Lower Klamath Sub-Basin Coordination & Planning - FY 2015

Final Annual Progress Report: 10/01/16 – 09/30/17

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F15AP00276 – FY 15 – **Final Annual Progress Report** (Yurok Project 5076)

Project Background & Objectives

Historically the Klamath River Basin contained bountiful anadromous fish runs, supporting indigenous peoples throughout the region. Anthropogenic activities over the last 150 years, coupled with natural events, have resulted in widespread degradation of native fish habitats and substantial declines in anadromous fish populations. The declining health and productivity of the Klamath River's anadromous fisheries is of great cultural and economic concern to the Yurok Tribe. To help address this decline, the Yurok Tribal Fisheries Program (YTFP) and Yurok Tribe Watershed Restoration Department (YTWRD) initiated a large-scale, coordinated watershed restoration planning effort in the Lower Klamath Sub-basin in the late 1990s. During this time, the Lower Klamath Restoration Partnership (LKRP) was formed to develop and implement innovative, process based restoration techniques and set priorities for future watershed analysis and restoration efforts. The LKRP is composed of the Yurok Tribe, Green Diamond Resource Company (GDRC), and California State Coastal Conservancy. This initial planning and coordination effort greatly assisted in the creation of the Yurok Tribe's Lower Klamath River Sub-Basin Watershed Restoration Plan (Gale and Randolph 2000).

The Lower Klamath Plan prioritized watershed restoration activities throughout the sub-basin. Since the late 1990s, YTFP and YTWRD have been working with the LKRP and several other stakeholders to accomplish objectives set forth in the Lower Klamath Plan as well as continue to update the plan based on real-time fisheries monitoring information and watershed assessments. Restoration activities conducted in the Lower Klamath to date have focused on decommissioning roads and removing stream crossings, planting native conifers in riparian habitats, installing constructed wood jams in fluvial habitats, bioengineering, and creating complex off-channel habitats (e.g. alcoves, wetlands, side channels) in priority Lower Klamath watersheds.

Objectives of the Lower Klamath Sub-basin Planning and Coordination Project include:

- Continue restoration planning and coordination efforts among the LKRP participants;
- Work within the LKRP to include other pertinent stakeholders (i.e. landowners and additional resource agency staff) and restoration specialists in developing comprehensive and prioritized restoration projects in the Lower Klamath River Sub-basin;
- Assist the LKRP develop and implement innovative, process based restoration techniques and set priorities for future watershed analysis and restoration efforts; and
- Work with other Yurok Tribal Departments, resource agency staff, local landowners, and stakeholders to update and revise the Lower Klamath River Sub-basin Restoration Plan.

All of the objectives identified and the proposed scope of work for the FY15 Lower Klamath Sub-basin Planning and Coordination Project were met. This report documents watershed assessment, planning, coordination, and restoration efforts conducted by YTFP and YTWRD in the Lower Klamath River Sub-basin during the period October 1, 2016 - September 30, 2017 and serves as the final report for Agreement F15AP00276. Interim accomplishments were reported in Beesley (2015 & 2016) and covered the period October 1, 2014 - September 30, 2016.

- **Restoration Planning & Effectiveness Monitoring**

During the project period, YTFP continued working with our restoration specialist Rocco Fiori (Fiori GeoSciences - FGS) to plan, prioritize, implement, and assess restoration effectiveness in the Lower Klamath River Sub-basin. Restoration priorities and treatment plans developed during the report period continued to be guided by fisheries research and effectiveness monitoring currently being conducted by YTFP, other basin partners (i.e. Karuk Tribe & Mid-Klamath Watershed Council), and other Pacific Northwest practitioners.

Klamath River Estuary and Blue Creek Climate Change Adaptation Planning

In 2016, YTFP was funded to conduct climate change adaption planning in the Klamath estuary and Blue Creek. To assist these planning efforts, YTFP went through a competitive bid process to hire Quantum Spatial Inc. (QSI) to acquire LiDAR for the estuary and Blue Creek and the Estuary Technical Group & Wolf Water Resources (ETG) to provide technical assistance and capacity building training opportunities related to climate change assessment and planning.

During this reporting period, QSI conducted the LiDAR flights for the entire project area and provided YTFP with all of the data. YTFP and FGS are currently reviewing the data in a QA/QC process. This information is critically valuable and will greatly assist in estuary inundation/sea level rise (SLR) assessments as well as aid the development of restoration designs and climate change adaptation strategies. Additionally, YTFP survey crews used a real-time kinematic GPS unit and optical total station to establish a network of topographic survey benchmarks in lower Blue Creek and have been surveying the channel to fill in areas (i.e. areas underwater) missed by the LiDAR. Once complete, FGS will construct a detailed digital elevation model (DEM) for the lower watershed which will be used to assist the restoration design process. This DEM will also be used to assess landscape changes over time.

For the estuary, ETG is currently working on an assessment of the Klamath River mouth dynamics. The objectives are to document patterns of connectivity with the Pacific Ocean and assess the factors that influence river mouth perching and closing. On 08/07/17, ETG and the members of the Klamath Estuary Assessment Team (KEAT) held a webinar to show preliminary findings of this study and to solicit feedback from other Yurok Tribe staff and Council members. ETG hopes to complete a DRAFT summary report in late fall 2017. The next steps will be to further assess how the mouth dynamics may be affected by climate change impacts (i.e. SLR), create a list of future study needs, and begin developing adaptation strategies.

Bear Creek

In spring 2017, YTFP and FGS began developing restoration strategies for lower Bear Creek. Prioritization of Bear Creek was based on several factors but primarily because of documented use of the watershed by coho salmon and the underlying geomorphic conditions existing within the lower reaches of the creek and the mainstem Klamath River at the confluence are favorable for restoration. Lower Bear Creek is low gradient with substantial opportunities to re-engage low lying floodplains and existing floodplain stored old growth wood, and to facilitate conditions that provide low velocity habitats ideal for coho rearing. Bear Creek enters the Klamath River just downstream of a river side channel and just upstream of a backwater/high flow side channel. These types of low gradient habitats are preferred by juvenile coho; therefore, YTFP and FGS are focusing design efforts on increasing habitat diversity and resiliency in these areas by

implementing process-based restoration techniques such as wood loading. As part of the effort, YTFP and FGS developed a first phase of restoration that includes installing several constructed wood jams (CWJs) in lower Bear Creek (Figure 1) and corresponding effectiveness monitoring plan. We are currently seeking out project funding, working on completing environmental and cultural resource compliance requirements, and identifying appropriate wood sources.

McGarvey Creek

In 2016, YTFP was funded to work with FGS to install and intensively monitor beaver dam analogues (BDAs) in two key locations within lower McGarvey Creek. During this reporting period, YTFP continued working with the landowner (GDRC), Yurok Cultural Department, and various state and federal resource agencies to complete regulatory compliance requirements for the project. Anticipated benefits of the proposed BDAs include 1) increasing the amount of summer rearing habitat by storing surface waters and recharging ground water tables, 2) improving winter rearing conditions in mainstem McGarvey Creek by increasing the amount of slow velocity refuge areas, and 3) increasing rearing habitat resiliency to environmental perturbations such as seasonal and/or /pro-longed drought and potential future climate change impacts. YTFP and FGS will install the BDAs during June 2018 and intensively monitor their performance over the next 2-3 years. YTFP is currently monitoring natural beaver dams in the watershed and developing site designs for future phases to be implemented in the upper reaches.

Stream Channel Monitoring

YTFP crews continued conducting topographic surveys of fluvial habitats within the Lower Klamath Sub-basin to document baseline conditions and to assess habitat changes following implementation of stream and riparian habitat restoration activities. This channel monitoring data allows us to quantitatively assess channel changes over time, document project performance, and guide future restoration in the Lower Klamath.

During this reporting period, YTFP survey crews completed the following topographic surveys:

Hunter Creek

- As-built survey of the 2016 restoration reach in Hunter Creek (Late Fall 2016)
- A final post-project survey of the restoration reach in Hunter Creek (May 2017)

Terwer Creek

- As-built survey of the 2016 restoration reach in Terwer Creek (Late Fall 2016)
- Post-winter survey of the restoration reach in Terwer Creek (June 2017)

Waukell Creek

- A final post-project survey of the restoration reach in lower Waukell Creek (Late Fall 2016)

Hoppaw Creek

- As-built survey of the Lower Hoppaw Creek restoration reach (Late Fall 2016)
- Post-winter survey of the restoration reach of Hoppaw Creek (June 2017)
- As-built survey of the modifications made to the lower restoration reach (Fall 2017)

McGarvey Creek

- Baseline survey of the McGarvey Creek beaver dam analogue project reach (Spring 2017)

West Fork Blue Creek

- Baseline survey of the West Fork Blue Creek Phase I restoration reach (Spring 2017)

Lower Blue Creek

- Baseline survey of lower Blue Creek for restoration planning/design purposes (Fall 2017)

Off-Channel Habitat Monitoring

YTFP continued assessing habitat conditions, water quality, and fish use in constructed off-channel habitats (i.e. alcoves) in Hunter Creek, McGarvey Creek, Hoopaw Creek, and Terwer Creek to document post-restoration conditions (Silloway 2010; Silloway and Beesley 2011; Hiner et al. 2011; YTFP 2012 & 2013; Beesley and Fiori 2014). Conducting habitat, water quality, and fisheries investigations greatly increases our understanding of habitat and fish response to restoration efforts and is invaluable for planning, implementing, and adapting fisheries restoration in the Lower Klamath River Sub-basin. YTFP has been summarizing results and drafting detailed case studies for a majority of the constructed alcoves in the Lower Klamath. These case studies will be finalized and shared with our funding partners during December 2017. Monitoring efforts during this reporting period include water quality monitoring in McGarvey Creek alcoves III and IV, and seasonal juvenile salmonid abundance surveys in the Terwer and McGarvey creek alcoves. All of the abundance data collected thus far is presented in Figure 2.

- **Fisheries Restoration Field Tours, Presentations, & Trainings**

In October 2016, Sarah Beesley and Chase Stockwell (YTFP) attended a 3-day class in Prineville, Oregon that was focused on working with beaver to restore ecosystem health (Figure 3). The class was hosted by the Environmental Professional Program at Portland State University with instructors from National Oceanic and Atmospheric Administration (NOAA), Utah State University, and Methow Beaver Project. The training was comprised of in-class and field instruction on trapping/relocating live beaver, assessing BDAs and associated habitat/ecosystem changes, and BDA design and construction.

In January 2017, Sarah Beesley (YTFP) and Rocco Fiori (FGS) led a group of federal and state resource agency staff on a tour of beaver dams in Salt Creek and to a reach in McGarvey Creek where YTFP plan to install a series of BDAs. Staff from NOAA formed this agency working group to focus on the application and performance of BDAs in northern California streams (i.e. potential benefits, regulatory/resource concerns).

In January 2017, Aaron Martin (YTFP-Trinity Division) and Brandon Scott (Yurok GIS Department) provided real-time kinematic GPS (RTK) survey training to YTFP's Lower Klamath restoration/survey crew. As part of the training, the group established several permanent survey bench marks in the Lower Klamath using the RTK equipment.

In February 2017, Matt Hanington (Yurok Tribe Environmental Program – YTEP) provided water quality monitoring training to YTFP's Lower Klamath restoration/survey crew. In

addition to the training, the group deployed continuously recording sondes in the recently constructed Hoppaw Creek alcove and the creek to document winter water quality conditions.

In February 2017, several Yurok Fisheries staff attended and presented at the annual River Restoration Northwest Conference in Stevenson, Washington. Tim Hayden (Yurok Tribe Natural Resource Director) presented on the Blue Creek Salmon Sanctuary, Mike Belchik presented on the Klamath dam removal process, Rocco Fiori (Restoration Consultant – FGS) presented YTFP's restoration strategies and innovations in the Lower Klamath, and Aaron Martin and DJ Bandrowski (YTFP-Trinity Division) presented posters on their restoration work in the Trinity River. The conference was a great opportunity for the Yurok Tribe to highlight the great work being accomplished throughout the Klamath Basin and to engage with other restoration practitioners/experts and fisheries biologists/managers.

In March 2017, Jimmy Faukner (YTFP) attended a California Department of Fish and Wildlife's (CDFW) Coho Recovery Team meeting and gave a presentation of findings from the Klamath Coho Ecology Study, McGarvey Creek Salmonid Life Cycle Monitoring Project, and fish rescue operations. Following the meeting, Jimmy attended the 35th annual Salmonid Restoration Federation Conference. Highlights included a one-day workshop on beaver and BDA science.

In March 2017, Jimmy Faukner (YTFP), Sarah Beesley (YTFP), and our restoration consultant Rocco Fiori (FGS) gave presentations at the Klamath Basin Monitoring Program (KBMP) meeting held at the Yurok Tribe main office in Klamath. Sarah and Rocco also led the KBMP group on a field tour of YTFP/FGS restoration projects in lower Terwer Creek.

Sarah Beesley (YTFP) and our restoration consultant Rocco Fiori (FGS) attended a field tour of restoration projects in Washington with staff from the Mid-Klamath Watershed Council, Karuk Tribe, and various consultants from the Scott River. The tour was led by Larry Lestelle and Tim Abbe and was part of an on-going effort to share knowledge (i.e. salmonid recovery efforts and monitoring) with our basin partners and other restoration practitioners/stakeholders (Figure 4).

Sarah Beesley (YTFP), Will Proctor (YTWRD), and Nicole Sager (Yurok Planning Department) coordinated with the County of Humboldt to develop a poster for our Proposition 84 funded project. The project is focused on increasing drinking water security for Tribal members in the upper Reservation, and supporting watershed restoration planning and implementation in Blue Creek, West Fork Blue Creek, and Terwer Creek. The poster was presented at the North Coast Resource Partnership quarterly conference in Sonoma County during April 2017.

In May 2017, our restoration consultant, Rocco Fiori (FGS) led staff from the Bureau of Reclamation (BoR) on a tour of restoration in Hunter Creek and discussed our program's objectives and restoration techniques (i.e. wood loading, floodplain enhancement).

In June 2017, Sarah Beesley and Jimmy Faukner (YTFP) attended a multiple day BDA workshop hosted by the Scott River Watershed Council (SRWC) with participation and instruction provided by NOAA, FGS, and CDFW. The workshop included in-class instruction on BDA theory and permitting discussions, field review of several different constructed BDAs, and hands-on experience building BDAs in two Scott River tributaries (Figure 5).

In August 2017, Sarah Beesley (YTFP) and Rocco Fiori (FGS) led staff from U.S. Fish & Wildlife Service (USFWS) and NOAA on a tour of the Terwer Creek restoration reach.

In August 2017, Sarah Beesley (YTFP) and our restoration consultant Rocco Fiori (FGS) led several Klamath River Renewal Corporation board members on a field tour of restoration sites in Terwer Creek (Figure 6). This was a great opportunity to highlight the innovative restoration work that the Yurok Tribe and Mr. Fiori is implementing within the basin and to share ideas regarding potential habitat work that should be considered in light of future dam removal. The group was very engaged and seemed very impressed with our program.

In September 2017, YTFP staff hosted Emily Dwyer of the Packard Foundation for a few days of volunteer work on Lower Klamath projects. The Packard Foundation supported the Tribe and Western Rivers Conservancy to finance to the Phase II acquisition, and as part of their employee development program, they allow one week a year for staff to "volunteer" with other organizations. Emily got to 1) help put out game cameras as part of our feral cattle management planning efforts; 2) tour the Terwer Creek restoration project and assist our biologist with topographic surveys; 3) assist our biologist tag juvenile coho salmon in McGarvey Creek; and 4) help check the juvenile salmonid outmigrant trap located in Blue Creek.

- **Fisheries Restoration Implementation**

Stream and Floodplain Enhancement

During summer-fall 2017, YTFP and FGS conducted the following restoration activities in priority Lower Klamath tributaries: 1) installed 16 CWJs, six large wood/willow baffles, and four riparian planting islands in Terwer Creek (Terwer Creek Gage Reach-Figure 7); 2) expanded (e.g. lengthened/deepened) Hoppaw Creek Alcove I and added more fluvial wood to the channel and alcove (Lower Hoppaw Creek Reach-Figure 8); and 3) began installing CWJs and treating road related impacts in West Fork Blue Creek (Phase I Reach-Figures 9-10).

- **Watershed Restoration Implementation**

During this reporting period, YTWRD coordinated with the Trinity River Division of YTFP, Trinity River Restoration Program, BoR, Hoopa Tribe, and various contractors to help plan and implement several projects in the Trinity River Sub-basin. Work included assisting with the following: 1) Bucktail Restoration Project on the Trinity River (2016 – Figure 11); 2) Sheridan Deep Gulch Restoration Project on the Trinity River (2017 – Figure 11), 3) Mill Creek (Trinity River tributary) Restoration Project (2017), 4) processing gravel and conducting gravel augmentation at the Weir Hole and Sawmill sites in Lewiston, CA (Figure 12); and 4) gathering large wood in Hayfork and Weaverville, CA to support restoration efforts (Figure 13).

YTWRD road crews conducted storm inspections and cleaned inboard ditches and culverts to prevent sedimentation of tributaries on the Yurok Tribe's Phase I property and on other roads within the Yurok Reservation. Maintaining Yurok roads during storm events is a critically important land stewardship activity and resource and community protection measure.

In fall 2016, YTWRD completed a road decommissioning project in the Hunter Creek watershed. This included decommissioning 2.50 miles of road (i.e. H350 Road), removal of 20 stream crossings, and treatment of six mass wasting sites for a total of 31,736 yd^3 of sediment saved. During summer-fall 2017, YTWRD began road decommissioning work in a high priority location in the Terwer Creek watershed. The project consists of decommissioning 2.34 miles of legacy logging roads (i.e. T800 Road) which includes removal of ~9,980 yd^3 of sediment saved and a total volume of 14,511 yd^3 of fill from 33 sites composed of stream crossings, mass movements, unstable side-cast fill, and crossroad drains (Figure 14).

- **Proposals Submitted**

YTFP Lower Klamath Division (LKD) submitted the following proposals:

U.S. Bureau of Reclamation (BoR) Native American Affairs Funding **(Secured Fall 2017)**:
- Restoration and Planning for the Lower Klamath River Sub-basin - $80,000

National Fish & Wildlife Foundation (NFWF) (BoR/PacifiCorp Klamath Coho Fund)
- Lower Bear Creek Instream Habitat Enhancement Project: Phase I - $99,588

Pacific Coastal Salmon Recovery Fund FY 2016 **(Secured Spring 2016)**:
- Lower Klamath Tributary Outmigrant Monitoring & Non-natal Stream Rearing - $80,000
- Re-Establishing Floodplain Connection & Ecosystem Function in Hunter Creek - $25,000

U.S. Fish & Wildlife Service Partners for Fish & Wildlife Program **(Secured Summer 2016)**:
- Lower Bear Creek Instream Habitat Enhancement Project: Phase I - $40,000

U.S. Fish and Wildlife Service CFDA Program Funds **(Secured Summer 2017)**:
- Lower Klamath Sub-basin Coordination and Planning FY17 - $15,000

California Department of Fish and Wildlife Fisheries restoration Grant Program:
- Effectiveness Monitoring for McGarvey Creek Beaver Dam Analogues - $214,711

U.S. Fish & Wildlife Service Yreka Area Office **(Secured Summer 2017)**:
- Added Funds - Watershed Restoration of Priority Lower Klamath Tributaries - $86,000

Department of Water Resources – California Proposition 84 Grant Fund: **(In Progress)**
- Added Funds - Restoration of Lower Klamath River Habitats - $219,276

- **Meetings Attended**

YTFP and YTWRD held regular meetings throughout the project period to coordinate ongoing and future sub-basin assessment, monitoring, and restoration activities.

YTFP and YTWRD held regular meetings with GDRC during the project period. These meetings were held to discuss ongoing and future watershed assessment, monitoring, and restoration activities within the Lower Klamath River Sub-basin.

YTFP and YTWRD met on a regular basis with the Yurok Tribe Council during the project period to hold fisheries and watershed restoration related planning sessions; and to discuss and seek approval from the Council for proposed watershed restoration, assessment, and monitoring projects within the Lower Klamath River Sub-basin.

YTFP and YTWRD worked regularly with Rocco Fiori (FGS) during the project period to plan ongoing and future restoration, assessment, and monitoring projects in the Lower Klamath River.

YTFP and YTWRD staff met regularly with staff from the CDFW, BoR, NOAA, NFWF, and USFWS during the project period to discuss ongoing and future restoration projects/proposals, discuss project performance/techniques, and to conduct pre- and post-project reviews.

YTWRD coordinated with the Trinity River Restoration Program, Hoopa Tribe, and various contractors to help plan and implement several projects in the Trinity River Sub-basin.

YTWRD coordinated with the NRCS regarding management and enhancement of Phase I and II lands as well as working towards improving NRCS coordination with California Tribes.

Sarah Beesley (YTFP) met with the regional CDFW Game Warden and concerned landowners in Hunter Creek to discuss bank erosion issues occurring in the lower reach the creek. The landowners were requesting agency and tribal input regarding treatment of the affected areas.

YTFP continued coordinating with the California Department of Transportation (Caltrans) on their proposed U.S. Highway 101 Hunter/Panther creeks bridges replacement project.

YTWRD coordinated with the Humboldt County Weed Management Association, Caltrans, Del Norte County Agriculture Department, and the National Park Service regarding eradication of Knot Weed and Shiny Geranium.

YTWRD coordinated with the U.S. Bureau of Indian Affairs regarding road maintenance issues including reducing the amount of road run off and the associated impacts and disconnecting inboard ditches from stream crossings throughout Yurok territory.

Sarah Beesley (YTFP) attended a field tour in Prairie Creek as part of a large-scale restoration planning effort led by Save the Redwoods League, California Trout, California State Parks, and Redwood National Park. Tour goals included providing project background to various stakeholders and resource managers and to solicit input. Aaron Martin (YTFP Trinity River Division) is a member of the Technical Advisory Team for this project.

YTFP continued participating in the Pacific Marine and Estuarine Fish Habitat Partnership (PMEP). PMEP is one of 19 nationally recognized partnerships whose mission is to work with partners to protect, enhance, and restore ecological processes and habitats within California,

Oregon, and Washington estuaries and nearshore marine environments to sustain healthy native fish communities and support sustainable human uses that depend on healthy fish populations. Sarah Beesley (YTFP) has served on the PMEP steering committee since 2010.

YTFP continued participating in CDFW's Coho Recovery Team (CRT) which is comprised of numerous California stakeholder groups focused on species recovery. Unfortunately, CDFW notified the group that the term for this organization came to an end in 2017. At the last meeting CDFW and the CRT participants agreed it would be good to stay connected and engaged.

YTFP worked closely with staff from the BoR, Karuk Tribe, and the Mid-Klamath Watershed Council to plan and implement the Klamath River Coho Salmon Ecology Study.

YTFP continued coordinating with YTEP as part of their Lower Klamath Wetland Program.

YTFP and YTWRD participated in Phase I & II planning meetings with our NR Department Director, YTEP, Yurok Forestry, Yurok Wildlife, and Rocco Fiori (FGS).

Sarah Beesley (YTFP) attended an open house meeting in Yreka, CA. The meeting was hosted by NFWF, PacifiCorp, and BoR and focused on the 2017 combined request for proposals to enhance coho salmon habitats in the Klamath River and priority tributaries.

Sarah Beesley (YTFP-LKD) met with staff from the Yurok Wildlife Department to discuss development of a Feral Cattle Management Plan and associated studies. The Wildlife Department is currently taking the lead on this effort with close coordination with YTFP.

- **YTFP Lower Klamath Division Project Reports Completed**

Beesley, S. 2016. Lower Klamath Sub-basin Coordination & Planning – FY 2014. Final Progress Report. Yurok Tribal Fisheries Program, Klamath, California.

Beesley, S. 2016. Lower Klamath Sub-basin Coordination & Planning – FY 2015. Interim Annual Progress Report. Yurok Tribal Fisheries Program, Klamath, California.

Beesley, S. 2016. Lower Klamath Sub-basin Coordination & Planning – FY 2016. Interim Annual Progress Report. Yurok Tribal Fisheries Program, Klamath, California.

Beesley, S. and R. Fiori. 2016. Enhancement of Salmonid Rearing Habitat in McGarvey Creek - Lower Klamath River. Yurok Tribal Fisheries Program, Klamath, California.

Beesley, S. and R. Fiori. 2016. Restoration of Stream & Floodplain Habitats of Terwer Creek: Upper Arrow Mills & Gage Reach. Yurok Tribal Fisheries Program, Klamath, California.

Beesley, S. and R. Fiori. 2017. Instream & Riparian Restoration of Terwer Creek. Yurok Tribal Fisheries Program, Klamath, California.

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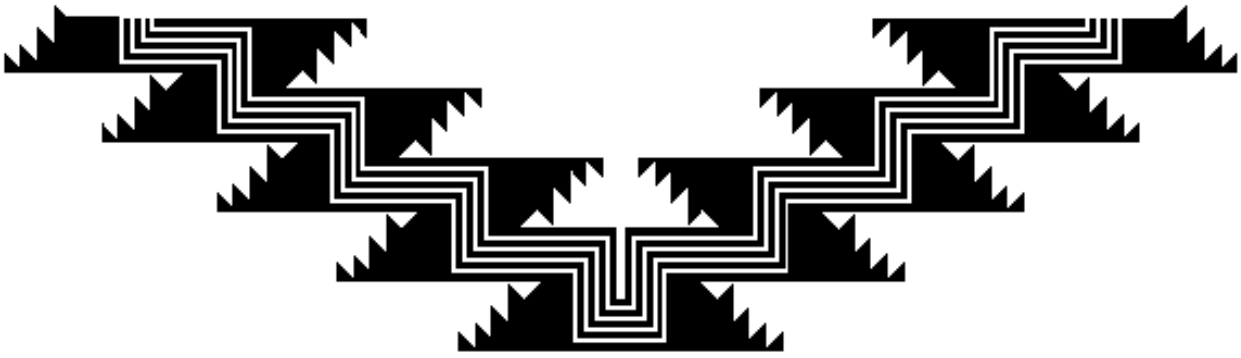
Hiner, M., S. Silloway, A. Antonetti, and S. Beesley. 2011. Lower Klamath Tributaries Riparian Restoration Projects and Yurok Tribal Native Plant Nursery. Yurok Tribal Fisheries Program, Klamath, California.

Silloway, S. 2010. Fish Surveys Related to the Proposed Del Norte Highway 101 Klamath Grade Raise Project. Yurok Tribal Fisheries Program, Klamath, California.

Silloway, S. and S. Beesley. 2011. Fish Surveys Related to the Proposed Del Norte Highway 101 Klamath Grade Raise Project: Addendum Report 2010-2011. Yurok Tribal Fisheries Program, Klamath, California.

Yurok Tribal Fisheries Program. 2012. Juvenile coho salmon use of constructed off-channel habitats in two Lower Klamath River tributaries: McGarvey Creek & Terwer Creek. Yurok Tribal Fisheries Program, Klamath, California.

Yurok Tribal Fisheries Program. 2013. Juvenile coho salmon use of constructed off-channel habitats in two Lower Klamath River tributaries: McGarvey Creek & Terwer Creek. Yurok Tribal Fisheries Program, Klamath, California.



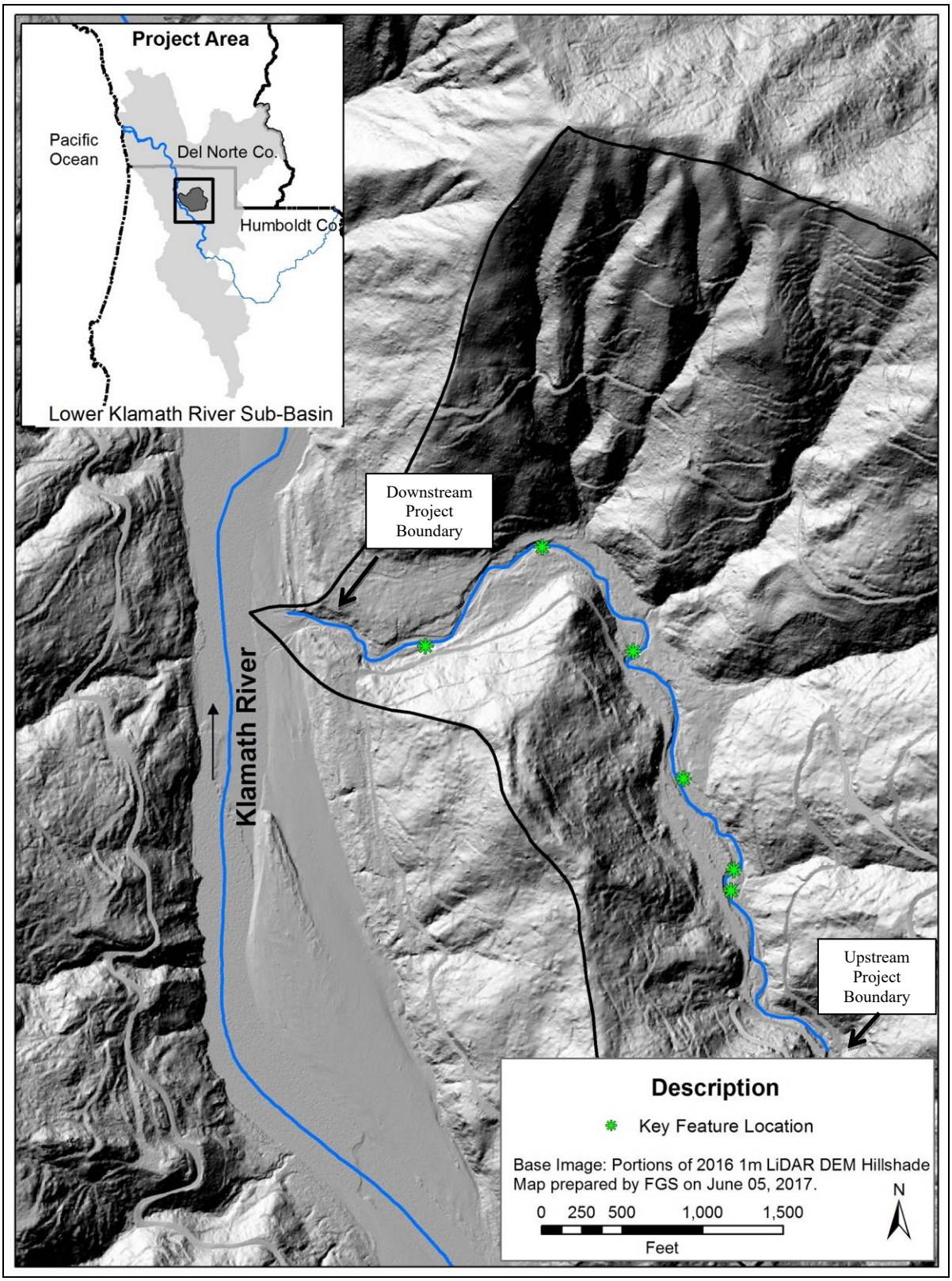


Figure 1. Map depicting proposed habitat enhancement activities in Bear Creek, Lower Klamath River Sub-basin, California (note: Key Feature refers to ~large-scale constructed wood jams).

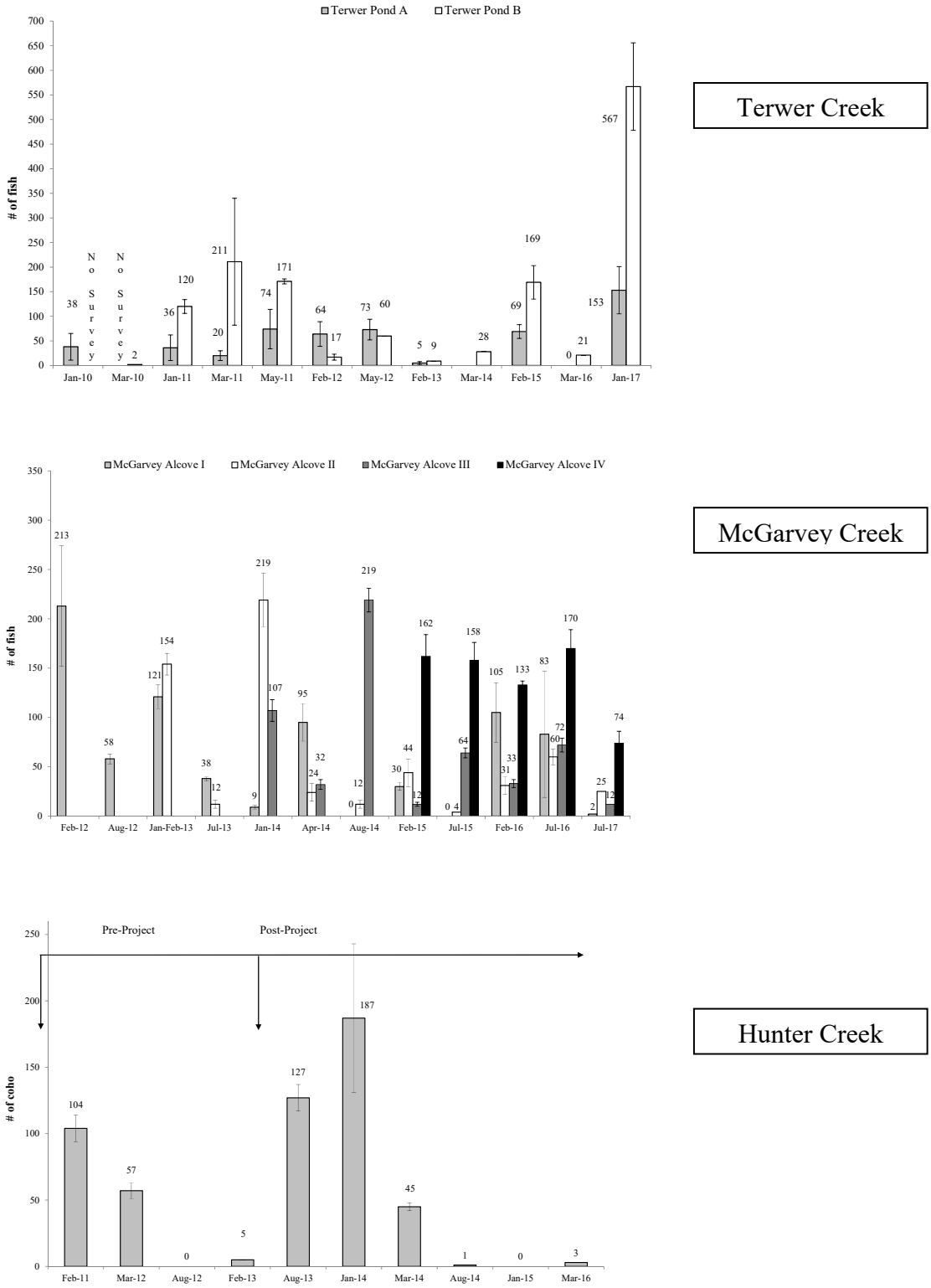


Figure 2. Mark-recapture population estimates for juvenile coho salmon in constructed off-channel habitats, Lower Klamath River Sub-basin, California.

Figure 3. Photographs of various field related tasks conducted during a Working with Beaver to Restore Ecosystem Health class hosted by the Environmental Professional Program (Top Left: learning live trapping techniques; Top Right: learning to use hydraulic post pounder; Bottom Left: building a juniper limb beaver dam analogue (BDA); Bottom Right: completed BDA).

Figure 4. Photographs taken during a Klamath River field exchange in Washington (Left: looking upstream of a dam removed on the Elwha River; Right: field exchange participants on a constructed wood jam located on the Nooksack River).

Figure 5. Photographs of various field related tasks conducted during a Beaver Dam Analogue (BDA) training hosted by the Scott River Watershed Council (SRWC) (Left: SRWC staff discussing a BDA on the Scott River; Right: BDAs constructed by the class on French Creek).

Figure 6. Photographs of a field tour of Terwer Creek habitat restoration with YTFP, Fiori GeoSciences, NOAA staff, and members of the Klamath River Renewal Corporation.

Figure 7. Photographs of wood loading activities in Terwer Creek (Top Left: Rocco Fiori (Fiori GeoSciences) discussing jam architecture; Top Right: constructing a bar apex jam (BAJ); Bottom Left: the BAJ as-built; Bottom Right: the BAJ during the first flow – post-construction).

Figure 8. Photographs of Hoppaw Creek alcove (Left: deepening the constructed alcove; Right: the alcove following enhancement efforts and wood loading) (Note: the alders are for reference).

Figure 9. Photographs of wood loading in West Fork Blue Creek (Left: enhancement sites prior to wood loading; Right: the same sites during wood loading activities – 09/28/17).

Figure 10. Photographs of road decommissioning activities in West Fork Blue Creek (09/26/17).

Figure 11. YTWRD crews operating heavy equipment on the Bucktail Restoration Project (Top) and on the Sheridan Deep Gulch Restoration Project (Bottom), Trinity River, California.

Figure 12. YTWRD crews processing gravel as part of the Trinity River Restoration Program.

Figure 13. YTWRD crews harvesting trees as part of the Trinity River Restoration Program.

Figure 14. Photographs of YTWRD road decommissioning activities in Terwer Creek (T800 Road – Left: stream crossing removed; Right: treated road segment).