AQUATIC BIODIVERSITY MANAGEMENT PLAN
FOR THE

BEAR RIVER MANAGEMENT UNIT

2020

Prepared By

Isaac Chellman,
Environmental Scientist;

Mitch Lockhart,
Environmental Scientist;

Sarah Mussulman,
Senior Environmental Scientist

NORTH CENTRAL REGION
DEPARTMENT OF FISH AND WILDLIFE
STATE OF CALIFORNIA

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LIST OF ACRONYMS

ABMP	Aquatic Biodiversity Management Plan
AG	Arctic Grayling (*Thymallus arcticus)*
AMMA	Long-toed Salamander (*Ambystoma macrodactylum*)
Bd	Amphibian chytrid fungus (*Batrachochytrium dendrobatidis*)
BK	Brook Trout (*Salvelinus fontinalis*)
BN	Brown Trout (*Salmo trutta*)
BUBO	Western Toad (*Bufo boreas*)
CDFW	California Department of Fish and Wildlife
CEQA	California Environmental Quality Act
CESA	California Endangered Species Act
CHIN	Chinook Salmon (*Oncorhynchus tshawytscha*)
CT-L	Lahontan Cutthroat Trout (*Oncorhynchus clarki henshawi*)
CT-P	Paiute Cutthroat Trout (*Oncorhynchus clarki seleniris*)
EIR/EIS	Environmental Impact Report / Environmental Impact Statement
ELCO	Northern Alligator Lizard (*Elgaria coeruleus)*
ENF	Eldorado National Forest
ESA	Endangered Species Act
GT-CA	California Golden Trout (*Oncorhynchus mykiss aguabonita*)
HML	California Department of Fish and Wildlife High Mountain Lakes Project
HYRE	Pacific Treefrog (*Pseudacris regilla*; formerly *Hyla regilla*)
IUCN	International Union for Conservation of Nature
KOK	Kokanee Salmon (*Oncorhynchus nerka kennerlyi*)
LT	Lake Trout (*Salvelinus namaycush)*
PG&E	Pacific Gas and Electric Company
PSEP	Pre-Stocking Evaluation Protocol
PWS	Planning Watershed
RT	Rainbow Trout (*Oncorhynchus mykiss*)
RT-KR	Kern River Rainbow Trout (*Oncorhynchus mykiss gilberti*)
SNYLF	Sierra Nevada Yellow-legged Frog (*Rana sierrae*)
SSC	State of California Species of Special Concern
THCO	Sierra Gartersnake (*Thamnophis couchii*)
THEL	Mountain Gartersnake (*Thamnophis elegans elegans*)
THSI	Common Gartersnake (*Thamnophis sirtalis*)
THSP	Gartersnake, all species (*Thamnophis* spp.)
USFS	U.S. Forest Service
USFWS	U.S. Fish and Wildlife Service
USGS	U.S. Geological Survey
VES	Visual Encounter Survey

SECTION I: INTRODUCTION

1) OVERVIEW

In response to the observed decline of the Sierra Nevada yellow-legged frog, *Rana sierrae* (SNYLF), and actions to list the species as threatened or endangered under the federal Endangered Species Act (ESA), the California Department of Fish and Wildlife (CDFW) implemented actions to meet the state's responsibility to manage SNYLF and their habitats for multiple uses. Although CDFW made significant changes to aquatic habitat management between 2000 and 2010, the Center for Biological Diversity petitioned the state to list SNYLF as endangered in 2010. On February 2, 2012 the Fish and Game Commission voted to add SNYLF to the list of threatened species under the California Endangered Species Act (CESA). The CESA listing marked the first formal protection of the species. Additionally, on April 29, 2014, the U.S. Fish and Wildlife Service (USFWS) released final rule FWS-R8-ES-2012-0100, which listed SNYLF as "endangered" throughout its range (USFWS 2014).

In 2000, in anticipation of the federal ESA listing of SNYLF, CDFW temporarily suspended aerial fish stocking in many Sierra Nevada lakes within the historic range of SNYLF and implemented an informal Sierra Nevada fish stocking policy, which states that:

- Fish will not be stocked in lakes with known SNYLF populations, nor in lakes which have not yet been surveyed for frog presence;
- Waters will be stocked only with a fisheries management justification;
- The number of stocked lakes will be reduced over time; and
- Water bodies within the same basin and two kilometers (km) (1.25 miles) from a known population of SNYLF will not be stocked unless:
    1) a management plan that considers all aquatic resources in the basin is developed, or
    2) there is heavy angler use and there exists no nearby opportunity to improve habitat for native amphibians.

Concurrent with the interim stocking policy for the Sierra Nevada, CDFW implemented the High Mountain Lakes (HML) project, designed to determine the status and distribution of SNYLF populations, introduced fish species, 'non-target' amphibian species (i.e., non-SNYLF populations), and their habitat throughout the Sierra Nevada. In addition, CDFW initiated dialogue with researchers, other resource agencies, and constituent groups to discuss management of high elevation Sierra Nevada aquatic ecosystems. Using this information, HML continues to develop long-term aquatic resource management plans specific to hydrologic basins of the Sierra Nevada. Implementation of the plans completed to date have helped stabilize and reverse negative effects of non-native fish introductions on native frog populations. Additionally, the plans have helped maintain viable recreational angling in a manner consistent with both the mission of CDFW and the guidelines set forth in CESA and federal ESA. This "Aquatic Biodiversity Management Plan for the Bear River Management Unit" is the most recent of such plans.

This plan was developed with the following objectives:

- Manage high mountain aquatic resources at a basin scale, rather than lake-by-lake;
- Develop a plan using site-specific data collected within the last five years, as well as available data collected in past years;
- Manage high mountain aquatic resources within a basin such that native biodiversity, habitat quality, and native species populations are maintained or restored;
- Provide recreational angling opportunities considering historical, current, and future use patterns;
- Comply with the 2010 Hatchery and Stocking Program Environmental Impact Report/Environmental Impact Statement (EIR/EIS) and future amendments (ICF Jones and Stokes 2010); and
- Incorporate objectives of the USFWS Conservation Strategy (MYLF ITT 2018).

2) FACTORS AFFECTING THE SIERRA NEVADA YELLOW-LEGGED FROG

The following threats have been identified as the primary factors negatively affecting SNYLF populations in the Sierra Nevada (USFWS 2014):

- Non-native fish;
- Disease (particularly chytrid fungus [*Batrachochytrium dendrobatidis*, Bd]);
- Climate change;
- Small population sizes; and
- Predation.

More localized threats to SNYLF populations may include:

- Livestock grazing and packstock use;
- Dams and water diversions;
- Roads and timber harvest;
- Fire and fire management activities;
- Mining; and
- Recreation (especially outside protected areas and in locations where motorized use occurs near extant SNYLF habitat).

Although many factors have played a role in global amphibian declines (Sodhi et al. 2008, Blaustein et al. 2011, Hof et al. 2011, Grant et al. 2016), the body of scientific literature identifies introduction of non-native fish to historically fishless waters as a leading cause of declines in montane frog populations (Bradford 1989, Bahls 1992, Bradford et al. 1993, Knapp and Matthews 2000, Knapp et al. 2001, Pilliod and Petersen 2001, Dunham et al. 2004, Vredenburg 2004, Knapp 2005, Knapp et al. 2007).

SNYLF spend virtually all their lives in or very near a water source. In particular, SNYLF larvae, which may over-winter for up to four years before metamorphosis (Stebbins and McGinnis 2012), require water sources deep enough to not dry completely (Lacan et al. 2008) or become anoxic (Bradford 1983). Because of these life history requirements, SNYLF populations thrive in larger, deeper water habitats (Brown et al. 2014). However, many of the larger and deeper lakes with high quality habitat capable of sustaining large frog populations now contain fish (Bradford 1989, Bradford et al. 1993, Knapp and Matthews 2000). Once non-native fish are introduced, SNYLF have limited recruitment because fish readily consume tadpoles and young frogs (Grinnell and Storer 1924 [pg. 664], Needham and Vestal 1938 [pg. 278], Vredenburg 2004). Over time, SNYLF have been relegated to fishless lakes, which are often isolated, small, and incapable of maintaining robust frog populations. Therefore, these unfavorable water sources are often only capable of supporting small, tenuous SNYLF populations that are vulnerable to extirpation.

In addition to predation by non-native fish, SNYLF declines have been heavily driven by the introduction of an infectious disease to the waters of California. *Batrachochytrium dendrobatidis* (Bd) is a fungus that infects amphibian species and causes the disease chytridiomycosis (Berger et al. 1998, Longcore et al. 1999). Chytridiomycosis is often fatal to susceptible frog populations and the disease has been associated with amphibian declines throughout the world (Ouellet et al. 2005, Skerratt et al. 2007, Lips 2016). In the case of SNYLF, Bd has been identified as a principal mechanism for localized extinction of isolated populations (Fellers et al. 2001, Rachowicz and Vredenburg 2004, Rachowicz et al. 2006, Fellers et al. 2007, Rachowicz and Briggs 2007, Vredenburg et al. 2010, Rosenblum et al. 2012). Therefore, factors such as Bd presence/absence, prevalence, and distribution must be considered when developing recovery strategies for SNYLF populations.

While CDFW recognizes that all the aforementioned factors negatively affect native frog populations, CDFW has primary authority over fish stocking programs in the Sierra Nevada and limited ability or authority to control other factors leading to the decline of the species.

3) REGULATORY STATUS OF THE SIERRA NEVADA YELLOW-LEGGED FROG

Current

On January 27, 2010, the Fish and Game Commission received a petition from the Center for Biological Diversity to list all populations of SNYLF as endangered under CESA. Following a 12-month status evaluation completed by CDFW (CDFG 2011), the Fish and Game Commission voted unanimously February 2, 2012 to add SNYLF to the list of threatened species under CESA. The state listing as threatened became effective on April 1, 2013 (CDFW 2019). The state listing marked the first formal protection afforded to SNYLF. On April 25, 2013, the USFWS released the proposed rule recommending that SNYLF be listed as federally endangered throughout its range. On April 29, 2014, the USFWS released the final rule listing SNYLF as federally endangered, which became effective on June 30, 2014 (USFWS 2014). On August 26, 2016, the USFWS released the final rule designating SNYLF critical habitat, which became effective on September 26, 2016 (USFWS 2016).

Historic

On February 10, 2000, the USFWS received a petition from the Center for Biological Diversity and the Pacific Rivers Council to list all populations of the mountain yellow-legged frog (MYLF) as endangered under the Distinct Vertebrate Population Segment Policy of the federal Endangered Species Act of 1973. On October 12, 2000, the USFWS published a 90-day finding in the Federal Register stating, "…*the petition presents substantial information to indicating that listing the species may be warranted.*" (USFWS 2000, pg. 60603). The 90-day finding was followed by a 12-month petition finding, published on January 16, 2003, which states:

> *"After review of all available scientific and commercial information we find that the petitioned action is warranted, but precluded by higher priority actions to amend the Lists of Endangered and Threatened Wildlife and Plants. Upon publication of this 12-month petition finding, this species will be added to our candidate species list. We will develop a proposed rule to list this population pursuant to our Listing Priority System.*" (USFWS 2003).

Although not formally listed at that time, candidate species are afforded some protection under the Prohibited Acts Section 9(1) (B) of the ESA. Specifically, the section states that it is unlawful to "*take any such species within the United States.*" Section 3 (19) states "*The term 'take' means to harass, harm, pursue, hunt, shoot, wound, trap, capture, collect, or attempt to engage in any such conduct.*" Because fish stocking in the Sierra Nevada has been linked to declines in SNYLF populations, the CDFW's aerial stocking program could potentially constitute "harm," and thus be considered "unlawful" under the provisions of the ESA.

In 2006, Pacific Rivers Council and the Center for Biological Diversity filed a lawsuit against CDFW, claiming that CDFW's fish stocking operation did not comply with the California Environmental Quality Act (CEQA). The petitioners noted a special concern for the effects of trout stocking on native fish and amphibian species. In July 2007, CDFW was directed by the Sacramento Superior Court to comply with CEQA regarding fish stocking operations and complete an Environmental Impact Report/Environmental Impact Statement (EIR/EIS) to evaluate fish stocking activities. CDFW released the final Hatchery and Stocking Program EIR/EIS on January 11, 2010 (ICF Jones and Stokes 2010). According to the California Superior Court ruling, CDFW must consider the effects of fish stocking on sensitive aquatic species when making future fish stocking management decisions (California Superior Court of Sacramento County 2007).

The process to consider such effects is outlined in Appendix K of the Hatchery and Stocking Program EIR/EIS (ICF Jones and Stokes 2010). “The intent is to reduce to less than significant any impacts from the [CDFW] hatchery stocking program on Decision Species, as defined in the EIR/EIS.” A Pre-Stocking Evaluation Protocol (PSEP) was developed “to determine that the proposed stocking action will not conflict with existing [CDFW] management programs, such as management directions stated in approved Aquatic Biodiversity Management Plans (ABMP), species recovery plans, or species conservation strategies” (ICF Jones and Stokes 2010, Appendix K). This protocol will be used by CDFW staff to determine if a water body may be stocked.

4) RESOURCE ASSESSMENT METHODS

CDFW conducted resource assessments at lentic waters within the management unit, on public land, and identified on U.S. Geological Survey (USGS) 7.5 minute series maps. CDFW also identified additional unmapped waters when survey crews located new habitat incidentally while in the field, or via field confirmation following observation in high resolution aerial imagery freely available on the internet. CDFW assigned a unique identification number (Site ID) to each mapped water body. Formerly, CDFW added a unique two-decimal suffix to the Site ID of the nearest mapped water body for unmapped waters found in the field by survey crews. Currently, CDFW assigns new waters with a unique Site ID that is not necessarily associated with a nearby historic mapped water body.

From 2001 to 2019, CDFW and Eldorado National Forest (ENF) collected the data used in this management plan. Field crews conducted surveys for herpetofauna (i.e., amphibians and reptiles) following protocols originally designed by Fellers and Freel (1995), which were field-tested for detecting genus *Rana* frogs in California. Knapp (pers. comm.) modified these survey protocols and CDFW further revised the methods for HML surveys. In general, CDFW conducts fish surveys in waters that contain fish, or in all waters where fish presence cannot be discounted. Field crews conducted fish surveys by setting a monofilament gill net in lakes, preferentially near an outlet or inlet, if available. During initial site visits, crews also recorded physical habitat features, such as stream and lake spawning substrate, littoral substrate, stream widths and depths, maximum lake depths, and the presence of fish barriers.

CDFW uses a visual encounter survey (VES) protocol that focuses on locating SNYLF (Appendix 1). The protocol is not designed to locate and document presence of certain amphibian and reptile species that are primarily terrestrial or nocturnal. Such non-target species are not usually in conflict with trout management and would require extensive additional effort to inventory. During VES, field crews recorded all herpetofauna observed, although non-target species were considered incidental sightings. For a complete description of the HML herpetofauna VES protocol, see Appendix 1.

5) FISHERIES MANAGEMENT TECHNIQUES

Fisheries in high mountain lakes can be grouped into several types, dependent on whether the fishery is stocked and/or self-sustaining. As a result, three types of fisheries emerge:

1) Self-sustaining fisheries;

2) Put-and-grow stocked fisheries; and

3) Stocking-supplemented fisheries.

Self-sustaining fisheries contain enough suitable spawning habitat for natural reproduction to perpetuate the population. For most trout species, the habitat requirements are access to oxygenated stream gravel and sufficiently deep or flowing water to prevent freezing during winter. However, Brook Trout (*Salvelinus fontinalis*, BK), warm water sport fish, and many non-game fish species are capable of reproducing in habitats without access to stream spawning gravels. Self-sustaining warm water fisheries are sites that support warm water game fish such as bass (*Micropterus* spp.).

Put-and-grow fisheries must be maintained through periodic fish stocking because natural reproduction is insufficient to sustain a trout population. In this case, fingerling-sized hatchery trout are planted and grow to adult size by utilizing the natural productivity of the lake. In high elevation lakes, put-and-grow trout fisheries often produce larger trout than self-sustaining fisheries.

A stocking-supplemented fishery is a self-sustaining fishery that is planted with additional fish to meet management goals. Examples of these goals include, but are not limited to, increasing catch rate, increasing average fish size, and increasing species diversity.

Historically, CDFW produced hatchery trout with the potential to reproduce naturally once sexually mature. CDFW has subsequently transitioned hatchery operations for production of triploid trout. Triploid trout are sterile because they have an extra chromosome, which prevents the fish from producing functional gametes(CDFW 2015). Planting triploid trout will help ensure hatchery fish do not hybridize with native trout species.

Reducing the number or density of fish in a population is sometimes desirable, but can be difficult to achieve. In the case of lakes with little or no natural reproduction, reducing the number or density of fish in a population may be achieved by decreasing the number of fish stocked or frequency of stocking events. In the case of self-sustaining fish populations, the undesirable species can be actively suppressed or completely removed using various mechanical methods, including traps, gill nets, or electrofishing (a piece of equipment that sends an electrical current into the water to stun fish for easier capture). However, mechanical methods can only achieve complete fish removal when physical characteristics of the lake and its tributaries are conducive to effective use of the equipment. Lastly, in complex habitats, removing self-sustaining fish may require using chemical piscicide (a substance that poisons gill-breathing organisms, e.g., rotenone).

CDFW determines the best management for a water body using the following guidelines:

- Decisions will be based on site-specific data collected within the last five years, as well as any additional data collected in earlier years;
- Decisions will consider historical, current, and potential public-use patterns;
- Water bodies with a population of SNYLF, or other species of concern, should not be stocked;
- Water bodies within the same basin and within two km of an existing SNYLF population should be assessed for fish removal;
- Water bodies with self-sustaining trout populations should not be stocked unless stocking is necessary to meet other management goals;
- If a water body is to be stocked, priority will be given first to species native to the watershed, and then species native to California;
- Adjustments to stocking frequency, number, or species should be based on site-specific data collected within the last five years;
- Comply with the 2010 Hatchery and Stocking Program EIR/EIS, specifically the PSEP outlined in Appendix K (ICF Jones and Stokes 2010);
- Comply with the 1995 memorandum of understanding between State of California, Department of Fish and Wildlife and U.S. Forest Service (USFS), United States Department of Agriculture; and
- Incorporate objectives of the Interagency Conservation Strategy for Mountain Yellow-legged Frogs in the Sierra Nevada (MYLF ITT 2018).

6) AMPHIBIAN MANAGEMENT TECHNIQUES

Most amphibian populations found in the Sierra Nevada are Pacific treefrog (*Pseudacris regilla**) populations that do not require active management or special attention to persist. In most cases, Pacific treefrogs do not directly compete with non-native fish for available habitat. Therefore, water bodies containing both fish and Pacific treefrogs can have managed fisheries with low risk of ecological conflict. Pacific treefrog populations are not managed by CDFW and are largely excluded from this plan.

[**A note regarding Pacific treefrogs: this species, formerly* Hyla regilla *(HYRE), is not an actual treefrog, but rather a chorus frog. However, "treefrog" is the common vernacular. The species is now most frequently designated* Pseudacris regilla *(Pacific treefrog). More recent alternative taxonomy places this species in genus* Hyliola *(Duellman et al. 2016). Clearly, there is currently disagreement in the herpetological community regarding the taxonomic placement of this group (Recuero et al. 2006, Barrow et al. 2014). Although* Pseudacris regilla *is probably the most commonly used and (currently) accurate scientific name for the species, this ABMP retains the abbreviation HYRE because much of the data included in the plan is stored using the earlier taxonomic designation*.]

Fishless water bodies supporting species of special concern (SSC) amphibian populations, such as the southern long-toed salamander, *Ambystoma macrodactylum sigillatum* (AMMA), are labeled by CDFW as amphibian resources. An amphibian resource, for the purposes of this plan, is defined as a water body that is not a fishery and has evidence of breeding by an amphibian SSC, or is being used by SNYLF. By this definition, fishless water bodies where SNYLF have been observed are considered amphibian resources. Native species reserves (NSR) are areas set aside for native amphibian habitat and permanently removed from stocking consideration. Areas with extant SNYLF populations or areas where SNYLF were known to be extant since 2005 fall into this category. Generally, all sites where SNLYF have been observed and any additional sites in the immediate vicinity will be included in NSRs.

In the case of SNYLF populations that do conflict with non-native fish, more aggressive management is often necessary. Under current CDFW policy, certain native amphibians, such as those listed as SSC or identified as a 'decision species' within the Hatchery and Stocking Program EIR/EIS, are given management priority over introduced fishes. If the opportunity to restore appropriate habitats to a fishless condition is feasible and beneficial to native amphibians, CDFW can restore the habitat. While recovery of SNYLF is a strong focus of fish-population-removal projects, other native species are also expected to benefit (Sarnelle and Knapp 2004, Finlay and Vredenburg 2007, Knapp and Sarnelle 2008, Pope 2008, Herbst et al. 2009, Epanchin et al. 2010).

There are a variety of techniques for fish removal, however, many traditional methods cannot be implemented in remote high mountain locations that are only accessible by trail. The simplest method is passive fish removal. This requires discontinuing stocking at a fishery that is not self-sustaining and allowing the lake to revert to a fishless condition. However, by using this method, fish extirpation may take years, and further decades may pass before the lake reverts to a pristine condition (Knapp et al. 2001). If a fishless condition is desired more quickly, or the fishery is self-sustaining, an active fish removal technique must be employed.

CDFW most commonly implements mechanical fish removal to restore high mountain lake habitat. CDFW uses numerous monofilament gill nets to catch adult fish and break the reproductive cycle. CDFW also uses electrofishing units to remove fish from tributaries and shallow lake fringes. In addition, CDFW sets gill nets in autumn to passively capture fish throughout the winter months under ice. However, mechanical removal requires extensive effort over the course of several years and is often only effective in lakes that have limited stream spawning habitat. Knapp and Matthews (1998) estimated that 15–20% of high elevation Sierra Nevada lakes are suitable for mechanical fish removal. Alternatively, large sections of stream or river, and lakes with complicated tributaries, often require piscicide to revert the habitat to a fishless condition. Although commonly utilized in the past, chemical treatment is currently an expensive and complicated endeavor, subject to a lengthy permitting process. To date, CDFW has not implemented any chemical treatment projects for the purposes of amphibian restoration.

For the purposes of this plan, CDFW has grouped fish removal into three broad categories:

- Category 1 fish removal projects are those that CDFW has determined are feasible using mechanical methods and will not negatively affect recreational angling opportunities within the watershed;
- Category 2 fish removals are feasible using mechanical methods, but are likely to be contested by constituents, and/or conflict with current public use patterns, and/or will severely affect angling opportunities within the basin; and
- Category 3 fish removal projects are those that CDFW deems should have fish removed, but the physical characteristics of the habitat are such that fish removal would not be successful using mechanical methods alone and would require the use of a chemical piscicide.

When habitat is not available to a threatened amphibian population or fish removal is not feasible at adjacent lakes, translocation may be necessary to stabilize and expand populations. Translocations must be implemented carefully, with thorough consideration of local SNYLF genetics, prevalence, incidence and/or absence of Bd, and the size of the source population. Additionally, any translocation efforts must comply with the CDFW Conservation Translocation policy (CDFW 2017).

Frogs should not be moved from Bd-negative to Bd-positive waters without strong justification and additional precautions, such as anti-fungal treatments undertaken by environmental professionals in a controlled setting (e.g., captive-rearing in zoos). However, frogs should under no circumstances be moved from Bd-positive to Bd-negative waters. Therefore, in general, the source and recipient water(s) must both be Bd-negative or Bd-positive environments.

In general, for translocations, CDFW attempts to move frogs into new recipient sites from nearby source populations. However, proximity is not the only consideration, and geographically close populations may not always provide the greatest benefit for establishing a new population (Weeks et al. 2011). International Union for Conservation of Nature (IUCN) discusses conservation translocations, which are defined as efforts involving population restoration (including population reinforcement and reintroduction) and conservation introduction (including assisted colonization and ecological replacement), all of which are undertaken to benefit species and ecosystems (IUCN/SSC 2013). Weeks et al. (2011) discuss genetic objectives associated with various types of conservation translocations. For reintroductions, suitable source populations close to the restoration site may be desirable to increase the likelihood of re-establishing a population with locally adapted genes. However, for augmentation (genetic rescue), source populations with a larger effective population size and higher genetic diversity may be more suitable (Weeks et al. 2011, Zeisset and Beebee 2013, Frankham 2015). Although augmentation from genetically divergent populations may increase the risk of outbreeding depression and loss of locally adapted genes, there may be far greater risk to recipient populations from the imminent threats of small population size, including inbreeding depression, loss of genetic diversity, or extirpation through stochastic events (Weeks et al. 2011).

When undertaking translocations, CDFW and other researchers usually collect and transport adult frogs (CDFW unpublished data, Knapp unpublished data, Joseph and Knapp 2018, MYLF ITT 2018 – Attachment 3: Protocol for translocation and reintroduction of *Rana muscosa* and *Rana sierrae*). Egg masses and larvae of SNYLF are fragile and need to be kept in cool, well-oxygenated water to survive transport. The fragility and additional logistical difficulties of transporting early life stages along with adequate water supplies makes translocation logistics more difficult, especially in remote areas where travelling on foot for several kilometers is often necessary. Additionally, recently metamorphosed SNYLF are highly susceptible to mortality from chytridiomycosis (Rachowicz et al. 2006). Therefore, recently metamorphosed frogs in Bd-positive populations have mainly been collected for captive-rearing efforts, wherein the young frogs are quickly transported to zoos and immediately treated with anti-fungal drugs (e.g., Itraconazole) to clear the Bd infection prior to acute chytridiomycosis. In translocation efforts involving direct movement of frogs from one location to another, CDFW has found that directly moving adults is usually the most straight forward method. Adult SNYLF have passed through the life stages most susceptible to Bd-induced mortality and have the potential to breed soon after adjusting to their new location (MYLF ITT – Attachment 3). Current research suggests that multiple translocations over several years may be necessary to establish self-sustaining SNYLF populations (Joseph and Knapp 2018).

7) MONITORING

A continuous monitoring program is necessary to assess resource changes, measure the effects of past management, and evaluate the effectiveness of new management decisions. CDFW proposes the following monitoring guidelines in this plan:

- Conduct monitoring surveys using the current standard CDFW HML survey protocol or pertinent portion of the protocol (Appendix 1). For example, if monitoring a fish population, conduct the complete fish survey protocol. This will ensure comparable data between different years, even when collected by different crew members.
- Long-term monitoring of amphibian populations should occur at the same time of year, whenever possible, to minimize variance from temporal behavior patterns.
- Apply extra effort when monitoring fish or amphibian populations with extremely low densities. For example, consider setting a gill net longer than the typical maximum of twelve hours, as stated in the protocol, if few or no fish may be present in the lake.

If monitoring for a species not expressly targeted by the HML protocol, CDFW will use the standard protocol for that species. If no internal protocol exists, CDFW will use an appropriate USFWS or USFS protocol.

SECTION II: MANAGEMENT SETTING AND RESOURCES

1) ENVIRONMENTAL SETTING

CDFW, in keeping with the Strategic Plan for Trout Management (Hopelain 2003), has adopted a watershed scale approach to management planning. This ABMP follows that approach and includes four Calwaters 2.2 planning watersheds (PWS) in the Bear River drainage, a tributary to the Mokelumne River.

The Bear River Management Unit (MU) is within the Sierra Nevada mountain range in northern California, roughly twenty-five miles southwest of Lake Tahoe. More specifically, the management unit lies just south of State Route (SR) 88 and north of SR 4, extending from a ridge dividing the headwaters of the Bear River from the headwaters of the Silver Fork American River, down to the dam at Lower Bear River Reservoir (Lower Bear). The management unit contains four Calwaters 2.2 PWSs: Corral Flat, Little Bear River, Tragedy Creek, and Upper Bear River. Together, these watersheds encompass approximately 23,860 acres (9,656 hectares) of montane and sub-alpine habitat, ranging from about 5,800 feet (ft) (1,768 meters; m) elevation above mean sea level at Lower Bear to the summit of an unnamed peak in the northeast corner of Upper Bear River PWS at 9,007 ft (2,745 m) elevation (**Figure 1**). Approximately 150 unique survey units (discrete lakes and ponds, plus selected sections of river and stream) have been mapped within the management unit boundary.

Most land within Bear River MU is managed by ENF. The national forest land supports a suite of public use activities, including camping, cross-country skiing, fishing, hiking, horseback riding, and hunting. Additionally, permittees graze cattle on the Bear River and Pardoe Grazing Allotments within MU lands during summer months (USDA Forest Service 2020). A small subset of lands within the MU are privately owned. This management plan does not propose management actions on privately owned land, nor does it suggest management direction for privately owned lands.

The land in the MU is highly visited around Lower Bear, with many two-way roads that access the reservoir and campgrounds. There are three privately-owned camping areas with access to the reservoir, including camps owned by Bear River Lake Resort, Boy Scouts of America (Camp Winton), and the Latter-Day Saints church (Camp Ritchie). Additionally, there are four public campgrounds run by USFS or USFS-associated concessionaires, including Sugar Pine Point (8 sites), South Shore (22 sites), Pardoes Point (10 sites), and Bear River Group (4 large group sites). State Route 88 runs along the margin of Little Bear River and Tragedy Creek PWSs, and bisects the Corral Flat PWS. There is a scenic overlook, Shot Rock Vista, located immediately south of SR 88, on the boundary between Corral Flat and Tragedy Creek PWSs, and the remains of the now defunct Iron Mountain Ski Area are located at the northern periphery of Corral Flat PWS. Other developments along the periphery of the Bear River MU include the CalTrans Peddler Hill maintenance station, several small private camps accessible from SR 88, Devil’s Garden vista point, and Tragedy Spring picnic area.

Most land in the MU lacks a maintained trail system, and is accessible by cross-country hiking, horseback riding, or skiing. A handful of trails and rough four-wheel drive roads access the northeastern (NE) and southwestern (SW) portions of the MU, but most roads are within the vicinity of Lower Bear to the SW and Mud Lake to the NE. For the purposes of this plan, proximity to access corridors, camping areas, or destination aquatic resources is used as a proxy for public visitation data (**Figure 2**).

2) HERPETOFAUNA RESOURCES

Bear River Management Unit hosts many amphibian and reptile species. Among these are one species listed as threatened under CESA, SNYLF, and one amphibian Species' of Concern, AMMA. Other species in the management unit include the widely distributed HYRE and Western toads (*Bufo* [*Anaxyrus*] *boreas*, BUBO). Three species of gartersnakes (THSP), including the common gartersnake (*Thamnophis sirtalis*, THSI), mountain gartersnake (*Thamnophis elegans elegans*, THEL), and Sierra gartersnake (*Thamnophis couchii*, THCO), frequent aquatic habitats to forage on frogs, salamanders, fish, and aquatic insects.

There are two primary SNYLF populations within the Bear River Management Unit. The most robust population currently known is found in Tragedy Creek, within Tragedy Creek PWS. During any given survey, between about 10 and 50 SNYLF adults have been observed along an approximately 2.8-km stream reach, including several small stream widening ponds. The next largest SNYLF population is found in Upper Bear River PWS, along the main stem of Upper Bear River. This river reach has thus far been minimally surveyed. However, rapid surveys in 2019 of an approximately 3.7 km segment of Upper Bear River revealed approximately 50 post-metamorphic SNYLF and over 1,600 tadpoles. Based on current survey results, CDFW suspects there may be a relatively large SNYLF population present in the approximately 10 km composing the upper reaches of Upper Bear River. To gain a better understanding of SNYLF population status in this area, reach-wide surveys of public lands along Upper Bear River, from upstream of BRR to Allen Camp, are planned in summer 2020. These surveys will also include additional portions of Tragedy Creek that CDFW has not previously surveyed for amphibians.

The Bear River MU contains several other small, isolated SNYLF populations, including one population found in a segment of meadow stream close to the headwaters of Upper Bear River, at the northeast end of the Upper Bear River PWS. This area is located just east of the privately-owned Allen Camp and contained about 20 post-metamorphic SNYLF during the most recent CDFW surveys in 2015. Other small SNYLF populations include a tiny spring-fed pond in northwestern Little Bear River PWS, small ponds south of Tragedy Creek, a small tributary to Tragedy Creek, and Mud Lake, including the Mud Lake outlet stream, located in the Upper Bear River PWS. Each of these populations contains at most 10 adult SNYLF seen during any one survey. SNYLF larvae have only been observed in Tragedy Creek, Upper Bear River, the spring-fed pond, and Mud Lake.

CDFW has records of Rainbow Trout (*Oncorhynchus mykiss*, RT) observations in the lower surveyed portions of Tragedy Creek. Although post-metamorphic SNYLF have been observed in this area, CDFW surveyors detected very few SNYLF larvae during the past several years of VES in the areas with known fish presence. The sections of Tragedy Creek with fish may be acting as a population sink for SNYLF moving into the area and attempting to reproduce. There are also old VES records of trout from some areas of Upper Bear River. However, CDFW did not observe fish during VES of Upper Bear River in 2019. Additional surveying and/or an overnight gill net sample will be required to determine if trout are sympatric with SNYLF in Upper Bear River. Based on CDFW detecting large numbers of SNYLF tadpoles in 2019, the presence of more than a very low-density trout population in Upper Bear River appears unlikely. If present, trout may be restricted to only the deepest, large perennial pools in the main stem of Upper Bear River.

CDFW collected Bd samples in the Bear River MU in 2008, 2010, and 2012, including samples collected from Tragedy Creek, near Allen Camp (NE corner of Upper Bear River PWS), the spring-fed pond (NW corner of Little Bear River PWS), and one sample from Upper Bear River. Individuals at most of these locations tested positive for Bd, with light to heavy zoospore loads. The two samples collected in the population near Allen Camp were negative for Bd. However, two samples provide too low of a sample size to determine if Bd is absent from the Allen Camp population.

3) FISHERIES RESOURCES

Historically, only twenty lakes naturally contained fish in the waters of the high Sierra Nevada mountain range (above 1,400 m; 4,600 ft) and all other headwaters ecosystems were naturally fishless due to impassable barriers to upstream fish passage (Moyle et al. 1996). California Golden Trout (*Oncorhynchus mykiss aguabonita,* GT-CA) and the Kern River Rainbow Trout (*Oncorhynchus mykiss gilberti,* RT-KR) of the upper Kern River Basin and the Sacramento Sucker (*Catostomus occidentalis)* in the Kern River were the only native fishes to the higher elevations of the Sacramento-San Joaquin River drainage. The Lahontan Cutthroat Trout (*Oncorhynchus clarki henshawi,* CT-L) and Paiute Cutthroat Trout (*Oncorhynchus clarki seleniris*, CT-P) were the only native trout species in the Lahontan Basin, which includes the Carson River, Susan River, Truckee River, Walker River, and Lake Tahoe drainages (Moyle et al. 1996, Moyle 2002). Non-trout species native to the Lahontan Basin include the Lahontan Redside (*Richardsonius egregius*), Tahoe Sucker (*Catostomus tahoensis*), Mountain Suckers (*Catostomus platyrhynchus*), Tui Chub (*Gila bicolor* ssp.), Paiute Sculpin (*Cottus beldingi*), and Mountain Whitefish (*Prosopium williamsoni*). Natural lakes in these watersheds such as Donner Lake, Eagle Lake, Fallen Leaf Lake, Independence Lake, Webber Lake, and Lake Tahoe, also contained these native fish species.

Beginning in the 1800s, non-native fish were introduced by a variety of groups to headwater systems in the Sierra Nevada. The practice of fish stocking became standard policy as state agencies took primary responsibility for managing each state’s fish and wildlife resources. CDFW has stocking records for many named lakes in Bear River Management Unit starting in the 1930s. Stocking increased in scope in the 1950s with the advent of aerial fish stocking (Knapp 1996) and non-native fish were eventually introduced into nearly every Sierra Nevada headwater system.

Although the practice of introducing non-native fish in historically fishless headwater ecosystems created many productive fisheries and established angling as a recreational activity in high mountain lakes, negative effects on the viability and biodiversity of native species populations have been thoroughly documented (Bradford 1989, Lunte and Luecke 1990, Bahls 1992, Bradford et al. 1993, Drake and Naiman 2000, Knapp et al. 2001, Pister 2001, Dunham et al. 2004, Vredenburg 2004, Finaly and Vredenburg 2007, Pope 2008, Herbst et al. 2009). In California, researchers have determined non-native fish introduction is a primary factor in observed population declines of SNYLF (Bradford 1989, Bradford et al. 1993, Knapp and Matthews 2000, Knapp et al. 2001, Knapp 2005, Knapp et al. 2007).

Currently, CDFW has jurisdiction of fish stocking programs in the Sierra Nevada outside of the National Parks and has maintained reliable fish stocking records since 1950. Brook Trout, Brown Trout (*Salmo trutta,* BN), Golden Trout, CT-L, and RT are the most commonly introduced fish species. Other less common species introduced include Arctic Grayling (*Thymallus arcticus,* AG), Bullhead (*Ameiurus* spp.), Carp (*Cyprinus carpio*), Goldfish (*Carassius auratus*), Hitch (*Lavinia exilicauda*), Golden Shiner (*Notemigonus crysoleucas*), Chinook Salmon (*Oncorhynchus tshawytscha*, CHIN), Kokanee Salmon (*Oncorhynchus nerka kennerlyi*, KOK), Lake Trout (*Salvelinus namaycush*, LT), Speckled Dace (*Rhinichthys osculus*), Sunfish (*Lepomis* spp.), and Tui Chub.

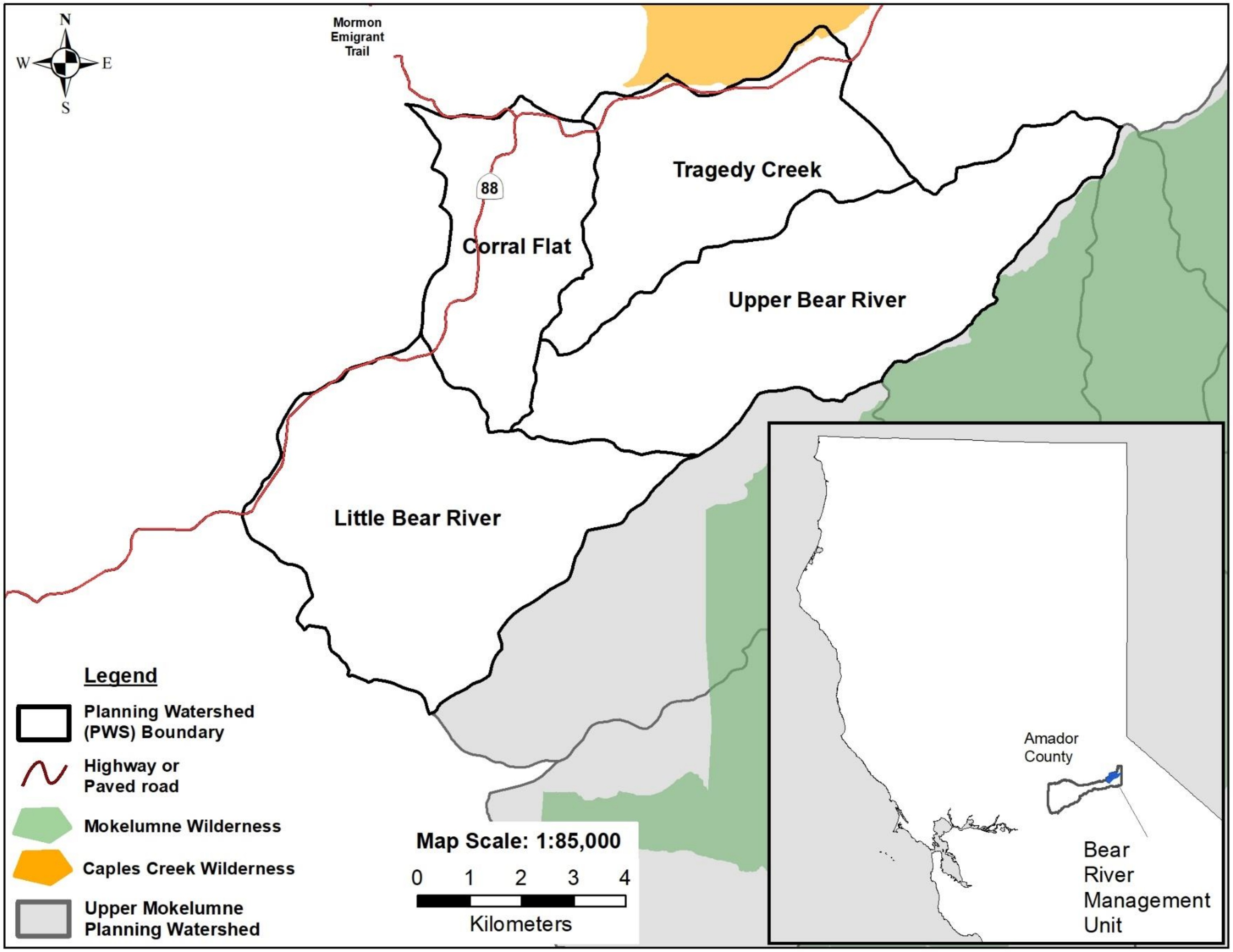


Figure 1: CDFW Planning Watersheds within Bear River Management Unit.

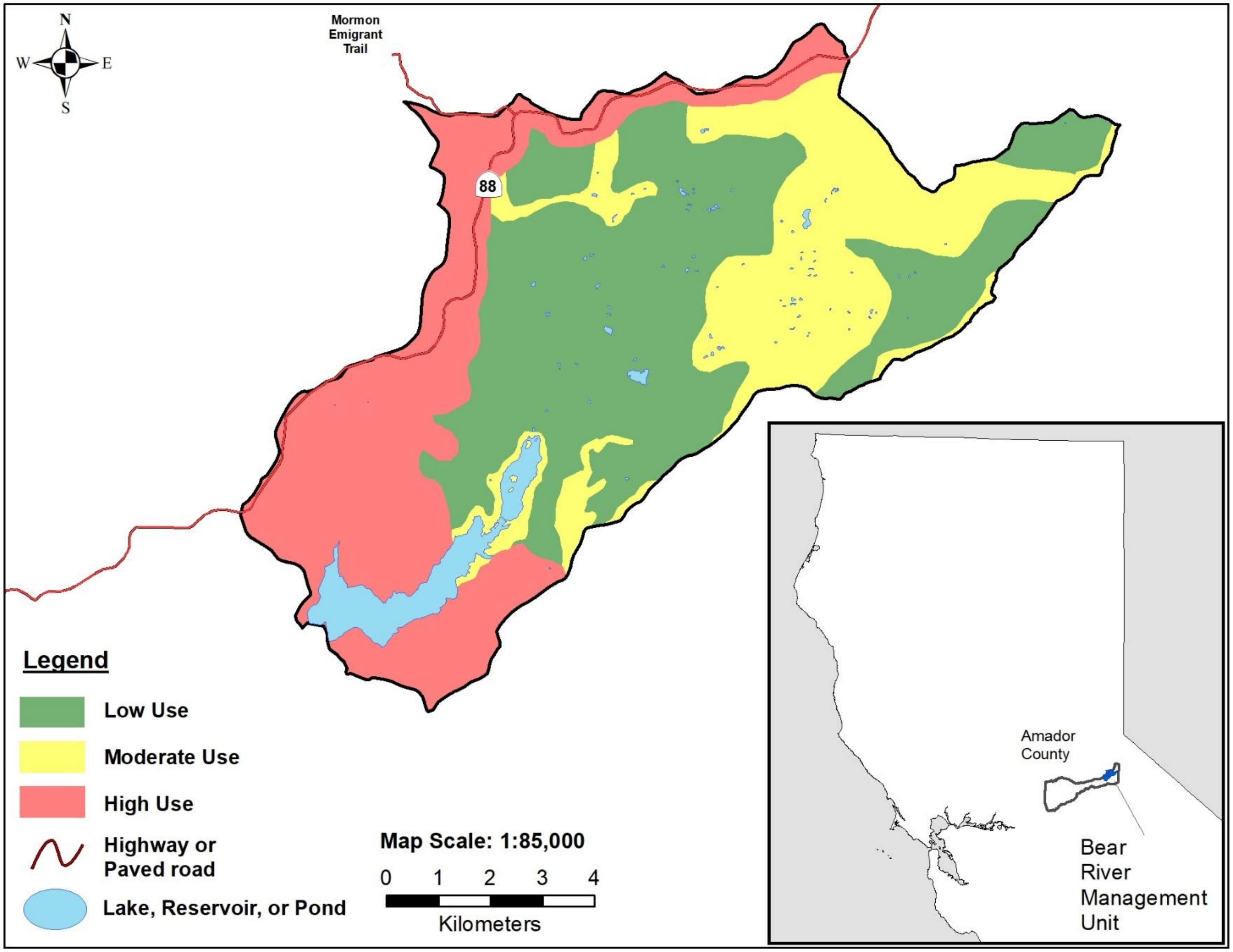
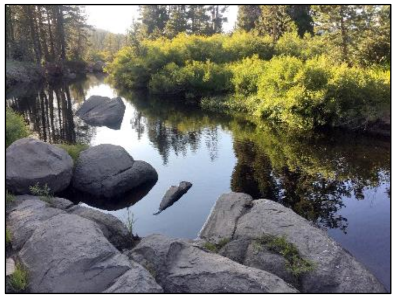


Figure 2: Use within the Bear River Management Unit.

SECTION III: MANAGEMENT DIRECTION

1) CORRAL FLAT PLANNING WATERSHED MANAGEMENT DIRECTION

Corral Flat PWS contains three unnamed lakes and an unnamed tributary to Bear River. State Route 88 bisects the watershed near its northern and western boundaries and most land within the PWS is managed by ENF. Elevations within the watershed range from Alder Hill, which is 2,350 m (7,714 ft), in the northwest corner, to the confluence of an unnamed tributary of Bear River at 1,800 m (5,900 ft). The area consists of mixed conifer forests, meadows, and granite outcroppings.

Table 1 provides summary data for amphibian resources and management in the Corral Flat PWS. **Figure 3** provides herpetofauna species distribution for the Corral Flat PWS. **Figure 4** provides the management direction for the Corral Flat PWS. **Figure 5** provides fish species distribution for the Corral Flat PWS.

Herpetofauna and Fisheries Resources and Management

In 2003, CDFW observed AMMA larvae at unnamed lakes 14815 and 14871. As a result of breeding AMMA, CDFW will manage these two lakes as amphibian resources. CDFW has identified via aerial imagery one stream segment to investigate for amphibian presence (**Figure 3**, area in grey), but this area has not yet been surveyed. The remaining stream sections appear to be less suitable for occupancy and CDFW does not currently plan to survey those sections.

Incidentally, CDFW survey crews observed HYRE at two sites and THSP at one site within the PWS (**Table 1**).

Table 1: Summary of herpetofauna survey data and management for Corral Flat Planning Watershed.

Site Name	Site ID	Survey Date	Herpeto-fauna Observed	Adult	Sub-adult	Meta-morph	Larva	Egg Mass	Management Direction
	14815	9/15/2003	AMMA	0	0	0	1	0	Amphibian resource
			HYRE	0	0	1	0	0	
	14849	8/18/2002	None						Not actively managed
	14871	8/18/2002	AMMA	0	0	0	45	0	Amphibian resource
			HYRE	0	0	0	20	0	
			THEL	1	0	0	0	0	

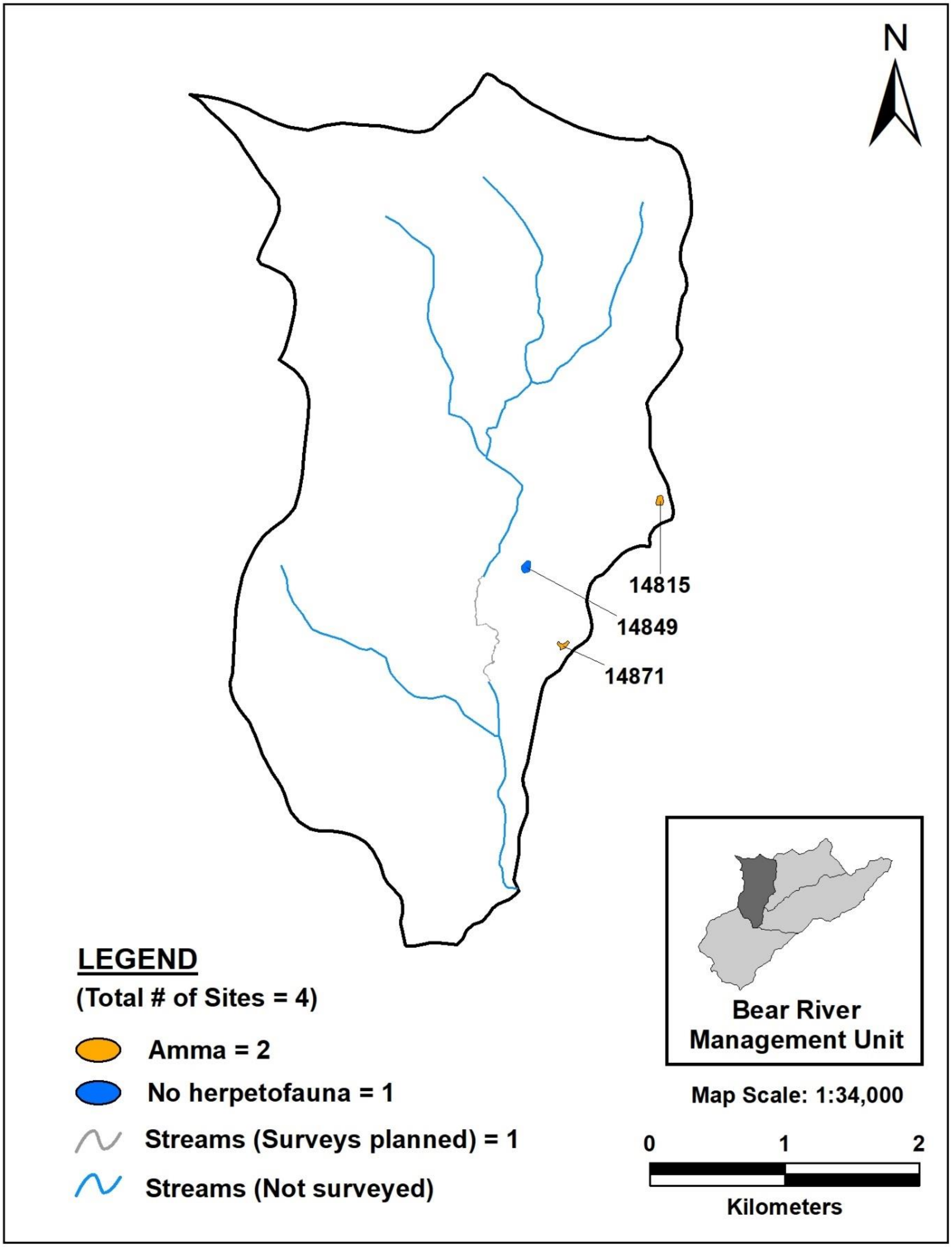


Figure 3: Herpetofauna resources in Corral Flat Planning Watershed.

Map sowing

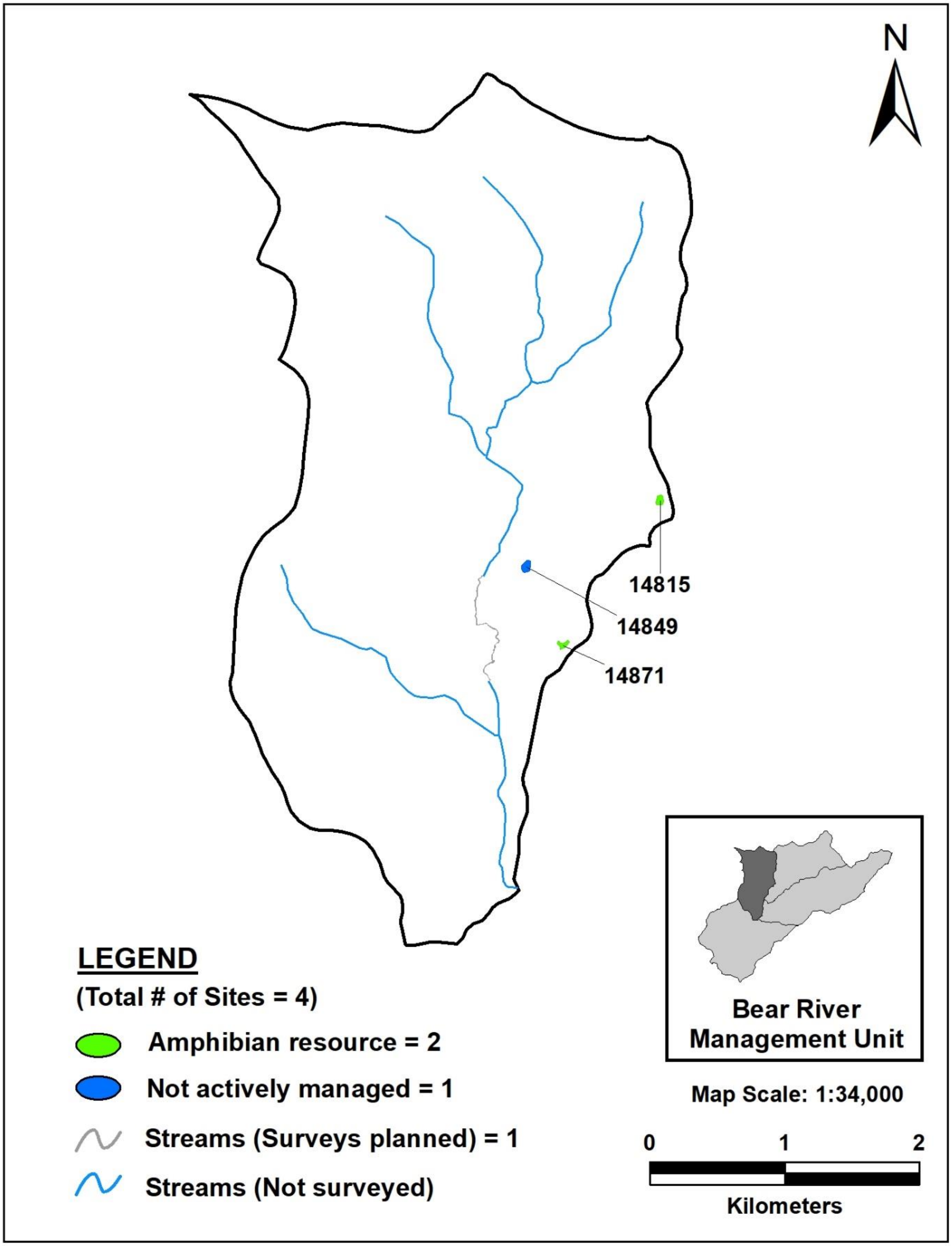


Figure 4: Management direction in Corral Flat Planning Watershed.

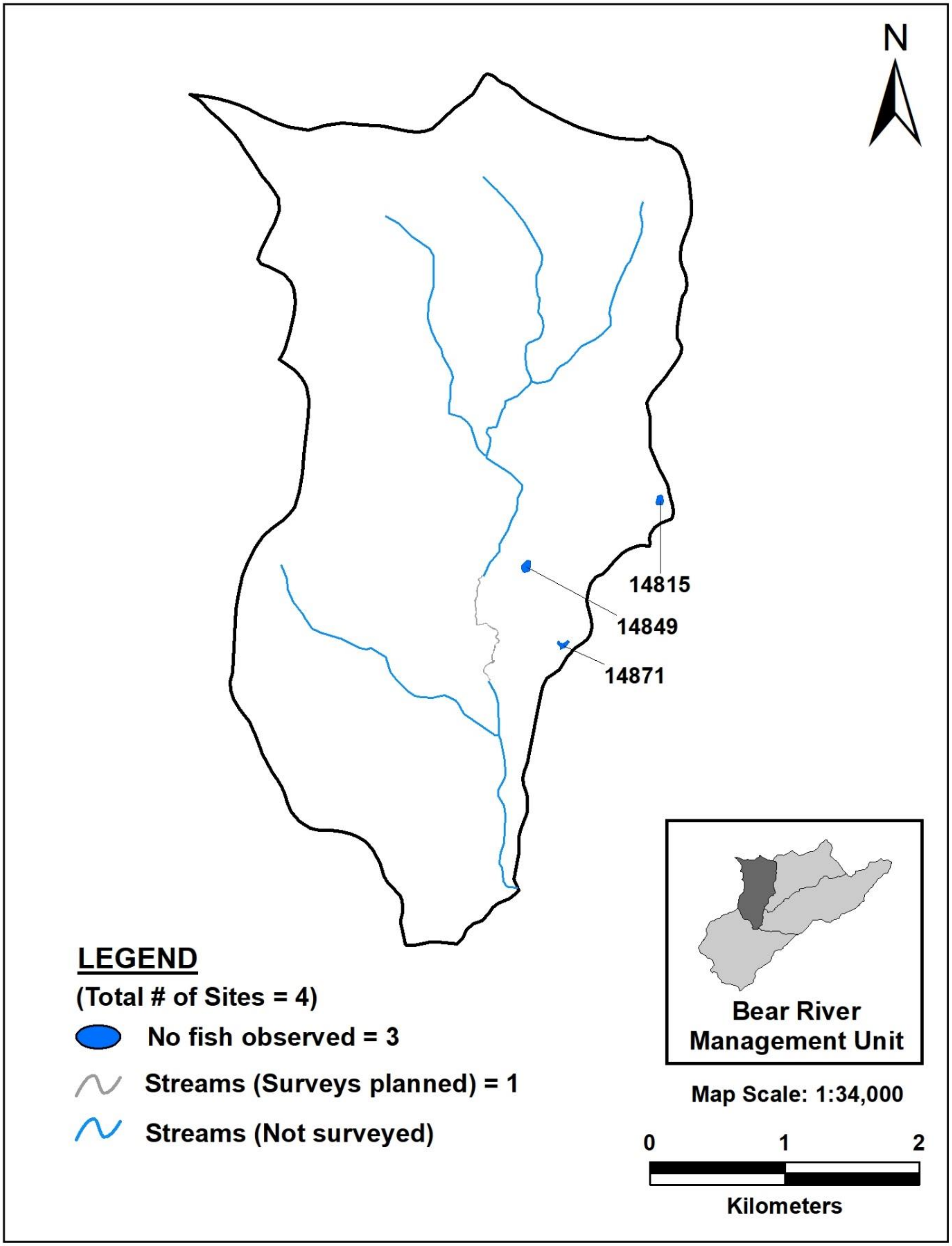


Figure 5: Fisheries resources in Corral Flat Planning Watershed.

2) LITTLE BEAR RIVER PLANNING WATERSHED MANAGEMENT DIRECTION

Little Bear River PWS contains two large impoundments: Bear River Reservoir (BRR) and Lower Bear. State Route 88 runs along its northern side and rough dirt roads provide access to most of the PWS. Eldorado National Forest manages most land in the watershed, including three campgrounds along the southwest side and one along the northern side of Lower Bear. Additionally, three privately operated campgrounds are located on Lower Bear. Two named tributaries flow into Lower Bear from the north: Sugar Pine Creek and Little Bear River. Elevations within the watershed range from approximately 1,774 m (5,820 ft), at Lower Bear, to an unnamed peak at the far northeast edge of the watershed, at 2,450 m (8,040 ft). The area consists of small rural developments, mixed conifer forests, meadows, and granite outcroppings.

Table 2 provides summary data for amphibian resources and management in the Little Bear River PWS. **Table 3** provides a summary of fish population data for the Little Bear River PWS. **Table 4** provides a summary of fisheries management for the Little Bear River PWS. **Figure 6** provides herpetofauna species distribution for the Little Bear River PWS. **Figure 7** provides the management direction for the Little Bear River PWS. **Figure 8** provides fish species distribution for the Little Bear River PWS.

Herpetofauna and Fisheries Resources and Management

Field crews observed SNYLF at two sites within the watershed in the early 2000s. At site 27501, a small spring-fed pond, CDFW consistently observed 10 to 30 adult and larval SNYLF. More recently, ENF biologists have been monitoring site 27501 annually and consistently observe a small SNYLF population. At site 27979, along Little Bear River, CDFW crews observed a single adult in 2005, but crews have not detected any SNYLF during four subsequent surveys. Thus, SNYLF are likely extirpated from site 27979. However, given the proximity of site 27979 to the breeding population at site 27501, CDFW will continue to manage both locations as amphibian resources.

Lower Bear is a road accessible reservoir with multiple public and private campgrounds along its shores. The reservoir and dam, which were completed in 1952, are managed by Pacific Gas and Electric Company (PG&E) for storage and power generation (DWR 2020). CDFW stocks Lower Bear with RT and BN. Rainbow Trout plants occur multiple times per year, whereas BN plants occur less frequently; approximately once per year, or every other year, depending on availability. PG&E and Bear River Lake Resort also plant Lower Bear with RT (Ewing 2019b). Rainbow Trout and BN plants began in the early 1970’s. Other species historically planted in Lower Bear include BK (1984), CT-L (1974 to 1977, 1980), KOK (1973 and 1974), and LT (1984, 1985, 1988, and 1990). Lower Bear is a popular fishing destination that tends to grow trophy-sized trout (Ewing 2019b). CDFW will continue to manage Lower Bear as a stocked fishery.

Bear River Reservoir is separated from Lower Bear by a dam built sometime before 1930. The reservoir and dam are managed by PG&E for power generation. Rainbow Trout plants began at BRR in 1938 and continued regularly through 2007. Lake Trout, BK, BN, and CT-L were each planted once. When compared with Lower Bear, BRR receives less public use because no public roads provide access. During general fish surveys in 2013, CDFW found self-sustaining RT in BRR (Ewing 2013). When considering lower public use and limited access, CDFW has not resumed fish plants at BRR. CDFW will manage BRR as a self-sustaining RT fishery.

Incidentally, CDFW survey crews observed HYRE at two sites and THSP at two sites within the PWS (**Table 2**).

Table 2: Summary of herpetofauna survey data and management for Little Bear River Planning Watershed.

Site Name	Site ID	Survey Date	Herpeto-fauna Observed	Adult	Sub-adult	Meta-morph	Larva	Egg Mass	Management Direction
Bear River Reservoir	14955	7/13/2009	THCO	0	1	0	0	0	Self-sustaining fishery
Bear River Reservoir, Lower	15004	5/11/2009	THCO	1	0	0	0	0	Stocked lake
			THEL	2	0	0	0	0	
		7/9/2019	None						
		9/4/2019	None						
	27501	6/9/2003	HYRE	2	0	0	0	0	Amphibian resource
			SNYLF	0	1	1	100	0	
		6/10/2005	SNYLF	9	0	0	31	0	
		7/16/2008	HYRE	0	0	0	9	0	
			SNYLF	2	7	0	6	0	
		7/3/2010	SNYLF	0	1	0	18	0	
		6/7/2012	SNYLF	1	0	0	9	0	
		9/7/2016	SNYLF	4	0	0	5	0	
	27979	6/10/2005	HYRE	1	0	0	0	40	Amphibian resource
			SNYLF	1	0	0	0	0	
		7/16/2008	HYRE	0	0	0	135	0	
			THEL	0	1	0	0	0	
		7/3/2010	HYRE	0	0	0	0	1	
		6/7/2012	HYRE	0	0	0	0	2	
		9/7/2016	None						

Table 3: Summary of fisheries population data in Little Bear River Planning Watershed.

Site Name	Site ID	Survey Date	Fish Species Observed	Self-sustaining	# Caught	Avg Length (mm)	Avg Weight (g)	Avg K Value
Bear River Reservoir	14955	6/18/2013	RT	Yes	51	157	Not recorded	N/A
Bear River Reservoir, Lower	15004	7/9 and 9/4/2019	*See footnote**	Stocked	-	-	-	-

CDFW conducted visual encounter surveys for aquatic wildlife around Lower Bear River Reservoir during summer 2019 (Ewing 2019a). CDFW has not conducted a gill net survey of the reservoir. However, the reservoir is regularly stocked with RT and BN (see* ***Table 4**). Additionally, recent angler surveys have provided CDFW with data on BK, BN, LT, and RT captures (Ewing 2019b).*

Table 4: Summary of fisheries management for Little Bear River Planning Watershed.

Site Name	Site ID	First Recorded Stocking	Last Recorded Stocking	Pre-survey Allotment	Proposed Allotment	Management Direction
Bear River Reservoir	14955	1997 - BN	1997 - BN	3000 RT ANN	DNP	Self-sustaining fishery
		1998 - BK	1998 - BK			
		1969 - CT-L	1969 - CT-L			
		1985 - LT	1985 - LT			
		1938 - RT	2007 - RT			
Bear River Reservoir, Lower	15004	1972 - BN	2019 - BN	7000 RT-C ANN, 2400 BN-C ANN	16000 RT-C ANN, 60000 RT-F ANN	Stocked lake
		1984 - BK	1984 - BK			
		1974 - CT-L	1980 - CT-L			
		1973 - KOK	1974 - KOK			
		1984 - LT	1990 - LT			
		1971 - RT	2019 - RT			

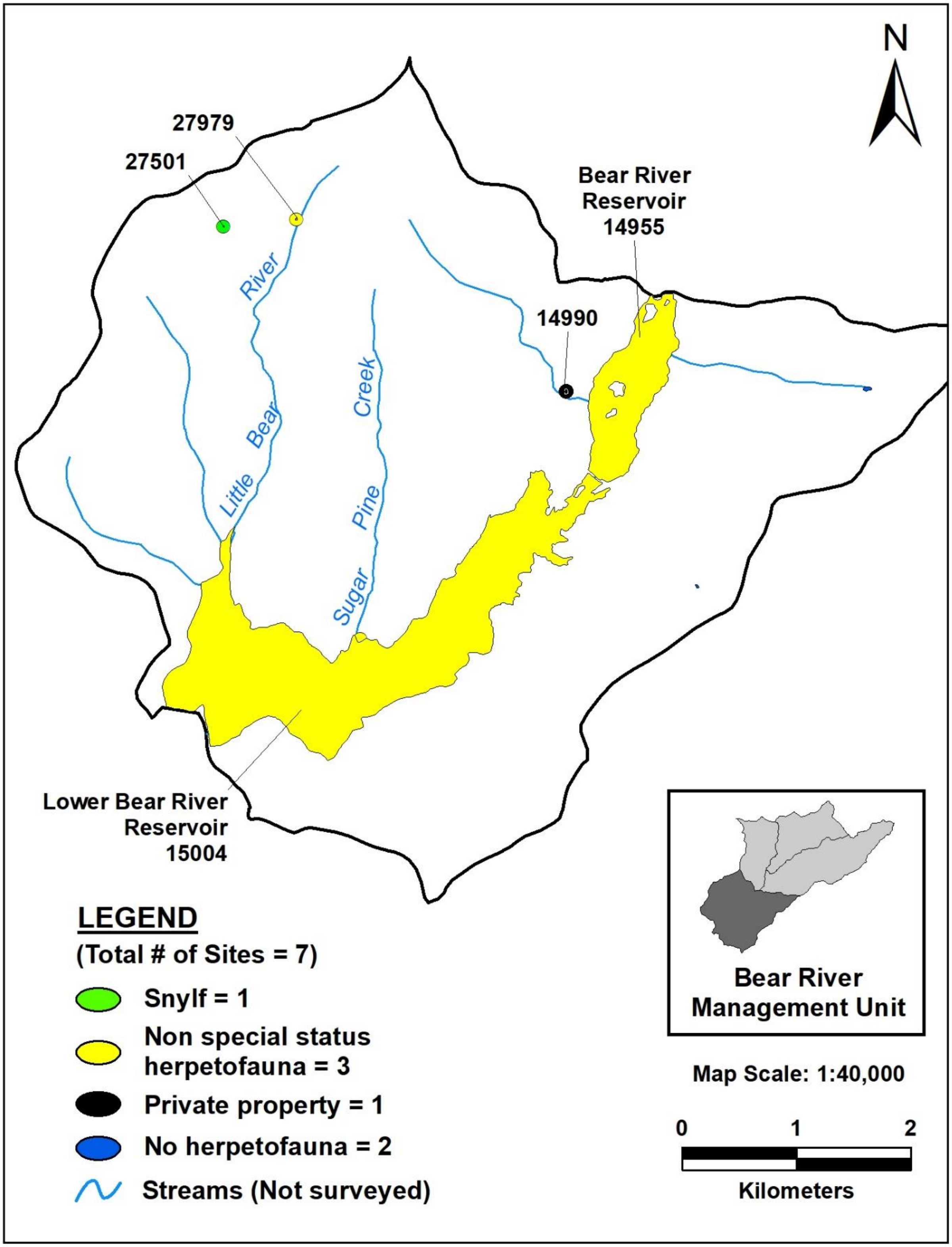


Figure 6: Herpetofauna species distribution in Little Bear River Planning Watershed.

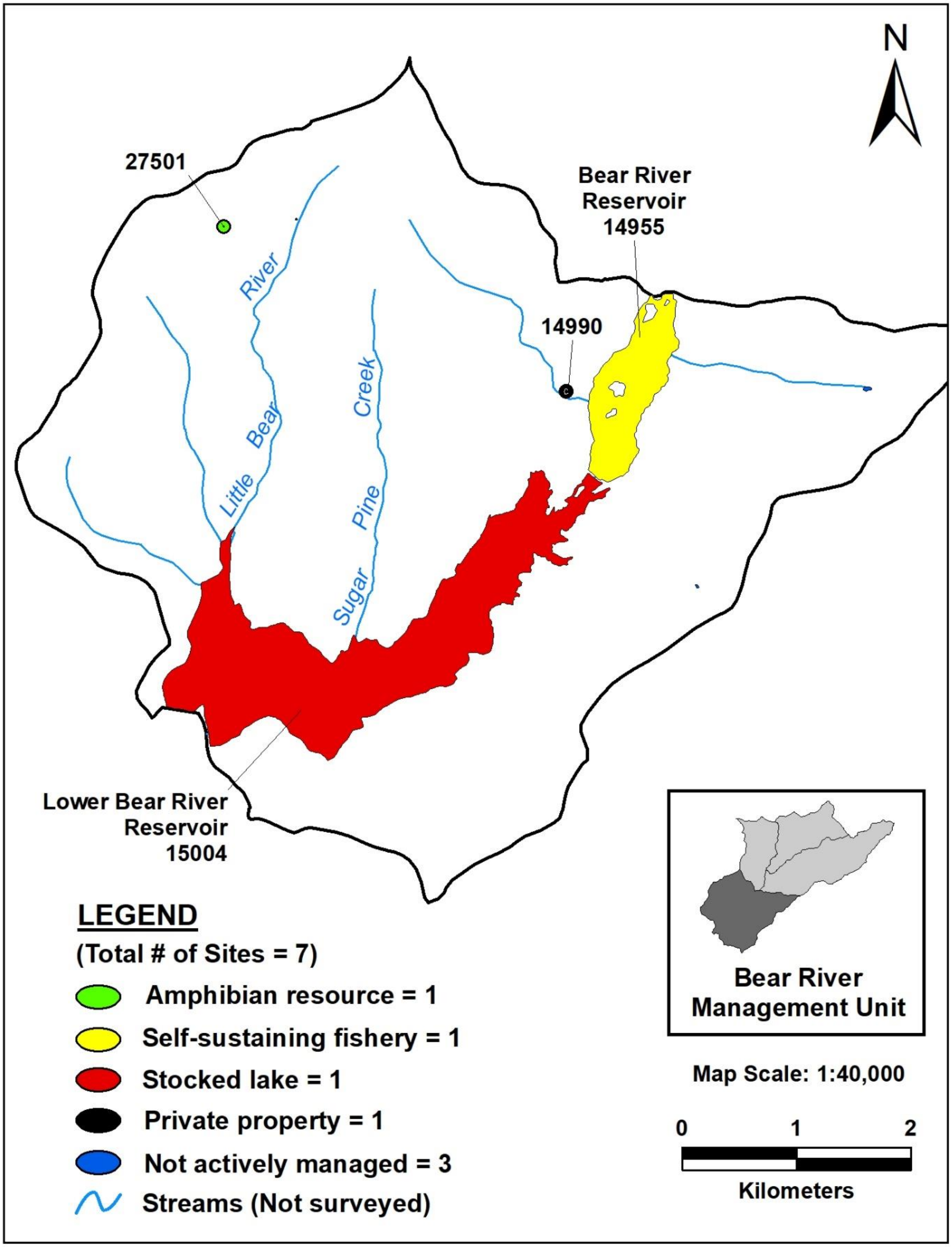


Figure 7: Management direction in Little Bear River Planning Watershed.

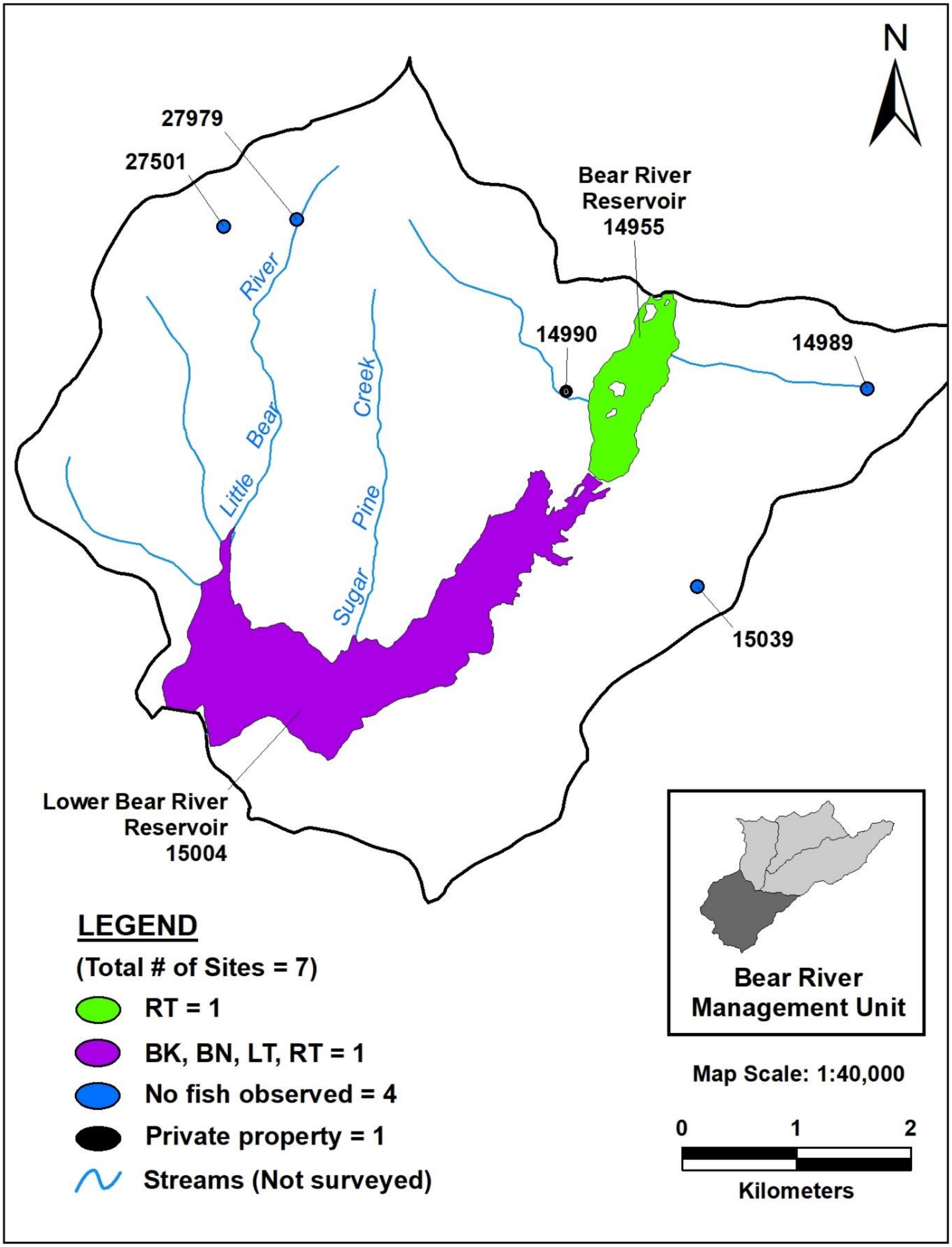


Figure 8: Fish species distribution in Little Bear River Planning Watershed.

3) TRAGEDY CREEK PLANNING WATERSHED MANAGEMENT DIRECTION

Tragedy Creek PWS contains Tragedy Creek, Tragedy Spring, several unnamed ponds, and five unnamed ephemeral tributaries to Tragedy Creek. State Route 88 is located on the northern boundary and most land within the PWS is managed by ENF. Elevations within the watershed range from Plasse Peak, at 2,576 m (8,451 ft), to the confluence of Tragedy Creek and Upper Bear River, at approximately 1,935 m (6,350 ft). The area consists of mixed conifer forests, meadows, and granite outcroppings. No maintained trails are present in the Tragedy Creek PWS: only two rough four-wheel drive roads are found in the far eastern edge of the watershed. Accessing most of the area requires cross country travel.

Table 5 provides summary data for amphibian resources and management in the Tragedy Creek PWS. **Table 6** provides a summary of fish population data for the Tragedy Creek PWS. **Figure 9** provides herpetofauna species distribution for the Tragedy Creek PWS. **Figure 10** provides the management direction for the Tragedy Creek PWS. **Figure 11** provides fish species distribution for the Tragedy Creek PWS.

Herpetofauna and Fisheries Resources and Management

Since the early 2000’s, CDFW has observed larval and post-metamorphic SNYLF along the central portion of Tragedy Creek, including within several large stream-widening pools. However, CDFW has still not surveyed several areas of Tragedy Creek for amphibians, including the upper headwaters and areas below unnamed pond 14777. Therefore, to gain a better understanding of SNYLF distribution and relative abundance in this watershed, CDFW plans to undertake more extensive surveys of the entire mainstem Tragedy Creek within the PWS in 2020. Additional areas planned for future surveys are shown in grey on the Tragedy Creek PWS maps (**Figures 9–11**).

Surveyors have also detected SNYLF in a small tributary to Tragedy Creek, and sympatric with AMMA in an isolated, unnamed pond south of Tragedy Creek. Portions of Tragedy Creek hold water year-round, but the creek only flows from late winter to early summer. The unnamed tributaries to Tragedy Creek are also ephemeral and only hold very small amounts of water by late summer. Most ponds in Tragedy Creek PWS are located south of Tragedy Creek, except for three small ponds found north of the creek. Apart from unnamed pond 14743 (1.1 hectare surface area), in which CDFW has observed SNYLF and AMMA, all ponds in the Tragedy Creek PWS are shallow and less than 1 hectare in surface area.

In August 2017, a CDFW staff member caught eight RT while recreationally angling in lower portions of Tragedy Creek. There are no records of fish planting in this section of creek and a large waterfall barrier to upstream fish passage is present between BRR and the surveyed sections of Tragedy Creek that contain SNYLF. Therefore, although the source of these RT is unknown, it is highly unlikely that RT gained access to this portion of Tragedy Creek without human assistance.

CDFW does not currently have plans to remove RT from this section of Tragedy Creek. However, Tragedy Creek is one of the most important amphibian resources in the Bear River MU and the presence of RT is likely detrimental to the co-occurring SNYLF population by limiting or precluding successful SNYLF breeding where fish are present. Therefore, CDFW may consider future efforts to physically removal RT using gill nets and electrofishing units to restore this section of Tragedy Creek for SNYLF. Before commencing any potential fish removal project on this segment of Tragedy Creek, CDFW would first fully assess the habitat composition and fish distributions to determine if fish removal is feasible. Additionally, CDFW would engage in public outreach to better determine current use and opinions about fish removal in this area.

CDFW has observed AMMA at nine sites within the watershed. All of these sites are fishless. As a result, CDFW will manage these sites as amphibian breeding resources.

Incidentally, CDFW survey crews observed HYRE at 15 sites and THSP at 11 sites within the PWS (**Table 5**).

Table 5: Summary of herpetofauna survey data and management for Tragedy Creek Planning Watershed.

Site Name	Site ID	Survey Date	Herpeto-fauna Observed	Adult	Sub-adult	Meta-morph	Larva	Egg Mass	Management Direction
	14713	8/13/2002	THEL	1	0	0	0	0	Amphibian resource
			AMMA	0	0	0	150	0	
	14730	8/14/2002	AMMA	0	0	0	6	0	Amphibian resource
	14734	8/14/2002	HYRE	3	0	0	0	0	Not actively managed
		9/8/2016	None						
Tragedy Creek	14740	8/14/2002	SNYLF	2	0	0	18	0	Amphibian resource
		8/26/2009	SNYLF	0	4	0	85	0	
		9/8/2016	SNYLF	0	0	0	8	0	
		7/7/2017	None						
		9/12/2019	SNYLF	1	0	0	15	0	
			THEL	1	0	0	0	0	
	14743	8/14/2002	SNYLF	2	0	0	0	0	Amphibian resource
			THCO	1	0	0	0	0	
			HYRE	8	0	0	0	0	
		9/15/2003	HYRE	0	0	10	0	0	
		7/5/2004	THCO	1	0	0	0	0	
			HYRE	0	0	0	2	1	
		7/20/2005	HYRE	0	0	0	4	0	
		8/4/2012	None						
		7/5/2014	SNYLF	1	0	0	0	0	
		9/8/2016	THEL	1	0	0	0	0	
			THSP	1	0	0	0	0	
			AMMA	0	0	0	1	0	
			SNYLF	1	0	0	0	0	
	14744	8/14/2002	HYRE	0	2	0	3	0	Not actively managed
	14748	6/28/2001	HYRE	0	0	0	100	1	Amphibian resource
			TATO	1	0	0	0	0	
			THSI	1	0	0	0	0	
		8/13/2002	HYRE	80	60	0	20	0	
			THEL	4	0	0	0	0	
			AMMA	0	10	0	0	0	
Tragedy Creek	14750	8/14/2002	SNYLF	1	0	0	0	0	Amphibian resource
		8/26/2009	SNYLF	0	4	0	56	0	
		9/8/2016	SNYLF	3	1	0	0	0	
			THSP	1	0	0	0	0	
		9/12/2019	SNYLF	1	0	0	3	0	

Site Name	Site ID	Survey Date	Herpeto-fauna Observed	Adult	Sub-adult	Meta-morph	Larva	Egg Mass	Management Direction
	14769	8/14/2002	HYRE	17	3	0	2	0	Not actively managed
			SNYLF	1	0	0	0	0	
		7/5/2004	HYRE	0	0	0	20	0	
		7/20/2005	HYRE	0	0	0	1	5	
		8/4/2012	HYRE	0	1	0	0	0	
		9/8/2016	HYRE	1	0	0	0	0	
	14771	8/14/2002	HYRE	20	0	0	30	0	Not actively managed
			THEL	1	0	0	0	0	
	14772	8/14/2002	HYRE	32	0	0	3	0	Not actively managed
		9/8/2016	None						
	14777	8/14/2002	None						Amphibian resource
		6/27/2013	None						
		9/8/2016	SNYLF	0	1	0	0	0	
		9/12/2019	SNYLF	1	0	0	0	0	
	14781	9/11/2019	None						Not actively managed
	14810	8/14/2002	AMMA	0	0	0	1	0	Amphibian resource
			HYRE	2	70	0	230	0	
			THEL	1	0	0	0	0	
	14813	8/14/2002	HYRE	1	0	0	6	0	Not actively managed
	14823	8/14/2002	HYRE	11	0	0	0	0	Not actively managed
	14826	8/14/2002	HYRE	0	0	0	4	0	Not actively managed
	14852	8/14/2002	THEL	1	0	0	0	0	Not actively managed
	14864	8/16/2002	HYRE	0	9	0	33	0	Not actively managed
		9/11/2019	HYRE	0	0	2	6	0	
	14872	8/16/2002	HYRE	0	0	0	1	0	Not actively managed
		9/11/2019	HYRE	0	0	0	1	0	
	26627	9/11/2019	HYRE	0	0	44	8	0	Amphibian resource
			AMMA	0	0	0	6	0	
Tragedy Creek	50151	8/8/2002	THCO	1	2	0	0	0	Amphibian resource
			SNYLF	11	9	0	536	0	
		7/5/2004	SNYLF	0	1	16	265	0	
			THCO	6	1	0	0	0	
		7/20/2005	SNYLF	2	1	0	63	0	
		7/21/2008	SNYLF	12	5	2	103	0	
			THCO	1	1	0	0	0	
			THEL	1	1	0	0	0	

Site Name	Site ID	Survey Date	Herpeto-fauna Observed	Adult	Sub-adult	Meta-morph	Larva	Egg Mass	Management Direction
		8/26/2009	THCO	1	0	0	0	0	
			HYRE	1	1	0	0	0	
			SNYLF	10	21	2	461	0	
		8/8/2010	SNYLF	6	8	3	4	0	
		8/4/2012	THCO	1	0	0	0	0	
			THEL	1	1	0	0	0	
			SNYLF	15	127	0	483	0	
		6/27/2013	BUBO	1	0	0	0	0	
			THEL	1	0	0	0	0	
			THCO	1	0	0	0	0	
		6/27/2013	SNYLF	2	3	1	60	0	
		9/8/2016	SNYLF	36	25	0	10	0	
		7/7/2017	SNYLF	5	0	0	14	0	
			THCO	4	0	0	0	0	
		9/12/2019	SNYLF	5	23	0	1421	0	
			THCO	4	1	0	0	0	
Tragedy Creek	50152	8/8/2002	THCO	3	0	0	0	0	Amphibian resource
			SNYLF	2	17	0	155	0	
		7/5/2004	THEL	1	0	0	0	0	
			SNYLF	1	0	3	187	0	
		7/20/2005	SNYLF	0	1	0	61	0	
		7/21/2008	SNYLF	3	6	1	124	0	
			HYRE	0	0	0	6	0	
		8/26/2009	THCO	4	0	0	0	0	
			SNYLF	10	20	0	474	0	
		8/8/2010	THCO	1	0	0	0	0	
			SNYLF	1	18	14	30	0	
		8/4/2012	THEL	1	1	0	0	0	
			SNYLF	0	35	1	461	0	
		6/27/2013	THCO	2	0	0	0	0	
			SNYLF	1	1	0	24	0	
		9/8/2016	SNYLF	6	2	0	2	0	
		7/7/2017	SNYLF	3	1	0	0	0	
			THCO	1	0	0	0	0	
		9/12/2019	SNYLF	2	2	0	114	0	
			THCO	2	1	0	0	0	
Tragedy Creek	50153	8/8/2002	THCO	1	0	0	0	0	Amphibian resource
			SNYLF	1	1	0	4	0	
		7/20/2005	SNYLF	1	3	0	0	0	
		7/21/2008	SNYLF	3	1	0	0	0	

Site Name	Site ID	Survey Date	Herpeto-fauna Observed	Adult	Sub-adult	Meta-morph	Larva	Egg Mass	Management Direction
		8/26/2009	SNYLF	4	2	1	0	0	
		8/8/2010	SNYLF	10	31	3	94	0	
			THEL	1	0	0	0	0	
		8/4/2012	SNYLF	3	35	2	126	0	
		6/27/2013	THCO	2	0	0	0	0	
			THEL	1	2	0	0	0	
			SNYLF	2	1	3	15	0	
		9/8/2016	SNYLF	5	6	0	0	0	
			THSP	1	0	0	0	0	
		9/12/2019	THCO	1	0	0	0	0	
Keith's Tragedy	52685	7/7/2017	SNYLF	2	0	0	0	0	Amphibian resource

Table 6: Summary of fisheries population data in Tragedy Creek Planning Watershed.

Site Name	Site ID	Survey Date	Fish Species Observed	Self-sustaining	# Caught	Avg Length (mm)	Avg Weight (g)	Avg K Value
	14750	8/26/2017	RT	Unknown	1	Not recorded	Not recorded	N/A
	14777	8/26/2017	RT	Unknown	5	Not recorded	Not recorded	N/A
	50153	8/26/2017	RT	Unknown	2	Not recorded	Not recorded	N/A

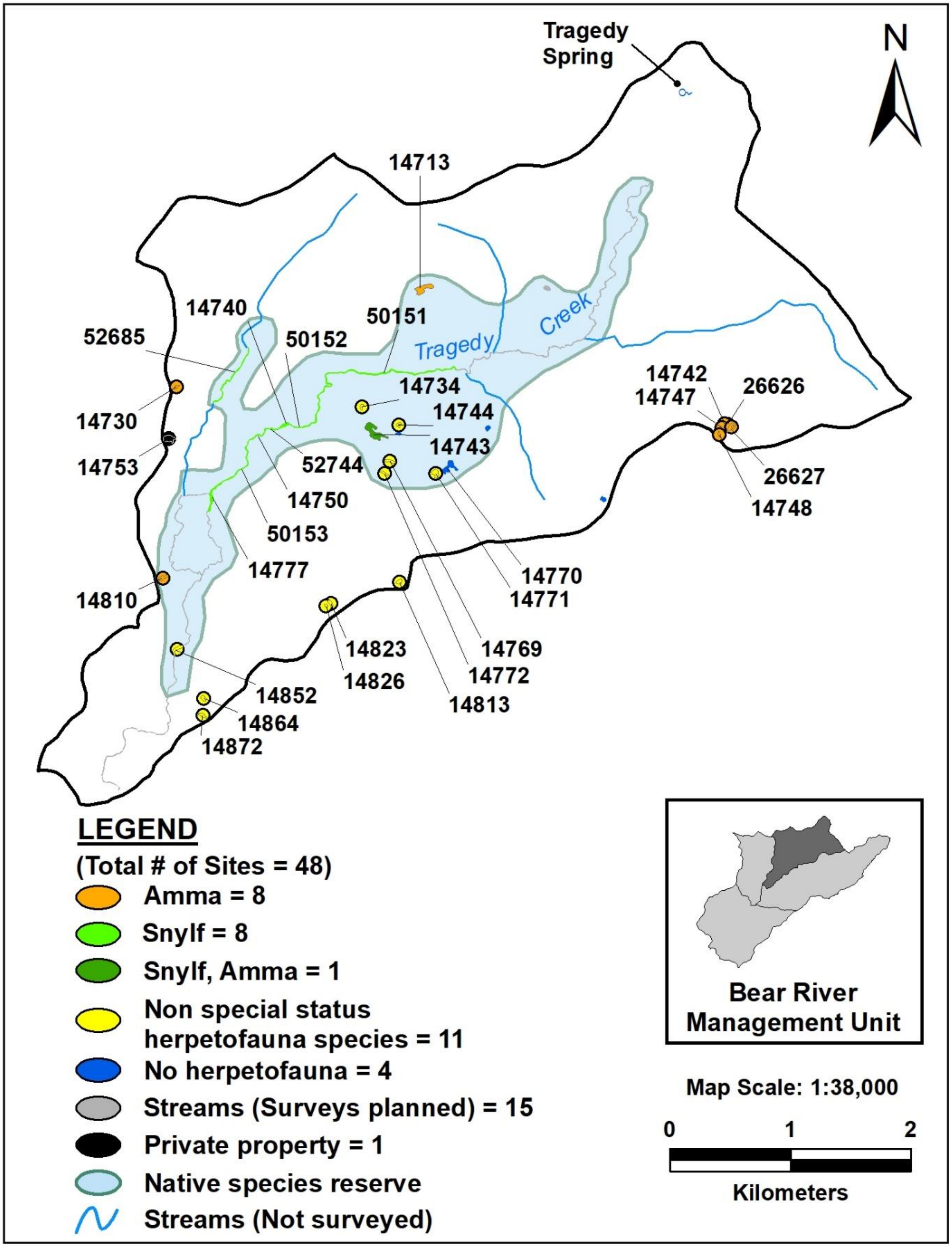


Figure 9: Herpetofauna species distribution in Tragedy Creek Planning Watershed

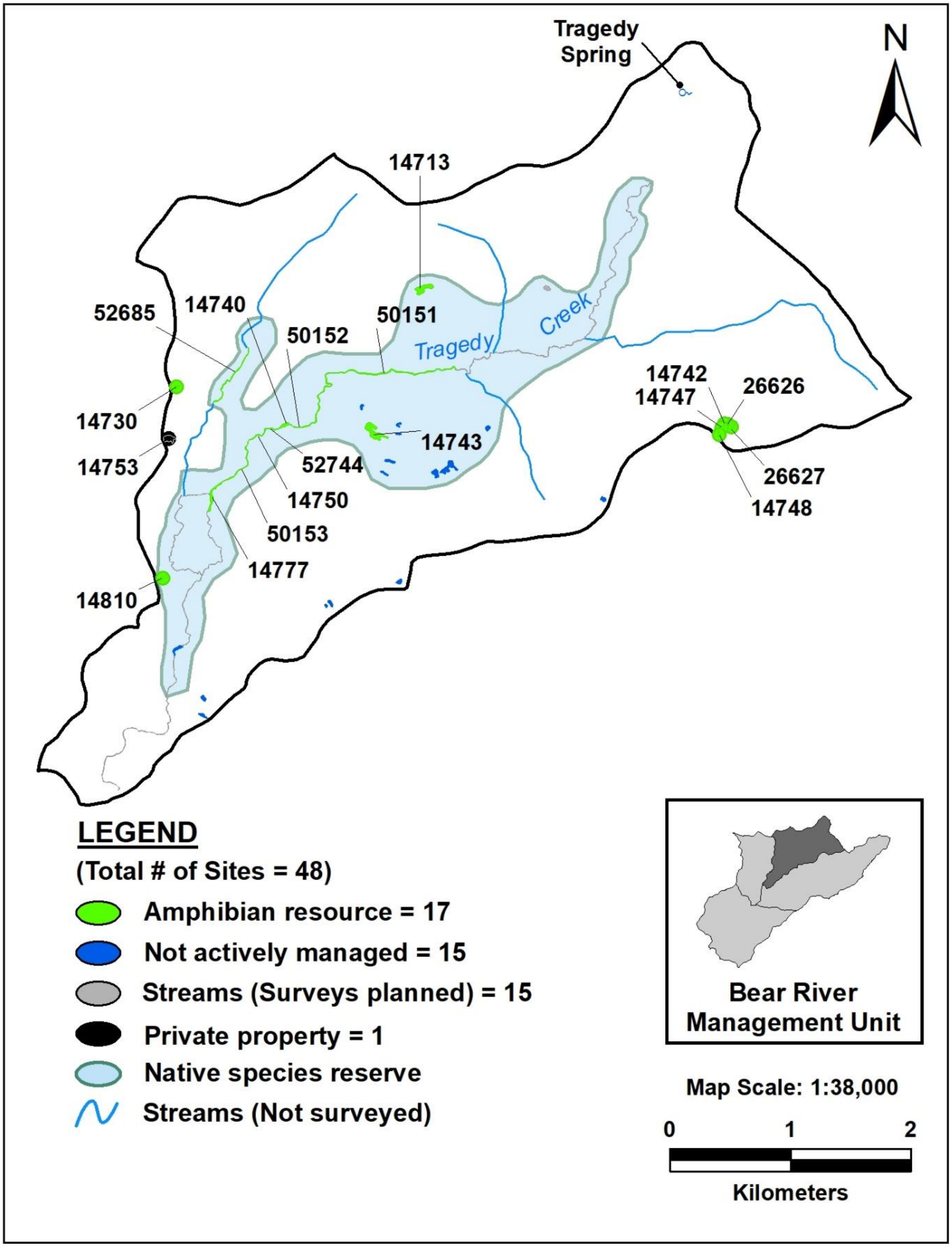


Figure 10: Management Direction in Tragedy Creek Planning Watershed.

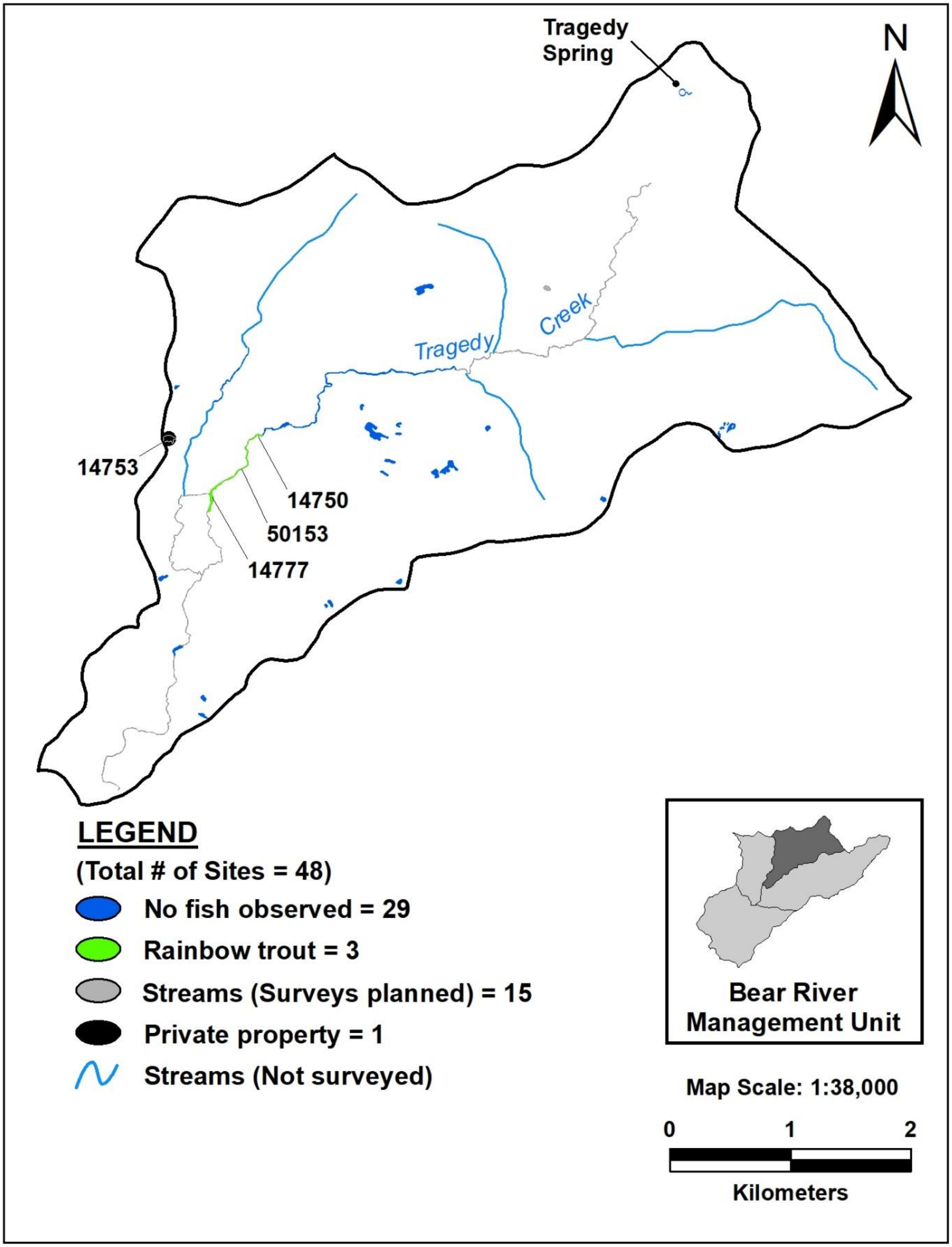


Figure 11: Fish species distribution in Tragedy Creek Planning Watershed.

4) UPPER BEAR RIVER PLANNING WATERSHED MANAGEMENT DIRECTION

Upper Bear River PWS contains the headwaters of Bear River and eight unnamed ephemeral tributaries, including the outlets of Mud Lake and Devils Lake, all of which drain into Upper Bear River. Upper Bear River PWS contains two named lakes, Devils Lake and Mud Lake, and about 50 small, unnamed ponds. Apart from two small parcels in the northeast corner, most land within the PWS is managed by ENF. Elevations within the watershed range from 2,745 m (9,007 ft) on an unnamed peak in the NE corner of the PWS, to the northern end of BRR, at about 1,795 m (5,890 ft). The area consists of mixed conifer forests, meadows, and granite outcroppings. The eastern half of the PWS contains several four-wheel drive dirt roads. These roads access Mud Lake, Allen Camp, and the Mokelumne Wilderness to the east. There are also a few unmaintained hiking trails, one of which proceeds from Mud Lake to the southern boundary of the PWS, where it later meets up with other trails systems near Lower Bear. Another trail leads into the southern end of the PWS and is used to access Devils Lake. Most of the watershed, including a large portion of Upper Bear River, is only accessible via cross country hiking or skiing.

Table 7 provides summary data for amphibian resources and management in the Upper Bear River PWS. **Table 8** provides a summary of fish population data for the Upper Bear River PWS. **Table 9** provides a summary of fisheries management for the Upper Bear River PWS. **Figure 12** provide herpetofauna species distribution for the Upper Bear River PWS. **Figure 13** provides the management direction for the Upper Bear River PWS. **Figure 14** provides fish species distribution for the Upper Bear River PWS.

Herpetofauna and Fisheries Resources and Management

Mud Lake is accessible via a rough four-wheel drive road that begins on SR 88, just west of Silver Lake. CDFW began BK plants at Mud Lake in 1943 and continued regularly through 2000. CDFW did not capture any fish during an overnight gill net set in Mud Lake in 2002, and staff did not observe fish during VES in 2002 and 2019. BK may have died out in the absence of stocking. Subsequently, in 2018, CDFW staff detected SNYLF in Mud Lake, including two subadult individuals with rear limb malformations. These limb malformations are likely associated with a parasitic trematode (*Ribeiroia ondatrae*) that is hosted by rams horn snails (*Helisoma* spp.), which are present in Mud Lake (Dr. Pieter Johnson, Colorado State University, pers. comm., August 9, 2019). Due to the presence of SNYLF, CDFW will manage Mud Lake as an amphibian resource.

Devils Lake is the only other water body with historic fish planting in the Upper Bear River PWS. CDFW began BK plants at Devils Lake in 1950 and continued for several years. In the late 1950's until 1960, CDFW stocked Devils Lake with RT, then CDFW completed one additional year of BK stocking in 1967. From 1969 to 1972, CDFW stocked Devils Lake with AG, but then changed plants back to BK from 1975 until 1999. CDFW only captured two BK during an overnight gill net set in 2002, and staff did not capture any fish during an overnight gill net set in 2014. Fish have likely been extirpated from Devils Lake in the absence of stocking. However, CDFW plans to conduct another survey of Devils

Lake in 2020. CDFW will propose a management direction for Devils Lake after collecting current data for the site.

The only other locations in which CDFW has detected fish in the Upper Bear River PWS are at sites 14945, 14881, and 52740. CDFW last detected fish at these locations in 2002, and all sites are large pools located on the main stem of Upper Bear River. At each location, field crews visually detected a single fish. The fish observed at sites 14945 and 14881 were unknown species, and the individual observed at site 52740 was a BK. The BK may have originally gained access to Upper Bear River by moving downstream from Mud Lake during the years when CDFW stocked Mud Lake. During visual surveys in late summer 2019, CDFW field crews did not observe any trout between sites 50577 and 14881. Additional surveys, including gill net sampling, will be necessary to determine if trout still occupy any locations in Upper Bear River.

In addition to Mud Lake and the Mud Lake outlet stream, CDFW has detected SNYLF in a headwater section of Upper Bear River east of Allen Camp, and along a long stretch of the main stem Upper Bear River. VES in late summer 2019 revealed a potentially large population of SNYLF occupying perennial pool habitats present along the main stem Upper Bear River. CDFW staff observed over 50 post-metamorphic and 1,700 larval SNYLF during surveys of Upper Bear River in September 2019, despite cool weather and less than ideal survey conditions. To gain a better understanding of SNYLF distribution and relative abundance in this watershed, CDFW plans to undertake more extensive surveys of the entire mainstem Bear River within the Upper Bear River PWS in 2020. Additional areas planned for future surveys are shown in grey on the Upper Bear River PWS maps (**Figures 12–14**).

CDFW has observed AMMA at 14 sites within the Upper Bear River PWS, all of which are fishless. As a result, they will be managed as amphibian breeding resources. Incidentally, CDFW survey crews observed HYRE at 33 sites and THSP at 16 sites within the PWS (**Table 7**).

Table 7: Summary of herpetofauna survey data and management for Upper Bear River Planning Watershed.

Site Name	Site ID	Survey Date	Herpeto-fauna Observed	Adult	Sub-adult	Meta-morph	Larva	Egg Mass	Management Direction
	14709	6/26/2001	HYRE	0	0	0	100	0	Not actively managed
	14760	9/11/2019	HYRE	0	0	30	0	0	Not actively managed
	14764	9/11/2019	HYRE	0	0	50	0	0	Not actively managed
Mud Lake	14773	8/13/2002	THEL	6	0	0	0	0	Amphibian resource
			HYRE	8	0	0	2	0	
		9/11/2019	SNYLF	0	0	0	2	0	
			SNYLF	1	0	0	24	0	
			HYRE	0	0	76	70	0	
			AMMA	0	0	0	1	0	
			THEL	0	1	0	0	0	
			THEL	0	1	0	0	0	
			HYRE	0	0	17	4	0	
	14792	8/14/2002	AMMA	0	0	0	1	0	Amphibian resource
			HYRE	4	6	0	27	0	
		9/11/2019	AMMA	0	0	0	110	0	
			HYRE	0	5	0	2	0	
			THEL	0	1	0	0	0	
	14809	8/13/2002	None						Not actively managed
		9/11/2019	None						
	14822	8/14/2002	HYRE	1	0	0	7	0	Not actively managed
	14828	8/13/2002	HYRE	9	20	0	2	0	Amphibian resource
			THEL	2	0	0	0	0	
		9/11/2019	HYRE	0	0	10	0	0	
			AMMA	0	0	0	7	0	
	14830	8/14/2002	THEL	1	0	0	0	0	Not actively managed
	14832	8/13/2002	HYRE	0	12	0	70	0	Amphibian resource
		9/11/2019	AMMA	0	0	0	2	0	
			HYRE	0	0	1	1	0	
	14835	8/14/2002	THEL	1	0	0	0	0	Not actively managed
			HYRE	6	12	0	37	0	
	14836	8/16/2002	AMMA	0	0	0	56	0	Amphibian resource
			HYRE	1	2	0	18	0	
			THEL	1	0	0	0	0	

Site Name	Site ID	Survey Date	Herpeto-fauna Observed	Adult	Sub-adult	Meta-morph	Larva	Egg Mass	Management Direction
	14839	8/13/2002	THEL	1	0	0	0	0	Not actively managed
	14844	8/13/2002	HYRE	0	0	0	11	0	Not actively managed
		9/11/2019	HYRE	0	0	9	1	0	
	14845	8/13/2002	HYRE	1	0	0	2	0	Not actively managed
		9/11/2019	HYRE	0	0	6	3	0	
	14846	8/16/2002	HYRE	1	0	0	36	0	Amphibian resource
			AMMA	0	0	0	200	0	
	14847	8/16/2002	AMMA	0	0	0	400	0	Amphibian resource
	14853	8/14/2002	None						Not actively managed
	14858	8/16/2002	None						Not actively managed
	14859	8/16/2002	HYRE	3	1	0	15	0	Not actively managed
	14862	8/16/2002	HYRE	9	0	0	0	0	Not actively managed
	14866	8/16/2002	HYRE	2	0	0	0	0	Not actively managed
			THEL	1	0	0	0	0	
	14867	8/16/2002	None						Not actively managed
	14869	8/16/2002	HYRE	5	0	0	13	0	Not actively managed
	14873	8/16/2002	HYRE	5	0	0	0	0	Not actively managed
	14875	8/16/2002	None						Not actively managed
	14876	8/16/2002	HYRE	0	0	0	9	0	Not actively managed
	14880	8/16/2002	HYRE	0	1	0	3	0	Not actively managed
			THCO	1	0	0	0	0	
		5/29/2014	HYRE	0	0	0	0	14	
		9/11/2019	None						
	14881	8/16/2002	None						Amphibian resource
		9/11/2019	SNYLF	1	0	0	0	0	
	14882	8/16/2002	AMMA	0	0	0	27	0	Amphibian resource
	14885	8/16/2002	HYRE	1	0	0	0	0	Amphibian resource
			AMMA	0	0	0	5	0	
	14886	8/15/2002	HYRE	2	0	0	10	0	

Site Name	Site ID	Survey Date	Herpeto-fauna Observed	Adult	Sub-adult	Meta-morph	Larva	Egg Mass	Management Direction
		9/11/2019	HYRE	0	0	16	1	0	Not actively managed
	14889	8/15/2002	HYRE	7	0	0	0	0	Not actively managed
		9/11/2019	THEL	1	0	0	0	0	
			HYRE	0	0	5	0	0	
	14890	8/15/2002	HYRE	1	0	0	0	0	Amphibian resource
		9/11/2019	HYRE	0	0	7	4	0	
			AMMA	0	0	0	2	0	
	14892	8/15/2002	HYRE	2	0	0	8	0	Amphibian resource
		9/11/2019	AMMA	0	0	0	15	0	
			HYRE	0	0	1	0	0	
	14896	8/15/2002	THEL	1	0	0	0	0	Amphibian resource
			HYRE	7	0	0	3	0	
		9/11/2019	HYRE	0	0	4	2	0	
			AMMA	0	0	0	2	0	
	14897	8/15/2002	HYRE	10	0	0	0	0	Amphibian resource
		9/11/2019	HYRE	0	0	19	110	0	
			AMMA	0	0	0	3	0	
	14899	8/16/2002	None						Not actively managed
	14902	8/17/2002	HYRE	1	0	0	0	0	Not actively managed
			THEL	1	0	0	0	0	
	14903	8/17/2002	HYRE	1	1	0	2	0	Not actively managed
	14906	8/17/2002	None						Not actively managed
Devils Lake	14908	8/16/2002	THEL	1	0	0	0	0	Not actively managed
			THCO	4	1	0	0	0	
		5/30/2014	THCO	1	0	0	0	0	
			HYRE	0	0	0	0	55	
	14926	8/16/2002	HYRE	0	1	0	15	0	Amphibian resource
			AMMA	0	0	0	10	0	
	14945	8/17/2002	None						Not actively managed
Bear River	50577	9/16/2003	SNYLF	1	0	0	0	0	Amphibian resource
		7/24/2010	SNYLF	2	0	0	8	0	
		9/21/2012	SNYLF	3	1	0	0	0	
		5/30/2014	None						
		9/11/2019	SNYLF	1	0	0	0	0	
Bear River	51100	7/27/2010	None						Not actively managed
		9/22/2015	None						

Site Name	Site ID	Survey Date	Herpeto-fauna Observed	Adult	Sub-adult	Meta-morph	Larva	Egg Mass	Management Direction
Bear River	51101	7/27/2010	HYRE	0	0	0	30	0	Amphibian resource
			ELCO	1	0	0	0	0	
			SNYLF	1	0	0	28	0	
		6/18/2012	SNYLF	1	0	0	10	0	
			THEL	2	0	0	0	0	
		9/22/2015	SNYLF	5	16	0	45	0	
			HYRE	0	3	0	0	0	
Upper Bear River	52733	9/11/2019	SNYLF	1	1	0	0	0	Amphibian resource
Upper Bear River	52734	9/11/2019	THEL	2	0	0	0	0	Amphibian resource
			SNYLF	1	1	1	101	0	
			THCO	1	0	0	0	0	
			HYRE	1	9	1	0	0	
Upper Bear River	52735	9/11/2019	SNYLF	1	1	0	10	0	Amphibian resource
Upper Bear River	52736	9/11/2019	SNYLF	1	1	0	10	0	Amphibian resource
Upper Bear River	52737	9/11/2019	SNYLF	2	10	0	500	0	Amphibian resource
Upper Bear River	52738	9/11/2019	THCO	0	1	0	0	0	Amphibian resource
			HYRE	1	0	0	0	0	
			SNYLF	4	29	0	1160	0	
Upper Bear River	52740	8/16/2002	None						Not actively managed

Table 8: Summary of fisheries population data in Upper Bear River Planning Watershed.

Site Name	Site ID	Survey Date	Fish Species Observed	Self-sustaining	# Caught	Avg Length (mm)	Avg Weight (g)	Avg K Value
	52740	8/16/2002	BK	Unknown	1			
	14881	8/16/2002	UKN	Unknown	1			
	14945	8/17/2002	TRT	Unknown	1			
Devils Lake	14908	8/16/2002	BK	No	2	420	1072	1.434
		5/30/2014	None		0			
Mud Lake	14773	8/13/2002	None		0			
		9/11/2019	None		0			

Table 9: Summary of fisheries management information for Upper Bear River Planning Watershed.

Site Name	Site ID	First Recorded Stocking	Last Recorded Stocking	Pre-survey Allotment	Proposed Allotment	Management Direction
Devils Lake	14908	1932 - RT	1960 - RT	500 BK BNO	DNP	Not actively managed
		1934 - BK	1999 - BK			
		1969 - AG	1972 - AG			
Mud Lake	14773	1943 - BK	2000 - BK	500 BK ANN	DNP	Not actively managed

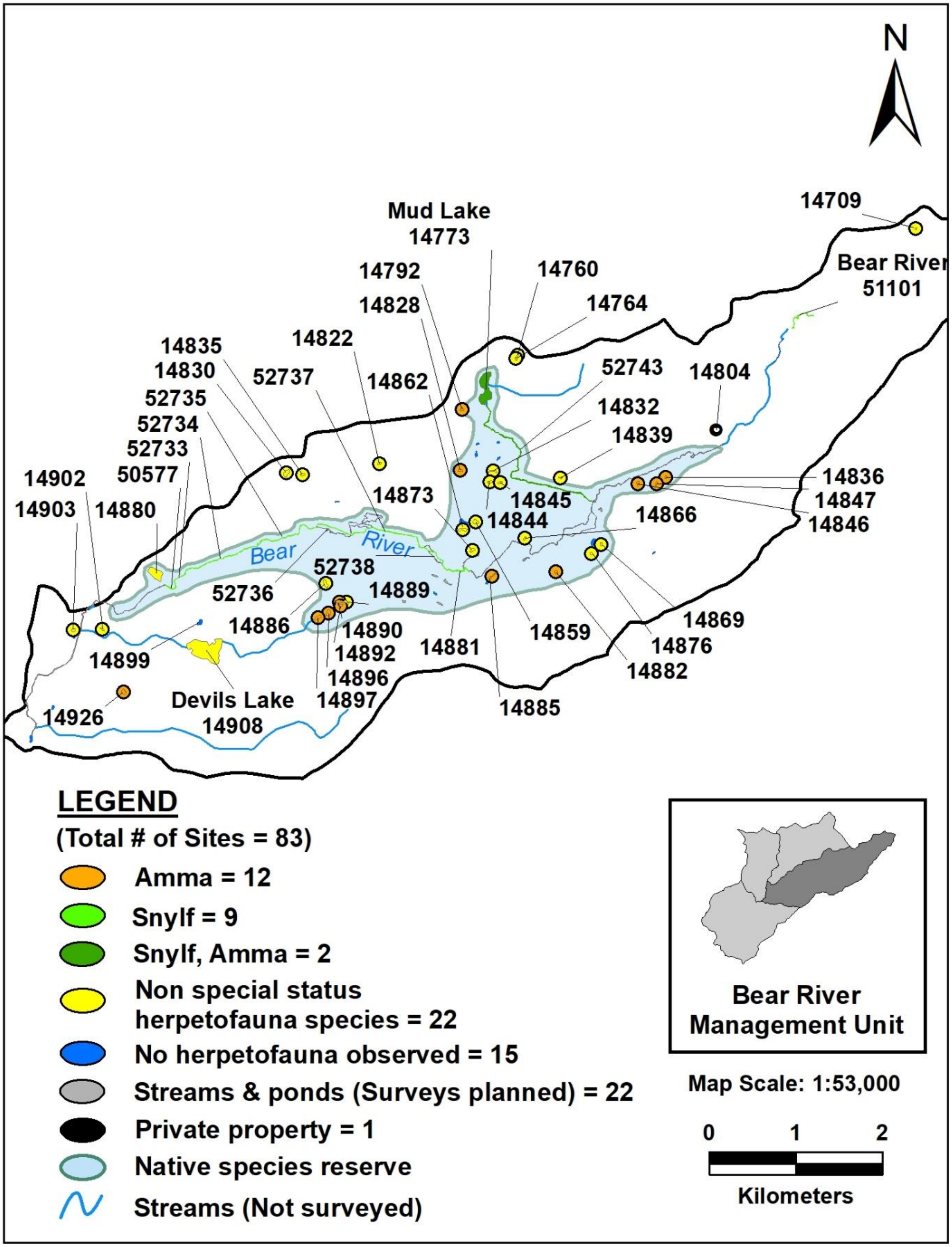


Figure 12: Summary of herpetofauna resources in Upper Bear River Planning Watershed.

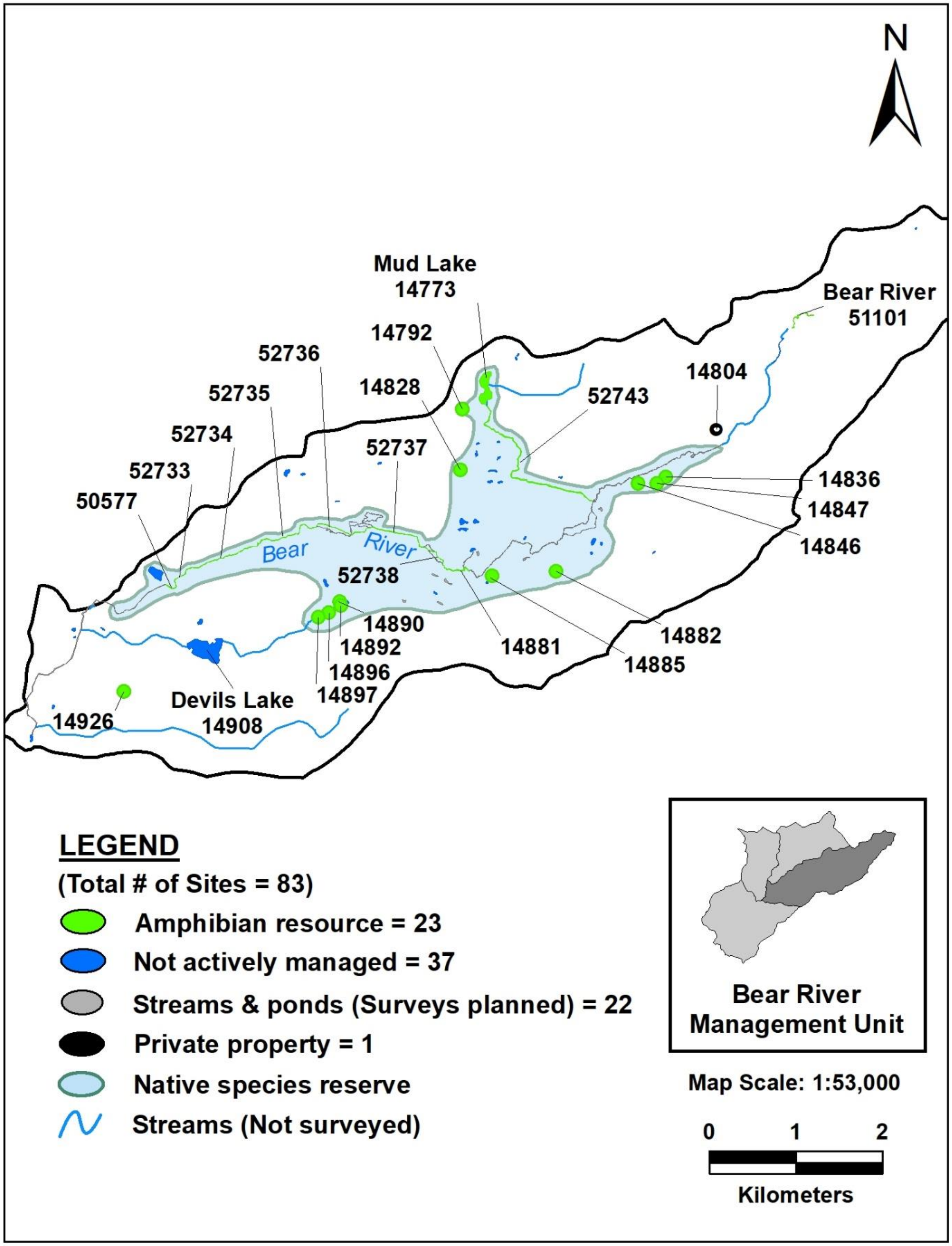


Figure 13: Management direction in Upper Bear River Planning Watershed.

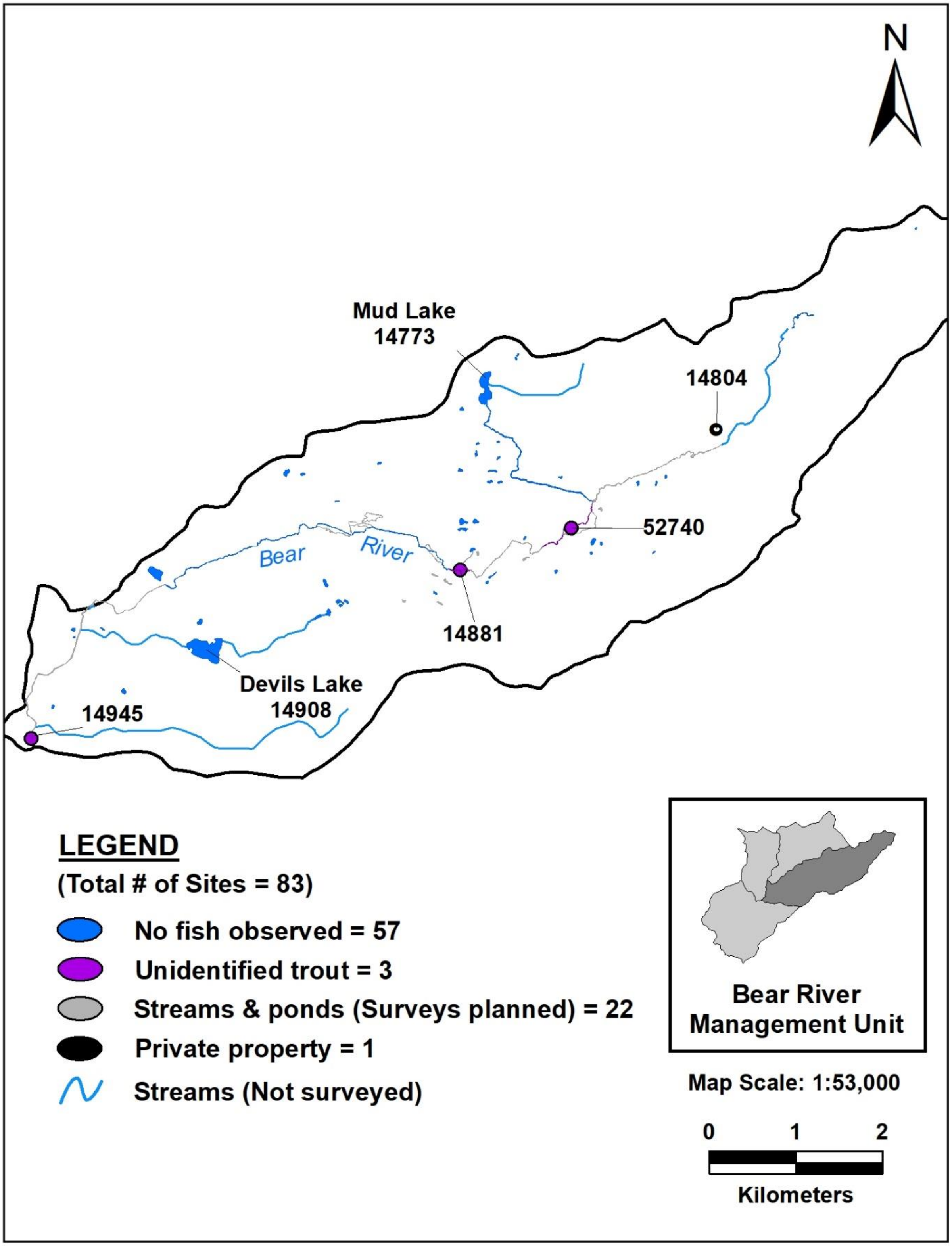


Figure 14: Fisheries resources in Upper Bear River Planning Watershed.

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SECTION V: APPENDIX 1

  

PROTOCOL FOR AMPHIBIAN AND REPTILE VISUAL ENCOUNTER SURVEYS AT MONITORING SITES

Version 3 (Updated Summer 2017, ICC)

1. You will need a data sheet, a notebook, pencils, GPS unit, thermometer, dip net, camera, and stopwatch.
2. During the survey, write down amphibian and reptile data in your notebook (since these data often get sloppy while tallying during the survey) and then transfer to the *Amphibian and Reptile Survey Data Sheet* once you have accurately tallied the numbers of each species and life stage. (It is helpful to have a datasheet available during the survey to make sure you do not forget to record any necessary information in your notebook.)

BEFORE THE SURVEY

3. Record the Site ID (from the map and data table provided) and Date (MMM-DD-YYYY; e.g., AUG-20-2017).
   Be sure to use your GPS Unit to make sure that you are at the correct site!
4. Circle sky (weather) conditions:
   - Clear, Partly Cloudy (<50%), Mostly Cloudy (>50%), Overcast, Rain, Snow, or Smoky.
5. Circle wind conditions: Calm, Light, Moderate, or Strong.
   - Calm = no wind; Light = leaves moving, ripples on water; Moderate = small waves; Strong = lots of whitecaps.
   - If the weather if poor (raining and/or more than moderate wind), delay the survey until better conditions.
6. If known, record the USGS topo name (1:24,000), county, and elevation (indicate m or ft.) of the site.
7. If not sampled, circle the reason.
   - Private property (no access permission); frozen (if only partially frozen, still perform the survey, but note site is not completely open); Not found; No access (can't get to site). Notes in "Site condition notes" box.
8. Record names of all surveyors.
9. Circle the water type. If only surveying a stream segment (independent of a lake) proceed to "STREAM" section on page 2. The "STREAM" section is also used to separately record data from the first 200 meters of inlets and outlets (if present) during a lake/pond or marsh/meadow survey. Record the following data for each in/outlet:
   - Perennial or Ephemeral; Currently Dry? (Y or N); Intermittent? (Y or N); Start and End UTM coordinates (In NAD 83. Provided beforehand. If not provided, make best estimate of 200 m); Color and Turbidity (Clear or Stained, Clear or Cloudy); Start and End Time (24-hr time), and survey duration (total combined survey time); Air Temp (1 m above stream) and Water Temp (mid-channel, or 0.5 m out, depending on size), Indicate C or F.
   - Herps Present? If no, circle "N." If yes, circle "Y" and record species and number of each life stage observed. Fish Present? If no, circle "N." If yes, circle "Y," and circle the appropriate species code in the last row of the table (if known). Indicate observed spawning activity by circling the appropriate selections under "Spawning evidence?"

- Include relevant information for observed barriers to upstream fish movement, including UTM coordinates, a brief description of the barrier (e.g., “5 m vertical cascade over bedrock”), and photo numbers for barrier images.

10. Record Lake Name (from map, if known)
11. Record UTM coordinates for the lake (in NAD 83)
12. Record water color and turbidity: (Clear or Stained; Clear or cloudy).
13. Record air temp (1 m above water surface) and water temp (0.5 m from shore, 10 cm deep) in the shade; record the time each temperature is taken after the “@” symbol and circle C or F.
14. Circle whether the site is perennial or ephemeral (if known), and if the site is currently dry.

THE SURVEY

15. Record the time you begin the survey. Start your stopwatch. Pause your stopwatch if you need to stop surveying (moving around rock outcrops, etc.); start it again when you begin looking again.
16. Slowly walk the shoreline, looking ahead for amphibians and looking in the water for adults and larvae. If you have them available, binoculars can be useful for scanning the shoreline ahead of you. Gently sweep the shoreline immediately in front of you with the dip net to attempt spooking any frogs that may be hiding in cover.
17. Record all amphibians and reptiles seen, separating by life stage. Record adults, subadults, metamorphs (a “fresh” sub-adult, usually with a tail remnant), larvae, and egg masses. Circle whether spp. heard calling. If possible, break RASI larvae into age classes (small=1st year, medium=2nd year, large = 2+ year). Record classes in the RASI larvae cell.
18. As mentioned above, also survey the first 200 m of each inlet and outlet (defined as channelized tributaries, **which you should survey whether wet or dry**). Record these data separately in the “STREAM” section.
19. Survey any additional wetted habitat, such as side ponds or small meadows that drain into the lake. Include these data in the main lake/pond herp data table.
20. Add any additional information in the “NOTES” box on page 1 (e.g., “Most RASI tadpoles in small pool just N of lake.”)

AFTER THE SURVEY

21. Record the time you end the survey.
22. Add the total time of all surveyors to determine the “Total Survey Duration” for the VES survey.
23. Circle “YES” or “NO” regarding if herps or fish were observed during the survey.
24. Use the “PHOTOS” table on page 1 to record photo data (have at least a site overview photo), include a SITE SKETCH showing lake/marsh **and** <u>labeled</u> (inlet or outlet and number) tributaries, and any notes from the survey in the “NOTES” box.
25. Before leaving the site, double check your data to ensure that you recorded everything.
26. You must follow the *HML Decontamination Protocol* before performing another survey at a site that is not downstream and connected to the site you just surveyed.