MISSOURI RIVER
RECOVERY PROGRAM

DRAFT

Missouri River Recovery Management Plan and Environmental Impact Statement

LAND USE AND OWNERSHIP ENVIRONMENTAL CONSEQUENCES ANALYSIS TECHNICAL REPORT

December 2016

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Missouri River Recovery Management Plan and Environmental Impact Statement

Land Use and Ownership Environmental Consequences Analysis

Technical Report

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Acronyms and Abbreviations

BiOp	2003 Amended Biological Opinion
CDL	Cropland Data Layer
DSS	Data Storage System
EIS	Environmental Impact Statement
EQ	Environmental Quality
ER	Environmental Regulation
ERS	USDA Economic Research Service
ESH	Emergent Sandbar Habitat
FRIS	Farm and Ranch Irrigation Survey
GRP	Gross Regional Product
H&H	Hydrologic and Hydraulic (Model)
HC	Human Considerations
HEC	USACE Hydrologic Engineering Center
MRRIC	Missouri River Recovery Implementation Committee
MRRMP	Missouri River Recovery Management Plan
MRRP	Missouri River Recovery Program
NED	National Economic Development
OSE	Other Social Effects
P&G	1983 Economic and Environmental Principles and Guidelines For Water And Related Land Resources Implementation Studies
PILT	Payments In Lieu Of Taxes
POR	Period of Record
RAS	River Analysis System
RED	Regional Economic Development
ResSim	Reservoir System Simulation
SAM	Social Accounting Matrix
SWH	Shallow Water Habitat
TERC	Tax Equalization and Review Commission
USACE	U.S. Army Corps of Engineers
USDA	U.S. Department of Agriculture
USFWS	U.S. Fish and Wildlife Service

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1.0 Introduction

The USACE in cooperation with the USFWS are developing a Missouri River Recovery Management Plan and Draft Environmental Impact Statement (MRRMP-Draft EIS). The purpose of the MRRMP Draft EIS is to develop a management plan that includes a suite of actions that removes or precludes jeopardy status for the piping plover, the interior least tern, and the pallid sturgeon using USACE authorities.

The purpose of the Land Use and Ownership Environmental Consequences Technical Report is to provide supplemental information on the Land Use and Ownership analysis in addition to the MRRMP-Draft EIS. Additional details on the Regional Economic Development (RED) methodology and results are provided in this report. The Other Social Effects (OSE) impacts are presented in the MRRMP-Draft EIS, Chapter 3, Land Use and Ownership, Environmental Consequences section. No National Economic Development (NED) or Environmental Quality (EQ) analyses were undertaken for Land Use and Ownership.

1.1 Summary of Alternatives

The MRRMP-EIS evaluates the following Management Plan alternatives. Detailed description of the alternatives is provided in the Draft EIS, Chapter 2.

- **Alternative 1 – No Action.** This is the no-action alternative, in which the Missouri River Recovery Program (MRRP) would continue to be implemented as it is currently, including a number of management actions associated with the MRRP and BiOp compliance. Management actions under No Action include creation of early life stage habitat for the pallid sturgeon and emergent sandbar habitat (ESH), as well as a spring plenary pulse. The construction of habitat will be focused in the Garrison and Gavins reaches for ESH (an average rate of 107 acres per year) and between Ponca to the mouth near St. Louis for SWH (3,999 additional acres constructed).
- **Alternative 2 – USFWS 2003 Biological Opinion Projected Actions.** This alternative represents the USFWS interpretation of the management actions that would be implemented as part of the 2003 Amended BiOp Reasonable and Prudent Alternative (USFWS, 2003). Whereas No Action only includes the continuation of management actions USACE has implemented to date for BiOp compliance, Alternative 2 includes additional iterative actions and expected actions that the USFWS anticipates would ultimately be implemented through adaptive management and as impediments to implementation were removed. Considerably more early life stage habitat (10,758 additional acres constructed) and ESH (an average rate of 3,546 acres per year) would be constructed under Alternative 2 than under Alternative 1. In addition, a spring pallid sturgeon flow release would be implemented every year if specific conditions were met. Alternative 2 would also modify System operations to allow for flows that are sufficiently low to provide for early life stage habitat as rearing, refugia, and foraging areas for larval, juvenile, and adult pallid sturgeon.
- **Alternative 3 – Mechanical Construction.** The USACE would only create ESH through mechanical means at an average rate of 391 acres per year across the entire system. This amount represents the acreage necessary to meet the bird habitat targets after accounting for available ESH resulting from system operations. The average annual construction amount includes replacing ESH lost to erosion and vegetative growth, as

well as constructing new ESH. An additional 3,380 acres of early life stage habitat for the pallid sturgeon would be constructed under Alternative 3. There would not be any reoccurring flow releases or pulses implemented under this alternative.

- **Alternative 4 – Spring ESH Creating Release.** The USACE would mechanically construct ESH annually at an average rate of 240 acres per year across the entire system. This amount represents the acreage necessary to meet the bird habitat targets after accounting for available ESH resulting from implementation of an ESH-creating reservoir release in the spring. Alternative 4 would be similar to Alternative 1 (current operations), with the addition of a spring release designed to create ESH for the least tern and piping plover. An additional 3,380 acres of early life stage habitat for the pallid sturgeon would be constructed under Alternative 4.
- **Alternative 5 – Fall ESH Creating Release.** The USACE would mechanically construct ESH annually at an average rate of 309 acres per year across the entire system. This alternative is based on Alternative 1 (current operations), with the addition of a release in the fall designed to create sandbar habitat for the least tern and piping plover. An additional 3,380 acres of early life stage habitat for the pallid sturgeon would be constructed under Alternative 5.
- **Alternative 6 – Pallid Sturgeon Spawning Cue.** The USACE would mechanically construct ESH annually at an average rate of 303 acres per year across the entire system. In addition, the USACE would attempt a spawning cue pulse every three years in March and May. These spawning cue pulses would not be started or would be terminated whenever flood targets are exceeded. An additional 3,380 acres of early life stage habitat for the pallid sturgeon would be constructed under Alternative 6.

1.2 USACE Planning Accounts

Alternative means of achieving species objectives were evaluated including consideration for the effects of each action or alternative on a wide range of human considerations (HC). Human considerations to be evaluated in the MRRMP-EIS alternatives are rooted in the economic, social, and cultural values associated with the natural resources of the Missouri River. The HC effects evaluated in the MRRMP-EIS are required under the National Environmental Policy Act and its implementing regulations (40 CFR Parts 1500-1508). The 1983 Economic and Environmental Principles and Guidelines for Water and Related Land Resources Implementation Studies (P&G) also served as the central guiding regulation for the economic and environmental analysis included within the MP-EIS. Further guidance that is specific to USACE is described in Engineering Regulation (ER) 1105-2-100, Planning Guidance Notebook, which provides the overall direction by which USACE Civil Works projects are formulated, evaluated, and selected for implementation. These guidance documents describe four accounts that were established to facilitate evaluation and display the effects of alternative plans:

- The national economic development (NED) account displays changes in the economic value of the national output of goods and services expressed in monetary units. Contributions to NED are the direct net benefits that accrue in the planning area and the rest of the Nation.
- The regional economic development (RED) account registers changes in the distribution of regional economic activity (i.e. jobs and income).
- The environmental quality (EQ) displays non-monetary effect of significant natural and cultural resources.

- The other social effects (OSE) account registers plan effects from perspective that are relevant to the planning process, but are not reflected in the other three accounts. In a general sense, OSE refers to how the constituents of life that influence personal and group definitions of satisfaction, well-being, and happiness are affected by some condition or proposed intervention.

The accounts framework enables consideration of a range of both monetary and non-monetary values and interests that are expressed as important to stakeholders, while ensuring impacts are not double counted. The USACE planning accounts evaluated for land use and ownership include RED and OSE.

1.3 Approach for Evaluating Environmental Consequences to Land Use and Ownership of Missouri River Recovery Management Plan

Changes in land use and ownership could affect agricultural operations and crop production within the Missouri River floodplain, which could adversely impact regional economic conditions. Under all MRRMP-Draft EIS alternatives, the USACE would purchase land from willing sellers to develop early life stage habitat for the pallid sturgeon. The majority of federally acquired lands are likely to have been used for agricultural production prior to their purchase by the USACE. Changes in agricultural activity as result of the federal purchase of farmlands could have regional economic effects that include changes in farm employment, implications for businesses that support farming operations, property tax receipts to local governments, and other effects due to farming households and other farm-related entities spending more or less money in the local and/or regional economy.

The transition of lands from private to public ownership also impacts the local tax base. If lands were purchased by USACE and put into federal or state management, the property tax revenue to local governments would decrease. To compensate local governments for lost property tax revenue, counties with non-taxable federal lands are eligible for Payments in Lieu of Taxes (PILT)[1] to offset losses in property taxes and provide local services. The conceptual flow chart shown in Figure 1 demonstrates, in a stepwise manner, how changes to the physical conditions of the Missouri River and its floodplain under the MRRMP-Draft EIS alternatives can impact agricultural conditions and operations and regional economic conditions. This figure also shows the intermediate factors and criteria that were applied in assessing the RED and OSE consequences to land use and ownership.

[1] The PILT program is managed through the Bureau of Land Management, and payments are made through the U.S. Department of the Treasury. More information on the PILT program is available here: www.doi.gov/pilt/.

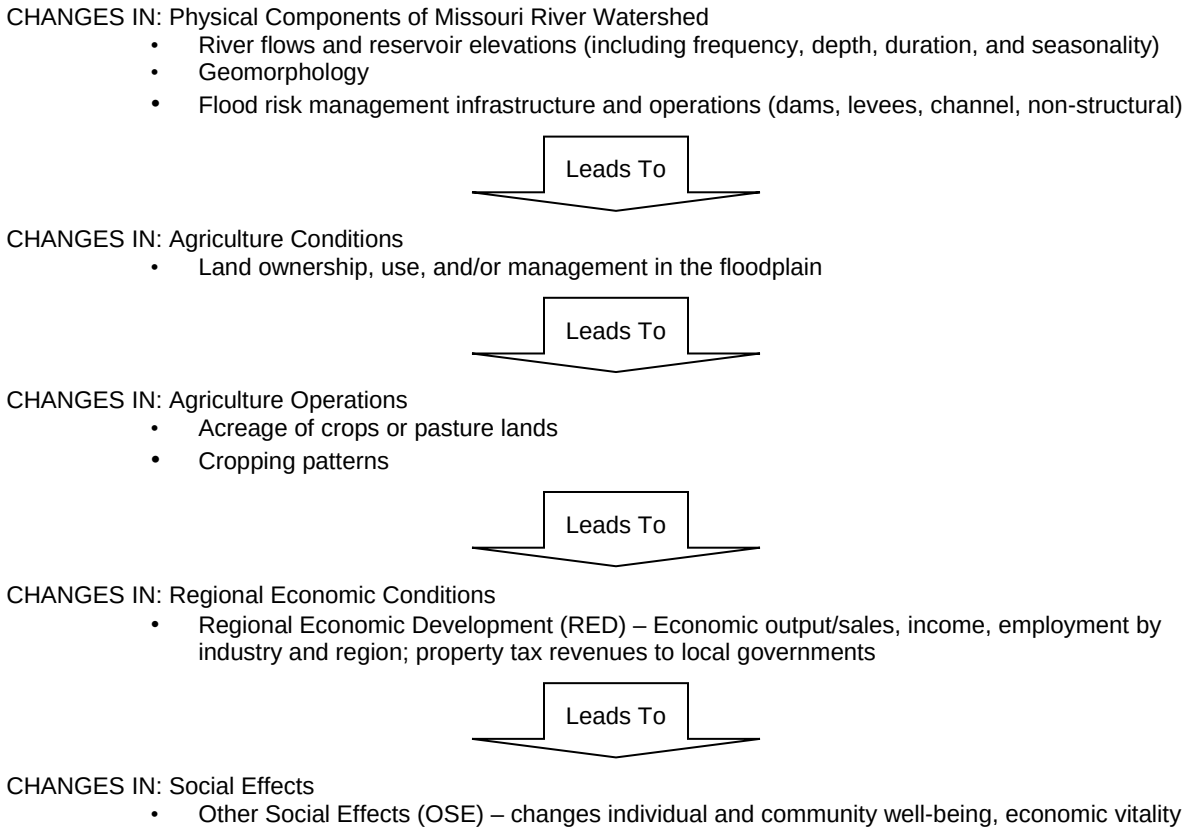

Figure 1. Flow Chart of Inputs Considered in the Land Use and Ownership Evaluation

The evaluation of the environmental consequences to land use and ownership assessed how the purchase of lands from willing sellers by the UASE to support habitat creation under the MRRMP-Draft EIS alternatives may impact the value of agricultural production within the floodplain, the resulting changes in regional jobs and income from changes in the value of crop production, and changes in property tax receipts to local governments. The methodology and assumptions associated with analyzing these impacts are further discussed in detail in the following sections.

The one-time spawning cue test (Level 2) release that may be implemented under Alternatives 3, 4, and 5 was not included in the hydrologic modeling for these alternatives because of the uncertainty of the hydrologic conditions that would be present if implemented. Hydrologic modeling for Alternative 6 simulates reoccurring implementation (Level 3) of this spawning cue over the wide range of hydrologic conditions in the POR. Therefore, the impacts from the potential implementation of a one-time spawning cue test release would be bound by the range of impacts described for individual releases under Alternative 6.

2.0 Regional Economic Development Methodology and Assumptions

A change in the land use and ownership under the MRRMP-Draft EIS alternatives may have implications for the economy as well as changes in property tax receipts to local governments. This section provides a brief overview of the methodology for evaluating the RED impacts as a

result of the federal acquisition of lands for construction of early life stage habitat for the pallid sturgeon to meet the specified acreages under each of the MRRMP-Draft EIS alternatives.

2.1 Assumptions

In modeling the environmental consequences as a result of land acquisition, the project team established a set of assumptions. The key assumptions used in the modeling effort follow.

- Approximately 60 percent of the lands that would be federally acquired in the Omaha District and 80 percent in the Kansas City District are assumed to have been in crop production prior to being Federally purchased.
- Because the actual location of targeted acres for acquisition for early life stage habitat for the pallid sturgeon is not known at this time, the project team estimated acreage amounts by river reach and allocated acres by river reach to states based on the proportion of floodplain acreage in the river reach in each state.
- The targeted acres that would be federally acquired under the MRRMP-Draft EIS alternatives do not include any acreage that has already been acquired as part of the Missouri River Recovery Program.
- The federal acquisition of lands would occur over a 15-year implementation period.
- Federally acquired lands that were in crop production were assumed to have crop patterns (i.e., the percentage of corn, alfalfa, barley) consistent with the overall percentage of crops grown in each state in the Missouri River floodplain as reported in the 2014 Cropland Data Layer (USDA 2014).
- Payments in Lieu of taxes (PILT) were not factored into the fiscal analysis, and therefore, the analysis represents a worst-case scenario. PILT would reduce adverse impacts to local governments from reductions in property tax receipts.
- Since willing sellers would be compensated the fair market value for his or her land, the direct effect as estimated in the economic impact analysis to the farming industry would be lower because the land owners would receive a payment that would theoretically include the future value of production. However, many direct farming jobs and labor income (i.e., if paid by the agricultural land owner) would be affected and these workers would not be compensated for the land sale. To be conservative, the analysis does not remove the direct effects, which may result in an overstatement of the regional economic impacts.

2.2 Risk and Uncertainty

Risk and uncertainty are inherent with any model that is developed and used for water resource planning. To address risk and uncertainty in the MRRMP-Draft EIS, the project team has attempted to define and evaluate a reasonable range of plan alternatives that include an array of management actions within an adaptive management framework for the Missouri River. Much of the risk and uncertainty associated with modeling the impacts to land use and ownership stem from the assumptions that historic farming conditions would continue to represent future agricultural conditions within the floodplain. Changing weather patterns as a result of climate change scenarios may have unforeseen impacts on the fertility of floodplain soils. Over time, these climatic changes may impact the productivity of agricultural lands and types of crops grown within the floodplain.

In addition to environmental uncertainties, technological advancements, changes in consumer preferences, and agricultural policies may also have unforeseen impacts on the types and size of future crop yields that would be grown on agricultural lands purchased to support habitat creation under the MRRMP. These operational changes may occur over time as USACE purchases land within the floodplain, however, these changes are speculative and would not be captured by the land use and ownership analysis conducted as part of the MRRMP-Draft EIS.

A further consideration that would affect the implementation of the MRRMP-EIS alternatives is that sufficient federal funds be available to purchase lands from willing sellers in order to construct the target number of acres of early life stage habitat for the pallid sturgeon. The outlook for the federal budget is uncertain depending on the political climate, economic context, and many other factors.

2.3 Regional Economic Development Methodology

Under all MRRMP-Draft EIS alternatives, USACE will create additional habitat to support the early life stage requirements of pallid sturgeon. In order to reach habitat targets for pallid habitat, USACE will need to construct habitat on existing public lands, and acquire additional private lands along the river from willing sellers. Federal acquisition of private lands may affect land uses within the floodplain, which could impact agricultural operations, regional economic conditions, and the local tax base. The analysis of environmental consequences associated with land acquisitions to support habitat creation under the MRRMP-Draft EIS alternatives included a RED analysis of impacts associated with changes in jobs and income; and property tax receipts to local governments from change in agricultural activities and production. The methodology used to assess these impacts is described in detail below.

2.3.1 Estimate the Agricultural Acres for Federal Acquisition

Although USACE will construct habitat to support the early life stage requirements of the pallid sturgeon on federal, state, and local public lands along the river, USACE will need to acquire and construct additional habitat on private lands adjacent to river in order to meet habitat targets for the pallid under all MRRMP-Draft EIS alternatives. When land is purchased from private sellers, USACE must purchase additional acres than what is required for pallid sturgeon habitat in order to account for various parcel sizes, account for the willingness of the seller to subdivide the parcel, and to provide a buffer between habitat and adjacent land. Based on past pallid sturgeon SWH projects, USACE has estimated that they would have to acquire 7.7 additional acres of land, on average, for every one acre of pallid sturgeon habitat that will be created. Table 2-1 summarizes the additional number of acres that would need to be federally acquired to meet the habitat targets for pallid habitat under the MRRMP-Draft EIS alternatives.

Based on the recent experience with federal acquisition of lands, the real estate divisions of the USACE Omaha and Kansas City Districts have estimated that 60 and 80 percent, respectively, of the lands that would be purchased from willing sellers under the MRRMP- Draft EIS alternatives are currently used in agricultural production. Estimates of the agricultural lands to be acquired to meet habitat targets for the pallid sturgeon under the MRRMP-Draft EIS alternatives are summarized in Table 1.

Table 1. Acquisition of Lands by Alternative

Alternative	Reach	Additional Federally Acquired Lands (acres)	Additional Federally Acquired Lands in Crop Production (acres)
Alternative 1	Ponca to Rulo	1,109	665
	Rulo to the Mouth	4,158	3,327
Alternative 2	Ponca to Rulo	9,333	5,600
	Rulo to the Mouth	24,130	19,304
Alternatives 3–6	Ponca to Rulo	0	-
	Rulo to the Mouth	1,418	1,134

Note: Alternative 1 considers the targeted acreage that would be acquired under the existing MRRP, but does not include any acreage that has already been acquired as part of this program.

Since it is not known exactly where these additional lands will be acquired within the river reach, the project team allocated future land purchases to meet habitat targets within the Ponca to Rulo and Rulo to the Mouth river reaches under the MRRMP-Draft EIS alternatives to the four states based on the approximate amount for floodplain acreage in each river reach (Table 2). The evaluation used the following states as the study area to estimate the economic impacts.

Table 2. Percentage of Acquisition Acres by State and River Reach

River Reach	State	Estimated Percentage of Acquisition Acres in Each State
Ponca to Rulo	Iowa	50%
	Nebraska	50%
Rulo to the Mouth	Kansas	5%
	Missouri	95%

2.3.2 Identify the Amount and Types of Crops on Agricultural Acquired Lands

Of the 2 million floodplain acres in the four states that make up the lower river basin, approximately 1.4 million acres are estimated to be used in agricultural production (Table 3).

Table 3. Percent of Agriculture Acreage by Crop in the Missouri River Floodplain by State

State	Floodplain Acres	Agricultural Lands within Floodplain	Agricultural Lands as a Percent of Total Floodplain
Nebraska	373,017	218,961	58.7%
Iowa	629,244	460,607	73.2%
Missouri	1,018,700	678,454	66.6%
Kansas	54,819	25,381	46.3%

Note: Total floodplain acreages are estimates derived from geographic computations of pixilated 30-meter square representations of land cover

Based on state level data reported by the USDA, agricultural lands in this region are predominately croplands, growing corn, soybeans, alfalfa, and other hays (Table 4). It is assumed that these distributions of crop types are also representative of agricultural production within the floodplain, and of agricultural lands that would be purchased under the MRRMP-Draft EIS alternatives.

Table 4. Percent of Agriculture Acreage by Crop in the Missouri River Floodplain by State

State	Crop Type (Percent of Agricultural Lands of Total Floodplain Acres)					
	Corn	Soy-beans	Alfalfa	Other Hay/ Non-Alfalfa	Fallow/ Idle Cropland	All Other Crops and Agricultural Land Covers
Nebraska	31.8%	25.0%	1.0%	0.2%	0.0%	0.7%
Iowa	39.2%	33.2%	0.3%	0.0%	0.0%	0.5%
Missouri	29.2%	35.4%	0.0%	0.4%	0.0%	1.6%
Kansas	23.2%	22.4%	0.0%	0.2%	0.1%	0.4%

Source: USDA NASS Cropland Data Layer 2014 (% of agricultural acreage by crop)

Note: Fallow and idle cropland types were assumed to grow primary hay. Since information was not available on the specific crop types included under the umbrella of "all other crops," or in the crops that may be in rotation in the fallow cropland, these lands were also assumed to produce hay, or other crops that would be of similar value.

Since crop lands purchased from willing sellers, would be transitioned from cultivated uses to more natural settings over time. USACE land acquisitions under the MRRMP-Draft EIS alternatives would represent the long-term removal of these croplands from agriculture production, resulting in lower crop yields and agricultural productivity within the floodplain.

2.3.3 Estimate Impacts of Land Acquisition on Agricultural Production

To evaluate how the transition of private lands to federal ownership would impact agricultural production, the project team estimated the value of agricultural production that would be lost over the implementation period as a result of land acquisitions to support habitat creation within the Ponca to Rulo and Rulo to the Mouth river reaches. Losses in agricultural production were valued at the state level based on the number of acres anticipated removed from corn, hay, and soybean production; the average yield-per-acre for these crops (Table 5); and the average statewide price of these commodities (Table 6).

Table 5. Average Commodity Yield by State, 2001-2015

State	Corn (bushels/acre)	Hay (tons/acre)	Soybeans (bushels/acre)
Iowa	167.8	3.1	48.4
Kansas	133.8	2.6	38.5
Missouri	131.3	2.2	35.9
Nebraska	154.7	2.8	49.5

Source: USDA 2001 – 2015.

Table 6. State-Level Normalized Price Estimates for Commodities, 2015

State	Corn for grain bushel	Hay, all types, baled ton	Soybeans for beans bushel
Iowa	$5.27	$143.27	$12.22
Kansas	$5.33	$148.90	$11.94
Missouri	$5.48	$92.60	$12.22
Nebraska	$5.22	$132.29	$11.82

Source: USDA, Economic Research Service.

The value of production that would be lost as croplands were acquired to support habitat creation were estimated by multiplying the estimated agricultural acquisition acreage by crop type by the average yield-per-acre (Table 5) and price (Table 6) for each crop type in each of the four states.

2.3.4 Economic Impacts of Reduced Agricultural Production

Changes in agricultural activity could have regional effects that include changes in farm employment, implications for businesses that support farming operations, and other effects due to farming households and other farm-related entities spending more or less money in the local and/or regional economy. To model these broader economic impacts resulting from changes in the value of crop production as USACE acquires lands, the project team employed a regional input-output model known as IMPLAN®. IMPLAN® is an industry-standard input-output model that traces the flow of dollars between purchasers and producers based on inter-industry, household, and institutional linkages within the designated regional economy. This model provides a snapshot of the current economy within the study area, and shows how the local economy would respond to changes in local economic activity.

To assess how reduced agricultural production as a result of removing lands from production would affect regional economies, estimated reductions in the value of crop production in each state under the MRRMP-Draft EIS alternatives were mapped to the appropriate IMPLAN® sector[2]. Based on the types of crop anticipated to be affected, changes in agricultural production were modeled in three IMPLAN® sectors (Table 7).

Table 7. IMPLAN® Industry Codes Used for Crop Categories

IMPLAN® industry	Crop as listed in CDL
0001: Oilseed Farming	Soybeans
0002: Grain Farming	Corn
0010: Other crop farming	Alfalfa
	Other Hay/Non-Alfalfa
	Fallow/Idle Cropland
	All Other Crops and Agricultural Land Covers

Source: IMPLAN® Group LLC 2015

[2] IMPLAN's commodity sectors are based on NAICS and BEA sectors.

Reduced corn, soybeans, hay, and other field crop production end up having three types of impacts on the regional economy.

- **Direct impacts**: jobs, income, and sales directly associated with farming and crop production.
- **Indirect impacts:** jobs, income, and sales associated with industries and businesses that provide goods and services to agricultural producers (e.g. fertilizer producers and distributors, truck and navigation transportation, and other farming support services).
- **Induced impacts:** direct and indirect jobs, income, and sales associated local households spending. Induced industries include medical services, food and beverage establishments, grocery stores, real estate, auto repair services, and many others.

This economic impact analysis measures the total economic impact of crop production losses resulting from federal land acquisitions to support early life stage habitat creation under the MRRMP-Draft EIS alternatives. Since willing sellers would be compensated the fair market value for his or her land, the direct effect to the farming industry would be lower because the land owners would receive a payment that would theoretically include the future value of production. However, many direct farming jobs and labor income (i.e., if paid by the agricultural land owner) would be affected and these workers would not be compensated for the land sale. To be conservative, the analysis presents total economic impacts and does not remove the direct effects which may result in an overstatement of the regional economic impacts.

2.3.5 Impacts to Property Tax Receipts

A change in land ownership from private to public would have an impact on property tax revenues collected by local government entities. The land use change from private to public would change its tax obligation status. If lands were purchased by USACE and put into federal or state management, the property tax revenue to local governments would decrease. However, these local governments would be eligible for payments in lieu of taxes (PILT). PILT is a federal program that provides payments to local governments to help offset losses in property taxes due to non-taxable federal lands within their boundaries.[3] In addition, once the land is acquired, USACE may spend a few years planning the project before starting construction at the site. In these cases, USACE may lease the property to private parties, usually for a term of three to five years for agricultural use. Federal agencies will return 75 percent of agricultural lease revenues to the county government to fund local services. This program can temporarily help with the shortfall of lost property taxes over and above the PILT payment, but leased acreages will be reduced as wildlife mitigation features are put into place (USACE 2013).

The states evaluated in this analysis assess the value of farmland based on its use value in agriculture. These taxing policies consider the productivity and net earning capacity of the property regardless of the actual value of the agricultural products produced. The farmland value assessment of the agricultural property is often based on the income a farmer can be expected to earn rather than the land's market value.

Agricultural land values, if relevant for the analysis, were obtained from state departments of revenue websites and local tax assessors. The mill levies were obtained for the counties in the

[3] The PILT program is managed through the Bureau of Land Management, and payments are made through the U.S. Department of the Treasury. More information on the PILT program is available here: www.doi.gov/pilt/.

floodplain in each state. Because the location of lands was not known, an average tax rate was applied to the total acres affected in each state. The following sections discussed the specific methodology in each state used for this analysis.

Missouri

In Missouri, agricultural land is valued based on its productivity value which is determined based on the natural characteristics of the land such as soil characteristics and other factors. The State Tax Commission of Missouri publishes eight agricultural and horticultural land grades. Grade 1 is prime farmland while grade 8 is the least productive farmland. Grades are determined based on land features, including the farmland's position relative to rivers and streams, slope, erosion, flooding, productivity, climate and moisture availability during the cropping season, color of soil, texture, subsoil characteristics, soil types, and other factors. Soil surveys and the soil productivity index rating also play a factor (Missouri State Tax Commission 2008).

Almost 85 percent of agricultural land in Missouri falls between Grades 4 and 7, with corresponding agricultural values between $405 per acre and $79 per acre (Missouri State Tax Commission 2015a). Agricultural and horticultural property that is actively used for this purpose is assessed at 12 percent of its agricultural production value in Missouri (Missouri State Tax Commission 2015a). The county specific mill levy is then applied to the assessed valuation to determine the estimated property tax paid.

For the purposes of this analysis, the average tax paid per acre of agricultural land for 2015 for counties along the Missouri River was applied to the acreage that was expected to be acquired under each alternative. The average property tax per acre varied from $4.94 in Cole County to $8.51 in Clay County. For all counties along the Missouri River, the average rate used for this analysis was $6.43 per acre (Missouri State Tax Commission 2015b).

Kansas

The appraised value of agricultural land in Kansas is based on the productive potential directly attributed to the natural capabilities of the land. Cultivated land is valued using an eight-year average of landlord net returns given a certain crop mix, yield, soil type, price, production costs, landlord's share of crop, landlord's share of expenses, and management fees. In each county, the average landlord gross income is weighted by the crop mix percentage for each crop, which estimates the landlord's weighted gross income. The county weighted landlord gross income is then weighted by soil type (Kansas Department of Revenue 2014, Kansas Department of Revenue PVD 2013).

To convert the landlord share of agricultural net income into an agricultural value, net income is divided by the capitalization rate and then a percentage of that value is considered the value assessed which a local mill levy is applied (Kansas Department of Revenue 2016). However, for the purposes of this analysis, an average tax paid per acre for 2015 for counties located in the floodplain was used. The average property tax per acre varied from $6.14 in Wyandotte County to $16.88 in Doniphan County. For all counties along the Missouri River, an average tax of $10.37 per acre was obtained from the Kansas Department of Revenue (Kansas Department of Revenue 2015) and used for the analysis.

Nebraska

Nebraska uses a unique approach to farmland valuation described as the classified-use system under which different tax rates and exemptions are applied to different kinds of property. Agricultural land and horticultural land is divided into classes and subclasses of real property to ensure that tax levels reflect uses appropriate for the land. Classes are assigned based on soil classification surveys (Nebraska Department of Revenue 2011)

The fiscal model used an average tax paid per acre based on a two-step process. First, for all counties near the Missouri River, the average level of value for all dryland cropland as assigned by county was collected. This is a dollar value based on this productivity rating of that dryland soil (Nebraska Tax Equalization and Review Commission 2016). Second, the estimated tax paid was estimated based on the percent of market value of agricultural land assessed in that county. Agricultural and horticultural land is assessed at between 69 and 75 percent of the market value for agricultural purposes.

The Nebraska Tax Equalization and Review Commission (TERC) collects the county-specific level of value assigned to agricultural and horticultural land and these values were used for counties where appropriate (Nebraska Tax Equalization and Review Commission 2016). In cases where the TERC did not have specific information for each county, it was assumed that assessed values of agricultural land were equivalent to 75 percent of the market value (Nebraska Tax Equalization and Review Commission 2015). The total tax receipts for all counties were then estimated for all acres taxed. The average tax rate assessed in each county was then used for counties located in the floodplain with an average tax rate of $44 per acre.

Iowa

In Iowa, the assessment of agricultural lands for tax purposes is based on its productivity. On a county-by-county basis, agricultural property is assessed using a five-year productivity calculation that uses the landlord's share of revenue from the sale of grain crops (primarily corn) from all agricultural land in the county. Expenses are then subtracted from that revenue and net revenue from all agricultural property in the county is divided by the number of agricultural acres. The resulting value is capitalized at a statutory rate of 7 percent. The resulting value is the average assessed value of an acre of farmland. This value is multiplied by an agricultural rollback established by each county and represents the set percentage of a property's assessed value that is subject to tax (Iowa Fiscal Services Division 2013, Iowa Legal Services Division 2013).

In order to determine the income-producing ability of each parcel of land for this analysis, the 2013 county-by-county agricultural rents on non-irrigated land were used. These values were then divided by the capitalization rate to estimate assessed value. The average tax rates for 2013 for each county in the floodplain were then applied to the estimated assessed value to determine and average tax paid per acre. For this analysis, the average tax paid on lands that may be acquired in Iowa was $38 per acre.

3.0 Regional Economic Development Results

This section presents the results of the RED analysis for land acquisition proposed under each of the MRRMP-Draft EIS alternatives. The analysis focused on estimating changes in sales, labor income, and employment from lost agricultural production on acquired lands. This section

also presents the results of changes in tax revenue associated with the MRRMP-Draft EIS alternatives. The results are summarized below.

3.1 Summary of Regional Economic Development Results

A summary of RED impacts, measured in terms of changes in sales, labor income, and employment, are summarized in Table 8. The table shows the total sales, employment, and labor income for all states where land acquisition is expected to occur. Alternatives 3 through 6 would have the smallest reduction in labor income, sales, and employment because fewer lands are acquired under these alternatives. Alternative 2 would have the greatest adverse impacts of up to 124 jobs lost over the 15-year implementation period. The following figures show the total change in jobs, income, and sales over the 15-year implementation period.

As with changes the changes in labor income, employment, and sales, adverse impacts to property tax receipts are lowest under Alternatives 3 – 6, while Alternative 2 would have the largest adverse impacts to property tax receipts to local governments (Table 9).

Table 8. Regional Economic Impacts of Agricultural Land Acquisition under MRRMP-Draft EIS Alternatives, 2016 Dollars

Type of Impact	Alt 1	Alt 2	Alts 3 - 6
Nebraska			
Estimated Agricultural Federal Acres Acquired	554	4,667	0
Total Sales	−$614,166	−$5,169,566	$0
Change in Sales Relative to Alternative 1	n/a	−$4,555,399	$614,166
Total Employment	−1.8	−14.8	0.0
Change in Employment Relative to Alternative 1	n/a	−13.1	1.8
Total Labor Income	−$140,402	−$1,181,796	$0
Change in Labor Income Relative to Alternative 1	n/a	−$1,041,394	$140,402
Iowa			
Estimated Agricultural Federal Acres Acquired	554	4,667	0
Total Sales	−$658,270	−$5,540,793	$0
Change in Sales Relative to Alternative 1	n/a	−$4,882,523	$658,270
Total Employment	−2.0	−16.7	0.0
Change in Employment Relative to Alternative 1	n/a	−14.7	2.0
Total Labor Income	−$129,143	−$1,087,021	$0
Change in Labor Income Relative to Alternative 1	n/a	−$957,878	$129,143
Kansas			
Estimated Agricultural Federal Acres Acquired	208	1,206	71
Total Sales	−$197,503	−$1,146,034	−$67,329
Change in Sales Relative to Alternative 1	n/a	−$948,531	$130,174
Total Employment	−0.6	−3.7	−0.2
Change in Employment Relative to Alternative 1	n/a	−3.1	0.4

Type of Impact	Alt 1	Alt 2	Alts 3 - 6
Total Labor Income	−$44,577	−$258,662	−$15,196
Change in Labor Income Relative to Alternative 1	n/a	−$214,085	$29,381
Missouri			
Estimated Agricultural Federal Acres Acquired	3,950	22,923	1,347
Total Sales	−$3,688,364	−$21,402,163	−$1,257,365
Change in Sales Relative to Alternative 1	n/a	−$17,713,799	$2,431,000
Total Employment	−21.4	−124.3	−7.3
Change in Employment Relative to Alternative 1	n/a	−102.9	14.1
Total Labor Income	−$839,146	−$4,869,240	−$286,065
Change in Labor Income Relative to Alternative 1	n/a	−$4,030,095	$553,081

Table 9. Property Tax Impacts Associated with Land Acquisition under MRRMP-Draft EIS Alternatives, 2016 Dollars

Type of Impact	Alt 1	Alt 2	Alts 3 through 6
Nebraska			
Estimated Agricultural Federal Acres Acquired	554	4,667	0.0
Average Property Tax Per Acre	$44	$44	$44
Total Change in Property Tax Receipts	−$24,623	−$207,261	$0
Change in Property Tax Receipts Relative to Alt 1	n/a	−$182,638	$24,623
Iowa			
Estimated Agricultural Federal Acres Acquired	554	4,667	0.0
Average Property Tax Per Acre	$38	$38	$38
Total Change in Property Tax Receipts	−$21,010	−$176,844	$0
Change in Property Tax Receipts Relative to Alt 1	n/a	−$155,834	$21,010
Kansas			
Estimated Agricultural Federal Acres Acquired	208	1,206	70.9
Average Property Tax Per Acre	$10.37	$10.37	$10.37
Total Change in Property Tax Receipts	−$2,157	−$12,514	−$735
Change in Property Tax Receipts Relative to Alt 1	n/a	−$10,357	$1,421
Missouri			
Estimated Agricultural Federal Acres Acquired	3,951	22,923	1,346.7
Average Property Tax Per Acre	$6.43	$6.43	$6.43

Type of Impact	Alt 1	Alt 2	Alts 3 through 6
Total Change in Property Tax Receipts	−$25,402	−$147,396	−$8,659
Change in Property Tax Receipts Relative to Alt 1	n/a	−$121,994	$16,742

3.2 Alternative 1 – No Action

Under Alternative 1, the MRRP would continue to construct habitat to support early life stage requirements of pallid sturgeon as part of the SWH program. This includes management actions that are in compliance with the BiOp, such as acquiring lands to support the creation of early life stage habitat for the pallid sturgeon.

Under Alternative 1, a reduction in agricultural production as a result of the federal acquisition of lands would result in adverse impacts to local and regional economies. For all acquired agricultural lands across all geographies at the end of the implementation period, there would be an estimated loss of 26 jobs, $1.2 million in labor income, and $5.2 million in sales (Table 10). With the highest number of acres affected, Missouri is expected to experience the most adverse impacts, with a total loss of approximately 21 jobs, labor income of approximately $840,000, and sales of $3.7 million. However, the land acquisition is likely to be gradual over the implementation period so the impacts would be spread over the 15-year period. On average, the adverse impacts to regional economic conditions in Nebraska, Iowa, and Kansas would be negligible. Missouri would experience the greatest adverse impacts to jobs and income, with an annual average reduction of one job and $56,000 in labor income. These adverse impacts would be long-term and relatively small, but could be locally large if acquired agricultural lands are concentrated in one area. Since the RED impacts described here include the direct effect, they likely overstate adverse impacts because the analysis does not include the monetary compensation to land owners from the federal purchase of these lands.

Table 10. Change in Regional Economic Activity from All Agricultural Land Acquisition under Alternative 1, 2016 Dollars

Impact	State				Total
	Nebraska	Iowa	Kansas	Missouri	
Estimated Agricultural Federal Acres Acquired over the Implementation Period	554	554	208	3,950	5,267
Reduction in Direct, Indirect, and Induced Sales over 15 Years resulting from land acquisition under Alternative 1	−$614,166	−$658,270	−$197,503	−$3,688,364	−$5,158,303
Reduction in Average Annual Direct, Indirect, and Induced Sales resulting from land acquisition under Alternative 1	−$40,944	−$43,885	−$13,167	−$245,891	−$343,887
Reduction in Direct, Indirect, and Induced Employment over 15 years resulting from land acquisition under Alternative 1	−1.8	−2.0	−0.6	−21.4	−25.8

Impact	State				Total
	Nebraska	Iowa	Kansas	Missouri	
Reduction in Average Annual Direct, Indirect, and Induced Sales resulting from land acquisition under Alternative 1	−0.1	−0.1	0.0	−1.4	−1.7
Reduction in Direct, Indirect, and Induced Labor Income over 15 years resulting from land acquisition under Alternative 1	−$140,402	−$129,143	−$44,577	−$839,146	−$1,153,267
Reduction in Average Annual Direct, Indirect, and Induced Labor Income resulting from land acquisition under Alternative 1	−$9,360	−$8,610	−$2,972	−$55,943	−$76,884

Table 11 summarizes the loss in property tax receipts associated with the total acres of agricultural land assumed to be acquired over the implementation period. In total, across all locations, there could be a loss of up to $75,000 in property tax revenue to local governments from the change in land ownership or an average annual loss of $5,000. The greatest loss in property tax receipts for local governments would be in Nebraska because the state of Nebraska assigns a relatively high value to agricultural lands compared to the other states. These reductions in property tax receipts would not occur at one time and would be spread over the 15-year implementation period. As a result, the adverse impacts to local governments associated with property tax reductions would be small in most cases. However, if acquired agricultural lands were concentrated in one county, these impacts could be notable, especially for small rural counties. Under a worst-case scenario, if all lands were acquired in one county in Nebraska the total loss in property taxes would be $25,000, with an average loss of $2,000 per year. Because PILT would be available to local governments to offset these losses in tax base, the adverse impacts are likely to be small.

Table 11. Change in Property Tax Receipts from Agricultural Land Acquisition under Alternative 1, 2016 Dollars

Type of Impact	State				Total
	Nebraska	Iowa	Kansas	Missouri	
Change in Property Tax for All Acquired Lands resulting from land acquisition under Alternative 1	−$24,623	−$21,010	−$6,662	−$22,847	−$75,143
Change in Average Annual Property Tax resulting from land acquisition under Alternative 1®	−$1,642	−$1,401	−$444	−$1,523	−$5,010

3.3 Alternative 2 – USFWS 2003 Biological Opinion Projected Actions

Alternative 2 represents the USFWS interpretation of the management actions that would be implemented as part of the 2003 Amended BiOp Reasonable and Prudent Alternative (RPA). Under Alternative 2, considerably more early life stage habitat for the pallid sturgeon would be created than under Alternative 1.

Under Alternative 2, a potential reduction of agricultural production as a result of the federal acquisition of lands would result in adverse impacts to local and regional economies. Alternative 2 would result in about six times the amount of acres to be acquired for pallid early life stage habitat over the implementation period compared to Alternative 1. Under Alternative 2, the location of the land acquisition would shift slightly, with larger portions of land to be acquired in the reach between Ponca and Rulo. Under Alternative 1, only 26 percent of all land acquisition would take place on this stretch of the river, whereas under Alternative 2, this percentage would increase to 34 percent.

For all acquired agricultural lands across all geographies, there would be an estimated loss of 160 jobs at the end of the implementation period, $7.4 million in labor income, and $33.3 million in sales. With the highest number of acres affected, Missouri is expected to experience the most adverse impacts, with a loss of approximately 124 jobs for all acquired agricultural lands, $4.9 million in labor income, and $21.4 million in sales. When compared to Alternative 1, Alternative 2 would result in at most 133 fewer jobs and $6.2 million less income across all locations at the end of the implementation period. Regional economic conditions in Nebraska, Iowa, and Kansas would also be affected with greater lands acquired in these locations, with a loss of 15, 17, and 4 jobs for all agricultural acquired lands, respectively (Table 12).

Table 12. Change in Regional Economic Activity from All Agricultural Land Acquisition under Alternative 2, 2016$

Impact	State				Total
	Nebraska	Iowa	Kansas	Missouri	
Estimated Agricultural Federal Acres Acquired	4,667	4,667	1,206	22,923	33,463
Change in Direct, Indirect, and Induced Sales For All Acquired Lands	−$5,169,566	−$5,540,793	−$1,146,034	−$21,402,163	−$33,258,556
Change in Sales Relative to Alternative 1	−$4,555,399	−$4,882,523	−$948,531	−$17,713,799	−$28,100,253
Change in Direct, Indirect, and Induced Employment For All Acquired Lands	−14.8	−16.7	−3.7	−124.3	−159.6
Change in Employment Relative to Alternative 1	−13.1	−14.7	−3.1	−102.9	−133.7
Change in Direct, Indirect, and Induced Labor Income For All Acquired Lands	−$1,181,796	−$1,087,021	−$258,662	−$4,869,240	−$7,396,719
Change in Labor Income Relative to Alternative 1	−$1,041,394	−$957,878	−$214,085	−$4,030,095	−$6,243,452

Table 13 summarizes the average annual economic impacts associated with the federal land acquired under Alternative 2 and the average annual change in land acquired relative to Alternative 1. In Missouri, the average acres of lands purchased in a given year would result in a reduction of seven jobs and $325,000 in labor income. Lands purchased in Nebraska, Iowa would result in a reduction in one job per year in each state, and lands purchased in Kansas would result in a reduction of less than one job per year, with negligible adverse impacts to regional economic conditions. Overall, relative to Alternative 1, the adverse impacts to regional economic conditions under Alternative 2 in a relatively larger economic context would be long-term and relatively small. However, if the concentration of acquired lands over the implementation period is in one location or a number of locations in a small rural region with limited economic activity, the adverse impacts could be relatively large in relation to the small economy. Impacts to regional economic conditions would be more adverse than experienced under Alternative 1. Again, these results should be interpreted cautiously as a worst-case situation, as these impacts include direct economic impacts and do not account for the compensation of farmers for the land sale.

Table 13. Change in Average Annual Regional Economic Activity from Agricultural Land Acquisition under Alternative 2, 2016 Dollars

Impact	State				Total
	Nebraska	Iowa	Kansas	Missouri	
Average Annual Agricultural Federal Acres Acquired	311	311	80	1,528	2,231
Change in Average Annual Direct, Indirect and Induced Sales for All Acquired Lands	−$344,638	−$369,386	−$76,402	−$1,426,811	−$2,217,237
Change in Average Annual Sales Relative to Alternative 1	−$303,693	−$325,502	−$63,235	−$1,180,920	−$1,873,350
Change in Average Annual Direct, Indirect, and Induced Employment for All Acquired Lands	−1.0	−1.1	−0.2	−8.3	−10.6
Change in Average Annual Employment Relative to Alternative 1	−0.9	−1.0	−0.2	−6.9	−8.9
Change in Average Annual Direct, Indirect, and Induced Labor Income for All Acquired Lands	−$78,786	−$72,468	−$17,244	−$324,616	−$493,115
Change in Average Annual Labor Income Relative to Alternative 1	−$69,426	−$63,859	−$14,272	−$268,673	−$416,230

Under Alternative 2, property tax receipts in all four states would be adversely impacted relative to Alternative 1. This is particularly true in Nebraska, where property tax per acre is high relative to the other states. Under Alternative 2, average annual property tax would decrease between $3,000 and $14,000 in reduced property tax revenues relative to Alternative 1, with the largest adverse impacts in Nebraska and fewest impacts in Kansas (Table 14). Across multiple locations in each state or in a relatively larger more diverse economic context, the adverse

impacts to local governments associated with property tax reductions under Alternative 2 would be long-term and relatively small. If acquired agricultural lands were concentrated in one county or two counties, there could be relatively large long-term adverse impacts compared to Alternative 1. A worst-case scenario would result in a loss of $207,000 in total tax revenues to local governments if all lands were acquired in one county in Nebraska in the implementation period relative to Alternative 1. However, the PILT program would help to mitigate these adverse impacts to these local governments.

Table 14. Change in Property Tax Receipts from Agricultural Land Acquisition under Alternative 2, 2016 Dollars

Type of Impact	State				Total
	Nebraska	Iowa	Kansas	Missouri	
Change in Property Tax for All Agricultural Acquired Lands	−$207,261	−$176,844	−$38,659	−$132,574	−$555,339
Change in Property Tax Relative to Alternative 1 For All Acquired Lands	−$182,638	−$155,834	−$31,997	−$109,727	−$480,196
Change in Average Annual Property Tax for All Acquired Lands	−$13,817	−$11,790	−$2,577	−$8,838	−$37,023
Change in Average Annual Property Tax Relative to Alternative 1	−$12,176	−$10,389	−$2,133	−$7,315	−$32,013

3.4 Alternatives 3–6

The anticipated targeted acres under Alternatives 3–6 for the creation of early life stage habitat for the pallid sturgeon would be the same. Under all of these alternatives, 1,418 acres of additional agricultural land would be acquired for the creation of habitat to support the pallid sturgeon, which is less than the targeted acreage for SWH under Alternative 1 (5,267 acres).

Under Alternatives 3–6, a reduction in agricultural production as a result of the federal acquisition of lands would result in adverse impacts to local and regional economies. Under Alternatives 3–6, no land would be acquired in the reaches of the river from Ponca to Rulo and Nebraska and Iowa would experience no change in economic activity (Table 15). For all acquired lands in Kansas and Missouri, there would be an estimated loss of 8 jobs, $1.3 million in sales and $301,000 in labor income at the end of the implementation period. Missouri is anticipated to experience most of the impacts. Fewer acres of land would be purchased under Alternatives 3–6 compared to Alternative 1, resulting in an increase of 18 jobs and $852,000 in labor income relative to Alternative 1 by the end of the implementation period.

Table 15. Change in Regional Economic Activity for All Agricultural Land Acquisition under Alternatives 3–6, 2016 Dollars

Type of Impact	State				Total
	Nebraska	Iowa	Kansas	Missouri	
Estimated Agricultural Federal Acres Acquired	0	0	71	1,347	1,418
Change in Direct, Indirect and Induced Sales for All Acquired Lands	$0	$0	−$67,329	−$1,257,365	−$1,324,694
Change in Sales Relative to Alternative 1	$614,166	$658,270	$130,174	$2,431,000	$3,833,610

Change in Direct, Indirect, and Induced Employment for All Acquired Lands	0.0	0.0	−0.2	−7.3	−7.5
Change in Employment Relative to Alternative 1	1.8	2.0	0.4	14.1	18.3
Change in Direct, Indirect, and Induced Labor Income for All Acquired Lands	$0	$0	−$15,196	−$286,065	−$301,261
Change in Labor Income Relative to Alternative 1	$140,402	$129,143	$29,381	$553,081	$852,006

Table 16 summarizes the average annual change in economic impacts over the 15-year implementation period. Missouri would experience the greatest adverse impacts to jobs and income, with a reduction of less than one job and $19,000 in income. The adverse impacts under Alternatives 3–6 would never represent a large share of total employment or income even if all of the impacts occurred in one county in Missouri. Alternatives 3–6 would have fewer adverse impacts to regional economic conditions when compared to Alternative 1. However, the change would be negligible in comparison to even small rural economies. Again, these results should be interpreted cautiously as a worst-case estimate as these impacts include direct economic impacts and do not account for the compensation of farmers for the land transfer.

Table 16. Change in Average Annual Regional Economic Activity under Alternatives 3–6, 2016 Dollars

Impact	State				Total
	Nebraska	Iowa	Kansas	Missouri	
Average Annual Agricultural Federal Acres Acquired	0	0	5	90	95
Change in Average Annual Sales for All Acquired Lands	$0	$0	−$4,489	−$83,824	−$88,313
Change in Average Annual Sales Relative to Alternative 1	$40,944	$43,885	$8,678	$162,067	$255,574
Change in Average Annual Employment or All Acquired Lands	0.0	0.0	0.0	−0.5	−0.5
Change in Average Annual Employment Relative to Alternative 1	0.1	0.1	0.0	0.9	1.2
Change in Average Annual Labor Income for All Acquired Lands	$0	$0	−$1,013	−$19,071	−$20,084
Change in Average Annual Labor Income Relative to Alternative 1	$9,360	$8,610	$1,959	$36,872	$56,800

Under Alternatives 3–6, property tax in Kansas and Missouri would be adversely impacted for all acquired lands with no impacts in Nebraska and Iowa (Table 17). However, because there are fewer anticipated lands to be acquired under Alternatives 3–6 compared to Alternative 1, there would be small beneficial impacts to property taxes under these alternatives. On average, Alternatives 3–6 would result in relatively higher property tax revenues ranging from $300 and $2,000 compared to Alternative 1 (Table 17). Under Alternatives 3–6, the impacts would not be perceptible to the local government budgets with negligible change in property tax revenues relative to Alternative 1. PILT would further reduce the adverse impacts to these local governments.

Table 17. Change in Property Tax Receipts from Agricultural Land Acquisition under Alternatives 3–6, 2016 Dollars

Type of Impact	State				Total
	Nebraska	Iowa	Kansas	Missouri	
Change in Property Tax for All Agricultural Acquired Lands	$0	$0	−$2,271	−$7,789	−$10,060
Change in Property Tax Relative to Alternative 1	$24,623	$21,010	$4,391	$15,059	$65,083
Change in Average Annual Property Tax for All Acquired Lands	$0	$0	−$151	−$519	−$671
Change in Average Annual Property Tax Relative to Alternative 1	$1,642	$1,401	$293	$1,004	$4,339

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