Warner Basin Strategic Action Plan

Warner Basin Aquatic Habitat Partnership

June 1, 2019

Warner Basin Strategic Action Plan

WARNER BASIN AQUATIC HABITAT PARTNERSHIP

JUNE 1, 2019

Page intentionally left blank.

Table of Contents

1. Introduction i
2. Outcomes 1
3. Scope and Vision 3
4. Governance/Partnerships 4
5. Context: Profile of the Focus Area 6
6. Conservation Need 11
7. Conservation/Restoration Targets 12
8. SMART Goals and Objectives 13
9. Funding Needs: Estimated costs/Leverage Opportunities 16
10. Evaluating Success 18
11. Adaptive Management 19
12. Sustainability 19
13. Communications Plan 20
14. Literature Citations 22
15. Partnership Certification 24

Tables

Table 9-1. Potential match funding sources for Warner Basin fish passage, screening, and habitat improvement projects. The Potential Annual Contribution Amount is based on recent funding levels for fish passage projects completed in the Warner Basin. 16

Table 9-2. SMART goals, lead groups, funding partners, and estimated costs. 17

Figures

Figure 5-1. The location of the Warner Basin within the Basin and Range region in southern Oregon, northwestern Nevada, and northeastern California. 6

Figure 5-2. The South Warner Rim forms the southwestern boundary of the Warner Basin. 6

Figure 5-3. The Warner Basin including primary waterbodies. 7

Figure 5-4. The Twentymile Creek alluvial fan in 1921. Remnants of the channel network remain on the landscape. 7

Figure 5-5. Stream form (top) and lake form (bottom) male Warner Suckers in spawning condition. Photos courtesy ODFW. 9

Figure 5-6. Warner Sucker occupied and designated critical habitat, and the Focused Investment Partnership planning area. 10

Figure 8-1. Proposed fish passage and screening project locations in the Warner Basin. .13

Figure 8-2. Deep Creek emerges from the Deep Creek canyon into the broader Warner Valley. The view is from upstream of Adel, to the east with Coleman Ridge in the distance. 14

Figure 8-3. A roll drum fish screen located on the lower Taylor Diversion on Honey Creek.15

Executive Summary

The Warner Basin Aquatic Habitat Partnership (WBAHP) was formally established in 2017 to complete fish passage, irrigation diversion intake screening, and habitat restoration projects with the goal of recovering Warner Sucker and expanding Warner Lakes Redband Trout populations in the Warner Basin. To meet these goals, the Warner Basin Strategic Action Plan (Plan) outlines the WBAHP members and their responsibilities, acknowledges the important relationships with local ranchers and water users who rely on surface water diversions for their economic livelihood, and identifies the actions that will be necessary to improve stream corridor conditions for Warner Sucker. The WBAHP seeks to address fish passage, irrigation diversion network screening, water availability, and habitat in the three tributaries and terminal lakes that comprise Warner Sucker habitat. These waterbodies also support Warner Lakes Redband Trout and actions that benefit Warner Sucker are anticipated to similarly benefit Warner Lakes Redband Trout.

Page intentionally left blank.

1. Introduction

The Warner Basin Aquatic Habitat Partnership (WBAHP) is a collaboration of local, state, and federal partners committed to the recovery of Warner Sucker (*Catostomus warnerensis*, Oregon and federally-threatened species) and Warner Lakes Redband Trout (*Oncorhynchus mykiss newberrii*, Oregon and federal sensitive species). The WBAHP is comprised of seven organizations including the Lake County Umbrella Watershed Council (LCUWC), Lakeview Soil and Water Conservation District (LSWCD), Oregon Department of Fish and Wildlife (ODFW), U.S. Fish and Wildlife Service (USFWS), U.S. Bureau of Land Management (BLM), U.S. Forest Service (USFS), and River Design Group, Inc. (RDG). The WBAHP members have completed fish passage, screening, and habitat enhancement projects in the Warner Basin, and have a goal of expanding these efforts to address fish passage and habitat limiting factors across the three focal tributary watersheds that support Warner Sucker and Warner Lakes Redband Trout. The WBAHP also recognizes that a successful restoration program requires the willing participation and support of the local community, landowners, and irrigators who own and manage the land where restoration activities will be completed. The WBAHP members have developed productive relationships with the Adel Water Improvement District, the Hart Lake Water Users Association, and the local communities of Adel and Plush, Oregon. These relationships have resulted in rapid project development, design, and implementation over the past decade.

The Warner Basin Strategic Action Plan (Plan) is intended to present the approach the WBAHP will take to pursue fish passage, screening, and habitat enhancement projects leading to the satisfaction of USFWS recovery criteria for the eventual delisting of Warner Sucker. Additionally, the Plan is anticipated to result in improved Warner Lakes Redband Trout population connectivity as fish passage constraints are addressed. The Plan defines the roles of the WBAHP member organizations, how the members will work together on pursuing future projects, identifies the primary limiting factors affecting the species of concern, and determines the pathways for addressing the limiting factors. The Plan is the result of numerous meetings, one-on-one and small group discussions, and the application of the members' individual and group experiences from working in the Warner Basin. The WBAHP's understanding of limiting factors affecting Warner Sucker and Warner Lakes Redband Trout, is based on a long record of scientific investigations completed by ODFW, USFWS, and other organizations over the past 40+ years. Recent efforts to develop collaborative relationships with landowners and irrigators have provided WBAHP members with the opportunity to implement projects that will address the long-recognized fish passage issues that affect the two target fish species and other native fish in the Warner Basin.

The Plan will serve as the guiding document for WBAHP coordination, project development, and project implementation. The WBAHP will periodically review and update the Plan to reflect project successes and opportunities for Plan improvement. Although the WBAHP currently includes all of the organizations pursuing restoration projects in the Warner Basin, other organizations interested in joining the WBAHP in the future will be invited to participate in the improvement and execution of the Plan.

2. Outcomes

Warner Suckers were historically abundant and widely distributed throughout the Warner Basin (Scheerer et al. 2007, 2011; Richardson et al. 2009), but poor connectivity among the lakes and

tributaries due to irrigation infrastructure, habitat degradation, and non-native fish effects, have diminished Warner Sucker and Warner Lakes Redband Trout populations. Habitat fragmentation within the Warner Basin and non-native fish impacts reduce or preclude the potential for a naturally functioning Warner Sucker metapopulation. As Warner Lakes Redband Trout have a similar geographic distribution as Warner Sucker, redband trout are similarly affected by the noted limiting factors.

The *Recovery Plan for the Threatened and Rare Native Fishes of the Warner Basin and Alkali Subbasin* (USFWS 1998) sets recovery criteria for delisting Warner Sucker. These criteria require that: 1) a self-sustaining metapopulation is distributed throughout the Twentymile Creek, Honey Creek, and Deep Creek (below the falls) drainages, and in Pelican, Crump, and Hart lakes, 2) passage is restored within and among the Twentymile Creek, Honey Creek, and Deep Creek (below the falls) drainages so that the individual populations of Warner Sucker can function as a metapopulation, and 3) no threats exist that would likely threaten the survival of the species over a significant portion of its range.

Project outcomes focus on water user participation in fish passage and screening, and landowner participation in habitat enhancement projects. The WBAHP will also develop educational outreach materials highlighting the value of Warner Basin native fish and the impacts of introduced fish species on the unique Warner Basin fish community. Additionally, WBAHP will investigate water conservation measures that may be instituted in the future to improve water use efficiency. The following project outcomes have been identified.

Outcome #1: By 2021, WBAHP will complete fish passage projects with the three irrigation districts in the Warner Basin.

Outcome #2: By 2025, WBAHP will have completed fish passage projects at ten diversions in the Warner Basin and documented Warner Sucker passage at selected diversions. Fish passage project execution will require support of the local community, landowners, and irrigators.

Outcome #3: By 2025, WBAHP will coordinate with ODFW the development of educational outreach materials concerning non-native fish in the Warner Lakes with the intent to educate anglers about the native fish community and the impacts of introduced fish species.

Outcome #4: By 2025, WBAHP will coordinate with the local community and irrigators to develop water conservation actions to increase water use efficiency.

Outcome #5: By 2035, WBAHP projects will achieve USFWS Warner Sucker recovery criteria. Project completion reports and monitoring reports will be provided to USFWS on a periodic basis during Plan implementation. Because species delisting follows a USFWS rulemaking process, WBAHP does not have the authority to delist Warner Sucker, but WBAHP will provide information that may lead to species delisting.

The WBAHP believes these outcomes are achievable long-term goals for the Plan.

3. Scope and Vision

The following section includes the WBAHP's vision and guiding principles to execute the WBAHP's vision.

Vision – Streams and lakes in the Warner Basin will comprise a connected watershed that provides access to the high quality spawning, rearing, and adult holding habitats that are necessary for Warner Sucker and Warner Lakes Redband Trout to complete their diverse life-history strategies. Addressing existing limiting factors will require a collaborative effort among WBAHP members, the local community, landowners, and water users. Recovery of Warner Sucker and Warner Lakes Redband Trout will preserve and ensure the valued fish community that is unique to the Warner Basin.

The **Guiding Principles** for the execution of the Vision include:

A collaborative approach to project development and execution. Plan implementation will require coordination among WBAHP members. Members will contribute their respective expertise regarding fisheries, vegetation communities, wetlands, monitoring, water rights, diversion infrastructure, and project funding.

Coordination with landowners and water users. The WBAHP will coordinate projects with the local community, landowners, and water users. Project execution will benefit from landowner and water user information. The WBAHP will strive to maintain trust and support from the local community.

Securing project funding to support design, implementation, and monitoring. The WBAHP will coordinate project funding opportunities. Many of the WBAHP members have funding sources they can apply to Warner Basin projects. Based on past completed projects, member organizations often account for a substantial portion of the project funding needs. Members' contributed funds and other outside funding opportunities the WBAHP will pursue, will provide the match-funding required by the Oregon Watershed Enhancement Board (OWEB) in order to receive OWEB funding either under the traditional competitive funding program, or the Focused Investment Partnership (FIP) program.

Retain local contractors to execute project construction. Rural communities and their economies benefit from funding dollars spent on projects in the surrounding area. The WBAHP will solicit bids from local and regional contractors that are typically small businesses that hire or subcontract local residents. Contractors also support the local economy through fuel, food, and material purchases over the course of projects.

Institute project monitoring and implement adaptive management to inform future designs. The WBAHP will take a systematic approach to completing baseline, as-built, and out-year monitoring. Baseline monitoring is important for establishing existing conditions to compare as-built and out-year monitoring results to. Monitoring data are reviewed as part of an adaptive management program that applies lesson learned through data collection to improve future project designs. Sharing lessons learned with the WBAHP members and other restoration program practitioners is an instructive way to advance the restoration field especially in the realm of native, non-game fish species passage which is generally an understudied area of ecological restoration.

Maintain current agricultural-based economy and rural lifestyles. The WBAHP will coordinate Plan execution within the context of maintaining and improving existing irrigation systems and land use. The

management and operation of Warner Basin diversions have relied on the experience and knowledge of generations of Warner Basin water users and changes to diversion operations will be approved by water users during the design process. The WBAHP will pursue projects with landowners and water users who agree to a reasonable level of responsibility in maintaining the project.

Ensure diversion project success and improve agricultural efficiency over time. The WBAHP will remain involved with irrigation diversion projects after they are completed to ensure the diversion modifications function as expected. Meaningful diversion infrastructure improvements are often beyond the financial capacity of small irrigation districts or individual irrigators. WBAHP funding will seek to improve fish passage and screening while also making irrigation diversions safer and easier to operate. Future projects may also increase agricultural efficiency, a result that could leave more water in-stream and require less intensive agricultural practices.

4. Governance/Partnerships

The following section provides a summary of the core implementation partners comprising the WBAHP, and the key leaders of each organization. Since the individual representatives for each organization have been in their current position for over 5 years, the role of the individual representatives is presented. We expect that over time as representatives move on to other challenges; the underlying organizations will continue to participate in the WBAHP and other qualified individuals will assume the responsibilities necessary for the continued success of the WBAHP.

Marci Schreder is the program manager of the LCUWC, the regional watershed council based in Lakeview, Oregon. Marci has worked with landowners and irrigators in the Warner Basin since 2010. Marci is the nucleus of the WBAHP and she is responsible for coordinating the other WBAHP members, conducting outreach with cooperating landowners and irrigators, pursuing broad funding for project engineering and implementation, and completing overall project coordination. Marci has been a locally-based, consistent voice for both the LCUWC and the WBAHP, her participation has been essential to the WBAHP's project success. Marci has overseen projects in the Twentymile Creek and Deep Creek drainages of the Warner Basin. She will continue to work with landowners and irrigators in these two watersheds while assisting with Honey Creek projects to a lesser extent.

Justin Ferrell is the LSWCD district manager. Like Marci, Justin is a Lakeview-area resident and he is integrated into the economic and social fabric of the Lakeview community. In addition to managing the LSWCD, Justin also manages his own ranch outside of Lakeview and he is attuned to the many economic pressures agricultural producers face in eastern Oregon. Justin often serves as a bridge between local agricultural producers and federal and state agencies responsible for improving habitat for species of concern. His perspectives provide balance to the conservation-focused agency participants on the WBAHP. Justin also provides an educated perspective on water rights and water use issues in the basin. Justin is the WBAHP's lead for Honey Creek projects.

Alan Mauer and Dirk Renner are based in the USFWS Bend Field Office. Alan and Dirk provide technical expertise, guidance for addressing habitat and fish passage needs for Warner Sucker, project funding, and regulatory perspective. Alan annually organizes the Oregon Desert Fishes Working Group Meeting which serves as a forum for sharing project successes and learning opportunities. USFWS guidance and

funding have been instrumental in developing and implementing Warner Sucker-focused projects throughout the Warner Basin.

Jimmy Leal is a fisheries biologist with the BLM based in Lakeview. Like Alan, Jimmy has worked on eastern Oregon endemic fish issues for over 15 years. In addition to Warner Sucker, Jimmy also collaborates with USFWS on the recovery of other federally-listed fish species including the Hutton Tui Chub (*Gila bicolor ssp*.) and Foskett Speckled Dace (*Rhinichthys osculus* ssp.). Jimmy is locally-based and also part of the Lakeview community. The BLM provides fisheries expertise, project funding, landowner and irrigator outreach, restoration project experience, and project monitoring and evaluation. Jimmy also serves as an authority on the BLM's Aquatic Restoration Biological Opinion (ARBO), a restoration programmatic review process that shortens the project permitting process.

Rich Pyzik is a fisheries biologist with the USFS Fremont-Winema National Forest based in Lakeview. Although Rich primarily focuses his work on Forest lands in the Warner Basin and surrounding watersheds, USFS provides restoration project and fisheries expertise and funding for Warner Basin projects on private land. Rich has participated in many restoration projects throughout Lake County. Past projects have brought the National Forest and private landowners together to implement large landscape-scale projects that have important conservation outcomes.

Historically, ODFW has maintained a strong presence the Warner Basin Watershed. Recently retired fisheries biologist Paul Sheerer, conducted monitoring research in the basin for the past twenty years. His research provided WBAHP and other conservation partners with valuable and inciteful information regarding the Warner Sucker and Warner Lakes Redband Trout. This information and his techniques have been passed on to Justin Miles, the assistant District Biologist who covers Lake County, and Fred Monzyk, ODFW's Native Fish Investigation Program manager based in Corvallis. Justin contributes to WBAHP through technical input and understanding of Warner Basin fishes. Justin also provides project assistance including fish salvage and monitoring. Fred is the newest participant on the WBAHP, having recently joined the Native Fish Investigations Program. Fred provides technical input and is overseeing ODFW's monitoring of Warner Basin fish passage and screening projects.

The Warner Lakes Basin has three irrigation districts and multiple members who utilize and maintain water resources. John Taylor (Honey Creek), Don Robinson (Twentymile Creek) and Jason Jaeger (Deep Creek) lead the irrigation districts in their annual plans for water distribution throughout the Adel and Plush area. The irrigation district managers are extremely instrumental in working with the stakeholders in the watershed. They have effectively encouraged members of their districts to participate in restoration actions with the goal of Warner Sucker recovery. They see these projects as important for the future success of the species, as well as preserving the use of stream flows that is a critically important to the local ranches who need water for their livestock, hay production, and to support their economic investments.

The WBAHP is comprised of both local and regional partners who each play instrumental roles in project outreach, funding, development, and monitoring. The WBAHP members' common goal of improving connectivity in the Warner Basin, their long-term participation in the WBAHP, and their local presence and participation in the Lakeview area community will continue to be critical to the WBAHP's success.

5. Context: Profile of the Focus Area

Physical Geography

The Warner Valley is an endorheic (i.e., no outlet) basin approximately 60 miles long and 8 miles wide located in south-central Oregon (Figure 5-1). The valley has two regions commonly referred to as the South Warner Valley and the North Warner Valley with the area of separation between Crump Lake and Hart Lake, known as the Narrows.

Figure 5-1. The location of the Warner Basin within the Basin and Range region in southern Oregon, northwestern Nevada, and northeastern California.

Similar to adjacent endorheic basins, the Warner Valley was formed by horst and graben geology whereby a central downward-trending block of ground is bordered by two adjacent uplifted blocks of ground in a general north-south orientation (USFWS 1998). During the Pleistocene era (2 million to 10,000 years ago), the Warner Valley contained a large pluvial lake. Since this time there have been glaciations (wet periods) creating large lakes in each basin, and arid periods creating many smaller lakes. The result of these periodic episodes of isolation and joining of habitats has been differentiation, and in some instances, speciation of the native fishes of the region. Today (a period of isolation), the fish assemblages in the Warner Basin show varying levels of differentiation relative to fish assemblages in adjacent endorheic basins.

Both sides of the South Warner Valley have steep cliffs rising from 1,000 to 2,000 ft above the valley floor (Figure 5-2). The eastern cliffs run the entire length of the valley, while the western wall turns into rolling hills at the north end of the valley. The Coyote Hills are the western boundary through the middle of the North Warner Valley, with the Rabbit Hills bounding the northwest corner of the valley. From the hills, the ground slopes west up to the crest of Abert Rim (Warner Ridge). The eastern boundary of the valley is Hart Mountain, a massive cliff face that rises 3,600 ft above the valley floor. Warner Peak with an elevation of 8,065 ft is the highest point on Hart Mountain.

Figure 5-2. The South Warner Rim forms the southwestern boundary of the Warner Basin.

Water Resources

The valley floor is occupied by a chain of lakes known collectively as the Warner Lakes. During the Pleistocene, the entire valley bottom was covered by a single vast lake with water as much as 200 ft deep. However, by approximately 10,000 years ago, the water level gradually receded, leaving a chain of lakes at the low spots with wetlands between the lakes. Starting at the south end of the valley, the largest of the Warner Lakes are Pelican Lake, Crump Lake, Hart Lake, Anderson Lake, Swamp Lake, Mugwump Lake, Flagstaff Lake, Upper Campbell Lake, Lower Campbell Lake, Stone Corral Lake, Turpin Lake, and Bluejoint Lake (Figure 5-3).

In addition to the valley bottom lakes, three primary tributaries, numerous ephemeral waterbodies, irrigation diversion channel networks, and a reservoir comprise the water resources in the Warner Basin. The three tributaries in the Warner Valley include Twentymile Creek, Deep Creek, and Honey Creek. The tributaries experience similar hydrologic conditions noted by low year-round precipitation, spring high flow, summer low flows, and periodic rain-on-snow events in late winter to early spring. Rain-on-snow events account for most of the largest floods on record.

The historical stream network was modified as early as the late 1800s as settlers altered stream networks to facilitate land draining and flood irrigation. Prior to modification, Twentymile Creek and Deep Creek drained to expansive wetlands that were likely characterized by distributary channel networks, ephemeral and perennial waterbodies, and diverse vegetation communities (Figure 5-4). To improve agricultural efficiency, the mainstem channels in the lower valleys were straightened and dredged. Irrigation diversion structures were installed to divert water from the mainstem channels into diversion channel networks in order to irrigate pasture, hay, and other livestock feed. Irrigation infrastructure is the primary modification to the historical stream network.

Biotic Systems

The Warner Valley supports numerous unique environments including lake, marsh, riparian, grasslands,

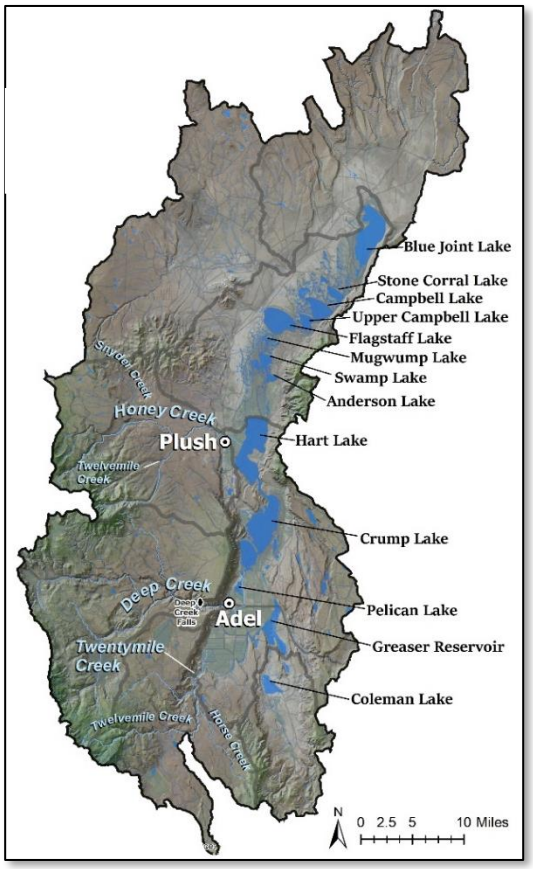


Figure 5-3. The Warner Basin including primary waterbodies.

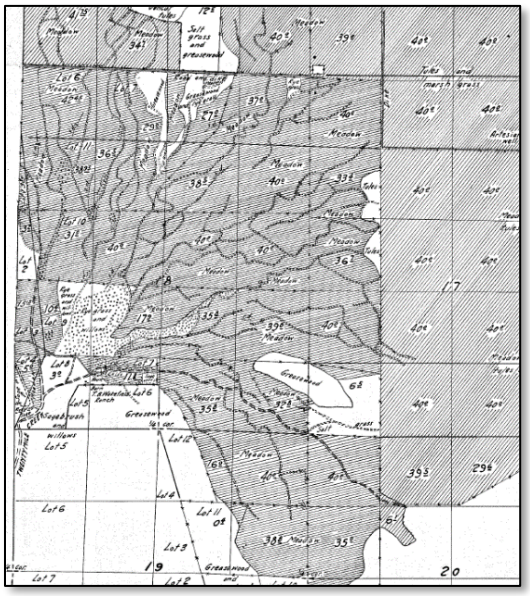


Figure 5-4. The Twentymile Creek alluvial fan in 1921. Remnants of the channel network remain on the landscape.

sage steppe, dry forest, and rimrock. Wild rose, choke cherry, wild plum, cottonwood, and willow are located in riparian areas. Vegetation in drier uplands includes sagebrush, greasewood, and western juniper.

Wildlife in the Warner Valley includes common high desert mammal species, resident birds, and migrant waterfowl. There are forty-two mammal species that live in Warner Valley include larger mammals such as pronghorn, bighorn sheep, elk, mule deer, cougar, bobcat, and coyotes. Smaller mammals include jackrabbits, ground squirrels, and chipmunks.

There are 239 species of birds that live in the area or migrate through the Warner Valley. Species that nest in the areas around Crump Lake and Hart Lake include American white pelicans, double-crested cormorants, willets, Wilson's phalaropes, Canada geese, gadwalls, northern shovelers, black-crowned night herons, and numerous varieties of ducks and terns. In addition, sandhill cranes, white-faced ibis, great white egrets, and American avocets are found in the marshes and along the lake shores. A broad variety of neotropical migrants, owls, falcons, hawks and eagles also inhabit the valley either as residents or migrants.

Native fish species found in the Warner Basin planning area include Warner Sucker, Warner Lakes Redband Trout, Tui Chub, and Speckled Dace. Non-native species include White Crappie (*Pomoxis anularis*), Black Crappie (*P. nigromaculatus*), and Largemouth Bass (*Micropterus salmoides*) were planted by ODFW into the Warner Lakes between 1971 and 1973 (White et al. 1990), and were well established by the late 1970s. Brown Bullhead (*Ameiurus nebulosus*) also inhabit the basin, although the year of introduction is unknown.

Warner Sucker

The following information is largely adapted from Scheerer et al. (2016).

The abundance and distribution of Warner Sucker has declined over the past century, and the species was listed as threatened under the U.S. Endangered Species Act in 1985 due to habitat fragmentation from impassable irrigation diversions and threats posed by the proliferation of piscivorous non-native game fishes (USFWS 1985).

The Warner Sucker inhabits the lakes and low gradient stream reaches of the Warner Valley. The species exhibits two life-history forms: lake and stream morphs (Figure 5-5). The lake-residing suckers have a lacustrine-adfluvial life history, spend most of the year in a lake environment, and migrate up the tributary streams in large aggregations to spawn (USFWS 1998). The adfluvial form generally matures later, lives longer, and is much larger and more fecund than the stream form. When upstream migration of lake-residing suckers is hindered by low stream flows during drought years or by irrigation diversion weirs, lake-residing suckers may spawn in nearshore areas of the lakes (White et al. 1991). Large lake-residing populations of introduced fishes may reduce sucker recruitment by preying upon young suckers (USFWS 1998). Periodic lake drying also threatens the lake-residing suckers, and suckers from the tributaries have recolonized the lakes after past drying events (mid-1930s and early 1990s; Allen et al. 1994). The stream-residing suckers have a fluvial life-history pattern and rear-spawn in the three major tributary drainages (Twentymile, Deep, and Honey creeks). Threats specific to the stream form include water withdrawals for irrigation and habitat degradation associated with grazing and agricultural practices. Both the lake- and stream-residing Warner Suckers spawn in the spring (April–June) (Coombs

and others 1979) in response to temperature and flow cues (Scheerer et al. 2016). Warner Suckers in the lakes are long-lived (17 years; White et al. 1991) and mature at 3 to 4 years of age (Coombs et al. 1979).

Figure 5-5. Stream form (top) and lake form (bottom) male Warner Suckers in spawning condition. Photos courtesy ODFW.

Warner Sucker Distribution

The following Warner Sucker distribution information is adapted from USFWS (1998).

Historical - The probable historical range of the Warner Sucker includes the main Warner Lakes (Pelican, Crump, and Hart), and other accessible standing or flowing water in the Warner Valley, as well as the low to moderate gradient reaches of the tributaries which drain into the Valley. The tributaries include Deep Creek, up to the falls 3.1 miles west of Adel, the Honey Creek drainage, and the Twentymile Creek drainage. In Twelvemile Creek, a tributary to Twentymile Creek, the historical range of the sucker extended through Nevada and back into Oregon, but probably not as high as the California reach of the stream.

Early collection records document the occurrence of the Warner Sucker from Deep Creek up to the falls west of Adel, the sloughs south of Deep Creek, and Honey Creek (Snyder 1908). Andreasen (1975) reported that long-time residents of the Warner Valley described large runs of suckers in the Honey Creek drainage, even far up into the canyon reach.

Current – Figure 5-6 includes the current Warner Sucker distribution and designated critical habitat in the basin. Between 1977 and 1991, eight studies examined the range and distribution of the Warner Sucker throughout the Warner Valley. These surveys showed that when adequate water is present, Warner Suckers may inhabit many of the lakes, sloughs, and potholes in the Warner Valley. The documented range of the sucker extended as far north into the ephemeral lakes as Flagstaff Lake during high water in the early 1980s, and again in the 1990s.

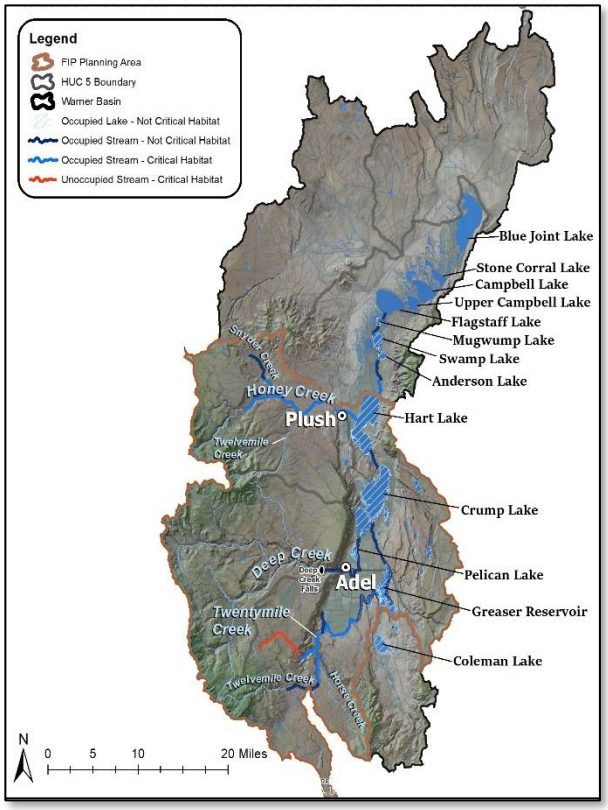


Figure 5-6. Warner Sucker occupied and designated critical habitat, and the Focused Investment Partnership planning area.

Stream resident populations are found in Honey Creek, Snyder Creek, Twentymile Creek and Twelvemile Creek. Intermittent streams in the drainages may support small numbers of migratory suckers in high water years. No stream resident suckers have been found in Deep Creek since 1983 (Smith et al. 1984, Allen et al. 1994), although a lake resident female apparently trying to migrate to stream spawning habitats was captured and released in 1990 (White et al. 1990). The known upstream limit of the Warner Sucker in Twelvemile Creek is through the Nevada reach and back into Oregon (Allen et al. 1994). However, the distribution appears to be discontinuous and centered around low gradient areas that form deep pools with protective cover. In the lower Twentymile Slough area on the east side of the Warner Valley, White et al. (1990) collected adult and young suckers throughout the slough and Greaser Reservoir. This area dried up in 1991, but because of its marshy character, may be important sucker habitat during high flows. Larval, young-of-year, juvenile and adult suckers captured immediately below Greaser Dam suggest either a slough resident population, or lake resident suckers migrating up the Twentymile Slough channel from Crump Lake to spawn (White et al. 1990, Allen et al. 1996).

Conservation History

Conservation actions in the Warner Basin are relatively recent. Fish passage projects have been completed on upper and lower Honey Creek (2008 and 2010, and 2013 and 2017, respectively) and Twentymile Creek (2014 and 2017). WBAHP is currently working with landowners, individual irrigators, and irrigation districts on fish passage projects in the three focal tributaries.

ODFW completed biological monitoring on fish passage projects on Twentymile Creek (Dyke Diversion, Scheerer et al. 2017) and Honey Creek (Rookery Diversion, Scheerer and Meeuwig 2017) and confirmed passage of Warner Sucker in the completed fish passage structures using PIT-tagged Warner Suckers. ODFW has also documented Warner Sucker passage at the MC Diversion, but the data have not been

published. A second fish passage project on lower Honey Creek (Flood Ditch) was completed in 2017 and has not been studied by ODFW.

The continued pursuit of fish passage, screening, and habitat enhancement work on the three focal tributaries in the Warner Valley, is anticipated to result in the future recovery of Warner Sucker and improved conditions for Warner Lakes Redband Trout. Lessons learned on each project are discussed among the WBAHP members and applied during the development of future projects.

Local Communities/Human Population

People have lived in the Warner Valley for more than 10,000 years as evidenced by Native American occupation noted by petroglyphs, hunting blinds, flakes from obsidian tools, and other material artifacts. The Kidütökadö band of Northern Paiute were the most recent Native American people to frequent the Warner Valley and the uplands of Hart Mountain.

Euro-American sheep herders and small cattle ranch operators settled the Warner Valley in the late 1800s. The town of Adel was found in the late 1880s and the Adel post office was established in 1896. The town of Plush located near Honey Creek, was founded during a similar time and the town's post office was established in 1888. Adel and Plush remain small communities supported by surrounding cattle ranches. Lakeview remains the regional economic and social hub of Lake County.

Local Economy

The "working landscape" is a key component of the basin economy. Agriculture is historically one of the region's principal industries and continues to support the local economies of Plush, Adel, and Lakeview. Historically, ranches raised sheep, but over time, cattle became the predominant agricultural industry in the region. Agricultural crops such as hay, alfalfa, and other feed are primarily raised for local livestock consumption. Timber harvest, tourism, energy production, and public works are other revenue sources for the region.

6. Conservation Need

Warner Sucker and Warner Lakes Redband Trout are the primary focus of the conservation need. The following section is largely taken from USFWS (1988) and the information remains relevant today.

The Warner Sucker was federally listed as threatened in September 1985 (USFWS 1985). The species is also listed as threatened by the State of Oregon, and sensitive by the State of Nevada. There is essentially one metapopulation of Warner Sucker which is endemic to the streams and lakes geographically delineated by the Warner Basin.

The major threats to the continued existence of the native fishes in the Warner Basin and Alkali Subbasin are human induced stream channel and watershed degradation, irrigation diversion practices, and predation and competition from introduced fishes. These three factors have worked both independently and in unison to threaten the viability of Warner Sucker and probably affect other native aquatic and riparian associated species. The Warner Sucker and the Warner Valley Redband Trout generally appear to occupy similar habitats in the same watersheds (although trout reside more in the upper reaches of streams than suckers do), so impacts affecting Warner Suckers likely also affect Warner Valley Redband Trout.

7. Conservation/Restoration Targets

The USFWS (1998) recovery plan for Warner Sucker outlines steps designed to recover the Warner Basin and Alkali Subbasin aquatic ecosystems with specific goals for Warner Sucker and other listed species (Hutton Tui Chub and Foskett Speckled Dace) which are located outside of the Plan area. Foskett Speckled Dace is currently (2019) being considered for de-listing by USFWS (2018). The primary recovery objective for the Warner Sucker is the eventual delisting of the species. Species delisting is an administrative process overseen by USFWS. WBAHP can execute projects that achieve recovery criteria, but WBAHP does not have the authority to delist the species.

USFWS is currently (2019) reviewing threats and recovery criteria for Warner Sucker, however, based on the 1998 recovery plan, USFWS may consider delisting the Warner Sucker when the following recovery criteria are met:

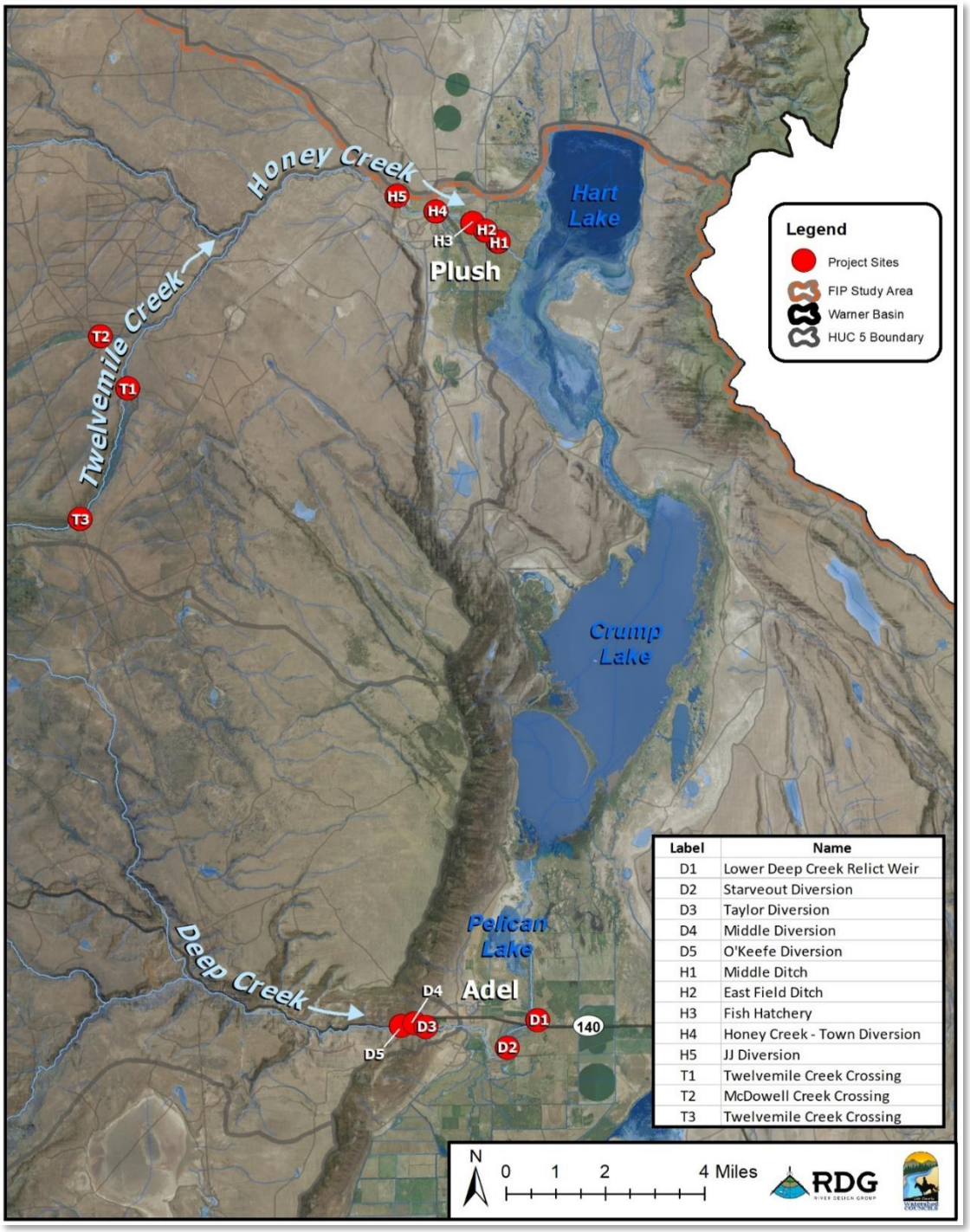
1. A self-sustaining metapopulation (a group of populations of one species coexisting in time, but not in space) is distributed throughout the Twentymile Creek, Honey Creek (Figure 8-1), and Deep Creek (below the falls) drainages, and in Pelican, Crump, and Hart lakes. Self-sustaining populations will be determined based on parameters such as:
    - Multiple age-classes, including adults, juveniles, and young of the year, which approximate normal frequency distributions,
    - A stable or increasing population size,
    - Documented reproduction and recruitment, and
    - Self-sustaining populations form a viable metapopulation, large enough to maintain sufficient genetic variation to enable it to evolve and respond to natural habitat changes.
2. Passage is restored within and among the Twentymile Creek, Honey Creek, and Deep Creek (below the falls) drainages so that the individual populations of Warner Suckers can function as a metapopulation.
3. No threats exist that would likely threaten the survival of the species over a significant portion of its range.

Actions needed for Warner Sucker recovery include:

1. Protect and rehabilitate Warner Sucker populations and habitat.
2. Conserve genetic diversity of Warner Sucker populations.
3. Ensure adequate water supplies are available for Warner Sucker recovery.
4. Monitor Warner Sucker populations and habitat conditions.
5. Evaluate long-term effects of climatic trends on the recovery of Warner Sucker.

8. SMART Goals and Objectives

In the following section, goals and objectives are assigned to each outcome included in Section 2. Figure 8-1 includes the locations of irrigation diversions proposed for fish passage and screening improvements.



Label	Name
D1	Lower Deep Creek Relict Weir
D2	Starveout Diversion
D3	Taylor Diversion
D4	Middle Diversion
D5	O'Keefe Diversion
H1	Middle Ditch
H2	East Field Ditch
H3	Fish Hatchery
H4	Honey Creek - Town Diversion
H5	JJ Diversion
T1	Twelvemile Creek Crossing
T2	McDowell Creek Crossing
T3	Twelvemile Creek Crossing

Figure 8-1. Proposed fish passage and screening project locations in the Warner Basin.

Outcome #1: By 2021, WBAHP will complete four fish passage projects with the three irrigation districts in the Warner Basin.

SMART Goal 1: Restore fish passage and screening on Deep Creek (Figure 8-2) and Honey Creek and monitor existing fish passage project on Twentymile Creek.

Objective 1A: Achieve fish passage at Lower Deep Creek Relict Diversion, Starveout Diversion, and Taylor Diversion on Deep Creek, and the Town Diversion on Honey Creek.

Action 1A1: Complete outreach to the MC, Adel, and Plush water users to develop project concepts, get project buy-in, and determine project goals, objectives, and constraints.

Action 1A2: Complete field data collection, engineering designs, acquire funding, permit, implement, and monitor fish passage at four irrigation diversions.

Action 1A3: Complete field data collection, engineering designs, acquire funding, permit, implement, and monitor fish screens at three irrigation diversions.

Action 1A4: Confirm fish passage at addressed diversions through biological monitoring (e.g., tag fish and monitor passage).

Figure 8-2. Deep Creek emerges from the Deep Creek canyon into the broader Warner Valley. The view is from upstream of Adel, to the east with Coleman Ridge in the distance.

Outcome #2: By 2025, WBAHP will have completed fish passage projects at ten diversions in the Warner Basin and documented Warner Sucker and Warner Lakes Redband Trout passage at each diversion. Fish passage project execution will require support of the local community, landowners, and irrigators.

SMART Goal 2: Restore fish passage and install screens on Deep Creek and Honey Creek, and monitor existing fish passage project on Twentymile Creek.

Objective 2A: Achieve fish passage at O'Keefe Diversion and Middle Diversion on Deep Creek, and at JJ Diversion, Hidden Diversion, Fish Hatchery Diversion, and East Field Diversion on Honey Creek. Also address three road crossing fish passage concerns in the Honey Creek drainage.

Figure 8-3. A roll drum fish screen located on the lower Taylor Diversion on Honey Creek.

Action 2A1: Complete outreach to the MC, Adel, and Plush water users to develop project concepts, get project buy-in, and determine project goals, objectives, and constraints.

Action 2A2: Complete field data collection, engineering designs, acquire funding, permit, implement, and monitor fish passage at six irrigation diversions and three road crossings.

Action 2A3: Complete field data collection, engineering designs, acquire funding, permit, implement, and monitor fish screens (Figure 8-3) at six irrigation diversions.

Action 2A4: Confirm fish passage at addressed diversions through biological monitoring (e.g., tag fish and monitor passage).

Outcome #3: By 2025, WBAHP will coordinate with ODFW the development of educational materials concerning Warner Basin native fish and threats from non-native fish. WBAHP will also coordinate a fishery outreach and education program to reduce the potential for future re-introductions of non-native species.

SMART Goal 3: Develop an educational outreach plan on the benefits of Warner Basin native fish and threats from non-native fish. The plan will include public outreach and informational materials.

Objective 3A: Develop non-native fish management plan.

Action 3A1: WBAHP review feasibility of managing non-native fish in Warner Lakes.

Action 3A2: ODFW review fishing regulations, angler use, and survey for angler input on removing non-native fish for native fish conservation in the Warner Lakes.

Action 3A3: Compile survey input and develop strategy for addressing non-native fish.

Action 3A4: Rollout education strategy through public meetings and by making materials publicly available through ODFW website and local information sources.

Outcome #4: By 2025, WBAHP will coordinate with the local community and irrigators to determine the feasibility for water conservation, and develop water conservation concepts to increase water availability to support the native fish community.

SMART Goal 4: Develop water availability goals and strategies with water users.

Objective 4A: Meet with water users to discuss potential strategies.

Action 4A1: Review water users' irrigation infrastructure and provide concepts that meet water users' needs and increase water availability. Concepts may include piping irrigation networks, soil moisture monitoring, and water leasing opportunities.

Action 4A2: Hold local water user meetings to present potential strategies.

Action 4A3: If determined to be viable, develop a water leasing entity for interested water users.

Outcome #5: By 2035, WBAHP projects will achieve USFWS Warner Sucker recovery criteria, and provide information support to USFWS for consideration in Warner Sucker delisting.

SMART Goal 5: Warner Sucker recovery and consideration for delisting.

Objective 5A1: Provide USFWS with Plan information to support species review and delisting consideration.

Action 5A1: Provide annual project monitoring data and reports in support of species review.

Action 5A2: Complete any outstanding monitoring or fish passage confirmation efforts that are necessary.

Action 5A3: Support USFWS in gathering additional information and coordinating public meetings.

9. Funding Needs: Estimated Costs/Leverage Opportunities

The WBAHP has been very successful in acquiring project funding and leveraging diverse funding sources to implement fish passage projects. To successfully carry out the Plan, the WBAHP will continue to rely on funding from both WBAHP members, OWEB, and outside funding sources. Table 9-1 includes possible funding sources and potential annual contribution amounts to match OWEB funds.

Table 9-1. Potential match funding sources for Warner Basin fish passage, screening, and habitat improvement projects. The Potential Annual Contribution Amount is based on recent funding levels for fish passage projects completed in the Warner Basin.

Funding Source	Potential Annual Contribution Amount
U.S. Fish and Wildlife Service - Partners Program	$50,000
U.S. Fish and Wildlife Service - Endangered Species Program	$50,000
U.S. Bureau of Land Management	$200,000
U.S. Forest Service – Resource Advisory Committees (RAC)	$50,000
Western Native Trout Initiative	$50,000
Ruby Pipeline Mitigation Fund	$25,000
ODFW/ODOT Fish Passage and Screening	$50,000

Table 9-2 includes SMART goal funding information.

Table 9-2. SMART goals, lead groups, funding partners, and estimated costs.

SMART Goal	Lead Group	Objective and Project Type	Potential Funding Partners	Estimated FIP Cost	Estimated Total Project Cost
1 – Preliminary Passage and Screening	LCUWC, LSWCD	Restore passage (4 diversions) and complete screening (3 diversions)	USFWS, BLM, WNTI, Ruby	$2,000,000	$2,597,500
2 – Remaining Passage and Screening	LCUWC, LSWCD	Restore passage (6 diversions), 3 road crossings, and complete screening (6 diversions)	USFWS, BLM, WNTI, ODOT	$3,541,500	$4,669,250
3 – Native and Non-native Fish Educational Outreach	ODFW, BLM, USFWS	Native fish benefits and non-native fish educational plan	ODFW, USFWS, BLM	$50,000	$57,000
4 – Increase Water Availability	LCUWC, LSWCD	Water efficiency	LSWCD, BLM	$221,500	$97,500
5 – Warner Sucker Recovery	USFWS	Provide information to inform Warner Sucker delisting	USFWS	$50,000	$57,000
Total				**$5,863,000**	**$7,478,250**

10. Evaluating Success

Plan success will be evaluated annually at the project level and biennially at the Plan level. Long-term monitoring completed at 3-yr and 5-yr post-project periods will be completed to ensure longer-term project success. Long-term monitoring to be completed beyond the life of the FIP is anticipated to be funded by WBAHP member organizations. The monitoring regime is described below.

Project-level Monitoring

The WBAHP partners will either complete the effectiveness monitoring or retain a consultant to complete the monitoring. Monitoring may include 1) as-built survey and project completion documentation, 2) out-year monitoring, and 3) biological monitoring. The as-built survey will document project completion and ensure the project was built as designed. The consultant will provide the WBAHP with an as-built surface model that will be used to prepare a design sheet including a plan view, profile view, and cross-section views. Photo points established during the pre-project survey, will be replicated. Out-year monitoring will include a site visit and repeated photo points to assess how the project site has changed and whether the project goals are still being met. If necessary, a site survey may be completed to quantitatively compare the out-year and as-built conditions. Hydraulic measurements may also be necessary to ensure the project meets fish passage criteria and to document hydraulic conditions as they relate to fish passage.

Biological monitoring will be overseen by or coordinated with ODFW. Biological monitoring may include documenting fish passage through fish passage structures with PIT-tag technology. ODFW has completed similar fish passage monitoring for passage projects completed on Twentymile Creek and Honey Creek. Other biological monitoring methodologies may be developed to address specific project questions.

Project-level monitoring outputs will include:

- Effectiveness monitoring plan methodology
- Annual monitoring data and memo
- Adaptive management feedback for engineering design, construction, and monitoring
- Annual program presentation summarizing completed work and monitoring outcomes

Plan-Level Monitoring

Plan-level monitoring will include tracking of project progress and overall success. Plan-level monitoring will be led by LCUWC and LSWCD. Biennial monitoring reports will include a summary of goals and objectives, actions completed to-date, project and monitoring status, and future work in the subsequent biennium. Plan-level monitoring will serve as a check on the WBAHP members to ensure program accountability. The following typical milestones and issues would be included in the monitoring report:

- Funding status:
  - Summarize secured funds and sources
  - Summarize new or potential funding sources
  - Provide a review of lessons learned on applying for/using FIP funding and match funding sources

- Construction/implementation period:
  - Description of projects that were planned, initiated, and completed
  - Project partners who were engaged in projects
  - Issues and lessons learned from completed projects
  - Review of engineering consultants and construction contractors
- Post-construction establishment period:
  - Project metrics (stream miles, restoration acres, number of barriers removed, revegetation, etc.) for completed projects
  - Monitoring methodology review, what worked, what didn't
  - Monitoring data and memo review
  - Issues and lessons learned from project monitoring
- Long-term monitoring:
  - Monitoring tracker spreadsheet and geodatabase review
  - WBAHP members will spot-check projects at years 10 and 15 after implementation

Watershed Indicators Monitoring/Long-Term Monitoring Network

Watershed indicators monitoring would consist of long-term monitoring networks and studies typically administered by USFWS, BLM, and ODFW. The long-term monitoring would be used to assess how Plan goals and objectives are being met and if the Warner Sucker recovery is on-track. With the ultimate goal of Warner Sucker recovery and species delisting, the watershed indicators monitoring would be a more holistic effort to confirm Warner Sucker fish passage, populations comprised of multiple age class, and increasing population sizes in both the tributaries and the lakes. We would anticipate that future studies will replicate past studies regarding fish populations in the Warner Lakes and the focal tributaries, Warner Sucker movement within and among the tributaries and lakes, and Warner Sucker demographics and genetics.

11. Adaptive Management

Annual project monitoring results will be reported to WBAHP and OWEB. Monitoring results will compare monitoring results to the project goals and objectives in order to assess project effectiveness. Information sharing among WBAHP members and participation in regional science review meetings are effective means for gathering feedback on project designs and monitoring results. Additionally, feedback from landowners and irrigators on how the project is functioning within their maintenance and operation schedules will also be informative. The extensive monitoring completed by ODFW and others over the past 20 years provides important information that is reviewed by project stakeholders during the assessment and design processes.

12. Sustainability

While the WBAHP has formally existed for only 2 years, the member organizations have coordinated on projects for over 10 years. Cooperation among WBAHP member organizations has resulted in strong working relationships both among the members, but also with local landowners and irrigators in the Warner Basin. This success has been in large part due to a flexible approach to continued learning and

adaptation that enables the WBAHP to sustain changes in funding, project opportunities and challenges, and other unexpected changes. Over the years, WBAHP members have come to understand how political, social, funding and technical issues can converge to either increase or decrease the pace of restoration work. Based on this perspective and assuming that funding continues to be available, WBAHP members believe consideration for the delisting of Warner Sucker should be possible by 2035. With the onset of fish passage projects in the Warner Valley beginning in 2010, this 25-year time frame may seem like a considerable period of time. However, each fish passage project yields incremental improvements in available habitat and watershed connectivity. WBAHP members also anticipate that periodic drying of the Warner Lakes and low water periods in the tributaries have the potential to disrupt Warner Sucker recovery and Warner Lakes Redband Trout population connectivity. This time frame also equates to less than two complete Warner Sucker generations, but the proposed time period would account for potentially more than five cohorts reaching reproductive age.

Although a 25-year timeframe is much longer than envisioned by most conservation and funding organizations, and local landowners and water users, the timeframe is consistent with emerging thinking from leading northwest conservation organizations that are starting to promote 50-year visions for watershed restoration. These long-term approaches are still relatively short when compared to the over 125 years of agricultural alteration the Warner Valley has experienced.

While the WBAHP may face project funding pressures in the future, the solid project development and landowner outreach program that has been achieved will ensure long-term success of the partnership. USFWS will continue to be responsible for managing Warner Sucker, ODFW and BLM will also continue to share in these responsibilities. The member representatives participating in the WBAHP today, will welcome and instruct their future replacements in order to maintain the partnership.

13. Communications Plan

Communication Goal – Generate local community support for conservation of Warner Sucker and Warner Lakes Redband Trout through implementation of fish passage improvement and habitat enhancement projects. Provide outreach and educational materials to local landowners and water users on the benefits of Warner Sucker delisting and irrigation infrastructure and management improvements.

Audience – The primary audience will be the landowners, water users, and community members of Adel, Plush, and Lakeview. While the plan will target landowners and water users primarily, providing educational materials for younger community members will be beneficial for educating future generations.

Communication Objectives – Objectives include providing community members with information on the unique qualities of Warner Sucker and Warner Lakes Redband Trout, healthy stream corridors and lakes, problems with introducing non-native fish species, and how agricultural producers and fish and wildlife can coexist and mutually benefit from watershed restoration.

Key Messages – The key message will focus on how delisting endangered species is expected to benefit the species, landowners, and water users. Impacts to Warner Sucker and Warner Lakes Redband Trout is due to long-term land use, ODFW introduction of non-native predatory fish species, and limited water in

a high desert environment. Warner Sucker recovery will require a combined effort of landowners, water users, agency personnel, and local community members.

Implementation Strategy – WBAHP will implement the communication strategy through local public meetings, meeting with landowners and water users, and by making annual reporting documents available to the public. The communication strategy will ensure transparent access to information and data.

Evaluation – Surveys will be provided during public meetings to inquire about how the local community, landowners, and water users would like to interact with WBAHP members, what information they would like to have made available, and how the WBAHP can meet the local needs in the context of project development. Survey information and other feedback will be used to update the communication plan to ensure it is a living document that meets the needs of the WBAHP, landowners, water users, and the local community.

14. Literature Citations

Baldwin, E.M. 1974. Geology of Oregon. Kendall/Hunt Publishing, Dubuque, Iowa. 147 pp.

Campbell-Craven Environmental Consultants. 1994. Draft evaluation of fish passage alternatives for water diversions in Honey Creek, tributary to Hart Lake, Lake County, Oregon. Prepared for the Oregon Department of Fish and Wildlife. Portland, Oregon. 16 pp.

Hubbs, C. L. and R. R. Miller. 1948. The Zoological Evidence: Correlation between fish istribution and hydrographic history in the desert basins of the western United States. Pages 17-166 in The Great Basin, with emphasis on glacial and postglacial times. Bulletin of the University of Utah, Volume 38 (20).

Kittredge, W. 1987. Owning It All: Essays. St. Paul, Minn. Graywolf Press.

Oregon Conservation Strategy. 2016. Oregon Department of Fish and Wildlife, Salem, Oregon.

Richardson, S.E., P.D. Scheerer, S.A. Miller, S.E. Jacobs, G. Swearingen, B. Berger, J. Deibner-Hanson, and J. Winkowski. 2010. Warner Sucker Investigations 2009. Oregon Department of Fish and Wildlife, Fish Research Project Contract Numbers 13420-08-J814, LO9PX00618, and W66QKZ90227848. Annual Progress Report, Salem.

Scheerer, P. D., S E. Jacobs, and A.V. Munhall. 2006. Warner Valley Fish Investigations- Warner Suckers. Annual Progress Report. Contracts HLP0630009 and 134206M093. Oregon Department of Fish and Wildlife, Salem, Oregon. 20 pp.

Scheerer, P.D., M.P. Heck, S.L. Gunckel, and S.E. Jacobs. 2007. Warner Sucker Stream Investigations. Oregon Department of Fish and Wildlife, Fish Research Project Contract Numbers HLP073006, E-2-46, and 134206M086. Annual Progress Report, Salem.

Scheerer, P.D., S.E. Jacobs, K. Bratcher, G. Swearingen, and S. Kramer. 2008. 2008 Warner Valley fish investigations- Warner Suckers. Oregon Department of Fish and Wildlife, Fish Research Project HLP0630009 and 134206M093, Annual Progress Report, Salem.

Scheerer. P.D., S. Clements, R Jacobsen, and J.T. Peterson. 2011. 2011 Warner Sucker Investigations (Honey Creek). Oregon Department of Fish and Wildlife, Fish Research Project Contract Numbers F11AC00095 and F11AP00439 and L10AC20356. Annual Progress Report, Salem.

Scheerer. P.D., J.T. Peterson, and S. Clements. 2013. 2013 Warner Sucker Investigations (Lower Honey Creek). Oregon Department of Fish and Wildlife, Fish Research Project Contract Numbers F11AC00095 and L12AC20619. Annual Progress Report, Salem.

Scheerer. P.D., and M.H. Meeuwig. 2017. 2017 Warner Sucker Investigations (Warner lakes and lower Honey Creek. Oregon Department of Fish and Wildlife, Fish Research Project Contract Numbers L12AC20619. Annual Progress Report, Salem.

Scheerer, P.D., J.T. Peterson, and M.H. Meeuwig. 2017. 2016 Warner Sucker investigations (lower Twentymile Creek). Oregon Department of Fish and Wildlife, Fish Research Project Contract Number: L12AC20619. Annual Progress Report, Salem.

Snyder, C. T., G. Hardman, and F. F. Zdenek. 1964. Pleistocene lakes of the Great Basin. U.S. Geological Survey – Miscellaneous Geologic Investigations Map I-416.

United States Fish and Wildlife Service [USFWS]. 1985. Endangered and threatened wildlife and plants; Determination that the Warner Sucker is a threatened species and designation of critical habitat. *Federal Register* 50 (188): 39117-39123.

U.S. Fish and Wildlife Service [USFWS]. 1998. Recovery plan for the native fishes of the Warner basin and Alkali subbasin. Portland, Oregon. 86 pp.

U.S. Fish and Wildlife Service [USFWS]. 2018. Endangered and Threatened Wildlife and Plants; Removing the Foskett Speckled Dace from the List of Endangered and Threatened Wildlife. 50 CFR 17 p. 475-490.

Weide, D. L. 1975. Postglacial geomorphology and environments of the Warner Valley-Hart Mountain area, Oregon. Ph.D Thesis, University of California, Los Angeles. 311 pp.

White, R.K., T.R. Hoitsma, M.A. Stern, and A.V. Munhall. 1990. Final report of investigations of the range and status of the Warner Sucker, (*Catostomus warnerensis*), during spring and summer 1990. Report to U.S. Bureau of Land Management, Oregon Department of Fish and Wildlife, and U.S. Fish and Wildlife Service. 66 pp.

Page intentionally left blank.

15. Partnership Certification

Page intentionally left blank.

Memorandum of Understanding
Warner Basin Aquatic Habitat Partnership

Official Copy-Adopted and Signed

Between

Lake County Umbrella Watershed Council

Lakeview Soil and Water Conservation District

USDA Bureau of Land Management Lakeview District

Oregon Department of Fish and Wildlife

US Fish and Wildlife Service

USDA Forest Service (Fremont-Winema) National Forest

Adel Water Improvement District

Plush Irrigation District

River Design Group, Inc.

This Memorandum of Understanding, here after called (MOU), is entered into by and between Lake County Umbrella Watershed Council, Lakeview Soil and Water Conservation District, Bureau of Land Management Lakeview District, Oregon Department of Fish and Wildlife, USDA Forest Service Fremont-Winema, Adel Water Improvement District, Plush Irrigation District, and River Design Group, Inc., hereafter called, Cooperators.

A. Authority:

This MOU is made under the Authority of the Cooperative Partnership established April 1, 2016 when the Warner Basin Aquatic Habitat Partnership officially agreed to formalize their partnership.

B. Purpose:

All of the above-mentioned agencies and entities, as Cooperators, have a combined interest in the establishment of the Warner Basin Aquatic Habitat Partnership for the Warner Lakes Basin Watershed in Lake County, Oregon. The Warner Basin Aquatic Habitat Partnership (WBAHP) is comprised of seven organizations including U.S. Fish and Wildlife Service, U.S. Bureau of Land Management, U.S. Forest Service, Oregon Department of Fish and Wildlife, Lakeview Soil and Water Conservation District, Lake County Umbrella Watershed Council, and River Design Group, Inc.

The WBAHP is focused on improving fish passage and habitat for Warner Sucker and Warner Lakes Redband Trout, the two focal, native fish species inhabiting the three Warner Basin tributaries included in the Warner Basin Fish Passage and Habitat Improvement Initiative (Initiative). The WBAHP has identified fish passage and habitat concerns, and has built productive relationships with basin landowners and irrigation districts that operate diversions. Implementation funding will be used for project engineering, permitting, and construction of fish passage, screening, and habitat improvement projects.

The vision of the WBAHP is to have streams and lakes in the Warner Basin that will provide a connected watershed that provides access to the high-quality spawning, rearing, and adult holding habitats that are necessary for Warner Sucker and Warner Lakes Redband Trout to complete their diverse life-history strategies. Addressing existing limiting factors will require a collaborative effort among WBAHP member, the local community, landowners and water users. Recover of Warner Sucker and Warner Lakes Redband Trout will ensure conservation of the native fish community that is unique to the Warner Basin.

The Partnership will invest in restoration projects in the Warner Lakes Basin. The Partnership will achieve USFWS (1998) recovery criteria for Warner Sucker including restoring passage among the three priority tributaries to reconnect individual populations and to restore a self-sustaining metapopulation among the three tributaries and the Warner Lakes.

This goal will be accomplished through the general direction of the WBAHP consisting of the six organizations listed above.

C. Mutual Benefit:

All cooperators to the MOU agree that it is to their mutual interest and benefit to work cooperatively in inventorying, implementing, and monitoring projects, while leveraging for project funding to reach the goals of the Partnership. The goals of the Partnership include the conservation and recovery of the focal species through habitat restoration and enhancement, ultimately leading to de-listing the endangered Warner Sucker. The WBAHP will work across jurisdictional and ownership boundaries within the Warner Lakes Basin Watershed. All cooperators also agree it is to their mutual benefit to work cooperatively to educate, train and share technology and information with agency and general public personnel about focal fish species, including producing and sharing documents that pertain to these species. The Partnership will work cooperatively to make the best use of available funds to improve connectivity and habitat conditions associated with the three primary streams in the watershed.

D. Items of Agreement and Guiding Principles:

1. **The WBAHP will use a collaborative approach to project development and execution.** Strategic Action and Design Plan (Plan) implementation will require coordination among WBAHP members. Members will contribute their respective expertise regarding natural resources (fisheries, vegetation, wetlands, etc.) monitoring, funding, agriculture, water rights, and diversion infrastructure.

2. **The WBAHP will coordinate with landowners and water users.** The WBAHP will coordinate projects with the local community, landowners, and water users. Project execution will benefit from landowner and water user information. The WBAHP will strive to maintain trust and support from the local community, through communication, transparency, and project accomplishment and support.

3. **The WBAHP will secure funding to support design, implementation, and monitoring.** The WBAHP will coordinate project funding opportunities. Many of the WBAHP members have funding source they can apply to Warner Basin projects. Based on past completed projects, member organization often account for a substantial portion of the project funding needs. Members' contributed funds and other outside funding opportunities the WBAHP will pursue, will provide the match-funding required by granting agencies.

4. **The WBAHP will retain local contractors to execute project construction, as practicable.** Rural communities and their economies benefit from funding dollars spent on projects in the surrounding area. The WBAHP will solicit bids from local and regional contractors that are typically small business that hire or subcontractors' local residents. Contractors also support the local economy through fuel, food, and material purchases over the course of the project.

5. **The WBAHP will institute project monitoring and implement adaptive management to inform future designs.** The WBAHP will take a systematic approach to completing baseline, as-built, and out-year monitoring. Baseline monitoring is important for establishing existing conditions to compare to as-built and out-year monitoring results. Monitoring data are reviewed as part of an adaptive management program that applies lessons learned through data collection to improve future project designs. Sharing lessons learned with the WBAHP members and other restoration program practitioners is an instructive way to advance the restoration field especially in the realm of native, non-game fish species passage which is generally an understudied are of ecosystem restoration.

6. **The WBAHP will maintain the current agricultural–based economy and rural lifestyles.** The WBAHP will coordinate Plan execution in the context of maintaining and improving existing irrigation system and land use. The management and operation of the Warner Basin diversions relies on the experience and knowledge of generations of Warner Basin water users. Changes to diversion operation will be approved by and coordinated with water users during the design process. The WBAHP will pursue projects with landowners and water users who agree to a reasonable level of responsibility in maintaining the project.

7. **The WBAHP will ensure diversion project success and improve agricultural efficiency over time.** The WBAHP will remain involved with irrigation diversion projects after they are completed to ensure the diversion modifications function as expected. Meaningful diversion infrastructure improvements are often beyond the financial capacity of small irrigation districts or individual irrigators. WBAHP funding will seek to improve fish passage and screening while making irrigation diversions easier and safer to operate. Future projects may also increase agricultural efficiency, a result that could leave more water in-stream and require less intensive agricultural practices.

8. **This MOU is neither a fiscal nor a funds obligation document.** An endeavor involving reimbursement, contribution of funds, or transfer of anything of value between the parties and this instrument will be outlined in separate agreements that shall be made in writing by representatives of the parties and shall be independently authorized by appropriate statutory authority. Specifically, this instrument does not establish authority for noncompetitive awards to the cooperator of any contract or other agreement. Any contract of agreement for training or other services must fully comply with all applicable requirements for competition.

9. **Supporting Partners, whether private citizens or organizations, in the WBAHP must have vested interests in the WBAHP and provide the assistance necessary to reach the goal of species conservation, connectivity, and habitat enhancement throughout the watershed**. New cooperators may join the MOU by submitting a signed letter indicating agreement with the terms of the MOU. It is intended that the WBAHP remains open and inclusive of all organizations and individuals who wish to work cooperatively on implementing high priority restoration actions.

10. The MOU in no way restricts Cooperators from participating in similar activities with other public or private agencies, organizations, and individuals.

11. Cooperators have, through any authorized representative, the right of access to, and the right to examine all records related to this MOU to the extent provided by law. As used in this clause, "records" includes books, documents, accounting procedures and practices, and other data, regardless of type and regardless of whether such items are in written form, in the form of computer data, or in any other form.

12. This MOU is executed as of the last date shown below and expires no later than 12/31/2030, at which time it is subject to review and renewal or expiration.

13. Any Cooperative Member, upon written address to the WBAHP requesting to terminate their membership of the MOU, shall be deemed automatically terminated. Any Cooperative Member that terminates may be reinstated by the WBAHP by majority vote.

E. Roles Identified for WBAHP Members:

Warner Basin Aquatic Habitat Partnership: The WBAHP shall be made up of representatives of the cooperating entities. The WBAHP shall operate as a steering group, and will be responsible for development and approval of the Strategic Action and Design Plan for the activities of the WBAHP. These activities include, but are not limited to, the planning, fiscal operations, project identification, accomplishments, inventory, monitoring, public awareness, and reporting of WBAHP projects.

Lake County Umbrella Watershed Council:

- Contracting with facilitator, engineers and implementation contractors
- Schedule quarterly meetings with WBAHP group
- Project management (Deep & Twentymile sub-basins)
- Fiscal administration of contracts for Deep and Twentymile sub-basins
- Outreach and planning with Water Districts
- Seek grant opportunities to leverage funds – future implementation
- Project implementation

Lakeview Soil and Water Conservation District:

- Project management (Honey Creek sub-basin)
- Contracting with engineers and implementation contractors
- Schedule quarterly meetings with WBAHP group – conference call
- Outreach and planning with water districts
- Seek grant opportunities to leverage funds – future implementation
- Project Implementation

Bureau of Land Management:

- Technical expertise
- Outreach and planning with water districts
- Project funding
- Assist with project implementation and monitoring as necessary and practicable
- Provide local, state, federal, and regional management plans relevant to the project/species (to be utilized by contractors for plan development) tools to guide all actions and outcomes identified in the Strategic Action and Conceptual Design Plan

US Forest Service:

- Technical expertise
- Project planning
- Provide local, state, federal, and regional management plans relevant to the project/species (to be utilized by contractors for plan development) tools to guide all actions and outcomes identified in the Strategic Action and Conceptual Design Plan

Oregon Department of Fish and Wildlife:

- Technical expertise
- Monitoring
- Project planning
- Provide local, state, federal, and regional management plans relevant to the project/species (to be utilized by contractors for plan development) tools to guide all actions and outcomes identified in the Strategic Action and Conceptual Design Plan

US Fish and Wildlife Service – Partners Program:

- Technical expertise
- Project funding
- Project planning
- Provide local, state, federal, and regional management plans relevant to the project/species (to be utilized by contractors for plan development) tools to guide all actions and outcomes identified in the Strategic Action and Conceptual Design Plan

US Fish and Wildlife Service – Endangered Species, Bend Field Office:

- Technical expertise
- Provide species recovery criteria
- Provide updates and information regarding listed species status
- Project funding
- Project planning
- Safe Harbor Agreement Guidance
- Provide local, state, federal, and regional management plans relevant to the project/species (to be utilized by contractors for plan development) tools to guide all actions and outcomes identified in the Strategic Action and Conceptual Design Plan

River Design Group Inc.:

- Meeting facilitator
- Technical expertise
- Survey, engineering, design concepts and final designs
- Permitting
- Engineering construction oversight

Strategy Plan: Each year the WBAHP will identify activities, projects and responsible parties to carry out the WBAHP Strategic Action and Design Plan.

Financial Plan: A table identifying projects with estimated costs and potential sources of funding is attached to this MOU and included within the Strategic Action Plan. This table will be updated annually by the Lake County Umbrella Watershed Council and/or Lakeview Soil and Water Conservation District.

Funds Manager: The Lake County Umbrella Watershed Council (LCUWC) and Lakeview Soil and Water Conservation District (LSWCD) shall manage grant funding based on project location. Those projects associated with Deep and Twentymile Creeks will be managed by the LCUWC. Projects located in the Honey Creek sub-watershed will be managed by the LSWCD.

Facilitator: The facilitator (River Design Group, Inc.) shall provide written minutes of the WBAHP meetings. The Lake County Umbrella Watershed Council and Lakeview SWCD will retain copies of meeting minutes.

F. Principle Contacts:

Lake County Umbrella Watershed Council
Contact Name: Marci Schreder
Phone: 541-219-0830
Email: schreder@centurytel.net

Lakeview Soil and Water Conservation District
District Manager: Justin Ferrell
Phone: 541-219-2698
Email: lakecountyswcd@hotmail.com

Bureau of Land Management
Contact Name: Jimmy Leal
Phone: 541-947-6120
Email: jleal@blm.gov

Oregon Department of Fish and Wildlife
Contact Name: Justin Miles
Phone: 541-947-2950
Email: Justin.P.Miles@state.or.us

US Fish and Wildlife Partners Program
Contact Name: Dirk Renner
Phone: 541-969-0162
Email: dirk_renner@fws.gov

US Fish and Wildlife Service Endangered Species Program
Contact Name: Alan Mauer
Phone: 541-383-7146
Email: alan_mauer@fws.gov

Fremont- Winema National Forest
Contact Name: Rich Pyzik
Phone: 541-943-4440
Email: rpyzik@fs.fed.us

River Design Group, Inc.
Contact Name: Troy Brandt
Phone: 541-738-2920
Email: tbrandt@riverdesigngroup.net

Adel Water Improvement District
Contact Name: Jason Yeager
Phone: 541-219-0537
Email: lakecountyweeds@gmail.com

Plush Irrigators
Contact Name: John Taylor
Phone: 541-947-2384
Email: taylorranch33@gmail.com

G. Signature Page:

IN WITNESS WHEREOF, the Warner Basin Aquatic Habitat Partnership, the Lake County Umbrella Watershed Council, Lakeview Soil and Water Conservation District, Bureau of Land Management, Oregon Department of Fish and Wildlife, US Fish and Wildlife Service, and US Forest Service have executed this Memorandum of Understanding, effective as of the last date written below.

By: Justin Miles	Justin Miles	11-6-2018
Print Name Authorized Representative	Signature	Date
By: Justin Ferrells	Justin Ferrells	11/6/2018
Print Name Authorized Representative	Signature	Date
By: James J. Leal, BLM	James J. Leal	11/6/2018
Print Name Authorized Representative	Signature	Date
By: Richard Ryzik, USFS	Richard Ryzik	11/6/2018
Print Name Authorized Representative	Signature	Date
By: Marci Schreder	Marci Schreder	11/6/2018
Print Name Authorized Representative	Signature	Date
By: Bridget Moran	Bridget Moran	1-30-19
Print Name Authorized Representative	Signature	Date
By: _____	_____	_____
Print Name Authorized Representative	Signature	**Date**
By: _____	_____	_____
Print Name Authorized Representative	Signature	Date

Warner Basin Strategic Action Plan

Warner Basin Aquatic Habitat Partnership

June 1, 2019