California Department of Fish and Game
Northern California - North Coast Region

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Coho Salmon Presence/Absence
Modified Ten Pool Survey Protocol

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INTRODUCTION

The Northern California-North Coast Region (NCNCR) will conduct coho salmon surveys in a portion of their range in Northern California (Winchuck River system to the Mattole River) for the second consecutive year. The objective of these surveys is to document coho salmon presence/absence in 396 locations identified in Brown and Moyle (1994) coho salmon status review in Humboldt, Del Norte, Trinity, Siskiyou, Mendocino, and Glenn counties. This documentation will provide the basis for comparison of the coho in terms of percent status reported by Brown and Moyle (1994) with the latest available information. Our approach has two phases: I) file review and ii) field review survey using a modified version of a Ten Pool Protocol reported by Adams et al. (1966).

This year's sampling effort will concentrate on LOWER and MIDDLE Reach Stream Sections due to a reduced field season and 2001survey results (see Appendix I) which indicate that coho salmon are rarely, if at all, observed in UPPER Reach Stream Sections with the exception of China Creek, tributary to Redwood Creek, hence South Fork Eel River. The lower stream reaches of China Creek were not surveyed because the upper reach was readily accessible and a documented history of coho salmon rearing throughout the stream. The GIS-depicted gradient for the UPPER Reach Survey Section of China creek was 0-5%, respectively. The use of gradients slightly greater than 5% by coho salmon is possible, but infrequent. For example, one 1+ coho was located in the MIDDLE Reach Stream Section of Grindstone Creek, Mattole River. The fish was observed in a stream reach which had a GIS depicted 6-10% gradient. Field personnel estimated the coho salmon to be residing in a stream gradient approximately 5 to 6%. Sampling the UPPER Reach Survey Section of streams with gradients >5% will reduce the total number of sampled and reduce the likelihood of finding streams with coho salmon.

File Review. Department of Fish and Game personnel will continue to collect and catalog all available current and historic files which describe fish sampling efforts and findings for all coho streams within NCNCR.

Coordination. The Department of Fish and Game will develop and distribute a spread sheet listing all 2002 sampling efforts by fisheries researchers. The Northern California Coho Investigation Project will survey streams where coho salmon presence/absence data is not available from research efforts by other fishery scientists.

Pre-Planning. Sampling reaches for each stream will be predetermined before entering the field using the best available data, including, but not limited to previous habitat and biological surveys, stream gradient, channel type, channel entrenchment, topography, size, location of tributary streams and private lands access agreements. Geographic Information Systems (GIS) will be used to divide the anadromous section of each stream into gradients of 0 to 5%, >5 to <10%, and ≥10%. Stream segments with gradients less than 5% will be given the higher priority for sampling effort. The end of coho anadromy is defined as 0.5 kilometer (0.3 miles) with ≥10% slope and the absence of perennial stream segments with ≤5% gradient further upstream.

Methods. Snorkel surveys (direct observation) will be the primary sampling technique employed. If project personnel encounter situations where physical habitat features render snorkel surveys ineffective (e.g., high turbidity, deep pools) or if human health hazards (e.g., dairy waste or unknown waste discharges) are present, then alternate sample methods should be employed. Minimum crew sizes for each sampling method are as follows: snorkel survey (2 people); backpack electrofishing and seining (minimum of two people, but three is preferred); and

baited minnow trapping (2 people). Snorkeling, electrofishing (a second backpack shocker may be used if the stream is wider than 10 feet) and seining effort will be limited to one pass. Baited minnow trapping effort should be confined to one set (30 minutes) of at least two traps per pool.

Training:

Snorkel Survey. Snorkel surveyors will have a minimum of eight hours of dive time in waters bearing steelhead, coho and chinook salmon. Snorkel divers will be taught and practice standardized counting techniques, fish identification, and habitat type recognition. These training hours are to be supervised by a CDFG fisheries biologist or other trained and qualified equivalent individuals with at least three field seasons of snorkeling experience for juvenile salmonids. Records of training hours will be maintained. Snorkel surveyors will only be deployed in the field if they are capable of identifying coho salmon, chinook salmon and steelhead with no errors.

Electrofisher Survey. Backpack electrofishing crews will be lead by project members who have had at least one field season of electrofishing experience. To become an electrofishing crew leader, a crew member must have at least 160 hours of supervised hands-on experience, familiarization with electrofisher set-up, setting controls, electrofishing techniques, fish anesthesia, fish identification handling, first aid and CPR.

Minnow Trap Survey. Each project member will gain at least four hours of supervised hands-on training by an experienced CDFG fisheries biologist in the use of baited minnow traps and its application in fish surveys. This training will include identifying trap locations trap rigging and baiting, deployment, trap recovery, fish removal and handling.

MODIFIED TEN POOL PROTOCOL

Stream reaches will be surveyed in the following sequence: LOWER, MIDDLE, UPPER. Ten pools or flatwater habitat units (hereafter referred to as pools) will be surveyed in any given reach; these ten pools constitute a Survey Section. Field crews will have the latitude to select pools based on shade, water velocity and instream habitat complexity; however crews may not skip more than five consecutive pools in any given Survey Section. The ten pool stream survey sites should start in the lower creek and move upstream, but this is not necessary where logistics make sequential reach sampling problematic. The pool survey for the lowermost reach will commence where the stream has defined banks and its habitat features are defined by its stream power. This protocol excludes stream segments flowing through aggraded deltas or other areas influenced by high flow of the water to which it is tributary.

Habitats will be sampled as defined by the Level II category for stream habitat typing (riffle, pool, flatwater). The primary Level II habitat types surveyed will be pools; however, if pool habitat is lacking, flatwater habitats (glides, pocket water, run, and step run) will be sampled. Instream habitat shelter complexity will be rated using California Salmonid Stream Habitat Restoration Manual Criteria (page III-43). Target streams will be surveyed according to the following decision sequence:

- If coho salmon are present (presence is defined as one coho salmon) in the LOWER Reach Survey Section, then it is not necessary to examine the MIDDLE or UPPER Reaches. Complete all ten pools in the LOWER Reach Survey Section before moving onto the next stream assignment list and repeat this decision sequence.

- If coho salmon are not observed in the LOWER Reach Survey Section, then move up to the MIDDLE Reach Survey Section. If coho salmon are observed in the MIDDLE Reach Survey Section, then it is not necessary to examine the UPPER Reach Survey Section. Move on to the LOWER Reach Survey Section of the next stream on your assignment list and repeat this decision sequence.

- If coho salmon are not observed in the MIDDLE Reach Survey Section, then move up to the UPPER Reach Survey Section. Examine 10 pools and record your findings. Move on to the LOWER Reach Survey Section of the next stream on your assignment list and repeat this decision sequence

note: the UPPER Reach Survey Section for streams >5% will not be surveyed in 2002

Each surveyed reach should be flagged at the downstream end and labeled with the following:

1. DATE (dd/mm/yyyy)
2. DFGCI (acronym for Department of Fish and Game Coho Investigation)
3. Stream Reach designation (LOWER, MIDDLE or UPPER)

Flagging will not be hung within State, National or City Parks, urban areas or anywhere it would be considered a visual nuisance by property owners. These areas are generally high traffic areas, within city limits or close to roads.

The upper and lower boundaries of each survey section will be geo-referenced, using GPS, as waypoints for later downloading into GIS. A waypoint is entered as a combination of numbers and letters using the unique (Brown and Moyle) designated stream number, followed by a hyphen and A for LOWER, B for the MIDDLE, and C for the UPPER Reach Survey Section. The numerals 1 and 2 are used to define the downstream and upstream Survey Section boundary, respectively. For example, the waypoint for the boundary of the lowermost reach of Howe Creek, Eel River is 252-A1. Conversely, the waypoint for the upper sample segment of Howe Creek is 252-C2.

The defaults settings for the standard issue GPS 12XL will be the following: Position Format = decimal degrees (hddd.dddd^{o}); Navigation Setup: Map Datum = NAD 27 CONUS, CDI = $\pm$0.25, Angle = Degrees, Units = Statute, Heading = E016; System Setup, Offset -7.00, Hours =24. GPS units will be checked prior to each day's field surveys for the above settings due to the possibility of the units resetting to factory defaults when the batteries run low.

Surveys will be conducted through each Survey Section in an upstream direction. Divers and electrofish samplers should enter each pool at the downstream end, in a manner which will minimize fish disturbance, and uniformly sample as they move upstream. Each diver will individually record fish data and other vertebrate species observed; assign an abundance category (e.g., 0 = no fish, 1 = 1 fish; 2 = 2-5 fish; 3 = > 5 fish) for each fish species present. Salmon (e.g., chinook and coho) will be identified by species. Steelhead and coastal cutthroat trout are difficult to identify at a small size, so lump them together and record your abundance rating in the “Trout” column on the data card. Separate coastal cutthroat trout from steelhead only if you can make a positive identification. (See photograph subsection).

Data for electrofishing, minnow trapping and seining should be recorded as an abundance category representing the sum of all fish collected per pool.

If a crew encounters a section where stream gradient exceeds 10%, which was not modeled by GIS or any other barriers, the crew will determine if continuing the survey is warranted. If coho salmon passage is not possible, then survey the ten pools immediately downstream and upstream of the barrier, and fully document the decision-making process through narrative and photographs. The base of the barrier should be recorded in the field notes and entered in the GPS as a waypoint. If coho salmon passage is possible, then proceed to the next reach assignment, but note and photograph this area for future reference.

While conducting your survey, it may be necessary to check a pool a second time because one or both crew members are not confident in their results. In this case, wait at least 20 to 30 minutes to let the fish settle down and for the pool to clear, then repeat the dive. If the team members agree that confidence is again low, flag the pool and enter its coordinates as a waypoint in the GPS, and move upstream to the next pool. Be sure not to count the problem pool as part of the ten pools. In either case, clearly describe your decision-making process on the data sheet.

Record the description of each surveyed pool to Level IV Habitat Type category, if possible. Visually estimate average wetted width, average length, and maximum depth for all surveyed pools. In the case of a skipped pool (see preceding paragraph), identify its Level IV designation and visually estimate the dimensions of the pool.

Photographs. At least one photograph should be taken of each pool sampled. Pictures should frame the entire pool with all its significant features and include the number card with the respective pool number. The number card should be located in the shade and the camera set for "no flash" to keep the number readable in the developed picture. Photographs of fish barriers, water diversion, sources of pollution, and examples of excellent habitat conditions should also have a placard with stream name in view. Record the number of photographs taken in the appropriate column of the data sheets. Using a fine point Sharpe, label all used rolls of film and their canisters with the date, stream name and reach. Write the same information on a separate piece (two to three inches) of flagging and also place it inside the film canister. (Note: do not change film where a dropped roll could be lost. For example, do not sit on a rock in mid-stream and change rolls as a dropped roll of film can be swept away.)

If coho are found using an electrofisher, seine or minnow trap. Surveyors should photograph at least one coho to confirm documentation. Photographs should be taken of the lateral view of the fish lying on its side and include the out-stretched dorsal and anal fins. Underwater photographs of coho should be taken in stream reaches where one or two individuals define coho presence. Photographs of fish should be taken after setting the camera on the fish icon.

At the end of each stream survey and before leaving the area, spend several minutes writing a narrative about special stream features, especially the reason for deviating from the established protocol. A journal will be included in each sample kit for this purpose.

LITERATURE CITED

Adams, P.B., T.E. Laidig, K.R. Silverberg, M.J. Bowers, B.M. Jarvis, K.M. Sakuma, K. Baltz, and D. Woodbury. 1996. Historical and Current Presence-Absence Data of Coho Salmon (*Oncorhynchus kisutch*) in the Central California Evolutionary Significant Unit. U.S. National Marine Fisheries Service. Southwest Science Center Administrative Report T-96-01. 24 p.

Brown, L.R., P.B. Moyle, and R.M. Yoshiyama. 1994. Historical Decline and Current Status of Coho Salmon in California. North American Journal of Fisheries Management 14:237-261.

Appendix I

Coho observed by CDFG Coho Project 2001 Field Season			
B&M Creek No.	**Creek Name**	**Reach**	**Gradient (using ArcView)**
3	Elk Creek	Middle	Unknown
11	Jaqua Creek	Lower	0-5%
14	Bummer Lake Creek	Lower	0-5%
24	Eightmile Creek	Lower	0-5%
35	Patrick Creek	Lower	0-5%
45	Knopti Creek	Lower	0-5%
48	Elk Creek	Middle	0-5%
218	Cloney Gulch	Lower	0-5%
219	Falls Gulch	Lower	0-5%
222	Martin Slough	Upper	0-5%
263	Bull Creek	Middle	0-5%
270	Salmon Creek	Lower	0-5%
276	Seely Creek	Lower	0-5%
278	China Creek	Upper	0-5%
279	Dinner Creek	Lower	0-5%
370	Woods Creek	Lower	0-5%
375	Honeydew Creek	Middle	0-5%
381	Fourmile Creek	Lower	0-5%
382	Sholes Creek	Lower	0-5%
384	Grindstone Creek	Middle	6-10%
394	Mill Creek	Lower	0-5%
	Raw Numbers	%	
coho not present	109	0.838461538	
coho present	21	0.161538462	
total creeks surveyed	130		
	Raw Numbers	%	
creeks w/coho in 0-5%	20	0.153846154	
creeks w/coho in 6-10%	1	0.007692308	
creeks w/coho in >10%	0	0	
total creeks surveyed	130		
# creeks w/coho in Lower reach	14		
# creeks w/coho in Middle reach	5		
# creeks w/coho in Upper reach	2		
Data compiled from document: D:\Preston, Larry\Coho 2001\coho results as of 10 15 2001.qpw			