USDA United States Department of Agriculture

Forest Service

Northern Region

October 2018

Mid-Swan Landscape Restoration & Wildland Urban Interface Project

Scoping Document

Swan Lake Ranger District, Flathead National Forest
Lake, Missoula, Flathead Counties, Montana

Responsible Official:	**Chip Weber** **Forest Supervisor**	
For Information Contact:	**Chris Dowling or** **Swan Lake District Ranger** **(406) 837-7501** cdowling@fs.fed.us	**Sandy Mack** **Team Leader** **(406) 329-3817** spmack@fs.fed.us
Comments Are Due By:	**November 21, 2018**	

Project Website:
http://www.fs.usda.gov/projects/flathead/landmanagement/projects

In accordance with Federal civil rights law and U.S. Department of Agriculture (USDA) civil rights regulations and policies, the USDA, its Agencies, offices, and employees, and institutions participating in or administering USDA programs are prohibited from discriminating based on race, color, national origin, religion, sex, gender identity (including gender expression), sexual orientation, disability, age, marital status, family/parental status, income derived from a public assistance program, political beliefs, or reprisal or retaliation for prior civil rights activity, in any program or activity conducted or funded by USDA (not all bases apply to all programs). Remedies and complaint filing deadlines vary by program or incident.

Persons with disabilities who require alternative means of communication for program information (e.g., Braille, large print, audiotape, American Sign Language, etc.) should contact the responsible Agency or USDA's TARGET Center at (202) 720-2600 (voice and TTY) or contact USDA through the Federal Relay Service at (800) 877-8339. Additionally, program information may be made available in languages other than English.

To file a program discrimination complaint, complete the USDA Program Discrimination Complaint Form, AD-3027, found online at http://www.ascr.usda.gov/complaint_filing_cust.html and at any USDA office or write a letter addressed to USDA and provide in the letter all of the information requested in the form. To request a copy of the complaint form, call (866) 632-9992. Submit your completed form or letter to USDA by: (1) mail: U.S. Department of Agriculture, Office of the Assistant Secretary for Civil Rights, 1400 Independence Avenue, SW, Washington, D.C. 20250-9410; (2) fax: (202) 690-7442; or (3) email: program.intake@usda.gov.

USDA is an equal opportunity provider, employer and lender.

Data Accuracy – The Forest Service uses the most current and complete data available. GIS data and product accuracy may vary. They may be developed from sources of differing accuracy, accurate only at certain scales, based on modeling or interpretation, incomplete while being created or revised, etc. Using GIS products for purposes other than those for which they were created may yield inaccurate or misleading results. The Forest Service reserves the right to correct, update, modify, or replace GIS products without notification. For more information contact:

Flathead National Forest

650 Wolfpack Way

Kalispell, MT 59901

(406) 758-5200

If a map contains contours, these contours were generated and filtered using the Digital Elevation Model (DEM) files. Any contours generated from DEM's using a scale of less than 1:100,000 will lead to less reliable results and should be used for display purposes only.

Proposed Action for Mid-Swan Landscape Restoration and Wildland Urban Interface Project

Welcome

It is with pleasure that we introduce you to the **concepts** of the Mid-Swan Landscape Restoration and Wildland Urban Interface Fuels Reduction Project (Mid-Swan). We use the word 'concepts' intentionally. This scoping document is the first draft of the Mid-Swan Project. It is a sketch. With the help of interested parties and further analysis this project will evolve to best protect, restore and enhance our lands and waters while reducing unintended negative effects. We cannot do this without you.

We will share with you the purpose and need for this project, what would happen if we don't implement the project, what we are proposing, and how you can get involved and comment to help us shape and improve our proposal.

In 2010 the Collaborative Forest Landscape Restoration Project (CFLRP) competitively selected the Southwestern Crown Collaborative (SWCC) as one of the first ten projects in the nation. Through that effort we have been working to restore the resilience and function of natural areas, in the 1.3 million acre Southwestern Crown of the Continent Landscape (SW Crown). With our partners we have made progress using tools of active management to protect communities and improve forest conditions.

The work, however, has not been at a broad enough scale to match the threats of current fires and insect and disease outbreaks[1]. The Mid-Swan Project is the first planning effort in the SW Crown to look at a large, connected natural area and determine management needs (USDA 2018) across multiple watersheds. As part of SWCC effort, the Mid-Swan Project is proposing to restore or maintain fish, wildlife, and plant habitats and reduce fuels. The Mid-Swan has a project area of 246,000 acres with 174,000 acres of National Forest System lands on the Swan Lake Ranger District (Figure 1). Montana State manages 59,000 acres and private lands comprise 12,400 acres. Of the acres on National Forest System (NFS) lands 67,000 acres are within wilderness.

The SWCC has been engaged in the development of the project's assessment. We have learned from their insight and worked diligently to reduce process limitations, improve our approach, and make a better draft product. This is what we are bringing to you for further improvement. For more information regarding SWCC efforts, visit www.swcrown.org.

The Mid-Swan has a diverse landscape. The Swan Mountains tower to the east and the Mission Mountains enclose the valley on the west. South of the Mid-Swan is the rural community of Condon and to the north Swan Lake. The landscape provides important habitat for grizzly bear, black bear, elk, mule deer, white-tailed deer, mountain lion, Canada lynx, gray wolf, wolverine, water howellia, cutthroat trout and bull trout among other species. Unique features and diverse habitat also exist including wetland habitats, dense western red cedar, open ponderosa pine, and subalpine forests with whitebark pine.

The beauty from the valley highway is in contrast to the existing risk of losing key habitat for native fish and wildlife species and the natural processes that support them. Current conditions also pose a risk from fire to residents, visiting public, infrastructure, and fire managers.

[1] For context, the 2017 Rice Ridge fire burned 160,000 acres. All vegetation decisions in Region 1 in FY 2017 approved a total of 75,000 acres of treatment. With 37 decisions this averages 2,000 acres of treatment per decision.

Table of Contents

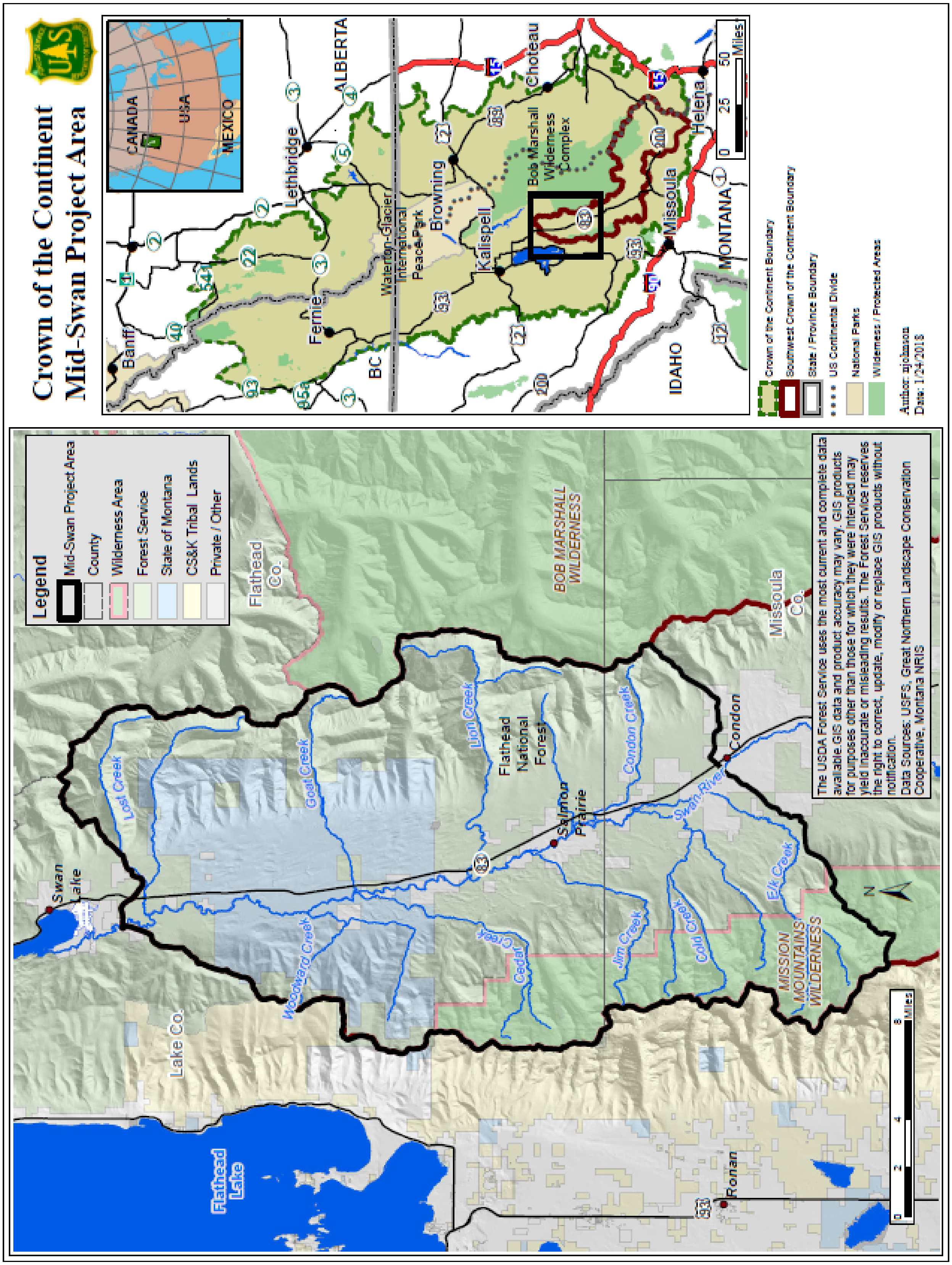


Figure 1. Mid-Swan Project Area and Vicinity Map.

Why is This Project Needed?

Today's Mid-Swan landscape is the result of more than a century of fire suppression and past timber management practices that promoted selective cutting of the largest or most valuable trees and left roads in various conditions of stability.

The purpose of the Mid-Swan Project is to:

- Restore and maintain aquatic biodiversity[2] in light of climate change
- Restore and maintain terrestrial biodiversity in light of climate change
- Reduce the risk from wildfire in the wildland urban interface (WUI).

Why is conservation of biodiversity important to you? Biodiversity is a corner stone for resilient ecosystem functions (Oliver et al. 2015). Resilience is the ability of a community or natural areas to recover after a disturbance such as fire, insect or disease attack or drought (FSM 2020.5). This means the natural benefits forests provide, such as clean water, wildlife, recreational opportunities and forest products, would be more stable when biodiversity is maintained.

Aquatic Biodiversity

Mid-Swan assessments used high resolution 3-dimensional aerial photo interpretation and modeling. Through this assessment we identified four challenges that need management actions to restore or maintain aquatic biodiversity (Figure 2). We also identified actions we could take to address those challenges.

CHALLENGES (Figure 2)[3]

1. Sediment in streams
2. Human-created barriers preventing fish access to suitable habitat
3. Lack of small scale disturbance to riparian areas
4. Reduced beaver activity

The primary native fish in the project area include bull trout and westslope cutthroat trout. Bull trout are listed as a threatened species under the Endangered Species Act. Both native fish populations are present at lower densities than historic levels and though they are considered important strongholds for these species, population numbers and fitness continue to decline.

An overarching aquatic challenge is the widespread presence of non-native fish which can outcompete native fish. This is a primary limiting factor for a properly functioning aquatic ecosystem. Directly managing fish populations is outside the scope of Forest Service management direction and is not discussed as an action in this document.

[2] Biodiversity refers to the variety and variability of all living organisms, including fish, wildlife and plants.
[3] These challenges are not independent from each other but are shown as such for ease of discussion.

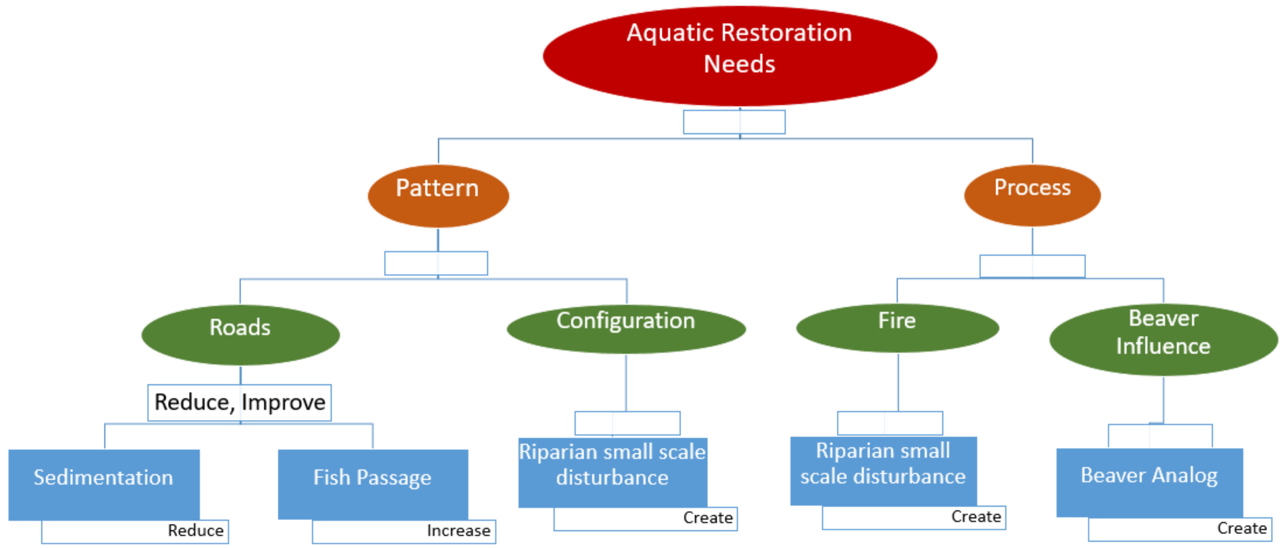


Figure 2. Diagram of the four unique aquatic needs identified through the Mid-Swan assessment to help restore or maintain biological diversity.

Sediment Reduction

We need to reduce delivery of sediment to streams to improve aquatic conditions. A 2015 Watershed Condition Framework (WCF) assessment by the Unites States Forest Service (USFS) found that the Cold Creek and Jim Creek watersheds were "functioning at risk", primarily because of existing high road densities. The WCF identified restoration activities, primarily on lands recently acquired from Plum Creek Timber Company, with a focus on managing the inherited road networks to reduce the rate of sediment delivery to the aquatic ecosystem. Recent USFS work in these watersheds will likely result in an upgraded WCF status to "Properly Functioning".

Photo interpretation identified 1,240 miles of roads across all ownerships; 570 miles are National Forest system roads. This equates to a density of 3.1 miles/mi² outside of the wilderness. Roads are the most frequently mentioned landscape feature impacting water quality and watershed processes in the project area. Restoration work in the last decade has decommissioned 67 miles of road. This work emphasized reducing the length of roads that were potential sources of sediment to delivery to streams.

Modeling, (locally calibrated using field data collected by a SWCC monitoring project), identified road segments that currently have the highest probability of allowing sediment into streams. Decommissioning, storing or improving approximately 167 miles of the 570 miles of existing Forest Service roads, including about 20 miles of road that are within riparian areas would reduce potential sedimentation to streams and improve stream function. This work is currently known, on the Flathead National Forest, as stormproofing[4]. Our proposed action would stormproof about 30 percent of the existing Forest Service roads, consistent with Forest Plan Objectives[5]. All of the roads proposed for stormproofing are currently closed to public motorized access and many are currently un-drivable due to vegetation growth.

[4] A stormproofed road is one where measures have been taken to upgrade the road so as to minimize the risk and potential magnitude of future erosion and sediment delivery. It generally consists of reducing hydrologic connectivity; identifying and treating potential road failures (mostly fill slope failures) that could fail and deliver sediment to streams; and reducing the risk of stream crossing failures and stream diversion. This also could include the application of road Best Management Practices.

[5] This statement, and all other references to the Forest Plan is in anticipation of the revised Forest Land and Resource Management Plan which is pending signature, unless otherwise noted. Analysis will be consistent under whichever plan is current.

Aquatic Passage

Native aquatic species need unobstructed passage to fully use available habitat. This is potentially even more important as lower stream reaches warm through climate change and fish seek new cold-water reaches. Restoration work on NFS lands in the last few decades have removed or improved known passage barriers with five known exceptions. Removing or improving the five aquatic barriers would increase the amount of habitat available for use. Consideration would be given to the potential negative effects of expanding non-native fish distribution before implementation.

Disturbance in Riparian Areas

Riparian areas evolved with fire. This resulted in riparian forests that were a complex, shifting mosaic of vegetation patches, presenting a landscape with great spatial variability and temporal dynamics. (Reeves et al. 2018, p.488)

With a century of fire suppression riparian zones function differently than they did historically. Less disturbance in riparian areas has resulted in more contiguous, denser vegetation than likely occurred in the past. Broad leaf trees and shrubs such as aspen, birch, cottonwood, and chokecherry, need sun light to prosper. Conifer forests are encroaching resulting in a loss of hardwoods. Dense forests are more prone to insect and disease issues. When fires occur, the riparian vegetation is more likely to be consumed, often with entire drainages affected. Dense riparian forests with connected canopies allow for effective heat transfer and more extensive crown fire.

A local example of this type of fire effect can be found just south of the project area in the Kraft and Glacier Creek drainages. The 2003 Crazy Horse Fire consumed almost all of the contiguous riparian vegetation for extensive reaches along these streams. Overly dense riparian areas may be more prone to intensive fires along the length of a stream or water body negatively affecting the riparian vegetation health for many years. This can negatively affect the role of vegetation in providing stream shade, wood recruitment and sediment filtering.

After the Crazy Horse Fire the District Fish Biologist noted more non-native brook trout moving into the watershed displacing westslope cutthroat trout. Westslope cutthroat trout are on the Regional Foresters Sensitive Species list. Habitat conditions likely changed, as well as summer temps, at least for a few years following the fire. This event reset the aquatic natural processes and riparian condition in an entire watershed to an early successional stage; likely this was reset to a greater spatial extent than if it had burned in a pre-fire suppression era. Fire mosaics of burned and unburned areas are actually likely to yield better fish habitat in the long run.

The aquatic ecosystem was precisely delineated for the project area using aerial photo interpretation. There is a benefit to removing vegetation and returning fire strategically in some riparian areas to break up continuous fuels.

Beaver Influence

Beaver, which are important to ecosystem functions, have declined from historic numbers (Swan Ecosystem Center 2004). Forest Service records (Natural Resource Management database) show that 32 of the 36 documented beaver dam sites in the Mid-Swan area are inactive.

Native fish need cold water to survive. Future conditions, due to climate change, are predicted to result in warmer surface water, earlier peak runoff, and a reduction in surface water in later summer. All of these conditions would degrade the existing aquatic patterns and processes.

Beaver historically strongly influenced riparian systems. They created a direct connection between stream channels and their floodplains, allowing for the storage of water, and extending available water later into the summer.

Models were used, and then verified through photo interpretation, to identify the best locations for building structures that mimic beaver activity. Aquatic Ecologists identified nine locations, high in stream drainages that are most likely to retain cold water into 2040. Constructing analog beaver structures in these locations would provide a benefit by retaining cold water longer in the heat of summer.

If No Action is Taken

If we don't implement management actions existing roads would continue to erode sediment into the aquatic ecosystem, potentially degrading habitat and further reducing the viability of existing fish populations.

Existing passage barriers would continue truncating the length of habitat available for use by native fish, potentially even more important as lower stream reaches warm through climate change, and fish seek new cold-water reaches.

Riparian Management Zones (RMZ) would continue to function differently than they did historically, with less disturbance and subsequently homogenous and denser stands that may be more fire-prone or attractive for insect disturbance affecting the RMZ vegetative health. This can negatively affect the role of these RMZs to provide stream shade, wood recruitment, and sediment filtering.

It is predicted that climate change would result in flashier peak flows, a reduction in surface water in late summer, and warmer late summer water temperatures. If we do not build analog beaver structures, native fish would not experience the small offsetting benefit provided by the construction of these structures.

Terrestrial Biodiversity

The Mid-Swan terrestrial assessments used several state-of-the-art tools. These tools include: high resolution 3-dimensional aerial photo interpretation, ecological departure analyses, historic documentation, and other modeling and research. We used the photo interpretation data to compare current conditions to historic reference conditions derived from the earliest available imagery (1930s to1960s). Our departure analysis followed the assessment process used for the Interior Columbia Basin Ecosystem Management Project (Hessburg et al. 1999). Historic reference conditions were based on the range of variation found in 23 watersheds with similar environmental conditions. Future reference conditions were based on the range of variation of 14 watersheds with a slightly warmer and drier climate, which served as approximation for future conditions in the Mid-Swan by the middle of this century.

Mid-Swan assessments identified seven challenges that need management actions to restore or maintain terrestrial biodiversity in this ecologically rich landscape. (Figure 3).

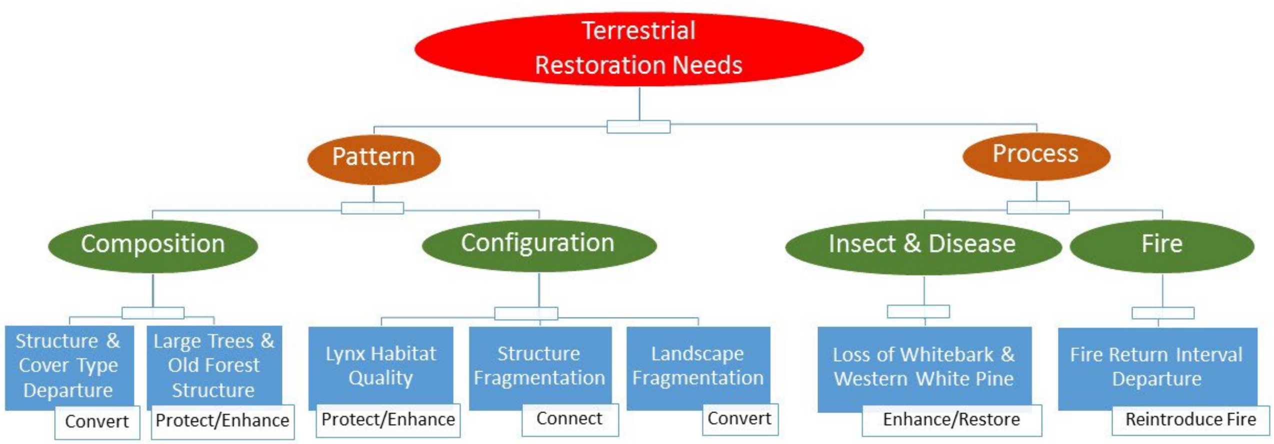


Figure 3. Diagram of the terrestrial needs identified through the Mid-Swan assessment to help restore or maintain biological diversity.

<u>CHALLENGES (Figure 3)</u>[6]

1. Loss of large trees and old forest structure

---

[6] These challenges are not independent from each other but are shown as such for ease of discussion.

2. Loss of western white pine and whitebark pine
3. Lynx habitat quality, distribution and long-term availability
4. Missed fire intervals through fire suppression (fire deficit)
5. Overabundance of young forests with multi-stories and shade tolerant species, in particular subalpine fir
6. Highly fragmented forests in the valley bottom (too many small patches)
7. Homogenous forests at higher elevations due to fire suppression (few large patches)

Loss of Large Trees and Old Forest Structure

We used photo interpretation to determine areas with existing medium to large trees (ponderosa pine, western larch and Douglas-fir over 16 inches diameter at breadth height). In 2016, Haufler et al. provided a landscape assessment of the entire SW Crown. The Mid-Swan analysis area is in the most northern portion of the SW Crown (Figure 1). The landscape assessment used modeling to understand the historic diversity of upland forest ecosystems. Key findings include a need to increase the large tree component of fire resistant species on the landscape and connect existing medium and large tree patches. The landscape is at high risk to large scale disturbances like insect and disease outbreaks and stand replacing fires, which may jeopardize the survival of remaining medium to large trees. These findings are supported by the Mid-Swan departure analysis.

In 1900, Ayers found western larch, Douglas-fir and ponderosa pine to be the principal timber trees on the valley bottom, the benches and the lower foothills. "Above Swan Lake the largest trees noticed were about four feet in diameter and 100 feet high." (Ayres 1900, p. 76). Western larch, ponderosa pine and older Douglas-fir have thick bark which provides excellent insulation from detrimental temperatures during low intensity fire. However, in particular western larch and ponderosa pine are shade intolerant and do not grow well in dense stands with limiting light availability. In the Mid-Swan western larch and ponderosa pine occur in mixed stands that are dense and ingrown with subalpine fir, grand fir and lodgepole pine. Large trees of any species are infrequent and scattered throughout the forest, a result of past timber management practices that promoted selective cutting of the largest or most valuable trees. We can help to retain existing large trees and encourage the growth of medium to large trees toward old growth structure by thinning within and/or adjacent to these stands. The Mid-Swan assessment identified the need to reduce ladder fuels and crown bulk density in or around areas with medium to large trees to protect or enhance these forest components. This would release western larch, ponderosa pine and Douglas-fir which enables them to grow larger, and reduces the risk of loss from high severity crown fires.

Species such as the flammulated owl and pileated woodpecker would benefit from the protection of larger trees provided by fuel mitigation efforts. Forest carnivores such as fisher, marten, and lynx would benefit in the long-term from efforts to promote the connectivity of older, multi-story forest stands and to protect that connectivity from high severity fires.

Western White Pine and Whitebark Pine

Western white pine and whitebark pine ecosystems are restoration priorities because of the losses caused by white pine blister rust, past logging and fire exclusion (Haufler et al. 2016). We used high resolution 3-D aerial photographs to determine areas with remnant western white pine, whitebark pine and whitebark pine snags in the Mid-Swan area.

Western white pine, previously a common species in the Swan Valley, is now a minor component of moist forest communities. We have identified western white pine sites where pruning of the lower branches and thinning may reduce blister rust infections and decrease competition from shade tolerant conifers. In addition, we determined suitable habitat for planting rust resistant western white pine after natural disturbances (early stand initiation) or in regeneration openings, as part of the species mix.

Whitebark pine is an iconic high elevation tree listed as a candidate species under the Threatened and Endangered Species Act. This pine is threatened by white pine blister rust and succession of subalpine forests to homogenous stands of subalpine fir and Engelmann spruce. By thinning stands with existing whitebark pine and caching rust resistant seeds (placing several seeds in specific micro sites) and planting rust resistant trees we can help to restore this species on the landscape. The Mid-Swan assessment identified the need for whitebark pine protection and restoration by thinning, burning, planting and caching rust resistant species.

Lynx Habitat

Lynx are a threatened species under the federal Endangered Species Act, and their presence is well documented in the Mid-Swan region. Lynx rely on a complex forest mosaic to provide prey in all seasons as well as secure denning locations (Holbrook et al. 2017). Historically, this mosaic was maintained through a series of interacting disturbances, which not only created the different forest structural conditions lynx require but also limited the impact of any one disturbance event (Larson et al. 2013). To maintain lynx habitat functionality on the landscape, the Northern Rockies Lynx Management Direction identifies four objectives related to vegetation management:

1) Manage vegetation to mimic or approximate natural disturbance processes while maintaining habitat components necessary for the conservation of lynx.

2) Provide a mosaic of habitat conditions through time that support dense horizontal cover and high densities of snowshoe hare.

3) Conduct fire use activities to restore ecological processes and maintain or improve lynx habitat.

4) Focus vegetation management in areas that have potential to improve winter snowshoe hare habitat but presently have poorly developed understories that lack dense horizontal cover.

Within the overall landscape mosaic, smaller areas that provide the bulk of resources needed by a territorial animal are referred to as core-use areas. These are areas where the animal spends the majority of its time, and where it can find the resources it needs with a minimum amount of effort. Historically, these areas were not fixed on the landscape. They shifted as the suitability of different areas changed following disturbances and succession, and animals shifted their space-use patterns in response. In this manner, the long-term viability of the habitat was assured; new core areas are created while older ones either are destroyed or lost their utility. For species whose habitat is associated with disturbance regimes, this landscape-level turnover can be critical. Efforts to protect existing habitat patches risks undermining the very dynamic that creates new habitat for future generations. It can also create what may be best described as a ‘boom-and-bust’ cycle, where large quantities of suitable habitat is created only to be destroyed in a single event.

Kosterman et al. (2018) quantified the spatial pattern associated with these core-use areas, and provided recommendations on the amount and configuration of different habitat types needed to promote lynx population persistence. Following those recommendations, the Mid-Swan assessment identified two opportunities for effective habitat protection and enhancement. First, existing mature lynx and snowshoe hare habitat in the region is at high risk of large, stand-replacing fire (e.g. Crazy Horse Fire - 2003, Rice Ridge Fire - 2017), which can result in the loss of large swaths of suitable habitat.

Second, current lynx winter foraging habitat is at risk of aging out of utility without adequate replacement, meaning that winter foraging habitat may become limiting in the future given human modification of the natural disturbance regime.

Strategically removing finer fuels in and around these areas, without compromising habitat integrity, would help protect current habitat and provide habitat resiliency in the face of wildfire. Limited use of regeneration treatments can also mimic the interactive effects of overlapping mixed and high severity fires, creating a suitable habitat mosaic and perpetuating habitat functionality into the future, without the risk of large-scale habitat loss. Objectives of lynx-based habitat restoration would include 1) identifying and protecting currently suitable core habitat, 2) improving habitat configuration in potential core areas to better reflect current data, 3) reducing the risk of large-scale habitat loss, and 4) creating a landscape pattern capable of supporting lynx habitat dynamics into the future. In some cases and over a limited spatial extent, this may require reducing habitat quality in the short-term (10 - 20 years) in order to promote the long-term development of high quality habitat (Holbrook et al. 2017). The Mid-Swan assessment identified areas where potential lynx habitat opportunities exist.

Missed Fire Intervals

Explorers and researchers have studied the historical role of fire in the Flathead drainage, and particularly the Swan River drainage for over a century. In his early exploration of the Flathead Forest Reserve, Ayers noted much evidence of historical fires noting that "Probably 90 percent of the valley has been burned over within the past one hundred years." (Ayres 1900, p. 77). More recent quantitative fire research in areas of the Swan Valley and the surrounding Flathead drainage, in similar forest types as the Swan Valley, indicate a range of historical fire regimes. Freedman and Habeck (1985) found abundant evidence of frequent fire of low to moderate severity in valley bottom areas of the Swan Valley. Native Americans were likely responsible for some fires, especially low to moderate severity fires, that underburned many stands in the valley bottom, since these areas were known travel routes (Barrett 1980). Evidence of less frequent mixed and high severity fires at middle and high elevation areas may be found in studies by Gabriel (1976) and Keane and Morgan (1993) from the adjacent South Fork of the Flathead drainage.

This historical evidence offers us a baseline to compare with fire regimes from more current time periods, starting with the 1930s, when fire suppression became more effective with the use of aviation resources to spot and attack fires from the air. Fire history maps for the Swan River district show very few fires in the Swan Valley and ones that have occurred are generally high severity. This has created a deficit in fire frequency, in which areas that burned every 30-40 years have now missed two fire return intervals or more. Other areas of the valley, where historical fire occurred every 100-200 years, may not have missed even one fire return interval. The deficit areas have been identified as priorities to restore characteristic fire that needs to be implemented after accounting for more recent management activities that have been slowly adding fire back into the landscape.

Structure and Cover

Our structure and cover departure analysis followed the assessment process used for the Interior Columbia Basin Ecosystem Management Project (Hessburg et al. 1999). Historical reference conditions were based on the range of variation found in 23 watersheds with similar environmental conditions.

Future reference conditions were based on the range of variation of 14 watersheds with a slightly warmer and drier climate, which served as approximation for future conditions in the Mid-Swan by the middle of this century (Hessburg et al. 2013, p. 818).

Key findings of the assessment are that the Mid-Swan vegetation is dominated by multistory forests composed of small to midsized shade tolerant conifers including subalpine fir, Engelmann spruce, western red cedar and grand fir. This is a departure from historical and future reference conditions. Western larch and ponderosa pine, both highly fire resistant but shade intolerant species, occur in mixed stands that are dense and ingrown with subalpine fir, grand fir and Douglas-fir. Exceptions to this are stands recently thinned by the Swan Lake Ranger District.

Fire suppression has created homogenous subalpine fir forests that cover large areas at higher elevations and less accessible slopes.

Management activities are needed to promote early seral fire resistant species, including western larch and ponderosa pine, convert subalpine fir to another cover type and to move young forest multistory stands to other structural stages.

Patch Density and Large Patch Departure

The lower elevations of the Mid-Swan is a landscape that is highly fragmented from small scale mechanical treatments, ownership boundaries, and roads (Figure 4). Current patch pattern reflect a legacy of fire suppression and management. In the lower elevation valley bottom, intensive management in a checkerboard of sections once owned by the Plum Creek Timber Company alternating with public, state, and private land has created a highly fragmented landscape with limited connectivity between older forest stands. In the upland and higher elevation areas fire suppression has allowed the forest to gradually homogenize, creating large, contiguous patches of dense, young, multi-story forest.

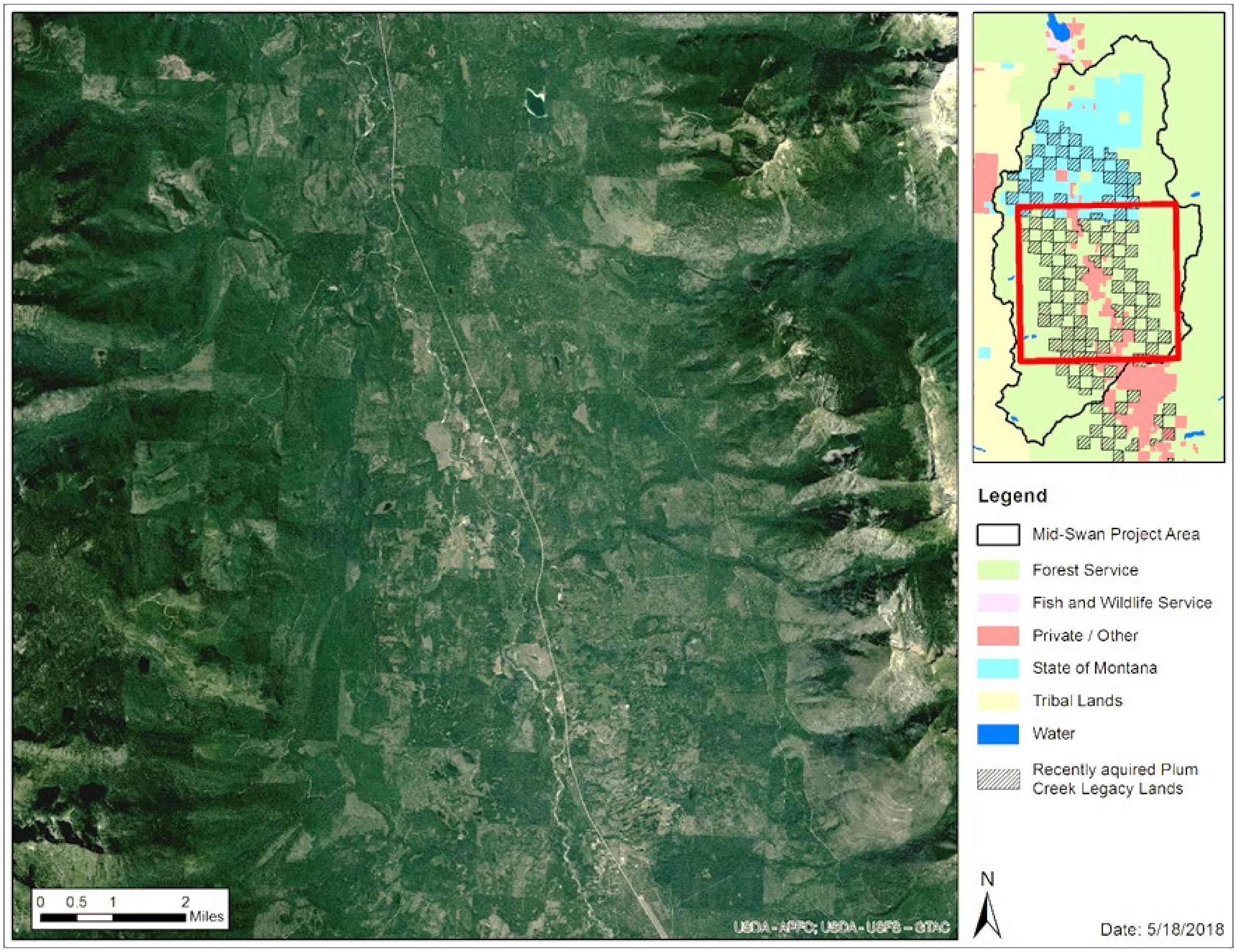


Figure 4. Aerial photo from 2016 showing valley bottom landscape fragmentation.

Some wildlife species may thrive under these changes while others may not but overall native biodiversity is at risk of decline due to continuing changes in habitat composition and configuration. Furthermore, the observed homogenization of forest structure in the upland areas increases the risk of large fires and subsequent habitat loss, as was observed in the 2017 Rice Ridge Fire.

High, moderate, and low severity fire all played a role in creating a mosaic of patches on the landscape. Ayres notes that the northern half of the Swan River Valley "is patched with burns", the southern half "has been much burned and has a dense network of fallen trees over a large part of the surface" (Ayres 1900, p. 39).

Given the landscape trajectories currently observed, native species would benefit from management actions that realign habitat patches and promote a natural disturbance regime.

If No Action is Taken

Forests would continue to be dominated by shade tolerant species like subalpine fir, spruce, grand fir, and western red cedar. Remaining large ponderosa pine, western larch, and Douglas-fir would be at risk to insect and disease or crown fire because of high tree densities and accumulation of fuels. Medium to large trees may become even less common than they already are.

Climate projections for the Mid-Swan Project area include warming summer and winter temperatures, decreased spring snow packs and increased likelihood of summer and fall droughts within the next 30 years. Fires are predicted to increase in frequency. They would likely burn with high severity and convert large continuous areas into early seral grass- and shrub lands. Valley bottoms would probably burn with the same high severity as mountain slopes. Many areas would regenerate into homogenous lodgepole pine stands which may either reburn or eventually be replaced by shade tolerant species like grand fir, western red cedar, western hemlock, or Engelmann spruce. None of these species are likely to survive fire events. There would be decreased opportunities for fire resistant species to establish.

While western white pine and whitebark pine are adapted to fire in the landscape, they have not evolved with white pine blister rust. Both species would continue to decline without planting or seed placement of rust-resistant stock. Whitebark pine communities are already exceedingly rare on the landscape. Without intervention, a few isolated individuals would be all that remains from these open subalpine forest communities.

The perpetuation of large pattern disturbances may, at least in the immediate future, create a more homogeneous landscape than we had in the past.

Homogenization of the landscape results in the loss of habitat diversity and native biodiversity. Without management intervention and the restoration of a more natural disturbance regime, this homogenization would continue until a large fire occurs. Such a fire would continue the homogenization process by creating a large area of stand initiation as opposed to the mosaic created by a mixed-severity disturbance. Allowed to continue, this process risks the conversion of a rich landscape supporting a diverse wildlife community into a landscape dominated by larger, more uniform habitat patches and fewer, more competitively dominant species.

Given the current landscape trajectory, lynx habitat availability can be expected to decline in the future for several reasons. As dense, young conifer stands mature, their utility as snowshoe hare habitat and lynx foraging habitat availability would decline within 20 to 40 years. In the absence of an active, natural disturbance regime, no new foraging habitat would be created and the overall landscape functionality for lynx would decline accordingly. While mature forest provides seasonal foraging habitat, alone it cannot provide for the full suite of lynx habitat needs. As the forest ages in the absence of a natural disturbance regime, the risk of large, uncharacteristic fires and the associated loss of habitat increases.

WUI

An analysis of the WUI identified three challenges.

CHALLENGES[7]

1. Flame lengths are greater than four feet precluding direct attack
2. Crown fire initiation conditions are too high
3. Crown fire propagation – crown bulk density is too high, greater than .08 kg/m3, which sustains a crown fire.

Flame Lengths, Crown Fire Initiation and Crown Fire Propagation

Based on the vegetation characteristics of cover type, dominant size class, and dominant cover class, we assigned a suite of fuel and fire modeling attributes including surface fire behavior fuel model, crown base height, and crown bulk density to each photo interpreted polygon. Based on these characteristics, we estimated potential flame length, a crown fire initiation index, and a threshold for crown fire propagation.

Surface fire behavior fuel models are used by fire managers to estimate potential fire behavior. Potential flame length is one metric to evaluate fire behavior and presents hazardous conditions to firefighters when it exceeds four feet in length. Under these conditions, direct attack by hand crews is compromised. Flame length is also useful for estimating crown fire initiation. To get crown fire initiation, the flame length generally must exceed the lowest reaches of the crown fuel in a stand, also known as the crown base height. Crown base height is estimated from the crown fuels of the polygon and any polygon where estimated flame length exceeds crown base height, there is potential for crown fire initiation. Crown bulk density is another metric estimated from the crown fuels of

[7] These challenges are not independent from each other but are shown as such for ease of discussion.

the polygon. In order to sustain a crown fire, a polygon has to have a crown bulk density of at least .08 kg/m3.

Potential flame length, crown fire initiation, and crown fire propagation were assessed for all polygons within the WUI. Polygons that could sustain crown fire were prioritized over polygons that could initiate crown fire which were prioritized over polygons in forested types with flame length over four feet.

When flame lengths in forested areas are greater than four feet and/or there is crown fire behavior, fire managers cannot safely use direct attack when fires burn near values at risk, primary lines of defense, or critical access/egress routes. Changes from existing conditions are needed to reduce risk from wildland fire to these values at risk. Conversion to vegetation and fuel conditions that allow for direct attack reduces risk of loss of life and damage to property and reduces the risk from fire within the WUI.

To achieve this, there is a need to reduce potential flame lengths to four feet or less in forested fuel models, reduce ladder fuels by increasing crown base height in areas of potential crown fire initiation, reduce crown fuels by reducing crown bulk density in areas of potential crown fire propagation, and maintain the above areas as well as address any additional areas as forest succession advances through time.

If No Action is Taken

If no action is taken in order to modify the vegetation and fuel matrix in the Mid-Swan Project area, conditions would continue to support fires with high flame lengths that exceed four feet and crown fire in the WUI and challenge fire fighters ability to suppress any fires that may occur. In addition, ingrowth of understory tress and increase in crown fuels would actually add acres to this vegetation and fuel matrix.

In addition, we can expect continued occurrence of mixed severity fires with a majority of the burn in the moderate to high severity categories. Fires like the Condon Mountain Fire of 2012 that threatened houses and other infrastructure in the Swan Valley. The Crazy Horse Fire is a template for fires that will occur on the west side of the valley, coming out of the Mission Mountains and into the WUI on the valley bottom. Similarly, the Condon Mountain Fire is a template for fires that may occur on the east side of the valley. Large areas of continuous fuel in areas north of these fires have set the stage for similar events in the future.

Proposed Action

We developed spatially explicit treatments that address the aquatic, terrestrial, and WUI challenges identified.

Restore and Maintain Aquatic Ecosystem Resilience

- Stormproof (decommission, store, or improve) approximately 167 miles of existing Forest Service roads, including about 20 miles of road that are within RMZ to improve their function.
- Improve or remove five known fish passage barriers (culverts) at road/stream crossings.
- Apply terrestrial vegetation treatment actions within a portion of RMZs to better match predicted historic/desired conditions.
- Implement beaver dam analog structures at nine stream sites to increase water holding capacity in cold water drainages, partially offsetting predicted climate change effects in key stream reaches.

Restore and Maintain Terrestrial Ecosystem Resilience[8]

- Reduce ladder fuels, reduce crown bulk density and reduce crown fire hazard in or around 23,700 acres with large ponderosa pine, western larch and Douglas-fir, or in areas adjacent to old forest structure to reduce risk to those stands from fire.

[8] The same acre of ground in the Mid-Swan landscape often has multiple terrestrial objectives. Therefore in the terrestrial proposed action section of this document acres are repetitive. For example treatment on one acre of land in the WUI could benefit WUI (1 acre), whitebark pine (1 acre), and mean fire return interval (1 acre) objectives. This means the acres cannot be added up and represent a footprint of land. A footprint of proposed treatments is in Table 1.

- Protect or improve habitat for lynx on up to 15,800 acres.
- Prune remaining western white pine to reduce blister rust infections and reduce competition from shade tolerant conifers and plant rust resistant stock in suitable areas after disturbance on up to 25,700 acres
- Restore up to 2,400 acres of whitebark pine stands by controlled burn and caching rust resistant seeds
- Address fire return interval deficit on up to 46,700 acres
- Address special departure and convert overabundant cover structural stage combinations, in particular subalpine fir young forest multistory, to other cover types and structural stages on up to 34,100 acres (Reduce number of small patches by combining or linking adjacent stands. Break up large homogenous patches through mechanical treatments and controlled burns).

Reduce Risk from Fire in the WUI

- Reduce the risk from fire on up to 31,100 acres within the WUI

Table 1. Treatment activities.

Proposed Biodiversity Restoration, Enhancement and WUI Activities	
Aquatic Treatments	
Stormproof roads that may deliver sediment	100 miles
Implement road best management practices	67 miles
Improve fish passage	5 structures
Install beaver dam analog structures	9 structures
Treatments in riparian management zones (acres included in vegetation treatment acres below)	12,000 acres
Vegetation Treatment Acres[9]	
Non-commercial thin with variable density	2,400
Thin with variable density	10,900
Thin with regeneration openings	19,300
Regeneration with variable retention	7,200
Controlled burn only	28,600
Planting of western white pine	500
Seed caching for whitebark pine	900
TOTAL – ALL ACRES MANAGED[10]	**69,800**
Volume Estimate	
Timber volume outcome	40 – 60 MMBF

[9] These acres represent a footprint of the proposed treatments. Acreages includes Riparian Management Zones.

Aquatic Treatments

Stormproofing

A stormproofed road is one where engineers and biologists upgrade the road to minimize the risk and potential magnitude of future erosion and sediment delivery. Generally engineers and biologists reduce hydrologic connectivity; identify and treat potential road failures (mostly fill slope failures) that could fail and deliver sediment to streams; and reduce the risk of stream crossing failures and stream diversion.

Best Management Practices

Best management practice (BMP) are the method(s), measure(s), or practice(s) selected by engineers and biologists to meet nonpoint source (i.e. not coming from a single location) sediment or pollution control needs. Best management practices include but are not limited to structural and nonstructural controls and operation and maintenance procedures. Best management practices can be applied before, during, and after pollution-producing activities to reduce or eliminate the introduction of pollutants into receiving waters (36 CFR § 219.19).

There are many BMPS related to roads. These details can be found on pages 104-127 in the following document: https://www.fs.fed.us/sites/default/files/FS_National_Core_BMPs_April2012_sb.pdf

Fish Passage

Biologists and engineers would remove or improve existing road culverts to specifications so that native fish can successfully move through the structure, gaining full access to upstream habitat.

Beaver Analog Structures

Biologists and engineers construct instream structures that emulate a natural beaver dam, retaining water, creating a pool, and increasing the duration that the adjacent floodplain is inundated (Figure 5).

Figure 5. Photograph of a beaver dam analog structure.

Riparian Management Areas

The location and extent of perennial streams and waterbodies/wetlands are easily delineated through photo-interpretation using our high resolution imagery. The Flathead Forest Plan, splits Riparian Management Zones (RMZ) into an Inner Riparian Management Zone (IRMZ) and Outer RMZ (ORMZ) of varying widths.

Our analysis shows there are about 21,000 acres of IRMZ and 37,000 acres of ORMZ associated with Category 1 (fish bearing streams), 2 (perennial streams), 4a (large or significant wetlands or waterbodies) and 4b (smaller waterbodies/wetlands).

Category 3 streams (intermittent flow) are more difficult to delineate from photo interpretation due to vegetation cover. We delineated approximate locations using a model and data derived from LIDAR-enhanced Digital Elevation Model. This process over-estimates the actual Category 3 stream network because it includes many ephemeral streams. We would complete final survey and delineation of these stream courses during the field implementation. There are an additional 15,000 acres within the variable-width RMZs associated with Category 3 streams (intermittent flow). About 11,000 acres of are in the IRMZ and 4,000 acres in the ORMZ.

Table 2. Total acres of IRMZ and ORMZ in the project area by stream category, and the number of acres of restoration proposed.

	Inner RMZ Total	**IRMZ proposed restoration**	**Outer RMZ Total**	**ORMZ proposed restoration**
Category 1, 2, 4a and 4b streams **(fish bearing, perennial, large or significant wetlands or waterbodies and smaller waterbodies/wetlands)**	21,000 acres	2,000 acres (controlled burn)	37, 000 acres	7,500 acres (5,000 acres thinning and 2,500 acres controlled burning)
Category 3 streams **(intermittent flow)**	11,000 acres	1,300 acres (controlled burn)	4,000 acres	1,150 acres (850 acres thinning and 300 acres controlled burning)

Outer RMZ Restoration

Outer RMZ restoration would be allowed under the Flathead National Forest Plan if there is an identified ecological restoration goal and existing conditions will be maintained or improved. Treating the vegetation in these Outer RMZs using one of the two identified thinning vegetation treatments will extend the beneficial attributes of this work into the stands of trees nearer streams and waterbodies. This work would reduce crown-fire risk, benefit the health and growth of retained vegetation, and reestablish the spatial pattern of disturbance across the landscape, with a similar pattern in the RMZ. Regeneration harvest, which would potentially result in the loss of some larger trees, will not be allowed in the RMZ. Thinning prescriptions identified for the RMZ-adjacent timber stands would be extended into the ORMZ, but modified to remove fewer trees, and create a “feathered” treatment outline where part of the ORMZ would be untreated. This would emulate a natural stand development pattern in the RMZ that leaves a mosaic pattern of disturbance. Ultimately, this would result in streamside vegetation conditions that are similar to those that were present as the native aquatic organisms established.

To actively restore conditions within the ORMZ associated with perennial/fish bearing streams and all wetlands/waterbodies (all RMZ categories except category 3), the Mid-Swan project proposes to thin 5,000 acres of ORMZ, and treat an additional 2,500 acres with controlled burning. This totals to about 20 percent of the total ORMZ for these categories. Actual effected percent of the ORMZ would likely be much less as skips/gaps are created during project unit layout, and the expected mosaic burning pattern leaves some portions of the ORMZ unburned.

Restoration work planned within the ORMZ for the Category 3 streams (intermittent flow) is also planned. The Mid-Swan project plans to thin about 850 acres of the Category 3 ORMZ (about 20 percent of the total ORMZ area). Controlled burning would be used to treat about 300 acres in the Category 3 ORMZ (about eight percent of the total Category 3 ORMZ).

Inner RMZ Restoration

Restoration in the IRMZ would be accomplished on 2,000 acres through the use of fuels reduction work limited to controlled burning, which is less than 10 percent of the total IRMZ. Intentional ignition would be allowed outside of the IRMZ, and low severity ground fire would move downslope to the adjacent water feature. Timber harvesting would not be allowed within the IRMZ. No more than 20 percent of the IRMZ would be affected by fuels reduction work in any given watershed per decade. Controlled burning would be used to treat about 1,300 acres of Category 3 IRMZ (about 12 percent of the total Category 3 IRMZ).

Vegetation Treatments

Non-Commercial Thin with Variable Density

Non-commercial thin with variable density is a tool for adjusting tree density and species composition. This tool would primarily be used in young stands to reduce the density of saplings. The variable density component would contribute to spatial heterogeneity and create the foundation for mosaics of individual trees, tree clumps and openings of variable sizes. Heterogeneous spatial patterns at a tree neighborhood scale are typical for fire-prone mixed conifer forests and increase native biodiversity and resilience to future disturbances (Larson and Churchill 2012, Hessburg et al. 2015).

Thin with Variable Density

Thin with variable density is a tool for adjusting tree density and species composition while maintaining or creating mosaics of individual trees, tree clumps and openings of variable sizes. The intent is to retain full stocking in a pattern consistent with a natural disturbance regime of frequent low-severity fires. This treatment is particularly suitable for low to mid-elevation forests in the project area, where we propose to adjust species composition in favor of early seral, fire resistant species (ponderosa pine, western larch, Douglas fir). Reduced density would increase vigor in remaining trees, decrease crown fire hazard, and decrease the risk of large scale stand-replacing fire. Treatments would prepare the site for controlled burns and improve the likelihood of large ponderosa pine and western larch to survive future disturbances.

Sites to be treated are dense, single to mixed-age, but of sufficient vigor and containing components suitable for retention. These are generally mixed conifer stands containing ponderosa pine, western larch, Douglas-fir, lodgepole pine and other shade-tolerant conifers (grand fir, subalpine fir).

Thin with variable density leaves areas with no treatment (skips), areas where trees are retained as individuals or clumps of various sizes, and sinuous openings (gaps) across the larger treatment area (Figure 6). Tree neighborhood patterns would be based on historical reference conditions for mixed conifer forests in western Montana (Arno et al. 1995, Larson et al. 2012, Clyatt et al. 2016). Approximate target ranges for clump and opening size distributions are displayed in Table 3. The most open areas would be located on dry outcrops, near existing openings, or where insects or active root disease centers have caused mortality. The resulting openings would be sinuous and variable in shape and size. Target residual density for the matrix would range from 40 to 100 square feet of basal area per acre or approximately 50 to 150 trees per acre depending on tree age, species and site variables. Long-lived, fire-resistant, shade-intolerant species (typically western larch, ponderosa pine, white pine, and occasionally Douglas-fir) would be favored for retention.

Where necessary, fuel treatments such as piling and burning, yarding and removing, slashing and lop and scattering, or jackpot burning would take place. Outside the Wildland Urban Interface, we propose to create heterogeneous fuel distributions to contribute to structural diversity in mixed-conifer forests (Larson et al. 2012).On the continuum of disturbance, thin with variable density would have low to moderate impact on the forest matrix, depending on existing conditions and site specific target densities.

Thin with Regeneration Openings

Thin with variable regeneration openings is a vegetation treatment closely related to the “thin with variable density” described above. The goals are to reduce tree densities, adjust species composition in favor of early seral, fire resistant species (ponderosa pine, western larch and Douglas fir on suitable sites) and maintain or create within stand heterogeneity. However, species composition would be modified by creating openings for regeneration of preferred species. Thus this treatment simulates the disturbance regime of mixed severity fires.

Sites proposed for this treatments are predominantly mature, dense, overstocked, and single to mixed-age. They are at risk to large scale stand-replacing fire. Species composition varies but generally consists of mixed conifer forests (ponderosa pine, western larch, Douglas-fir, lodgepole pine and other shade-tolerant conifers) at low to mid-elevations. Sites may have active root disease centers or lack tree components suitable for retention.

As with thin with variable density, thin with regeneration openings leaves varying densities of thinned patches, areas with no treatments, areas where trees are retained as individuals or clumps of variable sizes, and sinuous openings across the larger treatment area (Figure 6). The main difference is the range of opening sizes (Table 3.) Larger openings of 5 to 15 acres have the objective of regenerating fire and disease resistant species such as western larch and ponderosa pine. In suitable habitats, these larger openings also provide an opportunity to plant rust resistant western white pine. Seedlings would be planted in microsites and in clumped pattern that would contribute to spatial heterogeneity. Regeneration openings would be located where insects or active root disease centers have caused mortality or where there is a lack of early seral species suitable for retention. Target residual density for the matrix is identical to the thin with variable density treatment. It would range from 40 to 100 square feet of basal area per acre or approximately 50 to 150 trees per acre depending on tree age, species and site variables. Long-lived, fire-resistant, shade-intolerant species (typically western larch, ponderosa pine, white pine, and occasionally Douglas-fir) would be favored for retention.

Of the three treatments proposed for the Mid-Swan Project, this treatment would have intermediate disturbance effects on the overall forest matrix. Where necessary, fuels treatments such as piling and burning, yarding and removing, slashing and lop and scattering, or jackpot burning would take place. After the establishment of regeneration within large openings, stocking control measures may be taken to reduce competition from natural regeneration of undesired species.

Regeneration with Variable Retention

The regeneration with variable density harvest is used to initiate the regeneration of a new cohort while maintaining heterogeneous spatial patterns (Figure 6). Creating suitable openings for the regeneration of preferred species while retaining desirable large trees and trees needed for natural seeding is the primary objective of this treatment. It most closely resembles the disturbance effects of a high severity fire. Scattered dense patches (skips), tree clumps, snags and coarse woody debris would add spatial heterogeneity to the site. Species composition would be converted to include a large component of ponderosa pine, western larch and western white pine on suitable sites. Where root disease is not a concern, Douglas-fir may provide additional diversity to the species mix.

Sites proposed for this treatment may have high fuel loadings and low tree vigor with mortality caused by insect and disease agents, may be composed of fire intolerant species, and may have a forest structure and composition that is over-represented on the landscape when compared to historical conditions. Stands are often dominated by subalpine fire, grand fir and Engelmann spruce and are located at low to mid-elevations throughout the project area.

While regeneration with variable retention is primarily a treatment aimed at creating open conditions necessary for tree regeneration, we would include areas of no treatment (skips) and areas where trees are retained as individuals or small clumps (Table 3 and Figure 6). This would add structural diversity to the developing forest patches. Openings would range from 15 acres up to 150 acres in size.

Where necessary to establish regeneration, fuels treatments such as piling and burning, yarding and removing, slashing and lop and scattering, or broadcast burning would take place. After the establishment of regeneration, stocking control measures may be taken to reduce competition from natural regeneration of undesired species.

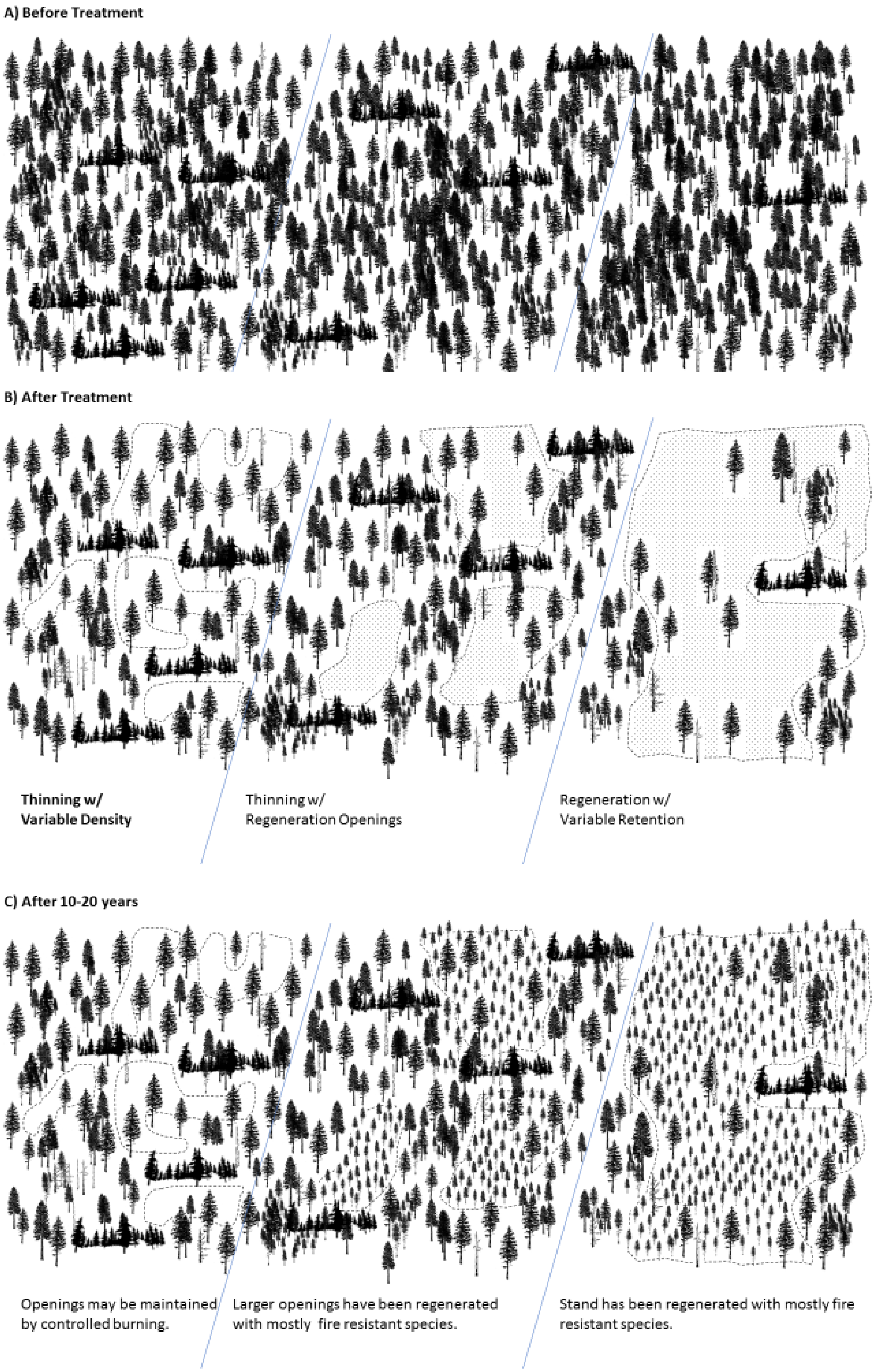


Figure 6. Illustration of three vegetation treatments proposed in the Mid Swan. Tree sizes, tree densities and openings are not to scale. For estimated target ranges regarding canopy cover, openings, and tree clump sizes see Table 3.

Table 3. Approximate target ranges for vegetation patch opening size and area, vegetation matrix composition, and canopy cover for proposed vegetation management treatments. Ranges are based on historical spatial patterns in mixed conifer forests of the Northern Rockies (Larson et al. 2012, Clyatt et al. 2016).

	Thin w/ Variable Density	Thin w/ Regeneration Openings	Regeneration w/ Variable Retention
Openings			
Opening Size (acres)	< 5 ac	< 15 ac Openings ≥ 5 acres would be regenerated	15-150 Openings would be regenerated
Percentage of Total Area in Openings	**49-79**	**49-79**	**80-98**
Small Openings (10-20ft to nearest tree)	35-47	35-47	0
Medium Openings (20-30ft to nearest tree)	7-25	7-25	0-2
Large Openings (>30ft to nearest tree)	0-20	0-20	80-98
Percentage of Total Trees in Matrix			
Individual Trees (≥ 20ft to nearest tree)	6-23	6-23	Not applicable
Small Clump Size (2-4 Trees / Clump)	24-48	24-48	Not applicable
Medium Clump Size (5-9 Trees / Clump)	19-30	19-30	Not applicable
Large Clump Size (10 trees or more / Clump)	0-39	0-39	Not applicable
Percent Canopy Cover (Post Treatment)	30-50	30-50	1-20

Controlled Burn Activities

Controlled burns would target and reduce existing dead and down fuels, activity generated fuels, as well as reduce competing understory trees while maintaining or increasing forage and browse. Hand ignition, aerial ignition, or a combination of both would be used for controlled burns to provide desirable results. All controlled burns would follow a burn plan and associated prescription, which describes favorable weather conditions and fuel moistures to meet objectives. Also, all burning operations would be scheduled in accordance with the memorandum of understanding for air quality protection between the State of Montana Air Quality Bureau and the Forest Service, which allows burning only when adequate smoke dispersal would occur. Prior to conducting controlled burns, the Swan Lake Ranger District would conduct the following activities to notify the local public of burning activities. These include but are not limited to posting media releases via social media websites, providing information at the local Forest Service office, and preparing a list of contacts for each controlled burn to be notified by phone, site visit, or mail.

If wildfire burns through these areas they may be managed for resource benefits.

Planting and Caching

Planting would be used to introduce rust resistant stock of western white pine in suitable habitat. In wilderness or proposed wilderness we propose seed caching (purposeful placement of several seeds in microsites) of rust resistant whitebark pine as least impactful to the wilderness character.

Patch Retention

To address the challenges of restoring and maintaining aquatic and terrestrial biodiversity while reducing the risk posed by wildfire in the wildland urban interface, we identified areas on the landscape where management action could assist with restoration efforts. However, we also identified areas where the current landscape pattern and composition contributed to ecosystem resiliency, habitat functionality, and biodiversity conservation. These areas were targeted for what we describe as "patch retention"; a recognition of the role they currently play on the landscape and an intentional decision to take no management action during the life of the Record of Decision for this project. A total of 53,300 acres met this criteria for a variety of reasons.

Areas proposed for patch retention include:

- Patches of old forest that may qualify as old growth under Green et al (2011), where there is a low risk of crown fire moving in and out of the patch due to the character of the surrounding landscape (waterbodies, grasslands, open forests with low crown fire propagation hazard).
- Patches of young to middle-aged forest adjacent to a mature forest patch, where allowing the younger forest to age would increase the amount and connectivity of older forest structure on the landscape.
- Early seral, post-disturbance patches in areas where sufficient lynx foraging and mature multistory lynx habitat currently exists. Allowing these patches to mature gradually will provide a future generation of lynx foraging habitat.
- Forest patches with western white pine or whitebark pine, where management activity could create a risk to these trees.
- Existing lynx foraging and mature multistory habitat, in areas where management activity would not provide additional benefits to lynx habitat functionality or resiliency.
- Forest patches of a cover / structure composition that are underrepresented on the current landscape compared to reference conditions.

Non-treatment

Large sections of the Mid-Swan landscape were not identified as either restoration or retention opportunities under our analytical process. Because the purpose and need for this project focuses solely on ecological restoration and WUI fuel reduction, areas not meeting these criteria were not identified for treatment. Approximately 25,000 acres were identified as not meeting either treatment or retention opportunities.

Connected Actions

Approximately 60 miles of roads would be constructed to implement proposed activities. Additional temporary roads may also be constructed and would be built on existing prisms wherever possible. Invasive and noxious weed treatments would occur along roads before and after vegetative treatments. Upon completion of the project, these roads would be made impassable so there would be no net increase to the baseline for motorized route access and no net decrease to the baseline for secure core.

What forest plan[10] amendments are needed and why?

We would require two project-specific suspension of forest plan standards to implement the proposed actions and achieve desired conditions[11]. The substantive requirements that are directly related are § 36 CFR 219.8 (a)(1); 219.9 (a)(1); 219.9 (a)(2); 219.9 (b)(1); and 219.10 (a)(8). The proposed amendments are:

1. NRLMD Standard VegS5. Exceptions to NRLMD Standard VegS5 state that "precommercial thinning projects that reduce snowshoe hare habitat may occur from the stand initiation structural stage until the stand no longer provides winter snowshoe hare habitat" only within 200 feet of administrative sites, for research studies, based on new information that is peer-reviewed, and for aspen, white pine, or whitebark pine restoration.

We are not proposing precommercial thinning, however we are proposing other activities that will reduce snowshoe hare habitat temporarily (10 - 20 years). Recent peer-reviewed research has highlighted the importance

[10] These amendments would be required under the existing and revised Forest Plans.
[11] The substantive requirement directly related is § 36 CFR 219.9 (b)(1).

of habitat configuration within female lynx core use areas, this means it is important where stand initiation habitat is located in relation to other habitat components. This research has also determined that female lynx reproductive success corresponds with habitat availability thresholds (how much habitat is available) and the connectivity of that habitat (Kosterman et al. 2018). We therefore propose to conduct non-commercial thinning, regeneration harvest, and prescribed fire in snowshoe hare habitat when existing levels of stand initiation snowshoe hare habitat exceed recommended levels and either: a) existing levels of mature, multi-story habitat are below recommended thresholds, or b) insufficient temporarily unsuitable habitat (stand initiation structural stage that does not yet provide snowshoe hare habitat) is available to meet future lynx habitat requirements. These activities would be limited to areas outside the WUI where management action has the potential to improve lynx habitat functionality.

2. NRLMD Standard Veg6. Exceptions to NRLMD Standard VegS6 state that "vegetation management projects that reduce snowshoe hare habitat in multi-story mature or late successional forests" may occur only within 200 feet of administrative sites, for research studies, or for incidental removal during salvage harvest.

To implement new management recommendations based on recent peer-reviewed research (Kosterman et al. 2018), we propose to conduct thinning and regeneration harvest in mature, multi-story habitat for two reasons.

First, in areas where existing mature, multi-story habitat is at risk from severe fire, selective thinning will be conducted to promote stand resiliency. In these areas, design criteria would be implemented to ensure that stands retained critical features and habitat functionality (Kumar et al. 2017).

Second, in areas with sufficient and well-connected mature, multi-story habitat and insufficient stand initiation snowshoe hare habitat (Kosterman et al. 2018), thinning with regeneration openings would be used to create snowshoe hare habitat within mature habitat and new winter foraging opportunities in areas with the potential to serve as female lynx core use areas (Fuller et al. 2010, Hodson et al. 2011, Fuller and Harrison 2013). These activities would be limited to areas outside the WUI where management action has the potential to improve lynx habitat resiliency and functionality.

Design Criteria and Implementation Guide

One design criteria for this project is that no change in public motorized use would occur. The motor vehicle use map would be unchanged and all NFS roads currently open to the public will remain open. Other design criteria and protection measures will be developed and captured in the draft environmental impact statement.

The extent of treatments are dependent on available funds. An implementation guide and corresponding checklist would assure all necessary survey work, for example soil, heritage, botany, wildlife and fisheries would be completed prior to implementation. Treatments are condition based, meaning the specific treatment to be prescribed would be determined by the conditions project specialists find on the ground at the time of implementation, and within the bounds of environmental impact statement effects analysis and implementation guide. This approach allows real time adjustment of management needs to meet objectives based on changes in environmental conditions. This provides flexibility for the interdisciplinary implementation team to use professional judgement within the project's decision to best meet the objectives for that action. It is important to note that actions outside the scope of those analyzed in the effects analysis would not be implemented.

Implementation monitoring would occur collaboratively with interested parties to assure actions remain within analyzed impact thresholds, and to assess if modifications to future actions are recommended. Informal consultation with the United States Fish and Wildlife Service has been ongoing and will continue throughout the development of this project and its implementation.

Next Steps

Decision Framework

The analysis will be documented in an environmental impact statement (EIS). The EIS will concentrate on the issues that are truly significant to the action(s) in question rather than amassing needless detail. Based on this analysis, the responsible official will decide to implement this proposal, implement an alternative or not to implement this project at this time.

The 30-day scoping period starts with the publication of the Notice of Intent in the Federal Register. Your comments will be used to define significant issues and develop alternatives. After reviewing and analyzing the comments we will prepare the draft EIS. Our anticipated timeline is as follows:

- Scoping Document – Fall 2018
    - Comment period
    - Public meeting
- Draft Environmental Impact Statement – April 2019
    - Comment period
    - Two public meetings
- Environmental Impact Statement and Draft Record of Decision – October 2019.
    - Pre-decisional objection process
- Record of Decision - March 2020
- Implementation - begin 2020

Make your Comments Count

This document starts the early and open process for determining the scope of issues to be analyzed in depth in the Mid-Swan EIS. The scoping process, and your resulting comments are used to identify significant environmental issues deserving of study, as well as to deemphasize insignificant issues, narrowing the scope of the environmental impact statement process accordingly.

Issues serve to highlight effects or unintended consequences that may occur from the proposed action and alternatives, giving opportunities during the analysis to reduce adverse effects and compare trade-offs for the decision maker and public to understand. Due to the nature of the NEPA process, additional issues may come to light at any time.

Your comments will be most useful if they describe a specific action and the environmental effects of that action. In other words, an issue should be phrased as a cause (the action proposed) and the effect of that action.

There are a number of ways you may submit comments:

- Email comments to: bslrp@fs.fed.us ((rich text format (.rtf), Word (.doc) or Adobe Acrobat (.pdf) format)).

- Fill in an electronic form by going to our Mid-Swan Landscape Restoration and Wildland Urban Interface Project internet site at https://www.fs.usda.gov/project/?project=54853, and selecting "Comment/Object on Project" on the right hand side of the screen.

- Mail comments to the Swan Lake Ranger District, Attn: Sandy Mack, Team Leader, Regional Office, 24 Fort Missoula Rd., Missoula, MT, 59804

- Hand-deliver comments to 200 Ranger Station Road, Bigfork, MT, 59911.

Comments received in response to this solicitation, including names, addresses, email addresses and phone numbers of those who comment, will be part of the public record for this proposed action. Comments submitted anonymously will be accepted and considered; however, anonymous comments will not provide the Agency with the ability to provide the respondent with subsequent environmental documents.

Because of the enormous amount of research regarding biodiversity and fuel reduction practices and methods, if you cite literature in your comments please provide us with a complete bibliography and a copy of the reference materials. Please explain the link between the literature and the cause-effect relationship to the Mid-Swan Project.

As stated in our cover letter we invite you to participate in a public meeting on November 8, 2018 at the Swan Valley Community Center located at the corner of Hwy 83 and Glacier Creek Road in Condon, Montana. The meeting will include a brief presentation beginning at 5:00 p.m. followed by an open house. Our team of specialists will be on hand to provide more information and answer questions about the project.

Scoping comments are due by November 21, 2018.

Contacts

For additional information concerning this project contact Swan Lake District Ranger Christopher Dowling, Swan Lake Ranger District, 200 Ranger Station Road, Bigfork, MT; 406-837-7501 or Sandy Mack, Team Leader, Regional Office, 24 Fort Missoula Rd., Missoula, MT; 406-329-3817.

Chip Weber 10/22/18

Chip Weber
Forest Supervisor
Flathead National Forest

Date

Literature Cited

Arno, S.F., J.H. Scott and M.G. Hartwell. 1985. Age-class structure of old growth ponderosa pine/Douglas-fir stands and its relationship to fire history. United States Department of Agriculture, Forest Service, Intermountain Research Station. Research Paper INT-RP-481. Ogden, UT. 25 p.

Ayres, H. B. 1900. The Flathead Forest Reserve. 20th Annual Report, part 5: 29--317. U.S. Department of Interior, Geological Survey, Washington, D.C.

Barrett, Stephen w. 1980. Indian fires in pre-settlement forests of Western Montana. P 35-41 In: Proceedings of the Fire History Workshop, M.A. Stokes and J.H. Dieterich, technical coord. United States Department of Agriculture, Forest Service Rocky Mountain Forest and Range Experiment Station. General technical Report RM-81. 141 p.

Clyatt, K.A., J.S. Crotteau, M.S. Schaedel, H.L. Wiggins, H. Kelley, D.J. Churchill and A.J. Larson. 2016. Historical spatial patterns and contemporary tree mortality in dry mixed-conifer forests. Forest Ecology and Management 361: 23-37.

Gabriel, H.W. 1976. Wilderness Ecology: The Danaher Creek drainage, Bob Marshal Wilderness, Montana. Dissertation University of Montana, Missoula, MT 143 p.

Freedman, J.R. and J.R. Habeck. 1985. Fire, logging, and white-tailed deer interrelationships in the Swan Valley, northwestern Montana. Pp. 23-35 In Fire's Effects on wildlife habitat – symposium proceedings. Lotan, J.E. and J.K. Brown (compilers). United States Department of Agriculture, forest Service, Intermountain Research Station. General Technical Report INT-86. Ogden, UT. 96 p.

Fuller, A.K. and D.J. Harrison. 2010. Movement paths reveal scale-dependent habitat decisions by Canada lynx. Journal of Mammalogy 91: 1269-1279.

Fuller, A.K. and D.J. Harrison. 2013. Modeling the influence of forest structure on microsite habitat use by snowshoe hares. International Journal of Forestry Research http://dx.doi.org/10.1155/2013/892327.

Haufler, J.B. C.A. Mehl and S. Yeats. 2016. Landscape assessment for terrestrial forest ecosystems. Ecosystem Management Research Institute, Seeley Lake, MT. Unpublished report of the USDA Forest Service. 132 p.

Hessburg, P.F., B.G. Smith and R.B. Salter. 1999. Using estimates of natural variation to detect ecologically important changes in forest spatial patterns: A case study, Cascade Ragne, Eastern Washington. USDA Forest Service, Pacific Northwest Research Station Research Paper PNW-RP-514. 65 p.

Hessburg, P.F., K.M. Reynolds, R.B. Salter, J.D. Dickinson, W.L. Gaines, and R.J. Harrod. 2013. Landscape evaluation for restoration planning on the Okanogan-Wenatchee National Forest, USA. Sustainability 5: 805-840.

Hessburg, P.F., D.J. Churchill, A.J. Larson, R.D. Haugo, C. Miller, T.A. Spies, M.P. North, N.A. Povak, R.T. Belote, P.H. Singleton, W.L. Gaines, R.E. Keane, G.H. Aplet, S.L. Stephens, P. Morgan, P.A. Bisson, B.E. Rieman, R.B. Salter and G.H. Reeves. 2015. Restoring fire-prone Inland Pacific landscapes: seven core principles. Landscape Ecology DOI 10.1007/s10980-015-0218-0

Hodson, J., D. Fortin and L. Belanger. 2011. Changes in relative abundance of snowshoe hares (*Lepus americanus*) across a 265-year gradient of boreal forest succession. Canadian Journal of Zoology 89: 908-920.

Holbrook, J. D., J. R. Squires, L. E. Olson, N. J. DeCesare, and R. L. Lawrence. 2017. Understanding and predicting habitat for wildlife conservation: the case of Canada lynx at the range periphery. Ecosphere 8(9):e01939.10.1002/ecs2.1939

Keane, Robert E. and Penelope Morgan. 1993. Landscape processes affecting the decline of Whitebark pine (*Pinus albicaulis*) in the Bob Marshal Wilderness Complex. In: Proceedings of the 12th International Conference on Fire and Forest Meteorology. October 26-28, 1993. Jekyll Island, Georgia. Society of American Foresters

Kosterman, M.K., J.R. Squires, J.D. Holbrook, D.H. Pletscher and M. Hebblewhite. 2018. Forest structure provides the income for reproductive success in a southern population of Canada lynx. Ecological Applications 28: 1032-1043.

Kumar, A.V.; J.R. Sparks and L.S. Mills. 2018. Short-term response of snowshoe hares to western larch restoration and seasonal needle drop. Restoration Ecology 26: 156-164.

Larson, A.J., K.C. Stover and C.R. Keyes. 2012. Effects of restoration thinning on spatial heterogeneity in mixed-conifer forests. Canadian Journal of Forest Research 42: 1505-1517.

Larson, A.J., R.T. Belote, C.A. Cansler, S.A. Parks and M.S. Dietz. 2013. Latent resilience in ponderosa pine forest: effects of resumed frequent fire. Ecological Applications 23: 1243-1249.

Oliver, T.H.; Heard, M.S.; Isaac, N.J.B; Roy, D.B.; Procter, D.; Eigenbrod, F.; Freckleton, R.; Hector, A.; Orme, D.L.; Petchey, O.L.; Proença, V.; Raffaelli, D.; Suttle, B; Mace, G.M.; Martin-Lopez, B.; Woodcock, B.A.; Bullock, J.M. 2015. Biodiversity and resilience of ecosystem functions. Trends in Ecology and Evolution, 673-684.

Swan Ecosystem Center. 2004. Upper Swan Valley Landscape Assessment.

USDA. 2018. Toward Shared Stewardship Across Landscapes: An Outcome-Based Investment Strategy. FS-118. 24 pp.

Appendix A. Proposed Action Treatments by Resource and Management Area[12]

Note: All locations, mileages, and acreages subject to change depending on site conditions.

Aquatics Restoration - Proposed Actions and Treatment Objectives

Table 4. Aquatic proposed actions and treatment objectives.

Treatment Type	Treatment Objective
Road Stormproofing	Reduce existing sediment delivery rates to streams and other waterbodies within the project area. Prepare the transportation system to be more resilient with the predicted increase in spring runoff due to global climate change. Improve drainage infrastructure (upgrade culverts, add water bars or drivable dips, etc.), or reduce the number of road crossing structures through storing or decommissioning existing roads. Goal is to implement the Forest Plan objective, pending approval, of stormproofing 15-30% of the roads in the conservation watershed network within the project area.
Road Best Management Practices Only	Similar to stormproofing, except the roads will remain in a drivable state, i.e. not stored or decommissioned. Focused work on road segments identified as having a higher risk of sediment delivery to the aquatic ecosystem.
Improve Fish Passage	Remove or upgrade the remaining five road/stream crossing culverts that are currently identified as fish passage barriers.
Beaver Restoration **Install Beaver Dam Analog Structures**	Implement instream restoration structures at nine sites to emulate beaver activity. Treated sites will store spring runoff, and increase stream/floodplain connectivity.

[12] These Management Areas reflect the revised Forest Plan which is pending signature.

Terrestrial Restoration – Proposed Actions and Treatment Objectives

Table 5. Treatment objectives by treatment type for med-large tree, whitebark pine and western white pine.

		Treatment Objectives by Terrestrial Need		
		Med-Large Tree	**Whitebark Pine**	**Western White Pine**
Treatment Type	**Non-Commercial Thin**	Reduce ladder fuels to reduce crown fire initiation hazard and improve the health of medium and large trees.	N/A	Promote heath of existing western white pine. Prune to reduce risk of blister rust infection.
Treatment Type	**Thin with Variable Density**	Select for fire resilient trees. Reduce crown fire hazard to protect existing medium large trees and improve health. Increase spatial heterogeneity (individual trees, clumps and openings).	N/A	Select for trees resilient to fire and insect and disease and improve health to western white pine.
Treatment Type	**Thin with Regeneration Openings**	Convert species compositions to species more resilient to fire and insect and disease (pines, larch) while maintaining existing medium and large trees (Ponderosa pine, larch).	N/A	Create openings for planting of rust resistant white pine. Increase the occurrence of western white pine on the landscape.
Treatment Type	**Regeneration with Variable Retention**	N/A	N/A	Convert species compositions to species more resilient to fire and insect and disease (western white pine, ponderosa pine, western larch). Increase the occurrence of western white pine on the landscape.
Treatment Type	**Controlled Fire**	Reduce ladder fuels to reduce crown fire initiation hazard.	Reduce ground cover composition to increase success of rust resistant whitebark pine planting or seeding.	N/A
	Planting	N/A	Establish rust resistant whitebark pine regeneration in recently disturbed sites (natural fire, or management actions).	Establish rust resistant western white pine regeneration in recently disturbed sites (natural fire, or management actions).
	Seed Caching	N/A	Establish rust resistant whitebark pine regeneration in open timberline communities or recently disturbed sites (natural fire) generally in wilderness or proposed wilderness.	N/A

Table 6 – Treatments objectives by treatment type for lynx habitat departures.

		Treatment Objectives by Lynx Habitat Type			
Treatment Type		**Mature Habitat**	**Intermediate Habitat**	**Foraging Habitat**	**Temporarily unsuitable**
	Non-Commercial Thin	N/A	N/A	In areas with sufficient foraging habitat but insufficient or unconnected mature habitat, goal would be to promote stand development toward mature habitat conditions. [2]	N/A
	Thin with Variable Density	In areas where existing mature habitat is at high risk of loss through crown fire, goal would be to provide stand resilience to fire without compromising mature forest characteristics. Would include design criteria to this effect.	In areas with insufficient or unconnected mature habitat, goal would be to promote stand development toward mature habitat conditions and protect existing medium to large trees.	N/A	N/A
	Thin with Regeneration Openings	In areas with sufficient and well-connected mature habitat, but insufficient foraging or temporarily unsuitable habitat, goal would be to create early seral or stand initiation conditions. Treatment intensity and controlled fire use would depend on whether objective was to create foraging or temporarily unsuitable stand conditions.[1]	In areas with sufficient mature habitat but insufficient foraging or temporarily unsuitable habitat, goal would be to create early seral/stand initiation conditions. Treatment intensity and controlled fire use would depend on whether objective was to create foraging or temporarily unsuitable habitat.	N/A	N/A
	Regeneration with Variable Retention	N/A	N/A	Objective would be to move a stand to early seral conditions from which it would develop into winter foraging habitat in 10-15 years. This would be done in areas where there is currently a surplus of foraging habitat but a deficit of temporarily unsuitable habitat.[2]	N/A
	Controlled Fire	N/A	N/A	N/A	N/A

[1] This would require a Forest Plan Amendment to NRLMD Standard Veg S6 due to the reduction in existing mature, multi-story snowshoe hare habitat.
[2] This would require a Forest Plan Amendment to NRLMD Standard Veg S5 due to the reduction of existing snowshoe hare stand initiation habitat.

Table 7. Treatment objectives with areas of historical mean fire return intervals less than 71 years and not in lynx mature or foraging habitat.

	Treatment Objectives with areas of Historical MFRI < 71 years and not in Lynx Mature or Foraging Habitat				
Treatment Type		**Seedling-Sapling Size Class**	**Historically Low Severity**	**Historically Moderate Severity**	**Historically High Severity**
	Non-Commercial Thin	Address stand spacing and prepare for re-introduction of fire at a later date; current activity might include piling and burning for slash disposal.	N/A	N/A	N/A
	Thin with Variable Density	N/A	Restore stand conditions characteristic of low severity fire by thinning canopy where crown fire can be initiated and/or propagated; treat surface fuel by following thinning with broadcast burning.	N/A	N/A
	Thin with Regeneration Openings	N/A	N/A	Restore stand conditions characteristic of moderate severity fire by thinning canopy where crown fire can be initiated and/or propagated and create small openings for regeneration; treat surface fuel with broadcast burning.	N/A
	Regeneration with Variable Retention	N/A	N/A	N/A	Restore stand conditions characteristic of high severity fire by thinning canopy where crown fire can be initiated and/or propagated and create larger openings for regeneration; treat surface fuel with broadcast burning.
	Controlled Fire	N/A	Restore stand conditions characteristic of low severity fire where crown fire hazard is low by treating surface fuel with broadcast burning.	Restore stand conditions characteristic of moderate severity fire where crown fire hazard is low by treating surface fuel with broadcast burning.	Restore stand conditions characteristic of high severity fire where crown fire hazard is low by treating surface fuel with broadcast burning.

Table 8 – Treatments objectives by treatment type for cover structure, patch density and large patch departures.

		Treatment Objectives with areas of Departed vegetation Cover/ Structure, Patch Density, and Large Patch Size and not in Lynx Mature or Foraging Habitat			
Treatment Type		**Goal is to convert vegetation**	**Goal is to grow vegetation**	**Goal is to connect vegetation**	**Goal is to maintain vegetation**
	Non-Commercial Thin	In seedling and sapling size classes, address stand spacing in order to set back current successional development of the vegetation.	In seedling and sapling size classes, address stand spacing in order to advance current successional development of the vegetation.	In seedling and sapling size classes, address stand spacing in order to connect polygons of similar successional development vegetation to create larger patches.	In seedling and sapling size classes, address stand spacing in order to maintain polygons of similar successional development vegetation to create larger patches.
	Thin with Variable Density	N/A	N/A	In primarily pole-sized and larger size classes, treatment objective is to connect polygons of similar successional development to create larger patches.	N/A
	Thin with Regeneration Openings	N/A	In primarily pole-sized and larger size classes, treatment objective is to advance current successional development of the vegetation.	N/A	N/A
	Regeneration with Variable Retention	In primarily pole-sized and larger size classes, treatment objective is to set back current successional development of the vegetation.	N/A	N/A	N/A
	Controlled Fire	N/A	Restore stand conditions characteristic of low severity fire where crown fire hazard is low by treating surface fuel with broadcast burning.	Restore stand conditions characteristic of low severity fire where crown fire hazard is low by treating surface fuel with broadcast burning.	Restore stand conditions characteristic of low severity fire where crown fire hazard is low by treating surface fuel with broadcast burning.

Proposed Actions, Locations, Treatments, and Methods for WUI

Table 9. Treatment objectives by treatment type for WUI.

Treatment Type	Treatment Objectives For the Wildland Urban Interface			
		Ponderosa and Larch Dominated	**Douglas-fir Dominated**	**All Other Species Dominated**
	Non-Commercial Thin	Address stand spacing and prepare for re-introduction of fire at a later date; current activity might include piling and burning for slash disposal.	Address stand spacing and prepare for re-introduction of fire at a later date; current activity might include piling and burning for slash disposal.	N/A
	Thin with Variable Density	Address hazard of crown fire initiation and propagation by thinning canopy and treating surface fuel by following thinning with broadcast burning.	N/A	N/A
	Thin with Regeneration Openings	N/A	Address hazard of crown fire initiation and propagation by thinning canopy and create small openings for regeneration of fire resistant trees while treating surface fuel with broadcast burning.	N/A
	Regeneration with Variable Retention	N/A	N/A	Address hazard of crown fire initiation and propagation by creating larger openings for regeneration of fire resistant trees and treat surface fuel with broadcast burning.
	Controlled Fire	Restore stand conditions characteristic of low severity fire where crown fire hazard is low by treating surface fuel with broadcast burning.	Restore stand conditions characteristic of low severity fire where crown fire hazard is low by treating surface fuel with broadcast burning.	Restore stand conditions characteristic of low severity fire where crown fire hazard is low by treating surface fuel with broadcast burning.

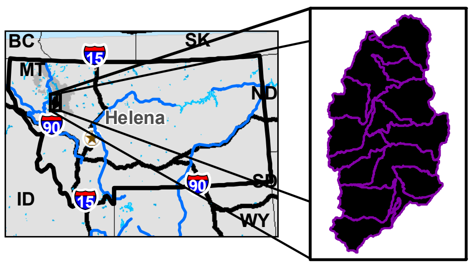
Appendix B. Project Maps

FLATHEAD NATIONAL FOREST

MID-SWAN SCOPING

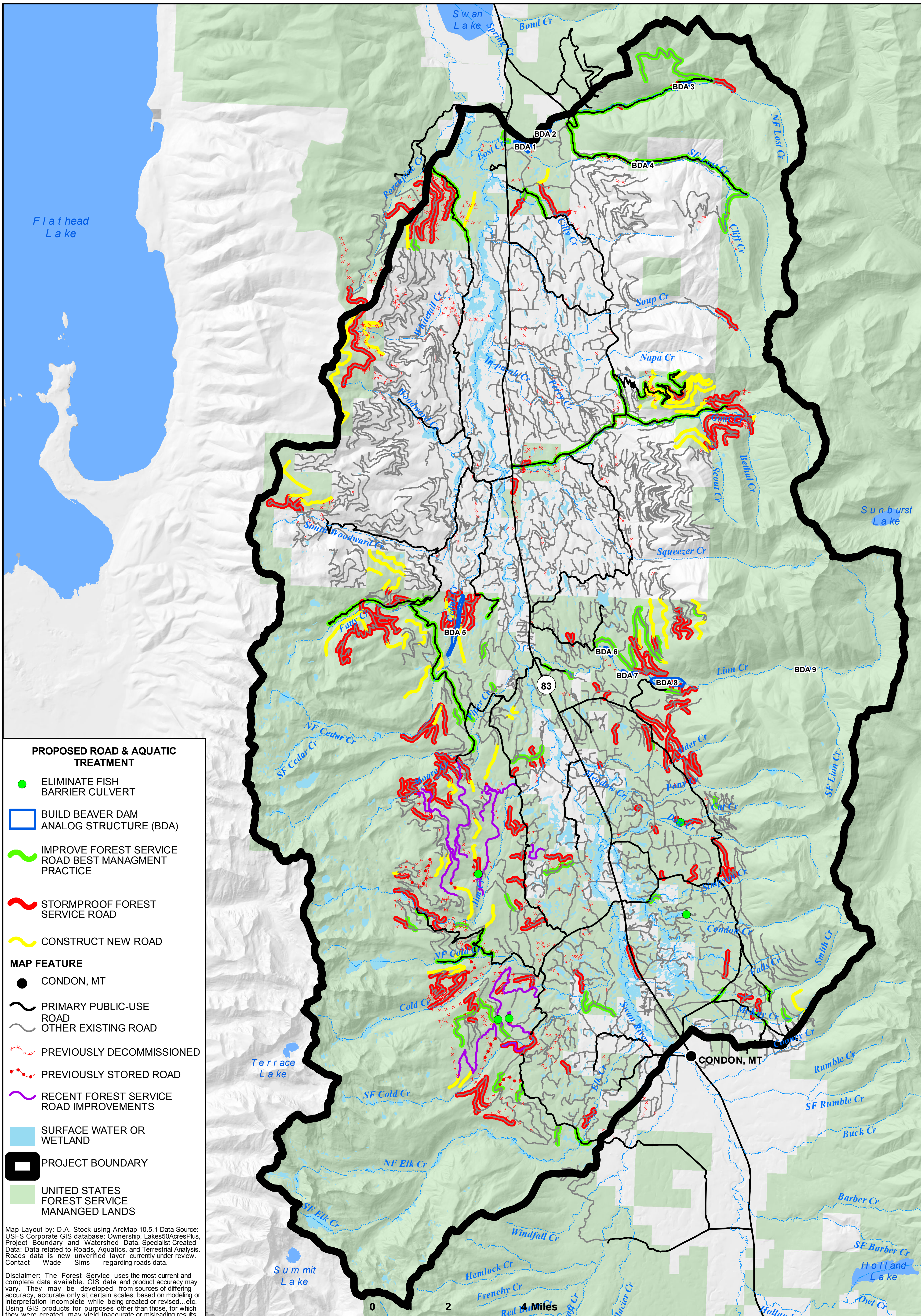
PROPOSED ROAD AND AQUATIC TREATMENT AREAS

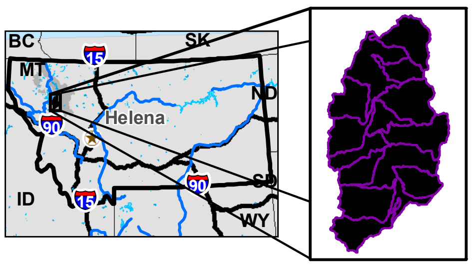
OCTOBER 2018



N

MAP: 01





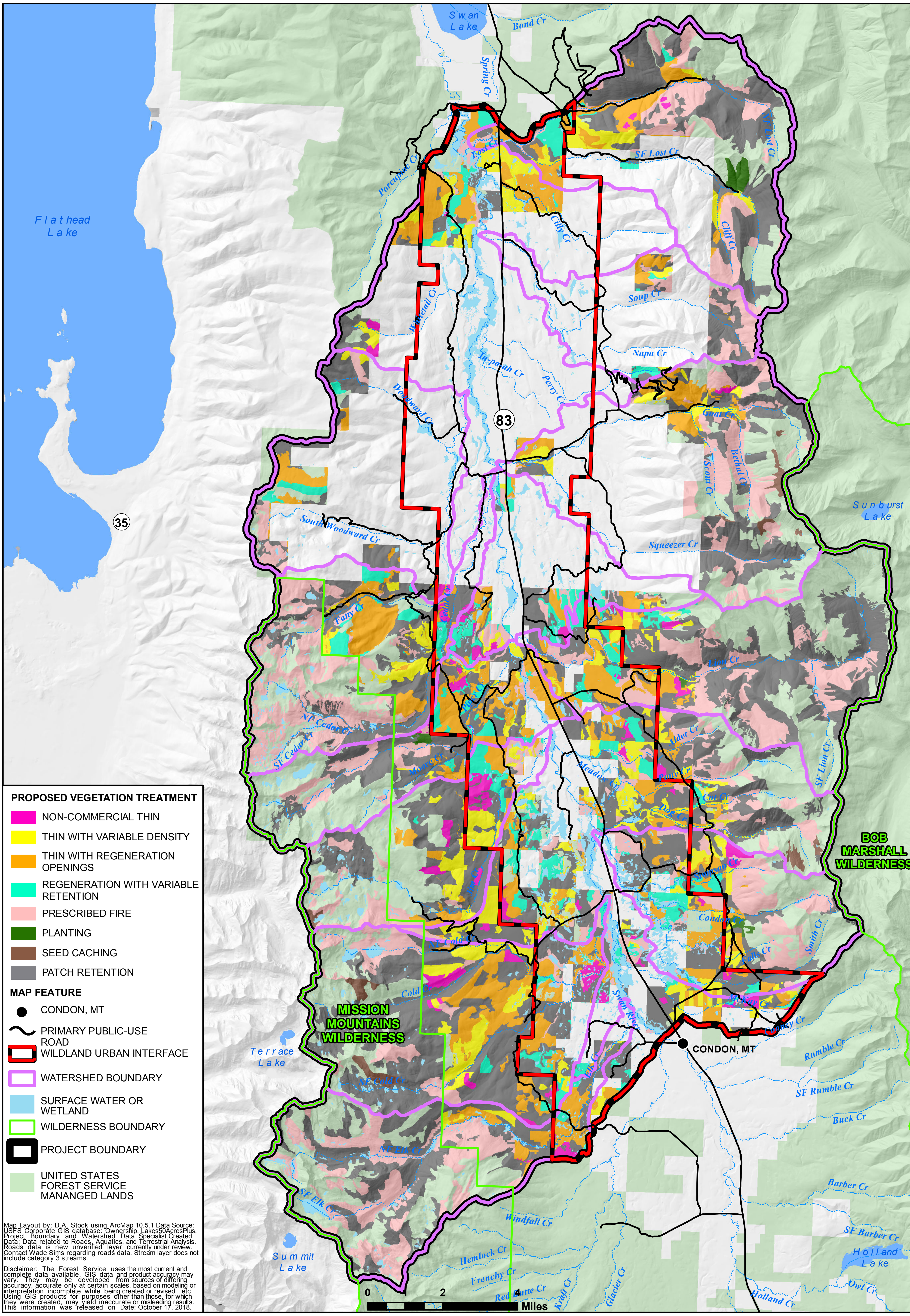
FLATHEAD NATIONAL FOREST

MID-SWAN SCOPING

PROPOSED VEGETATION TREATMENT

OCTOBER 2018

MAP: 02



Map Layout by: D.A. Stock using ArcMap 10.5.1 Data Source: USFS Corporate GIS database: Ownership, Lakes50AcresPlus, Project Boundary and Watershed Data. Specialist Created Data: Data related to Roads, Aquatics, and Terrestrial Analysis. Roads data is new unverified layer currently under review. Contact Wade Sims regarding roads data. Stream layer does not include category 3 streams.

Disclaimer: The Forest Service uses the most current and complete data available. GIS data and product accuracy may vary. They may be developed from sources of differing accuracy, accurate only at certain scales, based on modeling or interpretation incomplete while being created or revised…etc. Using GIS products for purposes other than those, for which they were created, may yield inaccurate or misleading results. This information was released on Date: October 17, 2018.

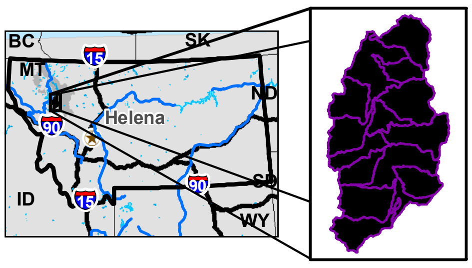
FLATHEAD NATIONAL FOREST

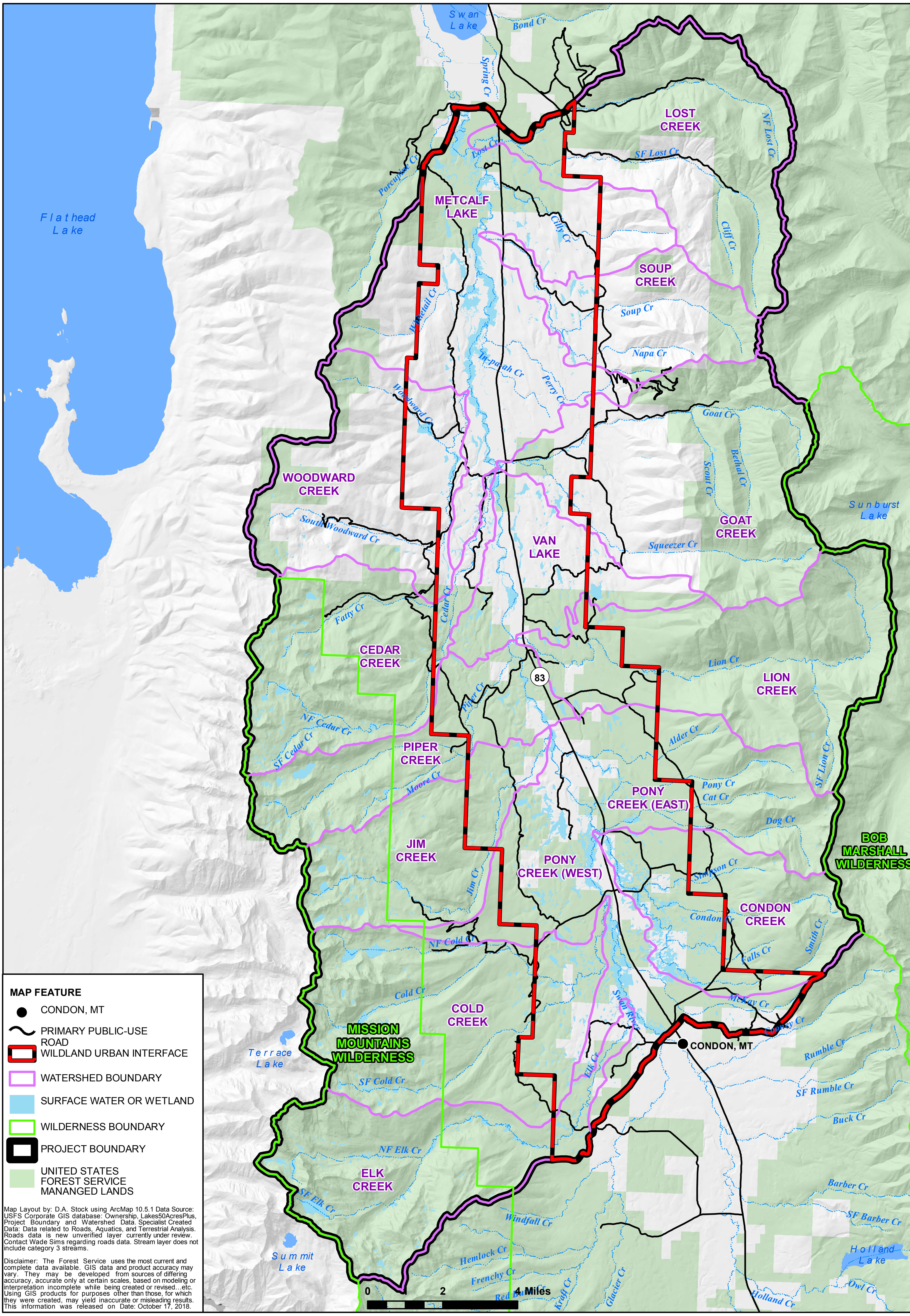
MID-SWAN SCOPING

WATERSHEDS

OCTOBER 2018

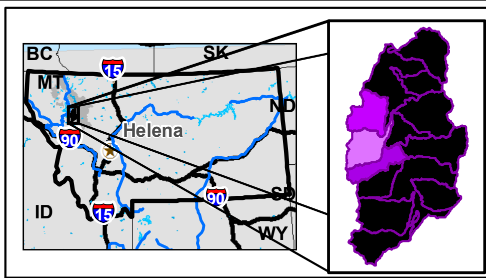
MAP: 03





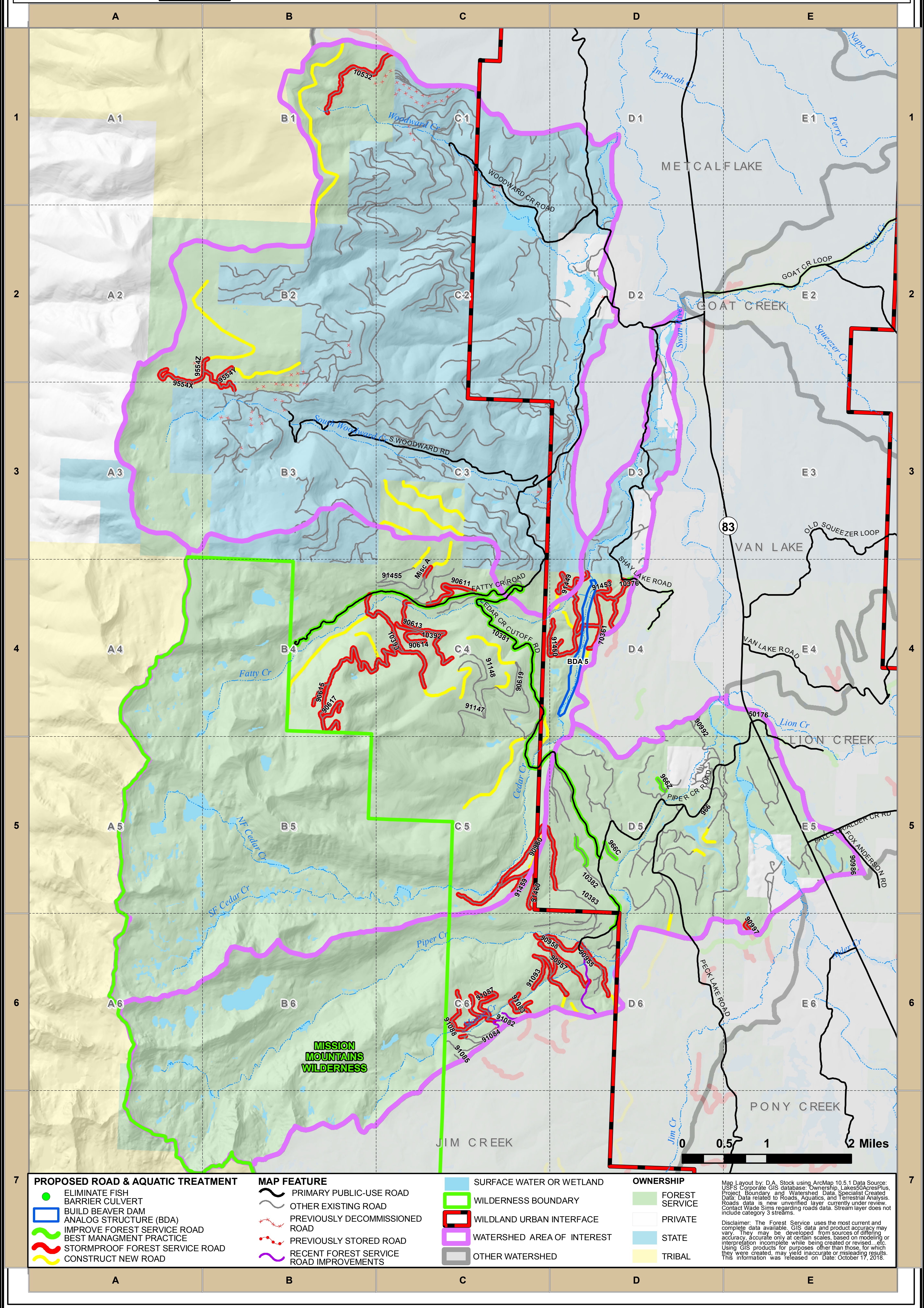
Map Layout by: D.A. Stock using ArcMap 10.5.1 Data Source: USFS Corporate GIS database: Ownership, Lakes50AcresPlus, Project Boundary and Watershed Data. Specialist Created Data: Data related to Roads, Aquatics, and Terrestrial Analysis. Roads data is new unverified layer currently under review. Contact Wade Sims regarding roads data. Stream layer does not include category 3 streams.

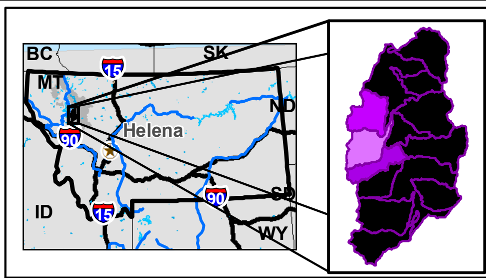
Disclaimer: The Forest Service uses the most current and complete data available. GIS data and product accuracy may vary. They may be developed from sources of differing accuracy, accurate only at certain scales, based on modeling or interpretation incomplete while being created or revised...etc. Using GIS products for purposes other than those, for which they were created, may yield inaccurate or misleading results. This information was released on Date: October 17, 2018.



FLATHEAD NATIONAL FOREST
MID-SWAN SCOPING
PROPOSED ROAD AND AQUATIC TREATMENTS BY WATERSHED
WATERSHED: CEDAR, PIPER AND WOODWARD CREEKS
OCTOBER 2018

MAP: 04

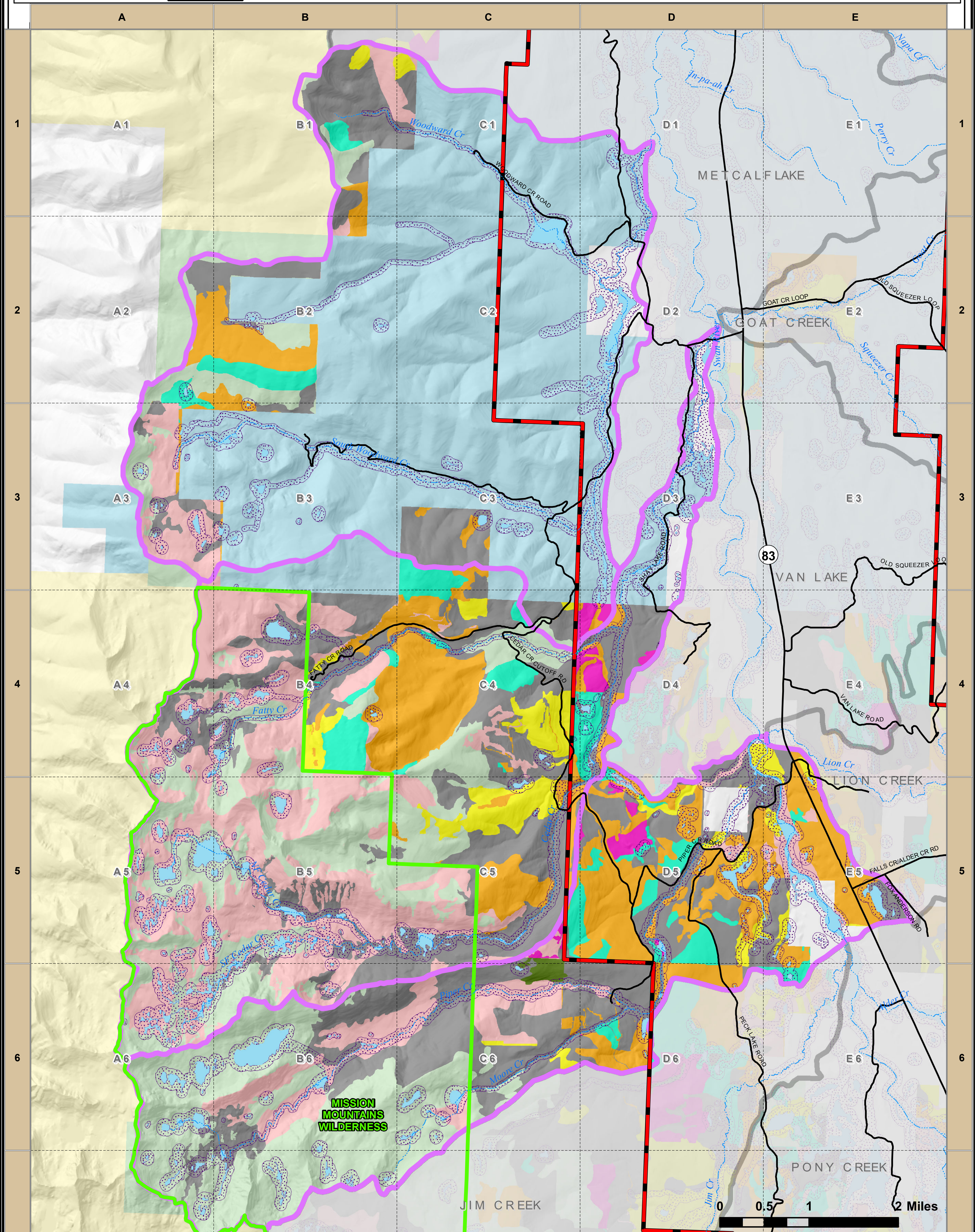




FLATHEAD NATIONAL FOREST
MID-SWAN SCOPING

PROPOSED VEGETATION TREATMENT BY WATERSHED
WATERSHED: CEDAR, PIPER AND WOODWARD CREEKS
OCTOBER 2018

MAP: 05



PROPOSED VEGETATION TREATMENT

- NON-COMMERCIAL THIN
- THIN WITH VARIABLE DENSITY
- THIN WITH REGENERATION OPENINGS
- REGENERATION WITH VARIABLE RETENTION
- PRESCRIBED FIRE
- PLANTING
- SEED CACHING
- PATCH RETENTION

MAP FEATURE

- PRIMARY PUBLIC-USE ROAD
- RIPARIAN MANAGEMENT ZONE (RMZ)
- SURFACE WATER OR WETLAND
- WILDERNESS BOUNDARY
- WILDLAND URBAN INTERFACE
- WATERSHED AREA OF INTEREST
- OTHER WATERSHED

OWNERSHIP

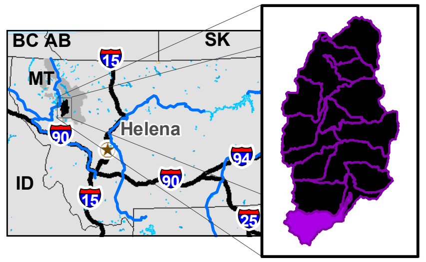
- FOREST SERVICE
- PRIVATE
- STATE
- TRIBAL

Map Layout by: D.A. Stock using ArcMap 10.5.1 Data Source: USFS Corporate GIS database: Ownership, Lakes50AcresPlus, Project Boundary and Watershed Data. Specialist Created Data: Data related to Roads, Aquatics, and Terrestrial Analysis. Roads data is new unverified layer currently under review. Contact Wade Sims regarding roads data. Stream layer does not include category 3 streams. In addition Inner/Outer RMZs are combined for mapping purposes.

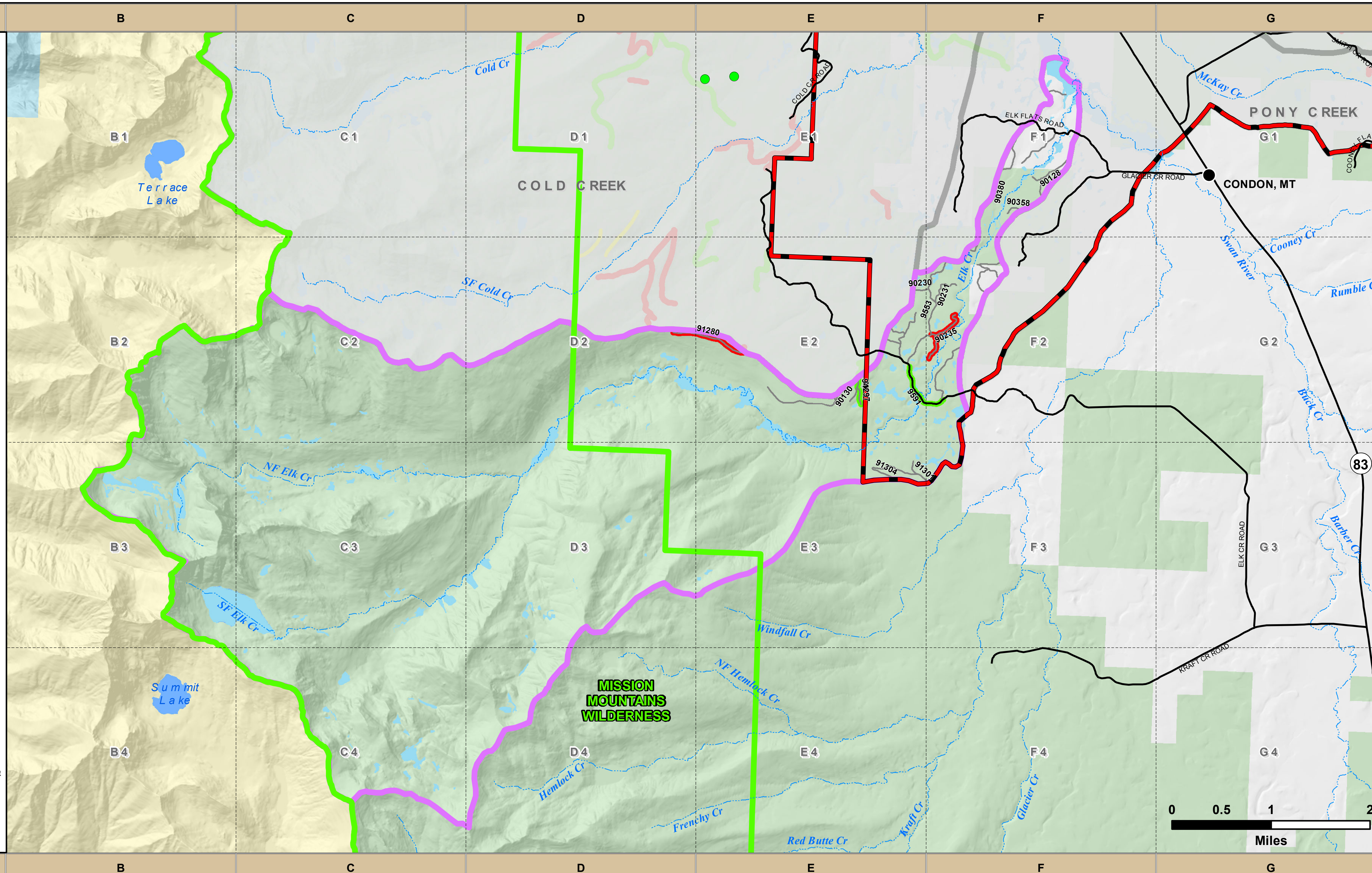
Disclaimer: The Forest Service uses the most current and complete data available. GIS data and product accuracy may vary. They may be developed from sources of differing accuracy, accurate only at certain scales, based on modeling or interpretation incomplete while being created or revised…etc. Using GIS products for purposes other than those, for which they were created, may yield inaccurate or misleading results. This information was released on Date: October 18, 2018.

FLATHEAD NATIONAL FOREST
MID-SWAN SCOPING

PROPOSED ROAD AND AQUATIC TREATMENTS BY WATERSHED
WATERSHED: ELK CREEK
OCTOBER 2018



MAP: 06



PROPOSED ROAD & AQUATIC TREATMENT

- ELIMINATE FISH BARRIER CULVERT
- BUILD BEAVER DAM ANALOG STRUCTURE (BDA)
- IMPROVE FOREST SERVICE ROAD BEST MANAGMENT PRACTICE
- STORMPROOF FOREST SERVICE ROAD
- CONSTRUCT NEW ROAD

MAP FEATURE

- PRIMARY PUBLIC-USE ROAD
- OTHER EXISTING ROAD
- PREVIOUSLY DECOMMISSIONED ROAD
- PREVIOUSLY STORED ROAD
- RECENT FOREST SERVICE ROAD IMPROVEMENTS
- SURFACE WATER OR WETLAND
- WILDERNESS BOUNDARY
- WILDLAND URBAN INTERFACE
- WATERSHED AREA OF INTEREST
- OTHER WATERSHED

OWNERSHIP

- FOREST SERVICE
- PRIVATE
- STATE
- TRIBAL

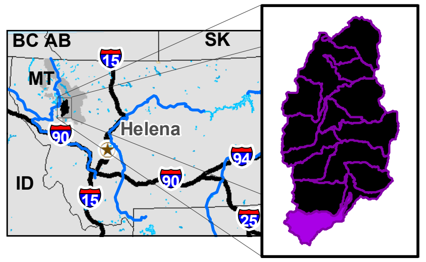
Map Layout by: D.A. Stock using ArcMap 10.5.1 Data Source: USFS Corporate GIS database: Ownership, Lakes50AcresPlus, Project Boundary and Watershed Data. Specialist Created Data: Data related to Roads, Aquatics, and Terrestrial Analysis. Roads data is new unverified layer currently under review. Contact Wade Sims regarding roads data. Stream layer does not include category 3 streams.

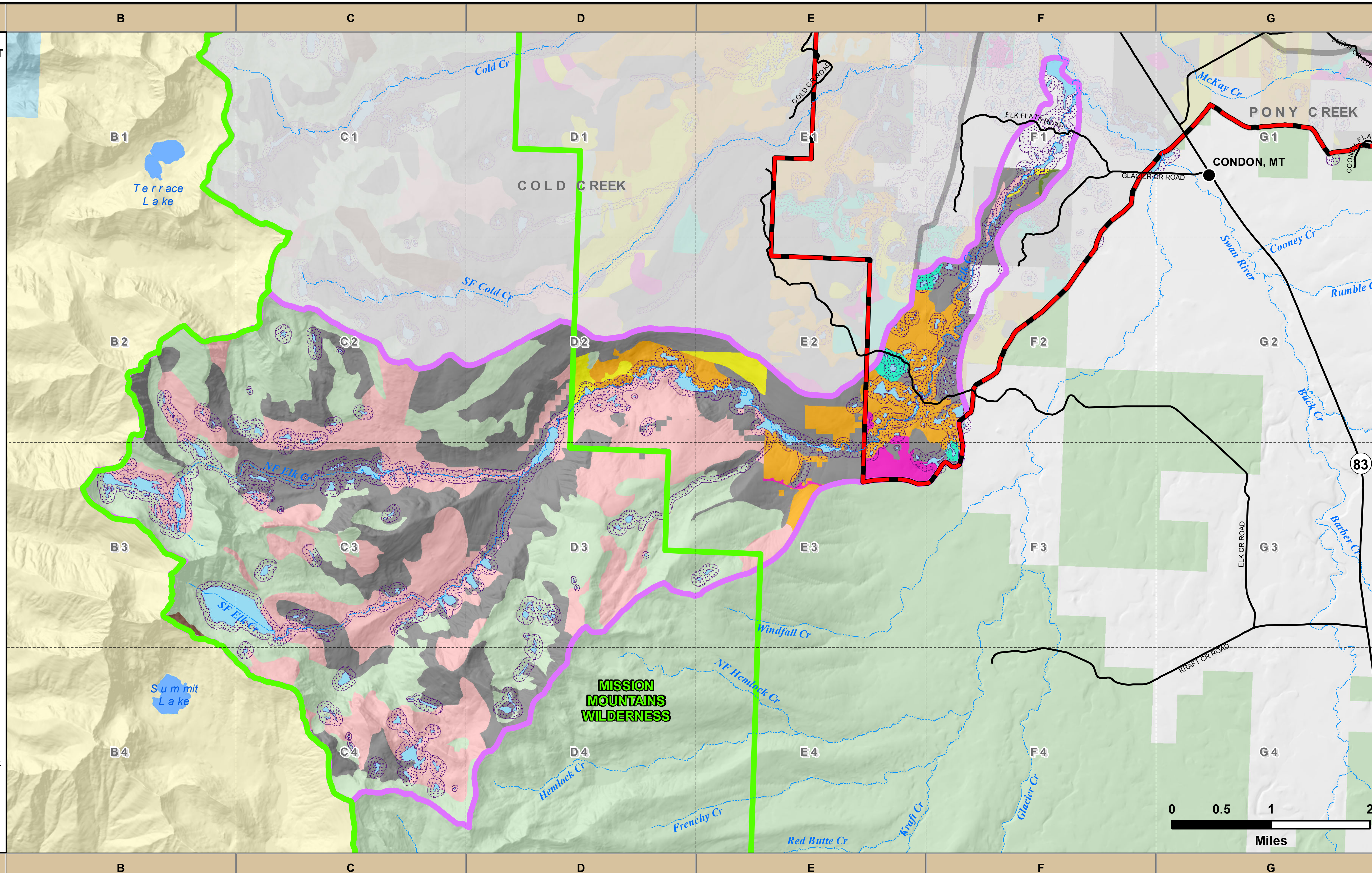
Disclaimer: The Forest Service uses the most current and complete data available. GIS data and product accuracy may vary. They may be developed from sources of differing accuracy, accurate only at certain scales, based on modeling or interpretation incomplete while being created or revised...etc. Using GIS products for purposes other than those, for which they were created, may yield inaccurate or misleading results. This information was released on Date: October 17, 2018.

FLATHEAD NATIONAL FOREST
MID-SWAN SCOPING

PROPOSED VEGETATION TREATMENT BY WATERSHED
WATERSHED: ELK CREEK
OCTOBER 2018

MAP: 07





PROPOSED VEGETATION TREATMENT

- NON-COMMERCIAL THIN
- THIN WITH VARIABLE DENSITY
- THIN WITH REGENERATION OPENINGS
- REGENERATION WITH VARIABLE RETENTION
- PRESCRIBED FIRE
- PLANTING
- SEED CACHING
- PATCH RETENTION

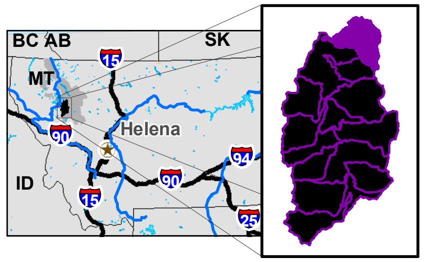
MAP FEATURE

- PRIMARY PUBLIC-USE ROAD
- RIPARIAN MANAGEMENT ZONE (RMZ)
- SURFACE WATER OR WETLAND
- WILDERNESS BOUNDARY
- WILDLAND URBAN INTERFACE
- WATERSHED AREA OF INTEREST
- OTHER WATERSHED

OWNERSHIP

- FOREST SERVICE
- PRIVATE
- STATE
- TRIBAL

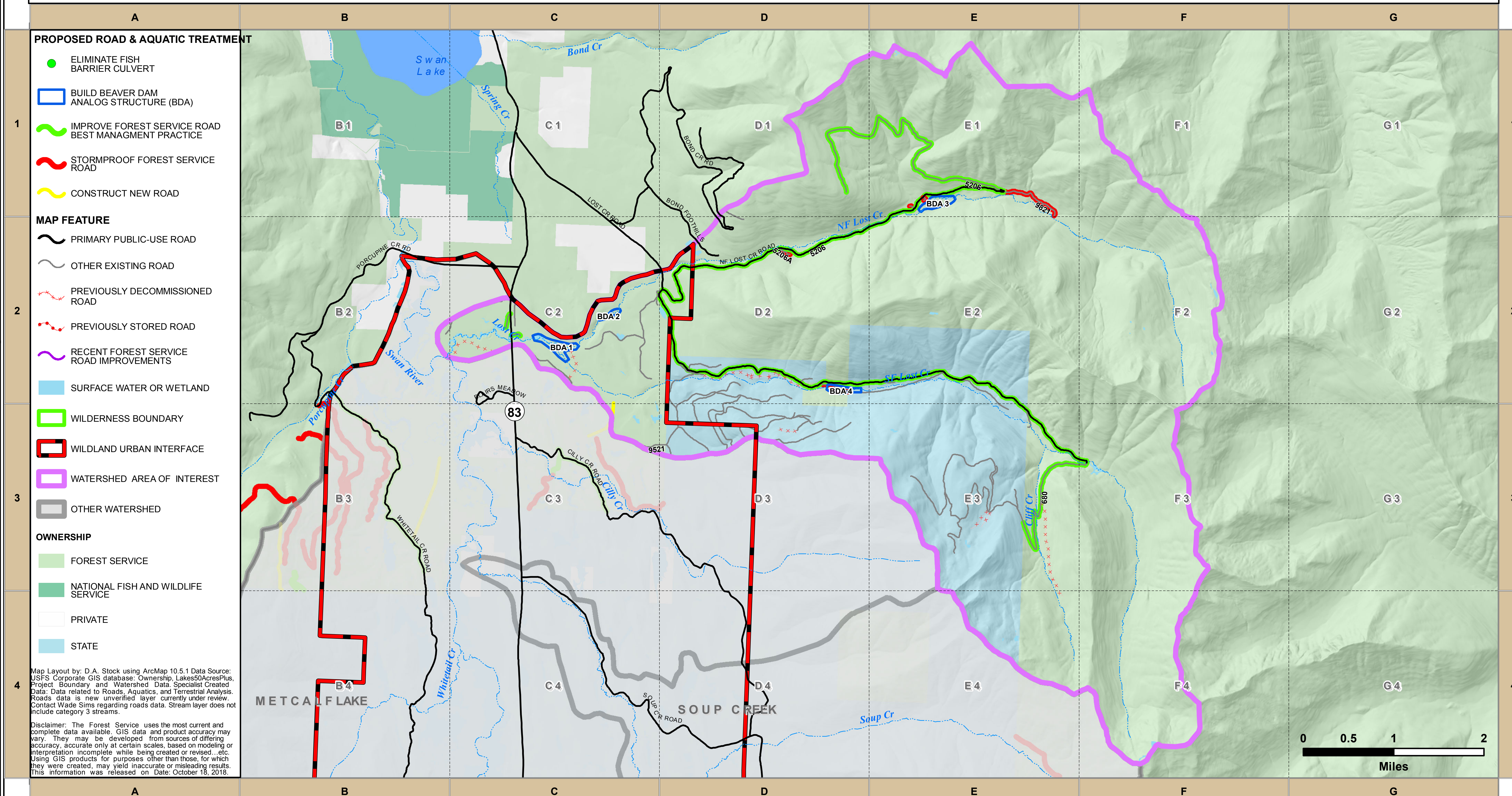
Map Layout by: D.A. Stock using ArcMap 10.5.1 Data Source: USFS Corporate GIS database: Ownership, Lakes50AcresPlus, Project Boundary and Watershed Data. Specialist Created Data: Data related to Roads, Aquatics, and Terrestrial Analysis. Roads data is new unverified layer currently under review. Contact Wade Sims regarding roads data. Stream layer does not include category 3 streams. In addition Inner/Outer RMZs are combined for mapping purposes.



FLATHEAD NATIONAL FOREST
MID-SWAN SCOPING

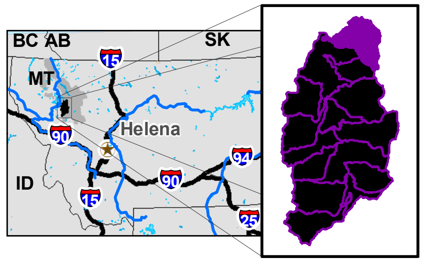
PROPOSED ROAD AND AQUATIC TREATMENTS BY WATERSHED
WATERSHED: LOST CREEK
OCTOBER 2018

MAP: 08



Map Layout by: D.A. Stock using ArcMap 10.5.1 Data Source: USFS Corporate GIS database: Ownership, Lakes50AcresPlus, Project Boundary and Watershed Data. Specialist Created Data: Data related to Roads, Aquatics, and Terrestrial Analysis. Roads data is new unverified layer currently under review. Contact Wade Sims regarding roads data. Stream layer does not include category 3 streams.

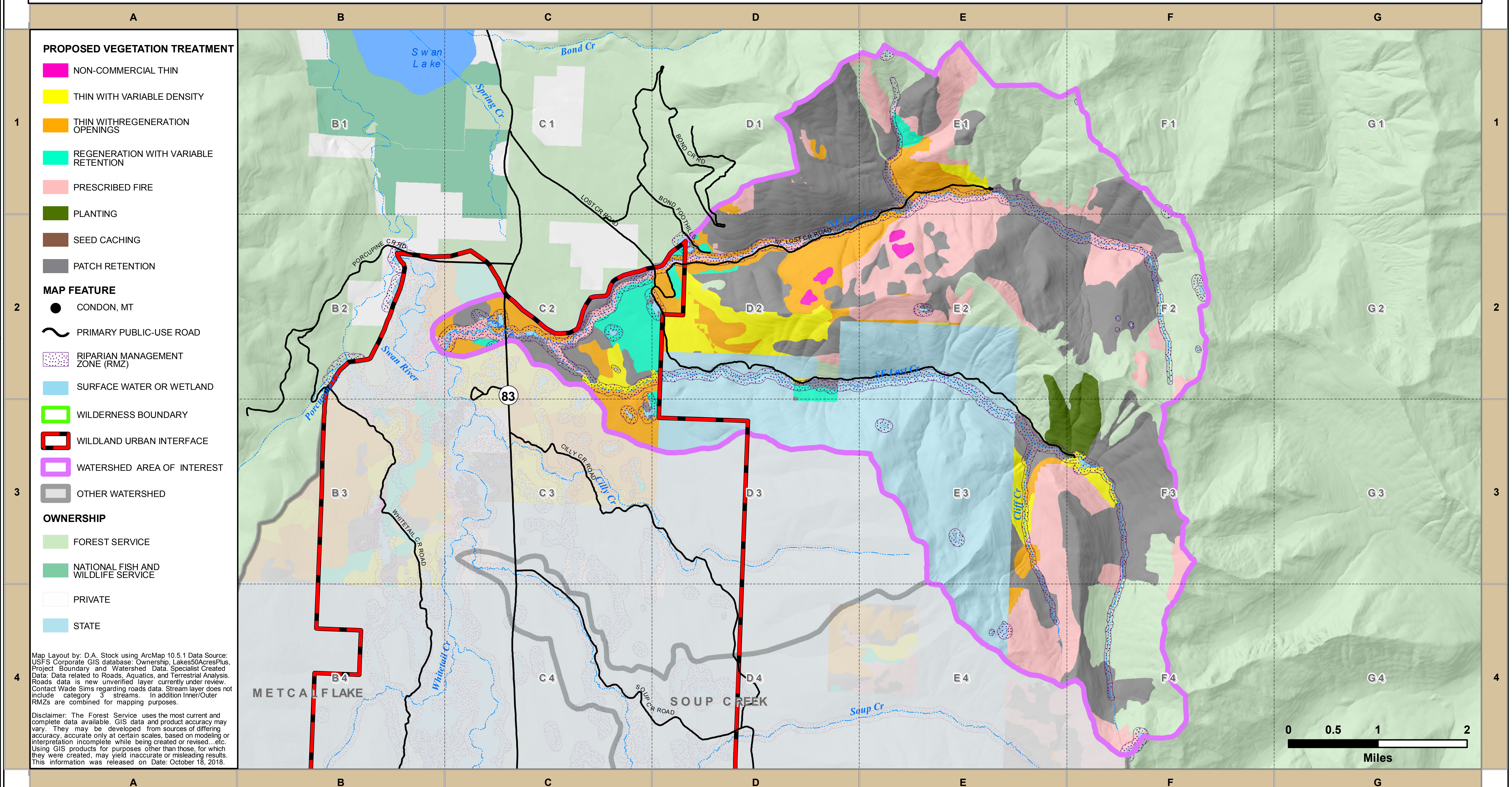
Disclaimer: The Forest Service uses the most current and complete data available. GIS data and product accuracy may vary. They may be developed from sources of differing accuracy, accurate only at certain scales, based on modeling or interpretation incomplete while being created or revised...etc. Using GIS products for purposes other than those, for which they were created, may yield inaccurate or misleading results. This information was released on Date: October 18, 2018.



FLATHEAD NATIONAL FOREST
MID-SWAN SCOPING

PROPOSED VEGETATION TREATMENT BY WATERSHED
WATERSHED: LOST CREEK
OCTOBER 2018

MAP: 09



Map Layout by: D.A. Stock using ArcMap 10.5.1 Data Source: USFS Corporate GIS database: Ownership, Lakes50AcresPlus, Project Boundary and Watershed Data. Specialist Created Data: Data related to Roads, Aquatics, and Terrestrial Analysis. Roads data is new unverified layer currently under review. Contact Wade Sims regarding roads data. Stream layer does not include category 3 streams. In addition Inner/Outer RMZs are combined for mapping purposes.

Disclaimer: The Forest Service uses the most current and complete data available. GIS data and product accuracy may vary. They may be developed from sources of differing accuracy, accurate only at certain scales, based on modeling or interpretation incomplete while being created or revised…etc. Using GIS products for purposes other than those, for which they were created, may yield inaccurate or misleading results. This information was released on Date: October 18, 2018.

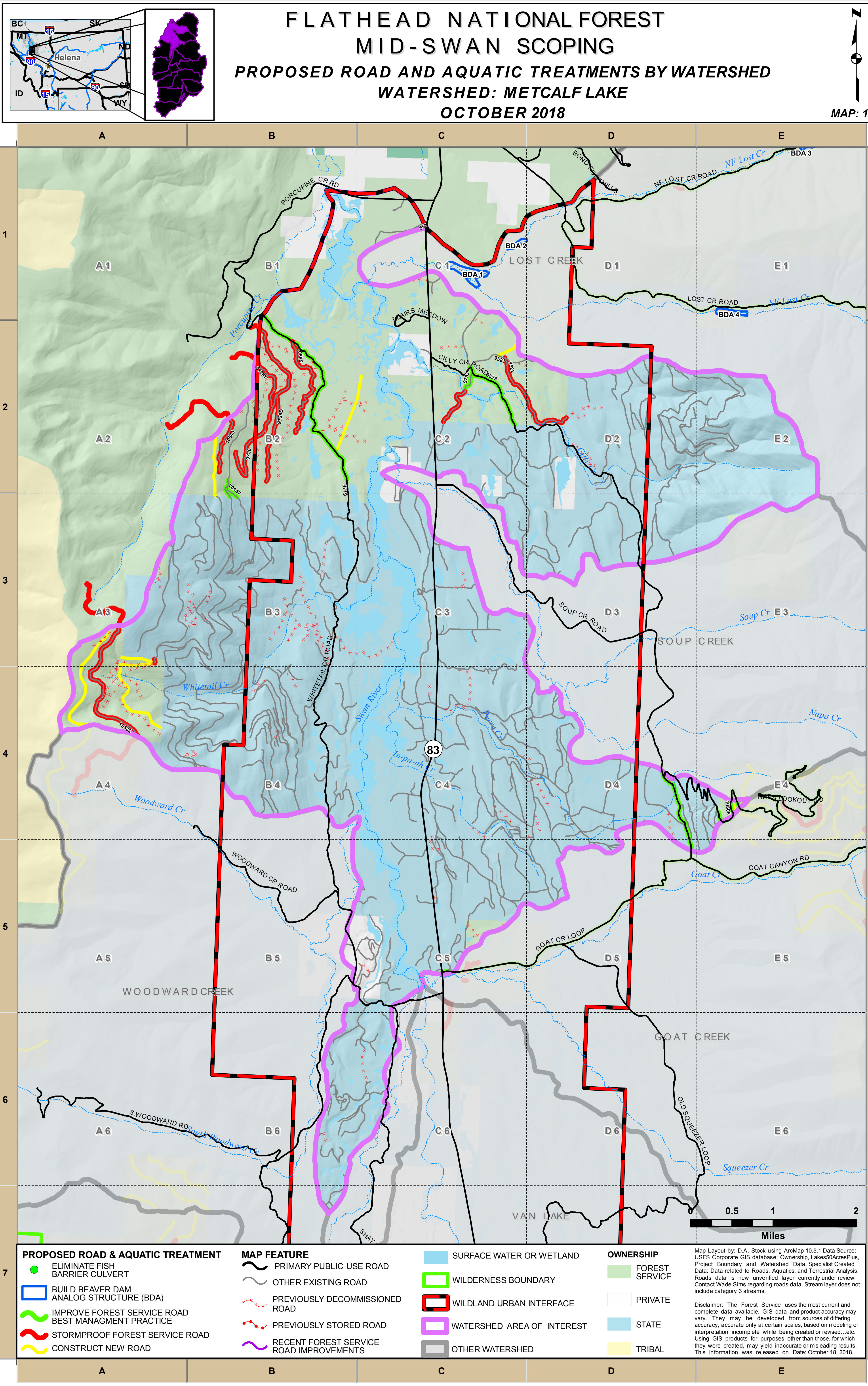
FLATHEAD NATIONAL FOREST
MID-SWAN SCOPING

PROPOSED ROAD AND AQUATIC TREATMENTS BY WATERSHED

WATERSHED: METCALF LAKE

OCTOBER 2018

MAP: 10



PROPOSED ROAD & AQUATIC TREATMENT

- ELIMINATE FISH BARRIER CULVERT
- BUILD BEAVER DAM ANALOG STRUCTURE (BDA)
- IMPROVE FOREST SERVICE ROAD BEST MANAGMENT PRACTICE
- STORMPROOF FOREST SERVICE ROAD
- CONSTRUCT NEW ROAD

MAP FEATURE

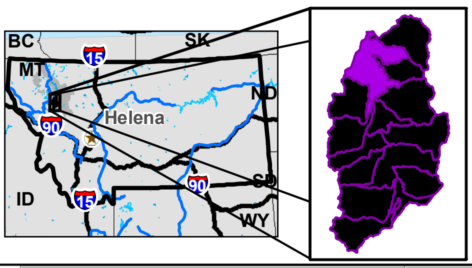
- PRIMARY PUBLIC-USE ROAD
- OTHER EXISTING ROAD
- PREVIOUSLY DECOMMISSIONED ROAD
- PREVIOUSLY STORED ROAD
- RECENT FOREST SERVICE ROAD IMPROVEMENTS
- SURFACE WATER OR WETLAND
- WILDERNESS BOUNDARY
- WILDLAND URBAN INTERFACE
- WATERSHED AREA OF INTEREST
- OTHER WATERSHED

OWNERSHIP

- FOREST SERVICE
- PRIVATE
- STATE
- TRIBAL

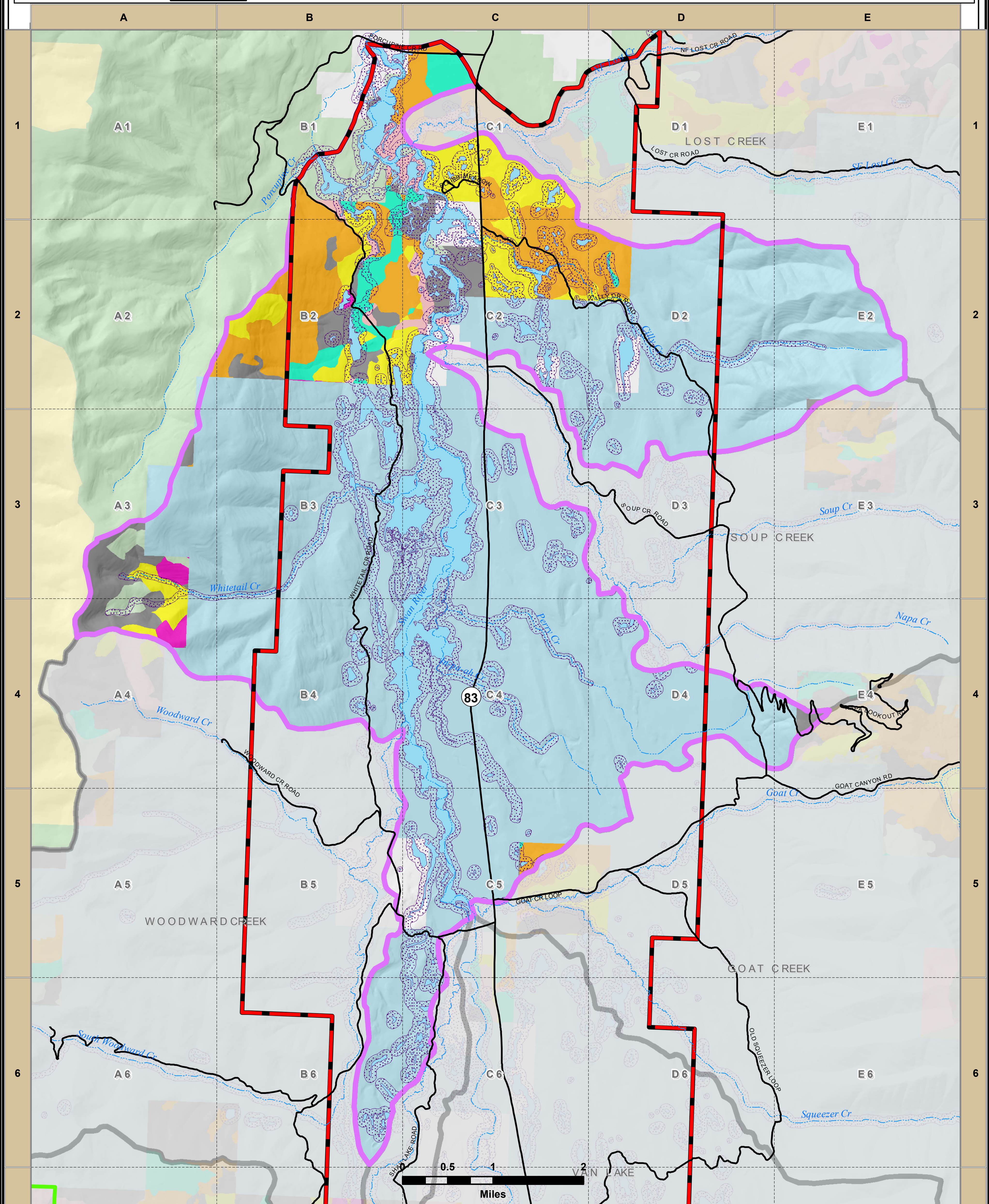
Map Layout by: D.A. Stock using ArcMap 10.5.1 Data Source: USFS Corporate GIS database: Ownership, Lakes50AcresPlus, Project Boundary and Watershed Data. Specialist Created Data: Data related to Roads, Aquatics, and Terrestrial Analysis. Roads data is new unverified layer currently under review. Contact Wade Sims regarding roads data. Stream layer does not include category 3 streams.

Disclaimer: The Forest Service uses the most current and complete data available. GIS data and product accuracy may vary. They may be developed from sources of differing accuracy, accurate only at certain scales, based on modeling or interpretation incomplete while being created or revised…etc. Using GIS products for purposes other than those, for which they were created, may yield inaccurate or misleading results. This information was released on Date: October 18, 2018.



FLATHEAD NATIONAL FOREST
MID-SWAN SCOPING
PROPOSED VEGETATION TREATMENT BY WATERSHED
WATERSHED: METCALF LAKE
OCTOBER 2018

MAP: 11



PROPOSED VEGETATION TREATMENT

- NON-COMMERCIAL THIN
- THIN WITH VARIABLE DENSITY
- THIN WITH REGENERATION OPENINGS
- REGENERATION WITH VARIABLE RETENTION
- PRESCRIBED FIRE
- PLANTING
- SEED CACHING
- PATCH RETENTION

MAP FEATURE

- PRIMARY PUBLIC-USE ROAD
- RIPARIAN MANAGEMENT ZONE (RMZ)
- SURFACE WATER OR WETLAND
- WILDERNESS BOUNDARY
- WILDLAND URBAN INTERFACE
- WATERSHED AREA OF INTEREST
- OTHER WATERSHED

OWNERSHIP

- FOREST SERVICE
- PRIVATE
- STATE
- TRIBAL

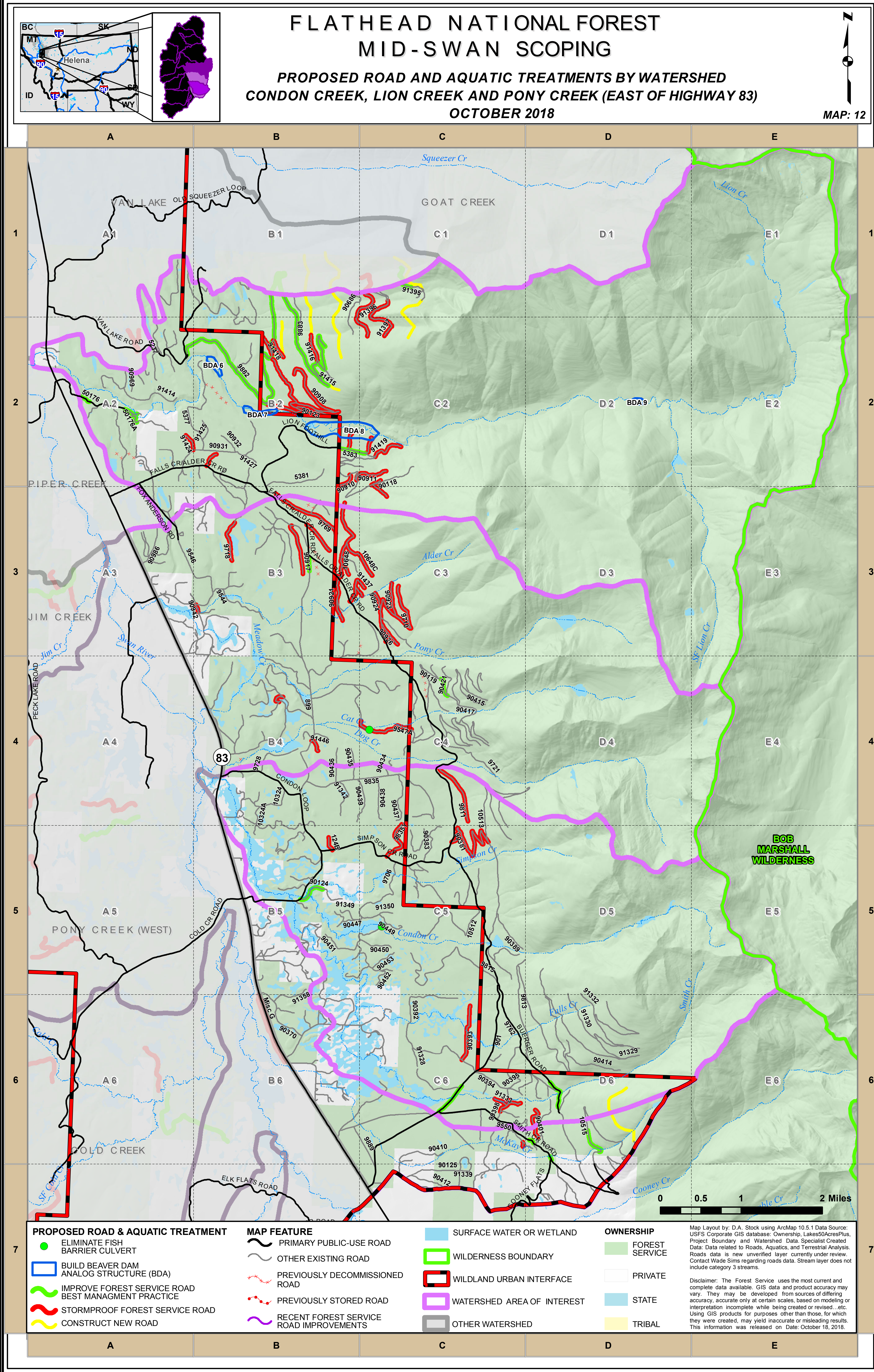
Map Layout by: D.A. Stock using ArcMap 10.5.1 Data Source: USFS Corporate GIS database: Ownership, Lakes50AcresPlus, Project Boundary and Watershed Data. Specialist Created Data: Data related to Roads, Aquatics, and Terrestrial Analysis. Roads data is new unverified layer currently under review. Contact Wade Sims regarding roads data. Stream layer does not include category 3 streams. In addition Inner/Outer RMZs are combined for mapping purposes.

Disclaimer: The Forest Service uses the most current and complete data available. GIS data and product accuracy may vary. They may be developed from sources of differing accuracy, accurate only at certain scales, based on modeling or interpretation incomplete while being created or revised…etc. Using GIS products for purposes other than those, for which they were created, may yield inaccurate or misleading results. This information was released on Date: October 18, 2018.

FLATHEAD NATIONAL FOREST
MID-SWAN SCOPING

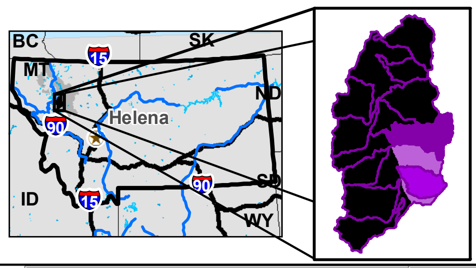
PROPOSED ROAD AND AQUATIC TREATMENTS BY WATERSHED
CONDON CREEK, LION CREEK AND PONY CREEK (EAST OF HIGHWAY 83)
OCTOBER 2018

MAP: 12



Map Layout by: D.A. Stock using ArcMap 10.5.1 Data Source: USFS Corporate GIS database: Ownership, Lakes50AcresPlus, Project Boundary and Watershed Data. Specialist Created Data: Data related to Roads, Aquatics, and Terrestrial Analysis. Roads data is new unverified layer currently under review. Contact Wade Sims regarding roads data. Stream layer does not include category 3 streams.

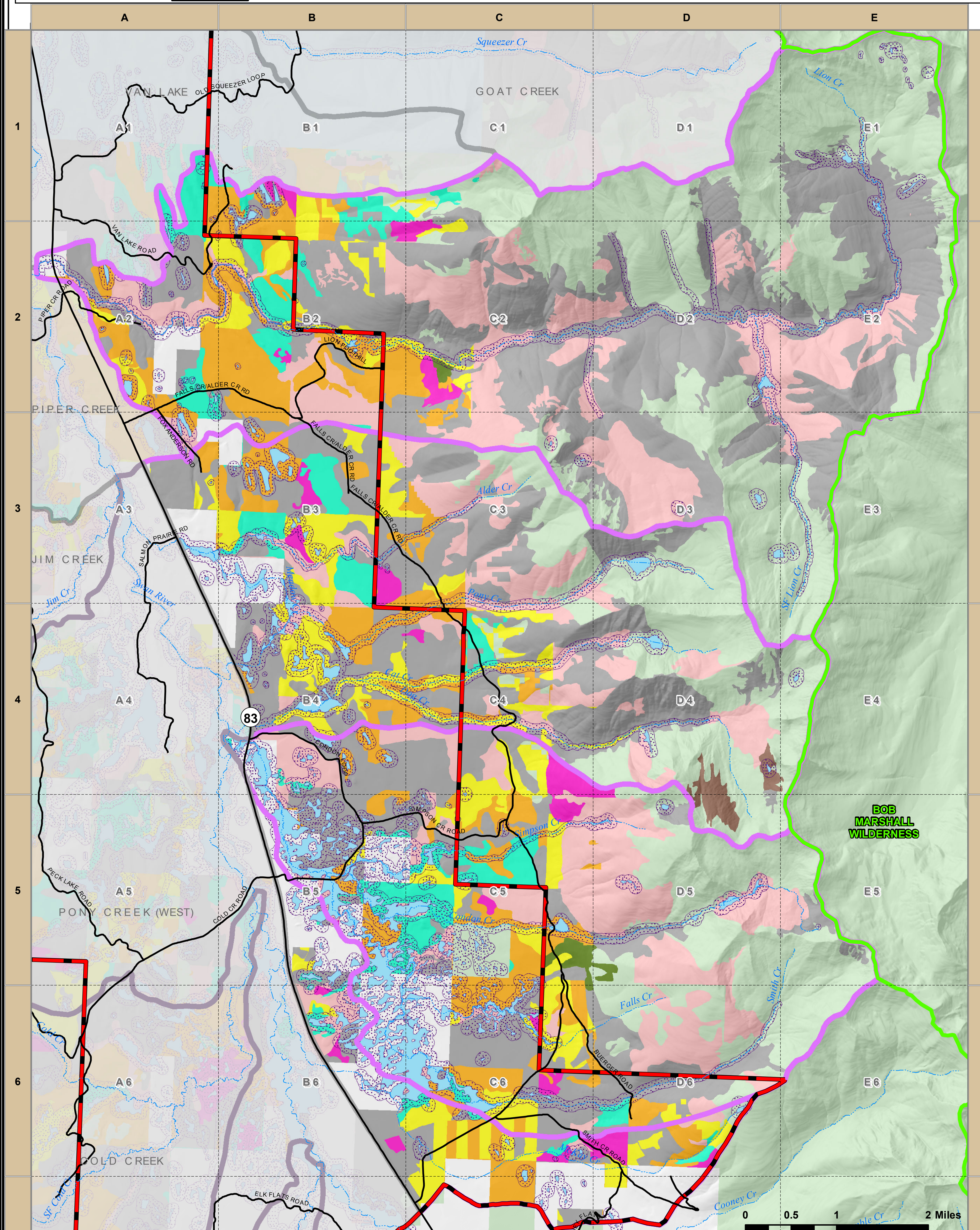
Disclaimer: The Forest Service uses the most current and complete data available. GIS data and product accuracy may vary. They may be developed from sources of differing accuracy, accurate only at certain scales, based on modeling or interpretation incomplete while being created or revised...etc. Using GIS products for purposes other than those, for which they were created, may yield inaccurate or misleading results. This information was released on Date: October 18, 2018.



FLATHEAD NATIONAL FOREST
MID-SWAN SCOPING

PROPOSED VEGETATION TREATMENT BY WATERSHED
CONDON CREEK, LION CREEK AND PONY CREEK (EAST OF HIGHWAY 83)
OCTOBER 2018

MAP: 13



PROPOSED VEGETATION TREATMENT
- NON-COMMERCIAL THIN
- THIN WITH VARIABLE DENSITY
- THIN WITH REGENERATION OPENINGS
- REGENERATION WITH VARIABLE RETENTION
- PRESCRIBED FIRE
- PLANTING
- SEED CACHING
- PATCH RETENTION

MAP FEATURE
- PRIMARY PUBLIC-USE ROAD
- RIPARIAN MANAGEMENT ZONE (RMZ)
- SURFACE WATER OR WETLAND
- WILDERNESS BOUNDARY
- WILDLAND URBAN INTERFACE
- WATERSHED AREA OF INTEREST
- OTHER WATERSHED

OWNERSHIP
- FOREST SERVICE
- PRIVATE
- STATE
- TRIBAL

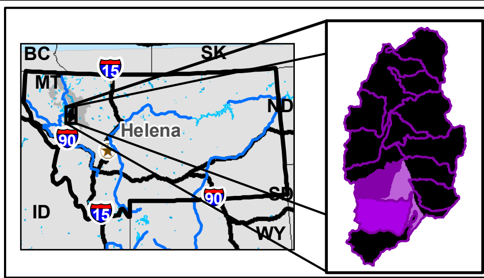
Map Layout by: D.A. Stock using ArcMap 10.5.1 Data Source: USFS Corporate GIS database: Ownership, Lakes50AcresPlus, Project Boundary and Watershed Data. Specialist Created Data: Data related to Roads, Aquatics, and Terrestrial Analysis. Roads data is new unverified layer currently under review. Contact Wade Sims regarding roads data. Stream layer does not include category 3 streams. In addition Inner/Outer RMZs are combined for mapping purposes.

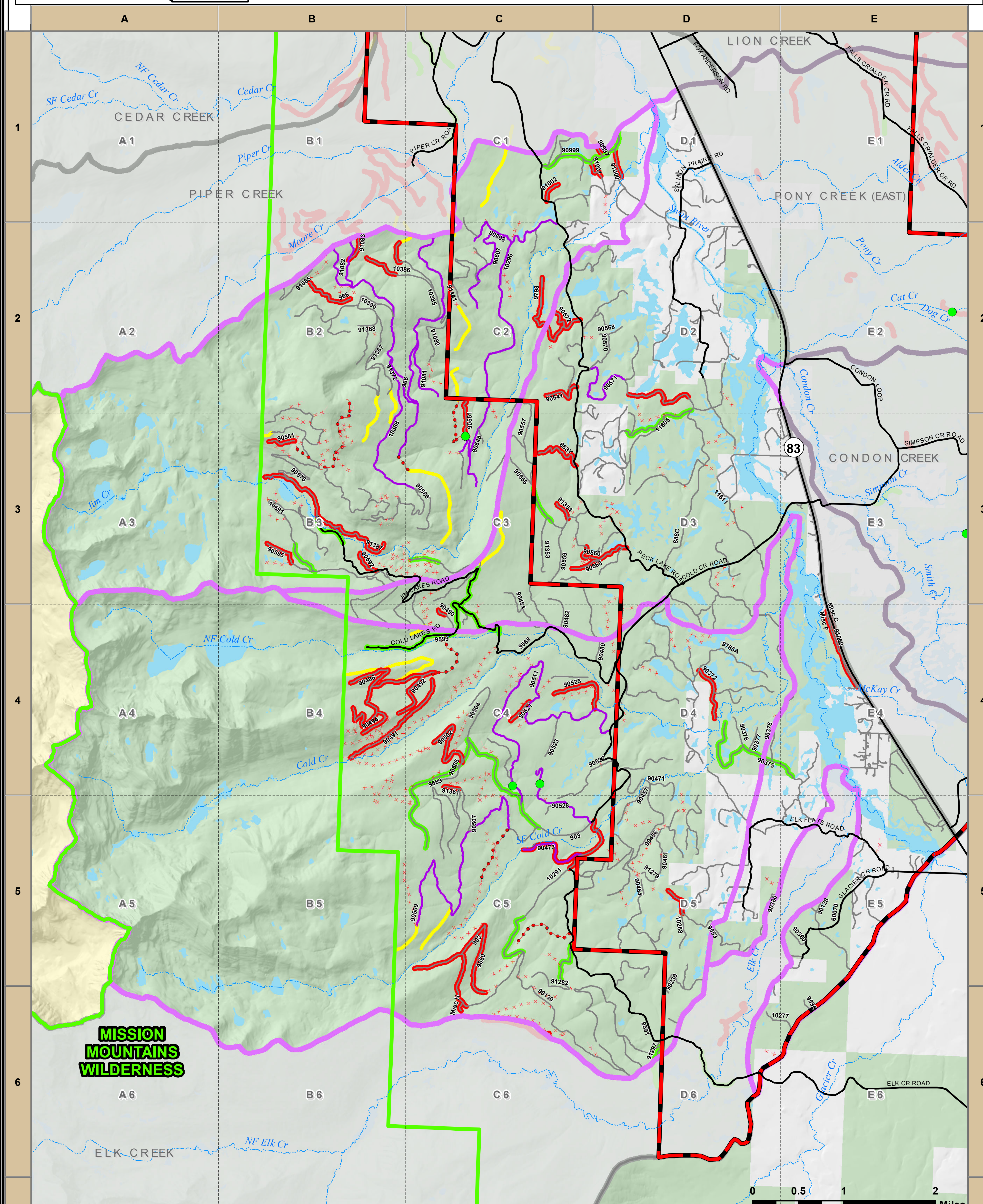
Disclaimer: The Forest Service uses the most current and complete data available. GIS data and product accuracy may vary. They may be developed from sources of differing accuracy, accurate only at certain scales, based on modeling or interpretation incomplete while being created or revised…etc. Using GIS products for purposes other than those, for which they were created, may yield inaccurate or misleading results. This information was released on Date: October 18, 2018.

FLATHEAD NATIONAL FOREST
MID-SWAN SCOPING

PROPOSED ROAD AND AQUATIC TREATMENTS BY WATERSHED
WATERSHED:COLD CREEK, JIM CREEK AND PONY CREEK (WEST OF HIGHWAY 83)
OCTOBER 2018

MAP: 14





PROPOSED ROAD & AQUATIC TREATMENT

- ELIMINATE FISH BARRIER CULVERT
- BUILD BEAVER DAM ANALOG STRUCTURE (BDA)
- IMPROVE FOREST SERVICE ROAD BEST MANAGMENT PRACTICE
- STORMPROOF FOREST SERVICE ROAD
- CONSTRUCT NEW ROAD

MAP FEATURE

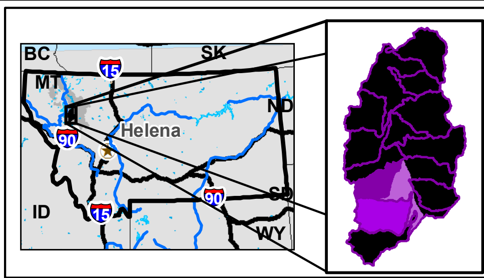
- PRIMARY PUBLIC-USE ROAD
- OTHER EXISTING ROAD
- PREVIOUSLY DECOMMISSIONED ROAD
- PREVIOUSLY STORED ROAD
- RECENT FOREST SERVICE ROAD IMPROVEMENTS
- SURFACE WATER OR WETLAND
- WILDERNESS BOUNDARY
- WILDLAND URBAN INTERFACE
- WATERSHED AREA OF INTEREST
- OTHER WATERSHED

OWNERSHIP

- FOREST SERVICE
- PRIVATE
- STATE
- TRIBAL

Map Layout by: D.A. Stock using ArcMap 10.5.1 Data Source: USFS Corporate GIS database: Ownership, Lakes50AcresPlus, Project Boundary and Watershed Data. Specialist Created Data: Data related to Roads, Aquatics, and Terrestrial Analysis. Roads data is new unverified layer currently under review. Contact Wade Sims regarding roads data. Stream layer does not include category 3 streams.

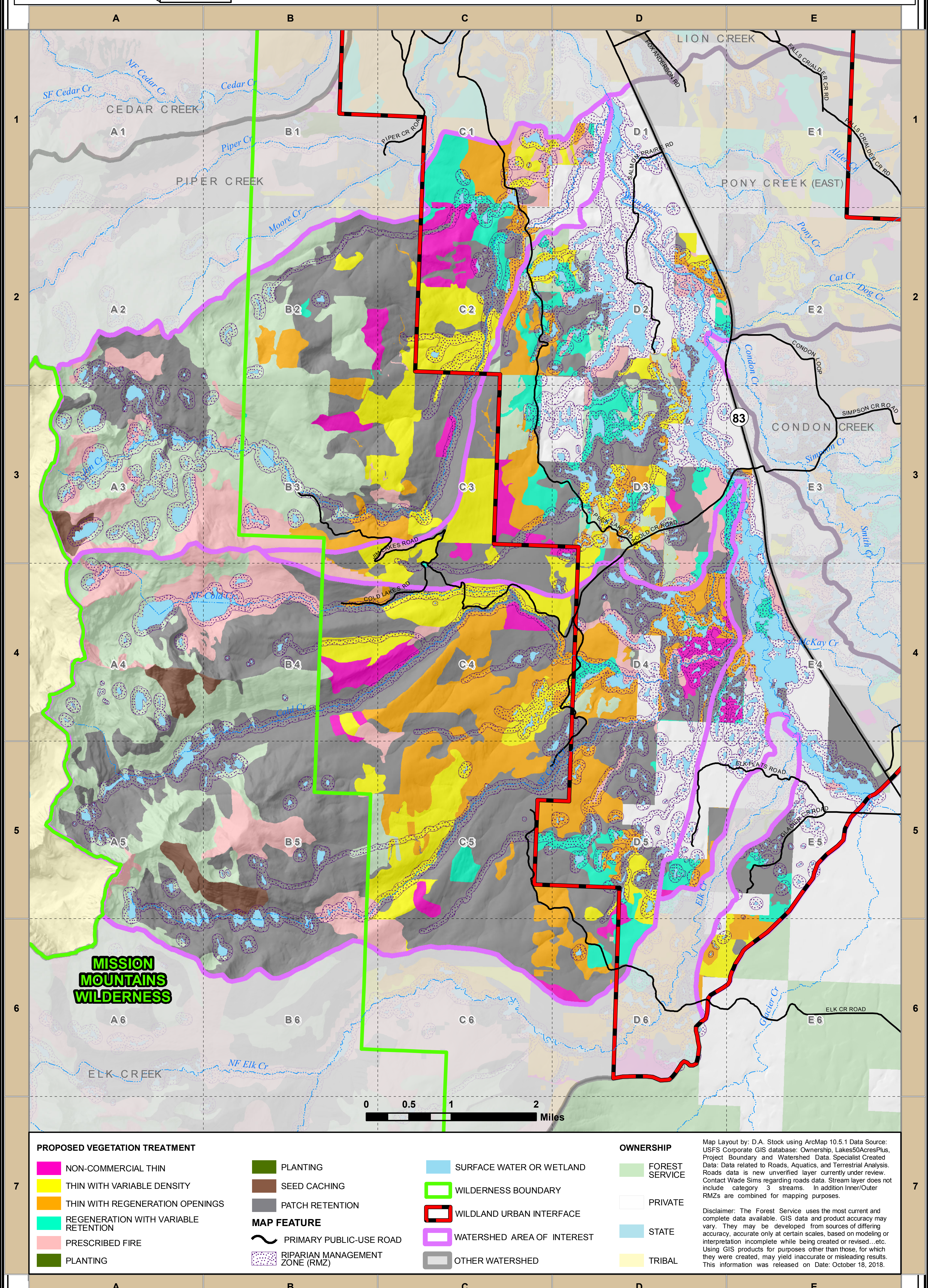
Disclaimer: The Forest Service uses the most current and complete data available. GIS data and product accuracy may vary. They may be developed from sources of differing accuracy, accurate only at certain scales, based on modeling or interpretation incomplete while being created or revised...etc. Using GIS products for purposes other than those, for which they were created, may yield inaccurate or misleading results. This information was released on Date: October 17, 2018.



FLATHEAD NATIONAL FOREST
MID-SWAN SCOPING

PROPOSED VEGETATION TREATMENT BY WATERSHED
WATERSHED:COLD CREEK, JIM CREEK AND PONY CREEK (WEST OF HIGHWAY 83)
OCTOBER 2018

MAP: 15



PROPOSED VEGETATION TREATMENT

- NON-COMMERCIAL THIN
- THIN WITH VARIABLE DENSITY
- THIN WITH REGENERATION OPENINGS
- REGENERATION WITH VARIABLE RETENTION
- PRESCRIBED FIRE
- PLANTING
- PLANTING
- SEED CACHING
- PATCH RETENTION

MAP FEATURE

- PRIMARY PUBLIC-USE ROAD
- RIPARIAN MANAGEMENT ZONE (RMZ)
- SURFACE WATER OR WETLAND
- WILDERNESS BOUNDARY
- WILDLAND URBAN INTERFACE
- WATERSHED AREA OF INTEREST
- OTHER WATERSHED

OWNERSHIP

- FOREST SERVICE
- PRIVATE
- STATE
- TRIBAL

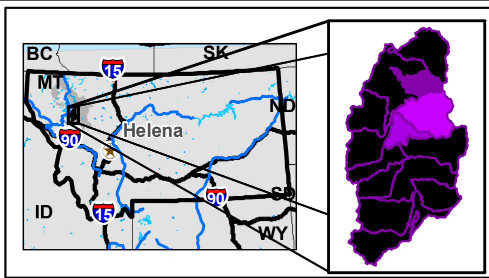
Map Layout by: D.A. Stock using ArcMap 10.5.1 Data Source: USFS Corporate GIS database: Ownership, Lakes50AcresPlus, Project Boundary and Watershed Data. Specialist Created Data: Data related to Roads, Aquatics, and Terrestrial Analysis. Roads data is new unverified layer currently under review. Contact Wade Sims regarding roads data. Stream layer does not include category 3 streams. In addition Inner/Outer RMZs are combined for mapping purposes.

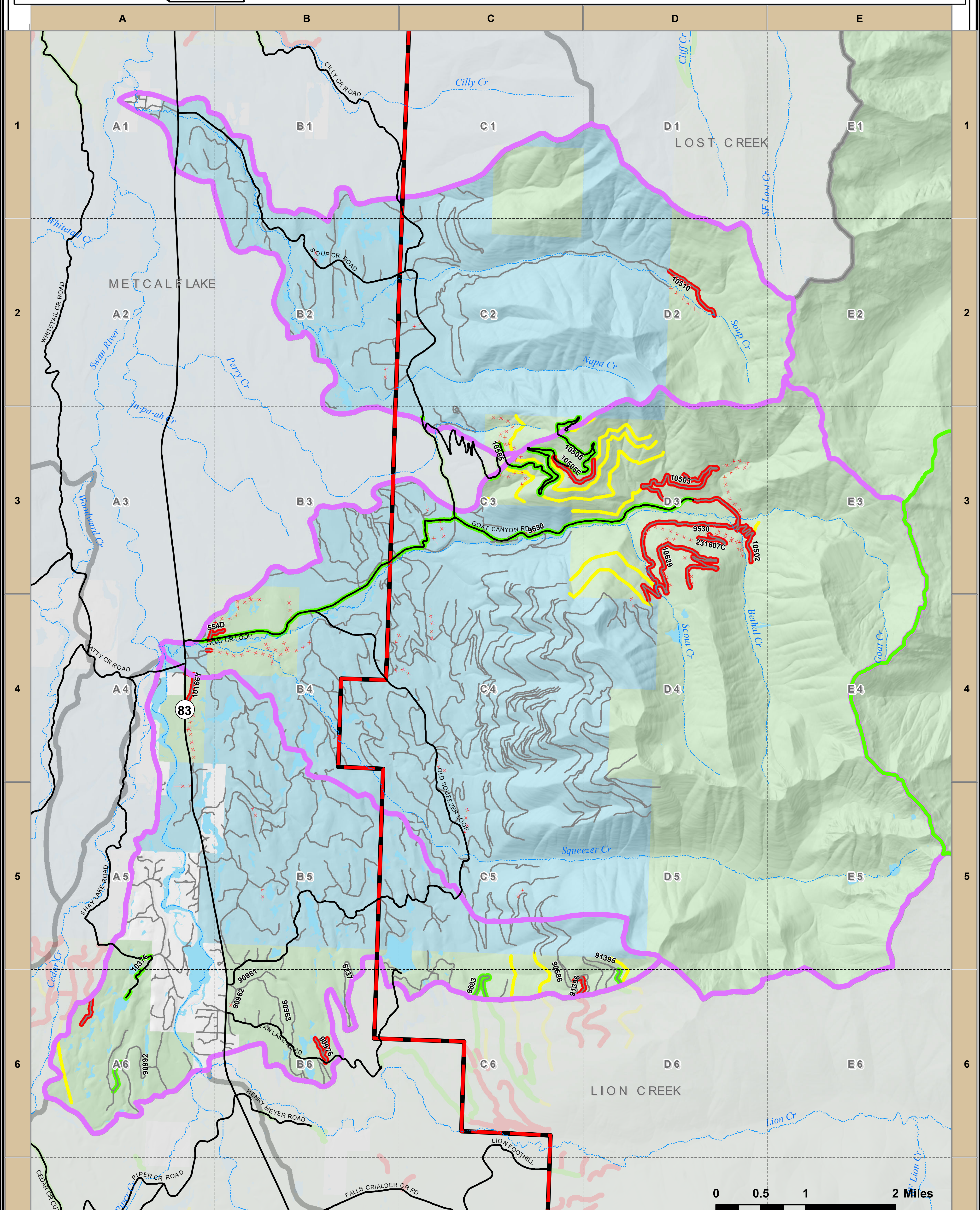
Disclaimer: The Forest Service uses the most current and complete data available. GIS data and product accuracy may vary. They may be developed from sources of differing accuracy, accurate only at certain scales, based on modeling or interpretation incomplete while being created or revised…etc. Using GIS products for purposes other than those, for which they were created, may yield inaccurate or misleading results. This information was released on Date: October 18, 2018.

FLATHEAD NATIONAL FOREST
MID-SWAN SCOPING

PROPOSED ROAD AND AQUATIC TREATMENTS BY WATERSHED
WATERSHED: GOAT CREEK, SOUP CREEK AND VAN LAKE
OCTOBER 2018

MAP: 16





PROPOSED ROAD & AQUATIC TREATMENT
- ELIMINATE FISH BARRIER CULVERT
- BUILD BEAVER DAM ANALOG STRUCTURE (BDA)
- IMPROVE FOREST SERVICE ROAD BEST MANAGMENT PRACTICE
- STORMPROOF FOREST SERVICE ROAD
- CONSTRUCT NEW ROAD

MAP FEATURE
- PRIMARY PUBLIC-USE ROAD
- OTHER EXISTING ROAD
- PREVIOUSLY DECOMMISSIONED ROAD
- PREVIOUSLY STORED ROAD
- RECENT FOREST SERVICE ROAD IMPROVEMENTS
- SURFACE WATER OR WETLAND
- WILDERNESS BOUNDARY
- WILDLAND URBAN INTERFACE
- WATERSHED AREA OF INTEREST
- OTHER WATERSHED

OWNERSHIP
- FOREST SERVICE
- PRIVATE
- STATE
- TRIBAL

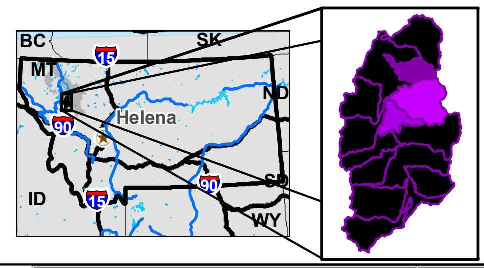
Map Layout by: D.A. Stock using ArcMap 10.5.1 Data Source: USFS Corporate GIS database: Ownership, Lakes50AcresPlus, Project Boundary and Watershed Data. Specialist Created Data: Data related to Roads, Aquatics, and Terrestrial Analysis. Roads data is new unverified layer currently under review. Contact Wade Sims regarding roads data. Stream layer does not include category 3 streams.

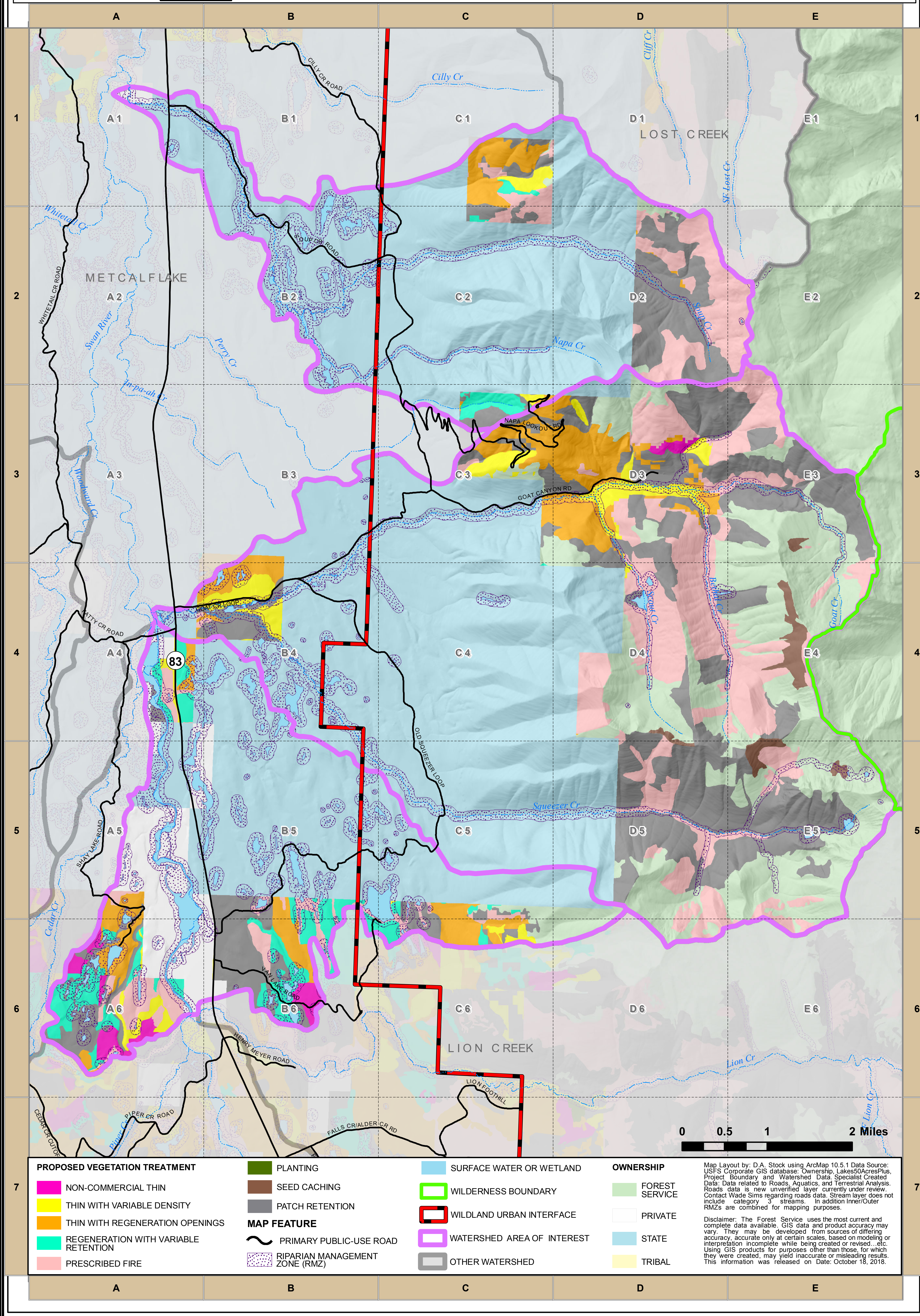
Disclaimer: The Forest Service uses the most current and complete data available. GIS data and product accuracy may vary. They may be developed from sources of differing accuracy, accurate only at certain scales, based on modeling or interpretation incomplete while being created or revised...etc. Using GIS products for purposes other than those, for which they were created, may yield inaccurate or misleading results. This information was released on Date: October 18, 2018.

FLATHEAD NATIONAL FOREST
MID-SWAN SCOPING

PROPOSED VEGETATION TREATMENT BY WATERSHED
WATERSHED: GOAT CREEK, SOUP CREEK AND VAN LAKE
OCTOBER 2018

MAP: 17





Map Layout by: D.A. Stock using ArcMap 10.5.1 Data Source: USFS Corporate GIS database: Ownership, Lakes50AcresPlus, Project Boundary and Watershed Data. Specialist Created Data: Data related to Roads, Aquatics, and Terrestrial Analysis. Roads data is new unverified layer currently under review. Contact Wade Sims regarding roads data. Stream layer does not include category 3 streams. In addition Inner/Outer RMZs are combined for mapping purposes.

Disclaimer: The Forest Service uses the most current and complete data available. GIS data and product accuracy may vary. They may be developed from sources of differing accuracy, accurate only at certain scales, based on modeling or interpretation incomplete while being created or revised…etc. Using GIS products for purposes other than those, for which they were created, may yield inaccurate or misleading results. This information was released on Date: October 18, 2018.