

# Adult Escapement Monitoring, 2005-2006 Season

## Mattole River Watershed



**Contractor:** Mattole Salmon Group  
P.O. Box 188  
Petrolia, CA 95558-0188

**MSG Project Coordinator:** Tom Campbell

**Report prepared by:** Tom Campbell May 2006

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## **Abstract**

Monitoring of adult escapement of salmonids on the Mattole River has been conducted by the Mattole Salmon Group (MSG) since 1981. In past years monitoring of fall run adults has been conducted with surveys of spawning grounds. Spawner surveys continue and are reported on separately. This year, the MSG spearheaded a pilot study with the intention of acquiring a quantitative estimate of adult Chinook returns in the Mattole River and its tributaries utilizing standard mark-recapture techniques. This report describes the trapping and mark-recapture monitoring conducted from 01-NOV 2005 through 17-DEC 2005. Several sizeable storm events occurred during the course of the 2005-06 trapping season, which has turned out to be the fourth wettest year on record. Due to high flows and safety issues, trapping was postponed during and after each event until river flows returned to levels safe enough to conduct trapping without risking harm to trapped fish and MSG personnel. Catch data for 2005 is presented for adult California Coastal Chinook salmon (*Oncorhynchus tshawtscha*), Southern Oregon/Northern California Coastal Coho Salmon (*Oncorhynchus kisutch*), and Northern California Steelhead (*Oncorhynchus mykiss*). Season catch totals were 39 Chinook, 11 coho and 1 steelhead. Temperature, river discharge, fork length, and age data from analyzed scale samples are also presented.

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## Background

The Mattole Salmon Group (MSG) has been assessing salmonid populations and their limiting factors for over 25 years on the Mattole River as part of a watershed approach to native salmonid and aquatic habitat enhancement. The primary goal of the MSG is the recovery of native salmon and steelhead stocks to robust, self-perpetuating population levels. Due to the considerable effort and expense devoted to the rehabilitation and recovery of natural systems, including native salmon and steelhead and their habitat, an integral component of watershed restoration is appropriate monitoring activities. The MSG has conducted downstream migrant trapping annually since 1985, summer steelhead dives annually since 1996, and spawning surveys annually for 25 years. The MSG has also operated an adult trapping operation for egg-taking artificial propagation since 1980.

These surveys are currently the primary source of information on adult salmonid population size and condition, run timing, and geographic distribution within the watershed. The adult trapping operation, in addition to its role in propagation, supplements and corroborates survey information. However, 2005 was the first year that adult salmonids were trapped not for propagation, but solely to assist in estimation of adult escapement.. Collectively, this information is used to better understand the status and needs of these species in this watershed and thus guide restoration efforts and provide for the best possible management decisions regarding the species and their habitat.

## Introduction

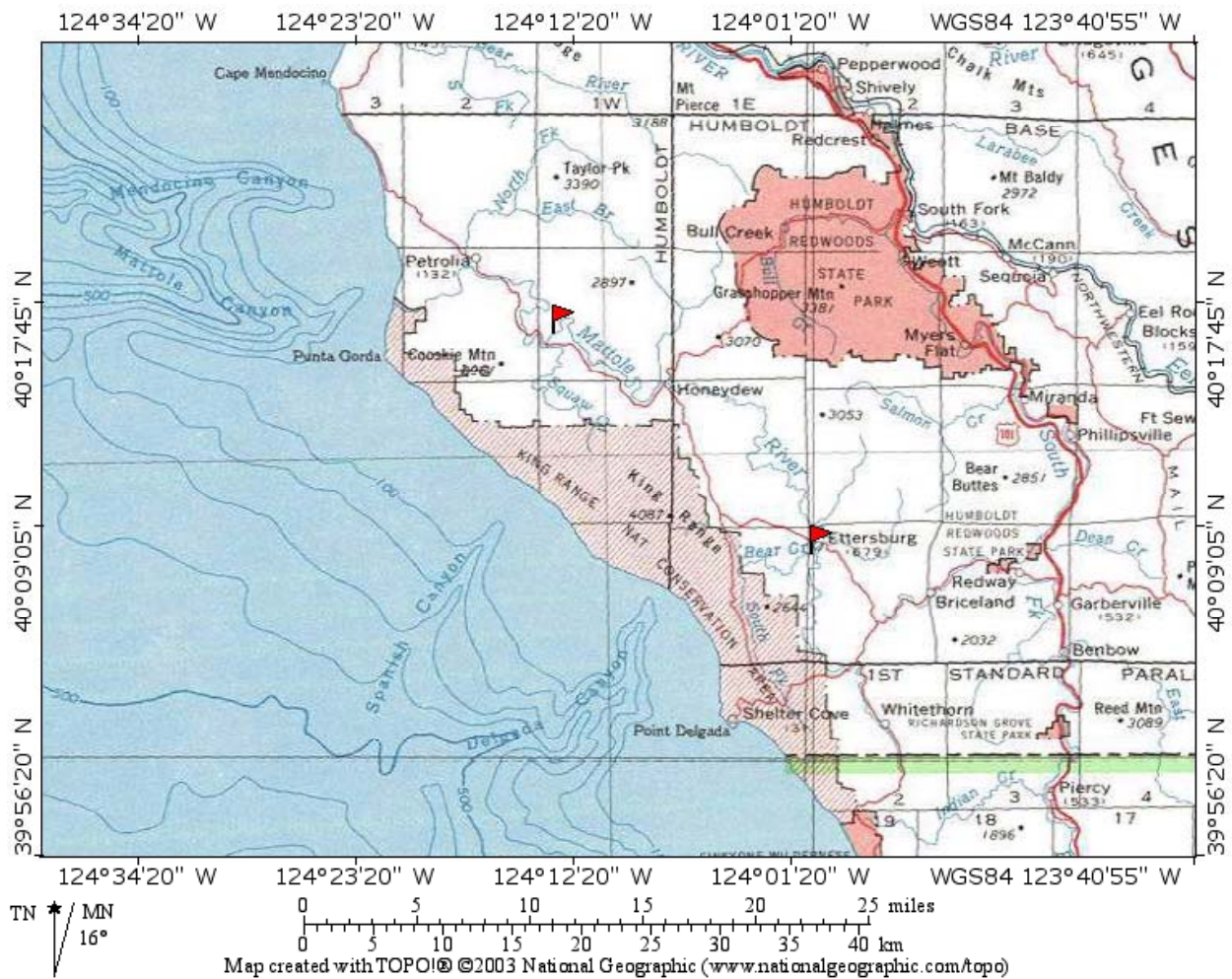
In past years, the MSG utilized an adult fish weir primarily to capture fall run Chinook and coho salmon in order to fulfill the native brood stock needs of a small hatchbox program. Data collection was an ancillary benefit. The California Department of Fish and Game, the hatchbox program's longtime primary funder and permitting agency, suspended the program following the release of the juveniles in spring 2004. 2005-06 marked the first year of adult trapping primarily for data collection for MSG's Adult Escapement Program. The main goal of the MSG's Adult

Escapement Program is to collect data that will help determine valuable information such as run timing, escapement, species composition, and returns from MSG's Hatchbox Program and Chinook Survival Enhancement Program. In addition to the ongoing spawner surveys, 2005-06 saw the introduction of standard mark-recapture population estimation techniques. Live Chinook adults captured at the mainstem traps were marked with easily visible spaghetti tags and then released otherwise unharmed. These marked fish were subsequently observed again at traps and on the spawning grounds as they migrated and spawned. Trapping was conducted on a total of 9 days between November 1, 2005, and December 17, 2005, at the Ettersburg trap site. In addition, trapping occurred one day at the Lower Mattole trap site, located just upstream of the confluence of Squaw Creek, on November 24th, 2005. To assess the valuable information listed in our goals above, particularly for trend analysis purposes, adult trapping needs to be conducted over many consecutive years.

## **Materials and methods**

### **Trap Site**

The primary 2005-06 trap site was located at the MSG's principal trapping and spawning station since the 1986-87 season, located on Richard and Sally French's land in Ettersburg. The trap was in the mainstem Mattole River, approximately 200 yards upstream from the Bear Creek confluence (river mile 42.8). In addition, a trap site was set up for one night, on November 24, 2005, at river mile 15 located on Joe and Linda Yonts' property approximately 1/4 mile upstream of the Squaw Cr confluence.



**Figure 1. Mattole River 2005-06 Adult Trap Locations .** The red flags indicate the sites.

## Trap Design and Operation

At the Ettersburg trap site, trapping was conducted using a portable, modular fyke-entrance trap, constructed using panels to form both the weir and a large instream pen. Panels (each 6 feet wide by 4 feet high) are constructed of redwood and have horizontal slats set 2” apart. Panels are supported by, and tied to, metal fence posts driven into the riverbed, and are secured at the bottom by feed-sack sandbags placed on a “skirt” of plastic construction fencing. The trap mouth opening is set at about 1 foot wide and is fitted with a swinging gate that is tripped manually from shore to prevent the escape of fish that enter the pen.

At the lower river trap site, an Alaskan weir constructed by the MSG was used. The Alaskan weir consists of modular, tripod bases (constructed of 6 inch and 4 inch diameter peeled Douglas-fir poles) arranged across the channel. Up-migrating fish are directed towards the weir panel pen by the placement of 1 inch diameter steel conduit that is fitted into aluminum channel guides along the upstream side of the tripod bases at a distance of 2 inches apart and secured by



hand into the substrate. The tripods are held in place by fence posts driven into the substrate and a steel cable anchored on the bank. This weir is used along with the traditional panel pen to form a larger holding area and more flexible trap configuration than is usually seen with Alaskan type weirs.

Once final permit permission was granted, river conditions ultimately determined when the trap was operated. The trap was put in and removed depending on flows. No trapping could be conducted with flows at the trap site greater than 700 cfs due to debris loading that leads to physical failure or overtopping of the weir and personnel safety issues. Hence, when flows rose, the trap gear was removed from the river and reinstalled when flows receded. When the trap was in the river, at least one panel was removed during the day to allow fish passage while the trap was not staffed. Trapping occurred, with continuous personnel presence, from sunset to sunrise, with checks at least every two hours.

Pertinent information and observations were recorded in a daily logbook and then later transferred to the MSG database and analyzed on completion of the project. The following information was recorded:

- (1) Times and dates of trap placement and removal;
- (2) Times and dates of trap checks;
- (3) Weather and flow conditions at each placement, removal and check;
- (4) Species ID, sex and length for all fish that entered trap;
- (5) Estimated weight and condition of all fish that entered trap;
- (6) Presence of any existing tags, marks or fin clips;
- (7) ID number and color of tag applied;
- (8) Whether scale and/ or tissue samples were taken;
- (9) Whether fish was diverted into the holding facility for egg taking.

## **Biological Sampling Procedures**

### **Monitoring**

Trapped fish were dip-netted, identified to species and sex, inspected to measure fork length and physical condition, and examined for hatchery marks (fin clips, maxillary clips), previous tags and other distinguishing characteristics (hook scars, net marks, predator wounds, deformities, etc.). All observations and tagging were made while the fish remained in a hooded cradle in order to impart the least amount of stress possible for the fish. After these observations and tagging were complete, a scale sample was taken for later analysis. Immediately after the described observations and sample collection every fish was released upstream of the weir (in an area of slower moving water as necessary for fish safety). Fish were kept under observation until they swam away. Average time spent working with each fish was two minutes. A mixture of Nov-Aqua and water was applied to each fish while handling in order to help maintain slime coating.

The Chinook were tagged with a Spaghetti tag manufactured by Floy©. Spaghetti tags are inserted near the dorsal fin using extreme caution and care so as not to stress the fish. These tags are used as a means of identifying fish during spawner and snorkeling surveys, in addition to

recapture at weirs and as carcasses. The Spaghetti tag colors utilized this year were: **Orange, Yellow, Red, Blue, Pink, Green, and White**. All tags have specific numbers and colors. Colors were changed weekly to distinguish between dates and traps. MSG personnel were trained on tag insertion by USFWS Fisheries Biologists Tom Shaw and Jason Ogawa.

Tag recoveries were accomplished both by recapture at trap sites upstream of the marking location and as live and carcass observations during spawner surveys. Live observations during surveys were anecdotal relative to the mark-recapture estimate due to the inability to read the unique ID number on the tag and the resulting possibility of multiple observations of the same fish. However, live observations did allow recognition of tag color thus providing insight into the ratio of tagged to untagged fish observed and run timing.

## **Quality Assurance/Control Procedures**

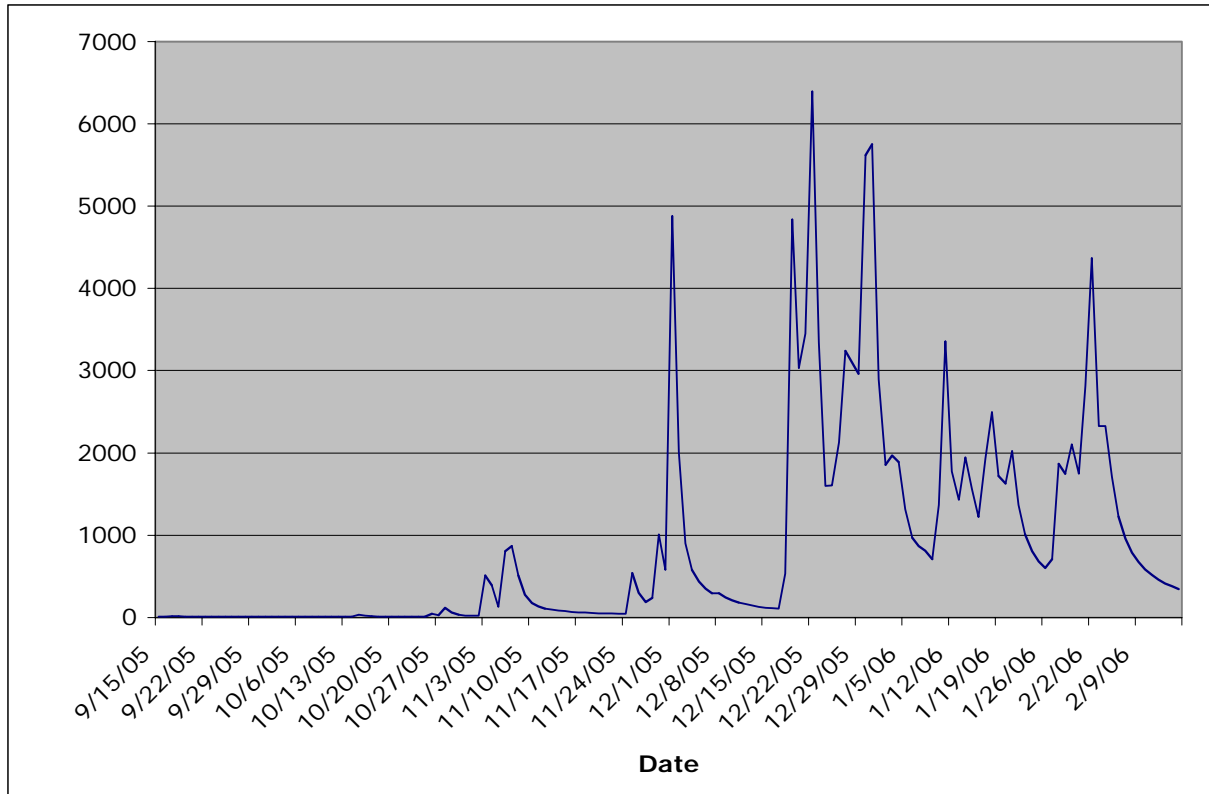
Prior to the initiation of trapping, a training session was required for all trap personnel. Training was given by experienced MSG staff and the aforementioned USFWS personnel. Training covered fish identification, trap operation, fish measurement (fork lengths of adult salmonids), data recording, safety, and QA/QC procedures. The training session also included tag application and sample collection utilizing a Chinook carcass. Trained trap operators counted the total number of fish trapped, and were able to accurately identify the species of each individual fish. Experienced personnel always accompanied and supervised inexperienced personnel at the trap. At least one holder of a valid CDFG Scientific Collectors Permit was required to be present at the trap whenever it was in operation.

## **Results and Discussion**

### **2005 Rainfall and Flow Patterns**

Figure 2 illustrates river flows just downstream of the Ettersburg trap site and Bear Cr. confluence. The 2005-06 Mattole River adult salmonid migration likely began with the opening of the river's mouth on October 15, 2005. Due to permitting delays, the trapping season began on November 9, 2005. Trapping was interrupted by flow events that were too high for safe and effective trapping and too low for fish passage upstream. Trapping ended on December 17, 2005 with the commencement of sustained high flows for the following month, during which time the last of the Chinook migration likely passed the permitted trap sites.





**Figure 2. Mainstem Mattole River flow at Ettersburg during the 2005-06 Adult Salmon Migration and Spawning Season.** This data is daily mean discharge from an automatic gauge operated by the U.S. Geological Service located at the bridge in Ettersburg where the county road (Telegraph Ridge Rd./Wilder Ridge Rd.) crosses the Mattole River. Further information on the gauge as well as water temperature and stage height can be found on the internet at: [http://waterdata.usgs.gov/nwis/uv?dd\\_cd=01%2C02%2C03&format=gif&period=30&site\\_no=11468900](http://waterdata.usgs.gov/nwis/uv?dd_cd=01%2C02%2C03&format=gif&period=30&site_no=11468900). Similar information is available for a USGS gauge in Petrolia.

### 2005 Catch Totals

Trapping occurred on 9 days in 2005, or on 23.1% of the period from the issuance of permits until high flows ended the trappable portion of the run. (November 9, 24, 26, 27; December 5, 6, 7, 8, 10, 13, 17). This represents approximately half of the potential number of trappable days had permits been in place prior to the beginning of the runs on October 15th. A total of 51 adult salmonids were captured, comprised of 39 Chinook salmon, 11 coho salmon, and 1 steelhead. Chinook salmon were captured on all trapping days. Coho salmon were captured on all trap days from November 26th to December 10th, except on November 27th; and one steelhead (sex unknown, 27" fork length) was trapped on December 5th. All Chinook salmon were tagged; coho salmon and steelhead were not.

Of the 39 Chinook salmon trapped, 9 were female (49%) and 20 were males (51%). Chinook salmon fork lengths ranged from 17 inches (December 6, 7, and 17) to 43 inches (December 6), with an average fork length of 31.0 inches. Males ranged from 17.0 inches to 43 inches, with an average fork length of 31.3 inches. Females ranged from 32 inches (November 26) to 38 inches (November 24), with an average fork length of 35.1 inches.

Of the 11 coho salmon trapped, 6 were female (55%), 4 were male (36%), and 1 was unknown (9%). Coho salmon fork lengths ranged from 17 inches (12-05-05) to 27 inches (12-10-05), with an average fork length of 23 inches. Males ranged from 23 inches (12-06-05) to 27 inches, with an average of 24.8 inches. Females ranged from 17 inches to 26 inches (12-05-05), with an average fork length of 21.3 inches.

## 2005 Objectives

### **Mark and Recapture**

There were a total of **39** Chinook marked. Eight tags on live fish were observed during spawner surveys (21% of total number marked)(includes Floy's, 6 otherwise) on the spawning grounds and during migration. One carcass was recovered with holes resulting from a spaghetti tag, but the tag was missing. These observations indicate the viability of observing and recovering tags on spawner surveys and anecdotally help indicate the ratio of tagged to untagged fish. However, there were no recaptures of individual tag numbers, making it impossible to utilize the Peterson mark-recapture equation. This was the unfortunate result of a combination of factors. There was no lower river trapping or seining during the low water period of October and early November due to permit restrictions and only one day of lower river trapping all season, thus precluding recapture of tags at the Ettersburg trap site. There also was a shortage of spawner survey personnel during the crucial tagged carcass recovery window during the second week of December. The subsequent sustained high flows of late December and early January prevented any further tagging or recovery for the end of the migration and spawning period.

The MSG looks forward to the 2006-07 season when permits are expected to be in place prior to the mouth opening so that trapping can take place in the lower river during the low water period and tags recaptured at Ettersburg, as was originally proposed this year. Unfortunately, it appears that seining will again not be permitted, thus limiting the opportunities for marking large numbers of adults as they hold in schools during very low flow events. For example, spawner surveys on November 19, 2005 located several accessible pools holding 20-50 Chinook. Seine capture at these locations as the low flow continued for several more days would have allowed as many as 200 fish to be marked in the lower river early in the run, which would certainly have resulted in numerous recaptures at the Ettersburg trap. An additional potential improvement to the program would be the permitting of trapping at any available location as flows and the progression of the migration allows, rather than being limited to only two sites. For example, trapping near the MSG office downstream of Petrolia in October when the low flows were limiting fish upstream migration would have resulted in the capture of fish that could have been recaptured during seining in November and at both of the permitted trap sites upstream.

### **Age Analysis and Interpretation of Stock-Specific Life History**

A selection of scale samples collected from Chinook salmon during the 2005 adult trapping season were analyzed for age determination. Scales were removed from each fish below the

insertion of the dorsal fin and the lateral line. Scales were then mounted on slides and read through a microfiche reader at the US Fish and Wildlife Service on March 9, 2005. A total of 45 samples were collected; however 9 samples were unreadable. Sixteen (44%) were determined age 2; four (11%) were determined age 3; fourteen (39%) were determined age 4; and two (6%) were determined age 5.

## Sightings

Date	Tag	Location	Comments
11/23/2005	ad clip	mainstem, just DS of Hideaway bridge	male, 36"
11/30/2005	yellow spaghetti	mainstem, just DS of Mendocino county bridge	female, 35", on redd
12/3/2005	yellow spaghetti	Upper Mill Cr., near Kirk's	male, 14"
12/4/2005	yellow spaghetti spaghetti holes, no tag	Bridge Cr., upper mainstem	female, 28", on redd
12/5/2005	ad clip	mainstem, Ettersburg trap site	male, 30"
12/5/2005	ad clip	mainstem, ~1/8 mile DS of Dreamstream	female, 32", on redd male, 35", was seen a
12/11/2005	orange spaghetti	mainstem, ~ 1 mile DS of Little Finley Cr.	movie
12/11/2005	yellow spaghetti	mainstem, near Grasshopper Hill	female, 33", on redd
1/5/2006	ad clip	Thompson Cr., ~3/4 mile US of strawbale	unknown sex, 14", he
1/6/2006	ad clip	Bridge Cr., just US of Olsen's house	male, 36", head tag #

**Table 1. Tagged Salmon Observed while conducting spawner surveys.**

## Conclusions and Recommendations

The 2005 adult Chinook escapement monitoring effort was hindered by: (1) permitting timing, (2) high flows, and (3) lack of flexibility of the trapping program. Permitting conflicts should not be an issue in upcoming years. High flows will almost always restrict the ability to trap during all permitted times, but could be improved with increased flexibility of the trapping program and improved techniques and trapping facilities. Recapture efforts could be improved with more flexibility and increased coverage of critical spawning periods. We will be investigating the feasibility and cost of using the latest technology for trapping and counting fish including different weir designs and high resolution sonar technology.

## Literature Cited

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