

Long Range Plan Lake County, Montana

Section I. Introduction

Purpose

The Long-Range Plan is a working document outlining the natural resource data, status and trends from Lake County. This plan represents a commitment to local and regional partnerships and outlines strategic approaches to solving complex natural resource issues. The plan will be used to assist in prioritizing projects for NRCS financial incentive programs.

The goal of the Long-Range Plan is to review natural resource characteristics and issues found throughout Lake County and surrounding areas. Updated on a semi-annual basis, this document will be used to highlight resource concerns of high priority and will give guidance on future planning of Targeted Implementation Plans (TIP) over the next one to five years.

The Lake County Long Range Plan was developed by the NRCS Ronan Field office with help from the Lake County Conservation District. Multiple partners were consulted during the completion of this plan. In addition, existing resource plans and management plans from partners have been referenced in completing this document. A full listing of resources can be found in the “Sources” section.

Partners in Natural Resources

- Lake County Conservation District (LCCD)
- Natural Resources Conservation Service (NRCS)
 - Ronan Field Office
 - Pablo Field Office
 - Plains Field Office
- Confederated Salish and Kootenai Tribes (CSKT)
- US Fish and Wildlife Service (USFWS)
- US Forest Service (USFS)
- Montana Fish Wildlife & Parks (FWP)
- Flathead Indian Irrigation Project (FIIP)
- Bureau of Indian Affairs (BIA)
- Flathead Lakers
- Five Valley's Land Trust (FVLT)
- Swan Valley Connections (SVC)
- Montana Dept. of Natural Resources and Conservation (DNRC)
- Pheasants Forever (PF)
- Ducks Unlimited (DU)
- Intermountain West Joint Venture (IWJV)
- Soil and Water Conservation Districts of Montana (SWCDM)
- Montana Association of Conservation Districts (MACD)
- Lake County Weed District

Section II. County Profile and Natural Resource Inventory

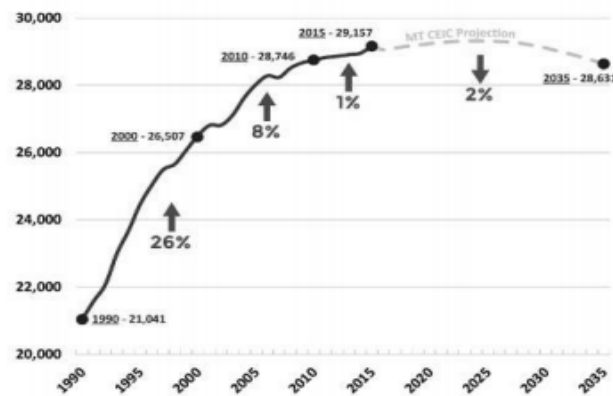
Lake County boasts incredible diversity of landforms and ecosystems. The county has an abundance of lakes, rivers, streams and wetlands and transitions from many broad valleys dominated by grass and shrub communities to the rugged peaks of the Mission and Swan Mountains that are home to alpine tundra and active glaciers. From a resource management perspective, this diversity of landforms creates unique challenges and opportunities. See 'Lake County Map' in appendix.

Humans

Lake County at a Glance

According to the most recent statistics available from the US Bureau of Census, the population of Lake County was estimated at 30,273 in 2017. The county is estimated 67% white and 24.7% American Indian (US Census Bureau, 2017). Lake County covers 1,654 square miles, approximately 1,056,679 acres, and shares county borders with Sanders County to the west, Flathead County to the north and east and Missoula County to the south and east. The largest city in the county is Polson which also serves as the county seat with a population of 4,488 in the 2010 census. The county population is predicted to increase slightly in the next few years and then decline slightly but keeping within 2% of the current population (Figure 1).

Figure 1 - Population Change 1990 – 2015, and 2015 – 2035 projections



**Figure 1. Past and projected county growth.
(Lake County Growth Plan)**

The Flathead Indian Reservation largely encompasses Lake County. The Reservation is home to three tribes, the Bitterroot Salish, Upper Pend d'Orielle and the Kootenai and together they are known as the Confederated Salish and Kootenai Tribes (CSKT). Historically the three Tribes maintained territories stretching from central Montana through eastern Washington and into Canada. The Flathead Reservation was established in 1855 by the Hellgate Treaty. The Reservation covers approximately 1.3 million acres. The majority of the Reservation is located within Lake County; however, the reservation also extends into Sanders and Missoula Counties. The 1904 Flathead Allotment Act eventually led to the opening of the Reservation to non-Indian homesteaders in 1910. According to CSKT's 2018 Annual Report, the Reservation has approximately 8,087 enrolled tribal members, 5,000 of which live on or near the reservation (CSKT 2018 Annual Report). The city of Pablo serves as the seat of government for the CSKT.

Table 1. Land ownership in Lake County (Community Wildfire Protection Plan)

Land Ownership Status	Acreage	Percent of Area of County
Fee (both Tribal and non-Tribal members)	364,882	35%
Tribal	290,103	27%
Federal Government	168,989	16%
Water*	102,495	10%
State Government	65,668	6%
Large Corporate	64,000	6%
Conservation Organization	524	.05%
Local Government	87	.001%
Total Surface Area	1,056,679	100%

Most of the land in Lake County is owned by CSKT either in fee or tribal ownership, totaling 62%. Other lands are owned by the federal and state governments, large corporations, and others shown on the left (Table 1). Within the reservation boundary approximately 62% of the land is owned by either the Tribe or by tribal members, 33% of land is privately owned by non-tribal members and 5% is federally or state owned. See the following maps in the Appendix: Appendix Map 1: Lake County Ownership, Appendix Map 2: CSKT of the Flathead Nation.

The Swan Valley is a unique component of Lake County with most of the land being public owned and managed by the U.S. Forest Service and the State of Montana. Only a small percentage of the property in the valley is in private hands. Private land ownership is estimated at approximately 30,000 acres and follows a ‘checkerboard’ pattern, intermixed with state and federal lands. Approximately 1,000 residents live in the Swan Valley.

Agriculture

CSKT has identified agriculture as “one of the most important basic industries on the Flathead Indian Reservation” (CSKT Comprehensive Plan Vol 1). According to the National Agricultural Statistics Survey 2017 Census data, Lake County is home to 1,170 farms covering an area of over 600,000 acres. The average farm size is 548 acres with a median size of 40 acres. Over 100,000 acres of agricultural lands are irrigated. Over 60% of the irrigated acres in the county are forage which includes hay and pasture. Primary agricultural products include small grains (spring and winter wheat, oats, barley and corn), forage (grass and alfalfa), some seed potatoes (approximately, 1,500 acres/year), diversified vegetable production (often on small ‘truck farms’ and high tunnels) as well as thriving cherry orchard and vineyard industries on Flathead Lake. The most common land use within the county is rangeland and pasture.

Table 2. Farm records from the USDA National Agricultural Statistics Survey from 2017.

Farm Statistics from 1992, 1997, 2012, and 2017	2017	2012	2007	2002	1997
Number of Farms	1,170	1,156	1,280	1,185	1,216
Average Size (Acres)	548	481	498	508	507
Land in Farms (Acres)	641,471	555,766	637,306	601,544	617,435
Irrigated Land (Acres)	100,398	80,691	86,526	88,871	111,385

Over the past twenty years the population of Lake County has increased nearly 15%. The average farm size has decreased and then started to increase once again during this time. As the population grows many farms and ranches have become subdivided and/or purchased by larger agricultural operations.

Rural zoning in the agricultural zone of the county (generally areas south of Ronan) prohibit any tracts greater than 10 acres from being subdivided more than once. This subdivision of existing properties has fractured some of the farmland and created a large base of additional smaller-scale agricultural producers many of whom are new to agriculture. Often these smaller-scale landowners have different viewpoints and goals than those within the traditional agricultural community. Conservation projects completed on smaller, subdivided land parcels often require participation of multiple landowners.

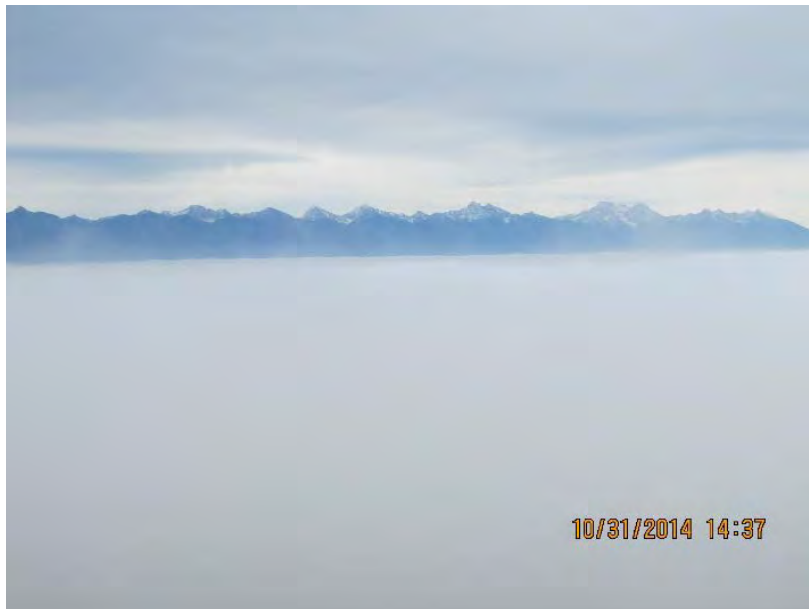
Geology and Soils

The field work for the Lake County Soil Survey (Soil Survey Area MT629) was completed in 1985 and published in 1990. Much of the information in this document is taken from the Soil Survey Manuscript. The soil survey lies within two Major Land Resource Areas (MLRA) including 44A – Northern Rocky Mountain Valleys and 43A – Northern Rocky Mountains.

Lake County lies along the main axis of the Rocky Mountains with elevations ranging from 3,051 to 9,249 feet. The bedrock under the majority of the county is comprised of Precambrian rocks of the Belt Supergroup.

The eastern part of the Lake County survey area is characterized by the Mission Mountains, and the western part by the steeply sloping Salish Mountains. The parent materials of most soils within these areas contain local argillites, quartzites, and impure limestones with layers of volcanic ash and are on cool, moist mountainsides.

The central part of the survey area is characterized by a broad glaciated valley of glacial till, glacial outwash, and glacial lacustrine deposits. This part includes level to strongly sloping alluvial fans, stream terraces, and rough badlands along the Flathead River. Parent materials of these areas are from glaciolacustrine sediments. These sediments consist of water-sorted material such as silty clays, silts,



and sands. The finest textured materials are easily recognized and were deposited in the calm, very deep waters of Glacial Lake Missoula. Glacial Lake Missoula covered much of western Montana including Lake County at elevations under 4,200 feet, until the ice dam holding back water ultimately broke about 10,000 years ago. At its highest level this ancient lake was more than 1,500 feet deep, occurring at the southern end of what is now Flathead Lake. These finely textured materials consist of alternating, thin strata (varves) of silty clay and clay.

Figure 2. How Glacial Lake Missoula might have looked. Photo taken on a foggy morning from a high elevation overlooking the Mission Valley. Photo by Ben Montgomery.

Soils of special importance include prime and unique soils and soils of both statewide and local importance. Prime soils/farmland consist of relatively small quantities in Lake County and almost all occur in the northeastern part of the county along the border with Flathead County. Some soils are classified as 'prime if irrigated' meaning they do well under irrigation and should be prioritized for this purpose. These soils occur mainly in the Mission Valley between Pablo and Ronan. Unique soils/farmland are generally a result of 'lake effect' due to Flathead Lake's moderating effects on climate. These soils occur exclusively in a narrow band along the shores of Flathead Lake where sweet cherries are grown. Soils/Farmland of Statewide Importance are mainly mapped in the east side of the county at the base of the Mission Mountains. Soils/Farmland of Local Importance are widely scattered in areas where hay and forage are grown and mainly in the Charlo and St. Ignatius areas. See Appendix map 3, 'Lake County Soils of Importance' for more information.

Water

Precipitation

Precipitation in Lake County ranges from approximately 12 inches in the valleys to over 100 inches in the higher elevations of the Mission and Swan Mountain ranges. Mean annual precipitation in the Mission Valley ranges from 12 inches on the western side to 16 inches on the eastern side near the mountains. Generally, precipitation is lower in the valleys and increases as elevations rise. Irving Flats, in the northwest portion of the county, usually receives the lowest levels of precipitation while the Mission and Swan Mountains receive the highest levels of precipitation with most being snowfall (Montana Climate Office). Appendix map 4 'Relative Effective Precipitation Map' details the precipitation patterns in Lake County.

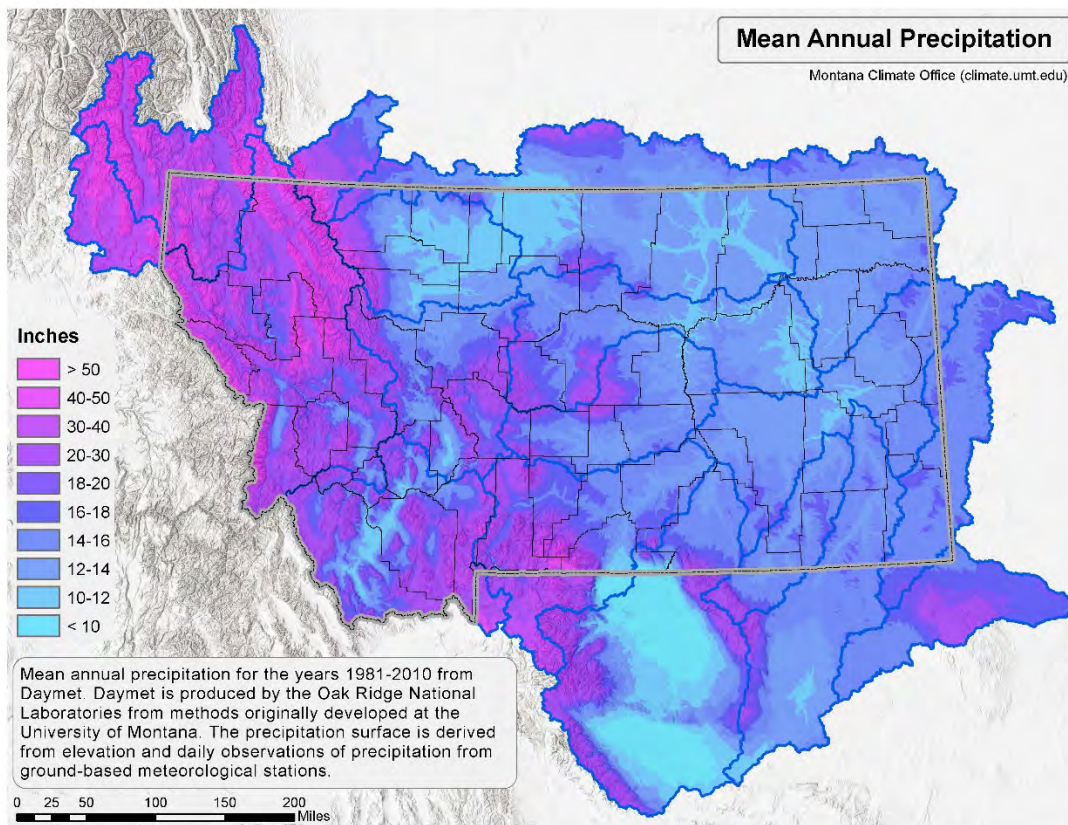


Figure 2: Mean annual precipitation in Montana.

Watershed and Streams

Lake County is situated on the south end of the Flathead Basin, which includes northwest Montana and stretches into southeast British Columbia. This area drains 6 million acres of water into the Clark Fork River and eventually into the Columbia River. CSKT has identified both surface and ground water as an important resource on the Reservation. Additionally, the Lake County Growth Plan emphasizes the importance of water resources on Lake County's economy and way of life because surface water represents 10% of the county's surface area.

Flathead Lake is the centerpiece of Lake County and is the largest freshwater lake by surface area west of the Mississippi River in the lower 48 states. It contains over 200 square miles of water and 185 miles of shoreline. The southern half of the lake is within the confines of the Flathead Reservation. The major tributaries of Flathead Lake are the Swan and Flathead Rivers. The watersheds feeding Flathead Lake originate in some of the most pristine ecosystems remaining in North America, fed by snowmelt from Glacier National Park and a number of wilderness areas. Flathead Lake is known for its deep, crystal clear waters. Lake levels are regulated with fluctuations of approximately 10 feet between winter and summer by the Seli's Ksanka Qlispe' Dam (formerly known as Kerr Dam). The Seli's Ksanka Qlispe' Dam was constructed on the Lower Flathead River near Polson in 1938 and is used for power generation. Flathead Lake is known for its high-water quality, however research by the Flathead Biological Station (FLBS) has shown decreasing trends for water quality. These trends appear to be the result of human causes and include increasing nutrient pollution, shoreline erosion, changing climate and introduction of non-native species into the ecosystem. Flathead Lake is currently listed as impaired by Montana Department of Environmental Quality (DEQ) for mercury, nitrogen, phosphorus and polychlorinated biphenyls (PCBs).

The Swan River traverses the Swan Valley running for some 75 miles from the southern end of the valley to the northern end before emptying into Swan Lake. Swan Lake is a 10-mile long lake at the northern end of the Swan Valley. Swan Lake is currently listed as impaired by Montana DEQ for nitrogen, phosphorus and sediment. In addition to Swan Lake, Jim and Goat Creek are also listed as impaired for fine sediments. The Swan Watershed has a Total Maximum Daily Load (TMDL) Implementation Evaluation indicating that most of the impairments are due to forest road networks, historical riparian timber harvests, activities associated with timber harvest (slash disposal and ground disturbance), and septic systems close to waterbodies (Swan Lake Watershed TMDL Implementation Evaluation). After exiting Swan Lake, the Swan River empties into the northern end of Flathead Lake. The Swan River drains 671 square miles and is one of Montana's most water-rich watersheds. Boasting over 4,000 lakes, ponds, and wetlands, which encompass 16% of its total area, the valley provides excellent habitat for grizzly bears, bull trout, and more rare plants than anywhere else in Montana (Swan Ecosystem Center).

The Swan River has been prioritized by FWP as a Tier I aquatic Focal Area (Montana State Wildlife Action Plan, 2015), see figure 4. According to FWP, the Swan River Focal Area is unique in the western part of Montana, in that it supports several 'species of greatest conservation need' in one system. Current impacts include road and subdivision development, incompatible timber harvest practices and non-native species such as lake trout, brook trout and northern pike.

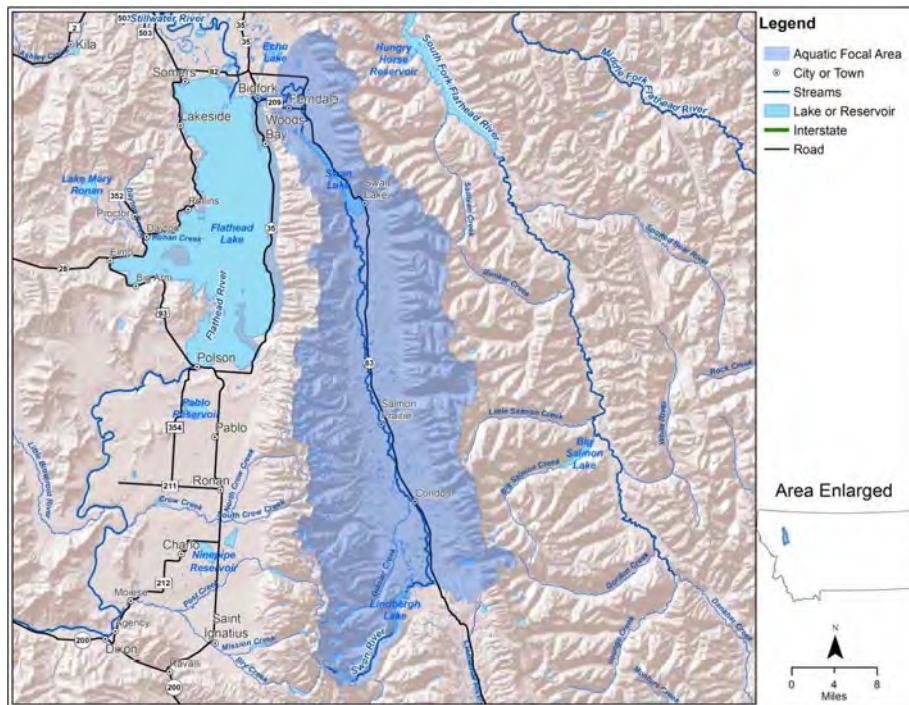


Figure 4: Swan River Focal Area in FWP Region 1 (Kalispell).

Lake Mary Ronan is located on the Northwest portion of Lake County and is not on the Flathead Indian Reservation. Lake Mary Ronan is listed on the 303d list as impaired for chlorophyll with sources listed as agriculture, riparian grazing, and silviculture (DEQ 303d list). A group called 'Friends of Lake Mary Ronan' does water quality testing on the lake as part of the Northwest Montana Lakes Volunteer Monitoring Program.

The Lower Flathead River exits Flathead Lake at Polson. Seli's Ksanka Qlispe' Dam regulates the water level of Flathead Lake and the flow of the Lower Flathead River. The Flathead River is the fourth largest river in Montana and can have a peak flow of 55,700 cubic feet per second but averages around 13,000 cubic feet per second (SNOFLO). Downstream of Seli's Ksanka Qlispe' Dam the river meanders for 42 miles through the reservation where it is joined by multiple creeks and small rivers including Crow, Camas and Mission Creeks and the Jocko and Little Bitterroot Rivers. It joins the Clark Fork River in Sanders County, immediately downstream of the reservation near the town of Paradise. Land uses along the Lower Flathead River corridor are of low intensity and consist primarily of grazing, cultural and recreational use. Water quality in the Flathead River is generally good however impacts from nutrients, temperature modification and habitat impairment are noted threats. A major threat to the river is irrigation return flows. Return flow water quality is highly impaired due to nutrient levels and bacteriological concentrations as well as suspended sediments, pesticides and emerging contaminants (CSKT Water Quality Assessment).



Figure 5. Crow Creek entering Flathead River, Lake County. Plumes of impaired water are typically visible for miles downstream of both Crow Creek and Mission Creek. (Photo courtesy of CSKT Water Quality Assessment Report, June 2002).



Figure 6. Crow Creek entering Flathead River, Lake County. High amounts of sediments, nutrients and other impairments are transported by both Crow Creek and Mission Creek due largely to agricultural runoff, all of these impaired waters empty into the Flathead River. (Photo courtesy of CSKT Water Quality Assessment Report, June 2002).

Flathead Reservation Water Resources

- ✓ 963 miles of perennial streams
- ✓ 3,118 miles of intermittent and ephemeral streams
- ✓ 71,849 lake surface acres
- ✓ 103,133 Wetland Acres

The reservation contains a vast and diverse array of water resources as shown in the table on the left. A report issued by the CSKT tribe titled "CSKT Water Quality Assessment Report" benchmarks the existing surface water quality conditions on tribal waters.

According to the report, 72% of

Figure 7. Water resources on the Flathead Indian Reservation.

perennial streams and 87% of intermittent streams are impaired for one or more uses. On the Reservation the sources for impairment of water quality are generally related to land use practices

which generate nonpoint sources of pollution. Tables 3 and 4, from the CSKT report, outline the causes and sources of impairment as well as their estimated extents.

Table 3. Causes of impairment of Reservation streams and rivers

Causes	Perennial		Intermittent	
	Stream miles	Percent of total stream miles	Stream miles	Percent of total stream miles
Flow alteration	567	59 %	1,538	49%
Habitat alteration	729	76%	2,692	86%
Nutrients	393	41%	1,897	61%
Siltation	661	69%	2,655	85%
Suspended solids	623	65%	2,655	85%
Turbidity	455	47%	2,261	73%
Thermal modification	298	31%	1,223	39%
Pathogens	224	23%	1,196	38%
Ammonia	11	1%		

Table 4. Sources of impairment of Reservation streams and rivers

Causes	Perennial		Intermittent	
	Stream miles	Percent of total stream miles	Stream miles	Percent of total stream miles
Silviculture	175	18%	896	29%
Hydromodification	632	66%	1,718	55%
Habitat modification	667	69%	2,659	85%
Agriculture – grazing	660	69%	2,691	86%
Agriculture – crops	382	40%	1,255	40%
Other urban runoff	356	37%	1,523	49%
Ground water loading	11	1%		
Minor municipal sources	7	1%		
Resource extraction	3	0.3%		

The “CSKT Water Quality Assessment Report” reviews the watersheds and the streams within them that are on the reservation and looks at four beneficial uses including aquatic life, drinking water, primary contact and recreation, and agricultural and industrial. For each of the uses a “Level of Use Support” is given. The “Level of Use Support” is defined as follows in the “CSKT Water Quality Assessment Report”:

- Fully Supporting (FS) – All designated beneficial uses are fully supported. Water quality condition is good.
- Fully Supporting but Threatened (FS-T) – All designated beneficial uses are fully supported but may not be in the future unless pollution prevention or control actions are implemented. Water quality condition is good.
- Partially Supporting (PS) – Water quality fails to meet designated beneficial use criteria at times. Water quality condition is fair.
- Not Supporting (NS) – Water quality frequently fails to meet designated beneficial use criteria. Water quality condition is poor.

For the purpose of this plan only the streams that are “Partially Supporting” and “Not Supporting” are listed. All other streams not listed are not impaired.

Table 5. All the streams that are at Not Supporting level in Lake County on the Flathead Indian Reservation.

Stream Name	Beneficial Use	Level of Support
Mission Creek (all other tributaries)*	Aquatic Life	NS
Mission Creek (all other tributaries)*	Primary Contact & Rec Use	NS
Mission Creek (all other tributaries)*	Drinking Water Uses	NS-E
White Earth Creek (headwaters to mouth)	Aquatic Life	NS
White Earth Creek (headwaters to mouth)	Primary Contact & Rec Use	NS
White Earth Creek (headwaters to mouth)	Drinking Water Uses	NS-E
Flathead River (all other tributaries)**	Aquatic Life	NS
Dayton Creek (includes tributaries on Reservation)	Primary Contact & Rec Use	NS
Dayton Creek (includes tributaries on Reservation)	Drinking Water Uses	NS-E

* Tributaries - Sabine, Thorne, Matt and Marsh Creeks

** Tributaries - Southwest, not including downstream of Jocko River

Table 6. All the streams that are at Partially Supporting level in Lake County on the Flathead Indian Reservation.

Stream Name	Beneficial Use	Level of Support
NF Jocko River (wilderness boundary to mouth)	Aquatic Life	PS
NF Jocko River (wilderness boundary to mouth)	Primary Contact & Rec Use	PS
MF Jocko River (reservation boundary to mouth)	Aquatic Life	PS
MF Jocko River (reservation boundary to mouth)	Primary Contact & Rec Use	PS
Jocko River (all other tributaries)*	Aquatic Life	PS
Jocko River (Confluence Big Knife Creek to mouth)	Aquatic Life	PS
Finley Creek (excludes tributaries in wilderness)	Aquatic Life	PS
Finley Creek (excludes tributaries in wilderness)	Primary Contact & Rec Use	PS
Valley Creek (headwaters to mouth)	Aquatic Life	PS
Mission Creek (wilderness boundary to St. Ignatius)	Aquatic Life	PS
Mission Creek (wilderness boundary to St. Ignatius)	Primary Contact & Rec Use	PS
Mission Creek (St. Ignatius to Sabine Creek)	Aquatic Life	PS
Mission Creek (St. Ignatius to Sabine Creek)	Primary Contact & Rec Use	PS
Mission Creek (Confluence of Sabine Creek to mouth)	Aquatic Life	PS
Mission Creek (Confluence of Sabine Creek to mouth)	Primary Contact & Rec Use	PS
Mission Creek (Confluence of Sabine Creek to mouth)	Drinking Water Uses	PS-E
Post Creek (wilderness boundary to mouth)	Aquatic Life	PS
Post Creek (wilderness boundary to mouth)	Primary Contact & Rec Use	PS
Post Creek (wilderness boundary to mouth)	Drinking Water Uses	PS-E
Crow Creek (Pump diversion upstream, N, M, S Forks)	Aquatic Life	PS
Crow Creek (Pump diversion upstream, N, M, S Forks)	Primary Contact & Rec Use	PS
Crow Creek (Crow pump diversion to mouth)	Aquatic Life	PS
Crow Creek (Crow pump diversion to mouth)	Primary Contact & Rec Use	PS
Crow Creek (Crow pump diversion to mouth)	Drinking Water Uses	PS-E
Crow Creek (all other tributaries)**	Aquatic Life	PS
Crow Creek (all other tributaries)**	Primary Contact & Rec Use	PS
Crow Creek (all other tributaries)**	Drinking Water Uses	PS-E
Flathead River (Outlet of Lake to Reservation boundary)	Aquatic Life	PS
White Earth Creek (headwaters to mouth)	Agricultural & Industrial Use	PS
Flathead River (all other tributaries)***	Primary Contact & Rec Use	PS
Flathead River (all other tributaries)***	Drinking Water Uses	PS-E
Flathead Lake Tributaries (west side of Lake, except Dayton Creek)	Aquatic Life	PS
Flathead Lake Tributaries (west side of Lake, except Dayton Creek)	Primary Contact & Rec Use	PS
Dayton Creek (includes tributaries on Reservation)	Aquatic Life	PS
Dayton Creek (includes tributaries on Reservation)	Agricultural & Industrial Use	PS

* Tributaries - Pistol, Lamoose, Selow and Jocko Spring Creeks

** Tributaries - West Miller Coulee, Ronan Spring and Mud Creeks

*** Tributaries - Southwest, not including downstream of Jocko River

The CSKT Tribe has taken an interdisciplinary approach to address historic sources of impairment including extensive water quality monitoring, nonpoint source control programs, permitting and NEPA processes. In addition, CSKT fisheries and wildlife programs have focused on restoration of habitat in many areas including riparian areas, wetlands and wildlife corridors along the Mission Mountain Front.

Irrigation

Irrigation has drastically altered the hydrology of the county. The Flathead Indian Irrigation Project (FIIP), authorized by Congress in 1908, and operated by the Bureau of Indian Affairs (BIA) was constructed to provide irrigation water to approximately 150,000 acres of land on the Flathead Indian Reservation. The project started construction in 1908 and was completed 56 years later in the early 1960s (Bureau of Reclamation – The Flathead Project). In this time an extensive network of over 1,200 miles of irrigation canals and seventeen reservoirs were constructed. The FIIP serves over 127,000 acres in the Mission, Jocko and Little Bitterroot Valleys. Much of the project was constructed in the early twentieth century and suffers from deterioration. In fact, according to the Department of Interior, Bureau of Reclamations Dam Safety Program, in 1991, ten of the Flathead Reservation's dams were ranked within the top 150 nationwide for posing the greatest level of hazard (CSKT Comprehensive Plan Vol 1). Loss of water through seepage within canals from porous soils and deteriorated banks is another major concern. See Appendix map 5, 'FIIP Area of Influence' map in Appendix as well as the three maps detailing the canal system and irrigated acres (Appendix map 6, 7 and 8. Irrigation also occurs in the Dayton Creek area and to a much lesser extent the Swan Valley, but these areas are not operated by FIIP.

The vast majority of irrigated lands within Lake County are located within the Mission Valley on the Flathead Reservation. Irrigation occurs primarily via flood and impact sprinkler but many of the orchards and small vegetable producing farms use drip or micro-spray irrigation. Flood irrigation is still the most common type of irrigation within the county. Many irrigators have already converted from flood irrigation to sprinkler which includes hand lines, wheel lines, k-lines and pivots. The most common type of irrigated cropland is pasture and hay and it is estimated that these forages comprise over 60% of the irrigated acres.

Flood irrigation in the Mission Valley can generally be characterized as 'wild flood' meaning the flooding is often completed via a series of contour ditches over uneven topography. This uneven irrigation causes numerous dry areas within each field while also causing over-irrigation of other areas. Flood irrigation on uneven topography creates significant amounts of runoff. This runoff not only wastes water but also reduces water quality in streams and waterbodies as the runoff often carries elevated levels of nutrients, sediments and higher water temperatures directly into impaired waterways and eventually into the Flathead River or other waterbodies.



Figures 8 & 9. Example of uneven irrigation due to ‘wild flood’ in Lake County. Photos by Ben Montgomery.

Most of the irrigated soils in the Mission Valley are silty clay loams. These soils have low infiltration rates and are particularly susceptible to runoff if irrigation water is over-applied or applied at rates that are greater than the intake rates of the soils.

Water quantity is a serious issue in Lake County. Water quotas are limited making the wise and sustainable use of water resources critically important. Flood irrigation in Lake County is extremely inefficient and it is estimated that only approximately 25% to 40% of water applied is effectively used by plants as desired (Farm Irrigation Rating Index (FIRI) data).

In 2015 after more than a decade of negotiation, the State of Montana Legislature ratified the CSKT Montana Compact outlining water usage for irrigation and instream flows on the CKST reservation and beyond. The Compact currently awaits approval by the United States Congress. The Compact protects historical irrigation uses while at the same time providing for Tribal in-stream flow targets. One of the key goals of the Compact is to improve irrigation efficiencies within the target area.

Groundwater

In 2011 a report was prepared by the U.S. Environmental Protection Agency (EPA) and Montana Department of Environmental Quality (DEQ) to summarize known groundwater characteristics within the Flathead Lake Basin. Generally, within the populated intermontane valleys, thick layers of deposits from glacial influences overlay bedrock. Most of the local communities within the basin rely on groundwater from local aquifers for municipal water supplies. Groundwater is also frequently used for irrigation. Generally, groundwater quality within the basin is high and suitable for domestic consumption, irrigation and most other uses. Most of the wells in the area are between 50 and 300 feet deep.

A summary of groundwater data for groundwater basins is shown below. This data is courtesy of the DEQ report and LaFave et al.; data collected between 1975 and 2000.

Table 7. Summary of groundwater data by basin. DEQ.

Mission	Nitrate concentrations generally low, averaging .88 mg/L for 91 samples
Flathead Lake Perimeter	groundwater quality reported to be good, with only one sample from 1984 above 10 mg/L for nitrate; phosphorus reported to be highest within the Basin
Jocko	average nitrate concentrations from 28 samples were 0.28 mg/L with a maximum recorded value of 1.69 mg/L
Swan	elevated nitrate concentrations (4.8 and 4.9 mg/L) observed near Swan Lake, suggesting a potential source of contamination

In 2018 arsenic was detected in wells around the Charlo area at a rate exceeding the maximum contaminate level. The arsenic is natural occurring in the aquifer but is theorized to have increased in concentration in the aquifer after a series of earthquakes in 2017 and 2018. Currently residents that had test results with high arsenic have been encouraged to install a filtration system (Valley Journal, 2019).

Wetlands

Wetlands are amongst the most important and beneficial ecosystems on the landscape. Montana's State Wildlife Action Plan identifies all streams, rivers, floodplain and riparian, and wetland community types across the state as "Community Types of Greatest Conservation Need". The plan defines this as meaning there is a clear obligation to use resources to implement conservation actions that provide direct benefit to these community types Area (Montana State Wildlife Action Plan, 2015). Wetlands provide critical biological, ecological, and economic benefits including flood attenuation, water filtration, carbon sequestration, and drought resiliency. Further, wetlands are home to 31% of all U.S. plant species, half of all North American bird species use wetlands as some point in their lifecycle, and nearly half of all threatened or endangered species in the US are also associated with wetlands. Lake County contains a diverse array of wetland types. According to the Montana Natural Heritage Program a total of 139,703 acres of wetlands can be found within the county borders. Of these, 33,407 acres are palustrine (lacking flowing water), 99,582 are lacustrine (lake associated) in nature, 4,169 acres are riverine (river associated), and 2,545 acres are located within riparian zones.

According to CSKT, the reservation alone contains approximately 22,000 acres of the above-mentioned wetlands and another 75,000 acres of lake open water. Together with the thousands of miles of tribal streams and riparian areas, these areas support most of the Reservation's fish and wildlife. CSKT values the importance of these resources and has active wetland and riparian restoration programs. The Tribe's goal is to "halt wetland and riparian losses on the Reservation and ultimately work to restore quantity and quality of these important aquatic resources" (CSKT Wetland Conservation Program).

Air Quality

Air Quality is monitored by CSKT's Natural Resources Department on the Reservation. Lake County in the cities of Ronan and Polson (PM-10 1987) have received nonattainment status from 1992 until now both nonattainment areas are defined by the city limits. Both Polson and Ronan are located in the Mission Valley which is a fairly narrow valley causing inversions, especially in the winter months (MT DEQ). More

information on visibility range and air quality standards are in the 'Lake County Air Quality Strategic Plan' (Document 9) in the appendix.

Utilities

Energy Keepers, Inc. - Seli's Ksanka Qlispe' Dam

Energy Keepers operates the Seli's Ksanka Qlispe' Dam on the south end of Flathead Lake near Polson. Energy Keepers plans to continue to work on upgrading the SKQ Dam through cleaning and rehabilitation of SKQ Dam Units. The energy generated from the dam is sold across the state of Montana (CSKT 2018 Annual Report).

Mission Valley Power

Mission Valley Power (MVP) is a distributor of power, providing to residential and businesses on the Flathead Reservation. Most of the power comes from Bonneville Power Administration and a smaller percent (19%) comes from the SKQ Dam (CSKT 2018 Annual Report). A major impediment for irrigators wishing to upgrade from flood irrigation to sprinkler irrigation is the lack of available 3-phase power in some areas of the valley. MVP can provide 3-phase power upgrades, but often the cost of these upgrades is prohibitive for private landowners.

Wildlife

Along with the diversity of ecosystems comes a rich diversity of wildlife in Lake County. According to CSKT's Comprehensive Resource Plan, the county is home to at least 308 species of birds, 67 species of mammals, 9 species of amphibians and 9 species of reptiles. As of early 2019 Lake County has 137 plants and animals listed as species of concern (Montana Natural Heritage Program). The following species are listed as threatened by the USFWS; grizzly bear (*Ursus arctos horribilis*), Canada lynx (*Lynx canadensis*), bull trout (*Salvelinus confluentus*), water howellia (*Howellia aquatilis*), Spalding's campion (*Silene spaldingii*), and yellow-billed cuckoo (*Coccyzus americanus*). There are also two proposed species, wolverine (*Gulo gulo*) and meltwater lednian stonefly (*Lednia tumana*), and one candidate species, whitebark pine (*Pinus albicaulis*).

Grizzly Bear

The U.S. Fish and Wildlife Service (USFWS), in cooperation with Montana FWP the U.S. Forest Service (USFS), National Parks Service (NPS), Bureau of Land Management (BLM), Blackfoot Tribe and Confederated Salish and Kootenai Tribes currently manages grizzly bears in Montana as 'threatened' under authority of the Endangered Species Act. This cooperative management is under the Interagency Grizzly Bear Committee (IGBC) within which all agencies and tribes are partners (FWP Grizzly Bear

Table 8. Estimated grizzly bear densities in NCDE areas. (Courtesy Grizzly Bear Management Plan for Western Montana)

Area	Size (mi ²)	Density (mi ² /bear)	Number of Bears
Red Meadow	215	10-15	14-22
Whitefish	831	18-25	33-46
Glacier National Park	1,583	6-8	198-264
St. Mary	211	10-20	11-21
Badger-Two Medicine	323	27-38	9-12
South Fork Flathead River	1,624	10-13	125-162
East Front	1,119	25-31	36-45
Swan Front	780	20-30	26-39
Mission Mountains	1,044	25-45	23-42
Scapegoat	1,903	56-112	17-34
Total	9,633	14-20	492-687
Total excluding GNP	8,050	19-27	294-423

Management Plan for Western Montana). Lake County falls within the Northern Continental Divide Ecosystem (NCDE) area which has a target goal of 500 or more grizzly bears (USFWS Grizzly Bear Recovery Plan, 2013). Lake County is one of 17 Montana counties that currently or could in the near future contain populations of grizzly bears. Grizzly bears are known to occur in most areas of Lake County. The Swan Valley and the Mission



Mountains contain sizable populations. However, grizzly bears are known to frequently inhabit populated Mission Valley, particularly along riparian areas and within stands of dense cover. Over the recent past both grizzly and black bears (*Ursus americanus*) have become increasingly drawn to the valley floor in search of corn fields and other human attractants. During fall corn harvests it is not uncommon to see numerous grizzly bears in some fields. Limiting human-bear conflicts is a critical component of grizzly

bear recovery plans.

Figure 10. Evidence of bear activity in a corn field in Lake County. County. Photos by Ben Montgomery.

Bull Trout

Bull trout (*Salvelinus confluentus*) are listed as a ‘threatened’ species in Lake County. Bull trout require specific habitat needs and are more vulnerable to environmental degradation than are other fish species. They require clean, cold, clear, complex and connected habitat (the five C’s). Bull trout populations have declined due to habitat loss and degradation from a variety of human-caused factors. Collaborative efforts by many partners including USFWS, FWP, USFS, CSKT, DNRC and many others developed the Montana Bull Trout Restoration Plan. According to a report issued by the Montana Bull Trout Restoration Team in 2000, bull trout populations in the Swan River appear to be stable or are increasing, however populations in the Flathead River (including the Lower Flathead River) and its tributaries have suffered large declines. Declines in the Mission Valley are largely a result of human-induced factors. Water quality and habitat degradation are both causative factors for these declines. The CSKT Tribe has taken a leading role in working to address these factors. Improving riparian habitat and limiting non-point source pollution are ways that habitat degradation can be addressed locally.



Figure 11. Current range of bull trout in Montana (Montana Field Guide)

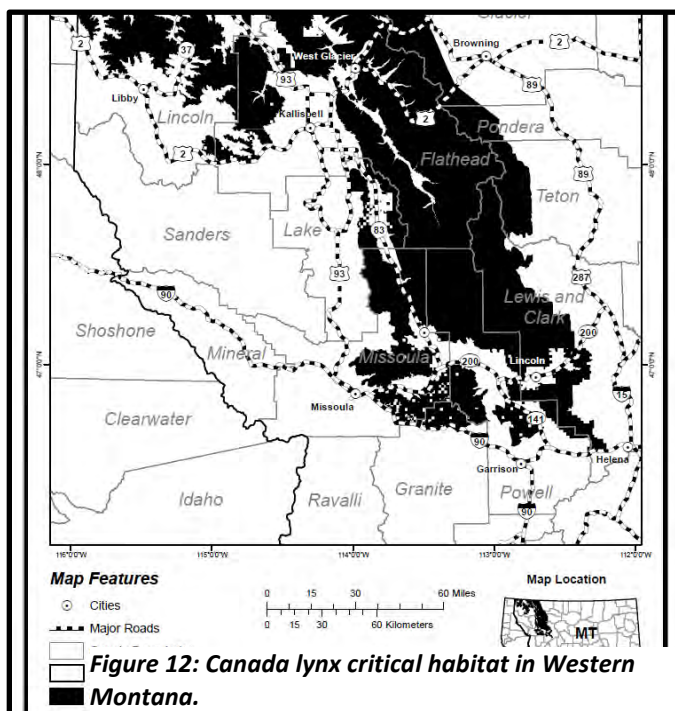
A plethora of high mountain lakes, irrigation reservoirs, lakes and streams support abundant fish populations. However, quality of habitat has been degraded by development activities. Water diversion

structures block access to spawning grounds over much of the original ranges of bull trout and westslope cutthroat trout (*Oncorhynchus clarkii lewisi*). Irrigation return flows adversely affect every major stream on the Reservation, including the Lower Flathead River. Many streams are dewatered each year due to irrigation uses. Numerous opportunities exist to improve water quality and overall aquatic habitat within Lake County and specifically within the Flathead Reservation, as noted by previously in the ‘Watershed and Streams’ section.

Canada Lynx

Canada lynx (*Lynx canadensis*) are listed as a ‘threatened’ species and reside within portions of Lake County. Canada lynx are limited to areas occupied by their main prey source, the snowshoe hare (*Lepus americanus*). Both the lynx and hare are typically found inhabiting moist, cool, boreal forests, typically above 4,000 feet in elevation. As snowshoe hares make up approximately 90% of the lynx diet in winter, any degradation to snowshoe hare habitat that reduces hare populations has a direct commensurate negative impact on lynx populations as well.

Critical habitat has been designated for Canada lynx and a portion of the area is in Lake County, specifically the eastern portion of the county associated with the Mission Mountains (see Figure 12). Protection of habitat quality within the designated critical habitat boundary is essential to the long term health of the species. The majority of habitat generally suitable for lynx in Lake County falls within the Mission Mountain Wilderness of the Flathead National Forest and Mission Mountain Tribal Wilderness on the Reservation. Both these areas have land use restrictions that are beneficial to lynx. Other lynx habitats under different ownership have fewer protections and as such are susceptible to practices and uses which have the potential to result in negative impacts to local populations. Activities posing the most risk on these lands include timber harvest, precommercial thinning, recreational disturbance, infrastructure development, mineral development, energy development, and wildfire management.



Historic lynx population declines in Lake County mimic those found in other occupied Montana counties and are largely a result of anthropogenic causes including timber harvest, infrastructure establishment, overharvest, and wildfire suppression. Currently, although exact populations levels are uncertain for the area, according to the USFWS’s October 2017 Species Status Report for the Canada Lynx recent studies have indicated that both lynx reproduction and recruitment are occurring at healthy levels. To maintain these healthy numbers conservation partners should seek to implement the Interagency Lynx Biology

Team's conservation strategy including: managing vegetation for a mosaic of successional stages, reducing habitat fragmentation, minimizing winter related recreational disturbances, avoiding backcountry road construction, and where possible maintaining fire as a key ecological process and disturbance mechanism.

Wolverine

The wolverine is listed as a 'proposed' species for Lake County. Wolverines are limited to alpine tundra and primarily coniferous forests in western Montana. They are generally solitary and wide-ranging and are opportunistic omnivores. In the early 1990s wolverines were nearly extinct in Montana, however their numbers and range have been increasing ever since (Montana Field Guide). On October 18, 2016, the FWS published a Federal Register action reopening the comment period on their February 4, 2013 proposed rule to list the wolverine as threatened in the contiguous U.S. A final listing determination is expected in January 2020.

Yellow-Billed Cuckoo

The only federally listed bird species in Lake County is the yellow-billed cuckoo (*Coccyzus americanus*) which was listed as threatened west of the Continental Divide in Montana in 2014 by the USFWS. Primary factors threatening the population include loss and degradation of habitat from altered watercourse hydrology and natural stream processes, livestock overgrazing, encroachment from agriculture and conversion of native habitat.

Water Howellia and Spalding Campion

The USFWS lists water howellia (*Howellia aquatilis*) and Spalding's campion (*Silene spaldingii*) as 'threatened' plant species in Lake County. Water howellia is restricted to depressional wetlands in the Swan Valley. The wetlands where water howellia occurs are tightly clustered and unique to the Swan Valley in Montana making the species vulnerable to localized events and management actions. Spalding's campion, also known as Spalding's catchfly occupies open, mesic grasslands in valleys and foothills usually co-existing with rough fescue and Idaho fescue. It exists only in a few locations in the northwest corner of Montana including the Niara area and on Wild Horse Island. Invasive weeds are the most pressing threat along with overgrazing, fire exclusion and lack of gene flow due to isolation of populations.

Whitebark Pine

Whitebark pine (*Pinus albicaulis*) is listed as a 'candidate species'. Whitebark pine is a common component of subalpine forests occurring in all major mountain ranges of western and central Montana. Populations have been severely impacted by mountain pine beetle outbreaks and by the introduction of the white pine blister rust pathogen. Major declines in whitebark pine have been noted across its range.

Meltwater Lednian Stonefly

Meltwater lednian stonefly (*Lednia tumana*) is listed as a 'proposed' species. This insect inhabits extremely cold glacier-fed streams at high elevations and is at risk due to climate change, loss of glaciers and permanent snowfields and changes in streamflow and temperatures.

The Mission Valley is well known for its healthy populations of waterfowl and pheasants. The area is popular with bird watchers and bird hunters. Both the Audubon Society and Pheasants Forever organizations are active in the Mission Valley. There exists great opportunity to continue implementing

progressive habitat improvements on both public and private lands in order to benefit a diversity of wildlife species.

Big game species present within Lake County include mule deer (*Odocoileus hemionus*), white-tailed deer (*Odocoileus virginianus*), elk (*Cervus canadensis*), mountain goats (*Oreamnos americanus*), bighorn sheep (*Ovis canadensis*) as well as small number of pronghorn antelope (*Antilocapra Americana*) and bison (*Bison bison*) within the National Bison Range (NBR).



Montana FWP have identified the Heart of the Salish Priority Area as a priority big-game winter range and migration corridor (Montana FWP Montana Action Plan). A portion of this priority areas lies within Lake County. The area serves as a migration corridor and wintering ground for both mule deer and elk as well as providing essential habitat for several species protected under the Endangered Species Act (ESA). Risks for this area include habitat fragmentation due to conversion of timber lands to private residential use as well as degradation of habitat quality via the spread of noxious weeds.

Figure 13: Heart of the Salish Priority Big-game wintering and migration corridor. Montana FWP Montana Action Plan October 2019.

Noxious and Invasive Species

Lake County suffers from a litany of noxious and invasive species issues, treatment and control of all invasive weeds in all areas is likely infeasible. However, identification and treatment of new and emerging threats should be prioritized. In addition, opportunities for integrated approaches to dealing with specific geographic areas and/or species should be sought.

Vegetative Weed Species

Lake County is home to a wide diversity of both annual and perennial weed species. Weed species noted on Lake County's Noxious Weed Management Plan include sulfur cinquefoil, tall buttercup,

whitetop, yellow or common toadflax, houndstongue, field bindweed, leafy spurge, meadow and orange hawkweed, musk thistle, ox-eye daisy, purple loosestrife, Canada thistle, common tansy, dalmatian toadflax, diffuse knapweed, Russian knapweed, salt cedar, spotted knapweed, St. Johnswort. In addition, Lake County's 'County Watch List' is continually updated with new species. The Lake County Weed Management Plan calls for integrated weed management strategies and methods including treatment, control, prevention, education, mapping, and chemical control (Lake County Weed Management Plan, 2012).

One weed that is very prevalent in Lake County is whitetop (*Lepidium spp.*). Whitetop is a perennial that germinates and sets a rosette in the late fall or early winter allowing it to be one of the first weeds to present itself in the spring. Whitetop has a rhizomatous root system that can establish and grow quickly, with roots reaching 12 to 30 feet deep after two to three years of establishment. With over 3,000 seeds per plant that can persist in the soil for up to 3 years this species can spread rapidly throughout a landscape and has done so in Lake County (MSU Extension, 2018). Currently whitetop has infested thousands of acres of pasture, range and hayland in Lake County and it continues to spread.



Figure 14: Whitetop in a pasture in Lake County. Photo by Ben Montgomery.

It is important to remain vigilant regarding new and invasive weeds. A new weed species of concern includes the annual grass *Ventenata dubia*. Ventenata is known to take over native range, pastures, hay fields, and right of ways. It is also found in Idaho where they have seen a 50% decrease in production of land that this species has invaded (MSU Extension – Ventenata, 2018).

Pollinators

Pollinators have received considerable 'buzz' in recent years. The Ronan NRCS and LCCD have taken a leading role in the development of pollinator-friendly projects and educational opportunities within Lake County. Started in 2016, the 'Lake County Pollinator Initiative' highlights the plight of pollinators and has implemented action items to address the risks in Lake County. The Pollinator Initiative is a joint project operated by LCCD and the Ronan NRCS with a goal of increasing local awareness of pollinators and improving pollinator habitat. LCCD has provided free seed for the establishment of pollinator gardens in Lake County and as of 2019 they have distributed this seed to over 200 local landowners. LCCD and the NRCS assist landowners by providing conservation planning assistance for pollinators and the establishment of pollinator gardens. LCCD also hosts multiple outreach events to educate and

energize the public regarding pollinators. This work will continue in the future and the template used by LCCD is being promoted to all Conservation Districts in the state of Montana.

Aquatic Invasive Species

Aquatic invasive species (AIS) are also prevalent within Lake County. AIS on the Lake County Designated Noxious Weed List include hydrilla, Eurasian watermilfoil, and mosquito fern. Other vegetative AIS that occur in Lake County include flowering rush and curly leaf pond weed.

In addition to vegetative AIS, Montana has recently had a positive detection for invasive mussels. Since this detection the state of Montana has set up check stations around the state and CSKT has also set up their own check stations in two locations on the Flathead Indian Reservation. There has not been any detections of zebra or quagga mussels in Lake County yet but there is extensive monitoring done on Flathead Lake by the Flathead Lake Biological Station.

The lakes, reservoirs, streams and rivers in Lake County also have invasive fish, amphibian, and crustacean species. The Flathead Lake Biological Station lists 18 nonnative species that have been introduced into the Flathead Basin some of which include lake trout, northern pike, and Mysis shrimp. In Flathead Lake specifically the release of nonnative species such as Mysis shrimp has altered the food web, contributing to the decline of bull trout and westslope cutthroat trout and the decline of the nonnative lake trout (<https://www.pnas.org/content/108/3/1070>).

Rangeland

Approximately 20% of Lake County supports rangeland vegetation. Cow/calf operations are the major type of livestock enterprise, constituting about 60% of farm income. A small number of dairy farms are in operation and a relatively small number of sheep and/or hog producing operations are also found locally. Native rangeland is used primarily for grazing by domestic livestock; however, it also is used as wildlife habitat, recreational areas and has esthetic value. Rangelands consist mostly of forested or open areas where elevations range from 2,500 to 6,000 feet in elevation. Rangeland soils are frequently gravelly, rocky and shallow. Some native range plants of particular importance in Lake County include rough fescue (*Festuca scabrella*), Idaho fescue (*Festuca idahoensis*), bluebunch wheatgrass (*Agropyron spicatum*), arrowleaf balsamroot (*Balsamorhiza sagittate*), camas (*Camassia quamash*), Columbia needlegrass (*Stipa Columbiana*), needle-and-thread (*Stipa comata*), prairie coneflower (*Ratibida columnaris*), prairie junegrass (*Koeleria pyramidata*) and western wheatgrass (*Agropyron smithii*).

Range condition varies, but large areas of rangeland have been degraded. Much of this degradation took place decades ago with the arrival of large quantities of livestock. Continuous, season-long grazing and over stocking has led to significant reductions in rangeland quality over the past 120 years. As bunchgrasses declined they were replaced with less desirable grasses, shrubs and weeds. Exotic species such as timothy, smooth brome, orchard grass, tall fescue, crested wheatgrass and many others were planted for hay and pasture and these plants displaced native rangeland vegetation in some areas, mostly in valley bottoms. Knapweed, sulphur cinquefoil, whitetop, leafy spurge, goatweed, dalmatian toadflax, thistles and other noxious weeds are common within the rangelands of the county. These plants often out-competed many native grasses. Annual grasses are also outcompeting native species and include, cheatgrass, Japanese brome and most recently ventenata. The short-lived perennial grass bulbous bluegrass is also a common invader. Poor grazing management, invasive species, and changes in fire regime are responsible for rangelands moving away from climax plant communities. Rangelands

in the Mission valley can vary in production from 2 animal unit months (AUM's) per acre to 0.05 AUM's depending on range type and condition.

To protect existing range resources and riparian health, livestock grazing management is of key importance. Rotating livestock and altering grazing season usage are important tools managers can use to manage their livestock. For areas that are already heavily invaded by annual grasses and weeds, the best course of action is often to time grazing events to coincide with peak palatability of the non-desirable species while working to limit usage when desirable species are most susceptible to grazing pressures.

Forestland

Lake County is 50% forested. 46% of the forested acres are in private and/or tribal ownership. The diversity of Lake County forests is strongly influenced by the Mission Mountains, with 17 inches annual precipitation on the west side and 29 inches on the east side. Forest types range from low elevation dry ponderosa pine savanna to moist, high elevation sub-alpine fir. The Lake County Community Wildfire Protection Plan includes an in-depth discussion of the different forest types.

The fire regime is as diverse as the forest type, with short, long, and mixed interval and severity. Aggressive fire suppression and short-term forest management decisions have altered the fire regime, the forest mosaic and species composition. Lake County fire history statistics depict a startling increase in both the number of acres burned annually and the severity of those fires. The county considers wildfire the highest priority disaster risk. There are 213,864 acres in the Wildland Urban Interface (WUI). The communities identified in the WUI include those that are in or near the tribal buffer zone, and those surrounding Flathead Lake that are heavily forested with minimal safe egress routes. More on specific communities that have a high fire risk is described later in the "Natural Resource Issues to be Addressed" section.

Forest insects and disease are naturally ever-present. However, the change in tree species composition and increase in forest density have elevated their role, intensifying fires and limiting forestry options.

In 1999 the Flathead Indian Reservation Forest Management Plan was released. In the Plan CSKT has prioritized restoring their timberland to "more closely resemble pre-European settlement conditions". Management of forestland on the Reservation follows a 'modified restoration' plan which was selected because it does the best job of balancing cultural, social, ecological, and economic concerns. The primary goal of the plan is to 'balance the restoration of pre-European forest conditions with the needs of sensitive species and human uses of the forest. Harvests are designed to mimic natural disturbances while balancing restoration against present-day uses, the needs of wildlife and watershed concerns. Other goals include restoration of grasslands, woodlands and riparian areas; reduction in livestock impacts, reduced road densities, protection of roadless areas and the designation of new wilderness. It is expected that restoration activities will reduce overall fire risk. (Flathead Indian Reservation Forest Management Plan, 1999).

In 1987 CSKT identified a "buffer zone" for the Mission Mountain Tribal Wilderness that included tribal, public and private lands and extended from the edge of the Wilderness boundary west with the goal "to protect and preserve the integrity of the Tribal Wilderness" (Mission Mountain Tribal Wilderness, 2005). The buffer zone is 22,833 acres, two-thirds of which are owned by the Tribe or Tribal members. Before

2005 the buffer zone was classified as “unavailable” meaning no commercial timber harvest was permitted, CSKT then reclassified the buffer zone so that the Tribe could use commercial timber harvest to “protect human life and property, the ecological integrity of the wilderness, fire ecology and ecological restoration principles” (CSKT-Mission Mountain Tribal Wilderness Buffer Zone Reclassification, 2005).

Unique Features

Pothole Region

Historical glacial activity left its marks upon the landscape of the Mission Valley. Near the town of Charlo glaciers created a series of shallow pothole wetlands, called kettles. Kettles are formed from melting glacial ice and today provide great value to wildlife in the Mission Valley. These wetlands support abundant waterfowl species as well as a host of other wetland-dependent wildlife. In large part because of the unique and valuable aspects of the pothole area the state of Montana, USFWS and CSKT Tribe have worked together to secure thousands of acres for habitat protection. These properties include USFWS Waterfowl Production Areas and National Wildlife Refuges (National Bison Range, Pablo and Ninepipes refuges), FWP Wildlife Management Areas and Tribal Trust Lands. Restoration efforts have taken place on many of these properties. These properties are a premier location for pheasant and waterfowl hunting, bird watching and other recreational activities. Pheasants Forever has taken an active role in assisting with conservation efforts on the state and federal lands in this area. The extent and proximity of these properties creates unique opportunities for coordinating conservation activities between multiple organizations and agencies.



Figures 15 & 16. Prairie potholes in the Mission Valley. Photo Credit: Left: Katie Finley, Right: Karli Becher

National Bison Range

Established in 1908 by President Theodore Roosevelt, the National Bison Range (NBR) is one of the oldest National Wildlife Refuges in the United States. The NBR encompasses 18,766 acres and is located on the southern end of the county between the towns of Dixon and Ravalli. The overall mission of the



NBR is to “maintain a representative herd of bison, under reasonably natural conditions, to ensure the preservation of the species” (National Bison Range). The original herd of bison was released in 1909. Today bison numbers on the refuge number between 250 and 400. The refuge features diverse ecosystems and supports a variety of native wildlife species in addition to the famed bison.

Figure17: Bison on the National Bison Range. Photo courtesy of USFWS.

Tribal Wilderness Areas

Located on the western slopes of the Mission Range, just east of the buffer zone, the Mission Mountain Tribal Wilderness covers over 91,000 acres and ranges in elevation from 4,000’ to over 10,000’. It is bordered on the eastern end by the Mission Mountain Wilderness, managed by the U.S. Forest Service. Together, these wilderness areas protect over 166,000 acres. In 1982, after many years of work, the CSKT Tribal Council voted overwhelmingly to approve the Tribal Wilderness Ordinance (Ordinance 79A) and adopt the Mission Mountain Tribal Wilderness Management Plan. A key point of Ordinance 79A outlines that “a primary purpose of the Mission Mountain Tribal Wilderness is the preservation of Tribal culture, and it acknowledges the importance of wilderness to the perpetuation of traditional Indian religion.” (Mission Mountains Tribal Wilderness, A Case Study, 2005). The Mission Mountain Tribal Wilderness also serves to; “sustain and protect culturally significant sites; maintain fragile alpine/tundra ecosystems; preserve habitat for a diversity of wildlife species such as the grizzly bear; and protect water quality and sensitive riparian zones.” Clearly stated, there is no construction of new roads, buildings, or structures allowed in the wilderness area. This also means that this area isn’t managed for timber like other areas on the reservation.



Figure 18. Mission Mountain Wilderness near Mollman Lakes. Photo Credit: Karli Becher

Flathead Lake Monster

The Flathead Lake Monster could be considered one of the most unique features of Lake County. The first sighting of the monster was in 1889 and has been periodically sighted ever since in the summer months. The Flathead Lake Monster is described as looking like a large eel up to 20 to 40 feet in length with noticeably grey eyes. <https://flatheadlakers.org/explore/flathead-lake-monster/>



Figure 18. Painting of the Flathead Lake Monster. Photo Credit: Chelsey Woolman

Section III. Conservation Activity Analysis

Recent NRCS Works

The NRCS has two field offices in Lake County. The Pablo Field Office is located in the CSKT Tribal Complex and focuses on working directly with the tribe and tribal producers. The Ronan Field Office works with both tribal and non-tribal producers.

NRCS work in Lake County has historically focused on meeting the needs of the Local Working Group's priority. This priority has generally shifted between grazing and irrigation over the past two decades. A summary of common practices that have been installed in Lake County between 2004 and 2018 can be seen in Table 9). Over the past 15 years (2004 thru 2019), the NRCS in Lake County has focused heavily on irrigation-related practices. During this time 62 irrigation projects, totally 2,660 acres were installed. There remains a strong need and desire in Lake County to prioritize irrigation projects. High tunnels

have also been a commonly contracted practice with 29 installed during the most recent 15-year period. Other common practices include grazing-related practices such as weed control (11,390 acres), watering facilities (60 total), and fencing (126,367 ft). Multiple other practices have been contracted to lesser extents. Of note is the relatively low level of forestry-related practices. Only 687 acres of forest stand improvement have been applied. Historically forestry has not been a prioritized resource concern in Lake County, but that may be changing as forestry has recently become a topic of interest for many partners.

Table 9. NRCS EQIP implementation of commonly applied practices from 2004 to 2018.

Practice Name	Unit Type	Applied Amount	Number of Practices
Herbaceous Weed Treatment/ Pest Management	Ac	11,390	65
Seasonal High Tunnel System for Crops	SqFt	61,493	29
Residue and Tillage Management, No-Till	Ac	11,390	65
Cover Crop	Ac	141	73
Critical Area Planting	Ac	16	7
Fence	Ft	126,367	82
Irrigation Pipeline	Ft	184,613	54
Irrigation System, Microirrigation	Ac	2,232	73
Sprinkler System	Ac	2,660	62
Irrigation Water Management	Ac	4,202	170
Structure for Water Control	No	97	79
Pumping Plant	No	51	48
Mulching	Ac	57	22
Forage and Biomass Planting	Ac	450	12
Livestock Pipeline	Ft	127,380	32
Watering Facility	No	60	52
Water Well	No	4	4
Prescribed Grazing	Ac	3,530	66
Nutrient Management	Ac	3,279	325
Tree/Shrub Establishment	Ac	186	44
Woody Residue Treatment	Ac	444	22
Forest Stand Improvement	Ac	687	27

Conservation easements are a valuable conservation tool. Depending on the parameters contained in the deed language, land can be protected for decades or even perpetuity for the purposes of safeguarding plant or animal habitat, landscape features (e.g. wetlands) or land management activities like farming and ranching. Lake County contains a total of 34,681 acres (3%) under some form of conservation easement. Of these, 8,058 acres are associated with private easement holders (land trusts, animal habitat conservation organizations, etc.). The remaining easements are federally owned (9,907 acres), state or locally owned (16,537 acres), and tribal owned (179 acres). Of the federal acres, the United States Department of Agriculture currently holds 619 acres under seven separate Wetland Reserve Program easements within the county.

Lake County TIP: Miller Coulee Water Quantity Improvement Project

In 2019 Lake County was approved for one of seven TIPs in Montana. The Miller Coulee Water Quantity Improvement Projects aims to improve irrigation efficiency in the Miller Coulee area by encouraging irrigation system improvements. This three-year project began in FY2019 obligating nine contracts valued at \$623,880 and improving irrigation efficiency on over 800 acres. The project will continue for several more years and hopes to ultimately improve irrigation efficiency on up to 1,500 acres in total. Appendix map 10 in the appendix shows the boundary of the Miller Coulee TIP.

Confederated Salish Kootenai Tribe – Natural Resource Management

The Confederated Salish Kootenai Tribe (CSKT) has developed a comprehensive resource plan to guide natural resource management and development on the Flathead Indian Reservation. The Tribe has identified goals for each natural resource and outlined a series of alternatives for management. While the plan focuses on lands and resources it also incorporates social service and human concerns. The plan also serves to define policies and processes that will guide future resource management on the Reservation.

CSKT has a long history of effective resource management. They have enacted a great many Ordinances that serve to guide the preservation, restoration and protection of their cherished resources. CSKT is very mindful of ‘zones of influences’ that affect Reservation resources. Zones of influence are policies and practices of off-reservation entities and individuals that affect the Reservation and its resources. For example, management of off-Reservation resources such as water quality and fish and wildlife habitat can have profound effects on the natural resources within tribal boundaries. The concept of an ecological zone of influence is important to the Tribe because a single major development activity off-Reservation can affect the Tribes’ resource base forever. CSKT places great value on communication and coordination of environmental and economic policies between itself and other entities.

For the purposes of facilitating resource planning efforts, CSKT has divided the Reservation into 6 smaller planning units called Study Areas. Each Study Area was developed to organize and prioritize resource information at a manageable scale. Study Areas include: Flathead Lake-River, Polson-Elmo, Camas-Hot Springs, Mission Valley, Perma-Dixon and Jocko Valley. Refer to the CSKT Comprehensive Resource Plan, Volume 1, Chapter 6 for information specific to each Study Area. The incorporation of the major resource and planning issues outlined within each Study Area is critical to NRCS planning efforts.

U.S. Fish and Wildlife Service and Partners Program

The U.S. Fish and Wildlife Service (USFWS) actively manages the National Bison Range with a weed management program, wildlife surveys and tracking, and participating in the bison trading program. Along with the National Bison Range the USFWS also manages Ninepipe and Pablo National Wildlife Refuges and has numerous Waterfowl Protection Areas (WPAs) and conservation easements in the county.

Pheasants Forever

The Mission Valley Pheasants Forever is an active chapter with many partners throughout the county including USFWS and FWP. The chapter has one employee, a Habitat Specialist who focuses on creating and maintain habitat for bird species. The Habitat Specialist works on federal and state lands in the Mission Valley.

The Lake County Conservation District

The Lake County Conservation District (LCCD) has a long history of community outreach and natural resources conservation efforts that has been amplified in recent years. Currently LCCD has several programs for community members to participate in including outreach events such as pasture walks, community speakers, and school outreach programs. LCCD also tries to offset some costs for producers in Lake County to implement conservation projects by providing a cost share via programs to encourage the use of cover cropping and an affordable rental program for their no-till drill.

In 2016 LCCD started a Pollinator Initiative with the goal of raising awareness of pollinators and increasing pollinator habitat throughout the county. This goal is being met by hosting community pollinator events, teaching Lake County youth about pollinators and their importance and by giving out free pollinator seed to members of the community to plant pollinator gardens. This program has been very successful and is planned to continue.

One of LCCD's longest running outreach events is 4th Grade Ag Days, which was started decades ago. At this event students from around Lake County come to learn about agriculture in Lake County. Booths, manned by local volunteers include livestock such as cows, sheep, and chickens and vegetable and small grain production. In recent years LCCD has expanded this event by adding a monthly classroom-based program called the Junior Conservationist Program to provide more in-depth education on agriculture and conservation topics.

Section IV. Natural Resource Issues to be Addressed

Throughout 2019 the Ronan Field Office has met with partners and evaluated resources developed by partnering entities. Following this in-depth analysis, the Ronan Field Office has highlighted some of the most pressing natural resource issues in Lake County.

Forestry

The resource issue that was brought up in almost every meeting was the management of the WUI in Lake County. There are several areas that are very high on the risk assessment summary in the table to the right. This risk assessment was done by Arctos Research for Lake County. In the risk assessment "potential loss of life, property and natural resources" (Lake County Community Wildfire Protection Plan, 2005) were looked at by taking a deeper look at 4 components, hazard, values, protection, and fire risk then taking all of these into account to get a composite score. The area with the highest score is the Big Arm/Rocky Point area due to narrow winding roads for access, population density, and value of homes. This is the area that the Ronan FO hopes to focus on first. See Appendix map 11 'Lake County Fuel Hazards' map in the appendix.

Table 10. Risk assessment in WUI's in Lake County. (Community Wildfire Protection Plan)

PLANNING AREA RISK ASSESSMENT SUMMARY					
NAME	WEIGHTED COMPONENT SCORES				COMPOSITE SCORE
	Hazard	Values	Protection	Fire Risk	
Big Arm/Rocky Point	37	13.4	27	8.3	85.7
Lake Mary Ronan	37	8.8	23.4	5	74.2
East Shore - North	26.8	20	13.2	3.3	63.3
East Shore - South	26.8	15.6	16.8	3.3	62.5
Rollins	23.2	13.4	16.5	6.7	59.8
Mission Front - North	20	13.4	16.8	8.3	58.5
Arlee	20	8.8	20.1	8.3	57.2
Salmon Prairie	23.2	8.8	16.5	6.7	55.2
Mission Front - South	20	6.6	20.1	8.3	55
Turtle Lake	20	11	13.2	10	54.2
Ferndale/Swan Lake	20	13.4	13.2	3.3	49.9

Water Quality and Quantity

Water quality and quantity are often over-lapping resource concerns. Often in Lake County, water quality issues are created as a result of irrigation and agricultural-related use. Irrigation runoff is a major concern affecting both the quality of water in rivers, streams and waterbodies as well as the quantity of water available for irrigation.

As stated in the “Irrigation” section, the CSKT Montana Compact was ratified by the state of Montana in 2015 and currently awaits approval by United States Congress. The Compact outlines water usage for irrigation and instream flows on the CKST reservation and beyond while also protecting historical irrigation uses. One of the key goals of the Compact is to improve irrigation efficiencies within the target area.

Irrigation is fundamental to agriculture in Lake County, particularly in the Mission Valley. The Flathead Indian Irrigation Project (FIIP) operates the irrigation delivery system. This system is antiquated and in need of vast infrastructure improvements. Areas in particular need of improvement include updating water delivery conveyances to gravity pressure where possible, converting from open ditch to pipeline to reduce system losses, improving water measurement abilities, reducing system waste including stemming the significant tailwater return flows and providing alternative stockwater options to reduce off-season delivery through canals solely for livestock water. On-farm improvements are also needed throughout the system. Currently there remains significant wild-flood irrigation on steep slopes which could benefit from flood-to-sprinkler conversion. Improving irrigation efficiency upgrading irrigation type may also be worthwhile in many cases. Improvements should focus on maximizing efficiency while eliminating off-site movement of water, nutrients and sediments. Working with partners to address multiple resource benefits is a key goal of the Ronan NRCS.

Weeds

Weeds are a constant natural resource issue in Lake County. The list of problematic weeds within the county is too extensive to discuss within this document, however, two notable issues include 1.) whitetop and 2.) emerging threats.

Whitetop is widely distributed within Lake County and continues to spread. Whitetop encroaches on both irrigated and non-irrigated lands affecting both well-managed as well as poorly-managed properties. It presents a particularly troublesome issue in Lake County and accounts for significant yield reductions and overall habitat degradation. There may be the potential for whitetop reduction projects in the Mission Valley. More research and work need to be completed to determine project boundaries and treatment methods.

Emerging threats is another weed-related issue that could be addressed. Aggressively targeting new threats should be a cornerstone of any active weed management plan and should be a high priority for resource allocations whenever possible.

Habitat

Wildlife habitat is a priority for many natural resource partners in Lake County. The CSKT tribe has completed numerous wetlands and riparian restorations and are actively working on additional opportunities. Pheasants Forever is active in Lake County and has cooperatively hired a field technician with FWP and USFWS to work on state and federal wildlife properties. There exist vast opportunities to

work with partners to continue to make improvements to habitat throughout the county, with a focus on the Mission Valley.

Soil Health

Soil health remains an area of interest in Lake County. Many producers are interested in improving their soil health and increasing the sustainability of their agricultural operations. Farmers have started utilizing cover crops, but adoption is still low. Encouraging more landowners to adopt soil building practices should be prioritized. Producers using cover crops have reduced input costs and created additional forage opportunities. Expanding the use and adoption of cover crops could prove beneficial within the county.

Grassland (Pasture/Range/Habitat Improvements)

Many of the grasslands in Lake County, which include pastures (dry and irrigated), rangeland and grassland habitat areas are in poor condition. The conditions are a result of both poor grazing management, weed encroachment and a general lack of species diversity. Targeting improvements related to weed control, species selection and grazing management could provide significant resource benefits. The Ronan NRCS and Lake County Conservation District have completed numerous grassland-related field trials in Lake County including legume interseeding studies and a recently-completed 40-acre dryland forage study in 2017. The results of these studies are promising and are currently being monitoring and analyzed and results could prove beneficial in planning future treatments for pastures within Lake County.

Cherry and Fruit Production

Flathead Lake is home to Montana's cherry production. Over the past 15 years the NRCS has worked on dozens of operations to make irrigation improvements and improve nutrient and fertility management. Small fruit production, including grapes, is another area of growing interest in western Montana.

Local Food Production

Over the past decade there has been an increased interest in locally produced, often organic agricultural products. Many local farms have risen to meet this community need. Over the past 15 years, the NRCS in Lake County has contracted over two-dozen high tunnels. Some operations in Lake County have multiple high tunnels in operation and are self-supporting, value-added business. It is likely that the community desire for locally-derived agricultural products will continue to grow. NRCS should continue to find ways to support these efforts.

Section V. Prioritization of Natural Resource Problems and Desired Outcomes

On October 2, 2019 the Lake County Local Working Group (LWG) was conveyed in order to identify and prioritize resource concerns in the county. Representatives were present from the farming and ranching community, Pheasants Forever, LCCD, DNRC, Flathead Lakers and MSU Extension. The group prioritized water quality and water quantity (identified as similar resource concerns), plant health and vigor (to include the interrelated resource concerns of weeds, grassland habitats and forage-issues) and forest health as the main resource concerns in Lake County. The group supported the development of Targeted Implementation Plans (TIP) for a large-scale whitetop control and revegetation project with the goal of improved pasture condition and grassland wildlife habitat in Lake County. They also supported the development of a TIP to improve forest health in the Rocky Point area. They voiced support for our current TIP in the Miller Coulee area for water quantity as well. Notes from the LWG are available upon request.

Prioritized Resource Concerns (no order of priorities provided):

- ***Water Quality and Water Quantity:*** Identified as similar resource concerns, often addressed via irrigation-related improvements. There exists broad support within the county and within the LWG to address water quality and water quantity issues. Largely this support relates to irrigation improvements that will improve irrigation efficiency and decrease runoff. There is a strong demand for irrigation improvement from producers in Lake County. On average the field office receives two to three irrigation assistance requests per month. The NRCS believes that the desire for irrigation improvements will remain steady or increase in coming years and that large numbers of producers are ready, willing and able to make the investments necessary to achieve success with future projects.
- ***Plant Health and Vigor:*** Inclusive of many plant-based resources concerns including weed management, grassland habitat and forage-related issues and grazing. This is an issue that all attendees at the LWG meeting were equally excited about. Grassland-related resource concerns received the broadest levels of support and generated the most excitement within the group. NRCS believes that multiple partners are willing to come to the table to target this resource concern locally. NRCS has held meetings with multiple partners since the LWG meeting to develop a TIP related to this issue. LCCD and the NRCS routinely receive requests for assistance related to plant health and vigor, generally numbering one per week, on average. We believe that there is strong desire within the community to address this resource concern. Before developing a TIP, we need to work with partners to outline priorities, stakeholder interest, contributions of partners and additional information. Field trials may be necessary in order to determine best management practices. Outreach events are being planned for 2020 to gather public input and share information.
- ***Forest Health:*** Supporting healthy forests and fire resiliency. Fire mitigation is a popular topic locally and many partners are actively seeking opportunities to collaborate on projects. LCCD has submitted a grant through the DNRC to complete fuels reduction work on private lands in the Rocky Point area, north of Polson. The NRCS and LCCD held a joint meeting with local landowners in September 2019 to gauge interest and discuss a potential project. Feedback from attendees was positive and there is local interest. To date we have a list of approximately 20 potential clients who have contacted our office. NRCS involvement will likely be dependent upon LCCD's success with acquiring a grant to work in the area with our organization.

Discussion thus far have focused on LCCD providing structural protection to homes and small acreages while NRCS would more actively work on large blocks of ground. The CSKT has expressed interest in the project and have already done thinning and commercial harvest in the area. They would like to expand these efforts. More discussion and planning are in the works to further develop this project.

Section VI. Targeted Implementation Plans

Miller Coulee Water Quantity Improvement Project

In 2019 Lake County was approved for one of seven TIPs in Montana. The Miller Coulee Water Quantity Improvement Projects aims to improve irrigation efficiency in the Miller Coulee area by encouraging irrigation system improvements. This three-year project began in FY2019 with a goal of improving irrigation efficiency on up to 1,500 acres while providing \$1,450,000 in financial assistance. In 2019 the Ronan NRCS obligated nine contracts valued at \$623,880, improving irrigation efficiency on over 800 acres. A second 2019 signup was held in August 2019 and the NRCS received 11 new applications. The NRCS is currently evaluating and completing conservation planning on these applications. Appendix map 10 shows the boundary of the Miller Coulee TIP.

Rocky Point – White Swan Forest Resilience Project

The Ronan Field Office along with partners including the Lake County Conservation District (LCCD), Montana Department of Natural Resources and Conservation (DNRC), private forest consultants, Pablo NRCS Field Office, and the Confederated Salish and Kootenai Tribes (CSKT) Forestry division have identified the Rocky Point – White Swan area as a Wildland Urban Interface (WUI) Area in Lake County that is of high priority to be managed for fire resilience. This area has been identified as a high priority because of the abundance of closed canopy fuel loads, hilly terrain, numerous structures and dwellings along with limited access roads that are narrow and winding posing a threat for evacuation situations to residents and emergency management officials.

The area is comprised of approximately 5,000 acres with over 600 property owners. The ownership in the project area is mixed between private, tribal, and county with the majority being owned by CSKT (>3,000 acres) followed by privately owned land (>1,900 acres). Many small one to ten acres parcels bordering the Flathead Lake are privately owned and include residences, cabins and other structures.

The Ronan Field Office has held numerous meetings with the LCCD, DNRC and CSKT Tribal Forestry. LCCD is actively pursuing opportunities to assist with the project by administering grants providing funding for complementary forestry improvement projects and residential fire protection education and assistance. LCCD has applied for grant funding through the DNRC for the Western Wildland Urban Interface Grant Program. LCCD has also provided support for this project by providing administrative assistance and assisting with outreach and education. LCCD has also hired a full-time Resource

Conservationist, Lauren Odom who will be working alongside NRCS on a full-time basis to assist with this project. The NRCS has met with CSKT Forestry representatives to discuss action that can be taken on the tribal lands in the project area. They have expressed interest in this project and tentatively agreed to cooperate in the project by using WUI funding to complete projects that would provide complement on Tribal Lands. Practices that the CSKT tribe has expressed interest in installing include fire breaks and precommercial thinning as well as commercial harvest in some areas. The Ronan FO has also met with the local landowner's group, 'The Masumola Club' which is in the project area. The Masumola Club meets regularly and is comprised of over 100 local landowners. Interest from landowners within the project area has been high and already approximately 20 landowners have expressed interest in participating.

Goal of the project are to 1.) reduce hazardous fuel loads, 2.) improve forest health, resiliency and overall productivity and 3.) increase wildfire preparedness through education and outreach. To accomplish these goals NRCS will work with our partners including LCCD, DNRC and CSKT. Each entity will provide support for this project with both funding and labor. This project will be implemented over a five-year time horizon.

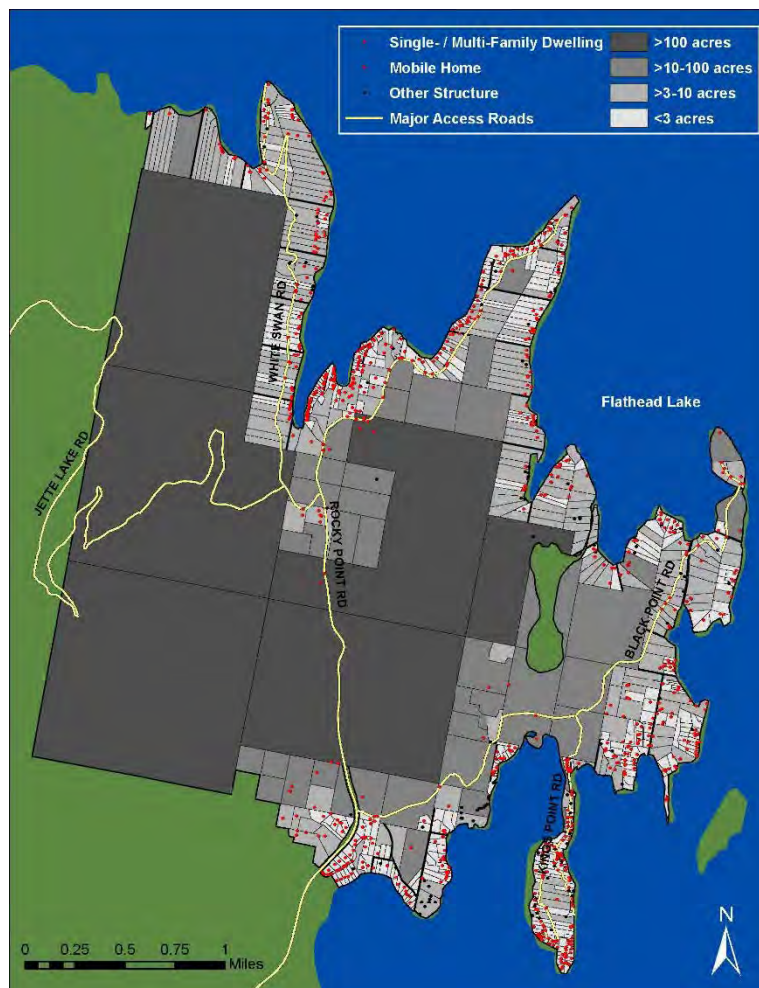


Figure 20. Proposed boundary of Rocky Point – White Swan Forest Resilience Project

Integrated Grassland Improvement Project (Name pending):

Perhaps the one issue that most galvanizes interest in the Mission Valley is whitetop control. Whitetop is an aggressive perennial weed that has taken over large swaths of productive agricultural land. At present the NRCS and LCCD are working with a diversity of partners to develop a TIP to treat whitetop on a large-scale and to improve grasslands for both habitat and agricultural production. Numerous partners have shown initial interest including Pheasants Forever, Lake County Weed District, MSU Extension, Flathead Lakers and private landowners. Discussion with the Agricultural Research Service (ARS) have been initiated and it is possible that a new bio-control agent may be available to test locally. Discussions and planning are ongoing, and it is expected that NRCS will develop a TIP proposal for submission in 2020.

Sources

US Census Bureau, <https://www.census.gov/quickfacts/fact/table/lakecountymontana/PST045217>

National Ag Statistics Service: <https://www.nass.usda.gov>

Montana Department of Environmental Quality, <http://deq.mt.gov/Water/Resources/report>

Swan Ecosystem Center, http://www.swanecosystemcenter.org/Water_Quality.html

Flathead Lake Bio Station, University of Montana, <https://flbs.umt.edu/newflbs/flathead-lake/lake-facts/>

Proceedings of the National Academy of Sciences of the United States of America:
<https://www.pnas.org/content/108/3/1070>

EPA-Air quality https://www3.epa.gov/airquality/urbanair/sipstatus/reports/mt_elembypoll.html#pm-10_1987_333

MT DEQ Air Quality <http://deq.mt.gov/Air/2017Air/Standards/airnonattainment>

LaFave, J. I., L. N. Smith, and T. W. Patton. 2004. *Ground-Water Resources of the Flathead Lake Area: Flathead, Lake, Missoula, and Sanders Counties, Montana*. Part A – Descriptive Overview and Water-Quality Data. Montana Bureau of Mines and Geology, Butte, MT. Summary of Groundwater System of the Flathead Lake Basin. US Environmental Protection Agency, Montana Operations Office. September 2011.

Lake County Soil Survey, NRCS, USDA.
<https://www.nrcs.usda.gov/wps/portal/nrcs/surveylist/soils/survey/state/?stateId=MT>

Flathead Indian Reservation Forest Management Plan, Final Environmental Impact Statement. Confederated Salish and Kootenai Tribes. 1999.

Montana Governor's Office of Indian Affairs, Confederated Salish and Kootenai Tribes.
<http://tribalnations.mt.gov/cskt>

Montana Department of Natural Resources and Conservation, Confederated Salish and Kootenai Tribes Compact. <http://dnrc.mt.gov/divisions/reserved-water-rights-compact-commission/confederated-salish-and-kootenai-tribes-compact>

U.S. Environmental Protection Agency, 'Case Studies in Tribal Water Quality Standards Programs, Confederated Salish and Kootenai Tribes of the Flathead Reservation'. EPA-823-R-06-007. July 2006.

Montana Climate Office. University of Montana. <http://climate.umt.edu/atlas/precipitation/default.php>

U.S. Fish and Wildlife Service, National Bison Range.
https://www.fws.gov/refuge/national_bison_range/

Mission Mountains Tribal Wilderness, A Case Study. Confederated Salish and Kootenai Tribes. 2005

Montana Natural Heritage Program. Montana Official State Website. January 2019. <http://mtnhp.org>

Grizzly Bear Management Plan for Western Montana, Draft Programmatic Environmental Impact Statement. Montana Fish, Wildlife & Parks. June 2006.

Confederated Salish and Kootenai Tribes. Mission Mountain Tribal Wilderness Management Plan, Flathead Indian Reservation, Montana.

Confederated Salish and Kootenai Tribes. Mission Mountain Buffer Management Plan, Flathead Indian Reservation, Montana.

Confederated Salish and Kootenai Tribes. 1981. Flathead Indian Reservation Grizzly Bear Management Plan, Flathead Indian Reservation, Montana.

Confederated Salish and Kootenai Tribes. 2000. Flathead Indian Reservation Forest Management Plan, Flathead Indian Reservation, Montana.

Confederated Salish and Kootenai Tribes. 2015. Wetland Conservation Program.
<http://csktnrd.org/ep/wetlands-conservation-program>

U.S. Fish and Wildlife Service. 1993. Grizzly bear Recovery Plan. Missoula, Montana. 181pp.

Confederated Salish and Kootenai Tribes. 2000. Wetland/Riparian Habitat and Bull Trout Restoration Plan

Montana Bull Trout Restoration Team. Restoration Plan for Bull Trout in the Clark Fork River Basin and Kootenai River Basin Montana. June 2000.

Seeley-Swan Fire Plan, 2004

Lake County Community Wildfire Protection Plan, 2005

Lake County Pre-Disaster Mitigation Plan, 2012

Montana Department of Environmental Quality. July 2017. Swan Lake Watershed TMDL Implementation Evaluation.

Valley Journal. March 2019. <http://www.valleyjournal.net/Article/21399/Charlo-residents-grapple-with-arsenic-in-well-water>

USDA National Agricultural Statistics Service. 2019.
https://www.nass.usda.gov/Quick_Stats/CDQT/chapter/2/table/1/state/MT/county/047

Lake County Weed District. 2012. Lake County Noxious Weed Management Plan.

Confederated Salish and Kootenai Tribes Natural Resources Department. June 2002. Water Quality Assessment Report.

Montana State University. September 2018. Biology, Ecology and Management of Whitetop.

SNOFLO. 2019. <https://snoflo.org/report/flow/montana/flathead-river-near-polson-mt/>

Montana State Wildlife Action Plan 2015.

<http://fwp.mt.gov/fishAndWildlife/conservationInAction/swap2015Plan.html>

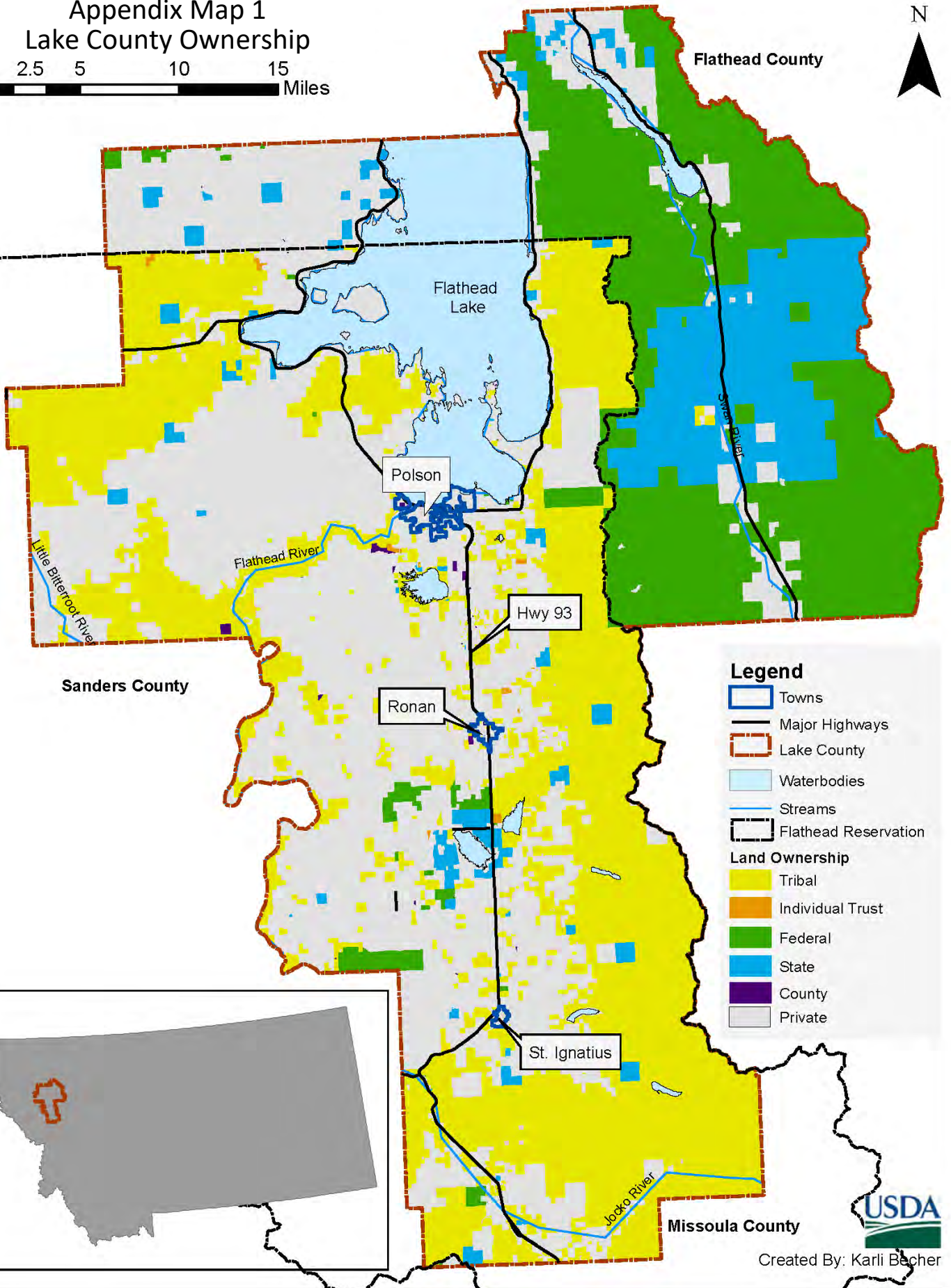
Montana Field Guide. <http://fieldguide.mt.gov>

Montana Fish, Wildlife and Parks. Montana Action Plan for Implementation of Department of the Interior Secretarial Order 3362: "Improving Habitat Quality in Western Big-Game Winter Range and Migration Corridors." October 2019.

<https://www.nfwf.org/rockymountains/Documents/Montana2020ActionPlan.pdf>

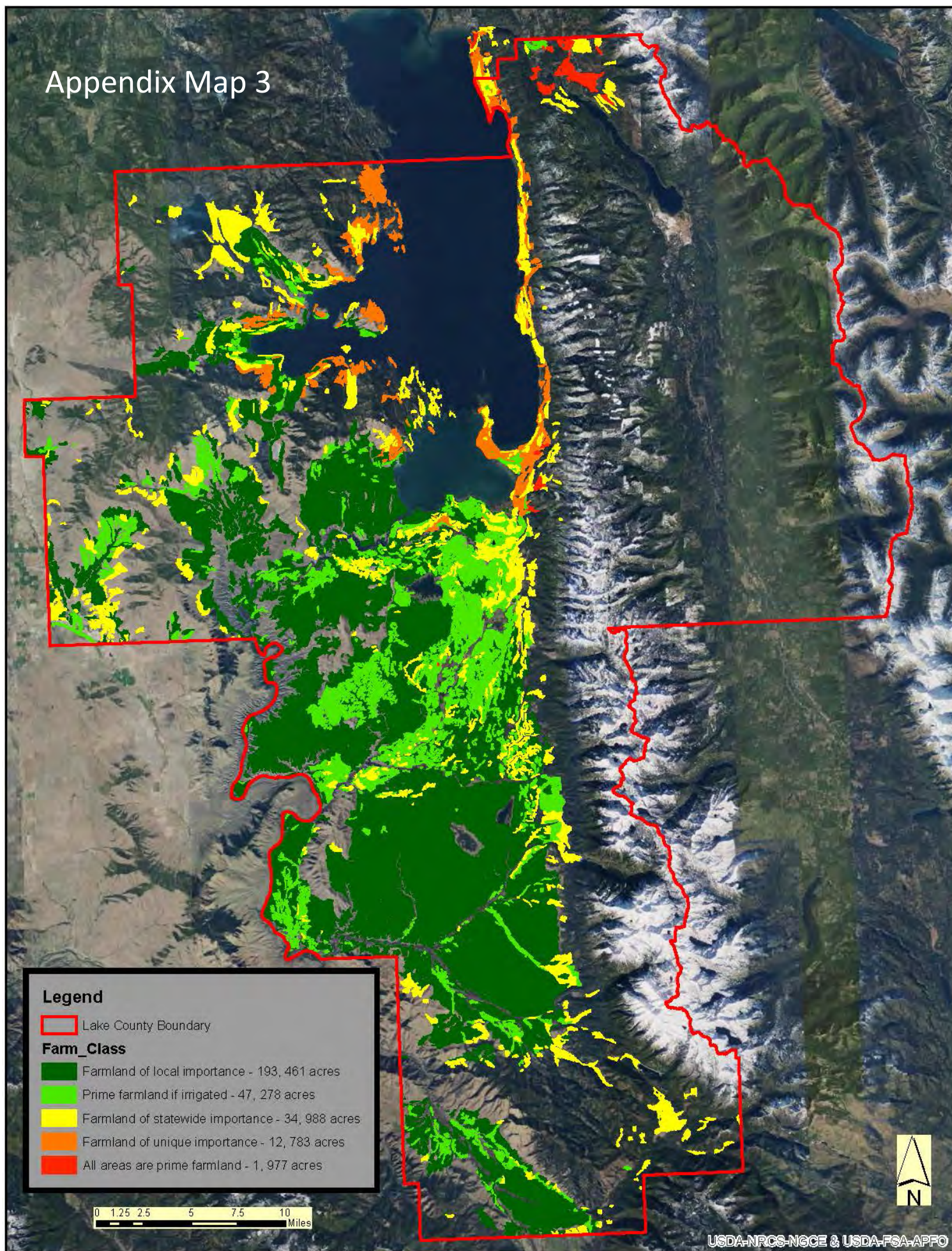
Appendix Map 1 Lake County Ownership

0 2.5 5 10 15 Miles





Appendix Map 3



Appendix Map 4

LAKE

FLATHEAD

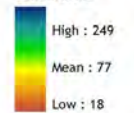
SANDERS

MISSOULA

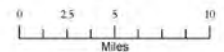
POWELL

MINERAL

Legend
Relative Effective Precipitation
Centimeters

[illegible]

Map Scale
1:205,000



DISCLAIMER:

This map is to be used as a primary reference source and is not intended for use in site-specific planning. This is public information and may be interpreted by organizations, agencies, units of government, or others, based on needs; however, they are responsible for the appropriate application. Federal, State, or local regulatory bodies are not to assign to the Natural Resources Conservation Service any authority for the decisions they make.

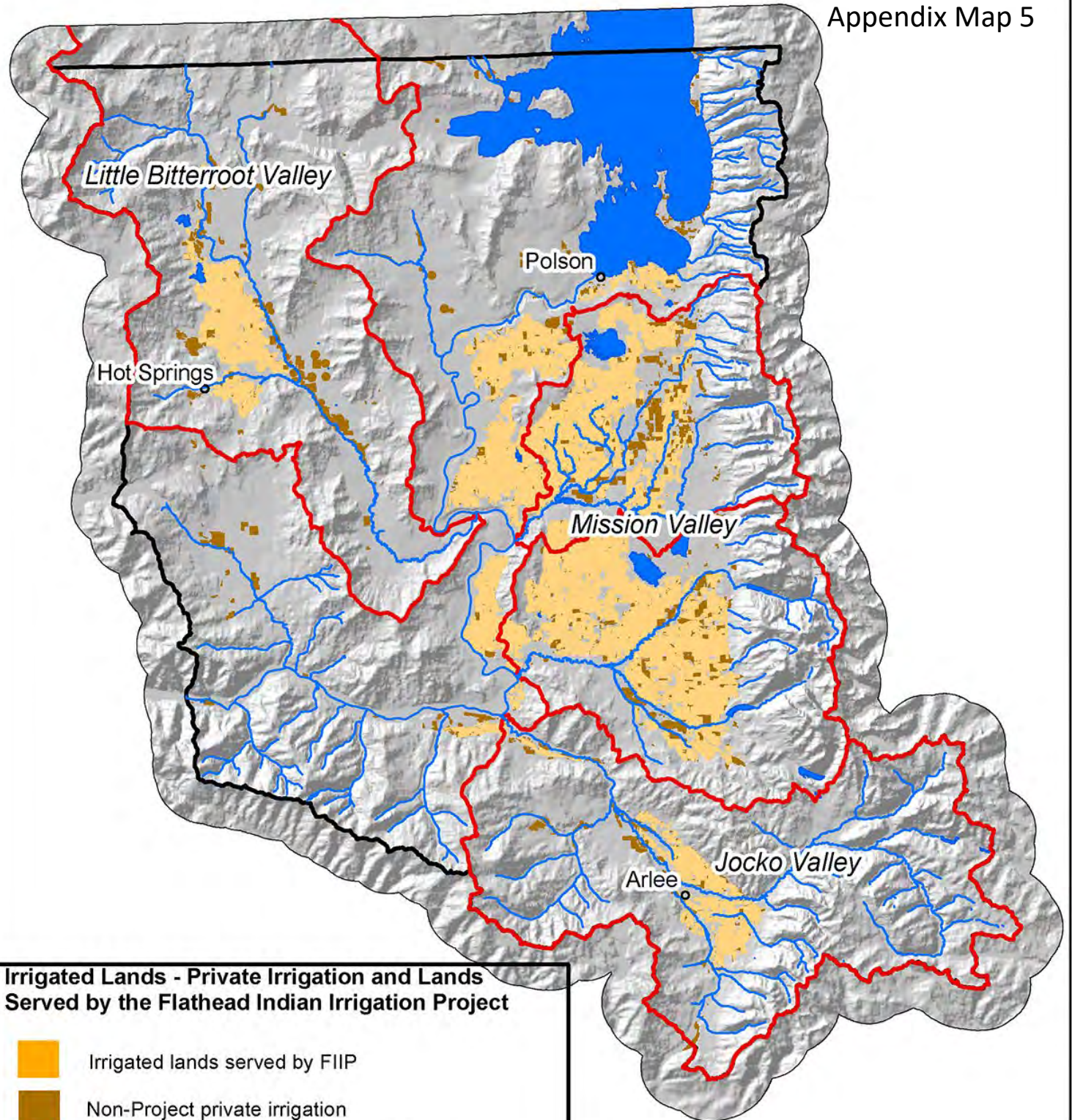
Location within Montana



 **NRCS** Natural Resources
Conservation Service

 **Montana State Library**
Natural Resource
Information System

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Irrigated Lands - Private Irrigation and Lands Served by the Flathead Indian Irrigation Project

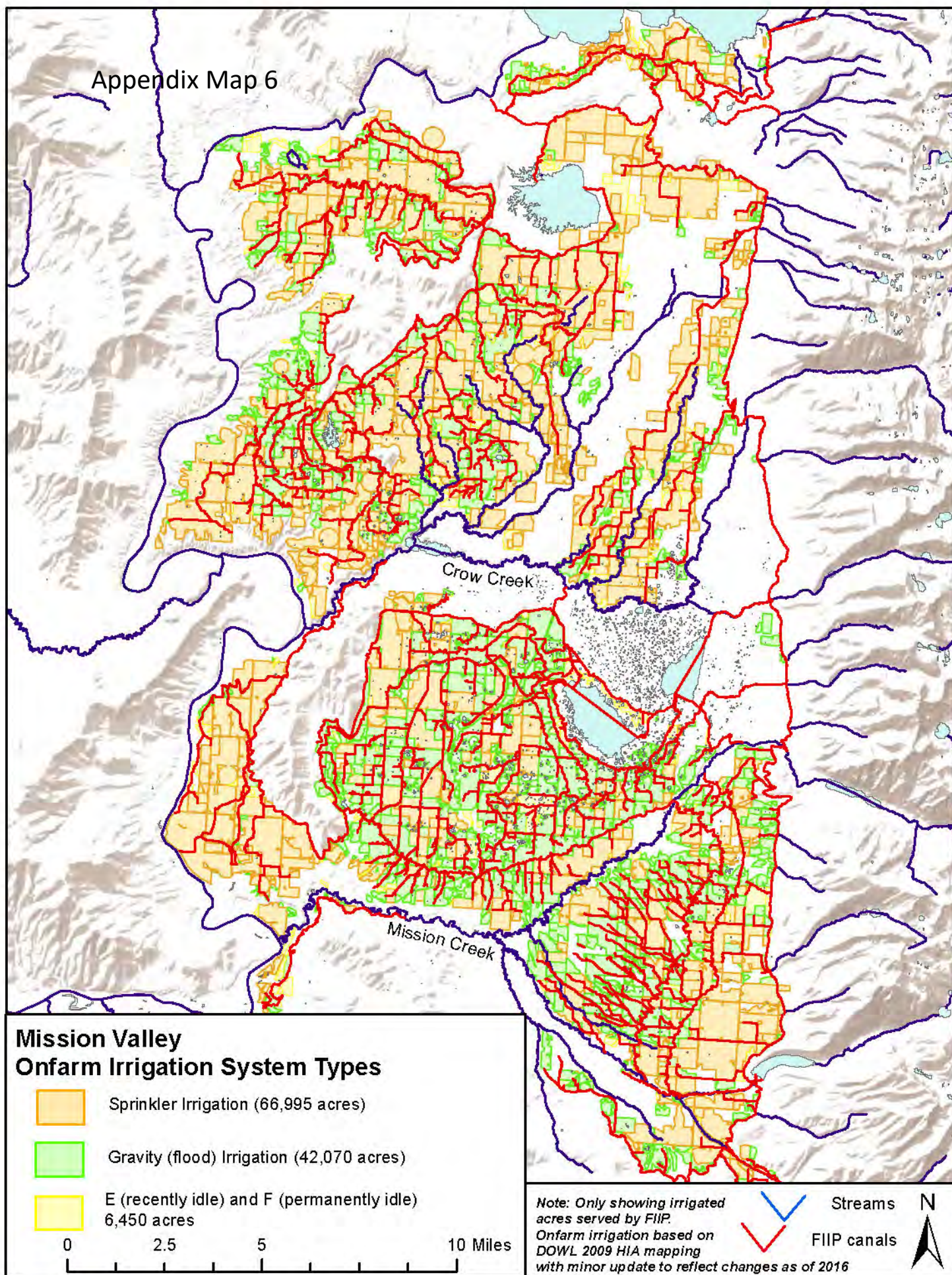
- Irrigated lands served by FIIP
- Non-Project private irrigation
- FIIP Irrigation Reservoirs and Flathead Lake, excluding Hubbard and Little Bitterroot Lake
- V Streams/rivers
- V Reservation Boundary

Irrigated acres include full and partial water supply acres and recently active irrigated acres

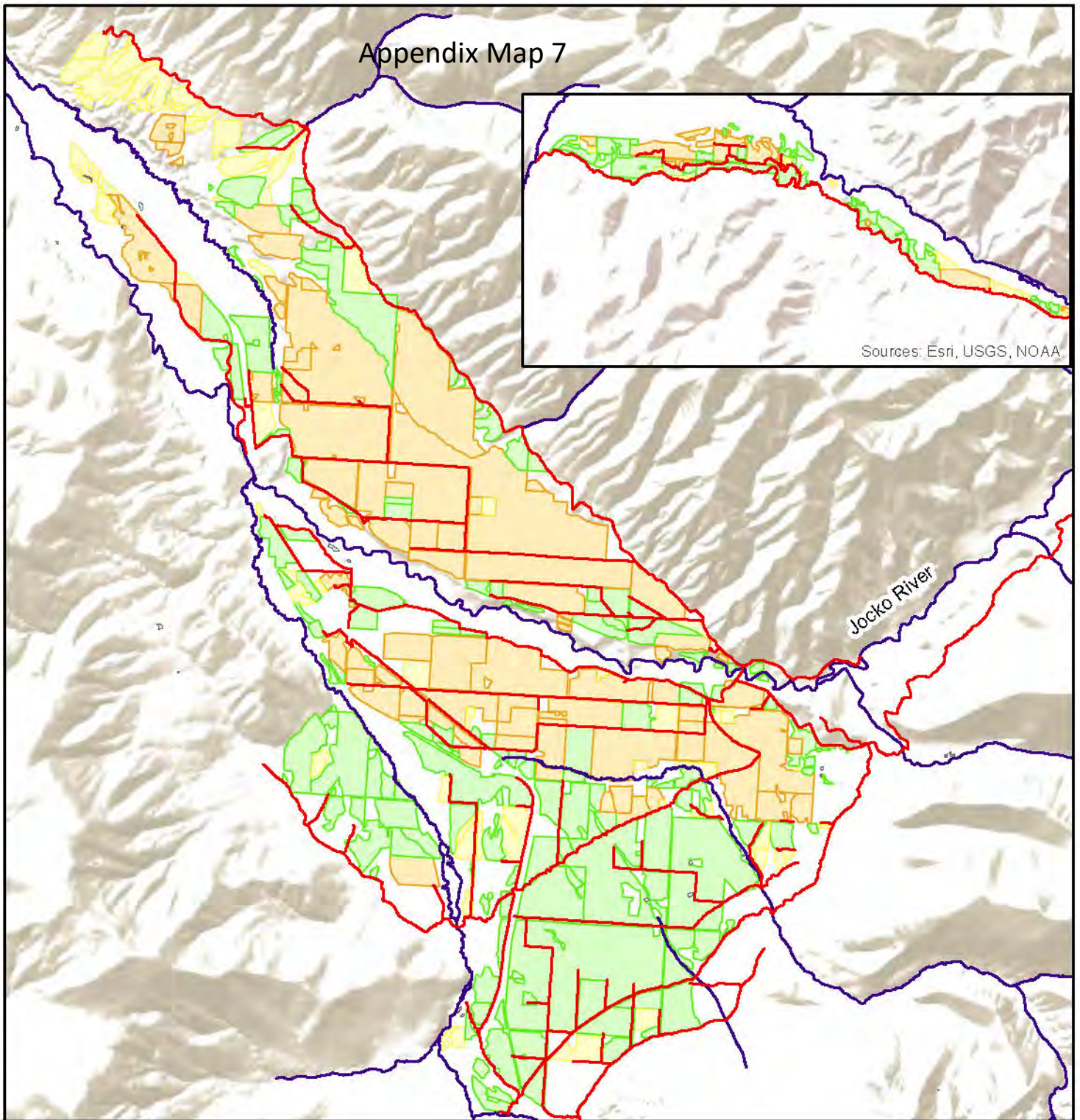
0 5 10 20 Miles



Appendix Map 6



Appendix Map 7



**Jocko Valley (Dixon Bench inset)
Onfarm Irrigation System Types**

-  Sprinkler Irrigation (5,780 acres)
-  Gravity (flood) Irrigation (5,733 acres)
-  E (recently idle) and F (permanently idle) 1,240 acres

 Streams

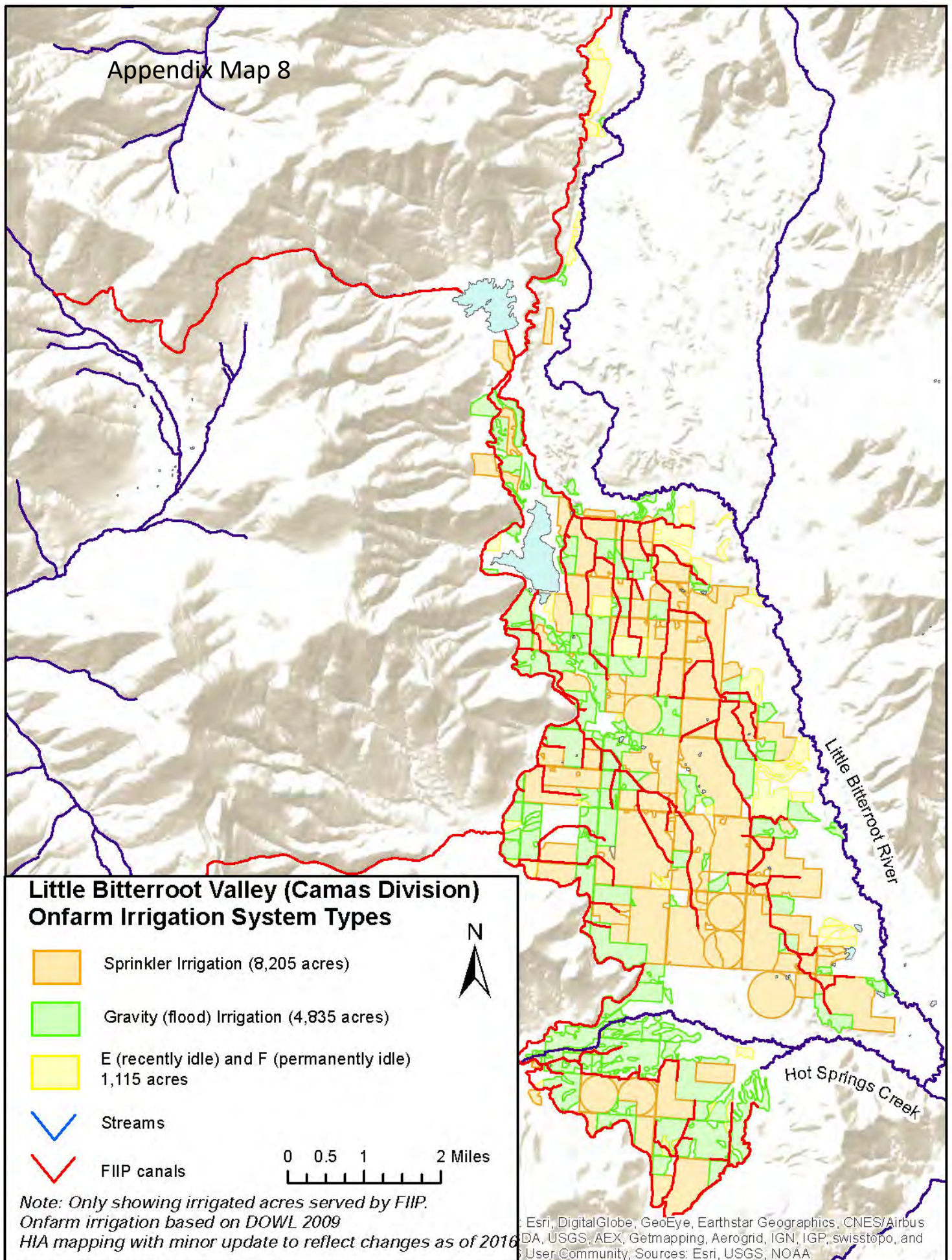
 FIIP canals

0 0.5 1 2 Miles



*Note: Only showing irrigated acres served by FIIP.
Onfarm irrigation based on DOWL 2009
HIA mapping with minor update to reflect changes as of 2016*

Appendix Map 8



Appendix Document 9

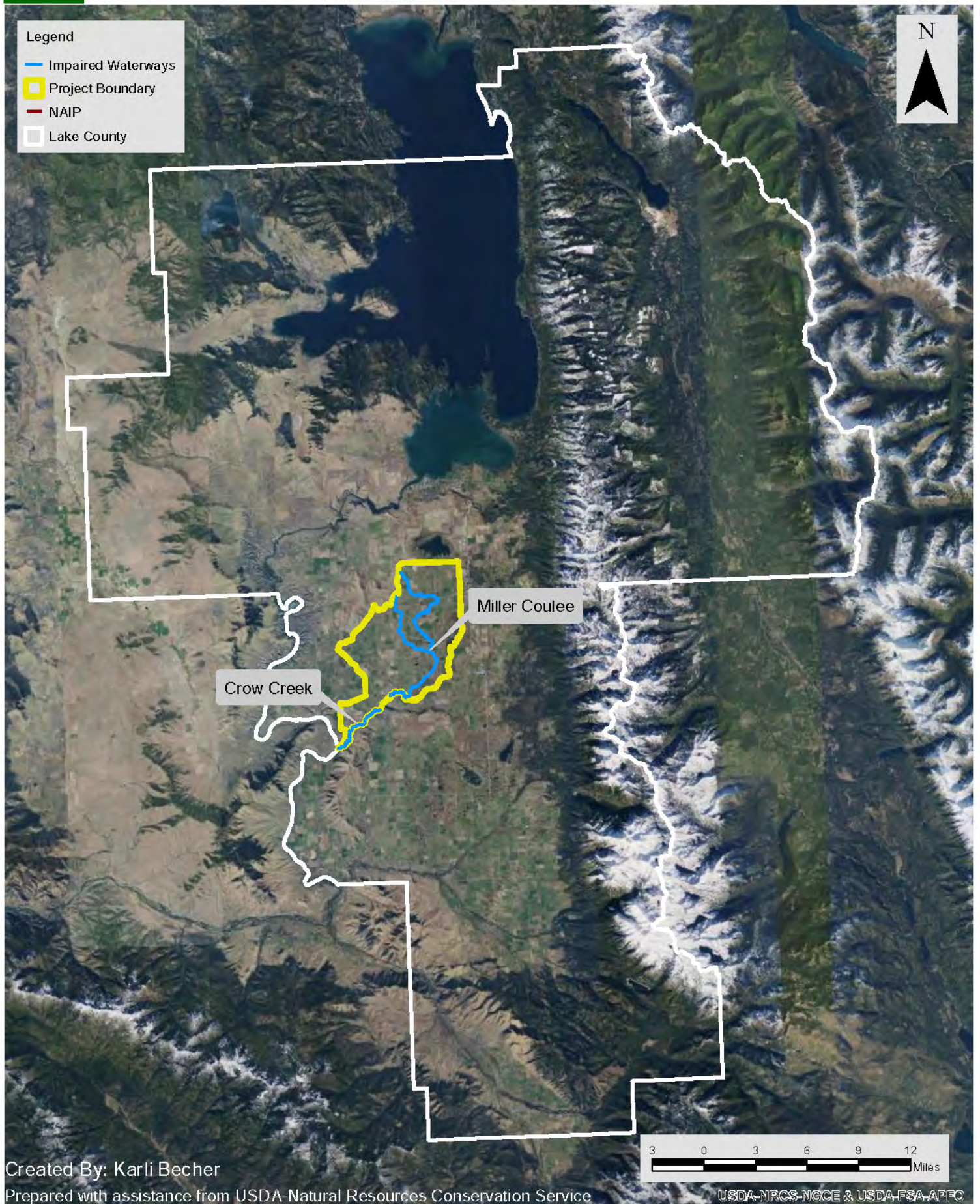
Lake County Air Stagnation Plan, Health Advisories & Wild Fire Smoke Under Good Dispersion Conditions Endorsed by Lake County Board of Health 8/19/03

<u>Episode Stage</u>	<u>Visibility Ranges</u>	<u>Health Descriptor*</u>	<u>Health Effects</u>	<u>Cautionary Statements</u>	<u>Action</u>
Good	10 miles and up	Good	None	None	
Marginal	8 to 9 miles	Moderate	Possibility of aggravation of heart or respiratory disease among persons with cardiopulmonary disease and the elderly.	None	
Poor	6 to 7 miles	Poor	Same	None	
Stage 1 Alert	3 to 5 miles	Unhealthy for Sensitive Groups	Increasing likelihood of respiratory symptoms in sensitive individuals, aggravation of heart or respiratory disease and premature death in persons with cardiopulmonary disease, smokers and the elderly.	People with respiratory or heart disease, smokers the elderly and children should limit prolonged exertion and stay indoors.	Outdoor burning suspended, limit exertion at outdoors sports practices
Stage 2 Warning	1.5 to 2.5 miles	Unhealthy 150-214 8 hr. ave.	Increased aggravation of heart or respiratory disease and premature death in persons with cardiopulmonary disease, smokers and the elderly; increased respiratory effects in general population.	People with respiratory or heart disease, smokers the elderly and children should avoid prolonged exertion ; everyone else should limit prolonged exertion .	Alert restrictions remain in effect plus, public advised to eliminate nonessential driving. Recommend no outdoor activity for persons under 18. Hold sports practices indoors.
Stage 2 Warning	0.9 to 1.4 miles	Very Unhealthy 215-354 8 hr. ave.	Significant aggravation of heart or respiratory disease and premature death in persons with cardiopulmonary disease, smokers, and the elderly; significant increase in respiratory effects in general population.	People with respiratory or heart disease, smokers, the elderly and children should avoid any outdoor activity ; every else should avoid prolonged exertion .	Same
Stage 2 Warning	¾ mile or less	Hazardous 355-419 8 hr. ave.	Serious aggravation of heart or respiratory disease and premature mortality in persons with cardiopulmonary disease, smokers, and the elderly; serious risk of respiratory effects in general population.	Everyone should avoid any outdoor exertion; people with respiratory or heart disease, smokers, the elderly and children should remain indoors .	Same
Stage 3 Emergency			Same	Everyone should avoid any outdoor exertion ; everyone should remain indoors whenever possible	Warning restrictions remain in effect- Recommend cancellation of public gatherings especially athletic evets, activities, and practices
Stage 4 Crisis			Same	Everyone should avoid any indoor and outdoor exertion ; everyone should remain indoors whenever possible	All (indoor and outdoor) athletic events. activities and practices cancelled.



Appendix Map 10 Lake County - Miller Coulee Water Quantity Improvement Project

Ronan Field Office
Targeted Implementation Plan



Created By: Karli Becher

Prepared with assistance from USDA-Natural Resources Conservation Service

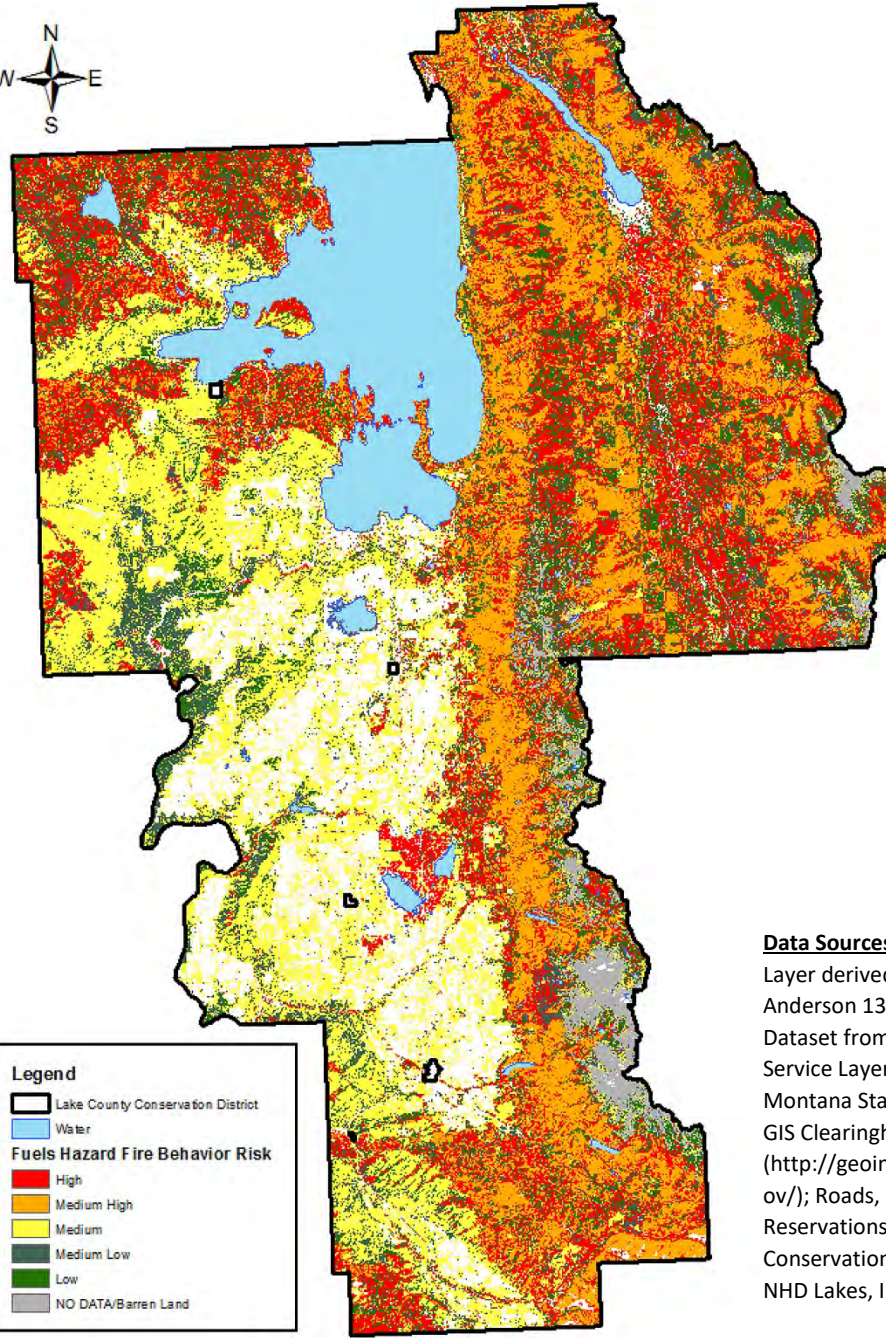


Appendix Map 11

Lake County Conservation District

Forest Fuels Hazard Analysis

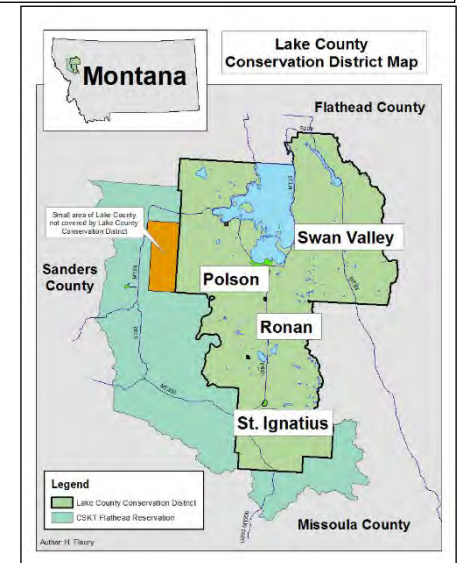
By: Heidi Fleury
SKC NR FIRE FORS343 and
LCCD Conservation Coordinator



Purpose: The Lake County Conservation District (LCCD) is creating a targeted outreach plan to assist homeowners in high fire hazard areas reduce their risks in case of extreme fire events. This hazard analysis of fuel loads will be used in conjunction with structure layers as well as property owner and NAIP aerial imagery to create a priority outreach list.

Methodology: Ranking was evaluated using the 2014 13 Anderson Fire Behavior Fuel Models (FBFM) Dataset downloaded from the LANDFIRE website (<https://www.landfire.gov/fbfm13.php>). Occurrence frequency of specific FBFM categories was calculated by % of total occurrences (i.e. FBFM 8 = $2945222/11888685 = .25$ or 25%), a literature review of Anderson, H.E. (1982), USDA-USFS Intermountain Forest and Range Experiment Station General Technical Report INT-122: Aids to Determining Fuel Models For Estimating Fire Behavior, was also completed and fuel behavior of FBFM categories was ranked by threat of fire behavior.

Data Sources: Hazard Layer derived from Anderson 13 Fuel Model Dataset from LANDFIRE. Service Layer Credits: Montana State Library GIS Clearinghouse (<http://geoinfo.msl.mt.gov/>); Roads, Reservations, Counties, Conservation Districts, NHD Lakes, Incorporated



Lake County Conservation District Fuels Hazard Ranking

Anderson Fire Behavior Fuel Model (FBFM) Category	Hazard Ranking	Occurrence Frequency of FBFM category of Total Count (%)	Literature Review Ranking
FBFM8 Closed Timber Litter	High	25%	1
FBFM10 Timber Litter and Understory	Medium High	16%	2
FBFM1 Short Grass (1 foot)	Medium	18%	3
FBFM2 Timber Grass and Understory	Medium Low	11%	4
FBFM5 Brush (2 foot)	Low	13%	5
Barren Land	N/A	2%	6
NO DATA	N/A	2%	0