Aquatic Wildlife Annual Report

2006

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TABLE OF CONTENTS

INTRODUCTION

This report summarizes the majority of the work the Fisheries Department has conducted in 2006. In some cases, data from previous years is also presented.

Our major projects included amphibian distribution surveys, red-legged frog breeding site monitoring and abundance (egg mass production), stream temperature monitoring, fish presence or absence in MRC's major drainage basins, fish habitat analysis in the Rockport Coastal 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, 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.

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.

RESULTS

There was only one major rainfall during the final weeks of December 2006, and red-legged frogs began depositing eggs during this first major rainfall event. However, there was no rain following this event and as a result many egg masses were left stranded on dry land with no water to allow them to develop. Towards the end of January 2007 another rainfall event initiated egg mass deposition. Counts were made in early February 2007. Complex sites which were difficult to survey were removed from Table 1.

Table 1: 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
Lower Albion (AL)	135	113	132	273
Russian Gulch (AG)	2	3	19	23
Ray Gulch (WR)	Present	Present	Present	Present
Lower Greenwood (CG)	25	18	16	18
Lower Elk (CL)	*	5	0	0
Mallo Pass (CM)	5	0	3	0

* Site found and surveyed beginning in 2005.

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. Table 2 below illustrates which planning watersheds have been sampled to date by target species.

Table 2: Planning watersheds surveyed for amphibian species. Columns with a year designated indicate that surveys for that particular species have been completed in the respective year presented. Some planning watersheds have not been surveyed for all three target species.

Inventory Block	Planning Watershed Name	PWS Code	Total Acres	MRC Acres	TLF	RLF	STS
Rockport	Middle Hollow Tree	RM	11,584	10,366	2004	2004	2004
Rockport	Upper Hollow Tree	RU	8,966	6,694	2004	2006	
Rockport	Cottaneva Creek	RC	10,579	7,967	2003	2003	2003
Rockport	Hardy Creek	RH	3,622	2,981	2006	2006	2006
Rockport	Juan Creek	RJ	4,915	4,690	2004	2004	2004
Rockport	Dutch Charlie Creek	RD	5,728	91		2006	
Rockport	Howard Creek	RW	3,514	2,373	2006	2006	2006
Noyo River	Hayworth Creek	NH	7,104	4,816		2006	
Noyo River	Olds Creek	NO	6,963	2,336	2003	2003	
Noyo River	Middle Fork North Fork Noyo	NM	4,563	4,176	2003	2003	2003
Big River	East Branch North Fork Big River	BE	5,158	2,527	2006	2006	
Big River	Mettick Creek	BM	11,725	10,294	2005	2005	
Big River	Russell Brook	BR	7,014	5,926	2003	2003	2003
Big River	South Daugherty Creek	BS	10,662	7,242	2006	2006	
Albion River	Russian Gulch	AG	7,098	277	2003	2003	2003
Albion River	Lower Albion	AL	8,070	4,510	2003	2003	2003
Albion River	Little River	AR	7,661	582	2006	2006	
Albion River	South Fork Albion	AS	5,830	4,696	2006	2006	
Navarro River	Ray Gulch	WR	3,910	2,982	2003	2003	2003
Navarro River	Lower Navarro River	WL	7,776	4,583	2004	2005	2004
Navarro River	Hendy Woods	WH	7,770	998		2003	
Navarro River	Upper South Branch North Fork Navarro	EU	7,898	4,807	2003	2003	
Navarro River	Lower South Branch North Fork Navarro	EL	4,448	3,988		2006	
South Coast	Upper Greenwood Creek	CU	7,597	3,674	2003	2003	2003
South Coast	Lower Greenwood Creek	CG	8,851	6,008	2003	2003	2003
South Coast	Upper Elk Creek	CE	9,894	9,136	2005	2005	2005
South Coast	Lower Elk Creek	CL	8,179	4,886	2005	2005	2005
South Coast	Mallo Pass Creek	CM	8,742	2,501	2003	2003	
South Coast	Lower Alder Creek	CA	10,656	5,899		2003	
Garcia	Rolling Brook	GR	8,000	4,582	2003	2003	2003
Garcia	South Fork Garcia	GS	5,594	5,148	2005	2005	
Sonoma	Annapolis Falls	SA	7,587	3,154	2003	2003	2003
Sonoma	Flat Ridge Creek	SR	7,034	883		2003	2006
Sonoma	Freezeout Creek	SF	1,900	1,647		2004	
Sonoma	Dutch Bill Creek	SD	12,614	774		2004	
Sonoma	Willow Creek	SW	5,650	2,928		2004	
Ukiah	Upper Ackerman	UU	8,698	3,544	2003	2003	2003
Ukiah	Jack Smith Creek	UJ	7,040	1,570	2005	2006	

RED-LEGGED FROG DISTRIBUTION SUMMARY

A total of 108 potential breeding sites were identified during this study (within the 38 planning watersheds surveyed). Approximately 18% of the potential breeding sites identified during this study were found to support red-legged frog reproduction (19 of 108 sites). Of the 38 planning watersheds surveyed, 7 planning watersheds were determined to support red-legged frog reproduction (~18%).

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. Fifty percent of the documented breeding sites identified were manmade (8 of 19 sites).

COASTAL TAILED FROG DISTRIBUTION SUMMARY

Coastal tailed frog surveys were conducted at 278 sites, of which 72 sites yielded detections (26% of sites). Coastal tailed frogs were detected within approximately 45% of the planning watersheds surveyed (13 out of 29). The majority of coastal tailed frogs (92%) 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; 39% were seeps or springs; and the remaining 12% were soil pipes.

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 from1989-2004 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 and DISCUSSION

Property-wide Stream Temperatures

In 2006stream temperature was monitored in 109 streams at 145 sites. It is reasonable to conclude that stream temperatures have not increased on MRC's timberlands from 1989-present. Climatic variability causes stream temperatures to fluctuate; this fluctuation requires many years of data in order to determine trends. At this point, no trends are evident.

To further analyze fluctuations on a larger scale, the MWAT value for all temperature monitoring sites were averaged within each planning watershed. This resulted in an average MWAT value per year for each planning watershed monitored. The planning watershed averages were then combined to establish an average MWAT value for each of MRC's Inventory Blocks as well as for the entire property (Figure 1). Due to small sample sizes, some areas were combined (Garcia and South Coast data were combined; Ukiah Area, Ackerman Creek, and Navarro East data were combined).

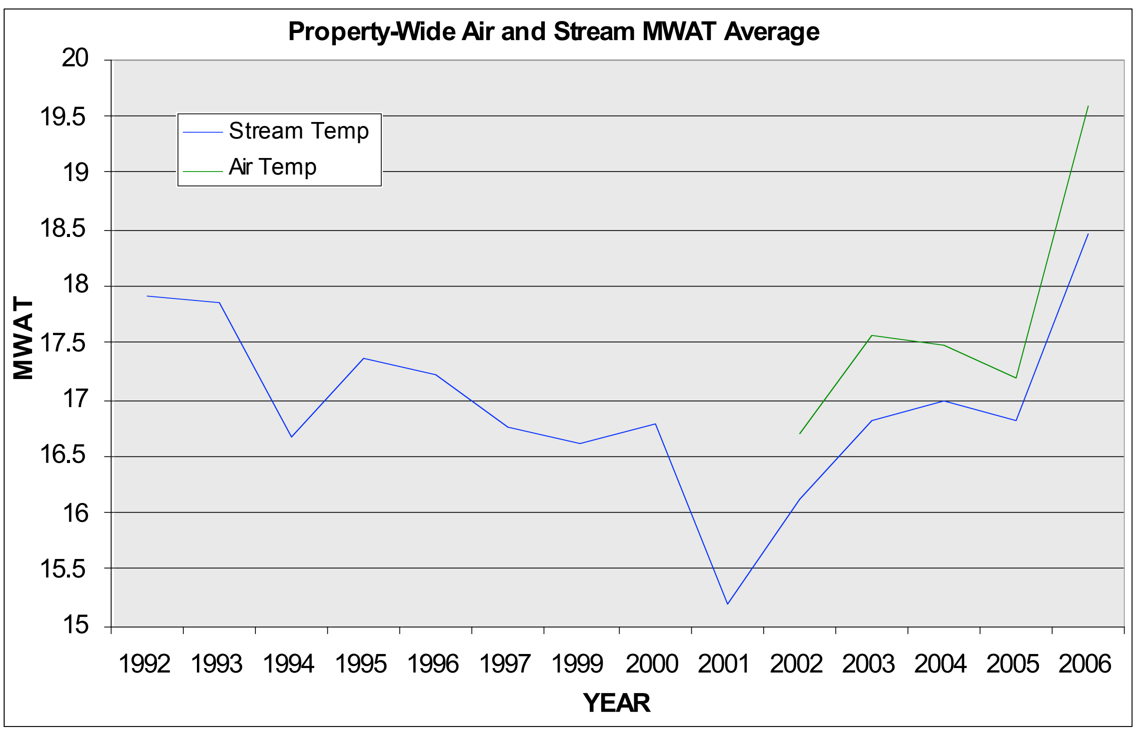

Figure 1: Average MWAT's for air and stream temperatures throughout MRC's ownership.

From 1992 until approximately 2001 stream temperatures appeared to be trending downward implying that water temperatures were, on average, cooling. However, beginning in 2002 stream temperature has begun to rise and has nearly surpassed the highest temperatures which have been recorded to date. The seemingly sharp increases in temperature during 2006 were a result of very warm ambient air temperatures.

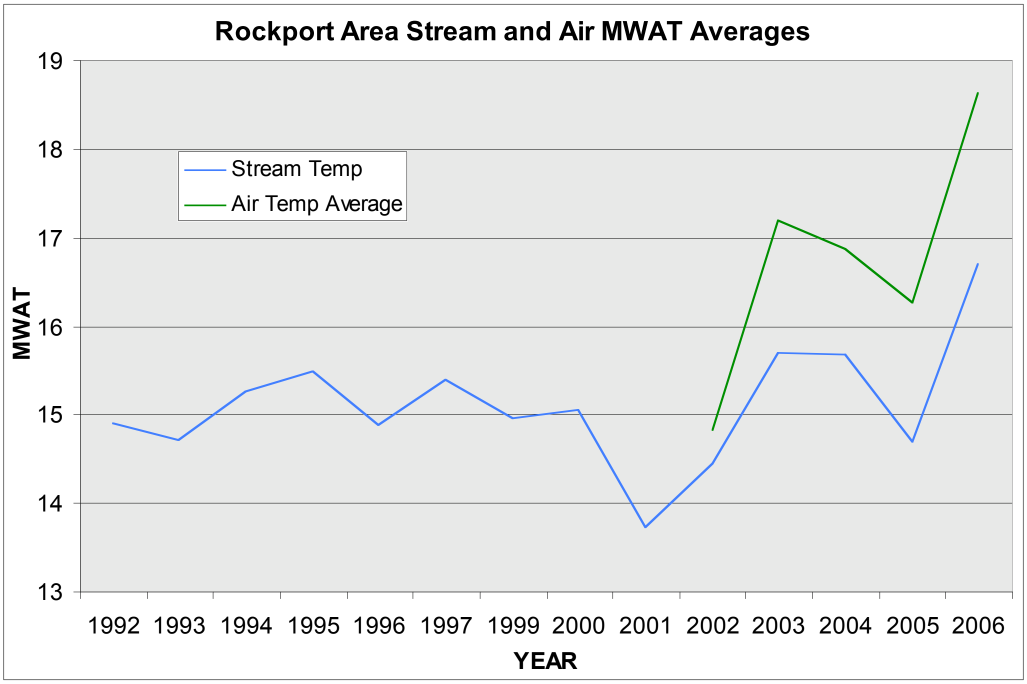

Figure 2: Average stream and air temperature MWAT's for the Rockport Tract.

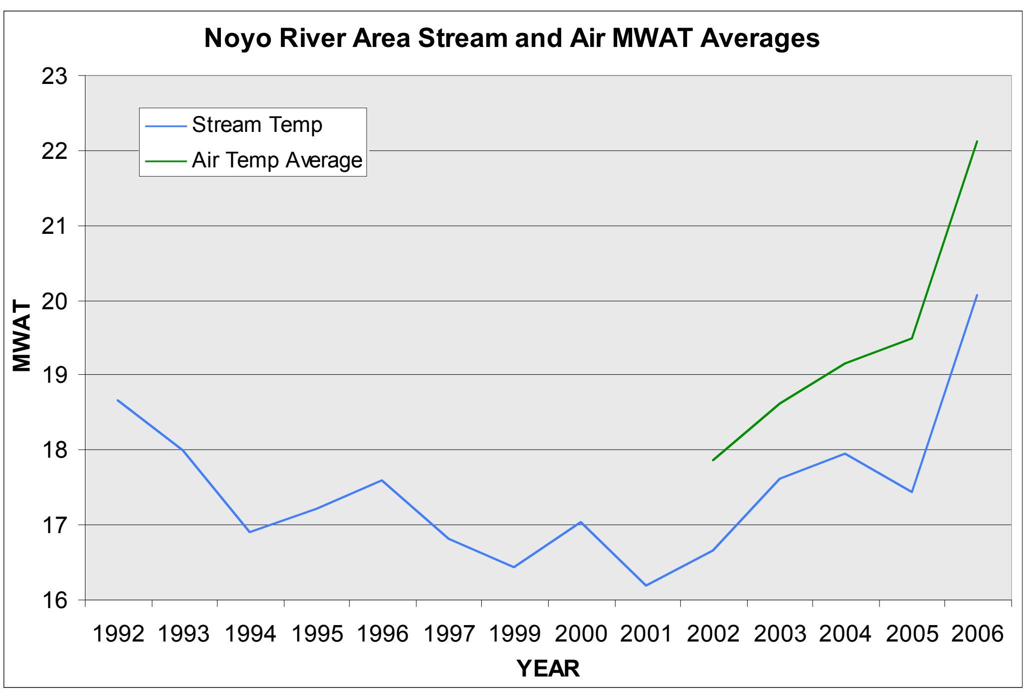

Figure 3: Average stream and air temperature MWAT's for the Noyo River Tract.

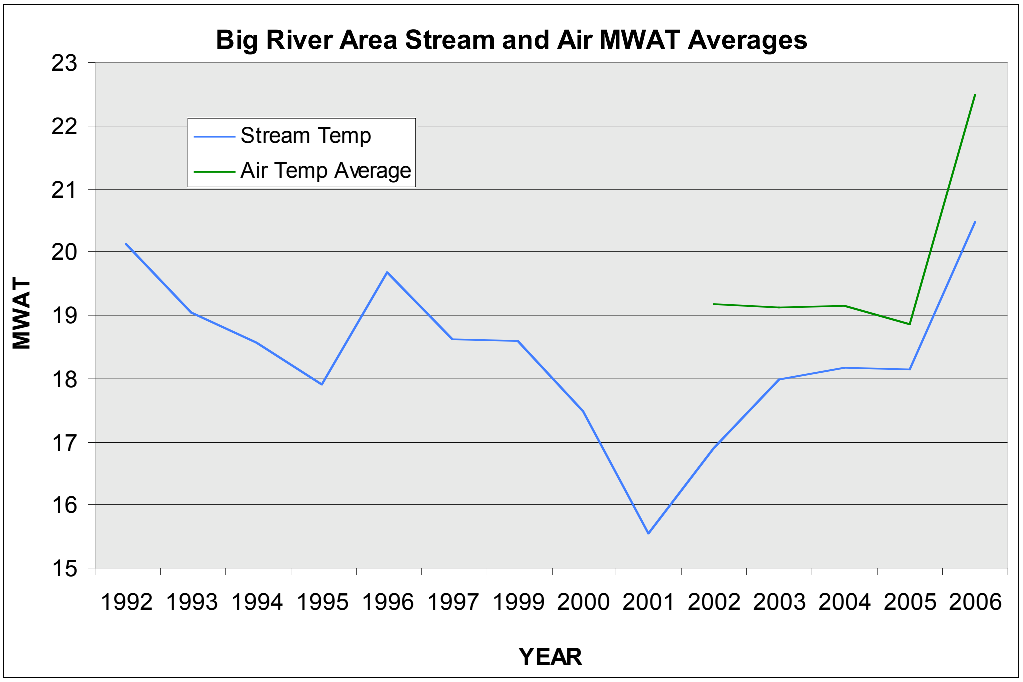

Figure 4: Average stream and air temperature MWAT's for the Big River Tract.

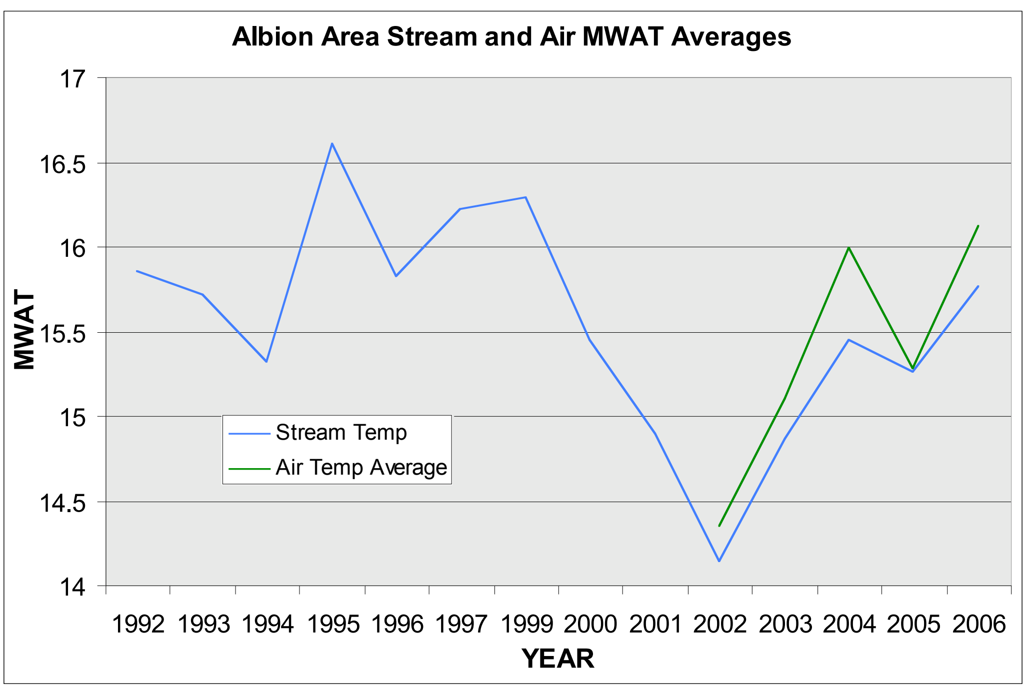

Figure 5: Average stream and air temperature MWAT's for the Albion River Tract.

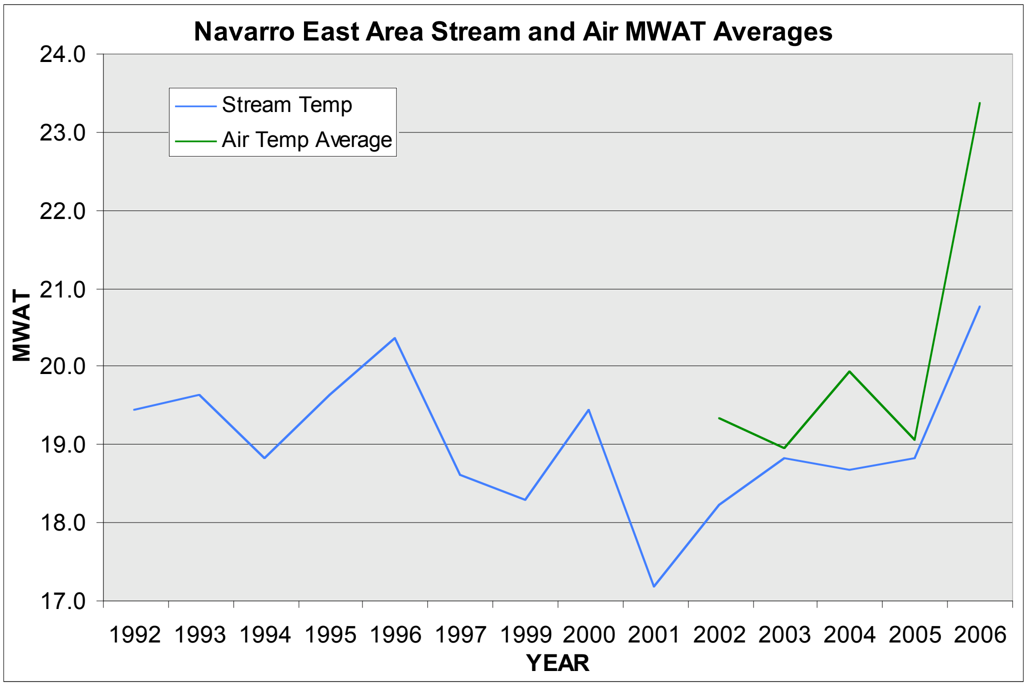

Figure 6: Average stream and air temperature MWAT's for the Navarro East Tract.

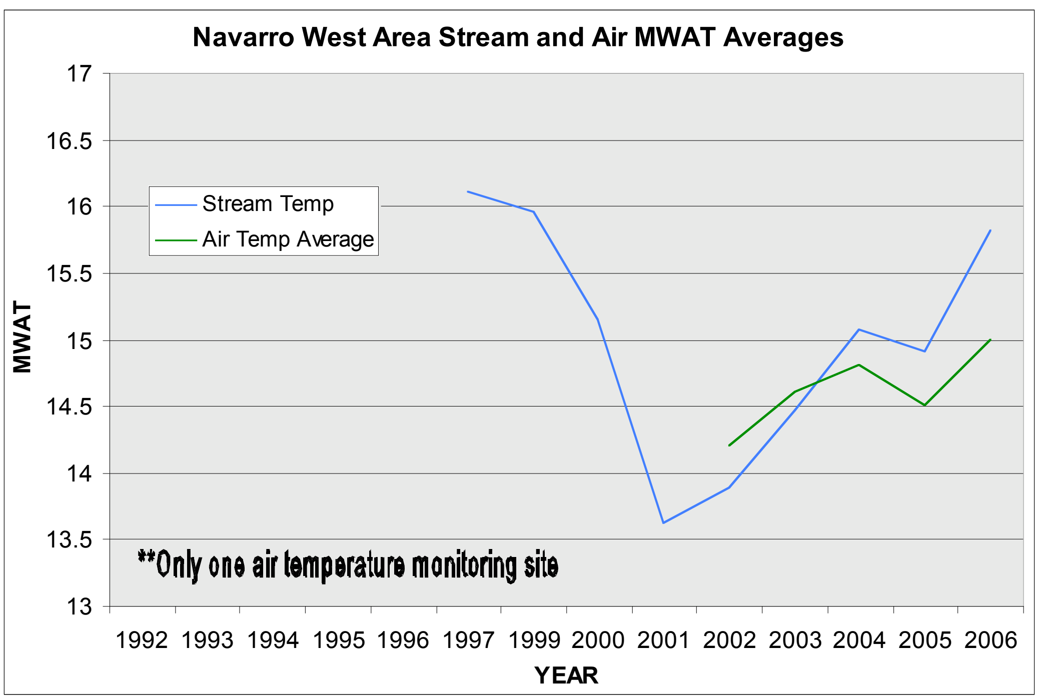

Figure 7: Average stream and air temperature MWAT's for the Navarro West Tract.

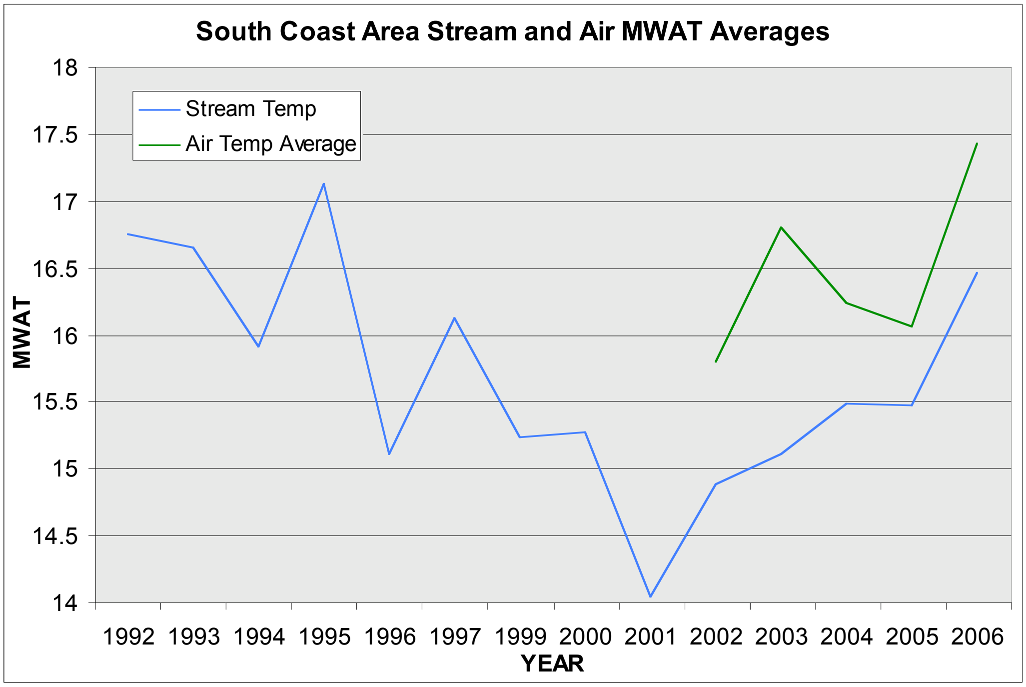

Figure 8: Average stream and air temperature MWAT's for the South Coast Tract.

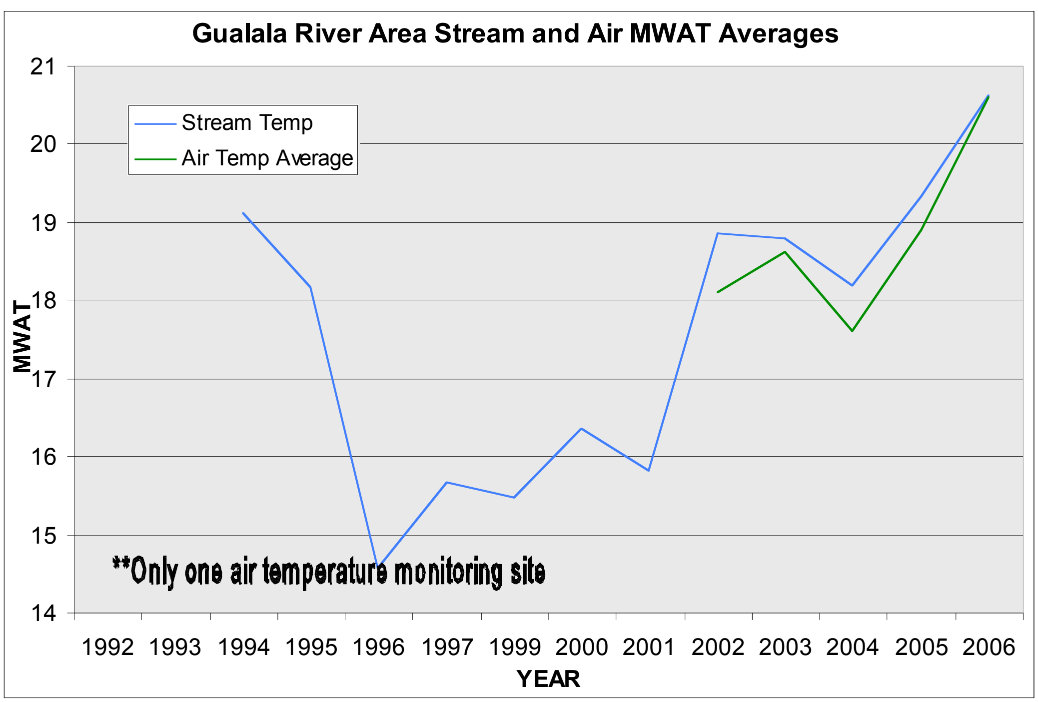

Figure 9: Average stream and air temperature MWAT's for the Gualala River Tract.

Air Temperature Monitoring

Bartholow (1989) found that air temperature above the stream surface was the greatest factor in increasing water temperatures followed in importance by relative humidity and shade. In 2006 air temperature was monitored adjacent to steam temperature monitoring sites at 49 sites throughout the MRC ownership.

Cold Water Amphibian Species

In 2006 twenty seven streams were monitored for stream and/or air temperatures where cold water amphibian species such as the southern torrent salamander (*Rhyacotriton variegatus*) and tailed frog (*Ascaphus truei*) are known to be present. The highest maximum stream temperature observed where tailed frogs are present was 20.3° C, in Sulphur Creek (site T87-10). MWAT's collected within these streams were cool, ranging from 13.4 ° to 18.1°C, the MWAT of the air (where monitored) was also low ranging from 12.9° to 19.5°C. These preliminary results support previous findings about the importance of cool microclimates for maintaining these species. More intense monitoring of these sites will be done in the future.

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 3: 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
Hollow Tree	Coho	Coho	Coho	Coho	Coho	Coho	Coho	Coho
Cottaneva	Coho	Coho	Coho	Coho	Coho	Coho	Coho	Coho
Hardy							Coho**	Coho
Juan								
Howard								
NF Noyo	Coho		Coho	Coho	Coho	Coho	Coho	Coho
Big River (above SF)					Coho	Coho	Coho	Coho
SF Big River		Coho	Coho			Coho	Coho	Coho
Albion (above SF)	Coho	Coho	Coho	Coho	Coho	Coho	Coho	Coho
SF Albion	Coho	Coho	Coho	Coho	Coho	Coho	Coho	Coho
NBNF Navarro	Coho	Coho	Coho	Coho	Coho	Coho	Coho	Coho
SBNF Navarro	Coho		Coho			Coho	Coho	
Greenwood								
Elk		Coho				Coho		
Mallo Pass								
Alder								
SF Garcia	Coho		Coho			Coho	Coho	Coho
Wheatfield Fork								
Ackerman								

**Coho salmon detected immediately downstream of MRC property.

FISH REMOVALS and RESCUES

Often times during restoration work (upgrading culverts, replacing culverts with bridges, or pulling sediment away from steam channels) the 1600 permit requires that biologists capture and remove fish from the affected area. The intent of these requirements is to avoid the direct take of fish. Moving all of the organisms from the affected area allows equipment to enter and perform the duties necessary to construct crossings or remove sediment that is posed to enter the creek without harming aquatic organisms.

Typically, we set up block nets on the upstream and downstream boundaries of the project to prevent fish or other aquatic organisms from moving into the affected area. Once the block nets are in place we use a backpack electro-fishing unit to stun and capture the organisms. We make several passes through the affected area until we do not capture any more organisms, or are confident that all of the fish have been removed. Once the organisms have been collected they are moved to appropriate habitat upstream or downstream of the project area.

Hollow Tree
There were 2 fish removals associated with Phase II of the Hollow Tree restoration work. Both removals were conducted in Michael's Creek and a total of 177 steelhead; 87 coho salmon; 31 coastal giant salamanders; and 2 yellow-legged frogs were removed from the project areas.

NoyoRiver
There were 6 fish removals performed in the North Fork Noyo River and its tributaries which were associated with Phase I of the Noyo River restoration work. There were a total of 125 steelhead; 6 coho salmon; and 21 coastal giant salamanders removed from the project areas.

CLASS I/II WATERCOURSE DELINEATION

One of the most common services the Fisheries Department provides is assisting forestry staff with stream classification as per the Forest Practice Rules. The "*Aquatic Species Distribution on MRC Forestlands 1994-1996 and 2000-2002*" report as well as the most recent Watershed Analyses documents and maps the extent of most of the fish bearing watercourses on MRC's forestlands. However, there are many watercourses which have not been surveyed to determine where the Class I/II boundary exists.

Most often, when forestry staff requests our assistance it is due to a watercourse that is difficult to classify. We employ the most conservative approach in identifying where the watercourse no longer provides habitat (as defined in the Forest Practice Rules) to fish. Temporary barriers, such as log jams, may preclude fish from accessing streams for several years. However, these streams are still considered Class I watercourses.

We identified the Class I/II boundary on 6 different watercourses in 2006. The following watercourses were completed:

<u>Rockport</u>: Slaughterhouse Gulch, Little Waldron Creek, North Fork Hardy Creek.

<u>Albion</u>: Gunari Gulch, Norden Gulch.

<u>Big River</u>: Harris Gulch.

FISH HABITAT INVENTORY
(ROCKPORT COASTAL STEAMS WATERSHED ANALYSIS UNIT)

INTRODUCTION

Fish habitat conditions were assessed throughout the Class I watercourses in the Rockport Coastal Streams WAU. These watersheds assessed include Hardy Creek, Juan Creek, and Howard Creek. Surveys described the quantity and quality of fish habitat present.

RESULTS (summarized)

Hardy Creek

Fish habitat surveys were conducted throughout 7,296 feet of Class I watercourses in the Hardy Creek watershed. ‘Poor’ ratings were only observed for the over-wintering life stages, predominantly due to higher percentages of riffle habitats and a small number of ‘key’ pieces of large woody debris.

Juan Creek

Fish habitat surveys were conducted throughout 20,350 feet of Class I watercourses in the Juan Creek watershed. In general, fish habitat conditions rated as ‘fair’ for all three life stages of salmonids. There were only a few segments which had ‘poor’ ratings and the majority of the ‘poor’ ratings were from the Little Juan Creek segments.

Howard Creek

Fish habitat surveys were conducted throughout 6,851 feet of Class I watercourses in the Howard Creek watershed. In general, fish habitat conditions rated as ‘fair’ for all three life stages of salmonids. The only segment with ‘poor’ ratings for all three life stages was observed in the upper reaches of Rock Creek (a tributary to Howard Creek).