

Final Report

Spawning Ground Surveys, 2006-2007 Season Mattole River Watershed



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Final Report

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Abstract

The Mattole Salmon Group (MSG) has conducted annual spawning ground surveys in selected mainstem and tributary reaches in the Mattole River watershed for 26 consecutive seasons, from 1981-82 through 2006-2007. Data are used to track long-term trends in escapement and spawner distribution for fall-run chinook salmon (*Oncorhynchus tshawytscha*) and coho salmon (*Oncorhynchus kisutch*). Some data is incidentally collected on steelhead /rainbow trout (*Oncorhynchus mykiss*). The 2006-2007 spawning ground surveys covered 70.89 miles of mainstem and tributary habitat with an accumulated total of 100.76 miles surveyed due to repeat surveys in some reaches. This included coverage of approximately 78.6% of the total available habitat in the mainstem (51.09 surveyed miles of the approximately 65 total miles). The percentage of tributary habitat was much lower and is also unknown due to much more stringent property access restrictions in the tributaries as compared to the mainstem. Redd counts are used as an indicator of escapement in index reaches because of the inconsistency of live spawner sightings and the low number of carcass recoveries. The 2006-07 spawner season was characterized by fairly typical or above average storm frequency, but low intensity. This resulted in relatively constant but low stream flows, particularly early in the season and limited opportunities for fish to migrate upstream during peak flows. As a result, fish were trapped below naturally occurring low flow barriers for extended periods. This resulted in little opportunity for repeat surveys as fish held and waited in the few reaches they occupied, which had already been surveyed. During the mid and late season surveys were precluded in the mainstem by constant moderate flows. In the upper river tributaries and upper mainstem Mattole there were numerous repeat surveys triggered by small rains. Surveys began on November 10, 2006 and continued intermittently as weather allowed through the last survey on January 16, 2007. Repeated surveys of well established index reaches have been supplemented by surveys of some past index reaches where survey effort had lapsed in recent years and surveys in some promising new reaches. Prior to beginning the 2006-07 spawning survey season, Mattole Salmon Group biologist Campbell Thompson conducted a one day training session covering the MSG training manual for these surveys, as well as fish identification techniques and carcass handling using an actual carcass and photos and videos of live fish, redds and carcasses from past survey seasons.

Introduction and Methods

The 2006-07 season marked the 26th consecutive year of spawning ground surveys in the Mattole River watershed. These surveys provide data on the distribution and relative abundance of live salmon spawners, carcasses, and redds (spawning nests) in key tributaries and selected mainstem reaches. Surveys are conducted by a resident network of trained volunteers and paid personnel by wading, canoeing or snorkeling specified stream segments one or more times during the

salmon spawning season- generally late November through late January. Data are used as an indicator of changes or trends in salmon escapement, and for evaluation of progress towards restoration goals. For further background on the program and it's past data as well as data analysis techniques, please refer to the State of the Salmon report section on spawner surveys. The report can be found on the MSG website: www.mattolesalmon.org

The basic protocols for conducting spawning ground surveys in the Mattole have remained consistent from the 1985-86 season to the present. In the fall of 1997, MSG Project Coordinator Gary Peterson prepared a detailed, 14-page training manual and developed a series of new data forms that facilitated the recording of information in the field. The manual and field forms were updated in November 1998 (version 2.2) and issued to prospective surveyors with two attachments, a one-page Safety Sheet and an 8-page guide to identification of adult salmonids. Prior to beginning the 2003-04 spawning survey season, Mattole Salmon Group Biologist Gary Peterson again updated and added to the 1998 training manual for these surveys. The 2004-05 season saw the initiation of a one day training session conducted by MSG Project Coordinator Campbell Thompson covering the MSG training manual for these surveys, as well as fish identification techniques and carcass handling using an actual carcass and photos and videos of live fish, redds and carcasses from past survey seasons. Attendance at the training session was intended to add to rather than to supplant the standard field training and quality control that has been used in the past. As in past years, on the job field training and quality control consisted of experienced surveyors (particularly the Project Coordinator) accompanying new participants for at least the first few outings of the season or until they demonstrated proficiency. As soon as possible after each survey the Project Coordinator reviewed data sheets and debriefed surveyors in order to clarify and correct the survey forms as necessary. After data entry, the Project Coordinator thoroughly checked each entry for errors.

All survey forms, maps, photographs, scale samples and ancillary information are kept on file by the Mattole Salmon Group (MSG). These materials are available for review and/or duplication by contacting the Project Coordinator. In the past, the information gathered in the field each season was entered into a Word table and distributed as raw data compilations to agencies, funding entities, and interested groups and individuals. This season marks the third since the transition of the annual data compilation to an Excel spreadsheet format that allows easier rearrangement of the data, summary analysis and graphical presentation. The recent State of the Salmon report further consolidates and analyzes the past ten years of Word survey data. Many of the past ten year's spawner survey data are digitized as layers in a Geographic Information System (GIS) maintained by the Mattole Restoration Council (MRC). Future plans are to continue the annual digitization of data into the GIS database and develop a query-able relational database, linked to the GIS database.

Established index reaches include the upper Mattole mainstem, Thompson Cr., Yew Cr., Danny's Cr., Baker Cr., Bridge Cr., McKee Cr., the mainstem Mattole through Whitethorn, the mainstem Mattole from Big Finley Cr. to Bear Cr., the mainstem from Bear Cr. to Four Mile Cr., the mainstem from Honeydew Cr. to Petrolia, upper and lower Mill Crs., and the South Fork of Bear Cr. Past index reaches that were renewed in 2003-04 include Eubanks Cr. and Honeydew Cr. New reaches for the 2003-04 season included Vanauken Cr., Indian Cr., Clear Cr., Big Finley Cr.

and Mattole Canyon Cr. The 2004-05 season covered most of these reaches, with the exception of Big Finley Cr., Mattole Canyon Cr. and Eubank Cr. New reaches in 2004-05 included Squaw Cr., East Mill Cr. and the mainstem from Four Mile Cr. to Honeydew Cr. The 2005-06 season covered all these reaches except Big Finley Cr., Squaw Cr., Mattole Canyon Cr. and Indian Cr. New reaches included the Lower North Fork of the Mattole, Ancestor Cr. and Honeydew Cr. above the Lower East Fork. During the 2006-07 season all these were covered except Big Finley Cr., Squaw Cr., Mattole Canyon Cr., Indian Cr., the Lower North Fork of the Mattole, Ancestor Cr., the mainstem downstream of Lindley Bridge, Lower Mill Cr., Eubanks Cr. and East Mill Cr.

Eleven people were involved in the survey effort during the 2006-07 season. Seven new surveyors received field training this season. All the surveyors received refresher training in the current protocol. MSG's Project Coordinator for Spawner surveys (Campbell Thompson) was involved in 59.3 miles of survey, or about 59% of the total accumulated mileage, including all but two of the surveys conducted by boat. Many thanks are given to all the people who participated in surveys. In no particular order, they were: Sean James, Jill Grbavac, Gary Hughes, Joe Sandoval, Forrest Phifer, Gary "Fish" Peterson, Eric Goldsmith, Mike Gordon, Jen Hayes and Natalie Arroyo. Thanks also go out to the Americorps Watershed Stewards Program for the contributions of Jill Grbavac, Jen Hayes, Natalie Arroyo and Mike Gordon.

Over the course of the season, numerous photos and video clips of live fish, spawning activity, redds and carcasses of all salmonid species were taken with the intention of adding them into the current training video. This will allow improvement of the training before the season, thus increasing MSG's ability to maximize our survey effort during the short season. It also allows numerous surveyors to see and compare observations at one time without disturbing living specimens and, most importantly, it will help overcome the perennial problem of trying to train new surveyors, who have not seen any salmonids before, on surveys with few or no actual observations.

Observations of "unknown" and "not determined" were lumped together with the 2004-05 season due to a lack of clear rationale for having them separate and this was continued during the 2005-06 season. These categories have in the past attempted to separate steelhead from chinook and coho when the species identification was unclear. However, in those cases where identification is unclear, the usual confusion is between coho and steelhead, since these two species are the closest in size, coloration and habitat usage relative to chinook. More importantly, the two categories created confusion for surveyors, needlessly complicated analysis of the data and introduced an unnecessary opportunity for observer bias. Lumping all unidentified observations into one "unknown" category eliminates these problems. Observations of unknown species live fish and carcasses were low, reflecting good identification skills amongst the season's relatively experienced surveyors. However, the number of unknown species live fish observed did rise, largely due to the large overall number of live fish observed. These were frequently seen in large schools resulting in less certainty about the exact species of each fish. As usual, the number of unknown redds was considerable due the difficulty in identifying an unoccupied redd to species.

Another change instituted in the 2004-05 report is in the data breakdown by tributary. In the past all tributaries with the exception of Bear Cr. had been lumped together and Bear Cr. reported separately. This was due to the presence in Bear Cr. of a MSG hatchbox and rearing facility. This facility was closed after the 2003-04 trapping and rearing season. More importantly, the rationale for separating out Bear Cr. inexplicably did not apply to the other hatchbox influenced reaches in the upper mainstem. As a result, it now seems more relevant to break down tributaries by their position in the watershed, particularly since the upper watershed differs significantly from the lower watershed in terms of land use and underlying geology. However, since the Escapement Index database was built with the prior system of tributary distribution, the older arrangement is retained for the EI tables and figures. This has proved convenient for this season in generating Fig. 13 and pinpointing the location of this season's increase in coho redds.

Results and Discussion

Tabular summaries of the 2006-07 survey results are appended at the end of this report. Tables were prepared separately for mainstem reaches (Tables 1-3) and tributary surveys (upper river tributaries: Tables 4-6 and lower river tributaries: Tables 7-9). Within each of these groups, there is a separate table for observations of live fish (Tables 1, 4 and 7), carcasses (Tables 2, 5 and 8), and redds (Tables 3, 6 and 9). A summary of all of the past twelve years of Mattole spawning ground surveys is presented in Table 10. Table 11 contains the Escapement Index data for all the years of the summary table. Major findings, interpretations and conclusions from the 2006-2007 season are discussed below and illustrated with selected figures. Figure 1 is a chart of river flow during the season and Figure 2 depicts survey effort and coverage for each season since 1994-95. Figures 3-5 are maps of the surveyed area. Figures 6-8 show the total number of live fish, redds, and carcasses observed by species for all of the seasons since 1994-95. Figures 9-12 depict the Escapement Index for chinook and coho for four separate subbasins for all seasons since 1994-95.

Survey timing during the 2006-07 season was roughly comparable to inventory efforts in past years. From November 10, 2006 through January 16, 2007, a total of 49 surveys were conducted. As usual, surveys of a given reach were scheduled to maximize the observation of live fish, redds and carcasses. For a complete explanation of the factors involved and how this is accomplished please refer to the State of the Salmon report Spawner section on the MSG website.

Run and rainfall/flow timing were relatively later than "normal" during this season. Figure 1 shows the flow (discharge in cubic feet per second) at Ettersburg during the season. The runs started about two weeks later than usual with the mouth of the river first opening on November 2 and salmon started coming into the river. The light rains were spaced with dry spells, so the river dropped quickly between storms and adult fish in the river found themselves trapped in whatever pools they could find in the lower river below Honeydew until mid November. When the rains picked up briefly in mid-November, they were still relatively light and while the river rose enough to allow salmon to reach the headwaters area in Whitethorn, they were only in the mainstem, not in tributaries. Surveys in early December saw plentiful chinook holding in the mid-mainstem river with a small amount of spawning occurring. Observations of coho were notably low, with few live fish observed and no spawning. More heavy and sustained rains (although still below average for the time of year) began in mid-December and continued

through Christmas and into mid-January. Further mainstem surveys downstream of Whitethorn were impossible due to turbidity causing low visibility for the remainder of the season. The numerous small storms resulted in several short series of surveys in the headwaters tributaries and upper mainstem. While good numbers of chinook were observed spawning the low numbers of coho continued to stand out from the norm. The last round of surveys during the second week of January saw the low numbers of live fish and preponderance of carcasses typical of the end of the chinook and coho runs. It notably did not see the typical appearance of the first few arriving steelhead. Rains did not return until the second week of February. Unfortunately, despite the potential for observation of additional live fish, redds and carcasses in the lower reaches of the river during this period, funds and personnel availability ran out and the surveys came to an end. Despite the steelhead's status as a federally listed threatened species here in the Mattole, funding has not been available for continuing the spawner survey program during the majority of the steelhead run. As a result, just as in past years, this is where the survey season ends, when the majority of the steelhead begin to arrive.

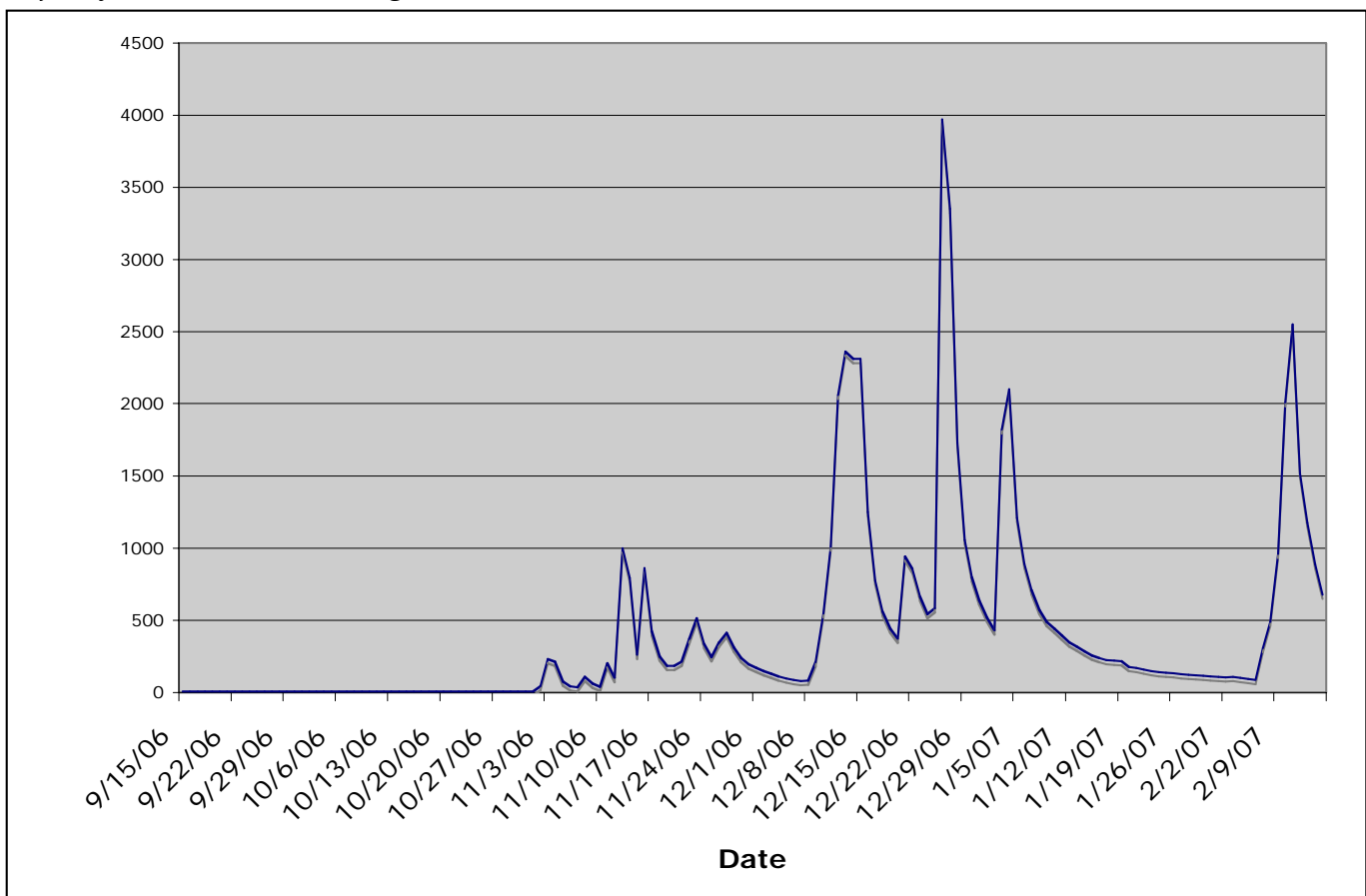


FIGURE 1: Mainstem river flow at Ettersburg during the 2006-07 MSG Spawning Survey Season.

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. Similar information is available for a USGS gauge in Petrolia.

Survey coverage during the 2006-07 season was about average compared to efforts in past years. Figure 2 shows miles surveyed and accumulated miles from 1994 to 2007. Figures 3-5 are maps showing the reaches surveyed. During the 2006-07 season 70.89 miles of mainstem and tributary habitat were inventoried. Some reaches were covered two or more times, resulting in 100.76 accumulated miles of survey. In the mainstem Mattole, 51.09 miles were surveyed (63.61 accumulated miles), comprising about 78.6% of the entire mainstem length. All mainstem surveys below the Mendocino County Bridge were done by canoe. The remaining headwaters reach was waded. In the tributaries, 19.8 miles were covered (37.15 accumulated miles) in 9 sub-basins containing historically productive salmon habitat. All tributary surveys were wading surveys. About 37% of the tributary coverage was focused on Bear Creek, the Mattole's third-largest tributary.

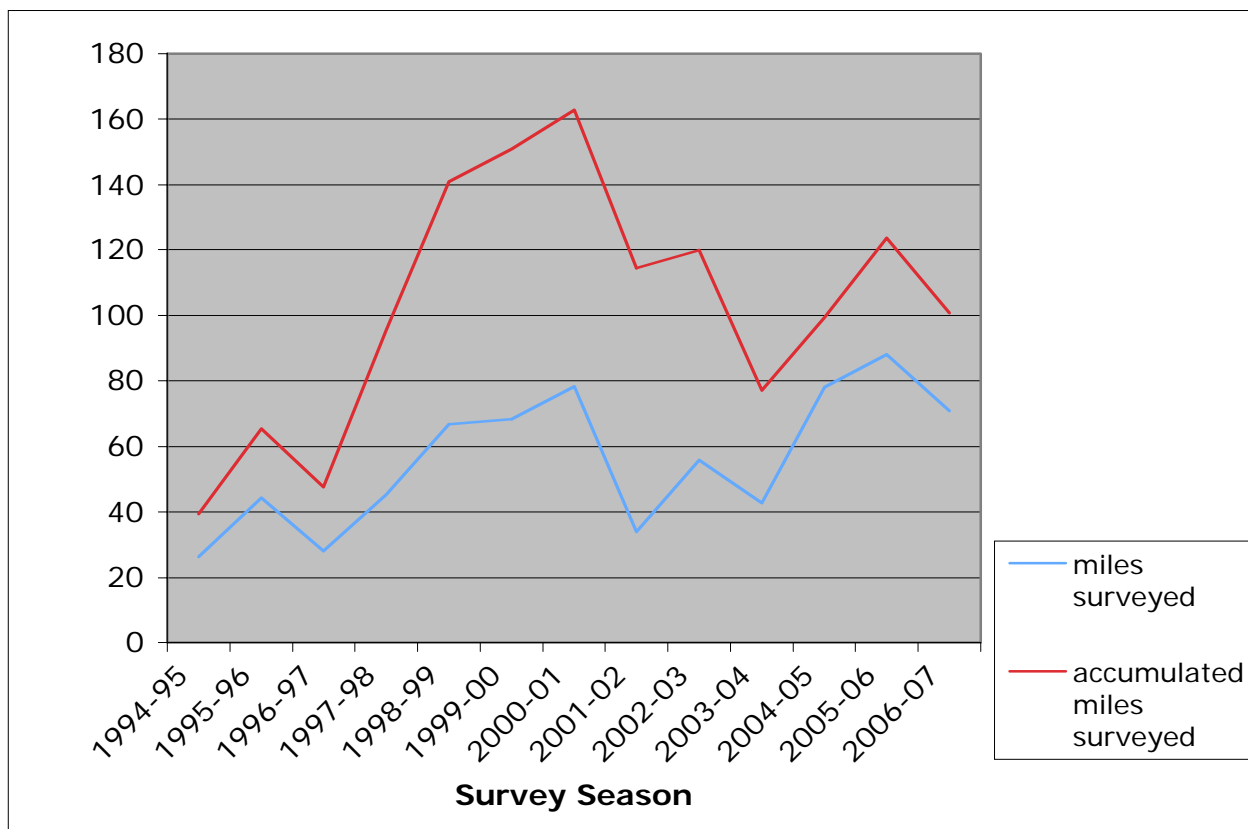


FIGURE 2: Survey effort and coverage for 1994-2007. The purple line shows the accumulated miles surveyed each season (survey effort) and the blue line shows the miles of stream that were covered each season.

The accumulated mileage is about the average over the past 13 years. In addition, the amount of stream covered is higher than the average of the past 13 years. This was largely due to three factors: the storm pattern during this year's season, availability of experienced personnel and availability of funding. Infrequent storms and low flows during the early season created good visibility throughout the watershed, including the lower mainstem, which in some seasons is unsurveyable due to turbidity throughout the season. This allowed extensive coverage of the

mainstem, but when combined with the personnel overlap between the adult trapping program and spawner survey program resulted in the moderate coverage. The mainstem reaches are all canoe surveys, with the exception of the uppermost reach above the Mendocino County Bridge in the Gopherville area, which allows many miles to be covered in a few surveys. At the same time the sustained moderate flows during the rest of the season prevented surveys of the mainstem and allowed only surveys of the shorter headwaters reaches. This resulted in more repeat surveys of short reaches. The relatively moderate availability of funding and experienced personnel this season enabled only limited surveys during the short breaks between storms. The unfortunate timing of the rainfall events coinciding with the Christmas holiday prevented MSG from taking advantage of some surveyable days due to personnel shortages. (Please refer to the separate 2006-07 MSG Adult Trap/Escapement report for detailed discussion of the tagging program) Future seasons may require the recruitment of additional experienced staff during these short periods.



FIGURE 3: Map of surveyed reaches in upper Mattole River. Surveyed reaches are shown in red.



FIGURE 4: Map of surveyed reaches in middle Mattole River. Surveyed reaches are shown in red.

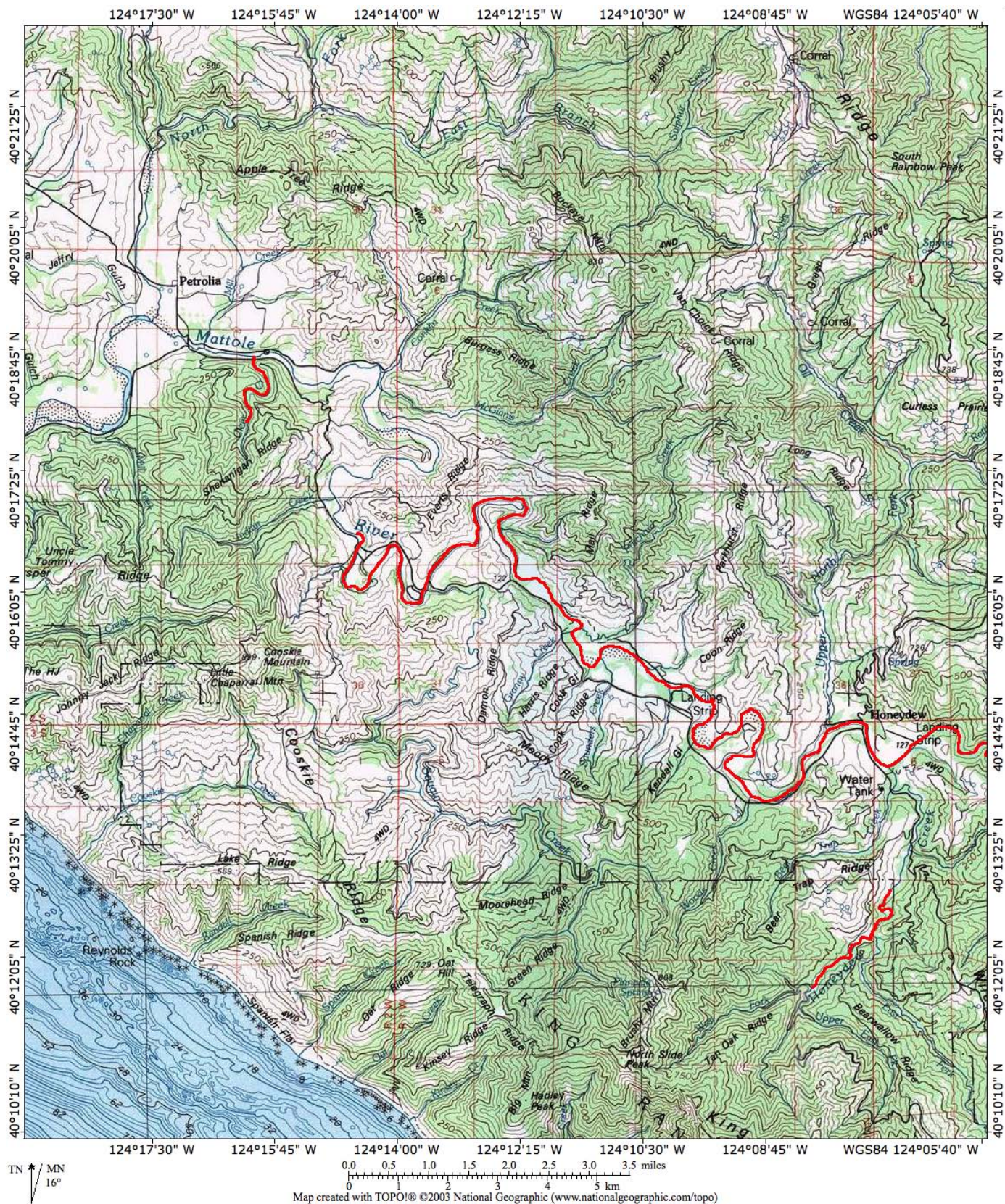


FIGURE 5: Map of surveyed reaches in lower Mattole River. Surveyed reaches are shown in red.

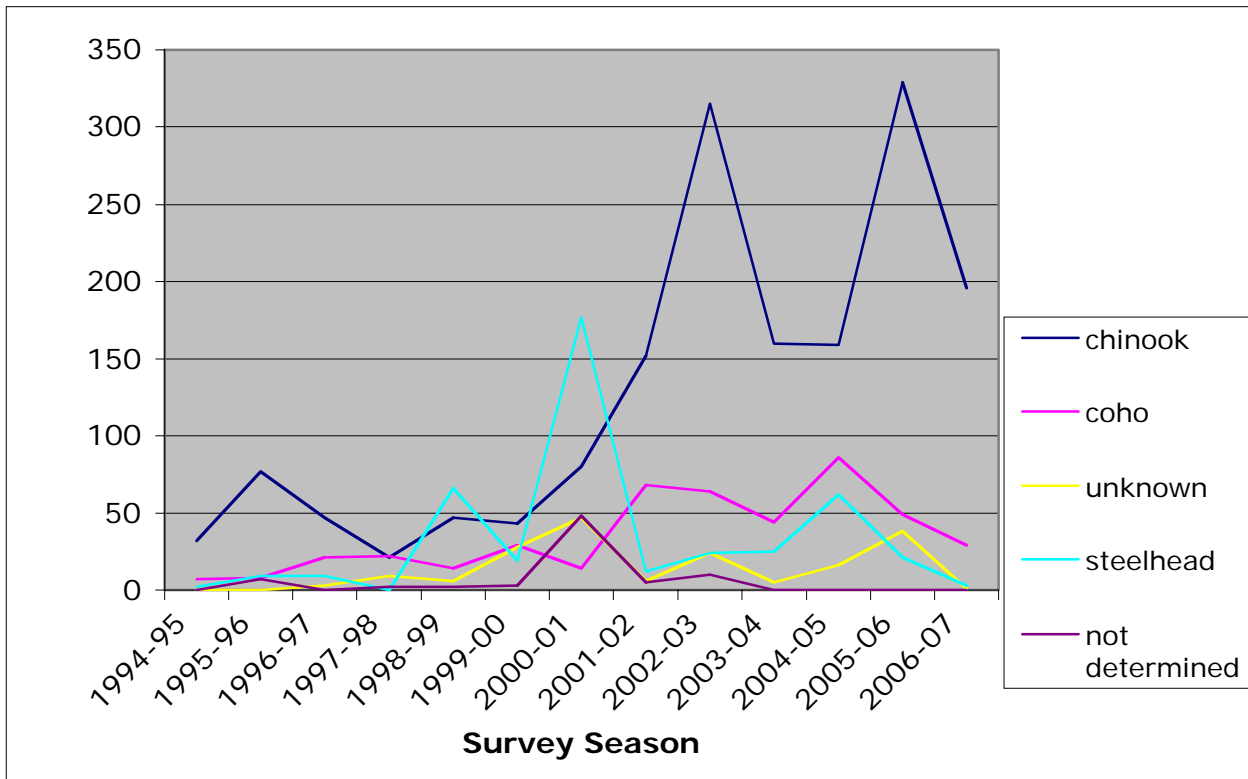


FIGURE 6: Observations of Live Adult Salmonids. Shown by species for all reaches combined for all seasons since 1994-95. Note that the “unknown” category has historically been used for either chinook or coho, but not steelhead, while “not determined” has historically included any of these three species. Beginning with the 2004-05 season these categories have been added together in one category as “unknown”, hence the maroon/purple line ends with the 2003-04 season.

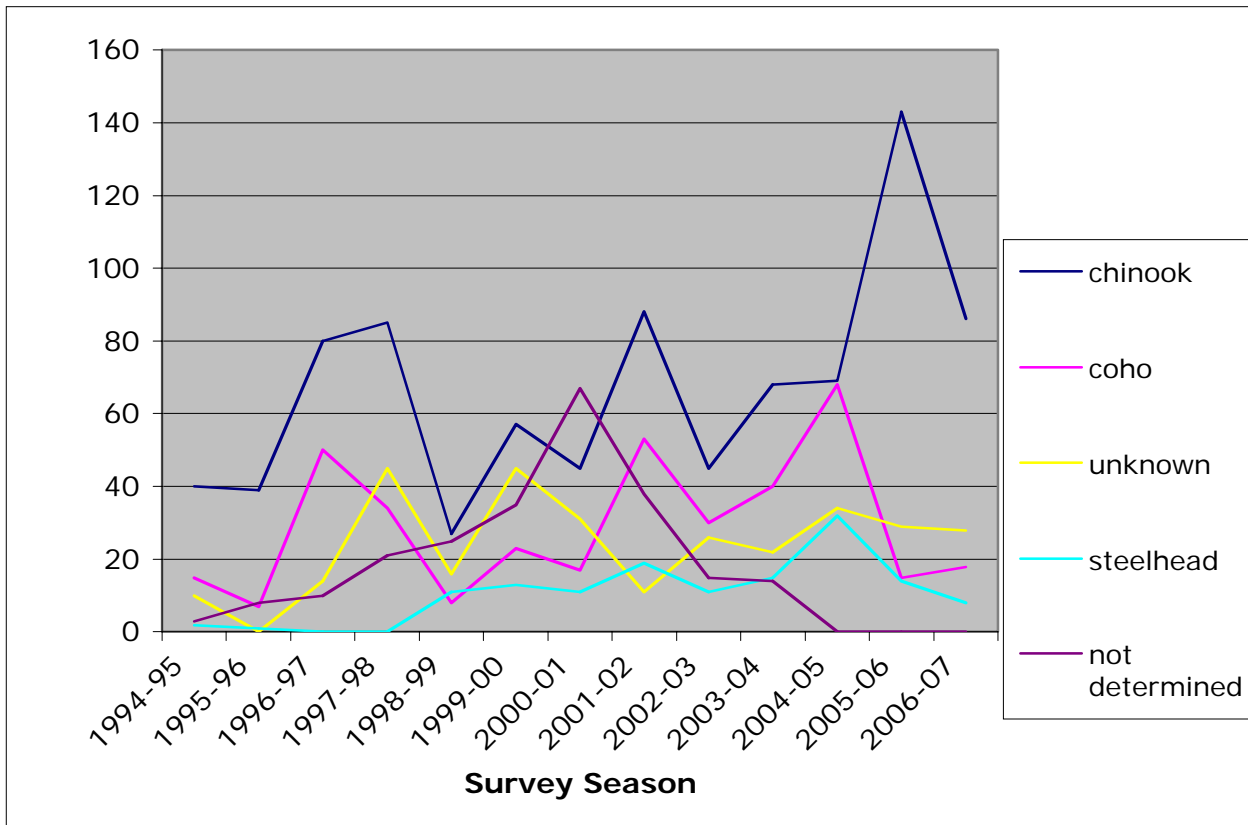


FIGURE 7: Observations of Redds. Shown by species for all reaches combined for all seasons since 1994-95. Note that the “unknown” category has historically been used for either chinook or coho, but not steelhead, while “not determined” has historically included any of these three species. Beginning with the 2004-05 season these categories have been added together in one category as “unknown”, hence the maroon/purple line ends with the 2003-04 season.

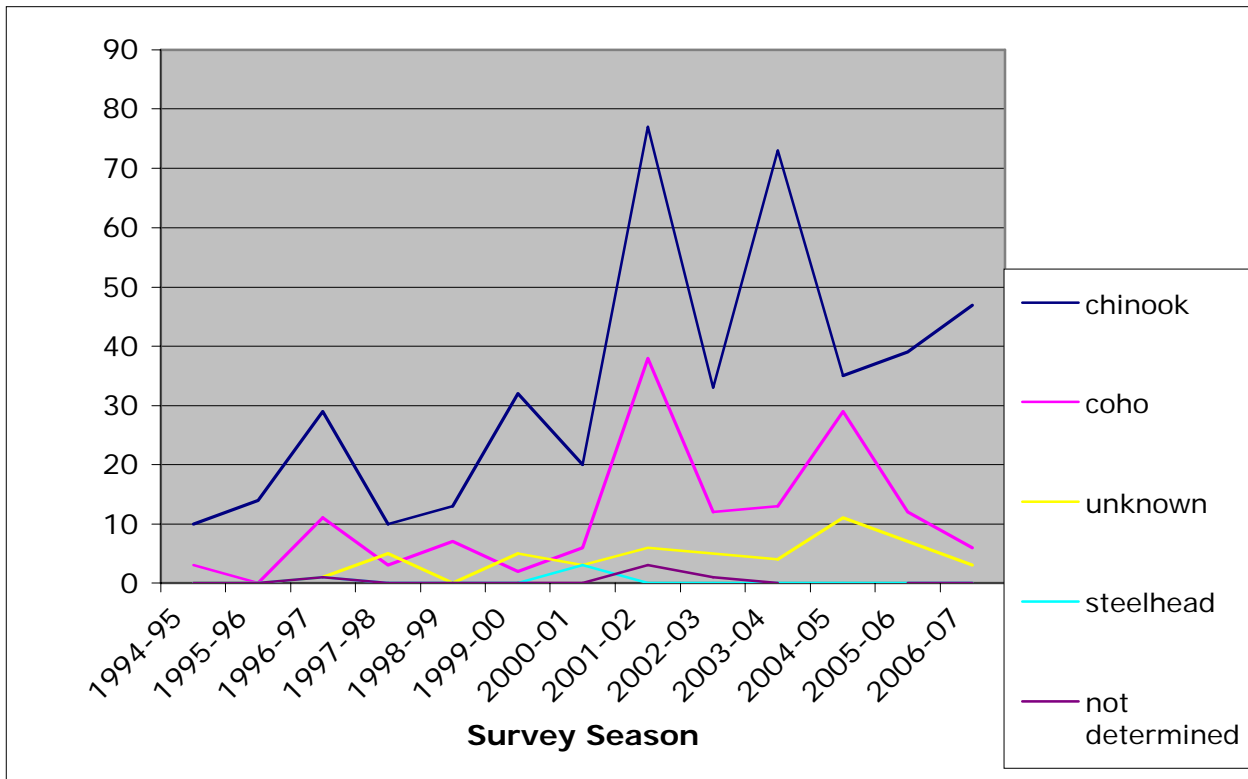


FIGURE 8: Observations of Carcasses. Shown by species for all reaches combined for all seasons since 1994-95. Note that the “unknown” category has historically been used for either chinook or coho, but not steelhead, while “not determined” has historically included any of these three species. Beginning with the 2004-05 season these categories have been added together in one category as “unknown”, hence the maroon line ends with the 2003-04 season.

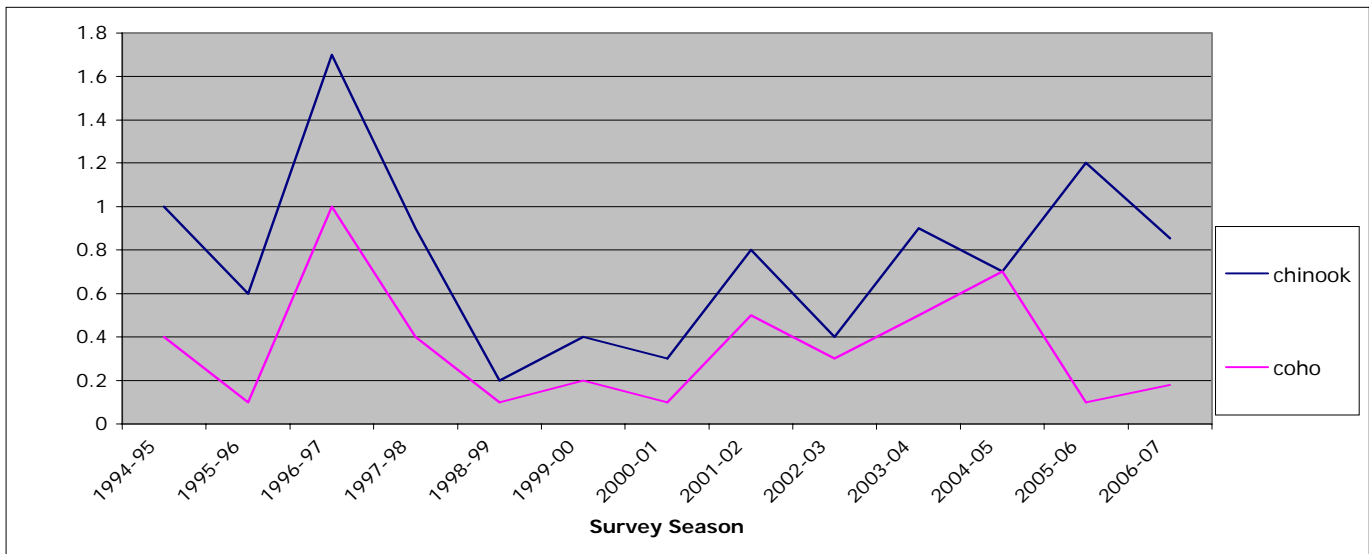


FIGURE 9: Escapement Index for all reaches combined. The EI is a comparison of number of redds observed corrected for amount of survey effort. For a further discussion of this index, please refer to the State of the Salmon 2005 report on the MSG website. Shown by species for all reaches combined for all seasons since 1994-95.

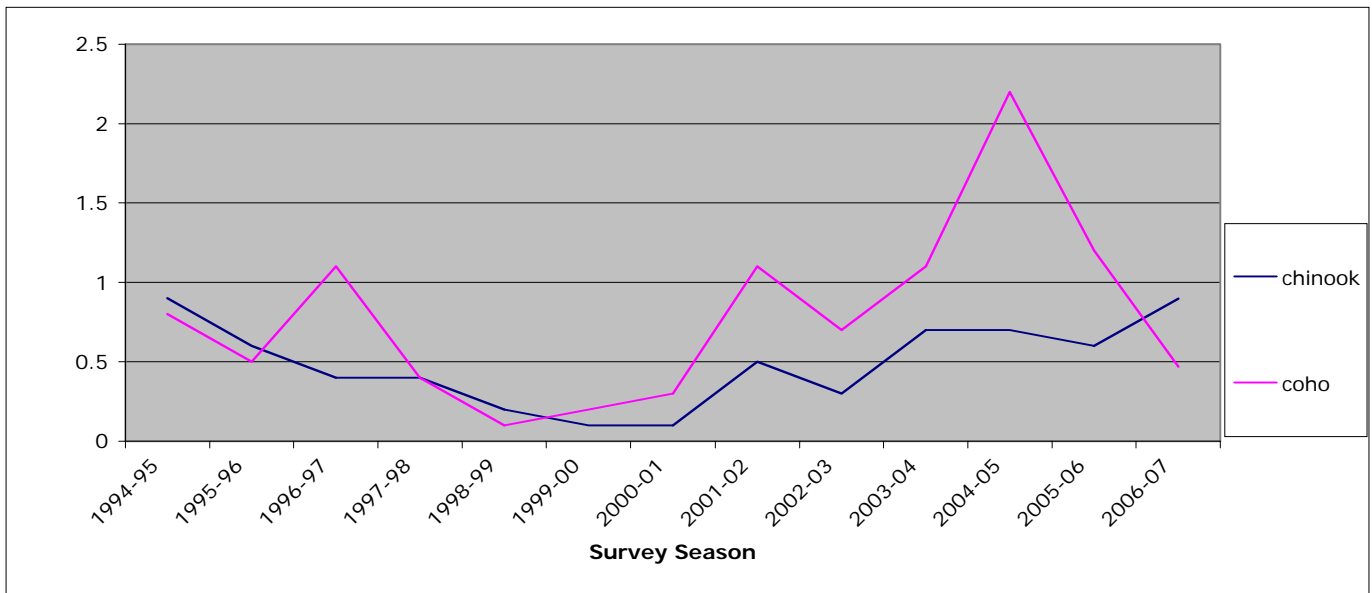


FIGURE 10: Escapement Index for all tributaries (except Bear Cr.) combined. The EI is a comparison of number of redds observed corrected for amount of survey effort. For a further discussion of this index, please refer to the State of the Salmon 2005 report on the MSG website. Shown by species for all tributary reaches except Bear Cr. combined for all seasons since 1994-95.

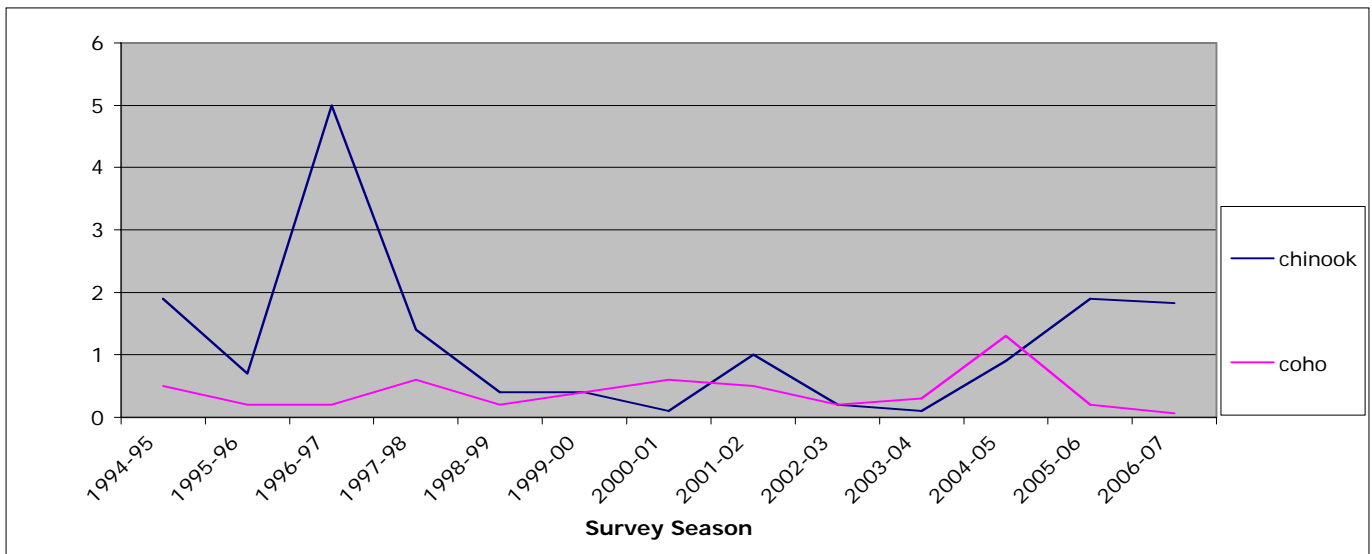


FIGURE 11: Escapement Index for uppermost mainstem Mattole River. The EI is a comparison of number of redds observed corrected for amount of survey effort. For a further discussion of this index, please refer to the State of the Salmon 2005 report on the MSG website. Shown by species for all uppermost mainstem reaches (upstream of Metz bridge) combined for all seasons since 1994-95.

The Mattole had one of the best chinook runs of the past 13 years, continuing a recent trend of increasing chinook escapement to the Mattole. For example, compared to 1994-2006, there were

more chinook live fish, redds and carcasses observed than all but two of those years. Conversely, coho escapement appears to have been nearly as low as ever observed over the period, continuing a downward trend in observations over the past few years. Of course, these interpretations could be the result of the fact that survey coverage was also relatively high for the period. The fact that survey effort (as indicated by accumulated mileage) was fairly average would suggest the chinook run was indeed particularly strong and perhaps the coho were present but unobserved. In order to compare survey seasons with varying amounts of survey coverage (total miles) and survey effort (accumulated miles) MSG utilizes both an "Escapement Index" that is the number of redds for a given species divided by the accumulated miles surveyed for a particular watershed unit in order to correct for variation in survey effort and a similar ratio using total miles to correct for variation in survey coverage. Please refer to the State of the Salmon report for further discussion and explanation. Using the Escapement Index (EI) to correct for the amount of survey effort this season confirms those impressions however. Note that while Figure 12 appears to show a large decline in chinook during the 2006-07 season this is the result of there having been a very significantly higher EI in the mainstem between Bear Cr. and Big Finley Cr. than in any other year or area in the whole period since 1994 during the 2005-06 season. Comparison with the other EI figures shows that 2005-06 was one of the best seasons on record and while 2006-07 was not as strong as 2005-06, it was still a good year for chinook and part of an overall rising trend for the species.

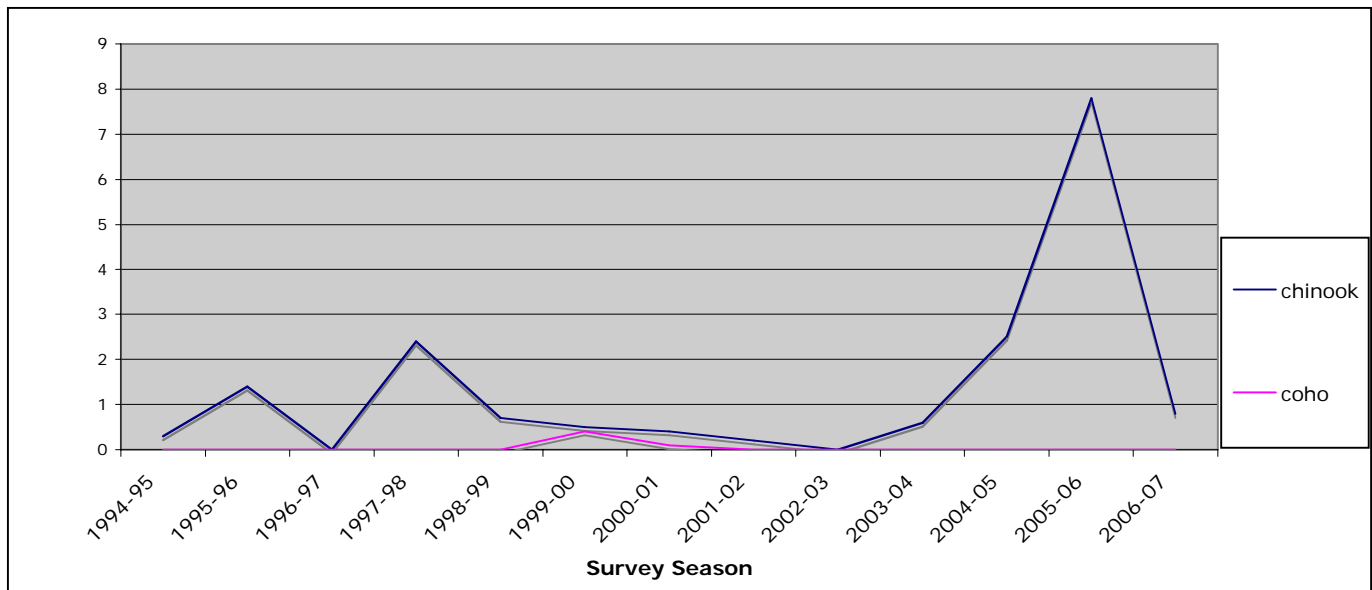


FIGURE 12: Escapement Index for mainstem Mattole River between Bear Cr. and Big Finley Cr. The EI is a comparison of number of redds observed corrected for amount of survey effort. For a further discussion of this index, please refer to the State of the Salmon 2005 report on the MSG website. Shown by species for all seasons since 1994-95. Note that in some seasons the reach was unsurveyable due to high flow and lack of visibility.

The 2006-07 season saw a continuing increase in the number of carcasses recovered. This was partly because of increased focus on recovering carcasses due to the fact that they are one of MSG's main recapture techniques for a variety of tags identifying fish from various population

enhancement programs and spawner survey tag recoveries are intended to be a significant mode of recapture for the adult trapping mark-recapture escapement estimate program. Unfortunately, the numbers recovered remain low relative to the number of redds and live fish observed. As with the other observations, storm timing and flow size play a determining role in opportunities for carcass recovery, as do personnel availability etc. The additional factor with carcasses however is predation and/or removal by other species. Many years of tagging or otherwise marking recovered carcasses has shown that carcass residence time in the Mattole is low, indicating a high rate of removal by predation. Only when carcass numbers are high enough to saturate local predator's appetites do carcass residence times increase. With an adult salmon population as low as that of the Mattole, such instances are rare and short-lived. Thus, any missed opportunities for carcass recovery due to lack of funds or personnel are very detrimental to the overall effort to estimate Mattole escapement. For a further discussion of these factors, please refer to the State of the Salmon 2005 report on the MSG website.

There were no right maxillary clips recovered. This is the mark used to indicate adult returns from MSG's natal-stock propagation (hatchbox) program. The program was discontinued by CADFG after the release of the last juveniles in mid-2004. The majority of returns from the 2004 release would be expected during the 2005-06 season as three-year-old fish, however, a minority could return during the 2006-07 season since four year old returns have been documented in many watersheds, including the Mattole. The lack of recoveries is unsurprising given that the number of released fish was low due to a vandalism incident that killed many of the juveniles in 2004, the fact that the majority of resulting returns were expected last season and the carcass recovery rate is relatively low as discussed above. Similarly, none of the chinook carcasses had a clipped adipose fin, indicating the presence of a coded wire tag (applied to the fish as a juvenile) and presumably origin in the MSG's downriver rescue rearing program. Heads from these fish are collected and processed by CADFG to determine the tag and fish origin. As with the hatchbox program, the downriver rescue rearing program was discontinued by CADFG in mid-2004. The MSG feels that the lack of tag recoveries indicates the programs were successful not only in not precluding a wild, self-sustaining run from surviving (as is sometimes feared when hatchery techniques are utilized), but also that the consistent recovery of tags in prior years indicates the programs were helping to preserve the existence of the chinook run during the period of very low escapement of the 1980's and 1990's. More importantly, while it is too early to tell for sure, chinook populations have yet to collapse from the lack of these programs. MSG hopes that this data indicates the presence of a self-sustaining population at this time, and that the population will prove sustainable over time. However, salmon populations in the Mattole remain far below historical levels and would most likely continue to benefit from the resumption of these two programs.

There were 2 observations of live fish with pink spaghetti tags from the adult mark-recapture program and none of these tags were recovered from carcasses. For a more complete discussion of this program, please refer to the separate adult trapping program report. However, these observations indicate that spawner surveys are a viable means of recovering tags, but the timing of surveys, number of fish tagged and assignment of personnel needs to be improved.

Coho spawning activity was concentrated in the headwaters and upper tributaries as usual. The observed coho redds were located in the upper mainstem Mattole above the Mendocino County Bridge, Thompson Cr., Danny's Cr. (aka North Fork Thompson Cr.), Yew Cr., Baker Cr., McKee Cr., South Fork Bear Cr. and Upper Mill Cr. The upper Mattole, Thompson and Yew Cr. basins were particularly notable for lower numbers of coho than usual. Nevertheless, all subbasins combined were equal to the Thompson Cr. system in coho redd observations. However, it is important to note that the lack of spawning observations in a particular basin may not necessarily mean there was no spawning activity. The typical peak of the coho spawning season coincided with the higher flows that prevented surveys in many areas from mid-December on but certainly did not preclude spawning activity. It is particularly notable that the peak of the coho spawning season is typically later than chinook in the Mattole and the 2006-07 season's surveys came to end while fresh chinook redds were still being found. So it is quite possible that significant coho spawning occurred during the period after the end of surveys but was not observed.

Despite the possibility of missed observations, which is true for both species and in almost every year, the data collected show that the coho run was nearly the opposite of the chinook run. There was a noticeable decline in almost every measure from last season, with most measures at their lowest levels in the last five years. Escapement Indexes were at some of the lowest levels of the whole 10-year period, with the exception that the overall EI was slightly higher than the 2005-06 season. Note that while Fig. 9 shows the increase in coho EI, Figs. 10-12 show a decrease. This is a result of the exclusion of Bear Cr. from the other tributaries as a result of a historical anomaly in how data was tabulated. Fig. 13 showing EI for Bear Creek clarifies where the coho increase shown in Fig. 9 was located. This is an encouraging result for the overall coho run, but raises questions. Note that over the 13-year period the Bear Cr. coho EI has been highly variable with three years at zero and one at 1.6, the second highest coho EI found in the data. A similar pattern is evident with the Bear Cr. chinook EI. While the past two year's data are encouraging, the historical variability suggests that the increase may be short-lived. This variability in Bear Cr. escapement has long been noted by MSG, but despite numerous investigations into various theories, no clear explanation has yet been found. It is interesting to note that many seasons when there were low numbers of coho in Bear Cr. there were relatively high numbers in the Southern subbasin, and when coho numbers have been relatively low in the Southern subbasin, they have been relatively higher in Bear Cr. This suggests that there may be one population of coho that shares the two basins, but what determines which basin is primary in which year is not currently known.

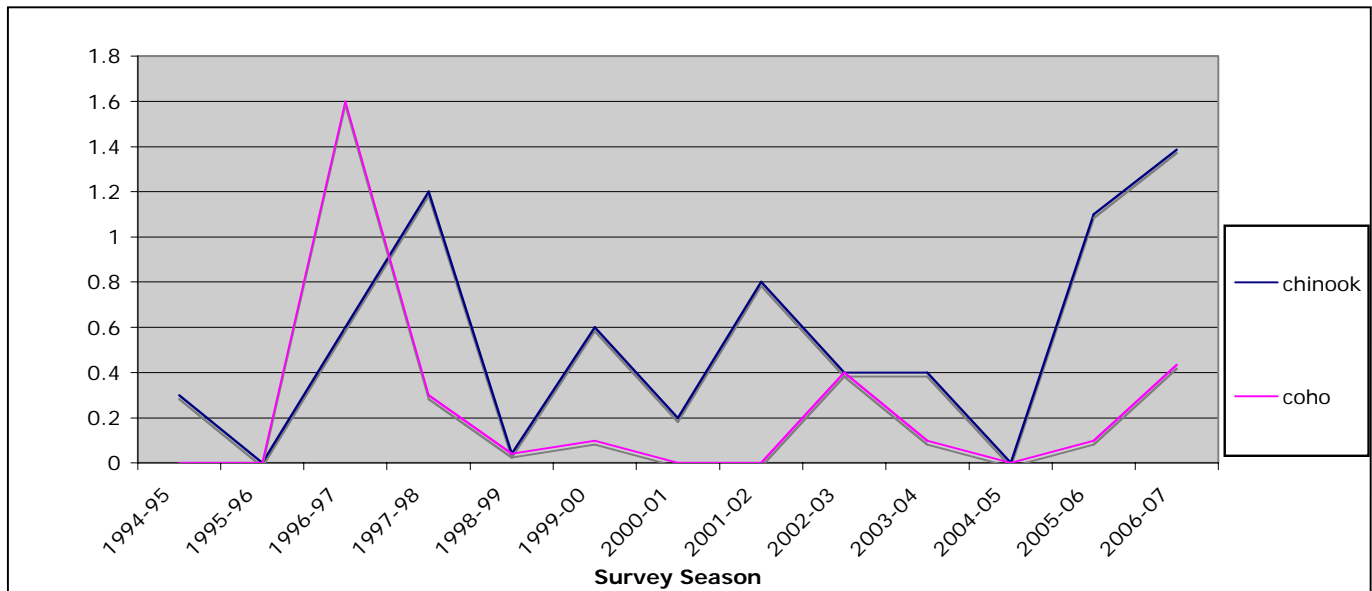


FIGURE 13: Escapement Index for Bear Cr. The EI is a comparison of number of redds observed corrected for amount of survey effort. For a further discussion of this index, please refer to the State of the Salmon 2005 report on the MSG website. Shown by species for all seasons since 1994-95. Reaches were surveyed in all seasons.

MSG attributed the sharp decline in coho observations during the 2005-06 spawning season to the extreme drought during the summer of 2002. The majority of good quality coho rearing habitat in the Mattole is located in the headwaters and upper tributaries, also referred to as the Southern subbasin. (Please refer to the Recovery Strategy for California Coho Salmon, page 6.28 and the North Coast Watershed Assessment Program Mattole report, page 17, both are available from the CA Dept. of Fish and Game) During the summer of 2002, all but a very few reaches in that area dried up, resulting in the death of most of the season’s juvenile coho. Analysis of scales from returned adults in the Mattole has consistently shown that the large majority of adult returns are three years of age, but some fish return at four years of age. Hence, adult returns in 2005-06 were primarily the survivors of juvenile oversummer rearing in 2002, but a fraction of the 2006-07 return could also be expected to spring from the 2002 juveniles. This may explain why there was a continuing decrease in coho escapement in the Southern subbasin in 2006-07 despite relatively normal summer flows in 2003. Also note that the 2002-03 coho escapement was relatively low, hence there may have been fewer juveniles to start with in 2003.

The addition of Figure 13 reveals that coho observations in Bear Cr. rose in both 2005-06 and 2006-07. This may be related to summer flows as well, since Bear Cr. has relatively good summer flows and temperatures, due at least in part to it’s low number of human diversions relative to the Southern subbasin. The observed drops in coho adult returns observed in the Southern subbasin combined with the simultaneous increases in Bear Cr. only reinforces the importance of maintaining summer flows in the Southern subbasin, which serves as a major refugia for coho in the Mattole watershed and beyond.

However, looking at the whole 10-year period, the 2006-07 coho data appear to be within the bounds of the overall pattern of ups and downs, such that it appears possible for coho populations to survive and hopefully recover from this level as they have in the past. It is also worth mentioning that summer flows in the years since 2002 have not been as low due to later spring rains and increased awareness of water conservation and storage by local residents, so hopefully the extreme conditions of 2002 will not be repeated and we can expect coho populations to return to the slow but general rise observed prior to 2005-06.

Steelhead are not the focus of these surveys and the majority of their run is believed to take place after the surveys end. As usual, the Mattole Salmon Group's spawning survey effort came to an end just as the steelhead run was getting started. Some steelhead were observed and photos and video footage taken. It is hoped that funding will be available in the future for extending survey coverage to include a larger portion of the steelhead run, in order to begin correcting the current lack of information.