2004-2005 ANNUAL REPORT
TRINITY RIVER TRIBUTARIES
WINTER-RUN STEELHEAD SPAWNING SURVEY REPORT
PROJECT 1d1

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ABSTRACT

This report documents results of spawning surveys conducted by the California Department of Fish and Game on randomly selected Trinity River tributaries from March through June of 2005. This is the sixth consecutive season of spawning surveys on selected tributaries and serves to create an index of in-river spawning steelhead abundance by enumerating redds. Between March and June 2005, we observed a total of 57 redds in 84.2 kilometers of surveyed habitat. Overall redd density for all tributaries surveyed was 0.676 redds/kilometer. The highest redd density occurred in East Fork of Hayfork Creek (1.91 redds/km), while zero redds were observed in East Fork South Fork Trinity River, Chanchelulla and South Fork Indian and Glen Creeks, and Bridge Gulch. During the course of the surveys, crews encountered 76 adult steelhead, 38 of which were observed in Deadwood Creek. Redd densities may be negatively biased in comparison to previous seasons due to high flows which made survey periodicity problematic.

INTRODUCTION

The current state of knowledge regarding steelhead (*Oncorhynchus mykiss*) spawning in the Trinity basin is limited. Most prior spawner surveys within the KMP ESU concentrated on salmon and were therefore terminated prior to steelhead spawning. Prior surveys have been conducted on main-stem Trinity River tributaries in 1964, 1971, 1972, and 1974 to monitor the effect of Lewiston Dam on steelhead populations. Most recently, steelhead spawning surveys were conducted in South Fork Trinity River tributaries in 1989 - 1995 under the California Department Fish and Game's Trinity River Project. This season marks the fifth year of spawning surveys conducted by the Anadromous Fisheries Monitoring Assessment Program (formerly the Steelhead Research and Monitoring Program) on selected Trinity River tributaries. Traditional basin-wide estimates of steelhead abundance provide little information on the distribution of steelhead spawning. Surveys conducted to enumerate successful steelhead spawning and habitat utilization in tributaries will help to assess this critical component of life history.

Klamath Mountains Province steelhead were recently petitioned to list under the Endangered Species Act, but the listing was found to be "not warranted" by review of the National Marine Fisheries Service on March 28, 2001. Steelhead in the Trinity basin can be split into three races based upon spatial and temporal segregation: summer, fall, and winter. Summer-run fish enter freshwater in April through September and over-summer in deep pools prior to entering smaller tributary streams during the first November rain. They continue to migrate upstream through January, and spawn in January and February. (Barnhardt, 1986). Fall-run fish, referred to as summer run-B in systems such as the Rogue, enter freshwater in September and October and spawn from January through April (Currier, personal communication). Winter-run steelhead enter the mouth of the Klamath and migrate upstream from November 1st through April 30th (Barnhardt, 1986). Winter-run steelhead spawning begins in early March and continues through May (Fukushima and Lesh, 1998). Historically, Moffitt and Smith (1950) observed, prior to the completion of Trinity Dam, that spawning of winter-run steelhead began in the upper Trinity drainage in the last part of February, peaking in late March and early April, with some scattered spawning continuing through early June. Previous spawning surveys of Trinity tributaries by the Department of Fish and Game from 2000-2002 showed that spawning in main-stem tributaries peaked in early April, approximately three weeks prior to peaks in the South Fork basin in late April and early May (Garrison, 2002).

Study Objectives

1. Quantify the number of steelhead redds in selected tributaries.

2. Assess spawning habitat conditions.

3. Verify successful spawning.

4. Create index for future comparison of redd numbers. Selected tributaries are included in future surveys for comparison and possible trend analysis.

5. Determine temporal and spatial spawning distribution of steelhead in Trinity River tributaries.

6. Verify and assess barriers to steelhead migration on surveyed tributaries.

Study Area

The area covered by these spawning surveys includes all anadromous tributaries of the Trinity basin upstream of the New River, including the South Fork of the Trinity River. A stratified random sampling design was used to select tributaries within the basin. To develop a sampling universe, all anadromous tributaries within the named basins were identified. The entire basin was then stratified into two sub-basins, the South Fork and the main-stem, each of which was sampled approximately evenly at a 10% sampling rate. Originally, nine tributaries were selected from each basin. Two tributaries had to be dropped from the main-stem basin due to high flow problems. No replacement tributaries in the main-stem were chosen due to time restraints. The following Trinity River tributaries were surveyed from their confluence to an upstream migrational barrier except where noted.

Smoky Creek was surveyed from the South Fork Trinity River confluence to a waterfall barrier 4.1 km upstream. Access is only available through private property owned by Jon Ostrat near Silver Creek. Smoky Creek's remoteness has spared it from most recent land management activities, leaving the creek in a rather pristine condition. Stream condition inventories of Smoky Creek by the US Forest Service in 1998 stated the quality and quantity of gravel in Smoky Creek was not found to be a critically limiting factor to steelhead, although high redd gravel embeddedness values could impede fry emergence. Overall, they concluded that the Smoky Creek watershed is one of the premier tributary systems of the South Fork Trinity River, with ample salmonid habitat, cool water temperatures, relatively low sediment recruitment and an ample riparian and structural cover component (Garrison, 1999).

Rattlesnake Creek was surveyed from the South Fork Trinity River confluence to a waterfall barrier 16.21 km upstream. Access is available via State Route 36. Lower Rattlesnake Creek has a steep high energy channel dominated by bedrock and boulder substrate. The lower creek is littered by large wooden restoration structures installed by the CCC in the early 1990s. Most of these structures were installed in areas of excessive gradient and have been blown out creating piles of cabled large wood debris. The middle and upper sections of Rattlesnake Creek are predominated by B channel and exhibit a healthy mix of deep pools, large wood and adequate spawning habitat. Major anadromous tributaries to Rattlesnake Creek include Post Creek, Little Rattlesnake, and North Fork Rattlesnake Creeks.

Eltapom Creek was surveyed from the South Fork Trinity River confluence to a waterfall barrier 1.26 km upstream. Access is only available by crossing the South Fork Trinity River (SFTR), off of Forest Highway 311. A raft is recommended and sometimes necessary for crossing the SFTR at higher flows, especially in March and early April. Eltapom Creek is often referred to as the gem of the South Fork Trinity River; it has excellent spawning gravel, sufficient holding pools, and a dense riparian corridor. Although very short in length, it consistently shows high redd densities and fish counts.

East Fork of Hayfork Creek (EF Hayfork) was surveyed from its confluence with Hayfork Creek to Byron Gulch approximately 6.77 km upstream. There is no permanent barrier on EF Hayfork; for the second season however, a temporary log jam barrier blocks anadromy approximately 0.2 km upstream of the confluence with the North Fork East Fork. EF Hayfork has been heavily impacted by historic mining, evidenced by large piles of mine tailings that stand above the channel. Even through much of the boulder/cobble framework needed to retain gravel has been removed, plentiful spawning gravel and suitable habitat flourishes. Major anadromous tributaries to EF Hayfork include Potatoe Creek and North Fork East Fork Hayfork Creek.

Potatoe Creek was surveyed from its confluence East Fork Hayfork Creek to a waterfall barrier 4.03 km upstream. Access is available via FH 343. Potatoe Creek is the major tributary to the East Fork Hayfork and has only two small third-order anadromous tributaries. Potatoe Creek is dominated by a high energy channel that alternates between A and B channel type. It has sufficient pools and excessive amounts of large wood, but is limited by the availability of spawning substrate. Several active gravel recruitment sites exist on upper Potatoe Creek, but these small areas of inner gorge mass wasting provide very angular substrate dominated by decomposed granite to the upper creek.

Tule Creek was surveyed from its confluence with Hayfork Creek to a long cascade barrier approximately 5.8 km. upstream. The confluence of Tule Creek is accessible by walking the fence-line from the Salt Creek confluence; the remainder of Tule Creek is accessible via FH 10. Tule Creek is one of the larger tributaries to Hayfork Creek and drains the west side of the mountains creating the Hayfork Valley. The lower reach of Tule Creek is predominantly C channel type with excellent spawning areas and plentiful gravel. The riparian corridor is dominated by thick willows with the occasional alder. The middle of the lower reach of creek contains a large seasonal beaver pond; no barriers to passage are created by the pond, but it sure complicates crew passage.

Deadwood Creek was surveyed from its confluence with the Trinity River to a waterfall barrier 3.82 km upstream. Access is available from Deadwood Road. Deadwood is the uppermost tributary to the Trinity River below Lewiston Dam. Deadwood Creek has a steep high energy channel in the lower kilometer that flattens out into a section of sinuous, complex spawning habitat with adequate large wood and a dense riparian corridor. One aesthetic problem is that Deadwood has become a dumping ground for trash, cars, and used appliances; these litter the banks of the creek in several areas, but have not yet led to any perceived or observable acute pollution problems, Trinity County is currently pursuing efforts to clean up this dump site.

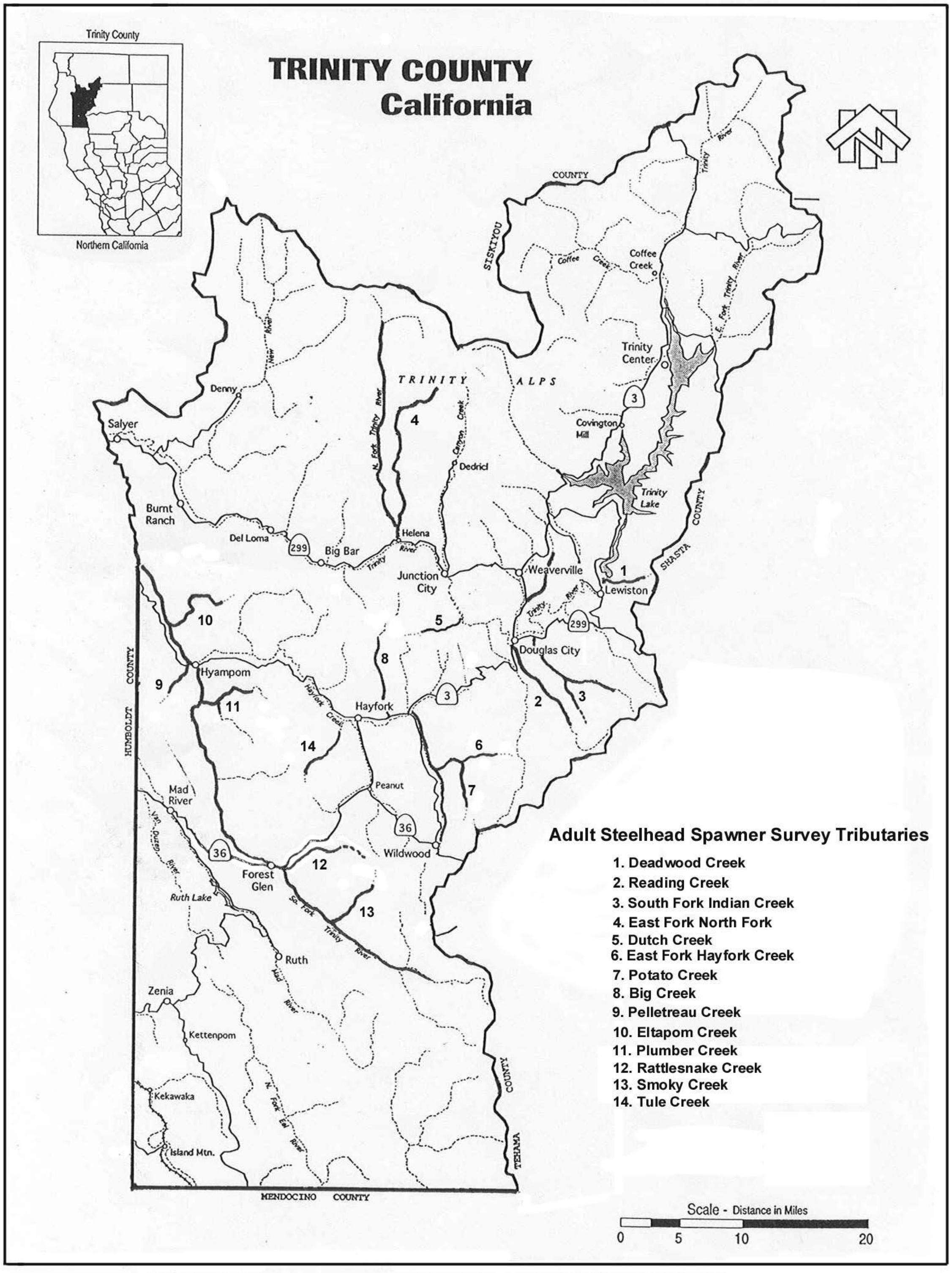

Figure 1. Map of Trinity basin with selected spawner survey tributaries.

South Fork of Indian Creek (SF Indian) was surveyed from its confluence with Indian Creek to a waterfall barrier 1.49 km upstream. Access is available via Reading Creek Rd. and by an unnamed SPI logging road. SF Indian has a bedrock dominated high energy channel, with no anadromous tributaries. Some spawning habitat is available in the lower reach, but gravel availability in the upper reach is sporadic. SF Indian has an abundance of deep pools and a thick riparian corridor.

Dutch Creek was surveyed from its confluence with the Trinity River to a culvert barrier created by a SPI logging road. Access is available via Dutch Creek Road, but it is not advisable to drive to the confluence, especially during winter flows. Access is available to the uppermost reach via an SPI logging road. In the event of heavy rains or other events which close the logging road, an historical mining ditch is used for access on the uppermost reach of Dutch Creek. Dutch Creek has a steep channel which alternates from A to B channel type. Spawning habitat is limiting in all areas except around the meadow near the access point. The mouth of Dutch Creek could prove problematic and may be negatively affecting fish numbers; although the mouth is not a barrier to fish passage, it passes through a narrow maze of willow trees, which dissipate much of its energy before it enters the main-stem Trinity River. This lack of attraction flow could be the reason few winter fish are found up Dutch Creek.

Reading Creek was surveyed from its confluence with the Trinity River to Byron Gulch approximately 20.86 km upstream. Reading Creek is the largest creek (5^{th} order) included in current spawning surveys. Due to the nature of the depositional channel, gravel availability is not considered a limiting factor to salmonid production. Lower reaches have long beds of clean, well sorted gravel. A log jam barrier was encountered just downstream of Byron Gulch, and was considered impassable by adult steelhead this season. Access is available via Reading Creek road and several SPI logging roads.

Eight new tributaries were randomly selected this season in an effort to develop a rotating panel design and eventually sample all or most of Trinity River tributaries. Four tributaries from each sub-basin (South Fork or main-stem) were selected to be revisited every four years and four tributaries from each were selected to only be visited this year. Glen Creek and Bridge Gulch from the South Fork basin and Maxwell Creek and Chanchelulla Creek from the main-stem were selected to be re-visited every four years. East Fork of the South Fork Trinity River, Packers Creek, Little Grass Valley and Brock Gulch were selected to be visited only this year. Of the tributaries to only be visited this year, all but East Fork South Fork were disqualified due to barriers to anadromy near their confluence. Packers Creek was disqualified due to a impassable fish ladder at FH16 culvert, just upstream of its confluence with Big Creek. Two surveys were conducted upstream of the barrier and no fish or redds were observed. Little Grass Valley Creek was dropped due to an impassable culvert 200 meters upstream of its confluence with Grass Valley Creek. This barrier consisted of a 7 foot perched culvert with a very shallow jump pool. Again, upstream of this barrier was surveyed once, with no fish or redds observed. Brock Gulch was dropped due to a 5.5 foot waterfall barrier just upstream of its confluence with East Fork North Fork Trinity River. This barrier was evaluated and found to be a partial barrier to steelhead anadromy, which when paired with lower flows observed in the Brock drainage, left little suitable steelhead spawning habitat. This tributary was also surveyed upstream of the barrier and no fish or redds were observed.

Glen Creek was surveyed from its confluence with the South Fork Trinity River upstream 1.7 km to the forks of its two headwater tributaries. Previously, Glen Creek had been considered non-anadromous due to a barrier caused by the aggradation of large cobble and boulders at its confluence with the South Fork Trinity. The mouth of Glen Creek was evaluated this year and found to not be a barrier to anadromy. Glen Creek is a steep (4-8% gradient) second order stream with plentiful amounts of large woody debris. Spawning substrate seems to be lacking due to the nature of the steep channel.

Bridge Gulch is a small second order stream which drains into upper Hayfork Creek, just downstream of East Fork Hayfork Creek. Low flows could possibly make fish passage problematic near the mouth and at the culvert under the Wildwood Road, but a higher flows passage was evaluated and found to not be a problem. Surveys of Bridge Gulch were conducted upstream 2.9 km to a small waterfall barrier just upstream of Natural Bridge.

Maxwell Creek is a medium sized third order stream which empties into the Trinity River at RM 86.8. The creek is most easily accessed by Dutch Creek Road and a short hike over from the Dutch Creek watershed. Maxwell Creek was surveyed from its confluence with the Trinity to a 8.25 foot waterfall barrier approximately 2.5 km upstream. The majority of Maxwell Creek consists of a steep V-shaped canyon with plentiful riparian vegetation, in-stream cover and moderate quantities of suitable spawning gravels.

Chanchelulla Creek was surveyed from its confluence with Browns Creek upstream 1.2 kilometers to a waterfall barrier. Early spring access is often problematic due to deep snow on the Deerlick Springs Rd. or over Sugarloaf Mountain. Chanchellula is a small, second order stream with gradients ranging from 2-4 percent in the anadromous portion. The creek contains plentiful large woody debris type cover and has small deep pools. Spawning gravel is sparse in most reaches due to the high energy nature of the steeper channel, with most suitably sized spawning gravel found only in the tailouts of deeper pools.

East Fork South Fork Trinity River (EFSFTR) is the largest headwater tributary of the South Fork Trinity River and drains the Yolla Bolla Mountains at high elevations near the wilderness boundary. Due to access issues, EFSFTR was only surveyed 7.5 km upstream of its confluence with the South Fork Trinity. In the surveyed section, EFSFTR is a large fourth order stream consisting of alternating sections of depositional channel and short riffle/ fast water sections. Channel gradients rarely exceed 2 %, and spawning gravels are plentiful. Early spring access is often not possible due to snow, and access to the upper reach is only feasible by hiking in the recently decommissioned 28N41 road.

METHODS

Sampling Frame/Tributary Selection

The sampling frame for this study consists of all anadromous water of the Trinity River upstream of the New River, but including the South Fork Trinity River. Tributaries of the Trinity located within the Hoopa Square are also not included. The sampling frame was developed by scouring U.S. Forest Service habitat typing files located in the Hayfork and Weaverville Forest Service Fisheries offices. Tributaries located in the Six Rivers National Forest were confirmed with the local Forest Service zone fisheries biologist (L. Morgan, personal communication). Most habitat typing data from the Forest Service is 15-30 years old; some barriers are classified as semi-permanent, i.e. log-jams, short cascade fields. We are currently verifying and expanding our sampling universe when time allows.

Tributaries were selected with a weighted stratified random sample. Each tributary was assigned a weighted sampling probability dependent upon proportion of available anadromous mileage compared to available mileage in basin strata. Weighted sampling probabilities were used in order to evenly sample the basin by complete anadromous tributary distance instead of standardized length systematically sampled reaches. Spatial distribution of steelhead spawning in the Trinity basin is highly sporadic; I wanted to minimize chance of selected non-representative reaches, and better examine the “big picture” of spawning in a selected tributary. The sampling universe was stratified into the South Fork tributaries and main-stem tributaries. Each tributary was assigned a range of numbers corresponding with its anadromous mileage, therefore the probability that any one tributary would be sampled was based on the portion of anadromous habitat to that of the total sampling frame. From each strata, nine tributaries were selected. Several tributaries from each strata were dropped due to logistical complications. The East Fork of the South Fork Trinity was selected, but could not be surveyed due to winter conditions. Brock Gulch was selected in the main-stem strata, but dropped because of inadequate flow for fish passage and spawning. The East Fork North Fork and Big French Creek have been dropped from the main-stem strata due to their extreme size and dynamic flow regime (Crews had problems navigating large water in remote environmental extremes). One additional tributary was dropped from each strata due to the refusal of private property permission; Big Creek was dropped from the South Fork strata. East Weaver Creek was dropped from the main-stem strata.

The same panel of selected tributaries is revisited every year. No new panel or revisit schedules have been implemented since the project’s inception in 1999. A revised revisit schedule with several panels is planned for implementation next year at the conclusion of the five-year pilot period.

Private Property Permission

Permission to survey across private property is obtained from all landowners prior to any surveys being conducted. Specific parcels to be surveyed across are identified using

ParcelQuest© software, which is updated biennially. All landowners are notified by mail and asked to return a postcard allowing the Department permission to survey the named tributary across their property with the condition that crews stay below the high-water mark. Additional permission is ascertained in cases where access to the tributary across a landowners property is necessary. Letters verifying permission are sent out annually in late January or early February. Sierra Pacific Industries (SPI) is the largest private landowner in Trinity County and has been most cooperative in allowing permission on all SPI lands.

Timing

All tributaries are surveyed every three to four weeks from March through May. Main-stem tributaries are surveyed first due to historically earlier spawning when compared to the South Fork basin. Survey reaches are surveyed sequentially from confluence to headwaters whenever possible. Some timing adjustment was necessary due to snow, rain events, and problems with funding for technicians. Table 1 (below) lists pass dates per reach and tributary.

Table 1. Tributary pass schedule.

Tributary	**Pass Date**			
	Pass 1	**Pass 2**	**Pass 3**	**Pass 4**
Deadwood	3/4/2005	3/25/2005	4/29/2005	
Dutch/R1	3/2/2005	4/19/2005	5/13/2005	
Dutch/R2	3/3/2005	4/19/2005	5/13/2005	
South Fork Indian	3/7/2005	4/7/2005	4/27/2005	
Reading/R1	3/8/2005	4/5/2005	5/2/2005	6/9/2005
Reading/R2	3/9/2005	4/5/2005	5/2/2005	6/9/2005
Reading/R3	3/9/2005	4/5/2005	5/2/2005	6/8/2005
Reading/R4	3/10/2005	4/6/2005	5/3/2005	6/10/2005
Reading/R5	3/10/2005	4/6/2005	5/3/2005	6/13/2005
Rattlesnake/R1	4/12/2005	5/4/2005	6/14/2005	
Rattlesnake/R2	4/12/2005	5/16/2005	6/15/2005	
Rattlesnake/R3	4/13/2005	5/16/2005	6/16/2005	
Smoky	4/15/2005	5/31/2005		
Potato/R1	3/11/2005	4/21/2005	6/7/2005	
Potato/R2	3/11/2005	4/21/2005	6/7/2005	
East Fork Hayfork/R1	3/14/2005	4/22/2005	5/25/2005	
East Fork Hayfork/R2	3/14/2005	4/22/2005	5/25/2005	
Tule/R1	3/16/2005	4/26/2005	5/24/2005	
Tule/R2	3/16/2005	4/26/2005	5/25/2005	
Eltapom	4/18/2005	5/26/2005		
Maxwell	3/9/2005	4/20/2005	5/6/2005	
Chanchelulla	3/18/2005	4/7/2005	4/29/2005	5/17/2005

Bridge Gulch	3/17/2005	4/25/2005	5/19/2005	
Glen	3/18/2005	4/27/2005	6/1/2005	
East Fork South Fork/R1	4/14/2005	6/6/2005		
East Fork South Fork/R2	4/14/2005	6/2/2005		

Redd Identification

Crews are trained in proper redd identification prior to the beginning of the season. Ultimately, an experienced crew leader is present to make all "tough calls" in terms of redd identification. In-experienced technicians often overlook redds or have trouble distinguishing steelhead redds from scour hydraulics or lamprey and resident trout redds. The following criteria (Table 2) is used to insure proper identification of steelhead redds; not all criteria must necessarily be satisfied in order for a redd to be called a redd.

Table 2. Redd identification criteria.

Criteria	Explanation
Location	Most redds are located in pool tail-outs or riffles; Briggs (1953) found that most redds occupied the transitional area between pools and riffles.
Size	Hunter (1973) found the area of average steelhead redds to be 4.4 $meter^2$, although, redds are often smaller when spawning habitat is limited or constrained by channel morphology.
Structure	Redd should consist of a pit and mound (tail-spill), with the mound downstream of the pit. Steelhead redds can be easily differentiated from lamprey redds, as lamprey redds lack a mound or tail-spill.
Substrate size	Steelhead prefer to spawn in gravel of 0.6-10.2 cm in diameter. (Smith, 1973).
Gravel sorted	The substrate of freshly constructed redds is usually well sorted, with larger gravel positioned anterior compared to smaller gravel.
% fines	Redds should not be overly embedded with fine substrate, as the mechanics of redd construction should wash away fine sediment.
Water velocity	There must be adequate velocity to insure oxygenation of eggs. Bovee (1978) found optimum velocity for steelhead spawning at 2 feet/sec.
Pit/tailspill mechanics	Redds should be properly spatially positioned, so that the pit is upstream of the tail-spill and gravel excavated from pit could form tail-spill.
Lack of algae or detritus	New constructed redds should be free of algal formation (i.e. periphyton) and detritus. Detritus often accumulates in the pit of older redds.
Presence of	Presence of an actively spawning pair of fish indicates probable

fish on redd	construction of a successful redd. Test digging can often be confused for successful completion of a redd.

The following data was recorded on all redds encountered during the course of the survey. GPS coordinates were taken using a Garmin 12XL receiver utilizing the NAD 29 datum. All redd measurements were taken using a water-proof tape measure. During measurements, extreme caution was taken to avoid disturbing redds. Redds currently under construction (fish on redd) were not measured at that time, to avoid disturbing spawning. These redds were measured on the subsequent pass. All encountered redds are flagged with date, redd number, position, and recorders intials, to prevent double counting, and to allow future evaluation.

Table 3. Data recorded on each redd.

Data Field	**Description**
Redd I.D.#	3 digit code with the first digit being the reach no. and the second two being the consecutive redd no. for that reach e.g. R101=reach 1, redd no.1
GPS coordinates	Lat/Long waypoint of redd location
Pit length	Pit length measured parallel to the flow
Pit width	Pit width measured perpendicular to the flow
Depth 1	Depth from substrate to bottom of the pit
Depth 2	Depth from water surface to bottom of the pit
Pit substrate	Dominant substrate in the pit
Tail spill length	Tail spill length measured parallel to the flow
Tail spill width 1	Tail spill width perpendicular to the flow at 1/3 of the distance down from the upstream end
Tail spill width 2	Tail spill width perpendicular to the flow at 2/3 of the distance down from the upstream end
Tail spill substrate	Dominant substrate in the tail spill
Habitat type	Habitat type where redd is located
Redd type	Condition of redd: 1=well defined recently completed 2=well defined but not new 3=not well defined 4=older and difficult to identify, may be questionable
Comments	Redd location description and information on redd condition

RESULTS

Spawning surveys of selected Trinity River tributaries conducted March through June, 2005 documented 57 redds and 76 adult steelhead. The East fork of Hayfork creek had the highest density of redds at 1.912 redds per kilometer, while in five tributaries no redds were found. Half of all the adult steelhead recorded were observed in Deadwood creek, the majority of which were presumably of hatchery origin (only two wild fish were observed of 38 total), as Deadwood creek is only less than a mile downstream of Trinity River hatchery. No hatchery fish were observed anywhere except Deadwood. Overall, crews could properly identify fish to be of hatchery or wild origin 59% of the time.

Table 4. Trinity River winter-run steelhead spawning survey summary results, March-June 2005.

Tributary	Mileage (km)	Redds	Redds/km	Adult Steelhead
Smoky	4.1	3	0.732	0
Rattlesnake	16.2	2	0.123	1
East Fork Hayfork	6.8	13	1.912	10
South Fork Indian	1.5	0	0	1
Potato	4	1	0.250	0
Reading	20.9	18	0.861	26
Dutch	3.7	3	0.811	0
Eltapom	1.3	2	1.538	0
Deadwood	3.8	5	1.316	38
Tule	5.8	8	1.379	0
Maxwell	2.5	2	0.800	0
Bridge Gulch	2.9	0	0	0
Chanchelulla	1.5	0	0	0
Glen	1.7	0	0	0
E.F.S.F. Trinity	7.5	0	0	0
Total	84.2	57	0.677	76

Table 5. Redd area measurements by tributary.

Tributary	N=	Mean Pit Area (ft^2)	Mean Tailspill Area (ft^2)	Mean Total Redd Area (ft^2)	Minimum Total Redd Area (ft^2)	Maximum Total Redd Area (ft^2)
Smoky	3	8.19	21.53	29.72	15.41	37.15
Rattlesnake	2	6.70	14.18	20.89	13.89	27.88
East Fork Hayfork	11	9.35	13.25	22.61	9.74	28.46

Potato	1	4.51	6.69	11.20	11.20	11.20
Reading	17	5.44	13.29	18.73	9.87	29.82
Dutch	3	4.95	19.54	24.49	19.50	31.75
Eltapom	2	12.72	29.29	42.01	17.78	66.24
Deadwood	4	5.02	7.90	12.91	2.67	21.97
Tule	8	8.67	16.43	25.10	10.25	33.70
Maxwell	2	9.18	10.99	20.16	18.94	21.39
Overall	53	7.21	16.42	23.63	2.67	66.24

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