Fisheries Annual Report

2007

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INTRODUCTION

This report summarizes the majority of the work the Fisheries Department has conducted in 2007. In some cases, data from previous years is also presented.

Our major projects included out-migrant trapping in the Little North Fork Navarro, amphibian distribution surveys, red-legged frog breeding site monitoring and abundance estimates (egg mass production), stream temperature monitoring, precipitation monitoring, long term channel monitoring, fish presence or absence in MRC's major drainage basins, fish habitat analysis in the Point Arena Streams WAU, drafting and editing the sections pertinent to aquatic biology in MRC's Habitat Conservation Plan (HCP), and providing assistance to forestry staff regarding stream classification and compliance with state 1600 permits.

Since 2003, the Fisheries Department has focused upon determining the spatial distribution of three key amphibian species (red-legged frogs, coastal tailed frogs, and southern torrent salamanders). We expect to have the distribution of these species identified throughout the majority of MRC's ownership by 2009. Upon completion of the amphibian distribution studies, we will focus our efforts on population estimates of out-migrating juvenile coho salmon, monitoring amphibian distribution and beginning to collect abundance estimates of larval tailed frogs.

OUT-MIGRATION OF JUVENILE SALMONIDS: LITTLE NORTH FORK NAVARRO 2007

METHODS

Both a rotary screw trap (Fig. 1) and a pipe trap (Fig. 2) were fished in Little North Fork Navarro in the spring of 2007. During higher flows (>5.5 CFS) the rotary screw trap was used and during lower flow levels (< 5.5 CFS) a pipe trap was used at the same trapping location. The rotary screw trap was used from February 14 until flows receded to less than 5.5 CFS on March 14. The pipe trap was installed and fished on March 14 throughout the remainder of the trapping season (June 11, 2007).

COHO SALMON

The number of coho salmon smolts migrating during the trapping period was estimated at 822.2 ± 92 fish (Fig. 1). A total of 365 coho salmon smolts were captured during the trapping period ranging from 67-136mm in size. Trapping efficiency (probability of capturing a fish) ranged from 19-97% throughout the trapping period. There were 1384 coho salmon YOY (young of the year or 'fry') captured ranging from 30-57 mm in size.

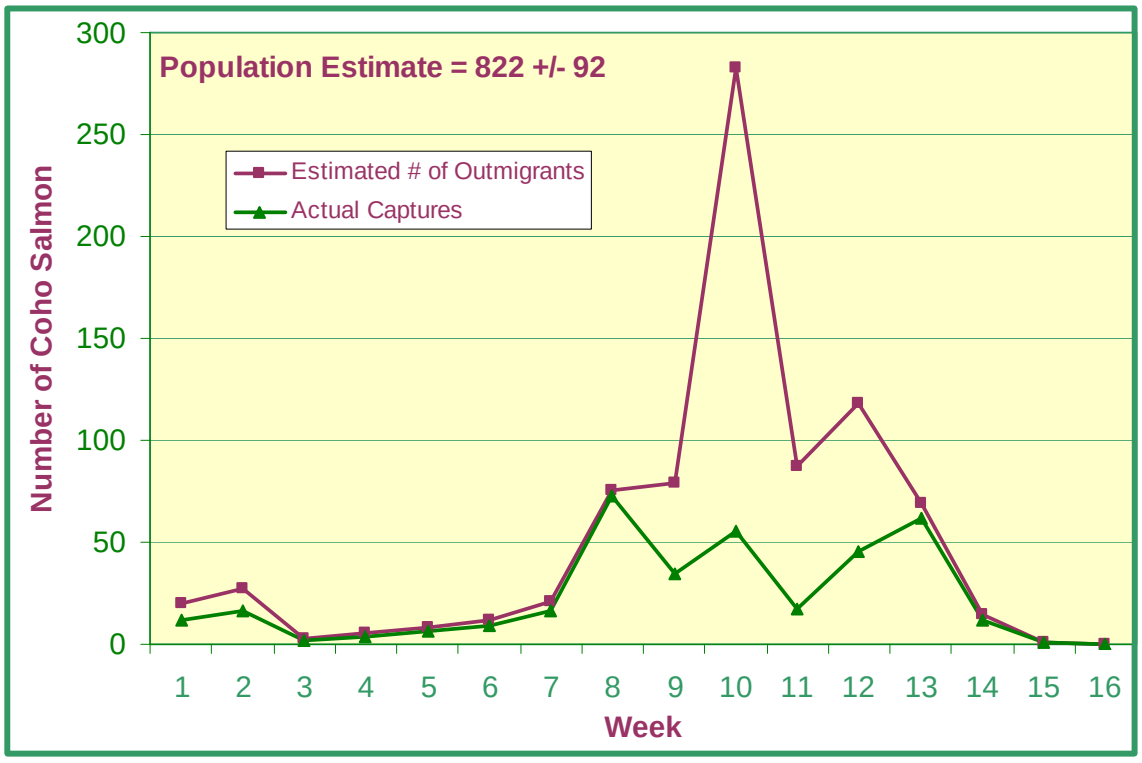

Figure 1: Number of coho salmon smolts captured and estimated.

STEELHEAD

A total of 740 age 1+ steelhead were captured throughout the trapping period ranging from 46-280mm in length. There was a total of 18 steelhead YOY captures during the study, which ranged from 28-37mm fork length. The total estimated migration for all age 1+ steelhead was 2459.6 ± 177.5 (Fig. 2). Estimated trapping efficiency (probability of capturing fish) ranged from 15-65%.

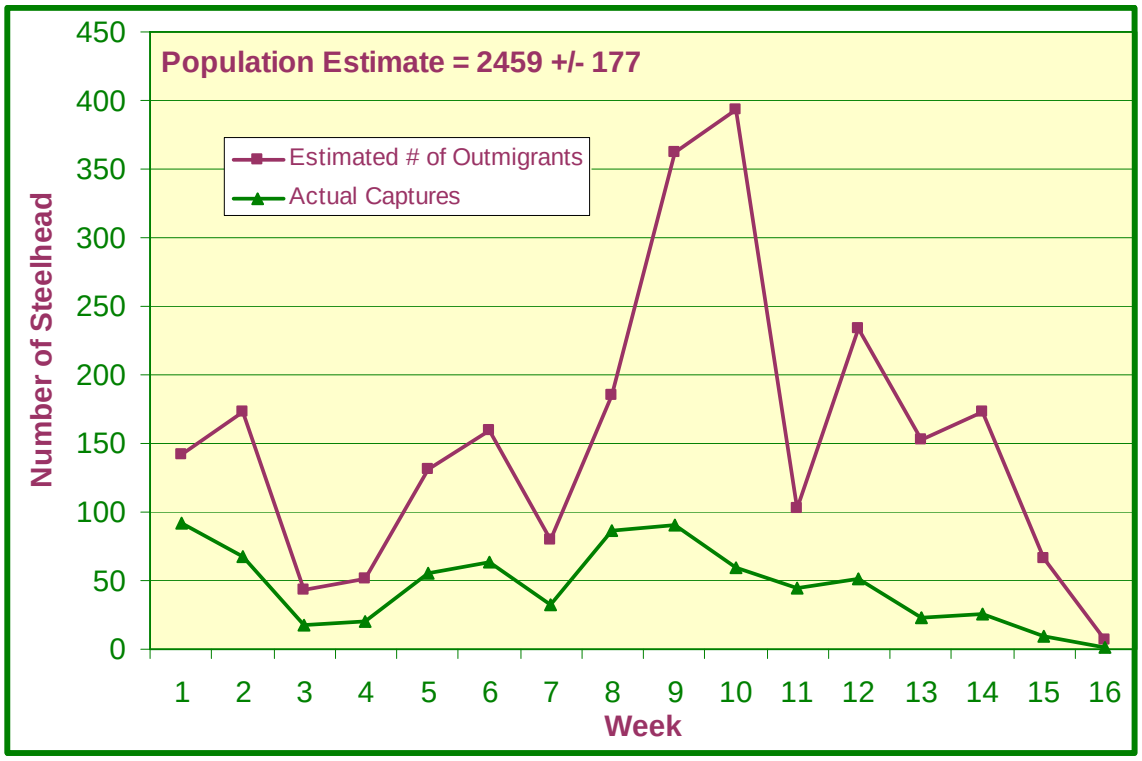

Figure 2: Number of all age 1+ steelhead captured and estimated.

FISH PRESENCE IN MAJOR DRAINAGE BASINS

During the years 1994-1996 and 2000-2002 MRC (and the former property owner L-P) conducted very robust sampling for fish distribution (450 sites sampled throughout the property for 3 consecutive years). MRC intends on repeating another round of this 3-year effort in the future. To monitor the distribution of fish more frequently, but on a less intensive scale, MRC conducts surveys in each of all of the major drainage basins owned. Basins were selected for annual monitoring if MRC owned a majority of the land to ensure the results reflect MRC's management as opposed to factors outside of MRC's control.

The major drainage basins identified for annual monitoring are listed below. Steelhead trout were detected every year within all major drainage basins sampled. If coho salmon were detected during a particular sampling year it is denoted with the word 'Coho' in the pertinent table cell.

Table 1: Results of fish distribution surveys combined from the 1994-1996; 2000-2002; and current annual studies within each major drainage basin identified for annual monitoring.

Basin	1994	1995	1996	2000	2001	2002	2005	2006	2007
Hollow Tree	Coho	Coho	Coho	Coho	Coho	Coho	Coho	Coho	Coho
Cottaneva	Coho	Coho	Coho	Coho	Coho	Coho	Coho	Coho	Coho
Hardy							Coho*	Coho	
Juan									
Howard									
NF Noyo	Coho		Coho	Coho	Coho	Coho	Coho	Coho	Coho
Big River (above SF)					Coho	Coho	Coho	Coho	Coho
SF Big River		Coho	Coho			Coho	Coho	Coho	Coho
Albion (above SF)	Coho	Coho	Coho	Coho	Coho	Coho	Coho	Coho	Coho
SF Albion	Coho	Coho	Coho	Coho	Coho	Coho	Coho	Coho	Coho
NBNF Navarro	Coho	Coho	Coho	Coho	Coho	Coho	Coho	Coho	Coho
SBNF Navarro	Coho		Coho			Coho	Coho		Coho
Greenwood									
Elk		Coho				Coho			
Mallo Pass									
Alder									
SF Garcia	Coho		Coho			Coho	Coho	Coho	Coho
Wheatfield Fork									
Ackerman									

*Coho salmon detected immediately downstream of MRC property.

FISH HABITAT INVENTORY
(POINT ARENA STEAMS WATERSHED ANALYSIS UNIT)

INTRODUCTION
Fish habitat conditions were assessed throughout the Class I watercourses in the Point Arena Streams Watershed Analysis Unit (WAU). The watersheds assessed include Mills Creek, Mallo Pass Creek, Point Arena Creek, Schooner Gulch and Alder Creek. Surveys described the quantity and quality of fish habitat present.

RESULTS (summarized)
Alder Creek
Fish habitat surveys were conducted throughout 15,166 feet of Class I watercourses in the Alder Creek watershed. Pool depths were exceptionally good with good percentages of pools with depths greater than 3 feet. The lack of LWD in the surveyed segments was the biggest limiting factor on fish habitat in Alder Creek. Both key pieces and functional pieces of LWD were significantly below published targets for functional systems.

Mallo Pass Creek
Fish habitat surveys were conducted throughout 4,881 feet of Class I watercourses in the Mallo Pass Creek watershed. Shelter ratings and pool frequencies were quite good. However, there were very few pools with depths exceeding 3 feet.

Schooner Gulch/Point Arena Streams
Fish habitat surveys were conducted throughout 1,068 feet of Class I watercourses in the Schooner Gulch watershed. Fish habitat in the Schooner Gulch portion of the WAU was predominantly fair and had good shelter ratings. Although the number of key pieces of LWD was quite small, there was a moderate amount of functional pieces of LWD.

STREAM TEMPERATURE

INTRODUCTION

Stream temperature is a key water quality parameter that can be altered as a result of streamside forest management practices. Concern over abnormal warming of stream temperatures as a result of streamside vegetation removal has generally focused on the impacts to coldwater inland fisheries. The California Forest Practice Rules addresses the effects of streamside timber harvesting activities on water temperatures and dictates the implementation of Best Management Practices to minimize impacts on water quality within forested watersheds. With recent attention to coho salmon and pressure to develop Total Maximum Daily Loads (TMDLs) for coastal watersheds, monitoring stream temperatures is becoming increasingly important. Tailoring land management to meet water quality requirements has come to the forefront.

METHODS

Louisiana-Pacific initiated stream temperature monitoring within forestlands now owned by MRC in the summer of 1989. Stream temperatures were not monitored in 1998 as MRC was in the process of purchasing this timberland. Monitoring continued in 1999 and was expanded to include Class II streams in 2001. Additional monitoring began in 2002 on all major streams on the property where coho salmon were detected during aquatic species distribution studies. Air temperatures were also monitored at various sites throughout the ownership. Air temperature data loggers were placed within 50 feet of the water temperature data loggers out of direct sunlight along the stream bank.

Stream water temperatures were monitored continuously (2-hour interval used from 1989-2004 and a 1-hour interval from 2005 to present) during summer and early fall (May-October) each year using remote electronic temperature recorders. The stream temperature recorders were placed in shallow pools (< 1 m in depth) directly downstream of riffles and out of direct sunlight. Placement of temperature recorders in these areas ensured monitoring water that was adequately mixed and prevented de-watering of the monitoring devices. Each data recorder was held in place with a piece of rebar that was driven into the streambed substrate with a sledge hammer and a post driver. Wire was used to attach the data recorders to the rebar stakes.

Data Analysis

Three different indices were used to characterize the water temperature regime in streams. We averaged daily maximum temperatures and daily mean temperatures for 7-day periods and then reported the highest average for the entire summer. These metrics are commonly called Maximum Weekly Maximum Temperature (MWMT) and Maximum Weekly Average Temperature (MWAT) and reflect 7-day moving averages. These weekly average temperatures are widely used as indicators of long-term exposure. We also reported the absolute

maximum value for the entire summer. The absolute maximum temperatures are useful however, these values may only occur briefly. Long-term exposure to sub-lethal temperatures may do more physiological damage than short-term exposure to higher temperatures.

RESULTS

Stream temperature was monitored in 108 streams at 144 sites in 2007. Climatic variability causes stream temperatures to fluctuate; this fluctuation requires many years of data in order to determine trends. Property-wide averages of MWAT can be useful to reveal trends (see Figure 3). The monitoring program currently in place has a site variation of less than 3%, thus allowing for property-wide comparisons. At this point no trends are evident. Responsible land management is necessary to maintain or decrease stream temperatures. Because of recent emphasis on land management and increasing scrutiny by regulatory agencies, stream temperature monitoring should continue and this data should be used to tailor management needs to specific water quality issues.

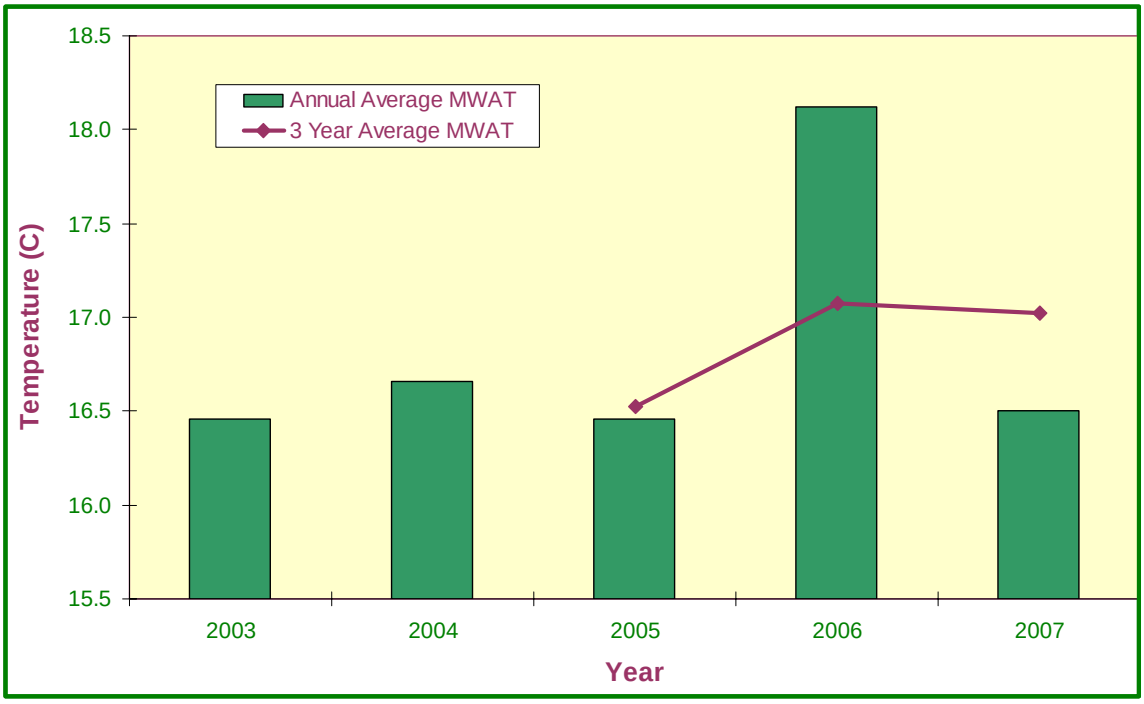

Figure 3. Annual average and 3 year moving average of MWAT for stream temperature sites consistently monitored on Mendocino Redwood Company timberlands in Mendocino and Sonoma Counties, California.

PRECIPITATION MONITORING

Rainfall and air temperature data was collected at ten locations throughout Mendocino Redwood Company forestlands. Rainfall was collected using an Onset® RG1 tipping-bucket collector. Rainfall and air temperature data was recorded using a HOBO® Event data logger. Each tipping bucket collection gauge was attached to a metal stake secured with guy wires. Rainfall collection stations were installed in existing forest openings (typically landings) having minimal obstruction to rainfall. Rainfall was measured in hundredths of an inch.

Table 2: Precipitation monitoring totals (in inches) are summarized for MRC forestlands through the 2007 water year.

Gauging Station	2003	2004	2005	2006	2007
Rockport	76.85*	50.91	56.57	79.94	42.17*
Hollow Tree	92.19*	58.64	56.34	92.36	43.65*
Noyo	42.61*	50.27	58.77	79.5	36.26
Big River	22.62*	38.19	22.28*	47.25*	31.99
Albion	53.85*	38.64	49.68	65.8	32.83
SBNF Navarro	51.99*	33.41	43.63	58.05	28.29*
Fashauer	51.19*	39.66*	20.75*	45.15*	35.27
Elk	47.73*	38.45	31.84*	59.88	29.11
Garcia	65.35*	30.82*	70.12	78.39*	46.58
Gualala	54.29*	50.08	57.18	75.94	37.19

*Indicates missing data.

RED-LEGGED FROG MONITORING AND EGG MASS PRODUCTION

INTRODUCTION

It is generally agreed upon by most herpetologists that the number of egg masses deposited each season is indicative of the number of mature females in the red-legged frog meta-population. Monitoring estimates of the total number of egg masses deposited is useful in determining the status of the species as well as assessing the impacts of land management activities upon the frogs.

METHODS

Red-legged frog egg masses are rather conspicuous and can usually be observed quite easily. Upon arrival to the site- a starting point is selected and marked to determine the ending point of the survey. Multiple (2 or 3) independent surveys are conducted by walking the entire perimeter of the site. Egg masses are tallied as the observer walks the perimeter of the site. Upon reaching the marked ending point, the survey is considered complete.

Some sites are very complex (due to floating debris, etc) or are difficult to access. In these cases efforts to count egg masses were not undertaken and efforts were focused on detecting presence of the species. Estimates are made later in the breeding season to ensure that the majority of the egg masses had been deposited, although there may be egg masses deposited after the estimates are made. Complex sites which were difficult to survey were removed from Table 3.

Heavy rainfall during the egg deposition season in 2008 complicated egg mass counts. The larger sites, especially in Russian Gulch, were so large that it was likely we missed several egg masses which were hidden underneath the large volume of water.

Table 3: Egg mass production estimates for planning watersheds known to support red-legged frog reproduction. Estimates were combined from all sites within the planning watershed to yield an overall egg mass production for each planning watershed.

Planning Watershed	2004	2005	2006	2007	2008
Lower Albion (AL)	135	113	132	273	188
Russian Gulch (AG)	2	3	19	23	5
Ray Gulch (WR)	Present	Present	Present	Present	Present
Lower Greenwood (CG)	25	18	16	18	20
Mallo Pass (CM)	5	0	3	0	2

AMPHIBIAN DISTRIBUTION

INTRODUCTION

In 2003, MRC began efforts to identify the distribution of three amphibian species (red-legged frogs, coastal tailed frogs, and southern torrent salamanders). Prior to efforts by MRC the distribution of these species was largely unknown.

RED-LEGGED FROG DISTRIBUTION SUMMARY

A total of 116 potential breeding sites were identified during this study (within the 45 planning watersheds surveyed). Approximately 17% of the potential breeding sites identified during this study were found to support red-legged frog reproduction (20 of 116 sites). Of the 45 planning watersheds surveyed, 7 planning watersheds were determined to support red-legged frog reproduction (~16%).

All of the documented breeding sites identified had minimal canopy cover. Canopy cover over documented red-legged frog breeding sites ranged from 0-60% with a median value of 10% ($\bar{x}$ = 13%). The majority of documented breeding sites identified were natural or manmade ponds within wet meadows or wetlands. The elevation of documented breeding sites ranged from near sea level to 1,160 feet ($\bar{x}$ = 404 feet above sea level). All of the documented breeding sites identified were over 2-feet in depth at high water. Forty percent of the documented breeding sites identified were manmade (8 of 20 sites).

COASTAL TAILED FROG DISTRIBUTION SUMMARY

Coastal tailed frog surveys were conducted at 326 sites, of which 81 sites yielded detections (24% of sites). Coastal tailed frogs were detected within approximately 38% of the planning watersheds surveyed (15 out of 40). The majority of coastal tailed frogs (87%) were detected in watercourses with gradients ranging from 0-10%. These findings are consistent with studies conducted by Diller and Wallace (1999), who found the median stream gradient where larvae were found to be present was 7.1%. It appeared that watercourses with gradients which exceeded 10% were often dominated by step-pools or cascades, and contained minimal amounts of riffle habitat (the preferred coastal tailed frog habitat).

SOUTHERN TORRENT SALAMANDER DISTRIBUTION SUMMARY

Surveys were conducted at 179 sites throughout the MRC ownership, and 33 sites yielded detections of southern torrent salamanders (~18% of sites). The distribution of southern torrent salamanders appears to be much less widespread than in Humboldt County. Diller and Wallace (1996) found southern torrent salamanders present in 80.3% of sites sampled in Humboldt County. Perhaps the ameliorating affects of coastal fog is more significant in Humboldt County, than in the southernmost portion of the species range (Mendocino County).

Southern torrent salamanders were found in only one site with a southerly aspect, and were only detected at sites within 5 miles of the Pacific Ocean. The importance of canopy closure over habitats further away from the ocean may play an important role in maintaining suitable habitat. The canopy closure over sites with southern torrent salamanders present ranged from 30-100% with a median value of 85% ($\bar{x}$ = 80%). Southern torrent salamanders were found within small watercourses, seeps, springs, and soil pipes. 49% of the sites with the species present were small watercourses; 51% were seeps, springs or soil pipes.