Cachuma Project Biology Staff

MIGRATION-REDD DATA SUMMARY, Lower Santa Ynez River

To: David Boughton, TRT chairman, National Marine Fisheries Service

From: Timothy H. Robinson, Scott B. Engblom, and Scott J. Volan, Cachuma Project Biology Staff

Date: June 13, 2007

Re: Requested Migration-Redd Data for NMFS Recovery Planning

The following is a data summary of the requested information by the National Marine Fisheries Service (NMFS) on migration and observed redds from the Cachuma Project's monitoring efforts of the Lower Santa Ynez River since the beginning of the project (1994-2007). The monitoring effort of the fisheries resources within the Lower Santa Ynez River is a product of multiple guidance documents, specifically the Biological Assessment (USBR, 2000a) and its revision of Section 3 (USBR, 2000b), the Cachuma Project Biological Opinion (NMFS, 2000), the Lower Santa Ynez Fish Management Plan (FMP) (SYRTAC, 2000), and the EIR/EIS of the FMP (COMB and USBR, 2004). The data summary is intended to assist in the southern steelhead recovery planning efforts ongoing by NMFS. If further information or clarification is needed, please direct all questions to the Cachuma Project Biology Staff (CPBS) at 805-687-4011.

Migration

Migrant trapping was conducted in various locations in the Lower Santa Ynez River basin from 1994 to 2007 (Table 1), with the primary effort focused on Salsipuedes and Hilton creeks. Traps were temporarily deployed in other tributary locations but for short durations (Table 2). Both upstream and downstream traps (paired 4x6x4 foot box fyke traps) were typically deployed simultaneously with the traps arranged side-by-side. Normally, migrant traps were in place from January through May (the migration period for steelhead in this area), depending on rainfall events and subsequent increases in stream/river discharge. The ability to continuously deploy the traps was affected by high flow events, debris loading, and beaver activity.

Prior to 2000, migration traps were checked for fish and cleaned of debris once or twice a day. Beginning in 2000, as required by the NMFS, all migrant traps were checked every 4 to 6 hours during the migration period to minimize the duration that any captured steelhead/rainbow trout were held in the trap. Trapped fish were measured to the nearest millimeter (fork length), photographed, scale and tissue samples taken (when possible), and released.

Table 1: Migration data for steelhead/rainbow trout collected in upstream and downstream migrant traps at Salsipuedes Creek, Hilton Creek, and the mainstem of the Lower Santa Ynez River from 1994-2007. Type of year is included to give an indication of the amount of precipitation received during that water year: Normal (Nor) 15-22 inches, Dry < 15 inches, and Wet > 22 inches at Bradbury Dam (USBR, 2007).

	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007
Type of year:	Nor	Wet	Dry	Nor	Wet	Nor	Nor	Wet	Dry	Nor	Dry	Wet	Wet	Dry
Salsipuedes adult salmonids (100mm +), not including anadramous adults or smolts	0	4	4	41	18	43	2	47	16	37	25	0	23	21
Total anadramous adults captured (525mm +)*	0	0	0	2	2	3	0	4	0	1	0	4	3	0
Salsipuedes smolts	0	2	2	7	14	3	9	129	4	82	24	55	154	2
Salsipudes juveniles (<100mm)	0	0	9	1	0	0	0	0	0	15	9	0	57	1
Hilton adult salmonids (100mm +), not including anadramous adults or smolts	nd	68	3	11	5	0	0	47	67	43	97	41	128	291
Total anadramous adults captured (525mm +)	nd	0	0	0	0	0	0	0	0	0	0	0	0	0
Hilton smolts	nd	0	0	0	0	0	0	1	20	3	31	7	45	138
Hilton juveniles (<100mm)	nd	0	0	0	0	0	0	2	7	18	23	1	188	212
Mainstem adult salmonids (100mm +), not including anadramous adults or smolts**	0	nd	1	1	nd	nd	nd	nd	nd	nd	nd	nd	1	nd
Total anadramous adults captured (525mm +)	0	nd	0	0	nd	nd	nd	nd	nd	nd	nd	nd	0	nd
Mainstem smolts	0	nd	0	0	nd	nd	nd	nd	nd	nd	nd	nd	14	nd
Mainstem juveniles (<100mm)	0	nd	0	0	nd	nd	nd	nd	nd	nd	nd	nd	0	nd
Total number of migrant captures (upstream + downstream) in the Lower Santa Ynez River	0	74	19	63	39	49	11	230	114	199	209	108	613	665

* - Many more adults (300mm-525mm) could have beeen anadramous, but have not been confirmed.

** - The mainstem trap was deployed in various locations within the Alisal and Refugio reaches over the years.

nd - No data as traps were not deployed that year.

Table 2: Migration data in tributaries of the Lower Santa Ynez River during short deployment durations from 1994-1999**.**

Year	Location	Trapping Dates (days deployed)	Number of Captures	Type of Captures
1995	**Alisal Creek**	1/18-2/7	2	Adult salmonids (100mm +), not including anadramous adults or smolts
1995	**Nojoqui Creek**	2/25-4/24, 3/29-4/24	0	-
1997	**Alamo Pintado Creek**	2/1-4/5	0	-
1997	**Nojoqui Creek**	1/27-3/9	0	-
1997	**San Miguelito Creek**	2/22-5/27	1	Adult salmonids (100mm +), not including anadramous adults or smolts
1998	**Nojoqui Creek**	3/30-6/1	3	Adult salmonids (100mm +), not including anadramous adults or smolts
1998	**San Miguelito Creek**	4/6-6/1	0	-
1999	**San Miguelito Creek**	1/1-6/28	1	Adult salmonids (100mm +), not including anadramous adults or smolts

Operation of the Hilton Creek Watering System (HCWS) began in 2000 and provided consistent flows throughout the lower reach of the creek year-round. The water delivered to the creek from Lake Cachuma was within the range of suitable temperatures and dissolved oxygen concentrations for over-summering steelhead/rainbow trout in the creek.

During 1998 and 2000, migrant trapping did not begin until late March because of the timing associated with NMFS and US Fish and Wildlife Service (USFWS) endangered species permits. Over the period from 1997 through 2004 trapping efficiency (number of hours the traps were

deployed over the migration season) within Hilton Creek and Salsipuedes Creek averaged 92.5% with a range from 69.7% (1998) to 100% (2000 and 2002). Although these trapping efficiencies are high, efforts are continuing to improve migrant trap design and deployment, particularly during higher flows.

Although Salsipuedes Creek and Hilton Creek drainages are within the same watershed, they often function as unique systems with different meteorological conditions, dry season flow regimes, fish populations, number of adult anadromous fish observed, and migration patterns. With the continuous flows from the HCWS, Hilton Creek has seen a steady increase in the number of migrant captures over the period. Salsipuedes is dependent on natural rainfall and continues to have high variability from year to year, specifically due to fluctuations in the amount of precipitation and associated runoff from year to year (i.e., 2001-wet/2002-dry, 2003-wet/2004-dry, and 2005+6-wet/2007-dry). The variability in steelhead/rainbow trout abundance between the two tributaries as observed by CPBS over time can be explained by observational data to (1) timing and magnitude of runoff events, (2) breaching of the sandbar at the mouth of the Santa Ynez River to provide full connectivity with the ocean, (3) the relative proximity to the ocean, (4) year-round flows provided by the HCWS that provide excellent over-summering conditions, and (5) a greater amount of upper basin habitat in the Salsipuedes drainage.

Specific results suggest that (Tables 1 and 2):

- As suggested in the guidance documents for the Lower Santa Ynez River FMP and observed by the CPBS, habitat use and production of steelhead/rainbow trout within the tributaries are important parts of the population dynamics of steelhead/rainbow trout within the Lower Santa Ynez River watershed.
- The HCWS has increased steelhead/rainbow trout production and habitat within Hilton Creek.
- Within Hilton Creek, no steelhead/rainbow trout greater than 525 mm were observed, while in Salsipuedes Creek large migrants ranged in length from 525 to 690 mm, although low in numbers. These large adult migrant captures were thought to be anadromous due to their size, scale analyses (sampled upon capture and analyzed by CPBS to verify rapid growth rate associated with ocean residency), morphological characteristics (size, color), and seasonal timing of capture in relation to stormflow events and connectivity to the ocean.
- The capture of juvenile steelhead/rainbow trout, including fish characterized as smolts, in traps on both Hilton and Salsipuedes creeks confirm successful reproduction within the tributaries. Hilton Creek and Salsipuedes Creek appear to be suitable spawning and incubation habitats because of observed productivity even during dry years. Successful years for reproduction in one creek, however, may not be successful in the other (i.e., productivity in 2007 was good in Hilton Creek but weak in Salsipuedes Creek due to the lack of runoff).
- Limited exploratory migrant trapping (Table 2) was conducted on the mainstem of the river and in a number of tributaries as part of the early phases of the monitoring program. Migrant trapping at these locations, including the mainstem of the river, Nojoqui, Alisal, San Miguelito, and Alamo Pintado creeks, was discontinued for a variety of reasons,

including few steelhead/rainbow trout captured or observed, restrictions on access, high flows, high sediment and debris loading, and staffing limitations. No conclusions should be drawn from these data, other than to confirm the presence of steelhead in some years in several tributaries.

Redd Surveys

Redd surveys were conducted to document evidence of, timing in relation to the spawning season, and geographic location of spawning within the lower basin. The surveys assist in subsequent monitoring activities such as snorkel surveys and integrated data analyses to track spawning activity and success. Redd surveys in the Lower Santa Ynez River basin were conducted from 1996 through 2007 at various times from November through May, depending on stream flow, water clarity, access permission, and level of sampling effort (Table 3). Also, migrant trapping during the winter and spring took priority over all other fieldwork. As a result, the redd surveys were conducted opportunistically and should be considered non-standardized. Steelhead/rainbow trout occasionally will "test" a site for suitable spawning. Test sites can be difficult to distinguish from actual redds. Actual redd sites were identified by the characteristics of the site (i.e., a well defined pit, mounded gravel immediately downstream of pit, and redd dimensions) and through professional judgment. Given the inherent difficulties and uncertainties associated with redd surveys, results of the surveys are considered to be an indicator of salmonid spawning activity with respect to timing and geographic location. Hence, a systematic approach for redd surveying was not possible and should not be inferred with the data presented. Data recorded during a redd survey included: date, stream reach, redd location, redd length, redd width, water depth, current velocity, substrate size and composition, associated cover and habitat conditions, fish observations, water quality, and photographs of the site.

Redd surveys were conducted in the same places every year although at different levels of effort. They were conducted along the entire stretch of the Refugio and Alisal reaches, a quarter mile stretch of Hilton Creek, 3.0 miles of Lower and Upper Salsipuedes Creek, half mile of Upper Salsipuedes Creek, half mile of El Jaro Creek, approximately 2.5 miles of San Miguelito Creek, approximately 2 miles of Nojoqui Creek, and approximately 300 yards of Quiota Creek.

Although qualitative in nature, the redd surveys provided valuable information on the occurrence and distribution of potential steelhead/rainbow trout spawning within the Lower Santa Ynez River basin. Results of these redd surveys suggested that (Table 3):

- Spawning activities are occurring in a variety of locations including the mainstem of the river and a number of tributaries.
- Documented redd sites are consistent with the observation of young-of-the-year (YOY) steelhead/rainbow trout at those sites that were observed during snorkel surveys later in the year, confirming successful reproduction within the lower basin.
- Although San Miguelito Creek has an impassable migration barrier to the ocean that prohibits any access by adult steelhead, the data were included because this is the first perennial tributary anadromous steelhead encounter coming from the ocean, NMFS includes this creek in its Technical Recovery Team (TRT) reports, and CPBS have observed reproducing population of steelhead/rainbow trout present. In 1973, a large

debris basin and concrete channel were constructed through the City of Lompoc to the confluence with the Santa Ynez River that ended migration connectivity to the sea. There are several other impediments above the city that limit upstream migration.

- The majority of redds observed appeared to be from resident trout inhabiting the basin (based on redd dimensions), particularly in dry and normal years. The March through May spawning time frame, when compared with high flow events generated in late winter and early spring, suggests that these flow events were a primary environmental condition associated with spawning activities. By creating a migration corridor to allow adult steelhead to migrate from the ocean and by removing the abundant amounts of rooted aquatic vegetation that covers the prime spawning habitat, these flow events triggered migration and spawning cues that led to the observed redd construction.
- Based on 13 years of observation, CPBS and project consultants hypothesize that under drought conditions with little variance in flow rate, resident rainbow trout within the basin may vary the time that they spawn. This could be a beneficial life-history strategy even for a resident trout population. Late-season storm events in a flashy system, coupled with a mobile streambed, can inundate and destroy redd sites. Populations of trout that spawn at different time intervals can help assure some YOY survival in this highly variable and flashy system.

Table 3: Redd data from 1996-2007. NS (Not Surveyed) refers to areas that were not surveyed at all due to access issues, staffing constraints, or little to no water available for spawning.

YEAR	BEGIN DATE	END DATE	Days Surveyed	Number of REDDS
		Hilton Creek		
1996	NS	NS	NS	NS
1997	1/29	5/9	4	0
1998	12/19	3/17	6	0
1999	2/17	4/23	3	1
2000	2/28	2/28	1	0
2001	2/16	5/3	4	3
2002	2/8	3/11	3	0
2003	1/27	4/11	8	9
2004	11/12	3/24	8	15
2005	3/1	4/8	3	5
2006	2/27	5/1	2	10
2007	1/17	3/13	2	3
		Lower Salsipuedes Creek		
1996	4/3	4/25	2	7
1997	1/9	5/7	7	14
1998	1/15	2/17	2	0
1999	2/12	5/28	10	49
2000	1/6	5/11	12	5
2001	1/15	5/8	7	0
2002	NS	NS	NS	NS
2003	4/23	4/23	1	7
2004	1/16	3/26	4	0
2005	NS	NS	NS	NS
2006	NS	NS	NS	NS
2007	NS	NS	NS	NS
		Upper Salsipuedes Creek		
1996	4/5	4/8	2	0
1997	1/9	3/27	6	11
1998	1/22	5/21	3	3
1999	2/12	5/12	6	16
2000	1/7	5/22	9	14
2001	1/17	5/8	7	12
2002		Denied Access		
2003		Denied Access		
2004		Denied Access		
2005		Denied Access		
2006		Denied Access		
2007		Denied Access		

YEAR	BEGIN DATE	END DATE	Days Surveyed	Number of REDDS
		El Jaro Creek		
1996	4/5	4/25	4	6
1997	2/11	5/7	7	18
1998	1/2	1/22	2	0
1999	2/15	5/28	4	0
2000	1/7	5/12	7	0
2001	1/22	2/5	2	0
2002	NS	NS	NS	NS
2003	3/27	5/1	2	3
2004	1/16	3/26	4	0
2005	NS	NS	NS	NS
2006	NS	NS	NS	NS
2007	NS	NS	NS	NS
		Los Amoles Creek (Tributary to El Jaro Creek)		
1996		Denied Access		
1997		Denied Access		
1998		Denied Access		
1999		Denied Access		
2000		Denied Access		
2001		Denied Access		
2002	4/8	4/9	2	4
2003	NS	NS	NS	NS
2004	3/2	3/2	1	1
2005	NS	NS	NS	NS
2006	3/15	3/15	1	4
2007	NS	NS	NS	NS
		Nojoqui Creek		
1996	NS	NS	NS	NS
1997	NS	NS	NS	NS
1998	1/27	5/21	5	0
1999	2/10	4/21	5	0
2000	3/11	3/12	2	0
2001	2/28	2/28	1	0
2002	NS	NS	NS	NS
2003	NS	NS	NS	NS
2004	1/27	1/27	1	0
2005	NS	NS	NS	NS
2006	NS	NS	NS	NS
2007	NS	NS	NS	NS

YEAR	BEGIN DATE	END DATE	Days Surveyed	Number of REDDS
		Quiota Creek		
1996	NS	NS	NS	NS
1997	NS	NS	NS	NS
1998	NS	NS	NS	NS
1999	NS	NS	NS	NS
2000	1/27	5/9	5	1
2001	1/24	1/24	1	0
2002	2/15	3/12	3	3
2003	3/26	4/17	2	0
2004	1/27	3/25	3	0
2005	NS	NS	NS	NS
2006	NS	NS	NS	NS
2007	1/17	1/17	1	0
		San Miguelito Creek		
1996	NS	NS	NS	NS
1997	3/20	5/8	5	49
1998	1/15	5/20	6	1
1999	2/7	5/13	9	35
2000	1/13	2/1	3	0
2001	NS	NS	NS	NS
2002	NS	NS	NS	NS
2003	NS	NS	NS	NS
2004	NS	NS	NS	NS
2005	NS	NS	NS	NS
2006	NS	NS	NS	NS
2007	NS	NS	NS	NS
		154 Reach (mainstem Santa Ynez River)		
1996	NS	NS	NS	NS
1997	1/29	5/16	5	0
1998	4/27	4/27	1	0
1999	2/10	5/7	6	5
2000	1/12	5/16	8	0
2001	1/30	4/5	2	0
2002	2/15	4/5	3	2
2003	NS	NS	NS	NS
2004	1/16	2/17	3	0
2005	NS	NS	NS	NS
2006	NS	NS	NS	NS
2007	NS	NS	NS	NS

YEAR	BEGIN DATE	END DATE	Days Surveyed	Number of REDDS
Refugio Reach (mainstem Santa Ynez River)				
1996	NS	NS	NS	NS
1997	2/3	5/16	7	0
1998	1/27	1/27	1	0
1999	2/5	5/6	5	1
2000	3/22	1/5	3	0
2001	1/24	1/24	1	0
2002	NS	NS	NS	NS
2003	4/17	4/17	1	0
2004	1/26	3/31	4	0
2005	NS	NS	NS	NS
2006	NS	NS	NS	NS
2007	NS	NS	NS	NS
Alisal Reach (mainstem Santa Ynez River)				
1996	NS	NS	NS	NS
1997	2/3	5/9	5	0
1998	1/26	1/26	1	0
1999	2/21	5/5	3	0
2000	3/21	5/23	4	0
2001	3/1	4/4	2	0
2002	NS	NS	NS	NS
2003	4/17	4/17	1	0
2004	1/26	3/29	3	0
2005	NS	NS	NS	NS
2006	NS	NS	NS	NS
2007	NS	NS	NS	NS
Avenue of Flags (mainstem Santa Ynez River)				
1996	NS	NS	NS	NS
1997	2/4	5/15	5	0
1998	1/26	1/26	1	0
1999	2/19	3/4	7	0
2000	4/11	5/8	3	6
2001	1/23	1/24	2	0
2002		Denied Access		
2003		Denied Access		
2004		Denied Access		
2005		Denied Access		
2006		Denied Access		
2007		Denied Access		

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USBR. 2007. Precipitation records at Bradbury Dam. Dam tender**.**