Hat Creek wild trout management plan

State of California

Natural Resources Agency

Department of Fish and Wildlife

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Northern Region

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Executive summary

California Fish and Game Code (Chapter 7.2, Section 1726.4 (b)) states that it is the intent of the Legislature that "the department [specifically, the California Department of Fish and Wildlife (CDFW) Heritage and Wild Trout Program (HWTP)], in administering its existing [heritage and] wild trout program, shall maintain an inventory of all California trout streams and lakes to determine the most suitable angling regulations for each stream or lake. The department shall determine for each stream or lake whether it should be managed as a wild trout fishery, or whether its management should involve the temporary planting of native trout species to supplement wild trout populations that is consistent with this chapter." Section 1726.4 (b) additionally states that "biological and physical inventories prepared and maintained for each stream, stream system, or lake shall include an assessment of the resource status, threats to the continued well-being of the fishery resource, the potential for fishery resource development, and recommendations, including necessary changes in the allowed take of trout, for the development of each stream or lake to its full capacity as a fishery."

Furthermore, California Fish and Game Code (Chapter 7.2, Section 1727 (d)) requires that the CDFW "shall prepare and complete management plans for all wild trout waters not more than three years following their initial designation by the commission, and to update the management plan every five years following completion of the initial management plan." For clarification, wild trout waters, as stated above, represent waters that have been formally designated by the California Fish and Game Commission as Heritage and/or Wild Trout Waters.

Wild Trout Waters are those that support self-sustaining 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. 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 wild populations of California's native trout that are found within their historic drainages (Bloom and Weaver 2008).

In an effort to comply with existing policy and mandates, the HWTP has prepared a fishery management plan (FMP) for Hat Creek. This FMP is intended largely as an operations guide for internal planning purposes and to communicate management direction to the public, other agencies, and trout angling organizations. This FMP is intended to provide direction and list actions necessary to sustain the recreational fishery for the benefit and enjoyment of the angling public. However, actions associated with this FMP are initiated independently; thus, any environmental review/permits needed to implement the actions are separate from the FMP itself.

Resource status

Area description

Hat Creek, located in eastern Shasta County, originates as a small mountain stream in northern California's Lassen Volcanic National Park (LNVP) and flows northward for approximately 45 miles (72.4 km) before entering Lake Britton, a hydroelectric impoundment on the Pit River (Figure1). The Wild Trout Area (WTA) is a 3.5 mile (5.6 km) reach of stream located upstream of the lake. The lake serves as the downstream boundary and a Pacific Gas and Electric Company (PG&E) hydroelectric plant, Hat Creek Powerhouse Number 2 (Powerhouse 2), forms the upstream boundary.

Above the WTA, inflow from two large spring systems, Rising River and Crystal Lake, make Hat Creek one of California's largest spring creeks. Flow from these sources enter Baum Lake, a small impoundment located about 0.75 mile (1.2 km) above the WTA. The PG&E Hat Creek flume carries most of the outflow from the lake to the powerhouse penstock. In addition to the flume, a Hat 2 bypass channel (the historic Hat Creek channel from Baum Lake to the upstream reach of the WTA) maintains a base flow of eight cubic feet per second (cfs), which is supplemented with approximately 32 cfs from leakage out of Baum Lake and downstream spring sources. With the dam releases and instream sources, the total bypass channel flow is approximately 40 cfs, as measured at the Joerger Diversion Dam (FERC Hat Creek No. 2661 Order 2004). The combination of large spring sources, Baum Lake's limited capacity, and historical releases through the powerhouse provide a stable (usually 550 to 650 cfs) flow regime in the WTA.

There is a short and swift-flowing riffle, directly downstream of Powerhouse 2, which flows into a 2.2 mile (3.5 km) long glide or flatwater section. The upper portion of the glide meanders through grassland with scattered oak and conifers. The channel is wider in this section, with lower velocities, than the downstream portion of the WTA. The streambed has an underlying and sometimes exposed diatomaceous layer. Most of the channel's substrate consists of silt and sand, which anchors abundant beds of aquatic plants in some locations. In the lower portion of the glide, downstream of what is known as the old Carbon Bridge site, grasslands transition into more dense stands of oaks and pines. State Highway Route 299 East (SR299E) crosses Hat Creek approximately 1.75 miles (2.8 km) downstream of Powerhouse 2, adjacent to Hat Creek Park. In this reach, there are few beds of aquatic vegetation or undercut banks, occasional deep pools, and overhanging or downed alders with limited fallen trees. All of these habitat features, while limited in this section, provide excellent trout cover.

Approximately 0.5 mile (0.8 km) downstream of the highway crossing, the glide shallows into a wide, 1.2 mile (1.9 km) long riffle with substrate consisting of embedded cobble and a thick layer of gravel overlaying diatomaceous earth. While pine and alders overhang portions of this reach, the fast-flowing open nature of the channel provides limited natural trout cover. Boulders and woody materials have been experimentally placed in parts of the riffle to provide cover. A fish barrier, constructed 0.1 mile (0.16 km) upstream of Lake Britton, has created a sediment-filled pool near the lower end of the riffle. Riffle habitat is again present below the barrier and continues to Lake Britton.

Land ownership/administration

- ☐ United States Forest Service
- ☐ Bureau of Land Management
- ☐ State Parks
- ☐ National Parks
- ☐ Fish and Wildlife
- ☒ Private (PG&E - open to public)
- ☒ Other (Shasta County Park)

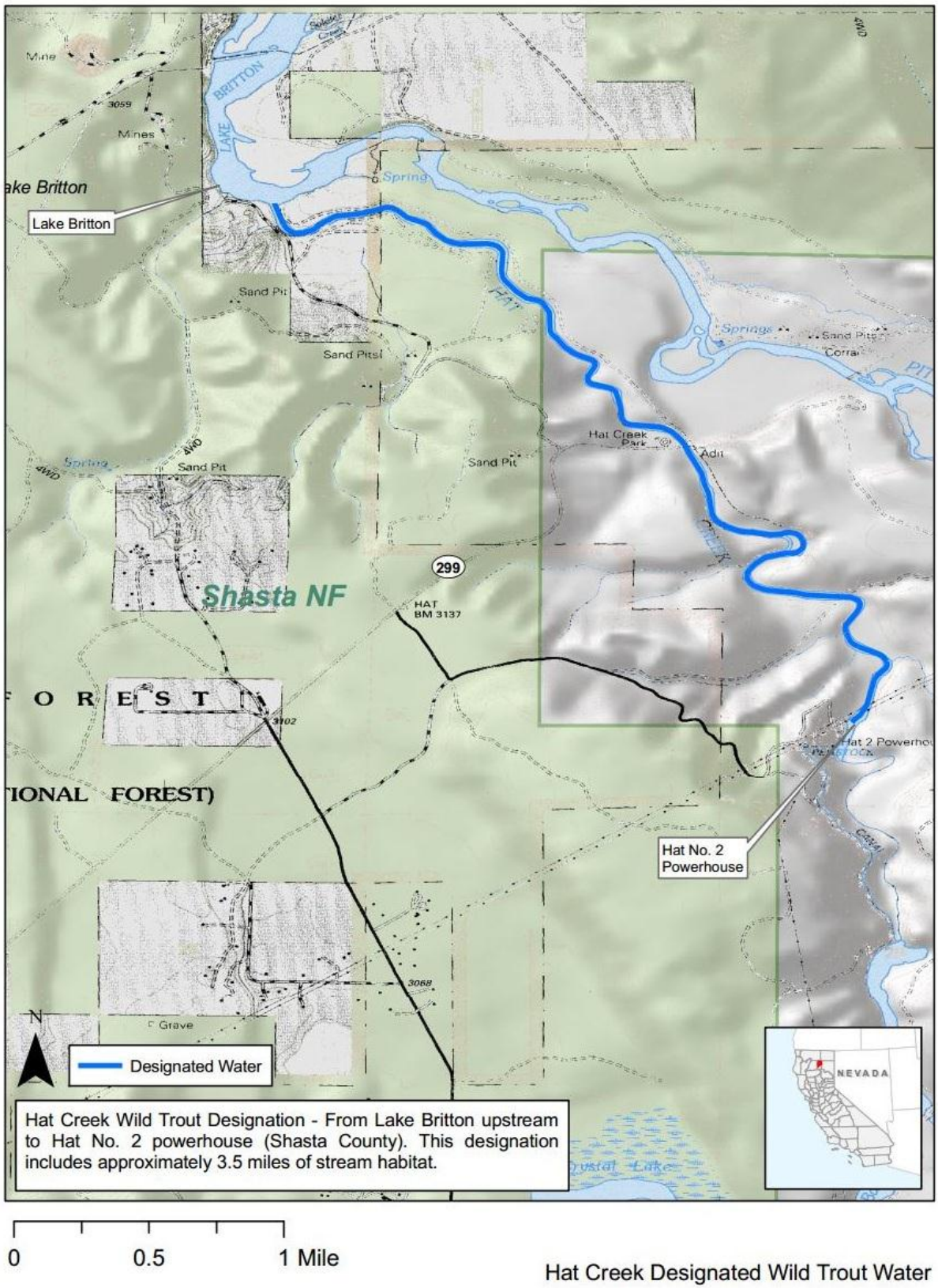
Public access

- ☒ Roadside
- ☒ Remote/hike-in
- ☐ Boat

Designations

- ☒ Wild Trout Water
- ☐ Heritage Trout Water
- ☐ Federal Wild and Scenic River
- ☐ Wilderness
- ☐ Other

Figure 1. Hat Creek Wild Trout Area map



Hat Creek Designated Wild Trout Water

Fishery description

Hat Creek is known as a premier spring creek fishery for its large, meandering channel and slow current, unique surroundings, lush rooted aquatic vegetation and large wild trout. These attributes are what made this fishery world-renowned and one of the first waters designated and managed by the Wild Trout Program.

Historically, Hat Creek reportedly sustained an excellent trout fishery but, shortly after the construction of Lake Britton in 1927, the trout fishery began to decline. The lake provided conditions suitable for the production of nongame fishes and some species of warm water game fish. As a result, these species, especially Sacramento sucker, migrated into lower Hat Creek and overpopulated the stream (Hat Creek Management Plan 1999).

In 1968, the CDFW (then California Department of Fish and Game), working with PG&E, California members of Trout Unlimited (now known as California Trout) and the Humboldt State California Cooperative Fishery Unit, implemented the Hat Creek Wild Trout Project (project). As part of the project, a chemical treatment of the lower section of Hat Creek was implemented to remove “rough fish” and a fish barrier was installed to prevent the upstream migration of fish from Lake Britton. Following this treatment, the section was restocked with wild strains of trout (rainbow, brown, and brook). In 1972, this section of Hat Creek was designated as the WTA. The project was apparently successful and fishing use increased dramatically (Weidlein, 1972).

After the project, Gerstung (1975) reported that 17 species of fish were identified in lower Hat Creek. The fish species composition of the Hat Creek WTA is best described as “above the barrier” or “below the barrier,” owing to the success of the 1968 chemical treatment and barrier’s effectiveness in preventing upstream migration of fishes. In 1973, above the barrier, fish species included one native salmonid (rainbow trout) and two introduced salmonids (brown and brook trout), one introduced warm-water game fish (brown bullhead), and six native non-game fish (Sacramento sucker, tui chub, bigeye marbled sculpin, Pit sculpin, rough sculpin, and Pit-Klamath brook lamprey). Seven species were limited to the riffle section below the barrier and present in only small numbers.

Fish surveys (boat electrofishing) conducted in 2000, 2010, and 2012 did not identify brown bullhead and this species may no longer be present in the WTA above the barrier. In addition, the 2012 electrofishing survey collected several tule perch for the first time in the WTA above the barrier. In 2012, a study focused on sampling rough sculpin (a state threatened and fully protected species), documented the species was still present and utilizing several habitat types found in the WTA (unpublished data; Spring Rivers Ecological Sciences and CDFW). Under FERC project No. 2661, PG&E conducted assessments of gravels and fish species composition in the Hat 1 and Hat 2 bypass reaches. The lower 2,650 ft. (900 m) of the Hat 2 bypass reach is accessible to fish from the WTA. Through these studies, PG&E documented rough sculpin, brook trout, hardhead and tule perch in the Hat 2 bypass.

In 2012, fish species documented in the WTA above the barrier were: rainbow trout, brown trout, brook trout, Sacramento sucker, tui chub, bigeye marbled sculpin, Pit sculpin, rough sculpin, Pit-Klamath brook lamprey, and tule perch (Table 1).

Additional information on the Hat Creek fishery can be found in Deinstadt and Berry (1999).

Water source

☒ Spring ☐ Rain ☐ Snow ☐ Tailwater

Gradient

☒ Low (< 2%) ☐ Medium (2-4%) ☐ High (>4%) ☐ N/A

Table 1. Fish species in Hat Creek WTA

Common name	Scientific name	Native (Y/N)	Listing status
rainbow trout	*Oncorhynchus mykiss*	Y	None
brown trout	*Salmo trutta*	N	None
brook trout	*Salvelinus fontinalis*	N	None
Sacramento sucker	*Catostomus occidentalis*	Y	None
tui chub	*Gila bicolor*	Y	None
bigeye marbled sculpin	*Cottus klamathensis macrops*	Y	California Species of Special Concern - Watch List
Pit sculpin	*Cottus pitensis*	Y	None
rough sculpin	*Cottus asperrimus*	Y	California Threatened Species, Fully Protected species
Pit-Klamath brook lamprey	*Lampetra lethophaga*	Y	None
tule perch	*Hysterocarpus traskii*	Y	None

Table 2. Other aquatic species in Hat Creek WTA

Common name	Scientific name	Native (Y/N)	Listing status
beetles	Order Coleoptera	Y	None
true flies	Order Diptera	Y	None
Mayflies	Order Ephemeroptera	Y	None
butterflies/moths	Order Lepidoptera	Y	None
Stoneflies	Order Plecoptera	Y	None
Caddisflies	Order Trichoptera	Y	None
Flatworms	Class Turbellaria	Y	None
Segmented worms	Class Oligochaeta	Y	None
Leaches	Class Hirudinea	Y	None
Amphipods	Order Amphipoda	Y	None
Isopods	Order Isopoda	Y	None
Arachnids	Class Arachnida	Y	None
snails	Class Gastropoda	Y	None
Clams	Class Plecypoda	Y	None
Shasta crayfish	*Pacifastacus fortis*	Y	California Endangered, Federal Endangered

Signal crayfish	*Pacifastacus leniusculus*	N	None
Pacific chorus frog	*Pseudacris regilla*	Y	None
Western pond turtle	*Actinemys marmorata*	Y	California Species of Special Concern
Muskrat	*Ondatra zibethicus*	N	None

Trout population estimates

The Hat Creek WTA has a long-standing monitoring record with population estimates, angler surveys and other fishery assessments dating back to 1968, most of which were initiated to monitor population trends and restoration effectiveness (Tables 3 and 4). The long-term dataset has documented population and habitat changes over time, including the influx of sediment and subsequent loss of aquatic macrophytes and insects. Mark-recapture population estimates (using boat electrofishers) were conducted until 1993 but, due to perceived concerns about repeated electrofish impacts to fish, the mark-recapture technique was replaced with direct observation (snorkel) surveys. Direct observation is an effective tool to generate estimates of fish abundance in small stream systems, where fish can be easily seen and numerous habitat breaks allow for “corralling” fish, increasing detection and identification to species. Due to concerns about low detection rates using snorkel surveys in Hat Creek (a large river system with areas dominated by aquatic vegetation and other habitat features that provide cover for fish and may impair visual detection), the mark-recapture method, using boat electrofishers, was reinstated in 2012 to generate historically-comparable population estimates for the WTA.

Table 3. Fish population estimates by year and survey method for the Hat Creek WTA (1968-2012)

Water	Section*	Date	Survey type	Reference data/summary report
Hat Creek	2, 3	1968	Mark-recapture	CDFW Northern Region files
Hat Creek	1, 2, 3, 4	Sep. 1969	Mark-recapture	CDFW Northern Region files
Hat Creek	1, 2, 3, 4	1970 Fall	Mark-recapture	CDFW Northern Region files
Hat Creek	1, 2, 3	Sep. 1971	Mark-recapture	CDFW Northern Region files
Hat Creek	1, 2, 3	Aug. 1972	Mark-recapture	CDFW Northern Region files
Hat Creek	1, 2, 3	Sep. 1972	Mark-recapture	CDFW Northern Region files
Hat Creek	1, 2, 3	Sep. 1973	Mark-recapture	CDFW Northern Region files
Hat Creek	1, 2, 3	Oct. 1975	Mark-recapture	CDFW Northern Region files
Hat Creek	1, 2, 3	Oct. 1976	Mark-recapture	CDFW Northern Region files
Hat Creek	1, 2, 3	Sep.-Oct. 1977	Mark-recapture	CDFW Northern Region files
Hat Creek	1, 2, 3	Sep. 1978	Mark-recapture	CDFW Northern Region files
Hat Creek	1, 2, 3	Sep. 1979	Mark-recapture	CDFW Northern Region files
Hat Creek	1, 2, 3	Sep. 1980	Mark-recapture	CDFW Northern Region files
Hat Creek	1, 2, 3	Sep. 1981	Mark-recapture	CDFW Northern Region files
Hat Creek	1, 2, 3	Sep.1982	Mark-recapture	CDFW Northern Region files

Hat Creek	1, 2, 3	1983	Mark-recapture	CDFW Northern Region files
Hat Creek	1, 2, 3	1984	Mark-recapture	CDFW Northern Region files
Hat Creek	1, 2, 3	Sep.1988	Mark-recapture	CDFW Northern Region files
Hat Creek	1, 2	1991	Mark-recapture	CDFW Northern Region files
Hat Creek	1, 2	Aug.- Sep. 1993	Mark-recapture	CDFW Northern Region files
Hat Creek	1	Aug. 1993	Direct observation	CDFW Northern Region files
Hat Creek	1	Aug. 1993	Direct observation	CDFW Northern Region files
Hat Creek	1, 2	Aug. 1995	Direct observation	CDFW Northern Region files
Hat Creek	1, 2	Aug. 1997	Direct observation	CDFW Northern Region files
Hat Creek	1, 2	Jul. 1998	Direct observation	CDFW Northern Region files
Hat Creek	1, 2	Aug. 1999	Direct observation	CDFW Northern Region files
Hat Creek	1, 2	2001	Direct observation	CDFW Northern Region files
Hat Creek	1, 2	2003	Direct observation	CDFW Northern Region files
Hat Creek	1, 2	2004	Direct observation	CDFW Northern Region files
Hat Creek	1, 2	2005	Direct observation	CDFW Northern Region files
Hat Creek	1, 2	2006	Direct observation	CDFW Northern Region files
Hat Creek	1, 2	2007	Direct observation	CDFW Northern Region files
Hat Creek	1, 2	2008	Direct observation	CDFW Northern Region files

Hat Creek	1, 2	2009	Direct observation	CDFW Northern Region files
Hat Creek	1, 2, 3, 4	2010	Direct observation	CDFW Northern Region files
Hat Creek	1, 2	2011	Direct observation	CDFW Northern Region files
Hat Creek	1, 2	2012	Direct observation	CDFW Northern Region files
Hat Creek	1, 2	2012	Mark-recapture	CDFW Northern Region files

* Section 1 = PG&E Powerhouse Riffle #2 to the old Carbon Bridge site, Section 2 = old Carbon Bridge site to State Highway Route 299E road crossing, Section 3 = State Highway Route 299E road crossing to "top of the riffle" at the downstream end of Hat Creek County Park, and Section 4 = top of riffle at the downstream end of Hat Creek County Park to the fish barrier.

Table 4. Angler survey data from Hat Creek WTA (1968-2012)

Water	Date range	Survey type	Reference data/summary report
Hat Creek	1968	Creel census	CDFW Northern Region files
Hat Creek	1969	Creel census	CDFW Northern Region files
Hat Creek	1970	Creel census	CDFW Northern Region files
Hat Creek	1973	Creel census	CDFW Northern Region files
Hat Creek	1979	Creel census	CDFW Northern Region files
Hat Creek	1983	Creel census	CDFW Northern Region files
Hat Creek	1988	Creel census	CDFW Northern Region files
Hat Creek	1993	Creel census	CDFW Northern Region files

Hat Creek	2012	Creel census	CDFW Northern Region files
Hat Creek	1990-2012	Angler survey box	CDFW Northern Region files

Angling regulations

Several important fishing regulation changes were implemented in Hat Creek to provide protection and enhance the quality of fishing. Prior to 1973, the sport fishing regulation on Hat Creek allowed take of ten trout per day with no gear restrictions. After the designation of Hat Creek as a Wild Trout Water in 1972, a two-fish limit with no gear restrictions was implemented during the 1973 fishing season in the WTA. In an effort to increase the population of ≥12-inch trout, the two-trout limit was amended to include an 18-inch minimum size limit with gear restricted to artificial lures with barbless hooks in 1979. In addition to the 18-inch size-limit change, the new regulation also included protection (zero take) of aquatic invertebrates including Plecoptera (stoneflies), Ephemeroptera (mayflies), and Trichoptera (caddisflies). As of 2013, the 1979 regulation is still in effect in the WTA, including:

Area or body of water

Hat Creek (Shasta Co.) from Lake Britton upstream to Baum Lake, exclusive of the concrete Hat No. 2 intake canal between Baum Lake and the Hat No. 2 Powerhouse.

Open season and special regulations

Last Saturday in April through November 15. Minimum size limit: 18 inches total length. Only artificial lures with barbless hooks may be used. Aquatic invertebrates of the orders Plecoptera (stoneflies), Ephemeroptera (mayflies) and Trichoptera (caddisflies) may not be taken or possessed.

Daily bag and possession limit:

Two

Existing stressors/potential threats

Sediment

The most conspicuous stressor facing the WTA is the excessive influx of sediment and subsequent impacts to the stream channel. Excessive sediment was first observed in the glide section immediately below the Powerhouse 2 riffle in 1988. By 1993, the leading edge of sediment had migrated downstream past the old Carbon Bridge site and, by 2012, the sediment was observed near the State Highway SR299E bridge crossing. While the influx of sediment appears to have decreased over time, the effects

of the initial “plug” of sediment are still evident in the WTA and will likely remain for years to come. The sedimentation has altered the upper Hat Creek WTA channel by decreasing channel depth, increasing channel width, and causing loss of rooted aquatic vegetation. This habitat degradation has impacted trout populations in the WTA by decreasing available trout habitat, reducing the forage base and likely reducing suitable spawning habitat.

Aquatic vegetation

Lower Hat Creek is known for its lush growth of aquatic vegetation and production of large trout. Abundant aquatic vegetation is likely essential to maintaining populations of wild trout by providing forage, cover and shelter. The factors which influence aquatic vegetation growth in lower Hat Creek have not been studied, but vegetation has been recognizably limited by excessive amounts of sediment and now show annual or seasonal variability in plant abundance and density (temporally and spatially).

Burrowing animals – muskrat

The Muskrat (*Ondatra zibethicus*) is a non-native species introduced in the Fall River Valley area around the 1930’s. Muskrat damage includes burrowing into stream banks for den sites and removal of aquatic/terrestrial vegetation for food. Excessing burrowing by these large microtine rodents can decrease stream bank integrity and increase stream bank erosion. In addition, bank erosion may be accelerated when stream banks are impacted by cattle, anglers, or other wildlife. Muskrat damage is evident at a restoration area downstream of the old Carbon Bridge site. There are currently no muskrat control measures in place in the Hat Creek WTA.

Cattle grazing

Cattle grazing impacts in the Hat Creek WTA are substantially reduced since grazing allotments were changed and cattle exclusion fencing installed. The detrimental impacts of historic, unregulated grazing in the WTA riparian corridor have been largely eliminated and are unlikely to become a principal stressor in the future.

Angler distribution

Powerhouse 2 continues to be a very popular area for angler access. The CDFW voluntary angler survey boxes show 76% of all reported angler effort (hours) in the WTA of Hat Creek occurred near the Powerhouse 2 area. Angler access is facilitated by a large, paved parking lot at the base of Powerhouse 2 and angler success appears higher in the riffle section than in other areas of the WTA, leading to localized impacts in this relatively short section of the designated reach. This concentrated use has raised concerns about potential detrimental effects to the fishery (assuming this area is one of the principal spawning grounds in the WTA and angler wading impacts may be negatively affecting recruitment and habitat quality). Limited or more difficult access to other areas of the WTA may be a limiting factor for dispersing angler impacts. In 2013, CalTrout, working with PG&E, UC Davis Center for Watershed Sciences, CDFW, and other entities began implementation of a multi-year California River Parkways Grant.

The project focuses on angler access and instream habitat improvements to disperse use and improve trout habitat from the Powerhouse 2 riffle to SR299E.

Fish barrier

Sections of the timber-constructed barrier, installed in 1968 as part of the restoration project, have been replaced over the years but the integrity of the structure is questionable, given its age. PG&E is responsible for its maintenance, as required by the Pit 3, 4, 5 license (FERC No. 233; 2007). This fish barrier is critical to preventing the upstream migration of non-salmonid fishes from Lake Britton and the lower portion of Hat Creek into the WTA and must be maintained in perpetuity to protect the upstream fishery.

Disease

Many rainbow and brown trout observed in recent population surveys exhibit black spot disease, caused by a parasitic nematode. There is no known cure for this fairly common condition. While black spot is unsightly, it generally does not affect an individual fish's life span or growth potential. However, heavy infection in younger fish may lead to mortality. The potential impact(s) of this disease to the Hat Creek fishery remain unknown.

Management

Management goals and objectives

- ☐ Fast action (catch rates > 2 fish/hour)
- ☒ Trophy (trout > 18 inches)
- ☐ Heritage trout
- ☐ Other

1. Restore and maintain trout populations that can provide a trophy trout fishery similar to what existed in the early 1980's. The flatwater section from the powerhouse 2 riffle to the 299 bridge crossing should contain at least:
    a) 5,000 trout ≥ 8 inches, including 2,000 trout ≥12 inches
2. Restore and maintain a fishery characterized by:
    a) average catch rates ≥0.75 trout per hour, with at least 30% of the trout caught ≥12 inches
3. Restore and maintain optimal habitat conditions. For WTA (above the barrier) management purposes, optimal is defined as:
    a) stable flow (400-750 cfs), with some fluctuations related to power

production except in flood stage conditions

b) temperate water (40-65 ºF)

c) good water clarity and low suspended sediments

d) absence of harmful pollutants and pesticides levels

e) sufficient clean gravel and cover (rooted aquatic plants) to maintain trout populations at or above levels present in the 1980's

4. Perpetuate native fishes, specifically indigenous, disease-resistant Pit River strain rainbow trout, rough sculpin and bigeye marble sculpin

5. Retain public access to the stream within the WTA

6. Identify and control any point-source disturbances that could jeopardize the fishery (such as major sources of sediment entering the WTA)

7. Preserve and enhance the natural character of the streamside environment

Fishery management elements

Monitoring recommendations include:

1. annual monitoring through angler survey box (ASB) data and

2. five-year monitoring to include Mark-recapture, angler creel, direct observation, and/or habitat monitoring

The five-year level monitoring may include a single survey/sampling method or multiple methods, depending on monitoring needs/objectives. Data from all methods (including historical data) should be used to evaluate the fishery and whether management goals and objectives are being met. Data should be compared between survey/sampling methods to determine if correlations exist that can provide some level of calibration of data sets over time.

Table 5. Hat Creek five-year monitoring plan

Water	Date range (month/year)	Survey type	Survey interval
Hat Creek	Apr.-Nov.	ASB	Annually
Hat Creek	Sep.-Oct	Mark-recapture	5-year or as needed
Hat Creek	Apr.-Nov.	Angler creel	5-year or as needed
Hat Creek	Jul.-Aug.	Direct observation	5-year or as needed
Hat Creek	Jul.- Aug.	Habitat typing	5-year or as needed

Angling regulations

The existing angling regulations for the Hat Creek WTA fishery were proposed/adopted to provide protection for trout and aquatic insect populations, while maintaining management goals/objectives. The CDFW will continue to monitor the fishery, along with angler satisfaction/preferences, to guide and direct any future regulatory changes as needed. Regulations will be used in an adaptive manner to optimize angler opportunities, while adhering to the management goals/objectives outlined in this FMP.

Addressing stressors

Sediment

Additional studies are needed to identify sediment sources and provide long-term solutions to minimize or offset the impacts associated with excessive sediment loads in the WTA. Information gathered from these studies should be used to help manage and minimize future impacts.

Aquatic vegetation

Changes in vegetation (density/abundance and species) should be evaluated through a multi-year study. The study should include an emphasis on sediment impacts to aquatic vegetation and water quality-related effects.

Burrowing animals – muskrat

Muskrat impacts may further degrade the shoreline habitat in the WTA and hinder future

restoration projects. While physical and chemical control methods are an option, design and implementation of restoration projects should include features (slope/gradient, plant species, physical structures, etc.) to deter or minimize muskrat-related impacts. A muskrat control plan, similar to what has been implemented on Fall River, is expected to be implemented as part of the CalTrout Hat Creek restoration plan. Effectiveness monitoring should be performed and adaptive management strategies implemented.

Cattle grazing

Riparian fencing should be monitored annually for structural integrity and repaired as needed. In addition, future grazing allotments should be reviewed for changes that might impact the WTA.

Angler distribution

Anglers should be encouraged to fish other areas of the WTA to alleviate high use impacts. A new system of streamside trails and access roads are expected to be constructed as part of the CalTrout Hat Creek restoration plan. The new system of trails and roads will lead anglers to fishing access points away from high use areas (Powerhouse 2 riffle and the old Carbon Bridge sites) and would provide additional access to lower use areas in the WTA.

Fish barrier

The integrity of the fish barrier should be evaluated annually by structural engineers and the CDFW will coordinate with PG&E if repair or replacement is deemed necessary.

Adaptive strategies

This FMP provides guidance and management direction for the wild trout fishery in Hat Creek. These management recommendations are based on existing conditions and should be used in accordance with updated information over time. Long-term monitoring of the fishery and associated angler information should play a central role in future management prescriptions. Any changes to the existing management goals and objectives should be based on updated quantifiable data, stakeholder input, HWTP Policy, the CDFW Strategic Plan for Trout Management (2003), and collaborative HWTP review.

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