Clicks Creek and Fish Creek 2011 summary report

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Department of Fish and Game

Heritage and Wild Trout Program

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Introduction

Little Kern golden trout (*Oncorhynchus mykiss whitei*) are endemic to the Little Kern River watershed and are listed as Threatened under the federal Endangered Species Act. The Little Kern River is tributary to the Kern River, approximately 65 miles to the northeast of Bakersfield, CA (Figure 1). The Little Kern River watershed encompasses a total of 137 miles of perennial stream habitat, the majority of which is located on public land administered by the U.S. Forest Service (USFS), Sequoia National Forest. In 2011, the Lion Fire burned over 20,000 acres of the Little Kern River watershed, with one area of highest fire intensity occurring in the vicinity of Lion Meadow, on the eastern side of the drainage. This area contains three key restoration and recovery populations of Little Kern golden trout which, according to recent genetic analyses, possess a high degree of genetic integrity relative to the populations inhabiting the rest of the drainage.

Concerns about short-term direct mortality from high stream temperatures and longer-term indirect mortality from increased sediment loads, reduction of suitable instream habitat, and loss of canopy shading prompted the California Department of Fish and Wildlife (CDFW) Heritage and Wild Trout Program (HWTP) to perform habitat and population surveys in the tributaries inhabited by these key populations. Surveys were to be performed in cooperation with the Sequoia and Inyo National Forests. However, due to inclement weather (rain and snow) and associated safety concerns, the surveys were canceled. Opportunistically, the HWTP conducted single-pass electrofishing in one mile of Fish Creek and an electrofish depletion survey at one location in Clicks Creek. Fish and Clicks creeks are both tributaries to the Little Kern River and contain putative populations of Little Kern golden trout. Survey goals and objectives included:

- Determine the upstream extent of fish distribution in Fish Creek
- Identify and geo-reference potential barriers to upstream fish migration in the upper portion of Fish Creek
- Gather baseline fisheries and habitat information including population-level data in Clicks Creek
- Collect genetic tissue samples of Little Kern golden trout in Clicks and Fish creeks

Methods

Single-pass electrofishing

On October 3, 2011, HWTP staff (Headquarters), assisted by volunteers, conducted a single-pass electrofishing survey in approximately one mile of habitat in the upper portion of Fish Creek (directly downstream of Loggy

Meadow; Figure 2). Physical measurements of the stream and environmental conditions were taken, including air and water temperature (ºC) and conductivity (specific and ambient; microsiemens; µS). These factors were used to determine appropriate electrofisher settings. Coordinates were recorded for both the upstream and downstream boundaries of the survey area and the upstream and downstream-most fish capture locations using a Global Positioning System hand-held unit (North American Datum 1983). Current weather conditions were noted and the area was scouted for any species of concern prior to commencing the electrofishing effort. Surveys proceeded in an upstream direction, with netters capturing fish and placing them in five-gallon buckets to be held until processed. Fish were captured opportunistically at accessible locations and in deeper pool habitats; surveyors did not attempt to collect all fish within the section. Over the course of the survey, fish were handled carefully to minimize injury and stress. Each trout was identified to species and total length (mm) and weight (g) were measured. Fish were allowed to recover before being released back into the section.

An abbreviated habitat assessment was conducted concurrent with the electrofishing survey. Surveyors recorded a written description of major habitat, substrate, and cover types. Tributaries and potential barriers to upstream fish migration were described, photographed, and geo-referenced.

Multiple-pass electrofishing

A multiple-pass depletion electrofishing survey was conducted in Clicks Creek (Section 1) on October 4, 2012 to generate population-level data including species composition, size class structure, and estimated abundance (Figure 2). These data, if collected in the same location and in the same manner, can be compared over time to study trends in the population. Personnel included HWTP staff (Headquarters) and volunteers. Section 1 was newly established in 2011 and was selected based on access (relative proximity to the road and trail networks), survey feasibility, and representative habitat.

At each section boundary, nylon mesh block nets were installed across the wetted width, effectively closing the population within the section. Both sides of the nets were secured above bankful, heavy rocks were placed side by side along the bottom of the nets, and the nets were secured to hold the top of the net out of the water. These nets were routinely monitored and inspected throughout the survey to ensure their integrity and to prevent fish from moving into or out of the section during the course of the survey.

Prior to electrofishing, physical measurements of the stream and environmental conditions were taken, including air and water temperature (in the shade) and conductivity (both specific and ambient; µS). These factors were used to determine appropriate electrofisher settings. Coordinates were recorded for both the upstream and downstream boundaries of the survey (North American datum

1983). Current weather conditions were noted and the area was scouted for any species of concern prior to commencing the survey.

Personnel needs were determined based on stream width, habitat complexity, and water visibility. For each of the surveys, individuals were assigned to shock, net, and tend live cars for the duration of the effort. Surveys were initiated at the lower block net and proceeded in an upstream direction, with netters capturing fish and placing them in live cars to be held until processed. Live cars were 32 gallon plastic trash bins perforated with holes to allow water circulation. Three passes were conducted within the section, with fish from each pass stored separately. Over the course of the survey, fish were handled carefully to minimize injury and stress. Fish were processed separately by pass number. Each fish was identified to species and total length (mm) and weight (g) were measured. Fish were then allowed to recover in live cars secured in the stream (with fresh flowing water) and released back into the section.

A habitat assessment was conducted in each section to document resource condition by collecting base-line data on habitat types and quality, water conditions, substrate, discharge, bank condition, and other attributes. The HWTP habitat assessment is a pared-down synthesis of Rosgen (1994) and the California Salmonid Stream Habitat Restoration Manual (CSSHRM; Flosi et al. 1988). Section length was measured along the thalweg. The length of the section was then divided into five cells of equal length. Wetted widths were measured at the center of each of the five cells. Across each width transect, five depths were taken (also at the center of five evenly divided cells), and both widths and depths were averaged for each section.

Stream characteristics, including active erosion (erosion occurring in the present), percent erosion at bankful and percent canopy closure over the stream area were recorded.. Section percentages were defined for each habitat type (riffle, flatwater, and pool), following Level II protocols as defined by the CSSHRM. Using visual observation, percent substrate size class within the wetted width were quantified. A rating (between poor and excellent) was given to the instream cover available to fish. Cover types were identified and defined as percentages of total instream cover. The change in water surface elevation (section gradient) and streamflow were measured. Representative photographs of the section were taken.

Fish measurements were entered into the CDFG Fisheries Information Sharing Host (FISH) database and extracted into MicroFish (MicroFish Software). Based on the capture rate (number of fish captured per pass) and probability of capture, a population estimate was determined for each species. MicroFish also calculated the average weight of each species by section. These data were used to determine biomass (pounds per acre; lb/acre) and density (fish per mile; fish/mi) of each species.

Genetic tissue acquisition

Tissue samples were collected from Clicks and Fish creeks (40 each) to determine the genetic relationships of fish throughout the watershed, to inform and contribute to Little Kern golden trout recovery efforts, and to aid in the development of a basin-wide genetics management plan. All fish were captured during the electrofish surveys and individual fish were selected for sample collection based on size and location in order to limit sampling of cohorts. Tissue samples were collected by removing a portion of the caudal fin with a clean pair of scissors, per University of California at Davis (UCD) Genomic Variation Laboratory (GVL) tissue collection protocols (Stephens, pers. comm.). Each tissue sample was placed in a labeled envelope with a unique identification number. Representative photographs were taken of the specimens collected and the samples were sent to the UCD GVL in Davis, CA for processing, analysis, and summarization.

Results

Single-pass electrofishing

The lower portion of Fish Creek, Section 111, was characterized by steep gradient bedrock-formed pools and runs with fish cover predominantly provided by dense riparian vegetation (willows, *Salix* sp.) and undercut banks (Figure 3). The upper portion of Fish Creek consisted of low-gradient meadow habitat with sand substrate; the majority of fish were captured in stagnant pools with large woody debris and mats of aquatic vegetation. Flow was minimal during the survey effort (< 1 cfs). Air temperature was 19 ºC at 1500 and water temperature was 8.9 ºC at 1300. One potential barrier to upstream fish migration was observed; however, fish were captured upstream of this location. The barrier consisted of an eight-foot near vertical bedrock sheet followed by a second smaller bedrock sheet separated by a pool with minimal water depth (Figure 3). Little Kern golden trout were the only species observed in Fish Creek and surveyors captured 40 individuals. Captured trout ranged in total length from 113 mm (4.4 in) to 312 mm (12.3 in) with a mean of 183 mm (7.2 in); weights ranged from 14.7 to 350.7 g with a mean of 81.5 g.

Multiple-pass electrofishing

Clicks Creek, in the vicinity of Section 1, consisted of low-gradient meadow habitat with excellent fish cover (Figure 4). Aquatic vegetation formed the dominant cover type (40%); undercut banks (25%), water depth (15%), and large woody debris (10%) provided additional cover opportunities. Section 1 was comprised of 75% flatwater and 25% pool habitat, with substrate dominated by sand (50%), silts/fines (20%), and organic matter (20%). Canopy closure and erosion were relatively low (<15% each). Streamflow was 0.35 cfs and mean wetted width and water depth were 6.0 ft and 0.9 ft, respectively. At 1100, the air temperature was 5 ºC and water temperature was 6.7 ºC. A cold front was moving into the area during the survey effort and the weather was overcast with dense fog. A total of 56 Little Kern golden trout were captured in 324.5 feet of

stream habitat and ranged from 26 mm (1.0 in) to 200 mm (7.9 in), with a mean total length of 114 mm (4.5 in; Table 1). Weight ranged from 0.1 g to 89.7 g with a mean of 22.0 g. Little Kern golden trout were the only species captured and abundance was estimated at 1041 fish/mi and 69.45 lb/ac (Table 2).

Discussion

Clicks and Fish creeks both contain wild populations of Little Kern golden trout and are areas of high conservation value for recovery and restoration of this subspecies. The principal reason for the decline of Little Kern golden trout is the introduction of non-native rainbow trout into this drainage and Clicks and Fish creeks are believed to contain relatively genetically pure populations, at least in the upper portions of the watershed. Surveys conducted in 2011 were limited in scope and duration due to inclement weather and provide limited data on the fishery and habitat. All captured fish appeared to be of wild origin and multiple size classes were observed, including young-of-year, in Clicks Creek.

Conclusion

The HWTP recommends implementation of a comprehensive basin-wide fisheries and habitat assessment throughout the Little Kern River drainage and tributaries to better understand current status, abundance, species distribution and genetics. This will provide up to date information that will aid in the development of recovery plans with the goal of restoring Little Kern golden trout to a level at which the subspecies can be de-listed. Sample design should include randomization of survey site selection and consideration should be given to depletion electrofishing methodology. These assessments will likely occur over a multi-year period. Throughout this process, an assessment should be conducted to measure, document, and geo-reference potential barriers to upstream fish migration, both natural and human-made, to aid in future restoration activities, identify isolated populations, and ensure that putative populations remain isolated from introgressed fish. Further, the HWTP recommends evaluation of post-fire impacts to putative populations of Little Kern golden trout and their habitats in Willow, Sheep, No Name, Lion, and Tamarack creeks. Collaboration between stakeholders including the US Fish and Wildlife Service, US Forest Service, and private landowners should occur simultaneous to the basin-wide comprehensive assessment.

In addition, the HWTP recommends evaluating the Little Kern River and tributaries for designation as a Heritage and Wild Trout Water. Wild Trout Waters are those that support self-sustaining (wild) trout populations, are aesthetically pleasing and environmentally productive, provide adequate catch rates in terms of numbers or size of trout, and are open to public angling (Bloom and Weaver 2008). Wild Trout Waters may not be stocked with catchable-sized hatchery trout. Heritage Trout Waters are a sub-set of Wild Trout Waters and highlight populations of California's native trout that are found within their historic drainages.

The UC Davis Genomics Variation Laboratory will conduct single nucleotide polymorphism and microsatellite genetics analyses of newly acquired samples. New markers for Little Kern golden trout will be developed for this process. A report, detailing the genetics analysis, will be provided to guide future monitoring, conservation, and management efforts throughout the basin and will contribute to the recovery efforts for Little Kern golden trout populations.

References

Bloom, R., and J. Weaver. 2008. The California Heritage and Wild Trout Program Handbook (Draft). State of California Resources Agency. Department of Fish and Game. Heritage and Wild Trout Program.

Flosi, G., S. Downie, J. Hopelain, M. Bird, R. Coey and B. Collins. 1998. California Salmonid Stream Habitat Restoration Manual. 3rd Edition. Vol. 1. State of California Resources Agency. Department of Fish and Game. Inland Fisheries Division.

Rosgen, D.L., 1994. A Classification of Natural Rivers. Catena Vol. 22 169-199.

Figure 1. Vicinity map of Little Kern River basin and 2011 survey location

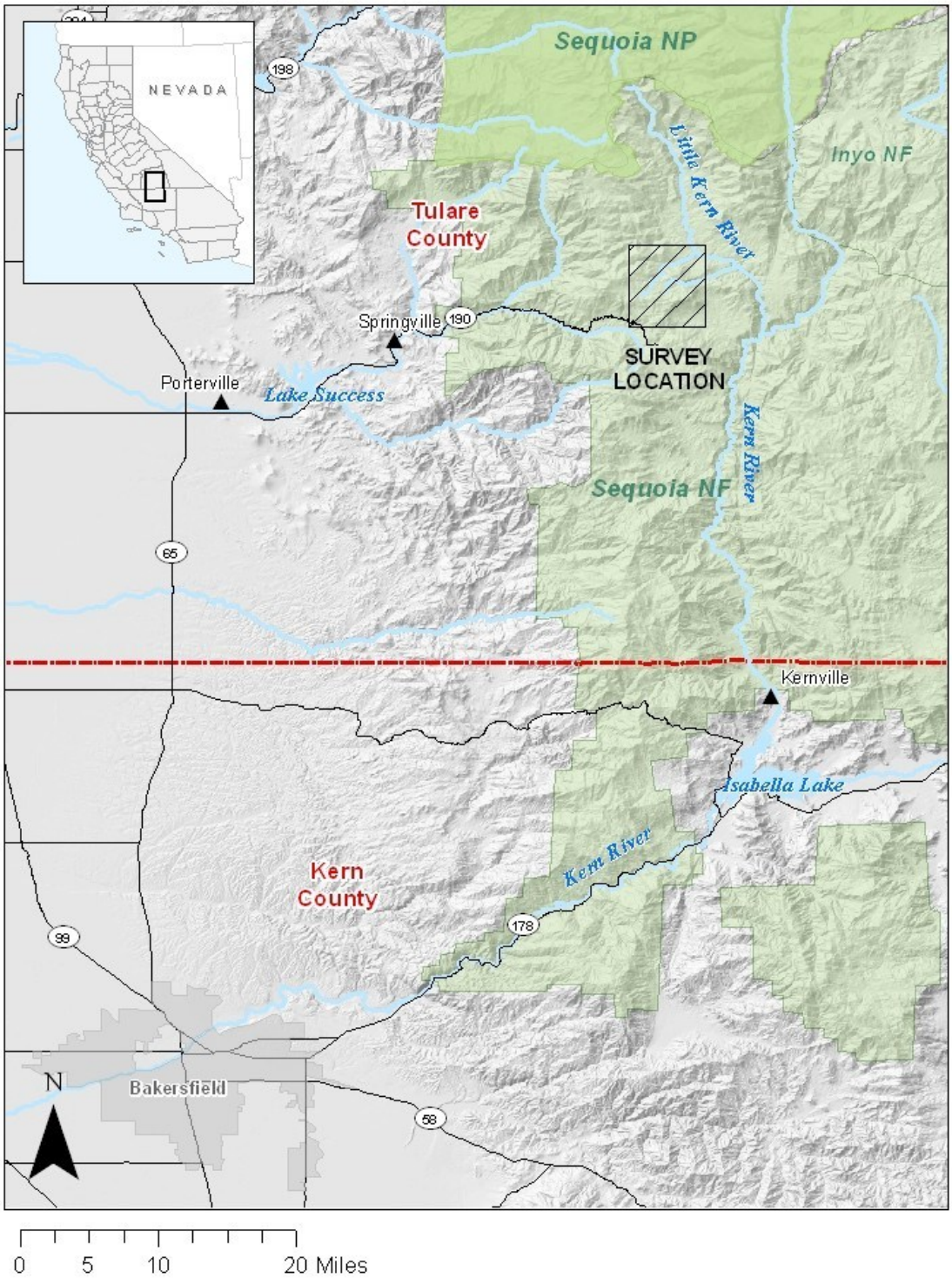

Figure 2. Detail map of 2011 Clicks and Fish creeks section locations

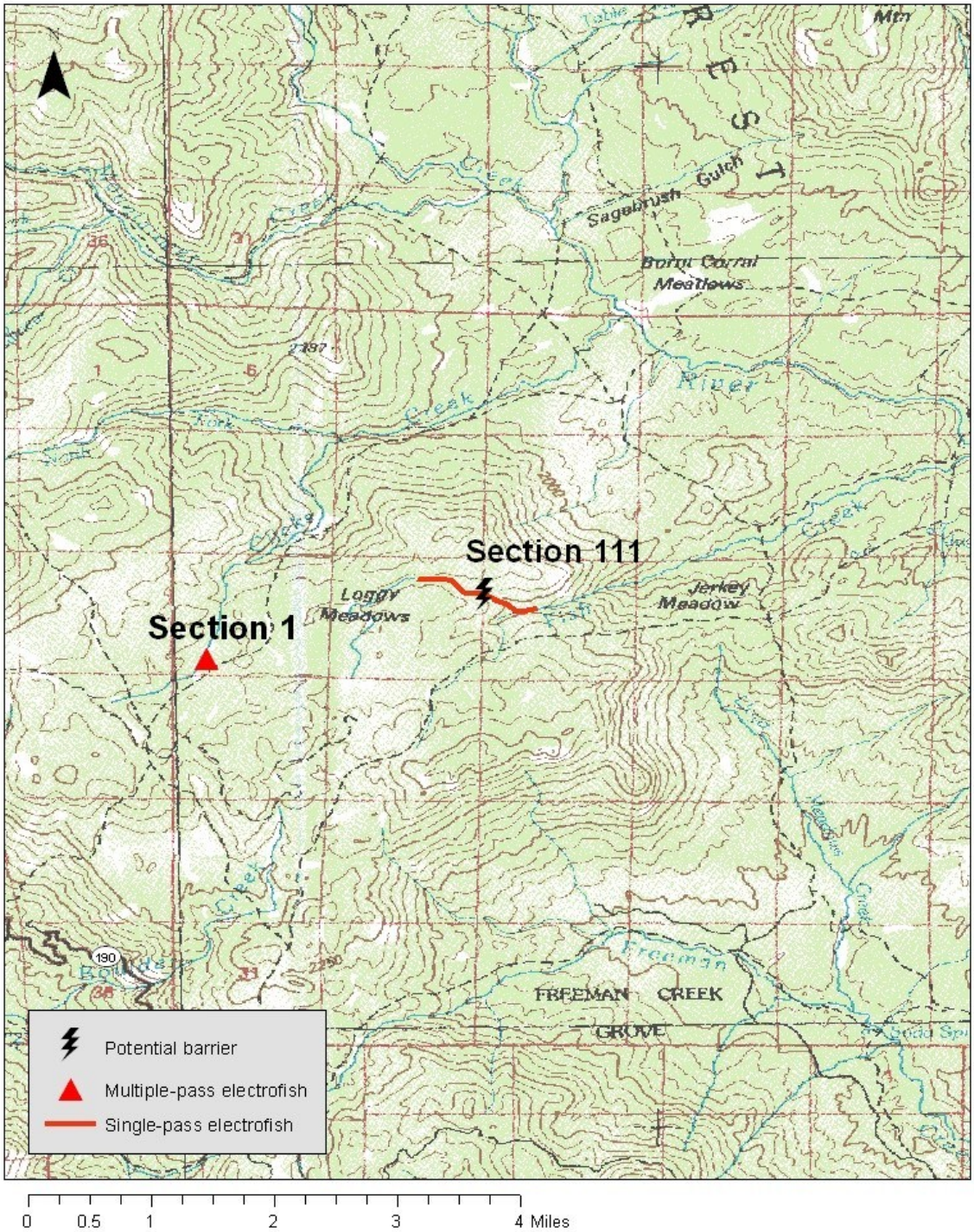

Figure 3. Representative photographs of Fish Creek 2011 survey effort including potential barrier to upstream fish migration (top), Little Kern golden trout (bottom left), and low-gradient meadow habitat (bottom right)

Figure 4. Representative photographs of Clicks Creek 2011 survey effort

Table 1. Summary of 2011 Clicks Creek multiple-pass electrofishing data: size class distribution of captured trout

Section	Little Kern golden trout						
	Total number captured	Total length min (mm)	Total length max (mm)	Total length mean (mm)	Weight min (g)	Weight max (g)	Weight mean (g)
1	56	26	200	114	0.1	89.7	22.0

Table 2. Summary of 2011 Clicks Creek multiple-pass electrofishing data: estimated abundance

Section	Little Kern golden trout						
	Section length (ft)	Total number captured	Estimated density (fish/mile)	Estimated biomass (lb/acre)	Capture probability	Confidence range (+/-)	95% Confidence interval
1	324.5	56	1041	69.45	49.1%	12	52-76