and surrounding area including human activity levels and types of activities would remain the same as they have been for 100 years. As a result, there would be no change to lynx prey species populations trends or distribution in relation to the long-term use of the Sperry Chalet dormitory.

Based on available observation data, previous use of the action area by lynx appears to be low. A large portion of the surrounding habitats were burned in the Sprague Fire and the resulting impacts to prey availability and/or lynx occupation are unknown. The proposed action may affect, Canada lynx that hunt or travel in the action area, by temporary avoidance of the action area and associated flight path by lynx during periods of active construction and material delivery. These effects would be insignificant and discountable due to the limited scale, scope, intensity, and duration of this action. No incidental take of Canada lynx is anticipated.

3.3.4 Cumulative Effects

Cumulative effects were determined by combining the effects of the proposed actions with "non-federal" actions reasonably certain to occur in the foreseeable future and in proximity to the proposed action area. The majority of the cumulative effects originate from on-going private concessioner operations. Table 2 (above) outlines "non-federal" foreseeable future actions.

Cumulative effects to lynx are likely. Several foreseeable future actions located within the proposed action area have collectively altered the habitat and subsequent demography of lynx. The operation and maintenance of the chalet, horse trail ride concessions, and private scenic air tours are the primary cumulative actions that effect lynx within the action area. Private scenic air tours involving both fixed-wing aircraft and helicopters would likely continue to occur over the action area. For private air tours, aircraft are expected to adhere to a voluntary flight altitude of 2,000 feet AGL, and they generally follow consistent flight paths over the park; flights usually last one half hour or an hour. These flights are not expected to displace individual lynx unless they happen to fly at low elevations when in areas of little vegetative cover. Although noise impacts associated with flights are expected to result in some temporary displacement of individuals, the frequency and regularity of aircraft overflights in the park during summer probably results in the habituation of some lynx to this activity. These flights are only anticipated to impact foraging habitats and would not be expected to have impacts to denning habitats or behaviors due to the seasonality (summer) of these actions. The effects of aircraft disturbance to lynx is described in more detail above in the effects analysis.

Chalet operations and horse concessions effect lynx through increased human activity and disturbance associated with stock and visitor use. Effects may result in the displacement of individual lynx from the action area. The effects of human and stock activity and disturbance to lynx are described above in additional detail in the effects analysis. The effects of these actions are minimized by keeping visitors and stock in designated areas or on designated trails to the greatest extent possible, and limiting horse trail rides to one a day.

When the overall effects of the proposed action are combined with these foreseeable future actions, there is potential for a long-term, cumulative adverse effect on lynx in the action area. However, when the incremental level of impact associated with the proposed actions is added to

the adverse effects of the listed cumulative actions, an insignificant overall increase above current levels of adverse effect is expected.

3.6.5 Conservation Measures – Canada Lynx

Conservation measures are an integral component of the proposed action and would be implemented in conjunction with standard BMPs and mitigation measures as part of the project. The following conservation measures would be implemented to minimize the effects of the proposed actions within the proposed action area to Canada lynx:

- Resource specialists would be involved in inspections and monitoring, and provide recommendations during construction work where applicable.
- Any observation of Canada lynx within the action area would be reported to the wildlife biologist and appropriate action would be taken to reduce potential effects.

3.6.6 Effect Determination – Canada Lynx

The proposed action would have insignificant and discountable effects that **may affect, but is not likely to adversely affect**, the Canada lynx or its habitat based on the following rationale:

1. The limited area affected by the activity and the availability of displacement areas;
2. Mortality risk to the Canada lynx is not expected to increase as a result of the action;
3. Snowshoe hare populations would not be measurably affected by the activity;
4. No expansion of the range of competitors and/or predators would result;
5. No alteration of critical habitat would occur;
6. No den sites are known in the area and are unlikely given the existing level of human activity within the action area;
7. The proposed action would not be expected to measurably affect lynx at the population level; and,
8. Long-term use of the chalet complex will not result in adverse effects to lynx as human activity levels and types of activities would remain the same as they have been for 100 years.

3.7 North American Wolverine (*Gulo gulo*) – Proposed Threatened

3.7.1 Baseline for Species Population and Habitat – North American Wolverine

On February 4, 2013, the USFWS published a proposal in the Federal Register to list the distinct population segment of the North American wolverine occurring in the contiguous United States as a threatened species. The USFWS had determined that habitat loss from decreased snow pack in the late spring as a result of higher temperatures and climate change was likely to adversely affect wolverine populations within the contiguous United States. Continued habitat loss would threaten wolverines in the contiguous United States with extinction. Additional threats to wolverine populations, as determined by the USFWS, include human use and disturbance, dispersed recreational activities, infrastructure development, transportation corridors, and land management (USFWS 2011). On August 13, 2014, the USFWS withdrew the proposed rule to list the North American wolverine as a threatened species. The basis for withdrawal was attributed to the conclusion that the factors adversely influencing wolverine populations were not as substantial as believed at the time of the proposed rule's original publication. In October of 2014, complaints were filed in court and as a result, a court order was issued requiring the USFWS to vacate the withdrawal. As a result, the process was effectively returned to the state of

the proposed listing rule that was published in 2013 and the USFWS reopened the comment period on October 18, 2016.

The wolverine is a rarely seen resident of coniferous forests and alpine meadows, although wolverine sighting and track observations have been documented in GNP on both sides of the Continental Divide. Wolverines occur in low densities and have large home ranges, making detection difficult. They utilize a range of habitats including alpine areas, mature forests, ecotonal areas, and riparian areas. Research by Copeland and Yates (2008) and Waller et al. (in prep) suggests that GNP has very high quality wolverine habitat due to extensive alpine areas, rugged topography, remoteness, and diverse ungulate populations. During a study in GNP from 2002-2007, 27 wolverines were radio-instrumented and over 30,000 locations were recorded, providing a better understanding of wolverine population status, trends, and movement patterns in the park (Copeland and Yates 2008). The study documented home ranges, mortality, denning characteristics, dispersal and habitat use, and estimated the wolverine population in GNP at between 40-50 animals (Copeland and Yates 2008). Recent population monitoring in the park, (2009-2012) using non-invasive DNA sampling resulted in a park-wide density estimate of 13 wolverine per 1000 square kilometers and a model-averaged population estimate of 33 individuals (Waller et al., *in prep*). This is one of the highest densities for wolverine reported in the literature. The data also indicated an increasing population, a result also obtained by Squires et al. (2007).

Two adult and three sub-adult wolverine mortalities were documented during the study and five out of seven kits died before the age of one year, indicating low survival to adulthood among juveniles, but high survival among adults (Copeland and Yates 2008). Wolverines died from predation, falls, avalanches, being trapped and shot outside the park, and being run over on the Going-to-the-Sun Road (Copeland and Yates 2008; GNP files).

Wolverines move to lower elevations during the winter where they search for carrion in ungulate winter ranges. Den sites are typically located under deep snow, usually on high elevation talus slopes in sparsely forested areas with boulders, rock caves, and downed woody debris (Copeland and Yates 2008).

Male wolverines can cover over 150 kilometers per week with short movements between denning and foraging areas intermixed with longer movements of 10 kilometers or more; two adults are known to have dispersed out of the park (Copeland and Yates 2008). Average home ranges for wolverines in GNP are 521 square kilometers for males and 139 square kilometers for females (Copeland and Yates 2008).

Previous and on-going federal actions within the action area have and continue to have effects on wolverines. Previous projects include the construction of restroom within the Sperry Complex, the replacement of the Sperry dormitory roof, repairs to the chalet following an avalanche, and improvements to the water system. On-going federal activities within the action area include helicopter flights supporting administrative activities, trail maintenance, waste removal, and increasing visitor use.

3.7.2 Inventories and Surveys – North American Wolverine

Radio-tracking population assessment (2002-2007). In 2002, Copeland and Yates began a radio-telemetry study of wolverine within GNP. This project looked to better define the distribution and reproductive ecology of wolverine within the park. Twenty-one adult and seven juvenile wolverine were captured and implanted with conventional and/or GPS radio transmitters. Data collected from these transmitters was used to monitor the movements, activities, and reproductive status of collared individuals. Den sites were located for six adult females and occurred beneath deep snow on sparsely wooded slopes (Copeland and Yates 2008). An additional 30 rendezvous sites were located on mostly bolder talus and cliff areas (Copeland and Yates 2008). The mortality of a sub adult male associated with construction along the GTSR was documented. Wolverine travel paths were found to cross uninhabited park structures and developed areas. The project estimated of a population of between 40 and 45 individuals that appeared to be stable or increasing.

Non-invasive DNA-based population monitoring (2009-2012). In 2009, Waller et al. initiated a non-invasive DNA-based wolverine population monitoring study within the park. The study looked at the efficacy and efficiency of estimating wolverine population size and density within the park using non-invasive DNA collection methods. Baited hair-snag stations were used to collect DNA samples in areas known to be frequented by wolverine in the winters of 2009 and 2010. Similar stations were used on a 10X10 km grid across the park in the winters of 2011 and 2012 in order to minimize sampling bias. Four different mark-recapture models were used to analyze data resulting in population estimates ranging from 15-78 individuals (Waller et al, *in prep*). The spatial mark-recapture program DENSITY was used to estimate a wolverine density of 22/1,000 km^2 (Waller et al, *in prep*). The study reported densities of wolverine in the park higher than had been previously reported in the literature. The sampling methods were found to be cost effective although the precision was low.

Glacier National Park Wildlife Observation Report Form (WORF). WORF is an electronic database of incidental wildlife observations and standardized wildlife survey and monitoring results submitted by park employees, visitors, and researchers. Sighting records provide occurrence data used by park biologists to describe wildlife distribution and habitat use patterns in the absence of intensive population level research.

Forest Carnivore Track Surveys. Starting in 1994, systematic winter track surveys for wolverine and other forest carnivores were conducted by GNP wildlife technicians as funding allowed (NPS files). Winter distribution and habitat use were analyzed using track survey data and GIS from 1998-2001 (Hahr 2001, NPS files).

3.7.3 Effects Analysis – North American Wolverine

USFWS had determined that habitat loss from decreased snow pack in the late spring as a result of higher temperatures and climate change was likely to adversely affect wolverine populations within the contiguous United States. Continued habitat loss would threaten wolverines in the contiguous United States with extinction (Federal Register 2013). Additional threats to wolverine populations, as determined by the USFWS, include human use and disturbance, dispersed recreational activities, infrastructure development, transportation corridors, and land management (USFWS 2011). Within the action area the primary risk factors for wolverine are

habitat loss from a decreasing snow pack associated with climate change, human use and disturbance, infrastructure development, and transportation corridors.

Direct and indirect effects from the proposed action to wolverine are human use and disturbance, and infrastructure maintenance. These stressors are existing and ongoing throughout the action area. The Sperry Chalet is a popular destination and visitation has continued to increase as overall visitation to the park has also increased. The Sperry Chalet Complex and its associate trails receive a substantial amount of visitor use. The Sperry Chalet Complex includes a dining hall that is open to visitors. The complex is a popular day-hike destination as visitors can choose to hike or travel by horseback (one guided trip is offered per day from the Lake McDonald Lodge area). While the loss of the dormitory (which had room for 54 guests) has reduced the amount of overnight guests that can stay in the immediate area, the Sperry and Lake Ellen Wilson (4 miles up trail) still provide overnight opportunities in the area. The Sperry Chalet and its associated trails are located in wolverine habitats. Since 1994, there have been 12 sightings of wolverine reported in the greater Sperry Chalet area through the GNP Wildlife Observation Reporting Form. Under the proposed action, human disturbance will increase in the proposed action area and flight path due to construction activities and the associated helicopter flights. Sustained levels of human disturbance, especially noise, is anticipated to contribute to increased levels of displacement of individual wolverine in the action area and flight path. Although little is known about the specific effects of human presence and repeated disturbance to wolverine behavior (USFWS 2011), we anticipate that at some unknown threshold the level of increased human disturbance would result in negative effects to the quality and availability of habitats in those areas as well as temporal and spatial displacement of individual wolverines. Displacement of individual wolverines from areas of high noise disturbance and human presence is not anticipated to have measurable population effects due to the large home ranges typically occupied by individual wolverines, as well as the amount of suitable habitat available in the adjacent areas.

The proposed action is not anticipated to result in effects to natal den sites given the timing of construction activities. No den sites or evidence of denning activity has been observed within the proposed action area. There will be no construction activities during the denning period (February-May). As a result, there would be no effects from the proposed construction activities on denning wolverine. The wolverine population within GNP has continued to be stable or increasing while providing refugia and acting as a source population supplying new individuals to available habitats outside of the park despite increasing park visitation and would be expected to continue to do so under the proposed action (Squires et al. 2007).

Any effect would likely result in temporary avoidance of the action area and associated helicopter flight path by wolverine during periods of active construction.

3.3.4 Cumulative Effects

Cumulative effects were determined by combining the effects of the proposed actions with “non-federal” actions reasonably certain to occur in the foreseeable future and in proximity to the proposed action area. The majority of the cumulative effects originate from on-going private concessioner operations. Table 2 (above) outlines “non-federal” foreseeable future actions.

Cumulative effects to wolverines are likely. Several foreseeable future actions located within the proposed action area have collectively altered the habitat and subsequent demography of wolverine. The operation and maintenance of the chalet, horse trail ride concessions, and private scenic air tours are the primary cumulative actions that effect wolverine within the action area. Private scenic air tours involving both fixed-wing aircraft and helicopters would likely continue to occur over the action area. For private air tours, aircraft are expected to adhere to a voluntary flight altitude of 2,000 feet AGL, and they generally follow consistent flight paths over the park; flights usually last one half hour or an hour. These flights are not expected to displace individual wolverine unless they happen to fly at low elevations when in areas of little vegetative cover. Although noise impacts associated with flights are expected to result in some temporary displacement of individuals, the frequency and regularity of aircraft overflights in the park during summer probably results in the habituation of some wolverines to this activity. These flights are only anticipated to impact foraging habitats and would not be expected to have impacts to denning habitats or behaviors due to the seasonality (summer) of these actions. The effects of aircraft disturbance to wolverine is described in more detail above in the effects analysis.

Chalet operations and horse concessions effect wolverine through increased human activity and disturbance associated with stock and visitor use. Effects may result in the displacement of individual wolverine from the action area. The effects of human and stock activity and disturbance to wolverine are described above in additional detail in the effects analysis. The effects of these actions are minimized by keeping visitors and stock in designated areas or on designated trails to the greatest extent possible, and limiting horse trail rides to one a day.

When the overall effects of the proposed action are combined with these foreseeable future actions, there is potential for a long-term, cumulative adverse effect on wolverines in the action area. However, when the incremental level of impact associated with the proposed actions is added to the adverse effects of the listed cumulative actions, an insignificant overall increase above current levels of adverse effect is expected.

3.7.5 Conservation Measures – North American Wolverine

Conservation measures are an integral component of the proposed action and would be implemented in conjunction with standard BMPs and mitigation measures as part of the project. The following conservation measures would be implemented to minimize the effects of the proposed actions within the proposed action area to wolverine:

- Resource specialists would be involved in inspections and monitoring, and provide recommendations during construction work.
- Any observation of wolverines within the proposed action area would be reported to the wildlife biologist and appropriate action would be taken to reduce potential effects.

3.7.6 Effect Determination – North American Wolverine

The proposed action would **not likely to jeopardize**, the North American wolverine or its habitat based on the following rationale:

1. Due to the limited area affected by the activity and the availability of displacement areas there would be no effect to wolverine range, abundance, or distribution;
2. Mortality risk to wolverine is not expected to increase as a result of the action;

3. No den sites are known in the area and are unlikely due to the existing level of human disturbance at the project site;
4. The proposed action would not be expected to measurably affect wolverine at the population level;
5. Several conservation measures would be implemented to reduce direct short-term effects from construction activity; and,
6. Long-term use of the chalet complex will not result in adverse effects to wolverine as human activity levels and types of activities would remain the same as they have been for 100 years.

3.8 Meltwater Lednian Stonefly (*Lednia tumana*) and Wester Glacier Stonefly (*Zapada glacier*) – Proposed Threatened

There are no meltwater lednian or wester glacier stoneflies within the proposed action area and it does not overlap with any potential stonefly habitat. The closest documented population of either species of stonefly is outside and upstream from the proposed action area. Nevertheless, all proposed construction activities will be land based and do not include excavation or dirt work that would contribute to downstream sedimentation. Best management erosion and sediment control measures would be used to prevent introduction of sediments into downstream wetlands and waterways. Similar to the trout species found in the park, stoneflies are not considered at risk from construction activity or aircraft disturbance, as they would not be anticipated to experience terrestrial sound at levels that would influence behavior or cause a physiological response (NPS 1995). The proposed project would not result in any change to the mortality risk, or the availability of habitat and forage. Implementation of the proposed federal action will have **NO EFFECT** on meltwater lednian or wester glacier stoneflies.

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