Field Measures of Wilderness Character 2015

Montana Wilderness Association

Executive Summary

This report summarizes the data collected in the 2015 Wilderness Character Inventory in the Custer Gallatin National Forest. Trails inventoried include South Cottonwood Trail #422, the Lionhead Recommended Wilderness including Sheep Lake Trail #218, Mile Creek Trail, #214, Mile Creek Face Trail #219, Coffin Lake Trail # 209, West Fork Coffin Creek #216 (to the junction of #209), and the non-trailed areas Lost Water Canyon and Big Ice Cave in the Pryor Mountains. These trails were hiked and observations documented of measures relating to the qualities of wilderness character identified in the Wilderness Act of 1964: untrammeled, natural, undeveloped, and opportunities for solitude or primitive and unconfined recreation.

The 2015 inventory supplements other wilderness character monitoring studies conducted by the Wilderness Institute of the University of Montana in 2011.[1] The structure and style of this report is modeled after the 2011 report to provide consistency in the data reporting. The inventories took place between May-July 2015.

The map visuals represent findings in the Custer Gallatin National Forest are separated into geographical areas (the Lionhead Recommended Wilderness, South Cottonwood, and the Pryor Mountains). We also tried to complete inventorying of trail #132, Eightmile Creek. The trail was very difficult to follow due to so much downfall, so we did not inventory any additional trail than the 2011 inventorying crew.

This study follows a protocol was created in 2009 by the Wilderness Institute of University of Montana, the Aldo Leopold Wilderness Research Institute, the Forest Service, and other local non-governmental organizations. These groups developed field measures to monitor four wilderness qualities identified in the Wilderness Act of 1964: 1) untrammeled, 2) natural, 3) undeveloped, and 4) opportunity for solitude or primitive and unconfined recreation.

[1] 2011 Wilderness Character Monitoring Report is available at:
http://www.cfc.umt.edu/wi/Documents/HPBH.combinedmeasures.2011.pdf

Trails inventoried in the Custer Gallatin in 2015.

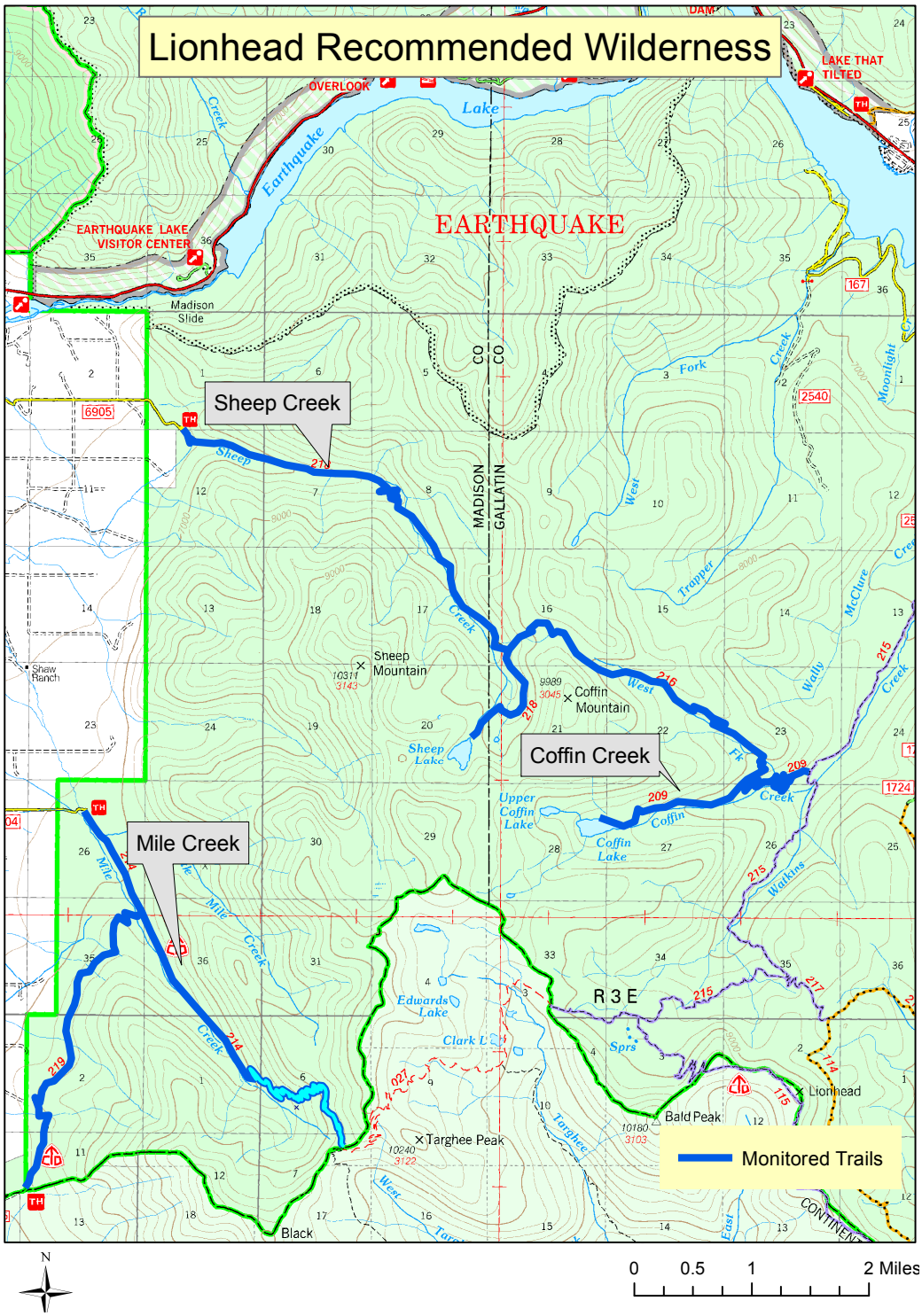

Figure 1. Location of inventoried trails in the Lionhead Recommended Wilderness

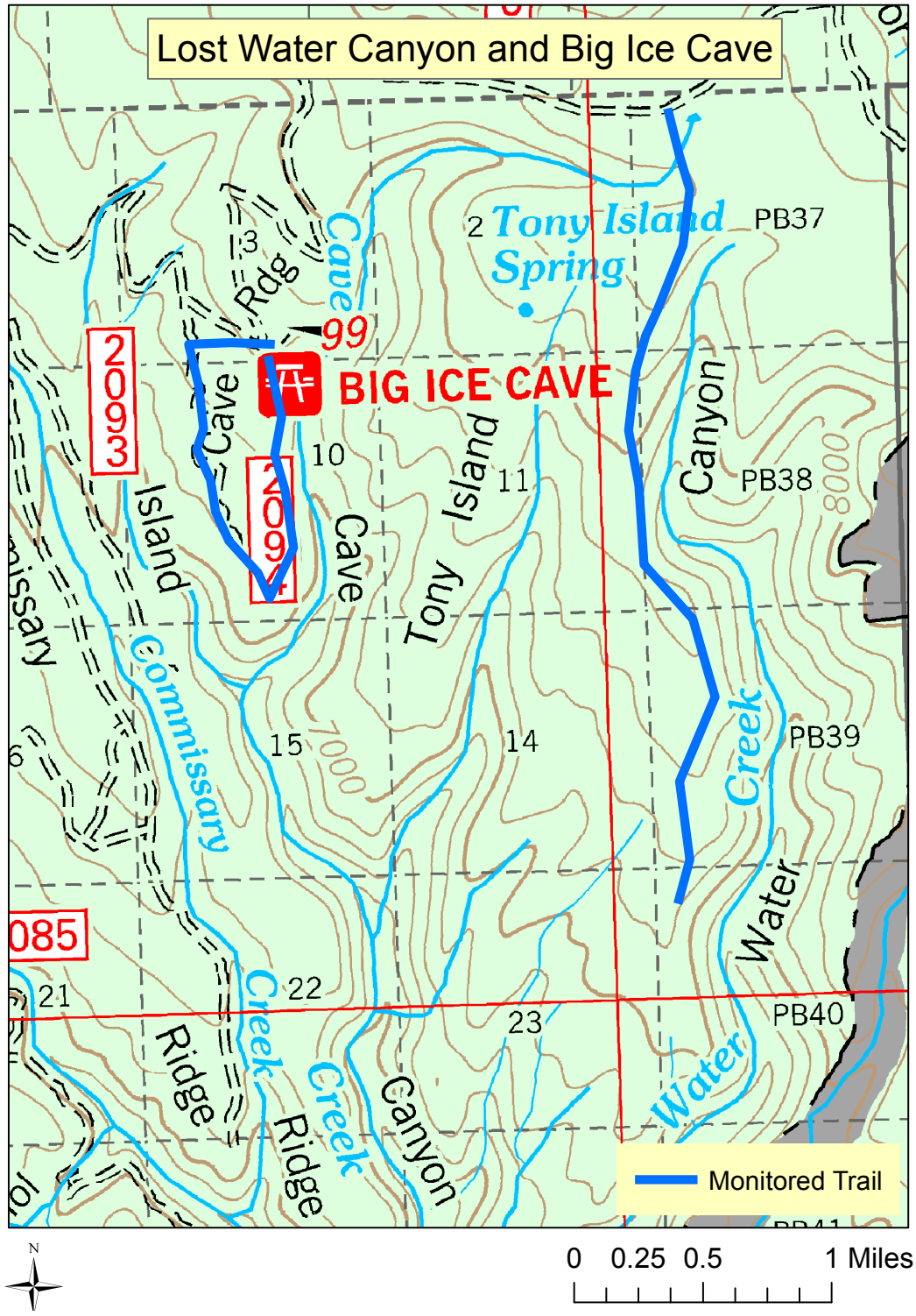

Figure 2. Location of inventoried trails in the Pryor Mountains

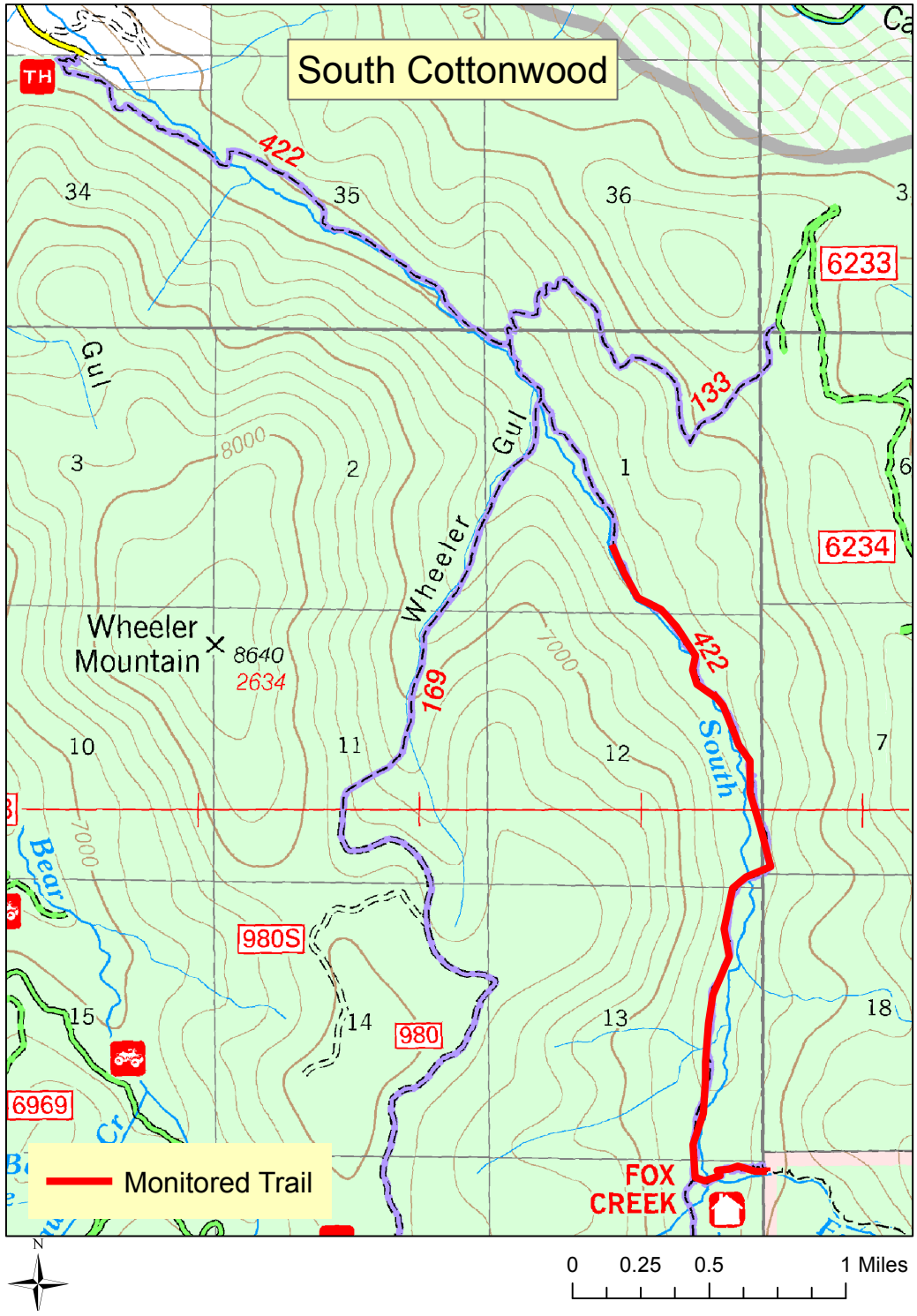

Figure 3. Location of the inventoried trail near South Cottonwood

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Introduction

This report summarizes data collected during a wilderness character inventory study led by the Montana Wilderness Association in the summer of 2015. Data was collected by MWA staff and occasionally with help from citizen scientists. This report shows the results of the 2015 study but does not qualify the data or make any determinations. All data in this report reflects inventories within the Custer-Gallatin National Forest.

The 2015 study adds to wilderness character inventory studies previously conducted by the Wilderness Institute of University of Montana.[2] This study provides baseline data for these trails as this is the first data collected.

This study followed the same protocol used in the 2011 HPBH WSA Character Monitoring. The protocol was created in 2009 by the Wilderness Institute of University of Montana, the Aldo Leopold Wilderness Research Institute, the Forest Service, and other local non-governmental organizations. These groups developed field measures to monitor four wilderness qualities identified in the Wilderness Act of 1964: 1) untrammeled, 2) natural, 3) undeveloped, and 4) opportunity for solitude or primitive and unconfined recreation.

The qualities were measured using the follow attribute categories:

1) Untrammeled: pulling weeds (no weed management occurred in 2015).
2) Natural: invasive plants, wildlife encounters, and water erosion.
3) Undeveloped: installations and developments, signs, and trail closures.
4) Opportunities for solitude: non-system trails, campsite conditions, mechanized or motorized use, recreational use, noise intrusions, and visual intrusions.

Data Management

The information below explains the 1) protocol development, 2) field data collection, 3) data analysis, and 4) data reporting.

1) Protocol Development

The protocol used is based off the Wilderness Institute's protocol used in 2011. Minor changes were made to the protocol by adding elements of the 2013 protocol.[3]

Changes include:

- Adding the *camp solitude* to the Campsite feature class
- "failed in-trail feature" was added to the Trail Width feature class, *TW_Width*
- 2013 protocol for *Installation and Developments* was substituted for the 2011 protocol

[2] 2011 Wilderness Character Monitoring Report is available at:
http://www.cfc.umt.edu/wi/Documents/HPBH.combinedmeasures.2011.pdf

[3] See Appendix A for 2014 Wilderness Character Monitoring Protocol

2) Field Data Collection

The Montana Wilderness Association staffers were trained in the protocol by the Wilderness Institute. The lead MWA staffer was trained in weed identification. Volunteers participating in the 2015 Wilderness Character Inventory were also trained in the protocol and supervised during data collection. The data collection in 2015 focused on trails in the Lionhead Recommended Wilderness, the Lost Water Canyon of the Pryor Mountains, and completing inventory work on the South Cottonwood trail in the Gallatin NF. We also tried to complete inventorying of trail #132, Eightmile Creek. The trail was very difficult to follow due to so much downfall, so we did not inventory any additional trail than the 2011 inventorying crew.

Weeds data was entered into the Juno Trimble and given to the Forest Service liaison at the Livingston Ranger District. The Juno Trimble, however, was not acquired until late in the season. The USFS weeds protocol was followed, and all listed weeds were recorded as encountered.

All other data was recorded in the iPad application, *GISPro*. The iPad was pre-programmed with the appropriate protocol. For every observation a point or line segment was created and further defined by its attributes. Photos were taken of attributes when appropriate. After each field day, MWA's project lead wrote a trip summary for the monitored trail.

3) Data Analysis

GPS Data was differentially corrected. All data was re-projected into North American Datum 1983 as Universal Transverse Mercator (UTM) grid coordinates in zone 12.

4) Data Reporting

The structure and background content of this report is modeled after the HPBH 2011 Field Measures Report.[4] This report summarizes data through text, maps and graphs, but relies on the 2011 report for context.

Due to the small inventory size, the visuals for South Cottonwood and the Lost Water Canyon and Big Ice Cave areas of the Pryor Mountains are found below. Attributes observed in these areas are not extrapolated and shown on individual maps like attributes observed in the Lionhead Recommended Wilderness.

All graphs and charts include data from *all* observations inventoried.

[4] HPBH 2011 Field measures Report

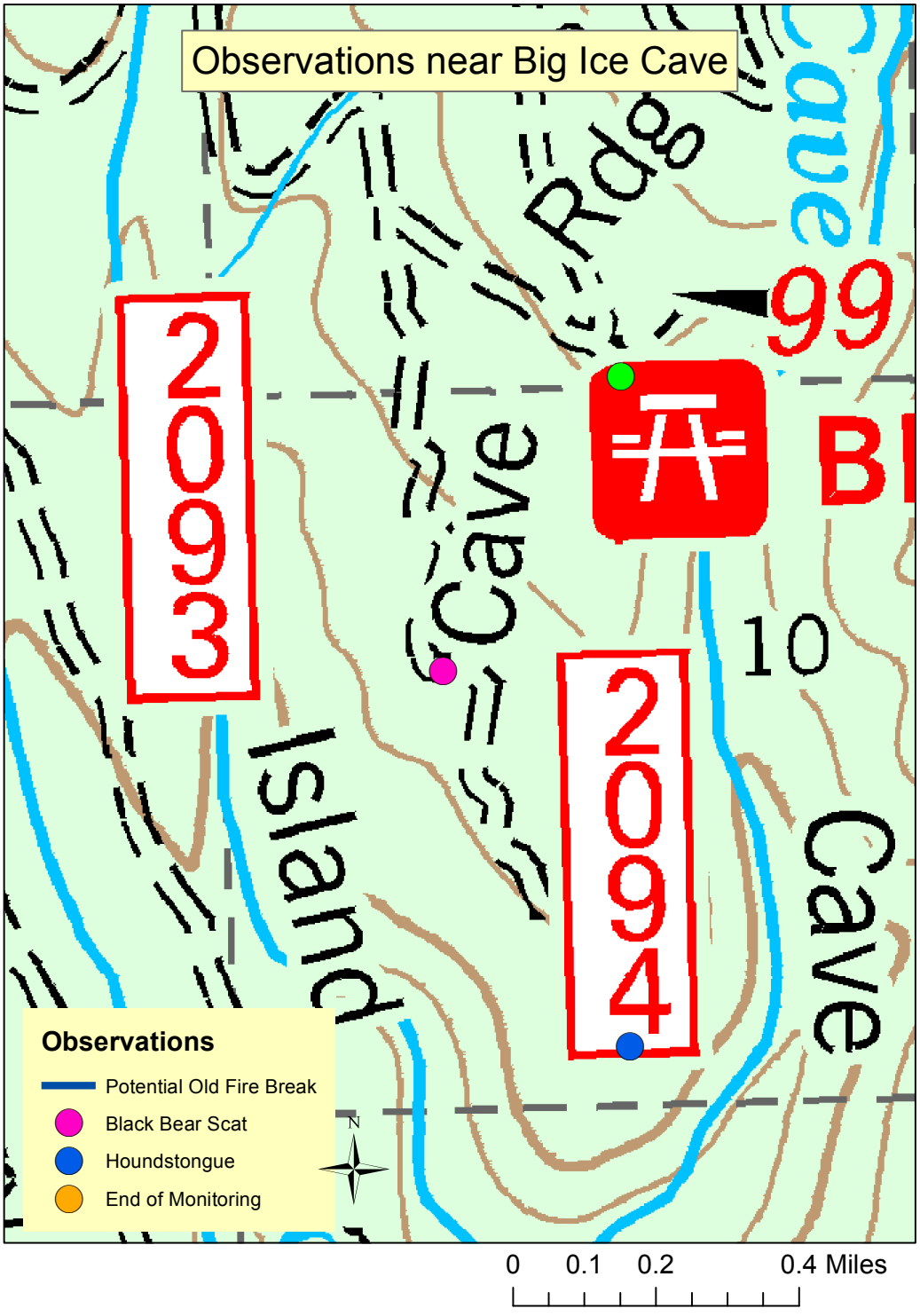

Figure 4. Observations during inventorying the Big Ice Cave loop.

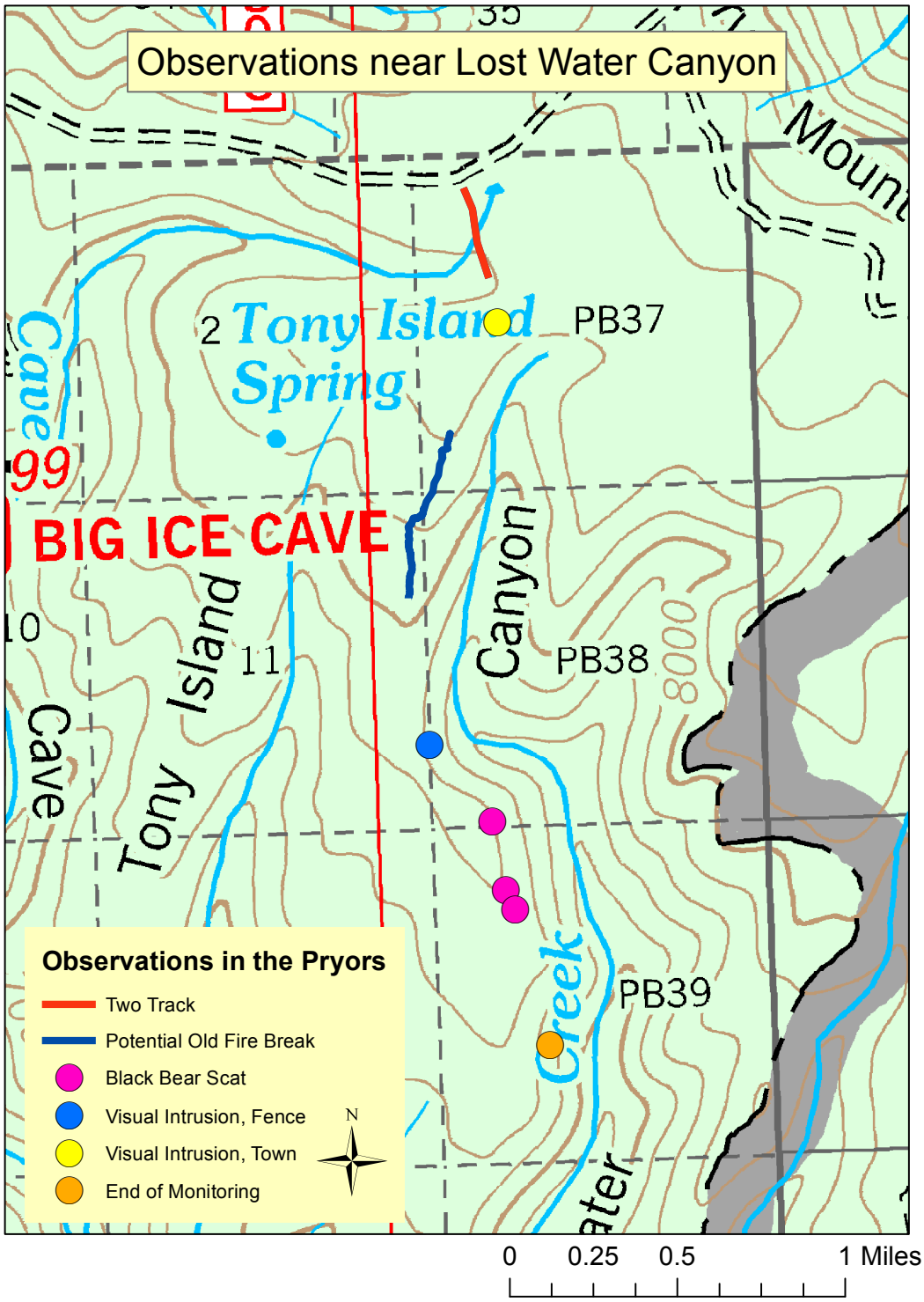

Figure 5. Observations during inventorying the Lost Water Canyon.

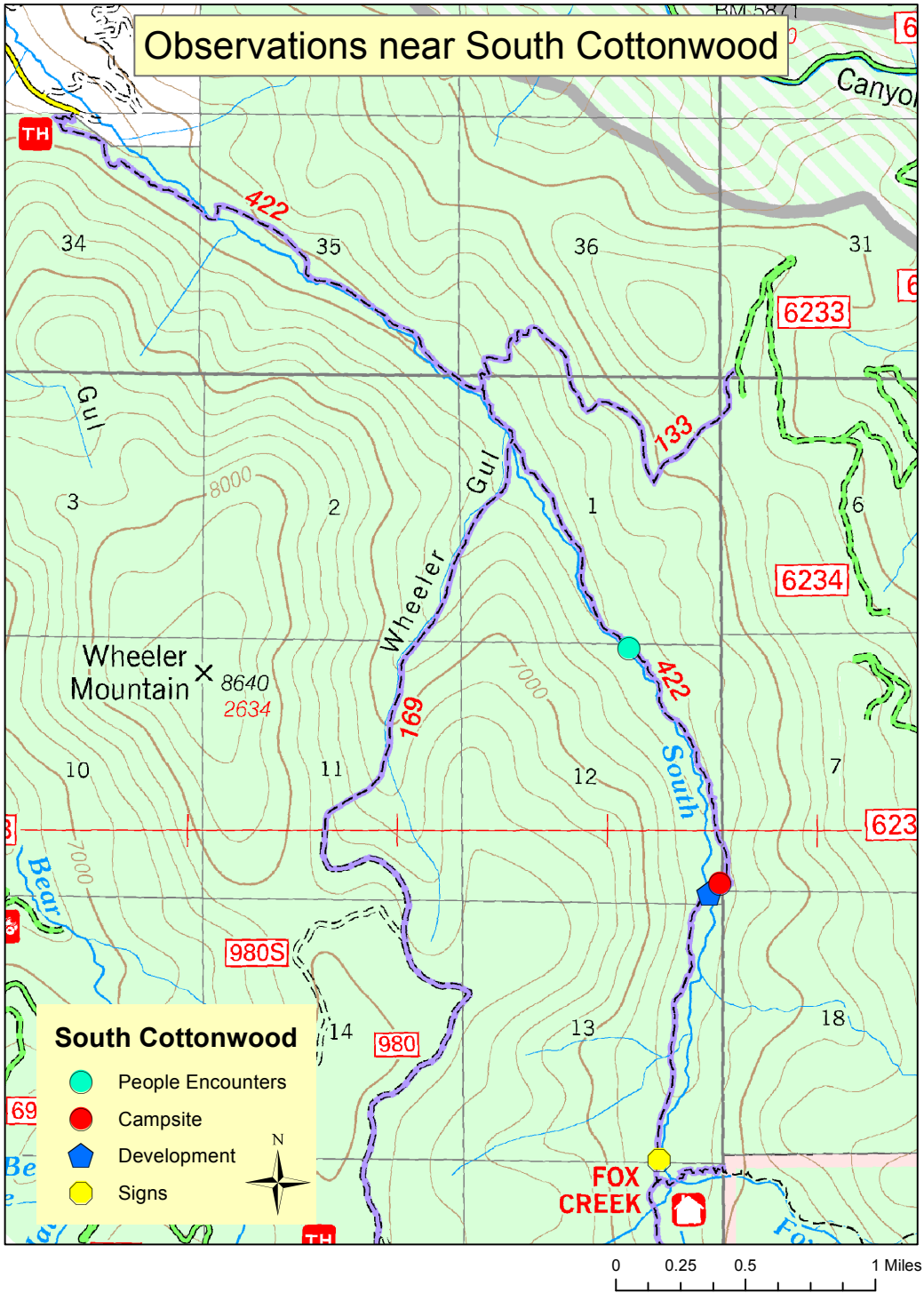

Figure 6. Observations while finishing the inventory of South Cottonwood.

Field Measures of Wilderness Character

I. Untrammeled Quality

Wilderness is "an area where the earth and its community of life are untrammeled by man" (Wilderness Act, 1964). Untrammeled has come to signify areas free from modern human control and actions which manipulate nature, even when taken to restore natural systems (Landres, et al. 2008). Actions taken by crews diminish the untrammeled character of the area. In the 2015 WCI participants did not conduct any weed management.

II. Natural Quality

Natural quality reflects the extent "wilderness ecological systems are substantially free from the effects of modern civilization" (Landres et al., 2008). Natural quality is assessed by monitoring attributes that reflect the integrity of ecological systems, such as species composition and physical characteristics. This project used three identifiable measures of naturalness that are appropriate and feasible to monitor with field protocols: 1) distribution and prevalence of non-indigenous species (weeds) along trail systems, 2) visible signs of select wildlife populations (scat and/or other signs of carnivores, bears, megafauna); and 3) user-created erosion associated with lakes and streambanks. Within these indicator categories, multiple attributes were recorded (see Appendix 1) that capture the detail and context of weed infestations, wildlife signs, and erosion events. Please note not all attributes are summarized in the following sections, but are available in the associated electronic files.[5]

Weeds

Protocol: This study used the USFS Weeds Protocol. As weeds were encountered a polygon representing the observed weed was recorded in the Juno Trimble. Within the polygon an estimate of the infestation's percent cover was made to gage density of the patch.

Weeds data was collected in a Juno Trimble and given to the Forest Service to add into their weeds database. Weed counts were not conducted, instead the USFS protocol required classifying weed encounters as single, clumpy, scattered-patchy, or scattered-even encounters. The Juno Trimble was not acquired until halfway through the season, so weeds data was also collected in the *GIS Pro* application. Only location and species was recorded in this device. Point and polygon data was collected to represent single, clumpy or patchy noxious weed encounters. Due to incomplete information about weed density, no weed density information is shown below. *Weeds data on the maps below reflect weed type and location, but does **not** represent weed density.*

Few weeds were encountered on inventoried trails in the Custer Gallatin. Weeds were observed on trail #218 to Sheep Lake, but after approximately 1.5 miles no more weeds were observed.

[5] Taken from HPBH Field Measures, page 8.

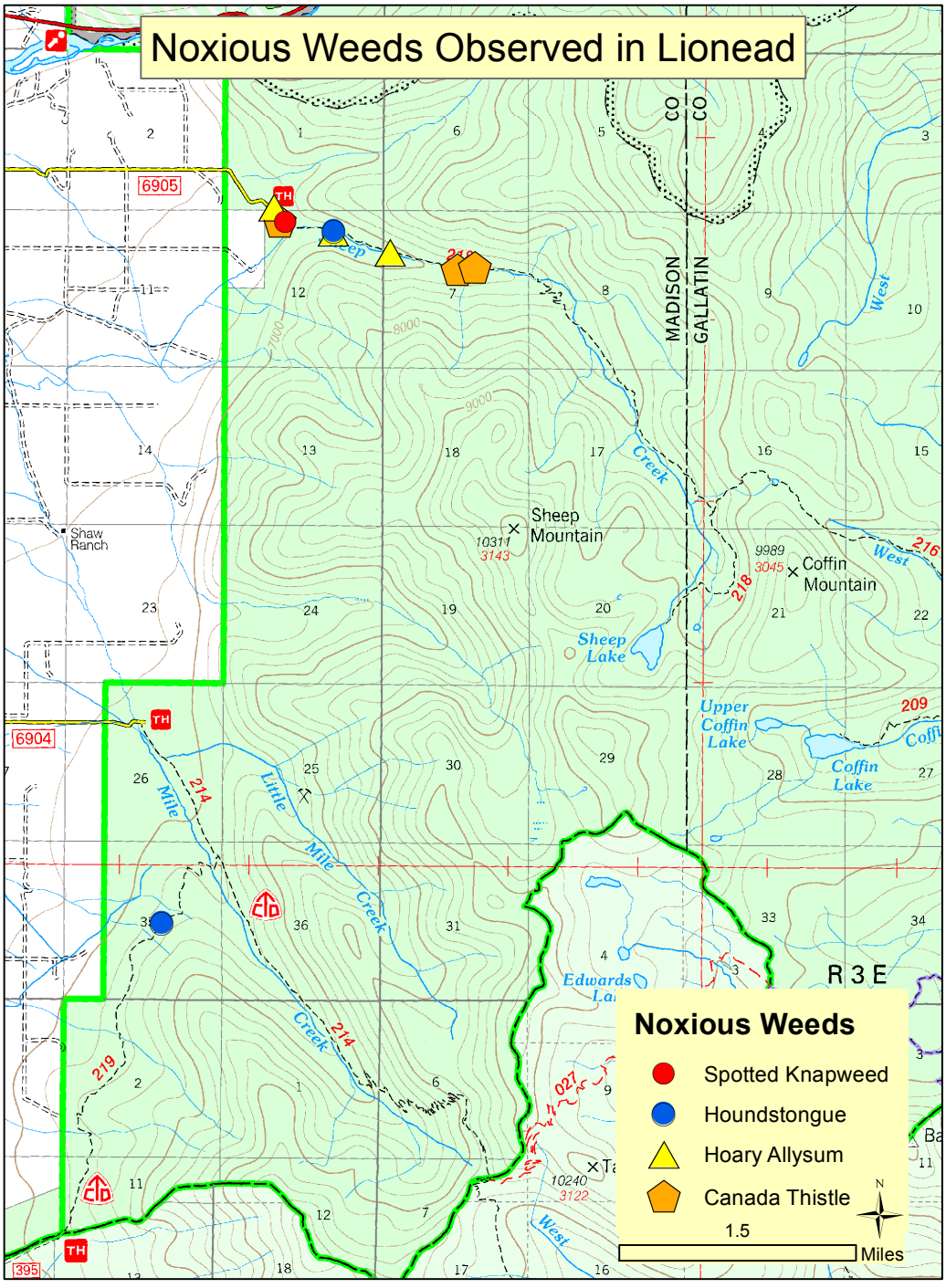

Figure 7. Weeds observed in the Lionhead Recommended Wilderness.

Wildlife Encounters

Wildlife encounters with specific animals were recorded. The protocol required documentation of encounters with wolves, mountain lions, lynx, bobcats, wolverines, fishers, martens, bear (grizzly or black), bighorn sheep, porcupine, hoary marmots, and pikas. Direct and indirect encounters were recorded. Indirect encounters included encounters with tracks, scat, aural encounters, sheds, or carcasses.

Encounters: 5 observations of wildlife were recorded during monitoring. 4 of these encounters were in the Pryor Mountains, the visual is on page 11.

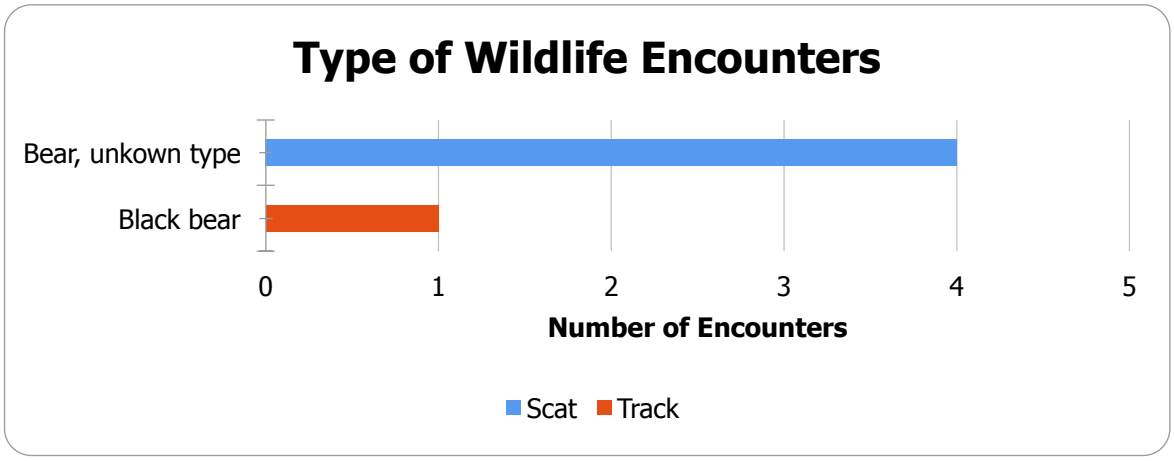

Figure 8. Number and type of wildlife encounter by species and type of encounter.

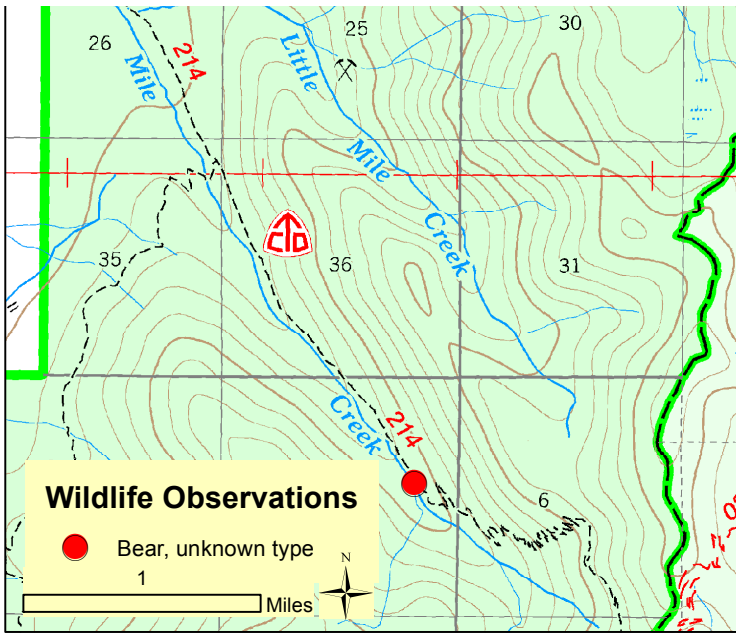

Figure 9. Location of wildlife observations in the Lionead Recommended Wilderness.

Water Erosion

Observed erosion along water bodies was recorded as water erosion points. When monitoring near a stream, lake, pond, etc. any human caused erosion observed was recorded and photographed. The type of water body was recorded as stream, spring, wetland, pond, or lake. The width of streams was noted (measuring the high water mark), and the acreage of ponds and lakes estimated. The severity of the erosion was also recorded as slight, moderate or severe.

Two observations of water erosion were documented. Both instances were slight in severity and were caused by horses crossing Sheep Creek.

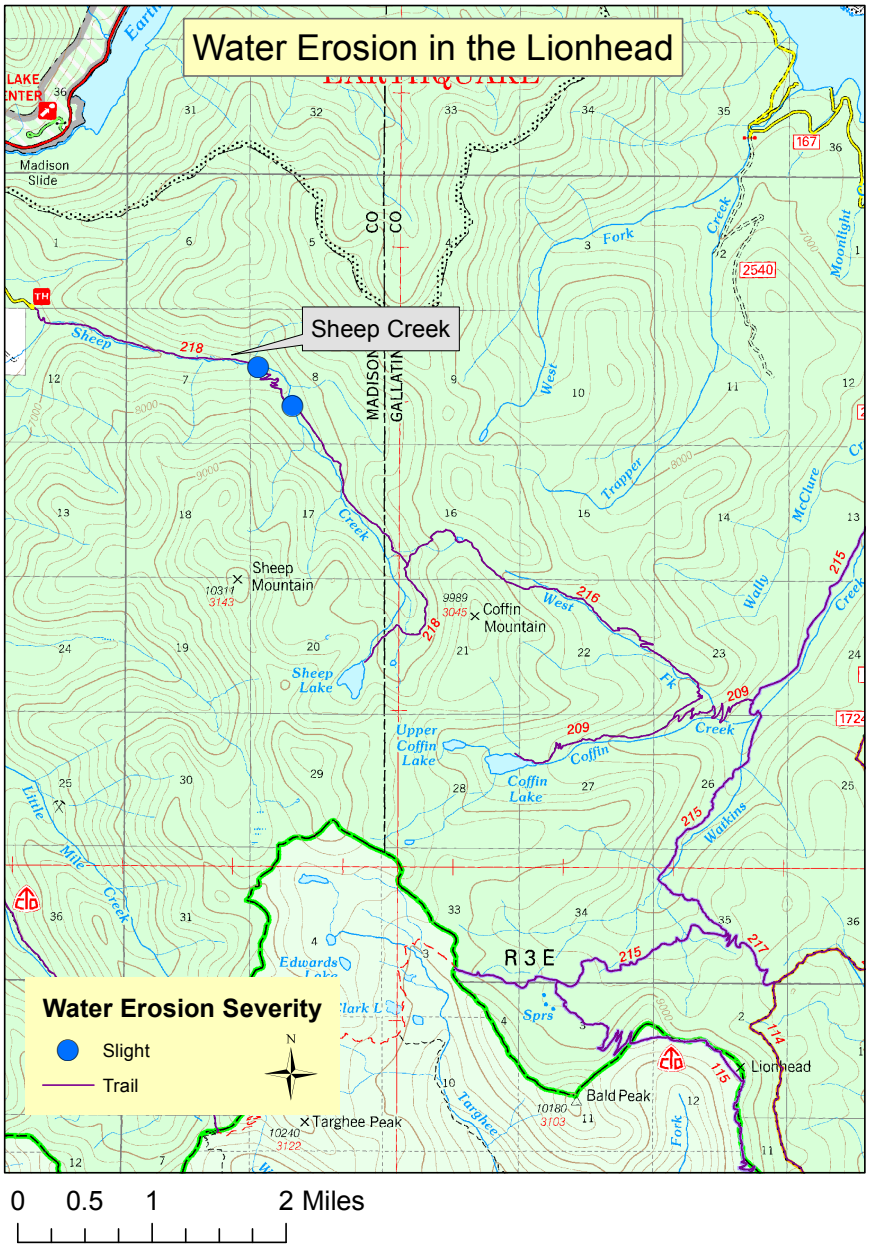

Figure 10. Location and severity of water erosion points in the Lionhead Recommended Wilderness.

III. Undeveloped Quality

Undeveloped quality is the third of four primary elements of wilderness character found within the language of the 1964 Wilderness Act. This quality refers to the extent to which "wilderness retains its primeval character and influence, and is essentially without permanent improvement or modern occupation" (Landres et al., 2008). Non-recreational developments such as installations and signs are considered to affect the undeveloped quality of wilderness character. Recreationally-focused developments, such as trails, campsites, shelters, etc. are considered in the next section, under the solitude or primitive and unconfined quality of wilderness character. This distinction is made so that the developments are not double-counted under both qualities (Landres et al., 2008).[6]

Installations and Developments

Human installations or developments were recorded and photographed as encountered. This includes bridges, restrooms, corrals, dams, repeaters, fences, old cabins, lookouts, pole stashes, cairns, hitch rails, insulated wires, mine adits, mine pits, or mine trenches. Developments not recorded include in-trail features like water bars, check steps, or culverts.

A total of 14 developments were recorded during monitoring.

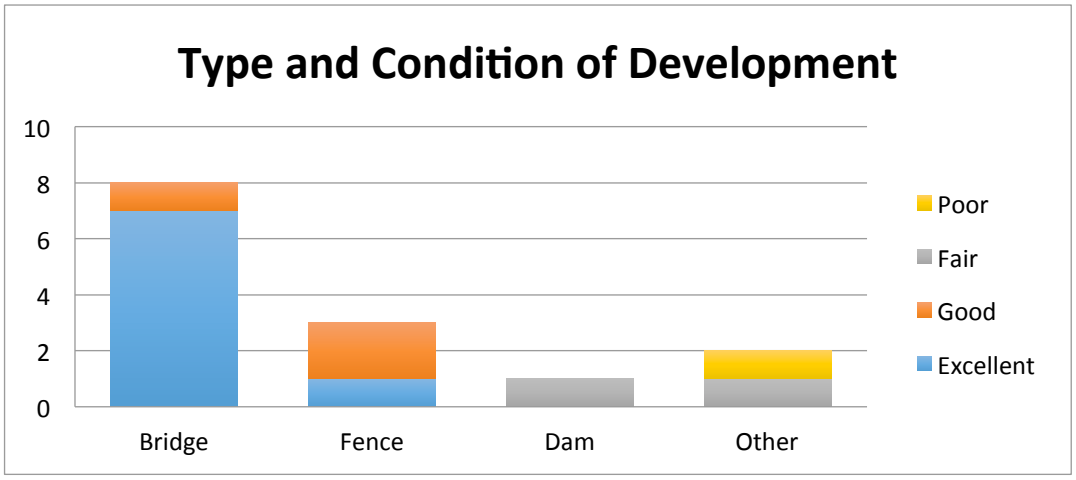

Figure 11. Number of installations and developments by type.

[6] Taken from HBPH Field Measures Report, pg 25

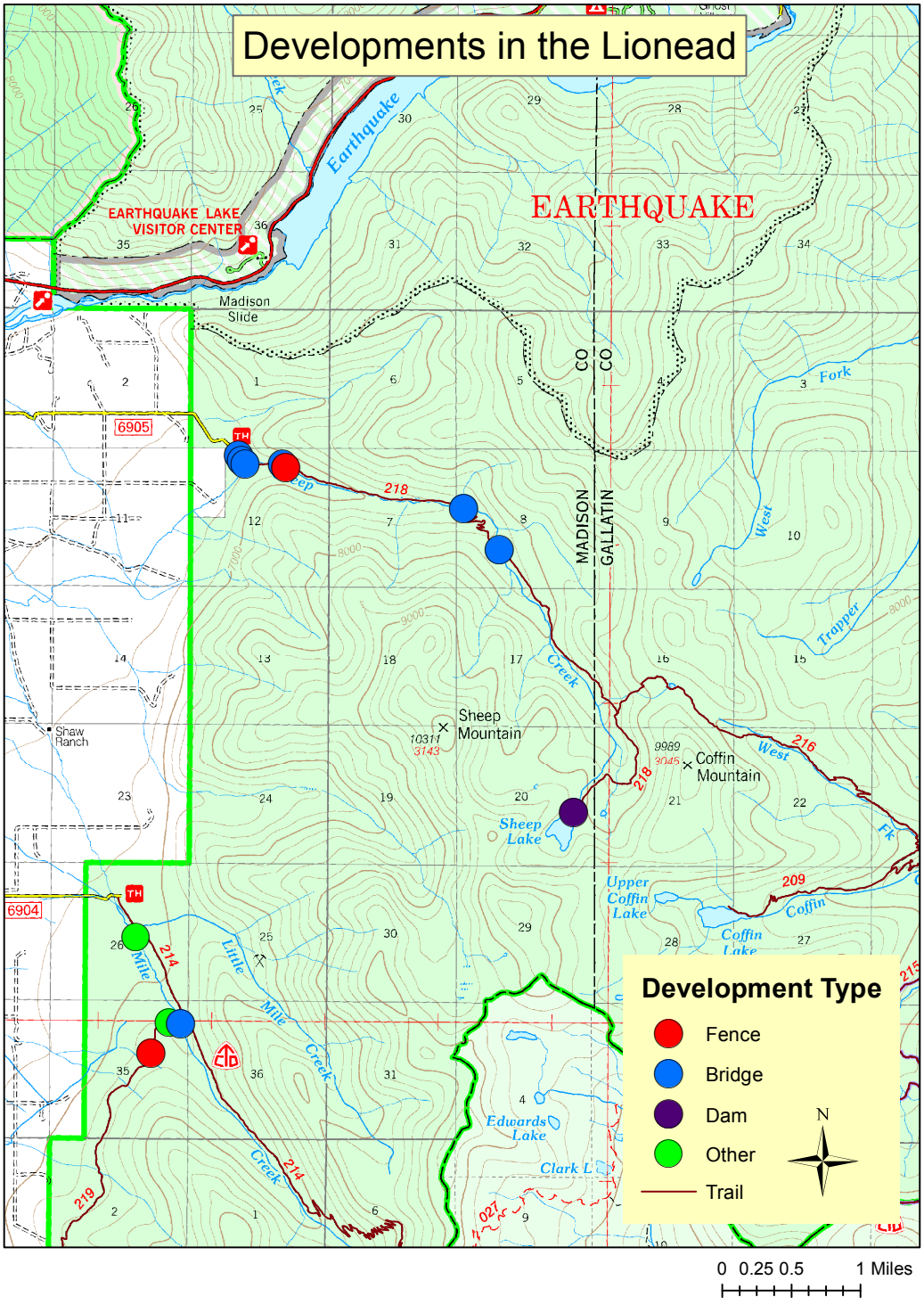

Figure 12. Location of installations and developments by type in the Lionhead Recommended Wilderness.

Signs

Signs were recorded and their condition noted. Signs include trailheads, trail junctions, interpretive, snowmobile markers, and recreational use signs. The sign condition was recorded as vandalized-legible, vandalized-illegible, post with no sign, faded-illegible, faded-legible, or good condition.

A total of 22 signs were observed during monitoring.

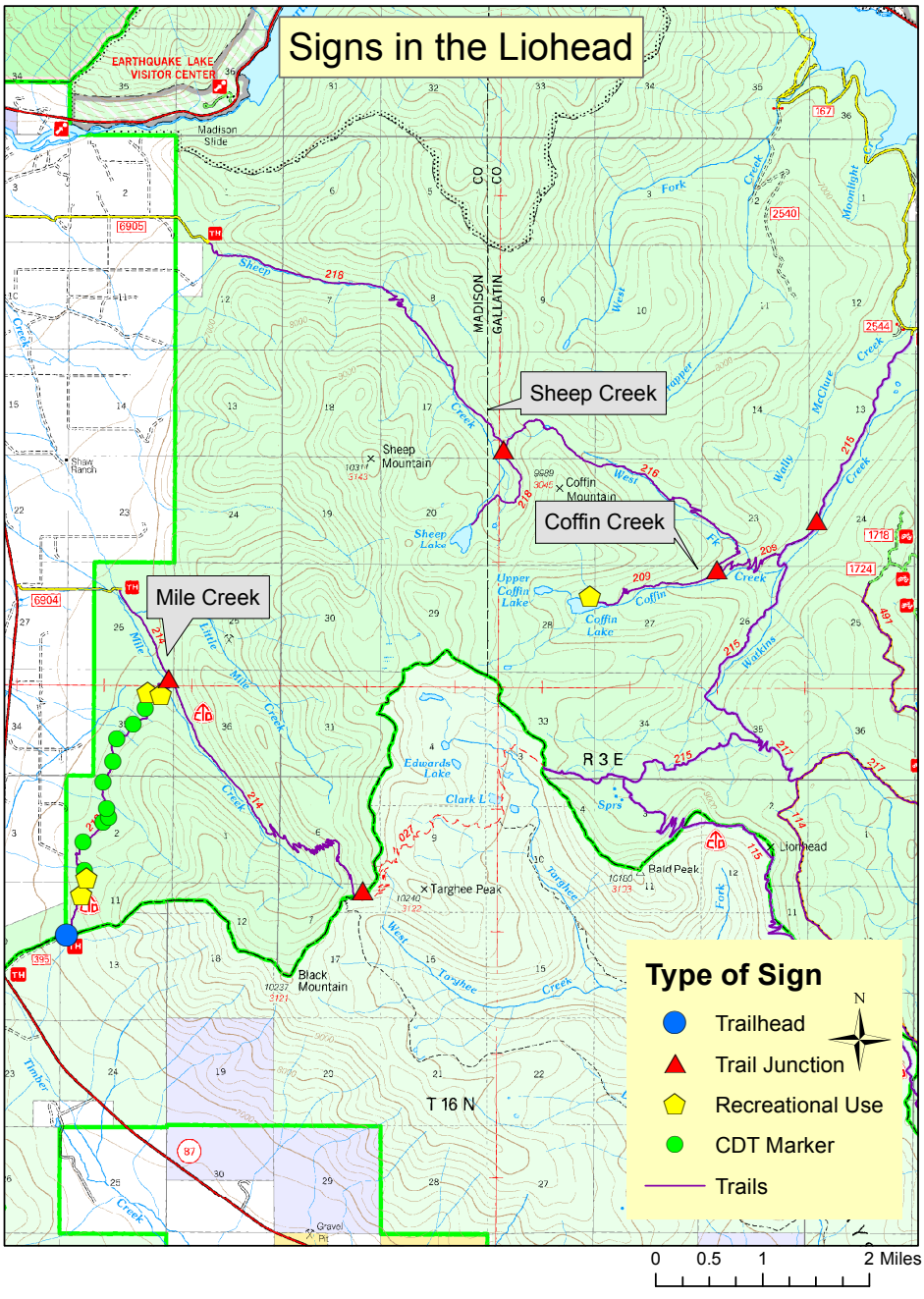

Figure 13. Location and type of signs observed during in the Lionhead Recommended Wilderness.

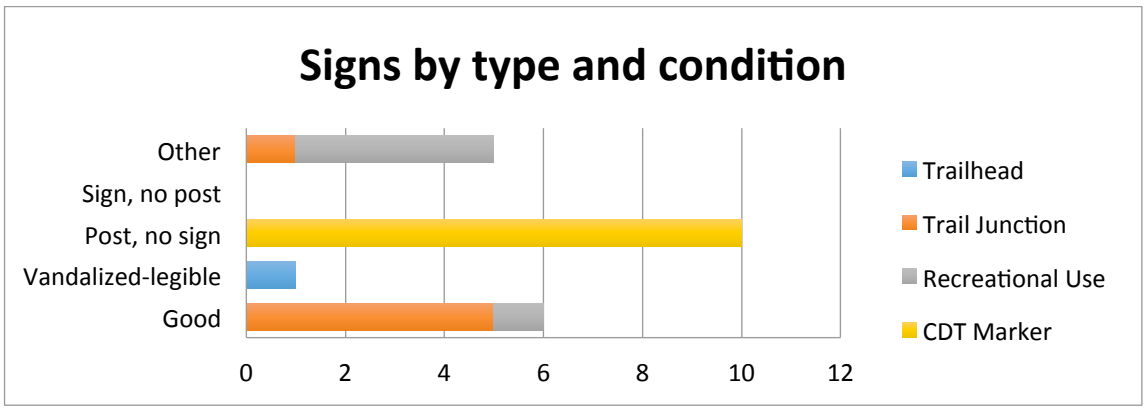

Figure 14. Number of signs by type and condition.

Trail Closure Devices

Trail closure devices were recorded as encountered. Locked gate, unlocked gates, berms, boulders, and fences were recorded if they impeded access to the trail.

No trail closures were observed during monitoring.

IV. Solitude or Primitive and Unconfined Recreation Quality

Solitude or primitive and unconfined recreation quality is the last of four primary elements of wilderness character found within the language of the 1964 Wilderness Act. This quality refers to the extent which "wilderness provides outstanding opportunities for solitude or primitive and unconfined recreation" (Landres et al., 2008), and assesses recreational developments such as trails, restrooms, shelters and campsites. Attributes included in the protocols that reflect this quality are: trail width, non-system trails, evidence of motorized or mechanized use, encounters with other users on trails, motorized noise, visual intrusions from developments outside the Forest Service boundary, and campsite characteristics and impacts.[7]

Trail Width

When a trail varied from a single track point or line data was collected. Trail width points or lines indicated whether the deviation from a single track was a double track, braided/multiple trails, old road beds, failed in-trail feature, standing water in trail, or erosion on the trail.

Trail width observations were made in the Pryor Mountains and a visual is displayed on page 11. Disturbance was observed is believed to be an old fire break. The break was mostly reclaimed and was recorded until it was no longer noticeable.

[7] Taken from HPBH Field Measures Report, pg 31

Evidence of Mechanized and Motorized Use on Trails

The 2014 study took place mostly outside the WSA. Many of the trails we monitored allowed hiking, horses, and mountain biking. As such, no evidence of illegal use was observed. No unauthorized motorized use was observed either.

Non-system Trails

User created trails that were not part of the USFS trails system were documented.

Non-system trails were not observed during the 2015 inventory. The inventoried areas of the Pryor Mountains have no trails. There were some beaten paths observed, but it was difficult to tell if they were game trails or non-system trails. These trails eventually faded away without ending at any type of destination, so we considered them to be game trails. The no non-system trails were inventoried trails in the Lionhead Recommended Wilderness.

Trailheads

Use of trailheads was documented by recording the number of vehicles, horse trailers and ORV trailers parked at the trailhead. The vehicles MWA staff and volunteers arrived in are *not* included in this tally. Several trails required crossing considerable distances prior to beginning monitoring. In these instances, a point was taken where monitoring began because no trailhead existed.

Table 1. Summary of vehicles at trailheads.

TRAIL #	NAME	TOT_NUMBER (vehicles)	HORSE_NUMBER	OVR_NUMBER
#214	Mile Creek	0	0	0
Big Ice Cave	Pryors, Big ice cave loop	1	0	0
#218	Sheep lake	2	0	0

Encounters with People

Points were taken as people were encountered on trails. Number of people, type of activity (hiking, backpacking, biking, horseback riding, etc.), and length of trip (day/overnight trip) were also recorded. If a person was encountered twice and fifteen minutes had passed between encounters, they were recorded again.

A total of 9 people were encountered during monitoring. 8 mountain bikers were encountered on the Sheep Lake #218 trail and 1 mountain biker encountered on South Cottonwood.

Noise

Noise intrusions were recorded during monitoring trips. The duration (1 minute, 1-5 minutes, 5-10, >10 minutes) and intensity (barely audible, clearly heard, loud, or variable) of the noise intrusion was recorded. The noise source was noted if seen. If unseen, the source was recorded in the notes section.

One noise intrusion was observed during the inventory. The vehicular noise intrusion along the Mile Creek Face Trail #219 was heard intermittently along the hike, disappearing completely approximately ½ mile before meeting with trail #214.

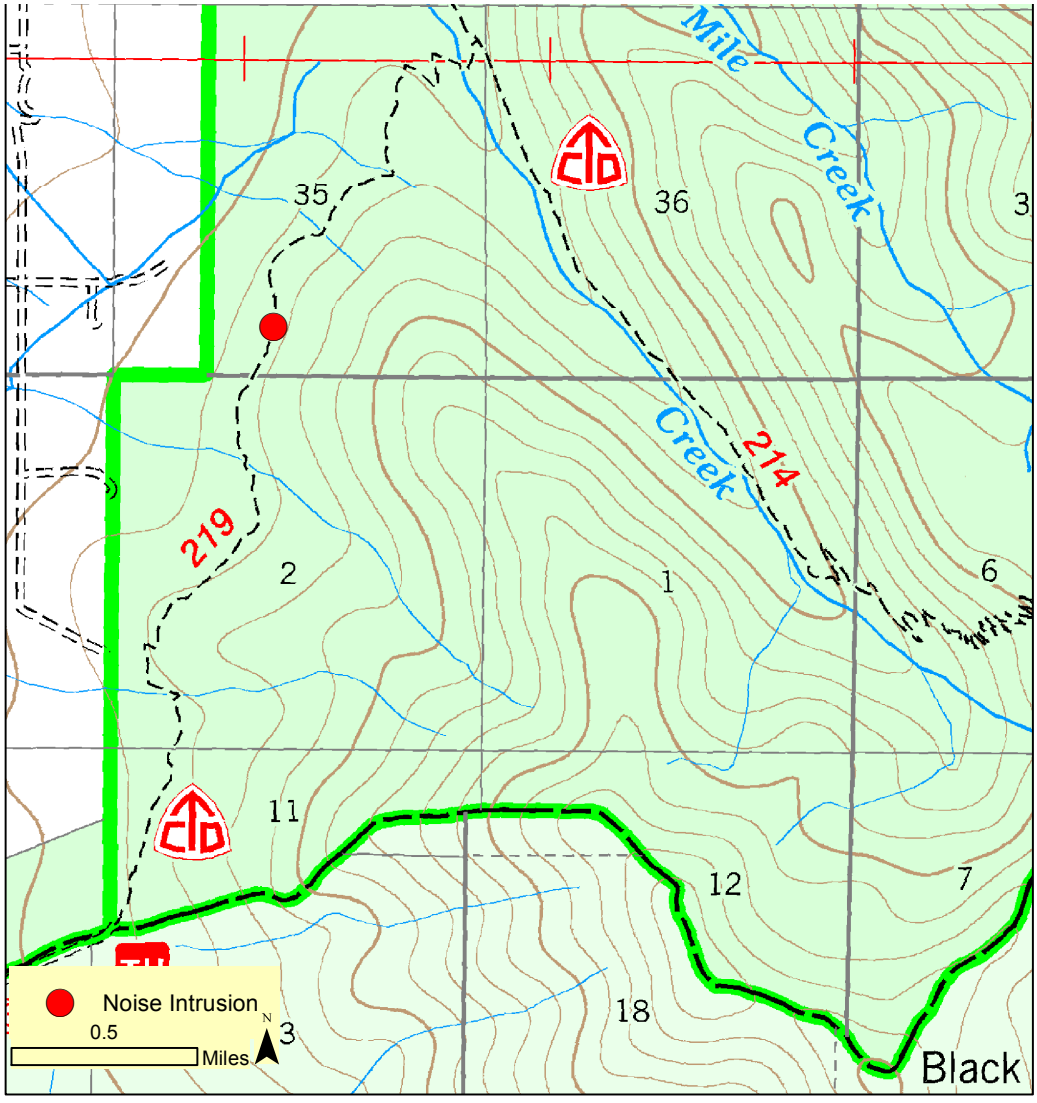

Figure 15. Location of noise intrusions in the Lionhead Recommended Wilderness.

Visual Intrusions

The protocol instructed that visual intrusions outside the Wilderness Study Area be recorded. To adjust this measurement to our study, human development seen from within the USFS boundary was documented. The type of visual intrusion was noted (towns, buildings, highways, dirt roads, repeaters, etc.).

Nine visual intrusions were recorded during monitoring.

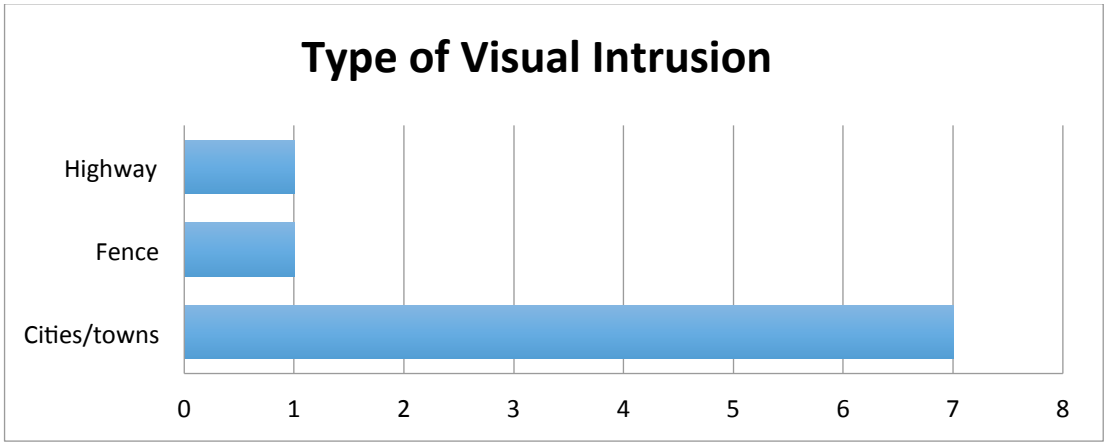

Figure 16. Number and type of visual intrusions.

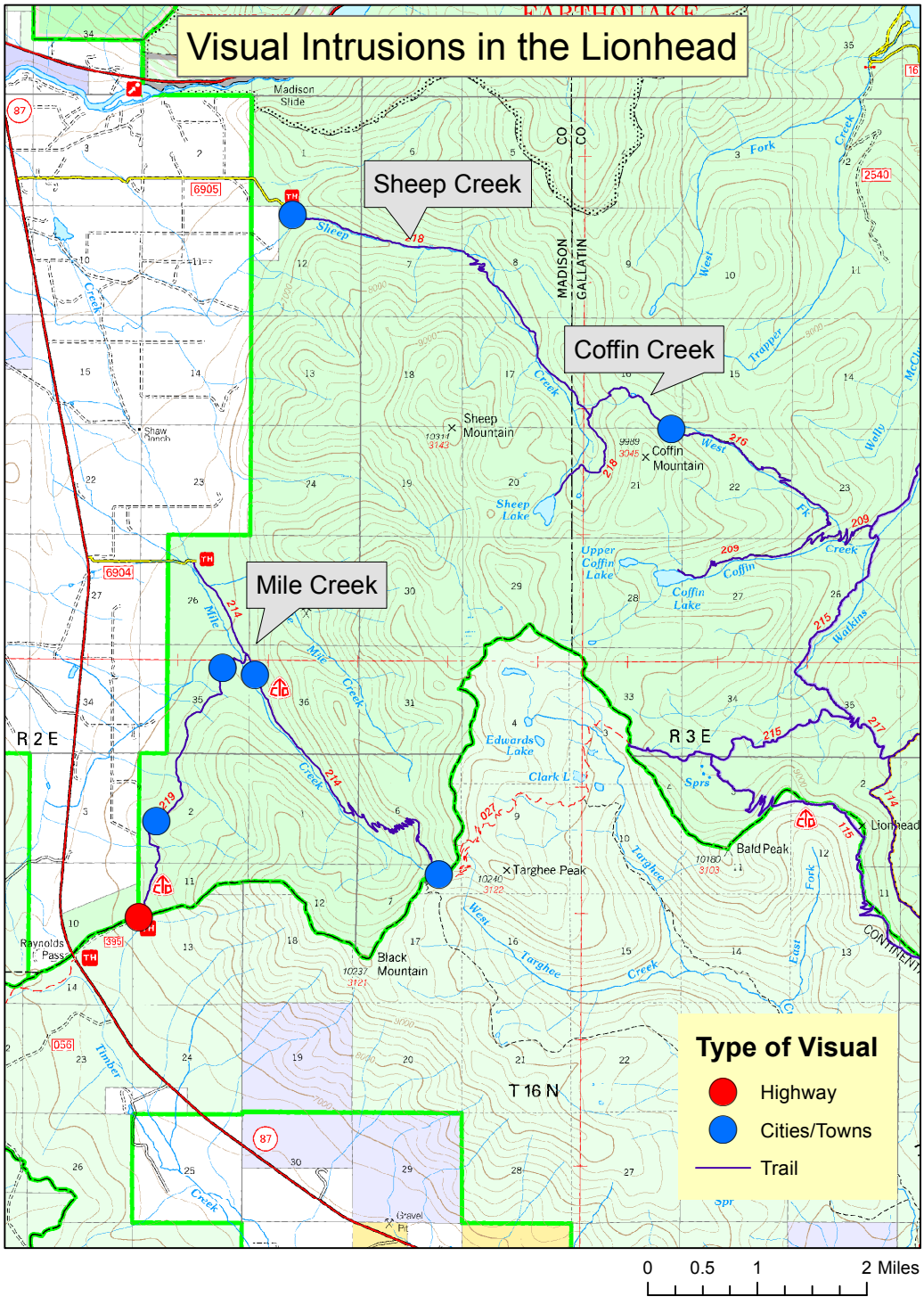

Figure 17. Location of visual intrusions by type.

Campsites

Campsites were monitored for their condition and level of human impact. Human impacts were evaluated based on 1) vegetative loss, 2) mineral soil exposure, 3) damage to trees, 4) number of trees with exposed roots, 5) the type and number of developments, 6) cleanliness, 7) number of social trails, 8) camp area, 9) barren core camp area, and 10) camp solitude. Each campsite was evaluated according to the Campsite Condition Evaluation Worksheet found in Appendix 4. This worksheet generated an impact index score. To provide an ecological context for campsite conditions, information on campsite location and dominant species was also recorded.

Five campsites were evaluated during monitoring. Based on the summary impact evaluation scores, 3 campsites show minimal impact and 2 sites show moderate impact. Some campsites encountered were only noticed because of an old fire ring with little evidence of use observed.

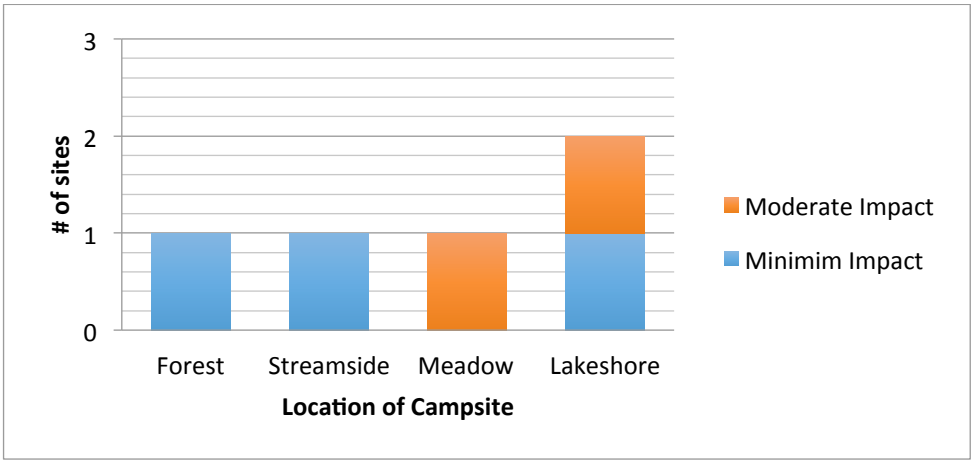

Figure 18. Number of campsites by impact evaluation score class.

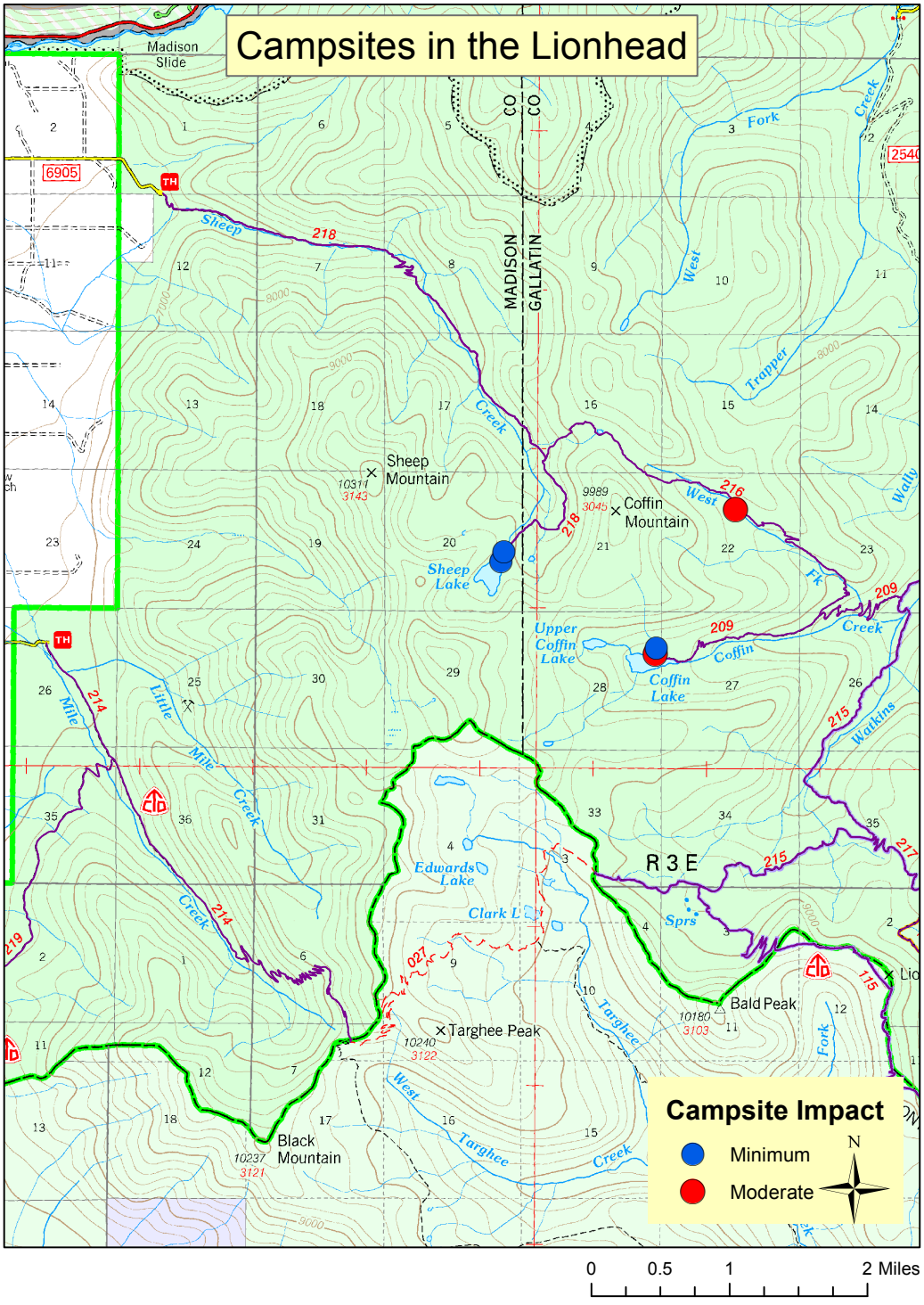

Figure 19. Location of campsites by impact class in the Lionhead Recommended Wilderness.

Sensitive Plants

No sensitive plant species were observed during monitoring.

Appendix 1: Monitoring Attributes

List of monitoring attributes recorded in 2014. A detailed copy of the protocol is available upon request.

I. Untrammeled Quality

Attribute Group: Weed Point

Weed_Action	Action taken to manage weed infestation.

II. Natural Quality

Attribute group: Weed Point

Weed_Collector	

Attribute Group: Wildlife Point

Wildlife_Species	Species of wildlife encountered
Wild_ObsType	Type of wildlife sign encountered
Wild_Group	Individual, Family, Pair
Wild_Repro	Reproductive status, if evident
Observ_Qual	Degree of observer expertise
Wild_Total	Numeric total of individuals detected
Wild_Notes	Description or additional details of siting
Wild_Photo	Corresponding photo number from camera
Pika_Behavior	Select behavior category
Pike_Habitat	Select habitat category
Pika_Notes	Note presence and # of haystacks

Attribute Group: Water Erosion

Water_Landform	Landform (stream/lake) associated with erosion
Water_Width	For streams only, width at high water
Water_Acres	Acre estimate of all non-stream water features
Water_Severity	Severity rating of erosion
Water_Photo	
Water_Notes	Describe site and any concerns

III. Undeveloped Quality

Attribute group: Development Point

Dev_Type	Type of installation or development encountered
Dev_Cond	Condition of development
Dev_Source	If known, who built the development
Dev_Photo	
Dev_Notes	

Attribute group: Sign Point

Sign_Type	Type of Sign
Sign_Cond	Condition of sign

Sign_Photo	Corresponding photo
Sign_Notes	Additional notes

Attribute group: Trail Closure Point

Closure_Type	Type of closure device encounter
Closure_Evidence	Description of evidence that closure is violated
Closure_Photo	Photo of trail closure
Closure_Notes	additional notes

IV. Solitude of Primitive and Unconfined Recreation Quality

Attribute group: Trail Width Point

TW_Name	Name of trail point
TW_Type	Type of trail width point
TW_Start/Finish	Start/finish of trail
TW_Photo	Photos of TW point
TW_Notes	Additional Notes

Attribute group: Motorized or Mechanized Use Point or Line

MotorMech_Name	Name of evidence for motorized use on trails
Motor_Start/Finish	Beginning or endpoint of evidence
MoorMech_Width	Track width of evidence
MotrMech_Photo	Photo of use
MotorMech_Notes	Additional Notes

Attribute group: Campsite Point

Camp_Landform	Associated landform
Cap_Area	Area class in square feet
Cap_TrailDist	Distance from trail
Camp_water	Distance from water
Cap_Camp	Distance from nearest campsite
Cap_TreeCover	Percentage of tree cover over campsite
Camp_DomTree1/2/3	Up to 3 dominant tree species (if >10% plot cover)
Camp_DomUnder1/2/3	Up to 3 dominant understory species (If >10% plot cover)
Camp_TreeDam	Rating of tree damage
Cap_Root Exp	# of trees with exposed roots
Camp_Develop	Level of development observed in/around camp
Camp_Clean	Level of cleanliness of camp
Camp_Trails	# of social trails in/around camp
Camp_Barren	Barren area estimate in/around campsite
Camp_VegCover	Estimate of ground cover canopy coverage
Camp_MinExp	Estimate of exposed mineral soil in core area
Camp_VegCoverOffSite	Offsite estimate of ground canopy cover
Camp_MinExpOffsite	Offsite estimate of exposed mineral soil
Camp_Photo	Photo of Campsite
Camp_Notes	Additional notes

Attribute group: People Point

People_Activity	Type of user encountered
People_Number	Number of people seen
Packstock_Number	Number of pack stock in party
Ridingstock_Number	Number of riding stock in party
Trip_Length	Overnight/daytrip
People_Notes	Additional notes

Attribute group: Trailhead Point

TH_Name	Assigned name and/or number
TH_TotNumber	Number of people seen in encounter
TH_HorseNumber	Total number of horse trailer
TH_ORVNumber	Total Number of ORV trailers
TH_Notes	Additional notes

Attribute group: Noise Point

Noise_Duration	Duration of noise (select from categories)
Noise_Intensity	Intensity rating of noise (select from categories)
Noise_VisConf	Indicate if source was seen
Noise_Notes	Additional notes

Attribute group: Visual Intrusion Point

VI_Type	Visible evidence of human impact outside boundary
VI_Photo	Photo
VI_Notes	Additional notes

Appendix 2. Summary of Field Notes

The trip leader recorded the information below for each monitoring trip. Information is organized by trail name and number and highlights information on trail conditions, weeds, and miscellaneous notes.

Eightmile: We approached Eightmile via the North Dry trail #132. The approach along #132 was straightforward, rarely traveled, and littered with signs of grizzly and black bear (in track and scat form). We reached the junction for the Eightmile Creek trail, continuing on #132, and it was seemingly straightforward. Shortly after turning to the west, we encountered the aftermath of the 2001 Fridley fire. As we hiked further into the heart of the old fire the trail became less visible and much more difficult to navigate. We crossed countless downed trees and crossed the creek no less than 15 times as we approached out turn around point near the North Fork's confluence with its mother stream. If you are bold enough to navigate the downfall and creek crossing, this trail offers rarely-found solitude. Old cut logs were the only signs of past human activity, but it was evident that moose, elk and deer found a safe haven in this drainage. When night fell over the drainage, the sky lit back up with incredible views of the stars. There was seemingly no night pollution, which made for a beautiful end to a rough hike. We did not make it any further than the folks who tried to inventory this area in 2011. For this reason, our findings were not reported in this document.

Pryor Mountains: The Pryor mountains is a unique island range that rises above the prairies of Eastern Montana. We inventoried the Lost Water Canyon area, which is trail-less but the rim of the canyon offers an easy guide. We walked among spectacular wildflowers blossoming on top of the plateau. While along the canyon's rim, the group discovered a literal hole-in-a-wall. A few people took the opportunity to climb into the opening and saw a sheer view of the valley below, and a close-up of the fossils of shells embedded in the rock. During the inventory, we also noticed (what we believe to be) an old firebreak that is mostly reclaimed. We followed the firebreak until it became too overgrown, then we returned to the rim. The inventoried area was weed-free. We encountered many signs of bear and even saw a yearling cross the road before we began monitoring. A piece of used flint was found making folks remember the human history so special to the Pryors.

We spent the night about 2 miles down the canyon's rim. The night sky was amazing with so many stars shining, and there was not an unnatural sound to be heard other than our own chatter. This night in the Pryors gave the distinct feeling of remoteness, both because we were so alone but also because there were no signs of anyone being in the area before us. It was truly a special night on this island range.

Trail #214, Mile Creek: This trail begins by following a two track for a few hundred yards. There is an irrigation ditch nearby and a small fence around the creek that I imagine the two track was created to access. The ditch is not encountered on the trail, but it's nearby. You can see the valley, houses, roads, etc for over a mile up the Mile Creek trail. The visual intrusion eventually disappears completely. The trail follows the creek until the switchbacks begin that lead to the ridge. The switchbacks are many and long. As you gain

the hillside there is a beautiful view of a cirque. This trail was very well-maintained and weed free. While there is quite a bit of elevation gain the number of switchbacks makes it a gentle climb. Once the trail gains the ridge, there is a nice view of Targhee Peak.

Trail #209, Coffin Lake: We accessed Coffin Lakes from the Watkins Creek trail #215 and then took trail #209 to Coffin Lakes. Trail #215 began in a meadow, just West of Hebgen lake. The trail was in good shape, and there was quite a bit of evidence of horse traffic noticed from scat. Shortly after the junction for trail #209, switches began leading up to the lakes. The trail crosses the creek a couple times, but it is easy to skip rocks across. Shortly before reaching the lake there was a little confusion about the correct route. There are two blazed routes, one that hugs the lake and one that is slightly north of the lake. Both trails end at the main campsite at the lake. Coffin Lakes, as the name suggests, are not the most stunning mountain lakes, but the ridge that acts as the backdrop is beautiful.

Trail #216, West Fork Coffin Creek- We met connected with trail #216 from trail #209. The trails seems infrequently used and not well-maintained. It gently climbs upward through wildflower meadows and fir and pine forests. A little beyond the junction with trail #209, the trees parted to reveal a front seat view of an impressive cliffed ridgeline. A creek ran nearby the trail, and white-tailed deer were seen feeding in the small open meadows. The trail crosses the West Fork of Coffin Creek, and it would have been difficult to cross had there nit been a fair amount of deadfall. After crossing the creek, the trail was in better condition. An old camp was noticed on the opposite side of the creek that was well-established, but almost hidden away. We continued the gentle climb and walked past a large pond that you can see on the forest map. The land around the pond was marshy. Form there we continue climbing until we came to the switchbacks that led down to the junction with trail #218. There wasn't much evidence of use on this trail, it was a very quiet walk.

Trail #219, Mile Creek Face- This trail runs along a hillside and parallels the highway for most of its length. We did not lose sight of the valley until we made the turn shortly before heading to meet up with the Mile Creek trail. The trail also runs behind some private property, and the private property owners have a path joining the trail. We did not inventory this, because the landowners were in their backyard at the time. Trail #219 meets the Mile Creek #214 trail shortly after crossing a significant bridge. The creek that flows below the bridge has a headgate attached that is diverting water from Mile Creek to the ditch mentioned in the Mile Creek trail notes. One houndstongue plant was found on trail.

Trail #218, Sheep Lake- The Sheep Lake trail was in good condition and easily followed. Approximately the first 1.5 miles of trail had noxious weeds, but after that there were not more weeds seen. If managed quickly, the invasion may be eradicated. We saw Canada Thistle, Hoary Allysum, Spotted Knapweed, and Houndstongue. The trail up to the lake offers beautiful views of the Madisons, including a uninterrupted view of Hilgard peak. The trail begins in a drainage, switchbacks up through a wooded area, and continue on in a more open, alpine area. There were a few campsites near the lake but none were badly

impacted. There isn't much camping at the lake, because the lake is mostly surround by steep walls. We did encounter several mountain bikers on the hike to the lake.

Appendix 3. Campsite Inventory & Condition

Campsite No.1

Location, South Cottonwood #422
Latitude 45.49714°
Longitude -111.04105°
Elevation 6,400 ft
Distance to trail <200 ft
Distance to water >200 ft
Distance to next campsite <500 ft

Ecological Associations
Landform Forest
Tree Cover 25-50%
Dominant Trees (1-3) Douglas Fir
Dominant Understory (1-3) Oregon Grape, Glacier Lily

Conditions
Vegetative Cover At Site/Off Site 76-100%/76-100%
Mineral Exposure At Site/Off Site 0-5%/0-5%
Tree Damage No more than broken lower branches
Root Exposure None
Development >1 Fire ring or other major developments
Cleanliness Remnants of >1 fire ring, some litter or manure
Social Trails None
Camp Area <50 sq ft
Barren Core Camp <50 sq ft

Impact Evaluation
Impact Score 22
Impact Class Minimum

Campsite No.2

Location, Coffin Lake #209
Latitude 44.76209°
Longitude -111.35751°
Elevation 8,200 ft
Distance to trail <200 ft
Distance to water <200 ft
Distance to next campsite <500 ft

Ecological Associations
Landform Lakeshore
Tree Cover <25%
Dominant Trees (1-3) Douglas Fir, Engelmann Spruce
Dominant Understory (1-3) Hawthorne, Glacier Lily, Forbs

Conditions
Vegetative Cover At Site/Off Site 6-25%/6-25%
Mineral Exposure At Site/Off Site 0-5%/0-5%
Tree Damage No more than broken lower branches
Root Exposure None
Development 1 Fire ring with or without primitive log seat
Cleanliness Remnants of >1 fire ring, some litter or manure
Social Trails 1 Discernable
Camp Area >500 sq ft
Barren Core Camp <50 sq ft

Impact Evaluation
Impact Score 26
Impact Class Moderate

Campsite No.3

Location, Coffin Lakes #209
Latitude 44.76264°
Longitude -111.35742°
Elevation 8,300 ft
Distance to trail <200 ft
Distance to water >200 ft
Distance to next campsite <500 ft

Ecological Associations
Landform Lakeshore
Tree Cover 50-75%
Dominant Trees (1-3) Douglas Fir
Dominant Understory (1-3) Lilies, Forbs

Conditions
Vegetative Cover At Site/Off Site 6-25%/26-50%
Mineral Exposure At Site/Off Site 0-5%/0-5%
Tree Damage No more than broken lower branches
Root Exposure None
Development None
Cleanliness No more than scattered charcoal from 1 fire ring
Social Trails None
Camp Area 50-500 sq ft
Barren Core Camp <50 sq ft

Impact Evaluation
Impact Score 22
Impact Class Minimum

Campsite No.4

Location, Sheep Lake #218
Latitude 44.77167°
Longitude -111.38035°
Elevation 8,800 ft
Distance to trail <200 ft
Distance to water <200 ft
Distance to next campsite <500 ft

Ecological Associations
Landform Lakeshore
Tree Cover <25%
Dominant Trees (1-3) Subalpine Fir, Five-needle Pine
Dominant Understory (1-3) Aster, Arnica

Conditions
Vegetative Cover At Site/Off Site 26-50%/26-50%
Mineral Exposure At Site/Off Site 0-5%/0-5%
Tree Damage No more than broken lower branches
Root Exposure 1-6 Trees with exposed roots
Development 1 Fire ring with or without primitive log seat
Cleanliness Remnants of >1 fire ring, some litter or manure
Social Trails 1 Discernable
Camp Area 50-500 sq ft
Barren Core Camp <50 sq ft

Impact Evaluation
Impact Score 23
Impact Class Minimum

Campsite No.5

Location, Sheep Lake #218
Latitude 44.77266°
Longitude -111.37985°
Elevation 8,000 ft
Distance to trail <200 ft
Distance to water <200 ft
Distance to next campsite <500 ft

Ecological Associations
Landform Streamside
Tree Cover <25%
Dominant Trees (1-3) Fir, Spruce
Dominant Understory (1-3) Aster, Arnica

Conditions
Vegetative Cover At Site/Off Site 26-50%/26-50%
Mineral Exposure At Site/Off Site 0-5%/0-5%
Tree Damage No more than broken lower branches
Root Exposure None
Development 1 Fire ring with or without primitive log seat
Cleanliness Remnants of >1 fire ring, some litter or manure
Social Trails None
Camp Area 50-500 sq ft
Barren Core Camp <50 sq ft

Impact Evaluation
Impact Score 22
Impact Class Minimum

Appendix 4. Campsite Condition Evaluation Worksheet

Wilderness Campsite Inventory & Condition Evaluation (TLWSA 2010)

Objectives:

- Determine number and location of campsites
- Create GPS waypoint for each site
- Evaluate changing campsite condition (trend) overtime)
- Photo record each site

Part 1: General Site description

1) Site number
2) Lat/Long
3) Elevation
4) Distance to constructed trail: <200 ft or >200 ft
5) Distance to water: <200 ft or >200 ft
6) Distance to closest campsite: <500 ft or >500 ft
7) Photos

Part 2: Wilderness Challenge Survey

A. Evaluate disturbance to ground core camp only.
   Choose one:
   1. Flattened vegetation but still alive, minimal physical damage
   2. Vegetation worn away around center of activity
   3. Vegetation lost on most of site, but humus and litter still present
   4. Bare mineral soil widespread over most of site

B. Evaluate severe damage to trees at site. A severely damaged tree has one of the following:
   - Been felled and is at least 4 inches in diameter
   - Scarring that exceeds 1 square foot in total area
   - Highly exposed roots totaling three linear feet

   Choose one:
   0… 0-5 severely damaged trees
   1… 6-10 severely damaged tree
   2… >10 severely damaged trees

C. Quantify **total disturbed area** for site, adding satellite areas to core area:
   Choose one:
   0… Sum of areas equal 0-250 ft square
   1… Sum of disturbed areas equals 251-1000 ft square
   2… Sum of disturbed area is greater than 1000 ft square

Part 3. Impact Evaluation

1) Vegetative Cover: On Campsite
1- 0-5% **2-** 6-25% **3-** 26-50%
4- 51-75% **5-** 76-100%

Unused Comparative Area
1- 0-5% **2-** 6-25% **3-** 26-50%
4- 51-75% **5-** 76-100%

2) Mineral Soil Exposure: On Campsite
1- 0-5% **2-** 6-25% **3-** 26-50%
4- 51-75% **5-** 76-100%

Unused Comparative Area
1- 0-5% **2-** 6-25% **3-** 26-50%
4- 51-75% **5-** 76-100%

Rating, score weight total

3) Vegetative Loss x2
1- No difference in cover class **2-** Difference of one cover class **3-** difference of 2 or more classes

4) Mineral Soil Exposure x3
1- No difference in cover class **2-** Difference of one cover class **3-** difference of 2 or more classes

5) Tree Damage x2
1- No more than broken lower branches **2-** 1-8 scarred trees, or 1-3 badly scarred or felled **3-** >8 scarred trees, or badly scarred or felled

6) Root Exposure x3
1- none **2-** 1-6 trees with exposed roots **3-** >6 trees with exposed roots

7) Development x1
1- None **2-** 1 fire ring with or without primitive log seat **3-** >1 fire ring or other major development

8) Cleanliness x1
1- No more than scattered charcoal **2-** remnants of >1 fire ring, some litter or manure
2- Human litter or manure

9) Social Trails x2
1- No more than 1 discernible trail **2-** 2-3 discernible trails **3-** >3 discernible trails

10) Camp Area x4
1- < 500 ft sq **2-** 500-2000 ft sq **3-** >2000 ft sq

11) Barren Core Camp Area x2
1-<50 ft sq **2-** 5-500 ft sq **3-** >500 ft sq

Impact index scores: <23= minimum, 24-34= moderate, >45= extreme

Appendix 5. Map of Lionhead Recommended Wilderness

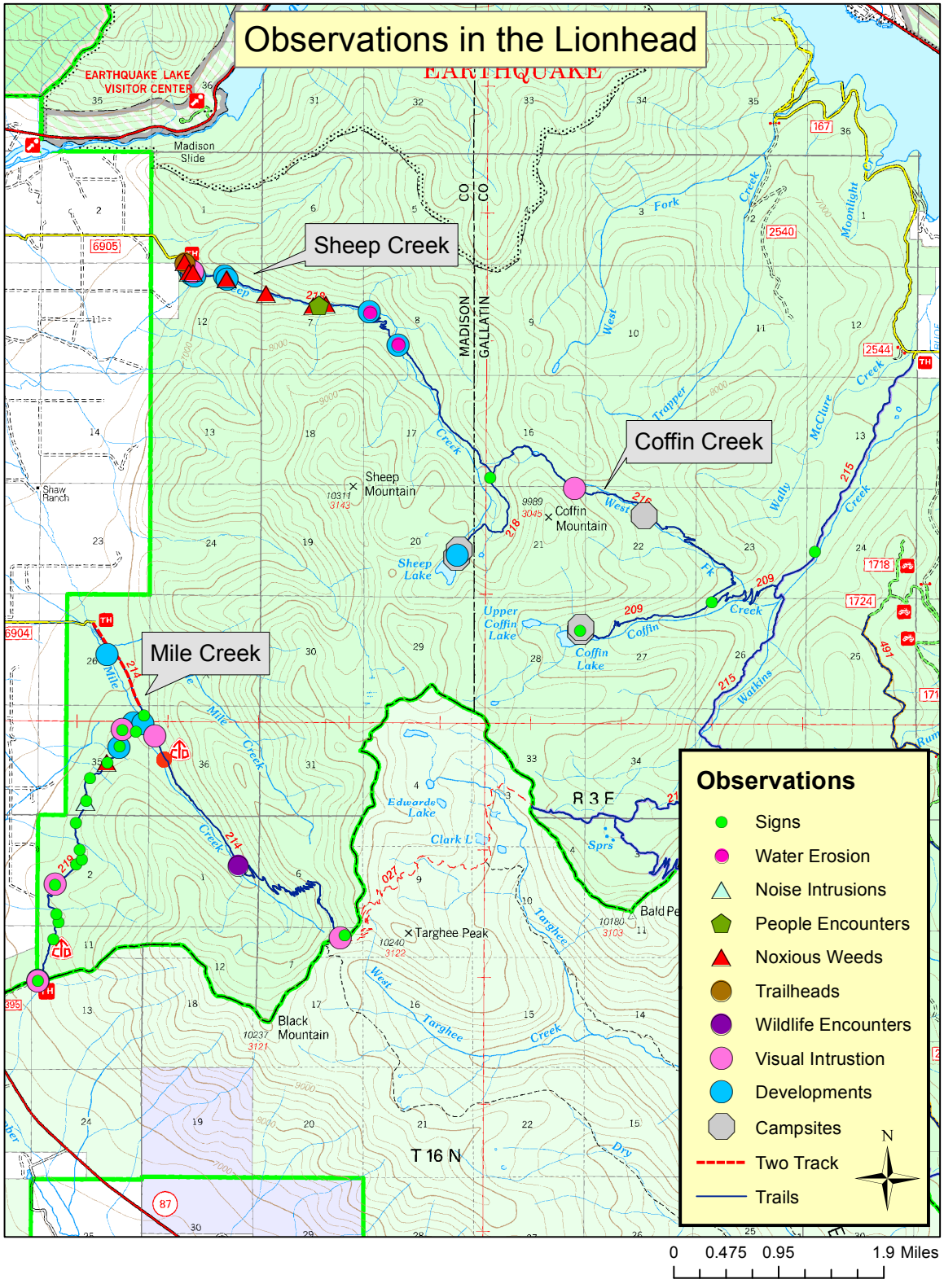

Figure 20. Observations inventoried in the Lionhead Recommended Wilderness