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Five Year Management Plan for Salmon Stock Rescue Operations 2000-2001 Through 2004-2005 Seasons

MATTOLE SALMON GROUP
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Approved Nov. 2000, by the
CA Dept. of Fish and Game

8/23/01

Here ya go.
Can't hope
you find this
document useful.

- Gary Peterson

Mattole Salmon Group

Five-Year Management Plan for Salmon Stock Rescue Operations 2000-2001 Through 2004-2005 Seasons

Program Summary

Project Name: **Mattole Salmon Stock Rescue Program**

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

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Mission Statement: *The overall mission of the program is to protect, enhance and restore wild, indigenous salmonid populations and the ecosystems which sustain them in the Mattole River watershed, and to foster an awareness among residents throughout the basin that would make it likely that Mattole salmonid runs, once regained, would be protected by watershed residents themselves.*

Program Goals, Objectives, and Policies: The following goals, objectives and policy guidelines are to provide long-range program direction for MSG in accomplishing its stated mission, and are to serve as broad directives for the planning and implementation of enhancement and restoration work. It is essential that all program elements be subject to modification as new knowledge and information emerges, thereby ensuring strategic and operational flexibility according to the principles of adaptive management.

1. ***Stock Recovery:*** Restore native Mattole salmonid runs to self-perpetuating population levels, with priority given to chinook salmon and coho salmon.

> *Short-Term Goal: To enhance and thus help ensure the survival of indigenous salmon populations using appropriate strategies and procedures of small-scale, site-specific bioenhancement and supplementation as a "holding action" against extinction, with particular attention given to maintaining genetic integrity and diversity and preserving the unique attributes of wild stocks.*
>
> *Long-Term Goal: To restore native runs of Mattole salmon to self-sustaining levels that can be maintained without artificial propagation or other significant human intervention in the natural life-cycle and in a milieu which can potentially support population abundance.*

a) Escapement Objectives: Short-term objectives are to achieve and maintain a base population of at least 500 pairs of chinook and 200 pairs of coho by the 2004-2005 season; these numbers are similar to escapements in the early 1980s. Long-term objectives are to increase returns of native salmon spawners to attain average annual and minimum annual adult populations of at least 25% and 10%, respectively, of historic escapement levels, as indicated in the table below. Once the latter escapement objectives are met for two chinook life-cycles, artificial propagation activities shall be discontinued.

Species	Estimated Historic Escapement Levels *[calculated by doubling escapement estimates reported by USFWS (1960) and DFG (1965)]*	Restored Escapement Objectives *Average Annual (at 25% level)*	*Minimum Annual (at 10% level)*
Chinook	5,000 pairs	1,250 pairs	500 pairs
Coho	2,000 pairs	500 pairs	200 pairs

b) Natural Production Objectives: Ensure that the restoration of salmonid runs is fundamentally based upon the sustainable recovery of wild stocks produced by natural spawning and rearing, rather than dependence on culture operations. All cultured juvenile fish shall be marked prior to their release in the wild, in order to permit identification of hatchery-origin fish in broodstock capture operations; all marked adults shall be released upon capture, specifically excluding them from spawntaking and artificial production. Data from in-river recoveries of marked fish will be used to estimate wild-to-hatchery ratios, and for ongoing program evaluation. All marking will be based on assignments worked out in advance and coordinated through the Department.

c) Genetic Conservation Objectives: Incorporate program elements that avoid or minimize the genetic risks inherent in small-scale natal stock supplementation. Some important genetic concerns for Mattole salmon stocks include low numbers of wild broodstock captured for spawning, artificial selection of mates, and undesirable "founder effects"such as genetic drift and cumulative inbreeding. Propagation practices shall be compatible with gene resource conservation goals, for example a strict prohibition of full-sibling or half-sibling crosses through non-utilization of marked hatchery adults, selection of broodstock over the full duration of the natural run, and incremental expansion of operations such as "rescue rearing" that entail comparatively low genetic risks. **(Please refer to "Best Genetic Practices" Addendum following page 6.)**

2. Project Prioritization: Using existing information, knowledge and data, develop and implement a ranking scheme for identifying and prioritizing Mattole tributary drainages or specific sub-basin units for application of focused restoration treatments that address important limiting factors to natural production.

3. Fluvial Restoration: Restore, to the extent feasible, watercourses of prioritized sub-basins toward the pre-disturbance state of dynamic equilibrium in the physical system with respect to sediment regime and channel geometry.

4. Habitat Protection: Protect critical, sensitive, and ecologically significant habitat areas from further human-induced disturbances, with particular attention to key headwaters areas of the mainstem and tributaries.

5. Land Use: Assist in establishing land-use practices that help ensure the maintenance and provision of high-quality salmonid habitat.

6. Revegetation: Re-establish vegetative structure and function of natural plant communities in riparian zones and upland areas of prioritized sub-basins.

7. Public Outreach: Promote education and involvement of residents, landowners, and other interested people in all aspects of the Mattole restoration effort. Educate watershed inhabitants and landowners to live in a sustainable relationship to their environment. Forge cooperative working relationships with landowners, residents, government agencies, academic institutions, researchers, industry, and business interests to promote restoration and sound management of Mattole natural systems, resources and values.

8. Monitoring and Evaluation: Continue and expand resource monitoring and assessment activities in order to refine evaluative capabilities, with particular emphasis on identification of factors limiting salmonid production, determination of carrying capacities for both juvenile and adult salmonids, and documentation of the status and trends of habitat conditions and stock recovery. Monitoring and evaluation goals and objectives are best achieved through a collaborative effort involving MSG, the California Department of Fish and Game, local groups and schools, landowners and residents, and, on public lands in the Mattole, the Bureau of Land Management's Arcata Field Office. All interested parties should remain in close communication and should meet at least once annually in summer, prior to commencement of fall spawning runs, for the purpose of exchanging ideas, reviewing and interpreting data, and coordinating basin-wide monitoring efforts.

9. Future Funding: Develop an adequate and sustainable funding base to support the goals, objectives, and range of activities outlined in this management plan.

General Rearing Plan:

Species of fish to be reared: **Chinook Salmon**

Number of eggs to be taken: 40,000 (from 10 females)

Number of fish to be reared: Hatchbox-reared: 34,000 -- emphasis on spring release *(smolts)*
Rescue-reared: 6,000 -- fall release *(post-smolts)*[1]
Total: 40,000

The above numbers will be adjusted accordingly by approval of the Department of Fish and Game and National Marine Fisheries Service, as necessary under the Endangered Species Act.

After examination of adult trapping and spawning survey data from the past five brood years (see page 5), and with conditional approval by DFG, MSG has decided to provisionally simplify the chinook post-smolt program by confining it exclusively to "rescue-reared" fish. At the same time, the monitoring program on Bear Creek will be expanded (see discussion of Bear Creek adult trapping below) to better determine the efficacy of the post-smolt program. We are deferring the full termination of our post-smolt program on Bear Creek to allow us the possibility of responding to new information from monitoring. Currently, the only way to distinguish adults returning from post-smolt rearing is through examination of scale samples. With DFG approval, and by techniques they designate, we will take scale samples from all marked adults captured at the traps on Bear Creek and the mainstem Mattole. If subsequent examination indicates returns from prior post-smolt releases, consideration will be given to reinstating the program. Such reinstatement would require that up to 6,000 (the number of prior-approved post-smolts on Bear Creek) of the juvenile chinook to be reared at Solitude would be held over the summer.

We have been permitted in the past to install an adult trap on Bear Creek near its confluence with the mainstem Mattole, though we have not done so since the 1988-89 season. Such an installation presents many logistical problems which can prove insurmountable in some seasons. The purpose of installing such a trap is twofold. One is to enable us to take eggs specifically from salmon returning to Bear Creek for rearing and release in Bear Creek. Also, installation of an adult trap near the mouth of Bear Creek will enhance our ability to identify marked chinook returns to that stream and evaluate program effectiveness. (See **Proposed Revisions and New Program Elements,** pages 34-35)

Of our total objective of 40,000 chinook eggs, we plan to take up to 16,000 from fish returning to Bear Creek (four females, eight males). This will allow us to take different broodstocks for different sub-basins of the watershed and keep them distinct. Our goal for the mainstem trap is 24,000 chinook eggs (six females and 12 males). In the eventuality that we cannot trap sufficient Bear Creek broodstock, we will fulfill our Bear Creek objectives with broodstock from the mainstem Mattole (see pages 8-9 for a description of trapping and support facilities). Primary incubation of all eggs will be at the Ettersburg site or in the immediate vicinity. Eggs taken from Bear Creek broodstock will be kept in separate numbered trays, and either they or substitutes from the mainstem Mattole will be moved to the Solitude hatchbox after eyeing.

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[1] The "rescue rearing" component entails the capture of wild juvenile chinook in the lower mainstem Mattole, and subsequent pond rearing and fall release as marked post-smolts. Strategies for rescue rearing have been discussed at length with DFG representatives, in terms of the timing and methods of juvenile capture. Written approval from the Department of Fish and Game will be obtained annually before initiation of this program. We request that such permission be forthcoming in a fashion that allows for timely response to natural circumstances.

The facility at Oliver Gap on South Fork Bear Creek may also be activated to supplement Solitude rearing capacity (pages 20-25 give detailed descriptions of incubation and rearing facilities at Solitude and Oliver Gap). All eggs and juveniles from Bear Creek broodstock will be reared and released in Bear Creek. Juveniles reared at the Solitude or the Oliver Gap facility will be released on-site or nearby as smolts. One other facility, on Squaw Creek, can be activated if the need arises to enlarge or substitute rearing capacity for eggs taken from mainstem Mattole broodstock. If subsequent data so indicates, and with the approval of DFG, MSG will re-initiate the suspended portion of the post-smolt rearing program at our Solitude facility on upper South Fork Bear Creek. MSG will request distinct marking assignments from DFG for chinook smolt and post-smolt releases. These unique marks are needed to evaluate the success of the various rearing and release strategies.

Sizes at release:

90/pound (spring release of chinook smolts), or other size criteria to be determined by approval of the Department.

15/pound(fall release of chinook post-smolts)

Dates of release:

Spring release: First new moon after April 15; no later than May 10.

Fall release: After first significant rains, preferably mid-October to mid-November.

Release sites:

Spring release sites for hatchbox-reared chinook smolts:

Mainstem Mattole River headwaters area, Squaw Creek, and South Fork Bear Creek headwaters area.

Fall release sites for hatchbox-reared chinook post-smolts:

South Fork Bear Creek headwaters area, mainstem Mattole River headwaters area.

Fall release site for rescue-reared chinook post-smolts:

Mattole River at Mill Creek confluence (southwest of Petrolia)

Source of eggs or fry: Native Mattole fall-run chinook salmon

Species of fish to be reared: Coho Salmon

Number to be reared, release size & dates to be determined annually with the approval of DFG and/or the appropriate regulatory agency.

Release locations for juvenile coho will be identified, in advance, before a production program is instituted. Potential sites are: North Fork Bear Creek, South Fork Bear Creek headwaters area, Thompson Creek, and the mainstem Mattole headwaters area. Also, alternate Mattole headwaters tributaries as approved by the DFG.

Source of eggs or fry: Native Mattole coho salmon

Project Funding: The following is a partial list of past and potential future funding sources: Commercial Salmon Stamp Account, Trout Unlimited (Six Rivers Chapter), Mendocino County Fish and Game Commission, Bureau of Land Management, California Department of Fish and Game, several private foundations, National Fish and Wildlife Foundation, solicitations from 20-year mailing list, and substantial community contributions of in-kind labor, materials & equipment.

Supporting and Cooperating Organizations: The following is a partial listing: Mattole Restoration Council, Sanctuary Forest, Bear Creek Watershed Association, Coastal Headwaters Association, Trout Unlimited (Six Rivers Chapter), Mill Creek Watershed Conservancy, California Department of Fish and Game, Shelter Cove Commercial Fishermen's Association, Trees Foundation, Redwood Sciences Lab (USFS Arcata), and the Bureau of Land Management (Arcata Field Office).

Propagation Program Summary and Evaluation
(refer to accompanying Table 1, page 6)

The Mattole Salmon Group's conservation rearing program has attained measurable success and has remained within Department-approved objectives. Over the last 5 brood years (1995-99) adult trapping data for chinook suggest an overall hatchery-to-wild ratio of 13:131, which is approximately 10%. The reared-to-wild ratio for chinook varied from 0 to 12.5% annually. Spawning ground surveys over the same period suggest a chinook hatchery-to-wild ratio of 3:98 (about 3.1%), with a range of 0-10% annually, notably lower than from adult trap observations. Estimated escapements (see Figure 1 on page 41) indicate a small, gradual increase from the 1990-91 season to the present, with a spike in chinook returns occurring in 1996-97. Although the recent population trend is somewhat encouraging, clearly more research is necessary in order to draw significant conclusions.

While genetic interference has been confined within acceptable limits, general population levels continue to be alarmingly low. With this in mind MSG plans to maintain current conservation rearing strategies, and remains open to further modifications as new and relevant data emerges. MSG recognizes that artificial propagation includes potential for adverse impact, and is vigilant in preventing such an occurrence. We conclude that the rearing program, in combination with monitoring and other restoration efforts, provides a comprehensive and safe approach to the restoration of native salmon in the Mattole watershed. **(See Addendum titled "Best Genetic Practices" following page 6.)**

Planned Facility Upgrades — Description and Timetable

After discussion with Jerry Ayers (DFG Cooperative Fish Rearing Program Coordinator), specific determinations for making our facilities more secure from predators, vandals or system failures have been made. These include:

1. Fencing and cover in a manner approved by DFG will be designed and constructed before the 2001-2002 season to enclose each facility where eggs or fish are to be held. In the instance of landowner denial of permission to erect a permanent fence, that owner will be asked to provide a written statement indicating his or her refusal. Electric fencing currently exists at the Ettersburg and Solitude facilities for prevention of damage from bears. Such fencing will be installed seasonally during the 2000-2001 season at all incubation and rearing sites and maintained in good working order when eggs or fish are being held. After the 2000-2001 season, electric fencing will be maintained at all facilities where permanent fencing has not been allowed by the landowner. Currently, all MSG facilities are remote from public access and overseen by MSG-trained personnel.

2. The current water system at our Ettersburg holding, egg-taking and primary incubation facility will be improved by the beginning of the 2001-2002 season in the following manner: an additional cable will be suspended across Bear Creek to carry backup water lines from both existing intakes and/or from a third intake dedicated to the backup system.

TABLE 1. Overall summary of the Mattole Salmon Group's natal-stock propagation program, 1981-82 through 1999-2000 seasons.

		CHINOOK SALMON						COHO SALMON						ESCAPEMENT ESTIMATES	
SEASON	NO. TRAP DAYS	TRAP CATCH (M/F)	MARKED RECOVERIES AT TRAP	MARKED RECOVERIES ON SURVEYS	CHINOOK FEMALES SPAWNED	CHINOOK EGG TAKE	JUVENILE CHINOOK RELEASED	TRAP CATCH (M/F)	MARKED RECOVERIES AT TRAP	MARKED RECOVERIES ON SURVEYS	COHO FEMALES SPAWNED	COHO EGG TAKE	JUVENILE COHO RELEASED	CHINOOK	COHO
1999-2000	10	25 (16/9)	3	1 of 32 carcasses	8	28,547	pending	5 (2/3)	0	1 of 2 carcasses	0	0	0	700	300
1998-99	14	12 (10/2)	0	0 of 13 carcasses	2	5,968	5,067	0 (0/0)	0	0 of 7 carcasses	0	0	0	350	150
1997-98	9	40 (29/11)	5	1 of 10 carcasses	7	34,904	20,900	14 (9/5)	0	0 of 3 carcasses	0	0	0	800	300
1996-97	12	24 (15/9)	3	1 of 29 carcasses	8	31,667	23,200	10 (5/5)	0	0 of 11 carcasses	0	0	0	1,000	300
1995-96	25	30 (19/11)	2	0 of 14 carcasses	9	35,641	16,721	15 (5/10)	0	No carcasses found	3	7,906	4,680	700	300
1994-95	0	0 (0/0)	0	0 of 10 carcasses	0	0	0	0 (0/0)	0	0 of 3 carcasses	0	0	0	500	150
1993-94	18	10 (8/2)	0	0	2	6,314	6,025	4 (2/2)	0	0	2	3,917	3,130	400	125
1992-93	15	19 (12/7)	0	0	7	30,274	23,250	4 (1/3)	0	0	0	0	0	400	75
1991-92	26	26 (17/9)	0	0	7	32,774	23,000	7 (6/1)	0	0	0	0	0	300	75
1990-91	38	3 (3/0)	0	0	0	0	0	10 (2/8)	0	0	6	11,050	8,000	100	100
1989-90	24	4 (2/2)	0	0	2	5,929	5,000	0 (0/0)	0	0	0	0	0	200	50
1988-89	43	32 (17/15)	0	0	7	28,455	19,500	8 (5/3)	0	0	3	6,704	4,400	600	200
1987-88	22	68 (51/17)	3	0	14	68,398	50,000	51 (29/22)	0	0	6	11,901	8,500	1,500	1,000
1986-87	29	146 (124/22)	3	0	14	61,500	51,400	30 (18/12)	0	0	3	7,375	5,000	800	275
1985-86	29	47 (46/1)	0	0	1	4,719	4,280	17 (8/9)	0	0	4	13,394	5,500	600	300
1984-85	64	60 (56/4)	0	0	4	13,672	13,400	23 (19/4)	0	0	0	0	0	1,000	350
1983-84	50	26 (17/9)	0	0	9	29,604	25,850	7 (3/4)	0	0	0	0	0	1,200	240
1982-83	33	61 (53/8)	0	0	5	22,185	15,000	15 (12/3)	0	0	0	0	0	1,800	600
1981-82	27	55 (50/5)	0	0	1	3,992	3,620	23 (19/4)	0	0	0	0	0	3,000	500

Mattole Salmon Group
Addendum to Five-Year Management Plan
2001-2005

Best Genetic Practices

Subject: Spawning Guidelines for Cooperative Rearing Project

Minimizing genetic drift is an ongoing concern for the Mattole Salmon Group's conservation hatchery program. The Group recognizes that it uses less than a desirable number of broodstock sources for rearing; larger numbers of parents (100 or more females) reduces the probability for concentration of allele diversity. Considering the fact that total female take is substantially less than 100, MSG will enact procedures to equalize family contributions to the greatest extent possible.

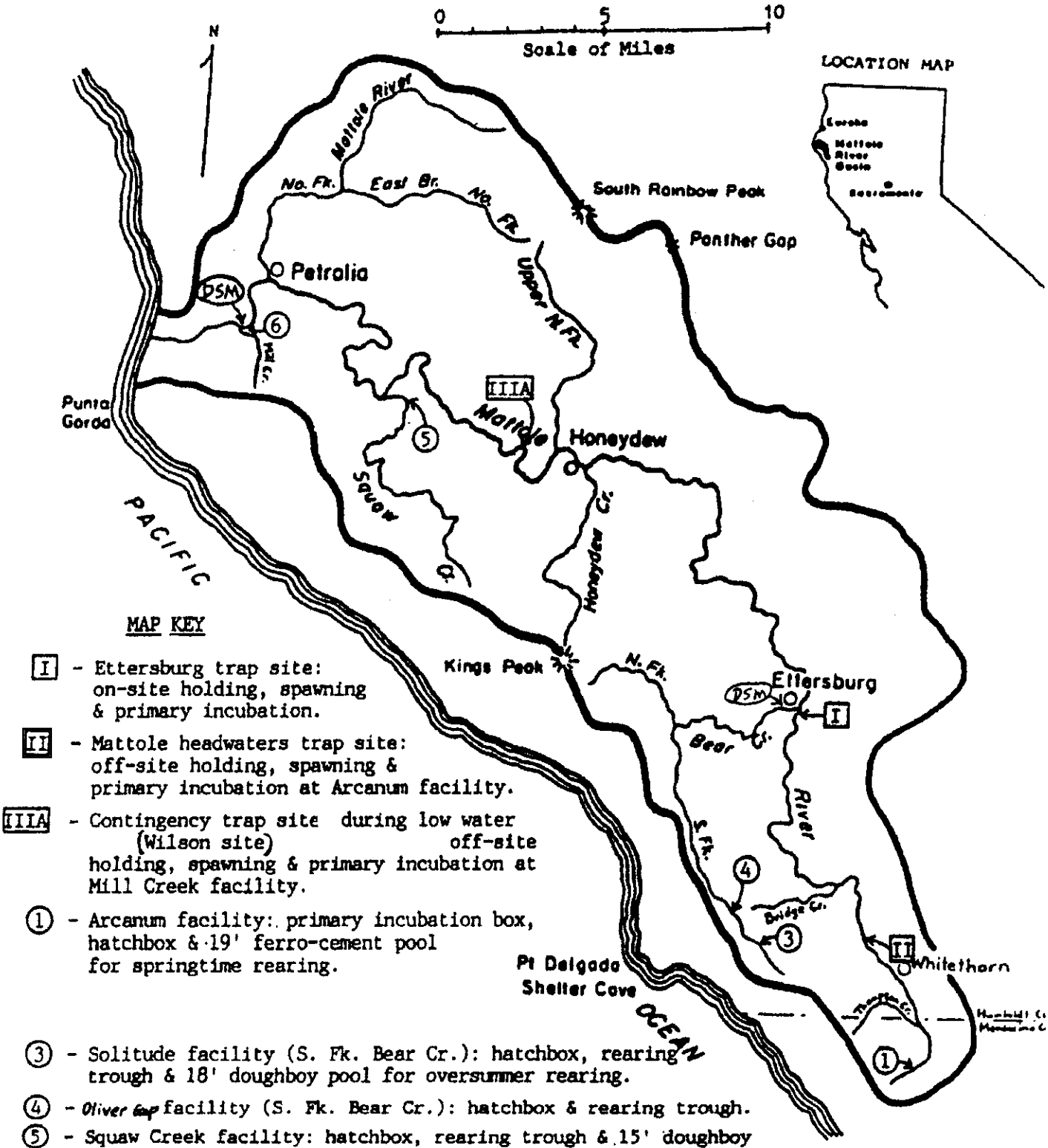
In order to maximize the availability, and thus contribution of variations in any given allele from as many parents as possible, MSG will, in consultation with and approval by DFG, NMFS, and all appropriate regulatory agencies, adopt all of the revised fertilization procedures for conservation hatcheries utilizing less than 100 female broodstock. These procedures are delineated in the November 15, 1999 DFG draft memorandum titled: Hatchery Spawning Guidelines and Techniques. This memorandum includes recommendations from the October, 1999 U.S. Fish & Wildlife Service document titled: Perpetuating a Broodstock.

The revised protocol includes specific guidelines for the MSG program. The following includes some of the key spawning procedures that will become a formal part of the project:

- Each female utilized as broodstock will have its eggs divided into two approximately equal lots.
- Two distinct males will provide sperm for each lot of eggs.
- Males will be utilized a maximum of twice for their contribution of gametes.
- Grilse will be used for spawning at a ratio proportional to all males trapped.
- When possible, mate different year classes to minimize the probability of sibling crosses.

The central idea is to maximize the possibility for all members of the broodstock population to contribute equally in passing on their unique genetic properties. The MSG considers these to be excellent suggestions for genetic integrity, and will work closely with Mr. Jerry Ayers (DFG Cooperative Fish Rearing Program Coordinator) and NMFS personnel toward their accomplishment. No obstacles are anticipated in the immediate inclusion of these procedures.

Mattole Salmon Group 5-Year Management Plan, October 2000
Map of the 304 square mile Mattole River watershed, showing the locations of MSG's facilities and proposed activties for the 2000-01 through the 2004-05 seasons.



Detailed Project Description

Project Location: Ettersburg Trapping, Holding & Spawning Operations

MSG's primary sites for adult trapping, broodstock holding and spawning, plus initial incubation of salmon eggs, are all located near Ettersburg in the vicinity of Bear Creek's confluence with the Mattole River (river-mile 42.8), on the French property. The landowner has granted permission for access, water use and site occupancy. Operations to secure native salmon eggs are conducted here in late fall and early winter when river flows remain at moderate levels. During prolonged drought conditions, the base of wintertime operations is shifted to downriver areas (see description of Wilson Trap Site, page 12); conversely, when river flows remain consistently high and turbid, MSG activates the Mattole Headwaters Trap Site (page 14).

Water Source: Water supply for adult holding troughs, primary incubation box, and spawning operations is from an unnamed intermittent tributary to Bear Creek on the left bank.

Flow: More than adequate during winter use.

Water rights: Landowner permission.

Temperature: Ranges from 46° F to 53° F; mean water temperature is 50° F (Dec. - March).

Turbidity: Low

Dissolved oxygen: No information available.

Other water quality factors: No information available. Successful adult holding, spawning and initial egg incubation at this site since 1987.

Physical Facilities: Refer to topographic map and facility diagram.

Egg incubation facilities: A primary incubation box (for egg "eyeing") consists of a shallow covered trough (8'L x 2'W x 1'H) constructed of redwood and plywood, and coated with marine epoxy resin for sealing and waterproofing. A series of interior baffles directs upwelling flow through two stacks of Vexar-screened trays (24"L x 20"W x 1"H) which slide on runners to allow access to individual trays. Newly fertilized salmon eggs are placed on numbered trays in a single or double layer (3,500 to 4,500 eggs per tray, depending on egg size), which allows the eggs from each female to be incubated and monitored individually; shallow-layer egg incubation also minimizes problems with *Saprolegnia* fungus proliferation, and makes the task of egg-picking safer and easier. The primary incubation box holds 10 screened trays for a total capacity of about 40,000 salmon eggs. It is supplied with filtered water (via a Bandon-style filter barrel) at a constant rate of 6 gpm. A perimeter electric fence, first installed during the 1999-2000 season for bear deterrence, remains activated during the entire time adults or eggs are on site.

Adult trapping and egg-taking facilities: MSG's principal trapping station since the 1986-87 season has been the Ettersburg Trap Site, located on the mainstem Mattole about 200 yards upstream from the Bear Creek confluence. The Bear Creek Trap Site, an auxiliary trapping station located on Bear Creek shortly above its mouth, was operated in the 1988-89 season to secure native salmon eggs for hatchbox facilities on South Fork Bear Creek. MSG operates a portable, modular, fyke-entrance trap constructed using weir panels to form a large instream pen. Weir panels (each 6'W x 4'H) are constructed of redwood and have horizontal slats set 2" apart. Panels are supported by and tied to metal fenceposts driven into the riverbed, and are secured at the bottom by feed-sack sandbags placed on a "skirt" of chicken wire or plastic construction fencing. The trap mouth opening is set at about 1' wide and is

fitted with a swinging gate which is tripped manually from shore to prevent the escape of fish that enter the pen.

Plan of Operation:

Water system: Two intakes provide gravity-flow water supply through 1-1/4" polyethylene pipes leading to a Bandon-style filter barrel. Aeration of holding troughs and the primary incubation box is produced by spray bars. A gas-powered water pump, oxygen equipment, and portable battery-powered aerators are kept on-site as backup in case of water emergencies.

Rearing facilities: None at this location.

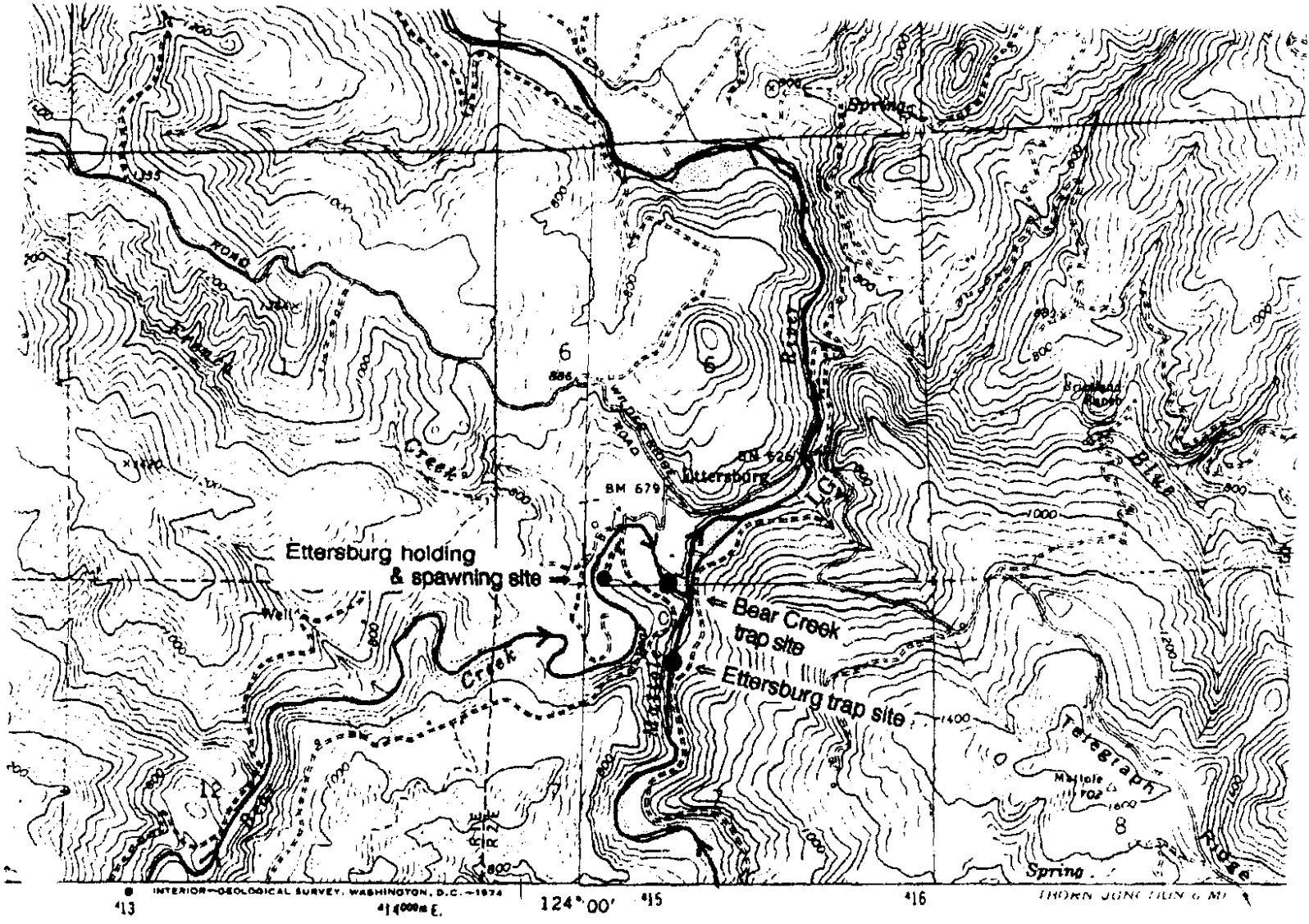
Egg incubation facilities: Using the siphon method, dead eggs are carefully and judiciously removed within the first 48 hours after spawning and subsequent to reaching the eyed stage, but not in the intervening "tender period." Salt flush treatments are used as needed to suppress fungus proliferation. Once eggs are eyed, measured allotments of eggs are transported to various hatchbox/rearing facilities strategically located throughout the Mattole watershed.

Adult trapping and egg-taking facilities: Capture of sufficient numbers of adult salmon for use as broodstock has proven to be a difficult and chancy proposition on the Mattole, since most spawners migrate upstream at flows too high for trap operation. Adult trapping is done on a schedule set by the Department of Fish and Game (according to the terms and conditions specified in the "Anadromous Fish Trapping and Rearing Permit," which is obtained before each spawning season by application to DFG's Region 1 office), so that free passage of upstream migration is allowed approximately 50% of the time. Alternate trapping schedules may be authorized by DFG to compensate for times when trapping is not possible due to high flows. Prior DFG approval is required for any anticipated or necessary changes in adult capture operations which differ from the conditions specified in the permit.

Personnel are on-site at all times during trap operation, and pertinent information and observations are recorded in a daily logbook. Trapped fish are dip-netted, identified as to species and sex, inspected to estimate size and physical condition, and examined for hatchery marks (fin clips, maxillary clips) and other distinguishing characteristics (hook scars, net marks, predator wounds, deformities, etc.). Fish not needed for attainment of program production goals are released upstream of the weir; this includes all steelhead, and any marked salmon indicating hatchery origin. Fish selected as broodstock are placed in numbered PVC holding tubes (6", 8", 10", and 12" diameter tubes are available for use), and tubes are secured inside the pen in an area where current velocity is slight. Female salmon that require long-term holding are retained in tubes in the river as long as possible to hasten the ripening process. For truck transport, fish in tubes are placed in a 135-gallon plywood tank filled with well-aerated river water.

The Ettersburg holding/spawning facility, located 0.4 road miles from the trap site, has 4 fiberglass troughs (three at 8' x 2' x 2', and one at 12' x 2' x 2') with the capacity to hold up to 24 adult fish in tubes for extended periods. Broodstock are sorted frequently to check for ripeness, and then dry spawned. Sorting and spawning operations utilize anesthesia (MS-222). Ripe female fish are killed by a sharp blow to the head, weighed, and are then bled and dried off. After spawning by incision, female salmon are measured (fork length), re-weighed, and a scale sample is taken for age determination. Beginning in the 2000-2001 season, MSG is seeking DFG approval to place the carcasses of spawned females in the upper reaches of the mainstem Mattole and South Fork Bear Creek **(see page 35 for a more complete discussion of this item)**. Male salmon, which rarely die after being used for spawning, are returned alive into the river at the point of capture. After a water-hardening period of at least one hour, newly fertilized eggs are measured volumetrically and placed on numbered screened trays in the primary incubation box.

Personnel: Colum Coyne, Peter Genolio, Ron Lyons, Morgan Lyons, Trevor Hall, Maureen Roche, David Simpson, Rob Yosha, Ray Lingel, Gary Peterson, John Stafslien



Mattole Salmon Stock Rescue Program - Five-Year Management Plan

Mattole Salmon Group October 2000

ETTERSBURG TRAP SITE: mainstem Mattole at river-mile 42.8, about 200 yards upstream from confluence of Bear Creek (French property); primary vehicle access from west side of river via one-lane spur road, mostly paved, about 0.3 miles southeast of flatcar bridge spanning Bear Creek; 4x4 access to east side of river requires passage through locked gate. MWSSG's principal trapping station since 1986-87 season.

BEAR CREEK TRAP SITE: Auxiliary station located on Bear Creek about 100 yards above its mouth (French property); occasional trap operation since 1988-89 season to secure native eggs for hatchbox facilities in headwaters area of S. Fk. Bear Cr.

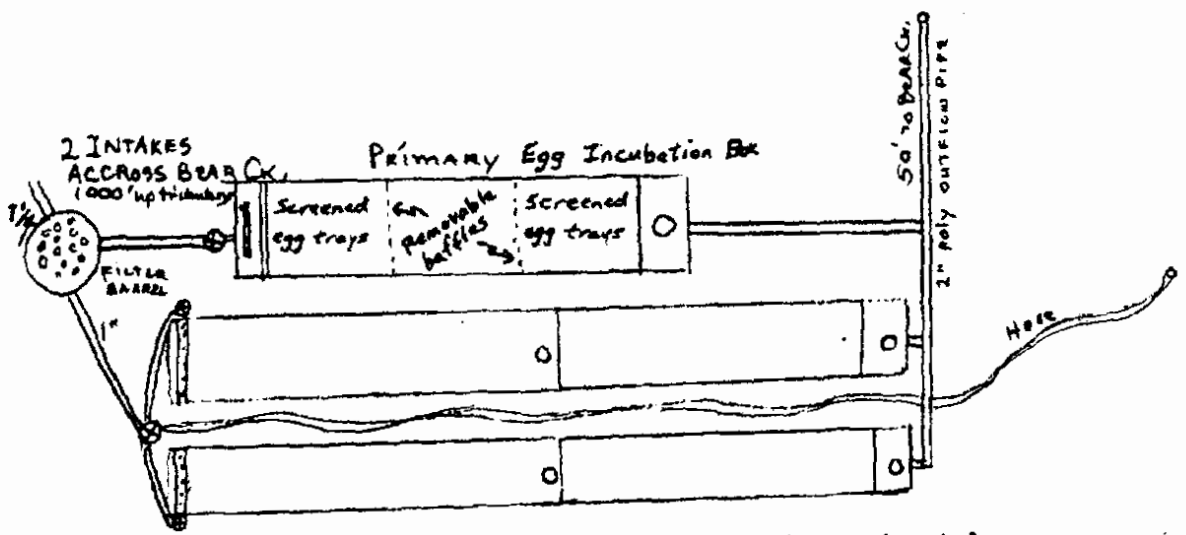
HOLDING AND SPAWNING: situated on east bank terrace of Bear Creek about 500 yards above its mouth; 0.4 road miles NW of trap sites (French property). Four fiberglass troughs for holding of adult salmon prior to spawning, & primary incubation box for egg "eyeing". Established 1987.

Ettersburg 7½-min. quadrangle: T4S, R2E, Sect. 7 (NW¼) - trap sites
T4S, R2E, Sect. 6 (SW¼) - holding/spawning

("LG" denotes locked gate on east-side 4x4 access road to mainstem trap site)

ETTERSBURG ADULT HOLDING, SPAWNING, & PRIMARY EGG INCUBATION SITE

(drawings not to scale)



4 fiberglass troughs with spray bars, stand pipes, screens, lids for Holding adults

Project Location: Wilson Trap Site

This site is located at river-mile 22.7 on the mainstem Mattole River on the left bank, about 3 miles downriver from the town of Honeydew. Jim Wilson is the landowner and he has given permission for access and water use during late fall and early winter. Adult capture operations have been conducted here during wintertime drought conditions, when prolonged periods of low riverflow prevented spawners from migrating freely to upriver areas.

Water Source: Unnamed tributary to the Mattole River supplies water to a trough for temporary on-site holding of adult fish.

Flow: Adequate during winter.

Water rights: Landowner permission.

Temperature: No information available.

Turbidity: Low

Dissolved oxygen: No information available.

Other water quality factors: No information available.

Physical Facilities:

Egg incubation facilities: *(Off-site egg incubation at the Mill Creek facility)*
The Wilson site is used as an adult trapping and egg taking facility only. Adults are captured using portable, modular trapping gear (described previously for the Ettersburg Trap Site). Fish retained as broodstock can be held on-site for short periods of time until ripe for spawning. After eggs are fertilized and water-hardened, they are transported to the Mill Creek facility for primary incubation. Broodstock that need to be held for extended periods before ripening are transported by truck to the Mill Creek facility, located 15 road miles west of the Wilson trap site.

Plan of Operation:

Water system: Gravity flow from an unnamed tributary through 1" polyethylene pipe supplies water at 15 gpm to a fiberglass trough (12' x 2' x 2') for on-site holding of broodstock.

Rearing facilities: None

Egg incubating facilities: None on-site. See plan of operation for Mill Creek facility.

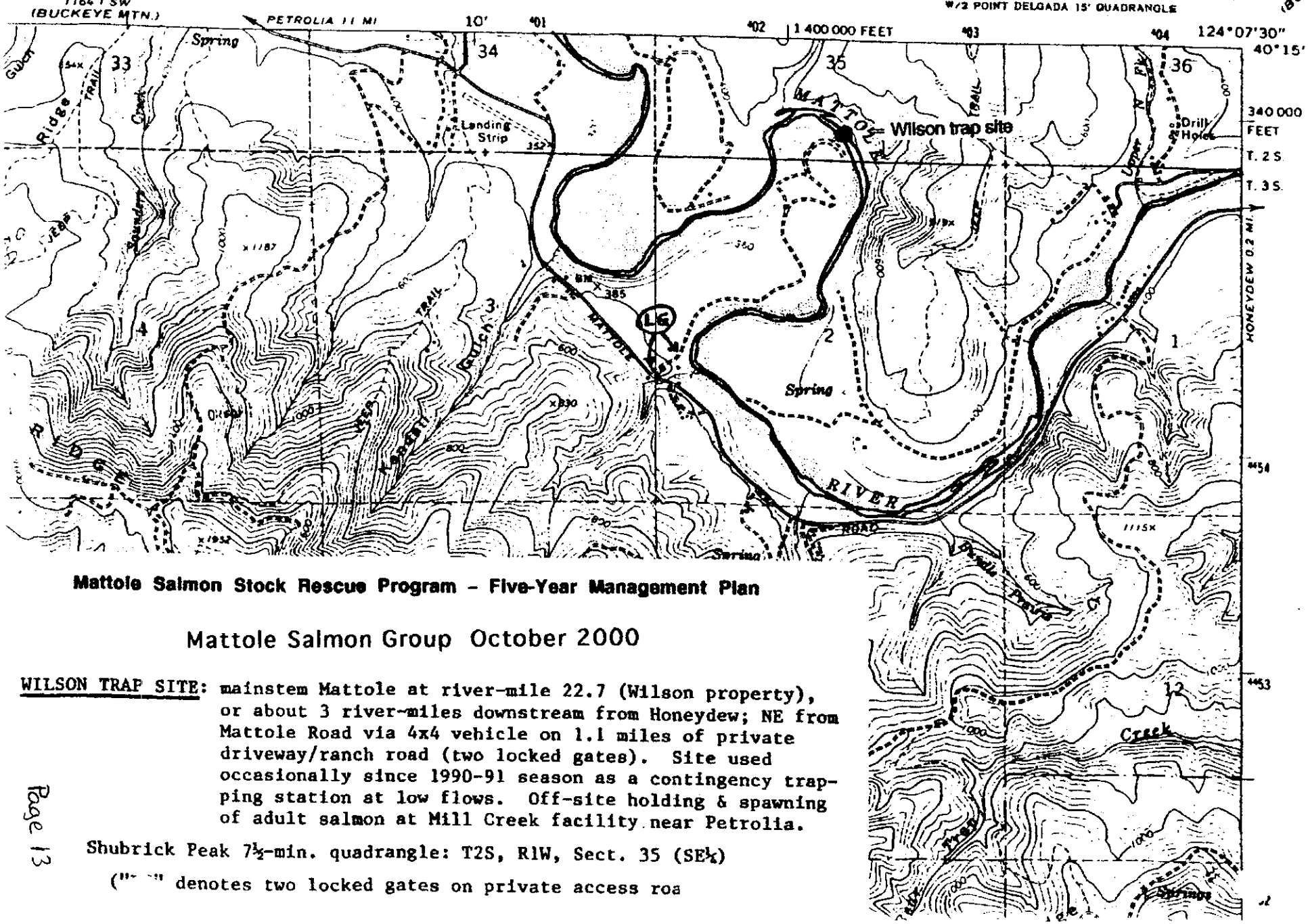
Adult trapping and egg-taking facilities: A mobile trap & weir is used to capture broodstock, which can be held and spawned on-site, or transported to the Mill Creek facility for extended holding, spawn-taking, and primary egg incubation. Plan of operation is the same as that described previously for Ettersburg site operations.

Personnel:

Ron Lyons	Morgan Lyons	Trevor Hall	Steve Woods
Bob Anderson	Maureen Roche	Don Ozard	David Simpson
Gary Peterson			

TE OF CALIFORNIA
ENT OF WATER RESOURCES

SHUBRICK PEAK QUADRANGLE
CALIFORNIA—HUMBOLDT CO.
7.5 MINUTE SERIES (TOPOGRAPHIC)
W/2 POINT DELGADA 15' QUADRANGLE



Mattole Salmon Stock Rescue Program - Five-Year Management Plan

Mattole Salmon Group October 2000

WILSON TRAP SITE: mainstem Mattole at river-mile 22.7 (Wilson property), or about 3 river-miles downstream from Honeydew; NE from Mattole Road via 4x4 vehicle on 1.1 miles of private driveway/ranch road (two locked gates). Site used occasionally since 1990-91 season as a contingency trapping station at low flows. Off-site holding & spawning of adult salmon at Mill Creek facility near Petrolia.

Shubrick Peak 7½-min. quadrangle: T2S, R1W, Sect. 35 (SE¼)

("" "" denotes two locked gates on private access roa

Project Location: Mattole Headwaters Trap Site

This is an alternative trapping site located on the upper mainstem of the Mattole River (river mile 54.4) between Thorn Junction and the town of Whitethorn, on the Wolfert property. The landowner has indicated a willingness to grant MSG permission for short-term site occupancy during salmon spawning runs when high river flows preclude adult capture operations at sites downriver.

Water Source: Unnamed intermittent tributary to the Mattole River supplies water to a trough for temporary on-site holding of adult fish.

Flow: Adequate during winter.

Water rights: Landowner permission

Temperature: No information available.

Turbidity: Low

Dissolved oxygen: No information available.

Other water quality factors: No information available.

Physical Facilities:

Egg incubation facilities: *(Off-site egg incubation at the Arcanum facility)*

Adult trapping and egg-taking facilities: Adults are captured using portable, modular trapping gear (described previously for the Ettersburg Trap Site). Fish selected as broodstock can be held on-site for short periods of time, and are subsequently transported by truck to the Arcanum facility (about 6.3 road miles south of the Mattole Headwaters Trap Site) for extended holding, spawning operations, and primary egg incubation.

Plan of Operation:

Water system: Gravity flow from an unnamed left-bank tributary through 1" polyethylene pipe supplies water at 15 gpm to a fiberglass trough (12' x 2' x 2') for temporary on-site holding of broodstock.

Rearing facilities: None

Egg incubating facilities: None on-site. See Arcanum facility plan of operation.

Adult trapping and egg-taking facilities: A mobile trap & weir is used to capture broodstock, which are then transported to the Arcanum facility for holding and spawn-taking. Plan of operation is the same as that described previously for Ettersburg site operations.

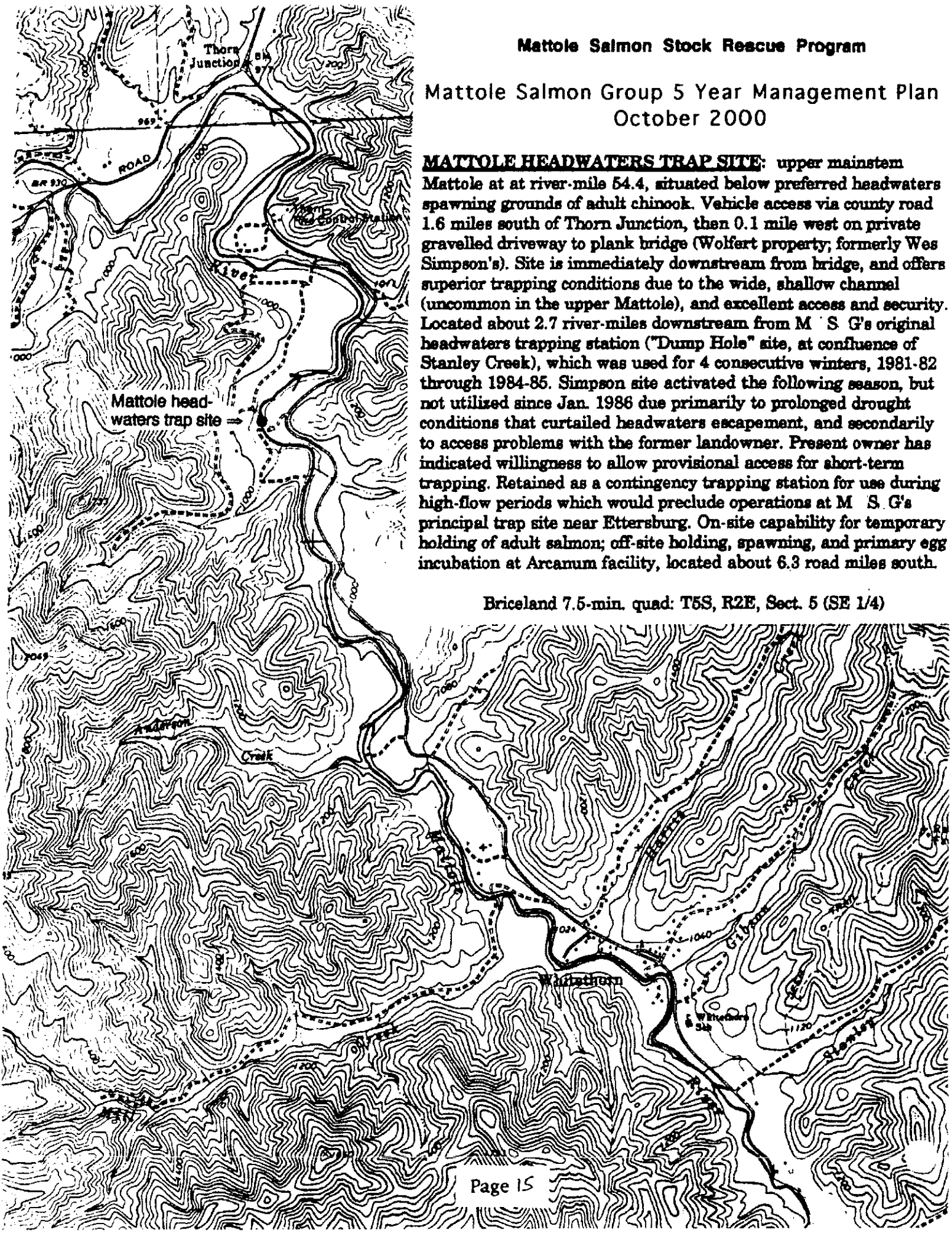
Personnel:

Gary Peterson	Colum Coyne	Ron Lyons	David Simpson
Monica Coyne	Richard Gienger	Maureen Roche	Peter Genolio
Will Bell			

Mattole Salmon Group 5 Year Management Plan
October 2000

MATTOLE HEADWATERS TRAP SITE: upper mainstem Mattole at at river-mile 54.4, situated below preferred headwaters spawning grounds of adult chinook. Vehicle access via county road 1.6 miles south of Thorn Junction, then 0.1 mile west on private gravelled driveway to plank bridge (Wolfert property; formerly Wes Simpson's). Site is immediately downstream from bridge, and offers superior trapping conditions due to the wide, shallow channel (uncommon in the upper Mattole), and excellent access and security. Located about 2.7 river-miles downstream from M S G's original headwaters trapping station ("Dump Hole" site, at confluence of Stanley Creek), which was used for 4 consecutive winters, 1981-82 through 1984-85. Simpson site activated the following season, but not utilized since Jan. 1986 due primarily to prolonged drought conditions that curtailed headwaters escapement, and secondarily to access problems with the former landowner. Present owner has indicated willingness to allow provisional access for short-term trapping. Retained as a contingency trapping station for use during high-flow periods which would preclude operations at M S G's principal trap site near Ettersburg. On-site capability for temporary holding of adult salmon; off-site holding, spawning, and primary egg incubation at Arcanum facility, located about 6.3 road miles south.

Briceland 7.5-min. quad: T5S, R2E, Sect. 5 (SE 1/4)



Project Location: Arcanum Facility

This facility is located 4.0 road miles south of the town of Whitethorn and about 400 feet north of the Briceland-Thorn Road, close to the headwaters of the mainstem Mattole River (river mile 59.8). Greiser and Felando are the landowners and they have given permission for access, water use and site occupancy. The facility is normally in operation from about February through May for incubation and fish-rearing activities which produce fingerling-size chinook or coho salmon. The Arcanum site is also occasionally activated in late fall and early winter in years when high river flows make it necessary to conduct adult capture operations at the Mattole Headwaters Trap Site.

Rearing Water Source: Unnamed north-side tributary, locally known as Arcanum Creek.

Flow: From 300 gpm in January to 30 gpm in July.

Water rights: Landowner permission.

Temperature: Ranges from a minimum of 42° F in winter to a maximum of 56° F in July; mean water temperature is about 48° F.

Turbidity: Very low

Dissolved oxygen: Adequate

Other water quality factors: No information available. Proven facility for short-term rearing (through May) since 1982.

Physical Facilities: Refer to topographic map and facility diagram.

Egg incubation facilities: From 1982 through 1986, when adult capture operations were conducted exclusively in the upper mainstem Mattole, all spawn-taking and initial incubation of eggs took place at the Arcanum facility. Eggs were incubated to the eyed stage in a covered plywood trough (8'L x 2'W x 0.7'H) containing a series of 5 compartments separated by internal baffles, which produced upwelling flow. Each compartment accepted 3 removable screened baskets that set on legs 2" off the bottom of the trough. Baskets could hold about 4,500 newly fertilized embryos each, by layering the eggs up to 4" deep (Note: This was during a time when the use of malachite green for fungus control was still permissible). After 1986, this "old style"primary incubation box was removed and used at other sites downriver; the box currently resides at the Mill Creek facility near Petrolia. If needed, the box can easily be moved back to the Arcanum facility, hooked up to the existing plumbing and filtration system, and used for primary egg incubation at approximately 30% of original design capacity (i.e., shallow-layer incubation at up to 1,350 eggs per basket, giving a total incubating capacity of about 20,000 eggs to the eyed stage). At the present time, however, egg incubation capability at the Arcanum facility is provided by a redwood hatchbox (8' x 2' x 2') which accommodates removable screened trays that are secured in place over the gravel matrix (25,000 eyed egg capacity). The existing hatchbox can also, if necessary, be used for primary egg incubation by removing most of the gravel to allow sufficient vertical space for stacking 10 screened trays inside, thereby permitting up to 40,000 newly fertilized eggs to be incubated to the eyed stage.

Adult trapping and egg-taking facilities: The Arcanum facility is usually dormant from June through January. However, when high flow conditions in winter dictate that broodstock capture operations be conducted at the Mattole Headwaters Trap Site, the facility is activated and used for adult holding, spawn-taking, and primary egg incubation.

Plan of Operation:

Water system: Two buried half-drum intakes (see illustration below), each with 1-1/4" polyethylene pipe leading to two Bandon-style filter barrels. A spray bar is employed for pond aeration. A gas-powered water pump is kept on-site as backup in case of water emergencies. Pond effluent is discharged into a soil pit, and water returns to the creek via subsurface percolation.

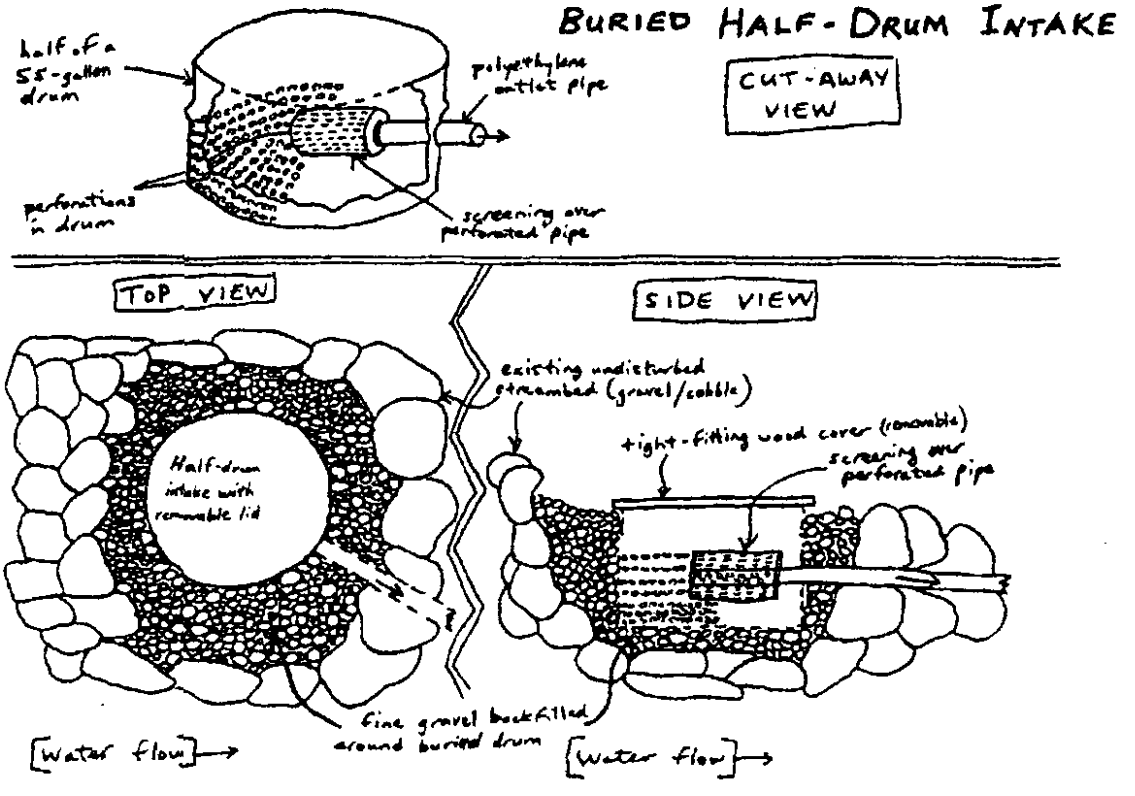
Rearing facilities: Newly emerged salmon fry are removed from the hatchbox daily and transported by bucket to an adjacent ferro-cement circular pond (19' diameter by 4.5' high'; 7,400 gallon capacity at 3.5' water depth). The Arcanum facility is used for short-term rearing only, as the water supply declines to inadequate levels by mid-summer. Fish are fed by automatic feeder and by hand, using Bio-Oregon (formerly Bioproducts) starter diet and pelleted feed; charts supplied by the feed manufacturer and guidelines in DFG's *Trout and Salmon Culture* are consulted to determine feeding rates and schedules. At a maximum loading density of 3 fingerlings per gallon, pond rearing capacity is about 22,000 chinook smolts or coho pre-smolts.

Egg incubation facilities: At the present time, the Arcanum facility has a hatchbox that can either receive eyed eggs or be retrofitted to incubate newly fertilized eggs to the eyed stage. If the need arises, an "old style" primary incubation box can easily be put in place for expanded incubating capacity. Refer to the plan of operation for Ettersburg incubation facilities for additional information.

Adult trapping and egg-taking facilites: No adult capture operations at this site. Adults captured in the upper Mattole and selected as broodstock are placed in numbered PVC holding tubes and transported by truck to the Arcanum facility. Tubes are placed in the 19' ferro-cement pool and are secured with tethers attached to the front and rear of each tube. Refer to the description of Ettersburg site operations for discussion of sorting and spawn-taking techniques.

Personnel:

Shaundra Vallotton	Bill Vallotton	Rustin Vallotton	Sandy Tilles
Theresa Vallotton	Gary Peterson	John Greiser	Greg Felando
Campbell Thompson	Mickey Dulas	Rondal Snodgrass	



STATE OF CALIFORNIA
WATER RESOURCES

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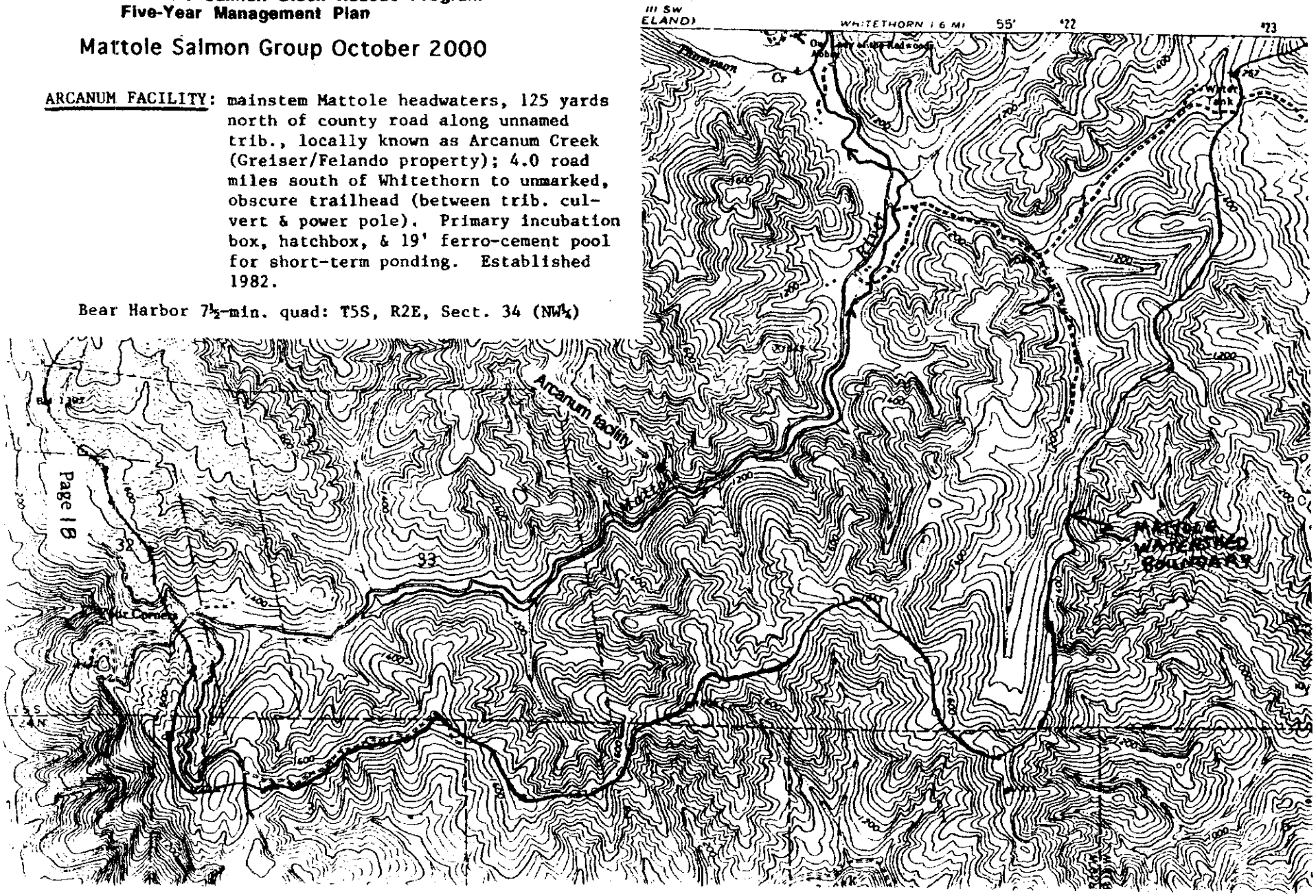
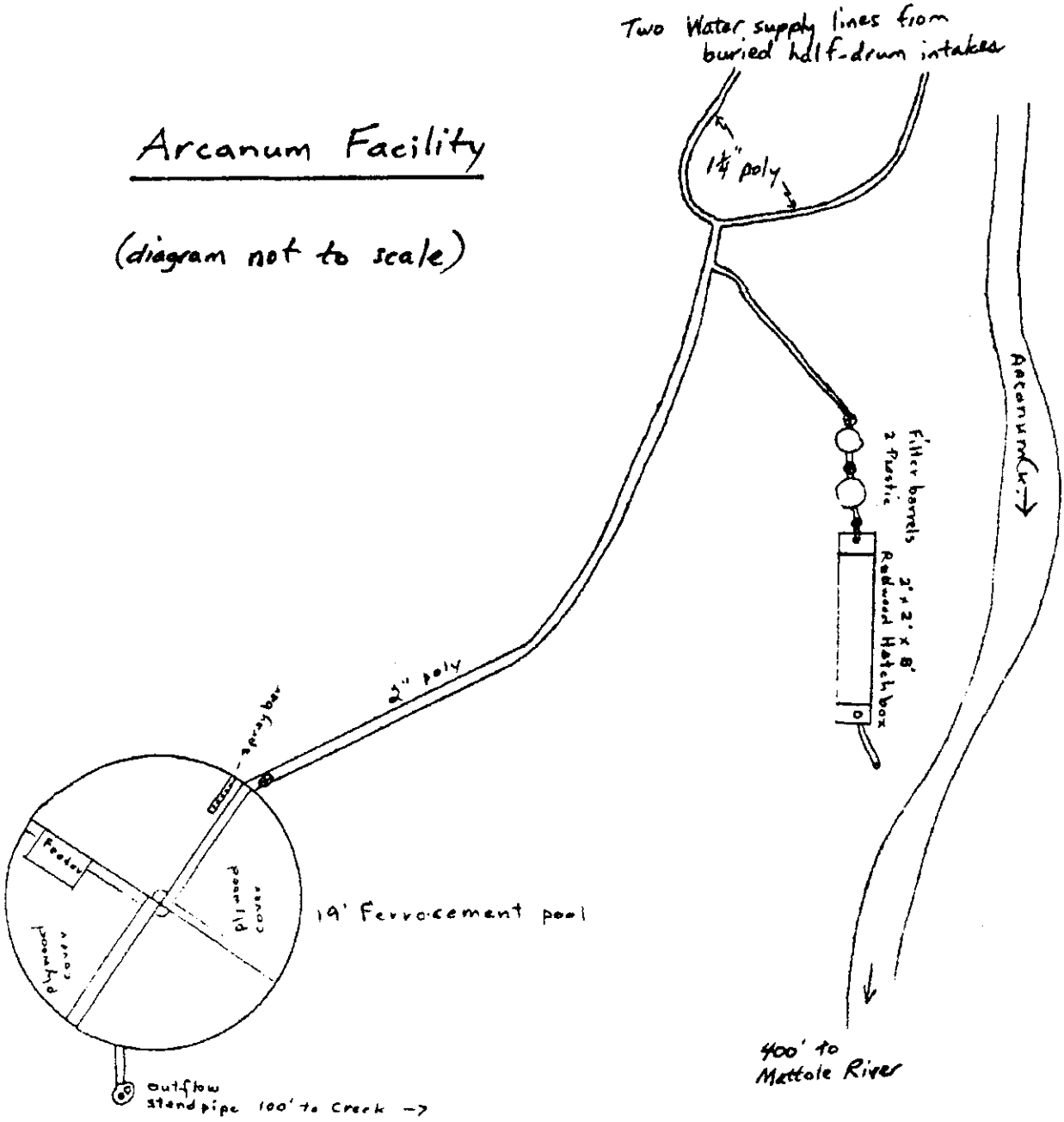
ARCANUM FACILITY: mainstem Mattole headwaters, 125 yards north of county road along unnamed trib., locally known as Arcanum Creek (Greiser/Felando property); 4.0 road miles south of Whitethorn to unmarked, obscure trailhead (between trib. culvert & power pole). Primary incubation box, hatchbox, & 19' ferro-cement pool for short-term ponding. Established 1982.

Bear Harbor 7½-min. quad: T5S, R2E, Sect. 34 (NW¼)




Arcanum Facility
(diagram not to scale)
Two Water supply lines from buried half-drum intakes
1¼" poly
Arcanum Crk.
Filter barrels 2 Plastic
2" x 2" x 8' Redwood Hatchbox
2" poly
spray bar
Feeder
plywood cover
plywood cover
19' Ferrocement pool
outflow standpipe 100' to Creek →
400' to Mattole River

Project Location: Solitude Facility

This site is located at the headwaters area of the South Fork of Bear Creek on the southwest side, at the mouth of an unnamed tributary. Mr. Day is the landowner and he has given permission for facility operation on the premises. The Solitude facility is MSG's only upriver site with sufficient high-quality water supply for problem-free oversummer rearing.

Rearing Water Source: Gravity-flow water delivery from unnamed perennial tributary, locally known as Solitude Creek.

Flow: From 300 gpm to 50 gpm.

Water rights: Landowner permission since 1983.

Temperature: Ranges from 46° F to 61° F; mean water temperature is about 55° F.

Turbidity: Very low.

Dissolved oxygen: 13 ppm, tested in September 2000 while rearing > 5,000 chinook yearlings

Other water quality factors: No information available. Proven oversummer rearing facility since 1983.

Physical Facilities: Refer to topographic map and facility diagram.

Egg incubation facilities: A hatchbox (8' x 2' x 2') constructed of redwood is fitted with removable screened trays over the gravel matrix, and has a total incubation capacity of about 25,000 eyed eggs.

Adult trapping and egg-taking facilities: None

Plan of Operation:

Water system: Two buried half-drum intakes (see illustration at top of page 22; also page 17), each with 1-1/4" polyethylene pipe leading to a Bandon-style filter barrel. Spray bars are employed for trough and pond aeration. A gas-powered water pump and oxygen equipment are kept on-site as backup in case of water emergencies. Effluent from the rearing trough and two doughboy pools drains into adjacent soil pits, and water returns to the creek via subsurface percolation.

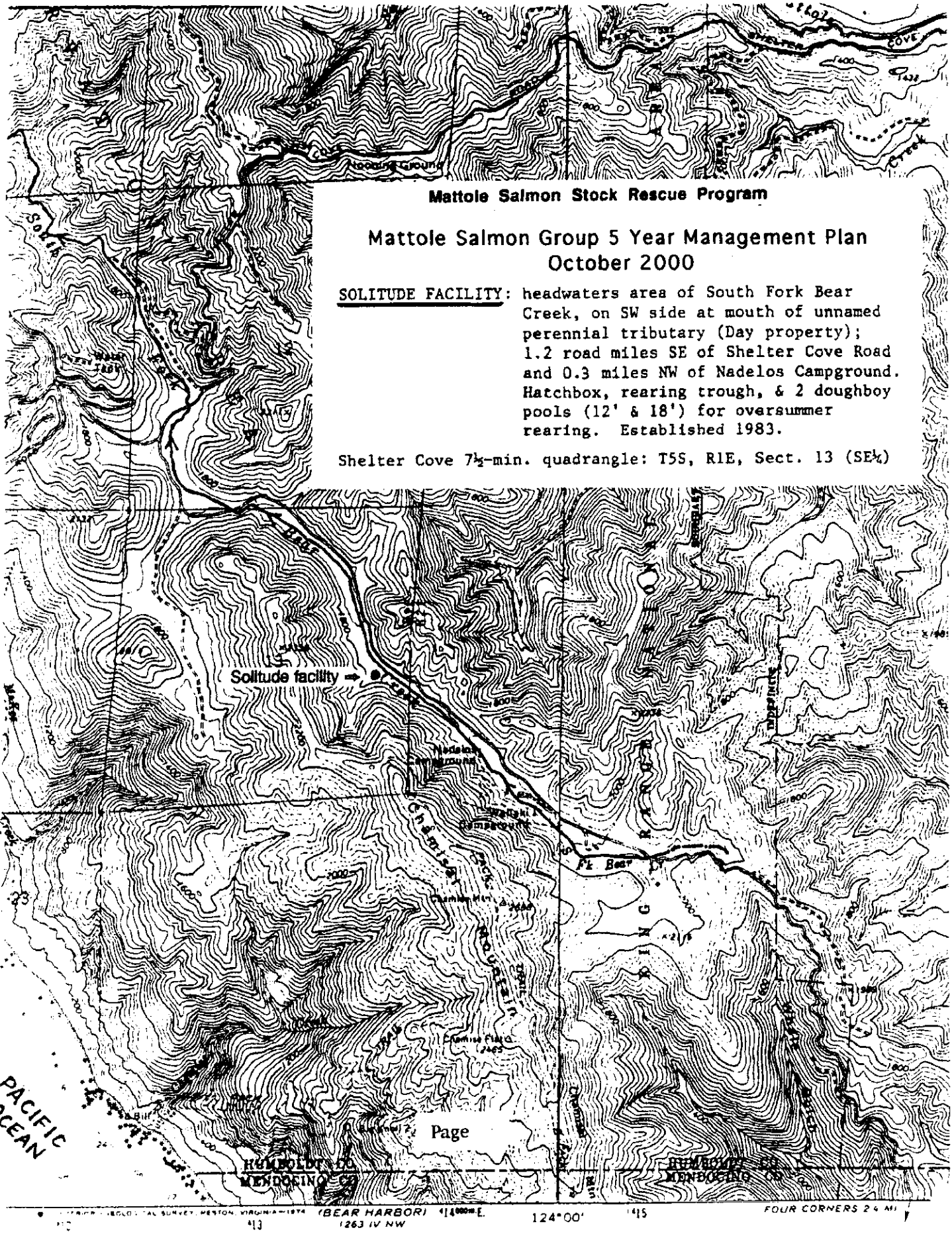
Rearing Facilities: Newly emerged fry swim out of the hatchbox via a 2" PVC overflow pipe which empties into a redwood rearing trough (16' x 2' x 2') used for initial feeding. The fish are then transferred to adjacent doughboy ponds for extended rearing. The larger of the two circular ponds is 18' diameter by 4' high (5,700 gallon capacity at 3' water depth) and the smaller one is 12' diameter by 3.5' high (2,100 gallon capacity at 2.5' water depth). Fish are fed by automatic feeder and by hand, using Bio-Oregon starter diet and pelleted feed; charts supplied by the feed manufacturer and guidelines in DFG's *Trout and Salmon Culture* are consulted to determine feeding rates and schedules. At a maximum loading density of 3 fingerlings per gallon *or* 1.5 yearlings per gallon, pond rearing capacities are as follows: for the 18' doughboy, about 17,000 fingerlings (chinook smolts or coho pre-smolts) *or* 8,500 yearlings (chinook post-smolts or coho smolts); for the 12' doughboy, 6,300 fingerlings *or* 3,150 yearlings. Rearing facility protected from predators by electric fence since the 1998 season.

Egg incubation facilities: The Solitude facility is equipped only to receive eyed eggs.

Adult trapping and egg-taking facilities: None

Personnel:

Tim Day	Logan Edwards	Gary Peterson
Laura Stern	Maureen Roche	Ray Lingel



Mattole Salmon Stock Rescue Program

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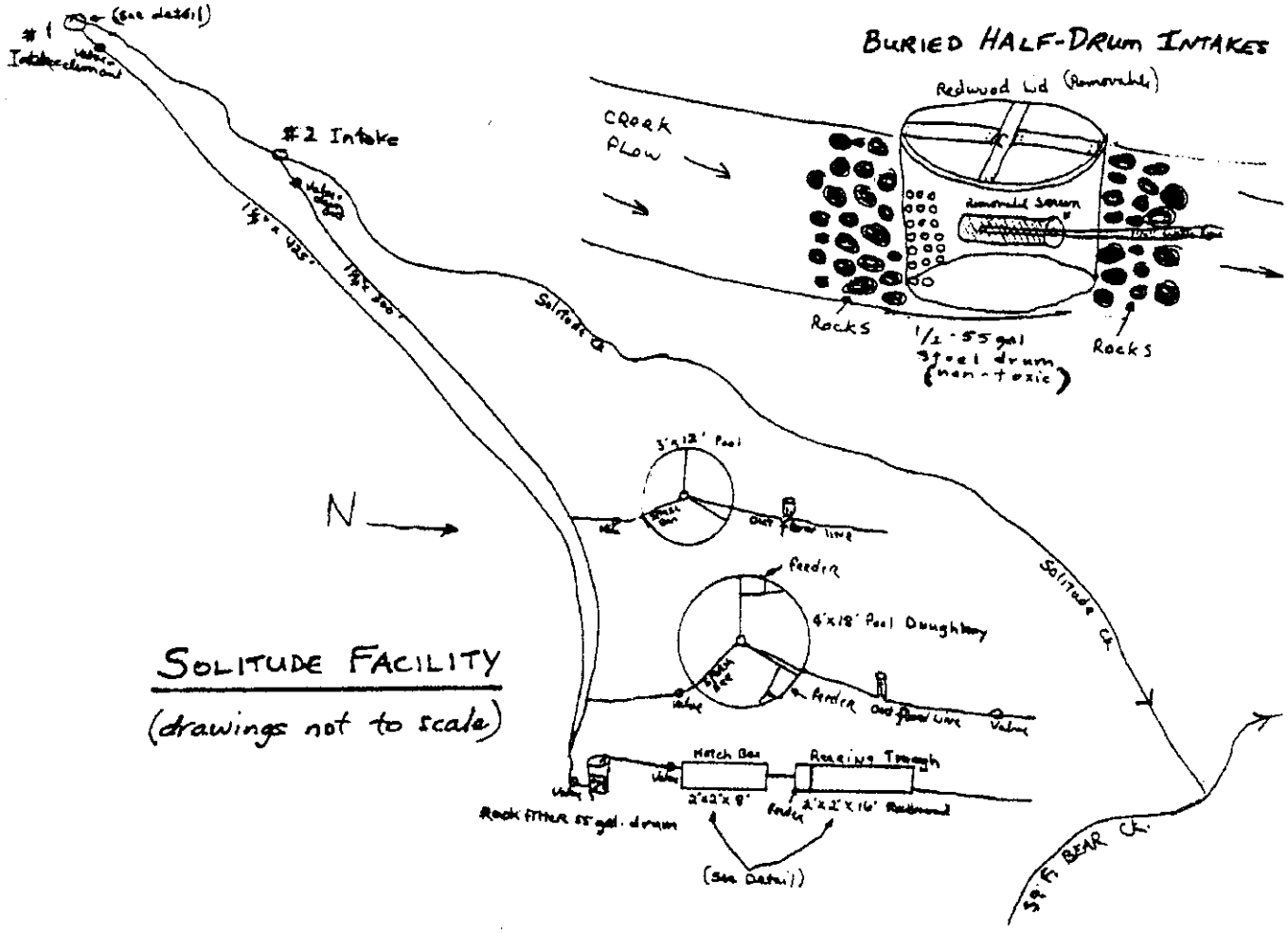
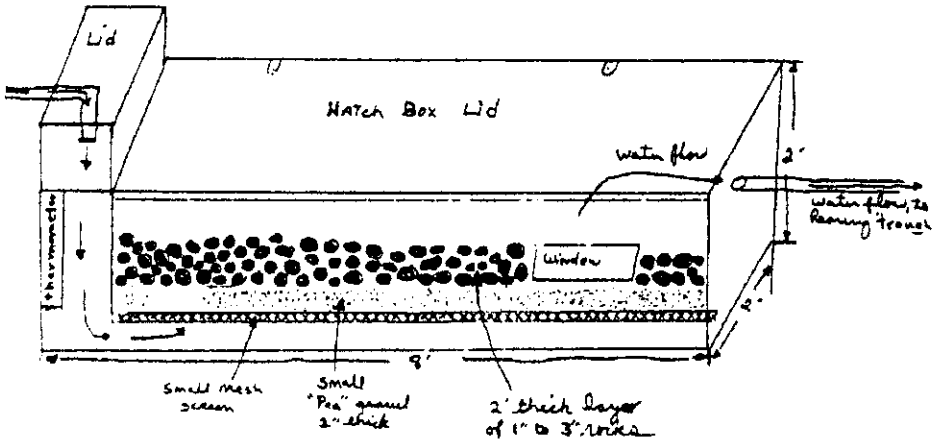
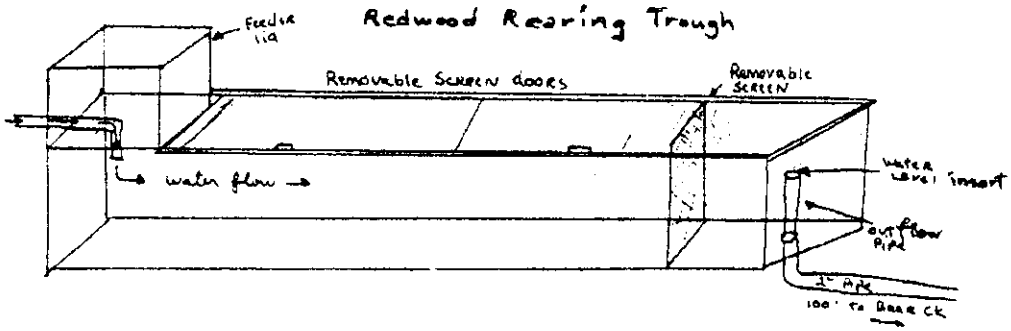
SOLITUDE FACILITY: headwaters area of South Fork Bear Creek, on SW side at mouth of unnamed perennial tributary (Day property); 1.2 road miles SE of Shelter Cove Road and 0.3 miles NW of Nadelos Campground. Hatchbox, rearing trough, & 2 doughboy pools (12' & 18') for oversummer rearing. Established 1983.

Shelter Cove 7½-min. quadrangle: T5S, R1E, Sect. 13 (SE¼)


BURIED HALF-DRUM INTAKES
Redwood Lid (Removable)
CReek FLow
Rocks
1/2 - 55 gal Steel drum (non-toxic)
Rocks
#1 Intake
#2 Intake
Solitude Ck
SOLITUDE FACILITY
(drawings not to scale)
N
Feeder
4'x18' Pool Doughboy
Hatch Box
Rearing Trough
Rock filter 55 gal. drum
Solitude Ck
Sq. Fk. BEAR Ck.


Lid
Hatch Box Lid
water flow
2'
water flow to Rearing Trough
Window
9'
Small mesh screen
Small "Pea" gravel 2" thick
2' thick layer of 1" to 3" rocks


Redwood Rearing Trough
Feeder Lid
Removable Screen doors
Removable Screen
water flow
water level insert
out flow Pipe
3" PVC
100' to Bear Ck

Project Location: Oliver Gap Facility

Located on a right-bank terrace adjacent to South Fork Bear Creek, about 1.5 miles downstream from the Shelter Cove Road. The landowner is Mr. Lingel and he has given permission for facility operation since 1987. The Oliver Gap site was originally developed for use in a DFG-approved program of coho pre-smolt rearing and release into barren or under-utilized habitat. The facility has not been activated since spring 1997, however, due to shortages of native coho eggs. The opportunity exists for future expansion and improvement of the facility, possibly to achieve oversummering capability, through water supply augmentation and doughboy pool installation.

Rearing Water Source: Unnamed intermittent tributary to South Fork Bear Creek on right bank.

Flow: From 200 gpm to 10 gpm (February through June)

Water rights: Landowner permission

Temperature: Range 43° F to 61° F; mean water temperature 54° F (February through June).

Turbidity: Low

Dissolved oxygen: No information available

Other water quality factors: No information available. Proven facility for short-term rearing (through late spring) since 1987.

Physical Facilities: Refer to topographic map and facility diagram.

Egg incubation facilities: Hatchbox (8' x 2' x 2') constructed of redwood accepts 3 screened trays for a total incubation capacity of 15,000 eyed eggs.

Adult trapping and egg-taking facilities: None

Plan of Operation:

Water system: Two buried half-drum intakes. Water supply lines are 1-1/4" polyethylene pipe, which feed into a Bandon-style filter barrel and then into a redwood hatchbox. Adjacent rearing trough is fed by overflow from the hatchbox, and also by a separate water-supply line with spray bar for aeration. A gas-powered water pump is kept on-site for use in the event of water emergencies. Rearing trough effluent is discharged into an existing earthen settling pond.

Rearing facilities: Newly emerged fry swim out of the hatchbox via a 2" PVC overflow pipe which empties into a fiberglass rearing trough (12' x 2' x 2'). The Oliver Gap site is for short-term rearing only, since the water supply declines to inadequate levels by early summer; however the possibility exists for facility expansion or improvement in the future, as a perennial tributary located 0.3 miles to the east could potentially be tapped as a supplemental water source. Fish are fed by automatic feeder and by hand, using Bio-Oregon starter diet and pelleted feed; charts supplied by the feed manufacturer and guidelines in DFG's *Trout and Salmon Culture* are consulted to determine feeding rates and schedules. At a maximum loading density of 10 fish per gallon, trough rearing capacity is about 3,000 chinook or coho fingerlings.

Egg incubation facilities: The Oliver Gap site is equipped only to receive eyed eggs.

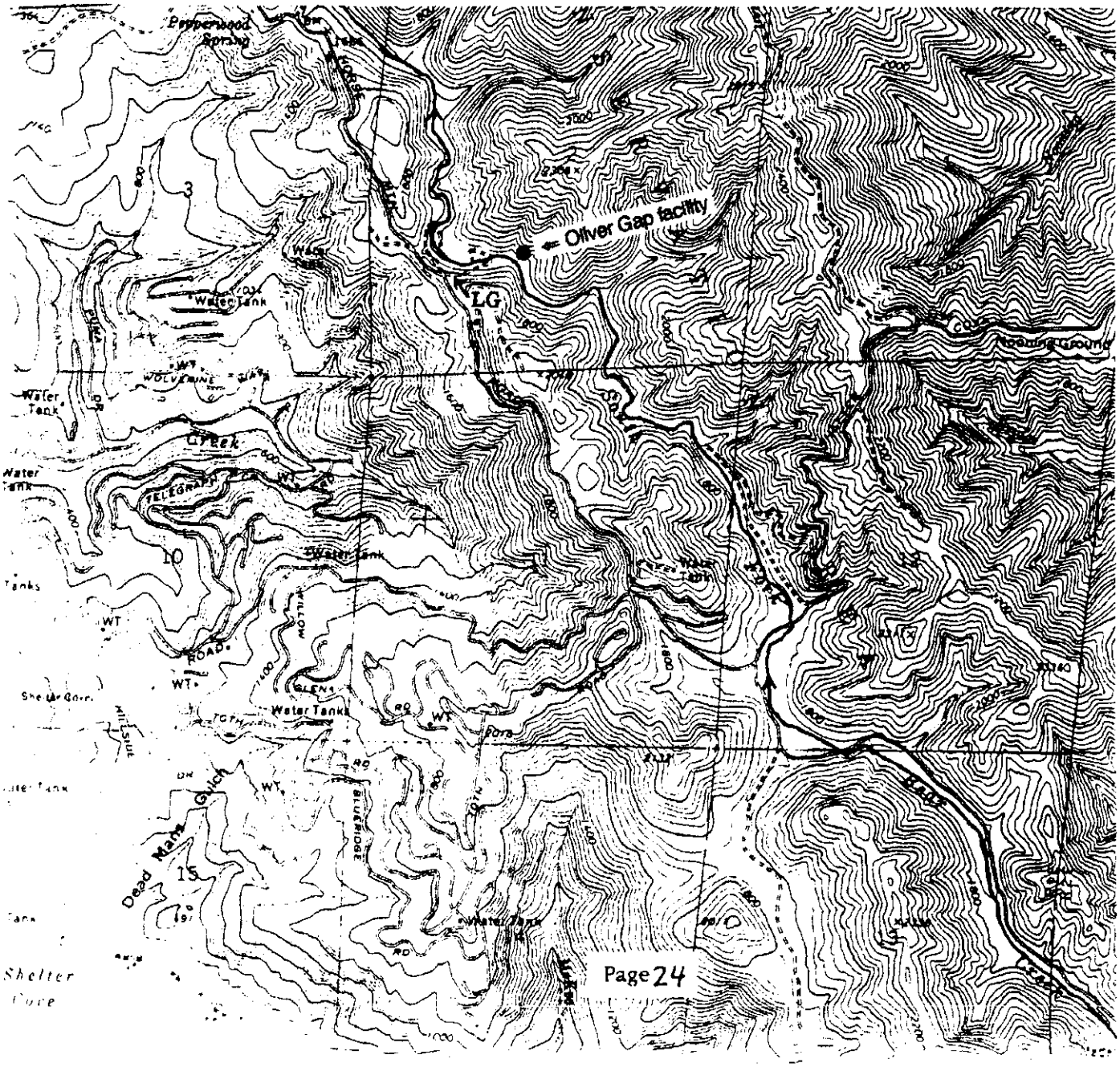
Adult trapping and egg-taking facilities: None

Personnel: Ray Lingel, Gene Brown, Dylan Brown, Greg Mullins

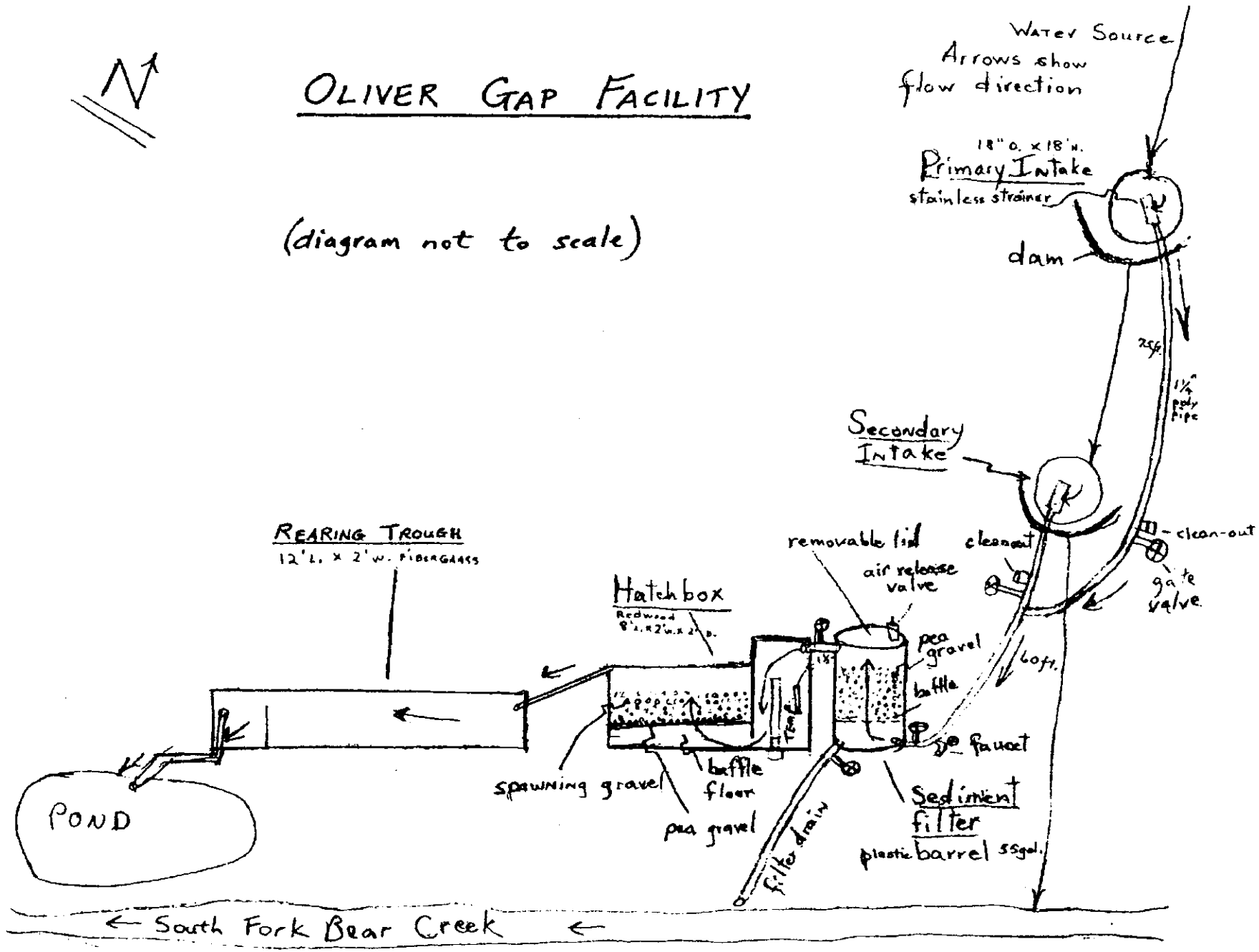
OLIVER GAP FACILITY: adjacent to upper South Fork Bear Creek on north-bank terrace (Lingel property). Vehicle access from Horse Mountain Road, about 1.2 miles north of Shelter Cove Road, right turn (east) onto private driveway with locked gate; steep downhill pitch 0.15 mile to parking area on south side of creek (4x4 vehicles only). Site is about 150 yards upstream from parking area, accessible via foot trail on north side of creek. Hatchbox and rearing trough, used for short-term rearing of coho in DFG-authorized program of pre-smolt releases into under-seeded habitat. Established 1987 and operated for 2 seasons, but facility has been dormant since spring 1989. Has oversummering potential (perennial trib. 0.3 miles to the east) for coho smolt or chinook post-smolt program.

Shelter Cove 7.5-min. quad: T5S, R1E, Sect. 2 (SW 1/4)

("LG" denotes locked gate on private access road)



OLIVER GAP FACILITY



Project Location: Squaw Creek Facility

This facility is located adjacent to Squaw Creek on an east-bank terrace approximately 1 mile upstream from the mouth. The landowner is the Hoyle's and they have given permission for facility operation at this site. The facility was established in 1985 for supplementation fish culture (rearing and release of native chinook smolts) in the Squaw Creek drainage, the fifth-largest Mattole tributary.

Rearing Water Source: Three unnamed intermittent tributaries to lower Squaw Creek.

Flow: From 90 gpm to 30 gpm (February through June)

Water rights: Landowner permission.

Temperature: Ranges from 40° F in February to 61° F in early June (maximum of 68° F recorded during a heat wave in late June 1992); mean water temperature is about 55° F

Turbidity: Low

Dissolved oxygen: No information available.

Other water quality factors: No information available. Proven facility for short-term rearing (through late spring) since 1985.

Physical Facilities: Refer to topographic map and facility diagram.

Egg incubation facilities: Hatchbox (8′ x 2′ x 2′) constructed of redwood receives 4 screened trays of eyed eggs for a total capacity of approximately 25,000 eggs.

Adult trapping and egg-taking facilities: None

Plan of Operation:

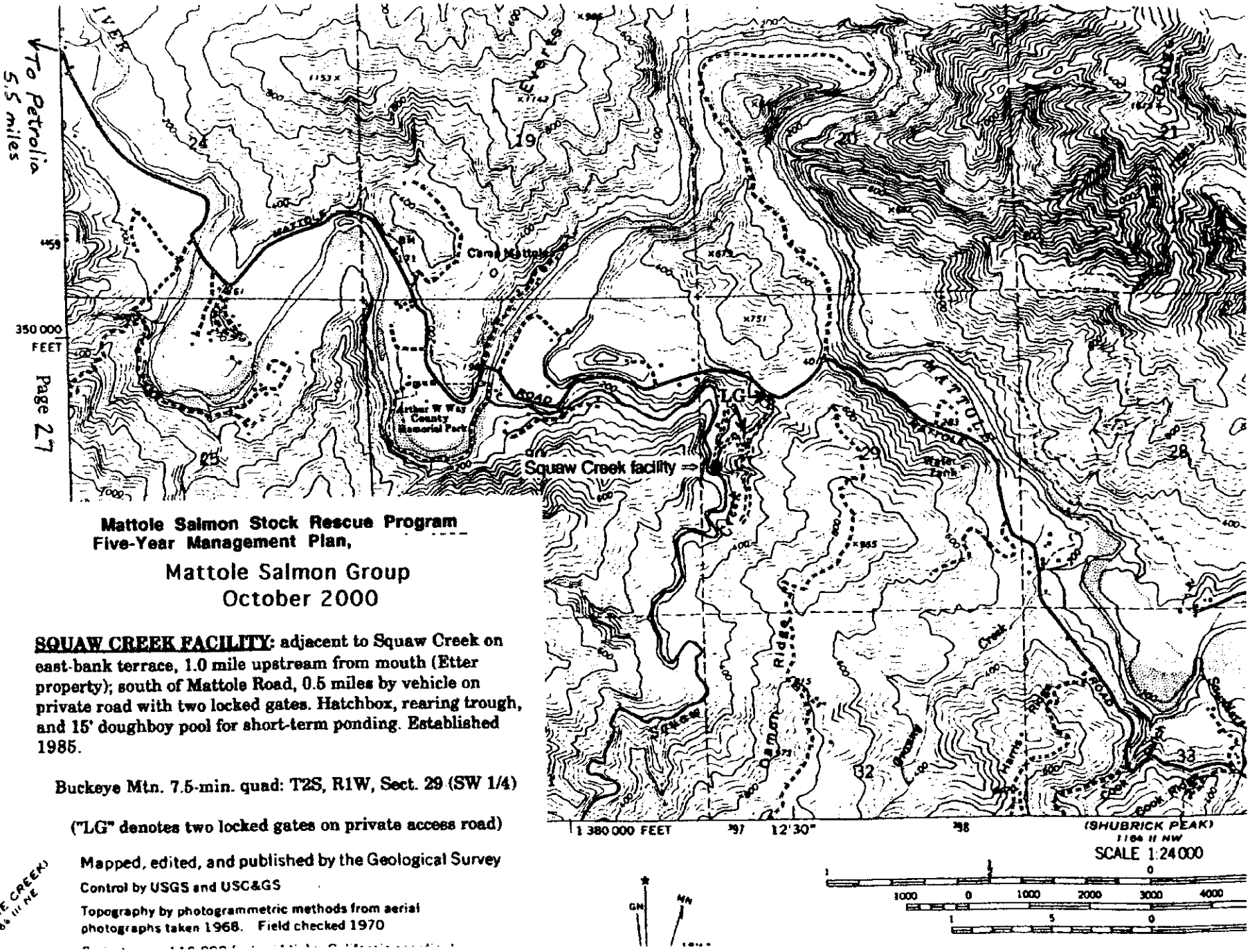
Water system: Three unnamed tributaries supply 3 intakes (buried half-drum intakes; see illustration on page 17), each with 1-1/4" polyethylene pipelines that feed into two Bandon-style filter barrels and then into a redwood hatchbox. Adjacent rearing trough is fed by overflow from the hatchbox, and also by a separate water supply line. Doughboy pool has a spray bar for aeration. A gas-powered water pump is kept at a residence 0.2 miles from the facility for use as backup in the event of water emergencies. Effluent from the rearing trough and the doughboy pond are discharged into a soil pit, and water returns to the stream via subsurface percolation.

Rearing facilities: Hatchbox receives eyed eggs which are placed on screened trays secured above the gravel matrix. Newly emerged fry swim out of the hatchbox via a 2" PVC overflow pipe which empties into a fiberglass rearing trough (12′ x 2′ x 2′) used for initial feeding. The fish are subsequently transferred to an adjacent doughboy pond (15′ diameter by 4′ high'; 4,000 gallon capacity at 3′ water depth). The Squaw Creek site is used for short-term rearing only, as the water supply declines to inadequate levels by early summer. Fish are fed by automatic feeder and by hand, using Bio-Oregon starter diet and pelleted feed; charts supplied by the feed manufacturer and guidelines in DFG's *Trout and Salmon Culture* are consulted to determine feeding rates and schedules. At a maximum loading density of 3 fish per gallon, pond rearing capacity is 12,000 chinook smolts.

Egg incubation facilities: The Squaw Creek facility is equipped only to receive eyed eggs.

Adult trapping and egg-taking facilities: None

Personnel: Laura Walker, Bob Hoyle, Pam Sturgeon, Gary Peterson, Fred Liu, Randy Stemler



Mattole Salmon Stock Rescue Program
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SQUAW CREEK FACILITY: adjacent to Squaw Creek on east-bank terrace, 1.0 mile upstream from mouth (Etter property); south of Mattole Road, 0.5 miles by vehicle on private road with two locked gates. Hatchbox, rearing trough, and 15' doughboy pool for short-term ponding. Established 1985.

Buckeye Mtn. 7.5-min. quad: T2S, R1W, Sect. 29 (SW 1/4)

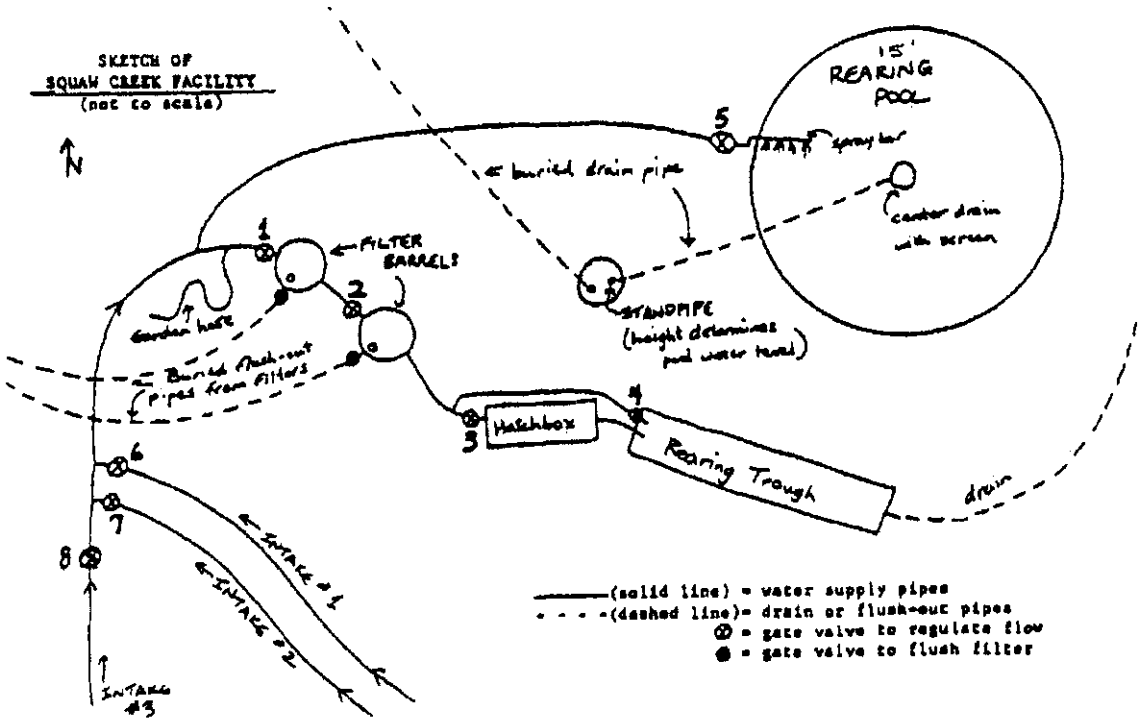
("LG" denotes two locked gates on private access road)

Mapped, edited, and published by the Geological Survey
Control by USGS and USC&GS
Topography by photogrammetric methods from aerial photographs taken 1968. Field checked 1970

OOSKIE CREEK)
1164 II NE

Squaw Creek Facility

(diagram not to scale)



Project Location: Mill Creek Facility

Located along the south bank of the lower mainstem Mattole River (river mile 3.0), just east of the Mill Creek confluence. We have secured landowner permission for facility operation on the Pearlston property. The Mill Creek site is the base of operations for MSG's chinook "Rescue Rearing" project (consisting of seining or trapping of wild juvenile chinook in the lower mainstem Mattole after mouth closure, transfer of captured fish to rearing units, oversummer ponding at low densities in a semi-natural environment, and fall release of marked chinook post-smolts adjacent to the facility). The Mill Creek site is also occasionally activated in late fall and early winter in years when prolonged periods of low river flow make it necessary to conduct adult capture operations in the lower Mattole River downstream from Honeydew (see description of Wilson Trap Site on page 12). Facility slated to be moved 250 yards east, adjacent to the Mattole Salmon Group's new office/shop site, in the spring of 2001.

Rearing Water Source: Intakes are located on the West Fork of Mill Creek, a perennial stream.

Flow: *Primary source:* 300 gpm in winter to 30 gpm in late summer/early fall.
Secondary source: 300 gpm in winter to 30 gpm in late summer/early fall

Water rights: Landowner has deeded water rights.

Temperature: Extremes range from 38° F in winter to 63° F in fall; mean temperature 53° F.

Turbidity: Low during wet season, clear in dry season.

Dissolved oxygen: Lowest during summer; always >9 mg/l, cool and near saturation.

Other water quality factors: Proven over-summer rearing facility since 1981.

Physical Facilities: Refer to topographic map and facility diagram.

Egg incubation facilities: An "old style" primary incubation box, last used in 1992, is available for on-site incubation of newly fertilized eggs; its design, use and egg capacities are fully described on page 16 in the write-up for the Arcanum facility. In addition, the Mill Creek facility has a hatchbox (8' x 2' x 2') constructed of redwood which can accept screened trays for initial incubation of eggs to the eyed stage. Approximately 60,000 eggs can be accommodated at full capacity (primary box and hatchbox capacities combined).

Adult trapping and egg-taking facilities: The Mill Creek facility is usually dormant from December through March. However, when prolonged low-flow conditions in winter dictate that broodstock capture operations be conducted at the Wilson Trap Site, the Mill Creek facility is activated and used for adult holding, spawn-taking, and primary egg incubation.

Plan of Operation:

Water system: Three instream cement basins (3' diameter x 2' deep) are fitted with 2" to 4" PVC standpipes, each perforated with 1/32" slotting. These gravity-fed intake basins are located in two branches of the West Fork of Mill Creek. A series of polyethylene pipes (1-1/4" & 1-1/2") run from the cement basin intakes to a Bandon-style 55-gallon filter barrel. Rearing units employ spray bars for aeration. Electric and gas-powered water pumps and aeration/agitation equipment are kept on-site as backup in case of water emergencies. Effluent is discharged into a soil pit, and water returns to the stream via subsurface percolation.

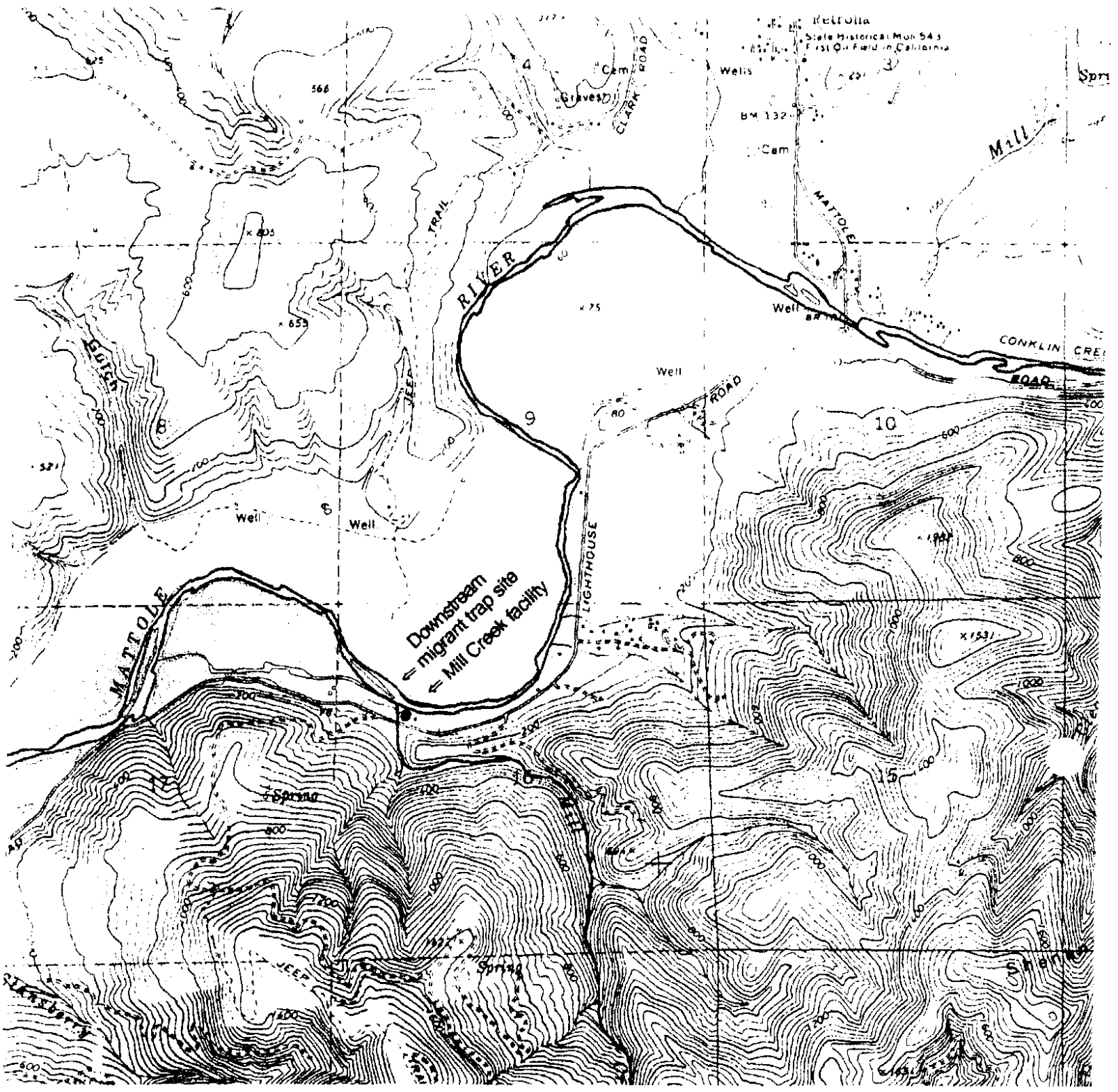
Rearing facilities: Two fiberglass troughs (12′ x 2′ x 2′) for initial rearing. One circular doughboy rearing pool (15′ diameter by 4′ high; 4,000 gallon capacity at 3′ water depth). Two circular fiberglass pools (10′ diameter by 5′ high) to be installed in spring 2001. Fish are fed by automatic feeder and by hand, using Bio-Oregon starter diet and pelleted feed; charts supplied by the feed manufacturer and guidelines in DFG's *Trout and Salmon Culture* are consulted to determine feeding rates and schedules, and recommended rations are approximately halved for chinook reared at low densities (reason: to slow the growth rate of the fish, and to take better advantage of the natural abundance of flying and crawling insects at this site). Downstream migrant trap site is located in the mainstem Mattole adjacent to the Mill Creek facility; 1994 was the inaugural year of "Rescue Rearing" at this facility, which consisted of trapping, rearing, and fall release of wild downmigrant chinook. (Note: The Department-approved procedure for capture of wild downmigrant chinook used in rescue rearing is through seining or trapping of juveniles after the mouth of the Mattole closes.) For rescued-reared chinook, MSG has adopted a strategy which entails low-density rearing, provision of submerged and overhead cover (e.g., willow branches), increased reliance on natural food items, conscious efforts to minimize human presence and interference, and an overall emphasis on quality over quantity of fish produced. Fish density for rescue rearing is not to exceed 0.75 fish per gallon (3,000 chinook in a 15′ doughboy pool), which is one-half the density guidelines normally used for oversummer rearing. With the planned addition of two 10′ fiberglass pools at the Mill Creek facility, the total ponding capacity for rescue-reared chinook will be 6,000 post-smolts annually.

Egg incubation facilities: Newly fertilized eggs are placed on screened trays in the hatchbox, and/or in screened baskets in the primary box, for incubation to the eyed stage. Once eggs are eyed, measured allotments of eggs are transported to various hatchbox/rearing facilities strategically located throughout the Mattole watershed. Refer to the plan of operation for Ettersburg incubation facilities for additional information.

Adult trapping and egg-taking facilities: No adult capture operations at this site. Adults captured at the Wilson Trap Site and selected as broodstock are placed in numbered PVC holding tubes and transported by truck to the Mill Creek facility. For holding of adults, tubes are placed in fiberglass troughs; if additional holding capacity is required, tubes can be put in the 15′ diameter doughboy pool and secured with tethers attached to the front and rear of each tube. Refer to the description of Ettersburg site operations for discussion of sorting and spawn-taking techniques.

Personnel:

Rex Rathbun	David Simpson	Rob Yosha
Ruth Rathbun	Jane Lapiner	John Vargo
Gary Peterson	Deva Wheeler	Maureen Roche



Mattole Salmon Stock Rescue Program - Five-Year Management Plan

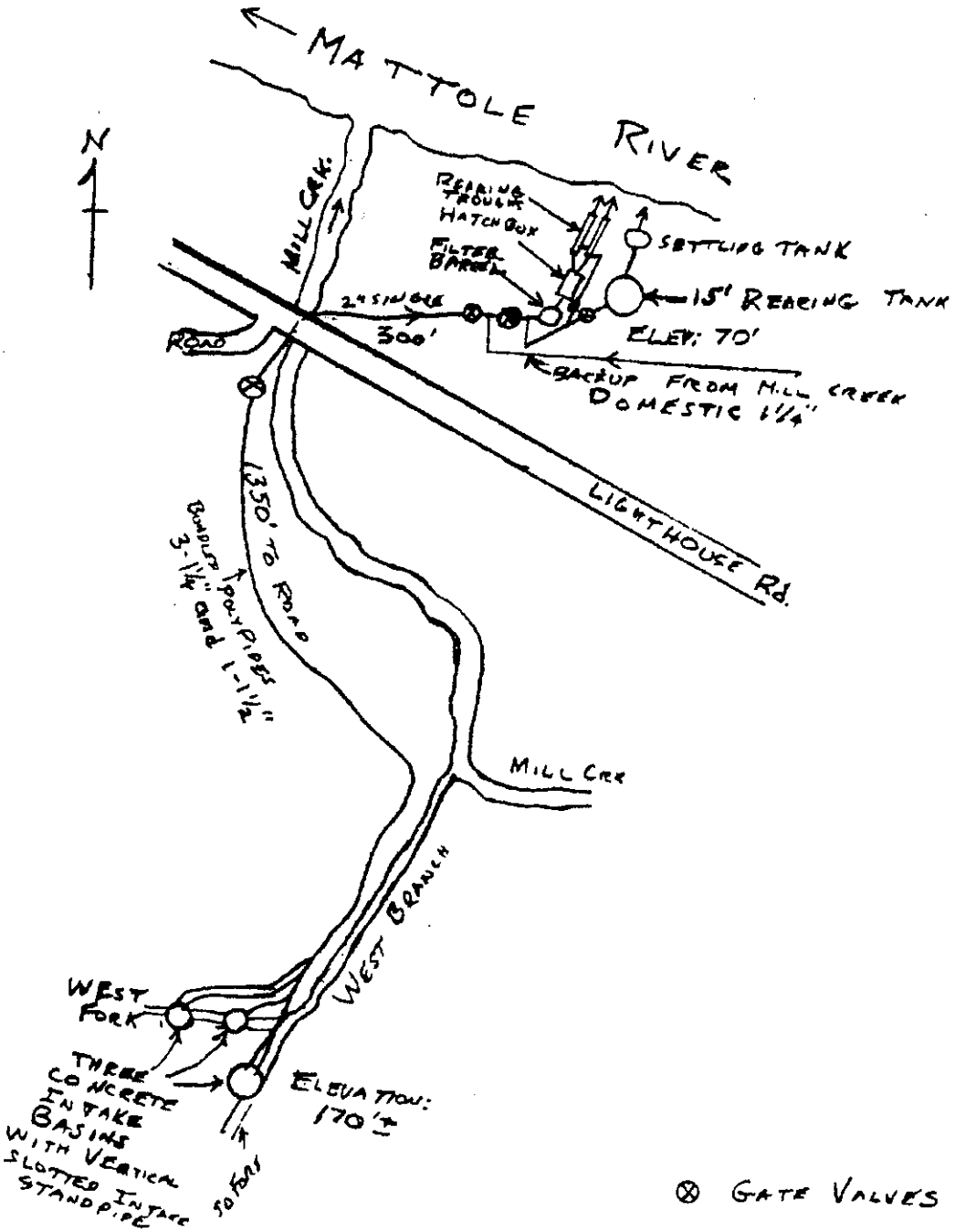
Mattole Salmon Group October 2000

MILL CREEK FACILITY: south bank along lower mainstem Mattole at river-mile 3.0, just east of Mill Creek mouth (Rathbun property); 1.9 miles down Lighthouse Road, southwest of Petrolia. Primary incubation box, hatchbox, 2 rearing troughs, & 15' doughboy pool for oversummer rearing. Established in 1980 as MWSSG's first hatchbox site; rearing facilities added in 1981. Downstream migrant trap site located in mainstem Mattole adjacent to Mill Creek facility, operated annually since 1985 to monitor juvenile salmonid downmigration (April - July); "Rescue Rearing" initiated at Mill Creek facility in 1994, consisting of trapping, rearing, and fall release of wild downmigrant chinook.

Petrolia 7.5-min. quad: T2S, R2W, Sect. 16 (NW 1/4)

MILL CREEK FACILITY

(diagram not to scale)



Project Justification

Species Status: Historical information, consisting of various spoken, written and photographic accounts, attests to the former status of the Mattole as a clear-running and highly productive river for its four extant species of anadromous salmonids: fall-run chinook salmon, coho salmon, summer-run steelhead, and winter-run steelhead. Prior to World War II, the 304 square-mile Mattole watershed was relatively pristine and the river supported an abundance of adult salmon and steelhead that were renowned for their large size. Logging in the basin began in earnest in the 1950s; by 1988, only 9% of the original old-growth coniferous forest remained. The cumulative impacts of intensive road-building, careless and widespread clearcut logging, large-scale conversion of forests to brushland or pasture, overgrazing by livestock, and human encroachment in general, were magnified many-fold when superimposed on the template of an inherently unstable landscape, incompetent geologic substrata, steep slopes, naturally high amounts of rainfall, and catastrophic events such as the 1955 and 1964 floods, severe drought, large earthquakes and damaging wildfires. The net consequence of the foregoing, with respect to aquatic environmental conditions, has been a massive and devastating loss of salmonid spawning and rearing habitat nearly throughout the Mattole watershed. Large-scale disruption of dynamic equilibrium in fluvial systems, persistent to this day and particularly severe in the mainstem below Ettersburg and in the lower reaches of most larger tributaries, has resulted in numerous detrimental and long-lasting physical changes, examples of which are as follows: pronounced increases in soil erosion, sediment delivery to stream channels, streambed sedimentation and embeddedness, wintertime turbidity, and summertime water temperatures; extreme aggradation resulting in wide, shallow channels and a lack of deep, high-quality pools; depletion or loss of instream cover and habitat complexity; disappearance or impairment of riparian zone structure and function; and greatly diminished recruitment of large woody debris to stream channels. Further details, discussion and information on watershed conditions, land-use history and effects, changes in aquatic habitat, and implications for Mattole salmonid populations are contained in the following publications: Brown et al. (1973); CA Dept. of Water Resources (1973 & 1974); Smith et al. (1976); Mattole Restoration Council (1989 & 1995).

The decrease in quality and extent of essential freshwater habitat has inevitably resulted in considerably reduced run strength, particularly for chinook and coho. In addition to habitat degradation, Mattole salmonid stocks have been impacted by intensive fishing pressure in the ocean (particularly before 1985, when few restrictions applied to commercial harvest in the Klamath Management Zone), excessive in-river harvest by legal and illegal means (prior to 1991, when emergency regulations were enacted on the Mattole), and the devastating effects of recent El Niños on productivity and fish survival rates in the ocean. By about 1990, Mattole salmon runs had progressively declined to levels approaching the critical threshold of minimum viable population size. The landmark publication by Nehlsen et al. (1991), an authoritative documentation of the widespread depletion of Pacific salmon stocks, classified Mattole fall-run chinook as a stock at "high risk of extinction" (defined as populations with occasional or chronic escapements of less than 200 adult fish; assuming a 1:1 sex ratio, this is theoretically the minimum annual number of spawners required to avoid irreversible loss of genetic diversity). Following up on this work, Higgins et al. (1992) concluded that extinction risks were high for both chinook *and* coho salmon on the Mattole. Further indications of the perilous status of Mattole salmon populations are provided by a series of actions that have been implemented by various management and regulatory agencies. Most significant among these were the Federal listings of coho in 1997, chinook salmon in 1999, and steelhead in 2000 as threatened species.

Prior to 1981, very little scientific information existed to document the status of native Mattole salmonid runs. The only escapement data available for over two decades were the results of a cursory inventory conducted in the 1958-59 season by the U.S. Fish and Wildlife Service (1960). Chinook salmon escapement to the Mattole was estimated at 5,000 spawners, with a potential capacity for 7,900 pairs (= at least 15,800 adults) based on the amount of suitable spawning habitat available. Corresponding estimates for Mattole coho salmon were 2,000 spawners and a potential for 10,000

pairs (= at least 20,000 adults); for steelhead, the numbers given were 12,000 spawners and a potential for 10,000 pairs (= at least 20,000 adults). Serious population depletion was thus well in evidence midway between the 1955 and 1964 floods. One can only guess as to the magnitude of salmonid runs in pre-settlement times, but undoubtedly their historic numbers were greater than the above estimates of potential spawning capacity.

The 1999-2000 season marked the nineteenth consecutive year of spawning ground surveys by Mattole residents. Annual estimates of chinook and coho salmon escapement to the Mattole watershed are displayed in Figure 1 (page 41). Population data are based primarily on the results of wintertime spawning ground surveys, supplemented by fish counts from MSG's adult capture operations, angler reports from the lower Mattole sport fishery, and miscellaneous sightings and observations. Total run size estimates represent adult males and females plus grilse ('jacks' or 'chubs'). Escapement estimates for chinook are regarded as more reliable than those for coho because survey effort is generally concentrated in representative chinook spawning reaches. Reviewers are cautioned that the data plotted in Figure 1 are rough estimates, not precise or absolute values, and as such are most useful for indicating changes or trends in salmon escapement.

There is currently a significant amount of underutilized good quality, stable spawning gravels for both species of salmon near the Mattole headwaters if adults can gain access to those preferred reaches. Limits to coho rearing habitat relate to depletion of both the number and volume of cold pools available as well as to a lack of sufficient cover and complexity in channels. Both are, in part and over the short term, remediable through intentional habitat enhancement. Chinook rearing and migration habitat is limited by the same factors but in different parts of the river system. Mitigation for lack of cold pools and instream cover presents greater challenges to the stamina and ingenuity of human habitat enhancers. Some short- to medium-term gains are achievable through direct population supplementation and instream habitat improvement.

Proposed Revisions and New Program Elements

After consultating with DFG, the Mattole Salmon Group is proposing adjustments and simplifications to the rearing program. Primary among these is our intent to temporarily suspend the chinook oversummering program at the Solitude facility on South Fork Bear Creek. MSG has operated a post-smolt rearing program only on Bear Creek (initiated in 1990 [1989 brood year]), yet compared to the upper mainstem Mattole we have seen no noticeable increase in Bear Creek chinook runs. Annual maxillary clipping of all hatchbox-reared chinook was initiated in the 1992 brood year (marked juveniles first released in 1993), but we have never seen a marked adult chinook in Bear Creek. Conversely, small numbers of marked adult chinook have been documented almost every year since the 1995-96 season in the mainstem Mattole River (nearly all recoveries of maxillary-clipped chinook spawners have occurred upstream from the Bear Creek confluence). MSG intends to increase monitoring in Bear Creek, including the installation of an adult trap at the mouth. After evaluating data from this increased monitoring, MSG may request DFG approval to reactivate the chinook oversummering program at the Solitude rearing facility.

Factors which hinder determining the efficacy of the Bear Creek chinook post-smolt program include inadequate escapement monitoring and limited marking options. To better understand the results of past releases of marked chinook, MSG proposes to initiate more rigorous adult monitoring in Bear Creek. In addition, MSG will work closely with DFG to work out a mutually acceptable marking scheme which will maximize the evaluative capabilities of the overall supplementation program. (See **General Rearing Plan**, pages 3-4)

Past drought cycles in the early 1990s and the strong El Niño of 1997 and 1998 appear to have given way to more favorable freshwater and ocean conditions for salmon survival. Over the past decade or so, the mouth of the Mattole has been closing in late June or early July, allowing adequate time for

chinook smolt outmigration to the ocean without their being trapped in the unproductive estuary/lagoon environment. Since the mid-1990s, snorkel surveys conducted in the lagoon after mouth closure have detected very low numbers of juvenile chinook. These observations provide further justification for focusing on the spring release program, since wild chinook are opting to enter the ocean in the spring as smolts rather than volitionally oversummering and emigrating as wild post-smolts. If monitoring or threatened early mouth closure so indicate, MSG will seek DFG approval to reactivate the oversummering program at the Solitude rearing facility.

In accordance with the previous Five-Year Plan, and in ongoing consultation with DFG, MSG intends to rescue rear up to 6000 downmigrant chinook at its Mill Creek facility. Two additional rearing pools will be added to ensure low population densities (see pages 29-30). MSG proposes to secure this number of fish using the most appropriate method available (either rotary-screw trap or DFG-authorized seining in the lagoon) considering river and estuarine conditions at the time of sampling.

Placement of hatchery carcasses in upper reaches of mainstem Mattole & South Fork Bear Creek

After artificial spawning of chinook and coho females used as broodstock, MSG has always complied with DFG's requirement of cutting the carcasses in half and depositing the pieces in the mainstem Mattole at the location of capture. However, recent research in Pacific Northwest salmonid streams indicates that placement of hatchery carcasses high up in the river system helps ameliorate nutrient deficits in headwaters reaches and can help boost production of aquatic insects and juvenile salmonids. MSG proposes to distinctively mark all spawned-out female carcasses and place them in the headwaters area of South Fork Bear Creek and the mainstem Mattole upstream from Whitethorn. Whole hatchery carcasses will be marked with a yellow tag applied to the lower jaw on the right side, and staked with a wooden pole to the streambottom in deeper pools so that the carcasses remain submerged and immobile when flows are low to moderate. Specific locations for carcass placement are in South Fork Bear Creek about 50 yards downstream from the Shelter Cove Road, and the mainstem Mattole headwaters immediately below Arcanum Creek (4.0 road miles south of the town of Whitethorn). Equal numbers of female hatchery carcasses will be placed in each location.

Project Effects

Wild Populations: Positive and negative effects of natal stock supplementation on remnant wild populations, with particular reference to possible genetic effects, cannot be accurately assessed at this time because of insufficient information regarding interactions between and relative abundance of wild and hatchery-origin fish. Negative effects could be expected if large numbers of artificially propagated salmon were released while wild populations remained at low levels. Genetic concerns with small numbers of hatchery broodstock are acknowledged and addressed in the Addendum "Best Genetic Practices" (following page 6). Our program has released relatively small numbers of chinook as either smolts or post-smolts (see Table 6, pages 50-52). Information gathered at our rotary-screw trap operating in the lower mainstem Mattole from 1997-2000 indicates that marked chinook smolts are constituting a surprisingly high percentage of the total downmigration in so far as we take between 1 and 5% of the annual escapement for our broodstock. (**See Figure 2, page 42.** A weighted average of 17.3% of the chinook migrants sampled during the periods our screw trap was operating in 1997, 1998, and 2000 were fish we released upstream. There was no smolt release in 1999. The previous numbers relate to hatchery-origin percentages during the period of sampling **only**, and do not include or take into account wild chinook that have downmigrated past the screw-trap site prior to trap installation.) While such data indicates a numerical success within the limited objectives of our hatchbox program, we are unclear what such data implies in terms of protecting genetic diversity.

The "rescue rearing" component of MSG's program entails significantly lower genetic risks than traditional hatchbox operations; the former incorporates fingerlings of broad parentage that have

already undergone natural selection in the wild, whereas the latter produces fish having a rather restricted genetic lineage. (Note: The marking requirements for all hatchbox progeny are used to exclude them from artificial production as returning adults.) As additional biological data is collected and existing information is scrutinized, these issues can be better interpreted and addressed.

In any fish culture operation there is always the potential for disease outbreaks, particularly when rearing densities are high, during extended ponding regimens (i.e., oversummer rearing), and in situations where water quality or quantity become marginal. Meticulous attention is devoted to pond hygiene, and all of our rearing sites are supplied with water from fishless creeks and springs.

Taking wild adult salmon as broodstock, especially from a river system where native populations are already substantially depleted, involves a degree of risk. Risks include those to genetic integrity and to the survivability of cultured fish in the wild. Rearing regimes are always based on assessment of relative risks. The longer the fish are reared, the larger they are upon release and the more domesticated. The original intention involved in adapting small, strategically located hatchboxes to our needs was to directly release swim-up fry into adjacent reaches where population enhancement was determined appropriate. This limits negative impacts to those related to adult capture — interference with natural selection of mates and spawning sites. Other dangers of trapping natives are in the trapping process itself. Careful attention to details of handling live fish and eggs is, of course, absolutely critical. We have been trapping native Mattole salmon since 1980 and have always treated fish with proper reverence for the few survivors of a once mighty race of chinook.

Other Environmental Effects: No other fish culturing operation exists or, as far as anyone remembers, did exist on the Mattole. It is hard to imagine how renewing the vigor of our chinook and coho runs could be anything but positive for other species in the valley and especially for human inhabitants. Public outreach, citizen involvement, and educational programs in local schools (e.g., classroom incubator projects, field trips, incorporation of environmental curricula) are some of the most valuable and worthwhile components of MSG's overall program.

Salmon stocks and hatchery operations in other nearby river systems are likely affected only minimally, if at all, by occasional straying of Mattole River fish releases. As for literal operations, we occasionally cause steelhead adults inconveniences related to the trap, but we apply considerable care to see that inconvenience does not include injury. Effluents from rearing facilities could pose a potential problem if delivered unfiltered into small streams. Additional information about possible environmental effects of MSG's stock rescue program has already been sent to DFG (Larry Preston, Eureka) in the form of a CEQA checklist, and this CEQA documentation should be considered an addendum to the present Five-Year Plan.

Alternatives to Proposed Project: Alternatives to the Mattole Salmon Stock Rescue Program entail various restoration and management-related activities, consisting of all or some combination of the following:

1) Upslope repair, instream habitat improvement, and riparian revegetation

2) Mediation of destructive land-use practices, for example:
   Poorly conceived and executed road construction and maintenance
   Careless and short-sighted timber harvest practices
   Overgrazing, particularly in riparian zones
   Depletion of summer flows by excessive or illegal water withdrawals/diversions
   Potentially damaging gravel mining

3) Further restriction of the incidental harvest (by-catch) of salmon in the ocean

4) Strengthened enforcement of existing sport fishing regulations

5) Broader resident education and involvement

The preferred approach is the proposed Stock Rescue Program *plus* the restoration and mitigation measures listed above. A "no project" alternative could result in continued, even total depletion of Mattole chinook and coho salmon populations.

Project Evaluation

Project History: The Mattole Salmon Group was formed as an ad hoc citizen's group in 1980 and was incorporated as a non-profit public benefit organization in 1981. Since its inception, MSG has been active in promoting and operating a broad-based program aimed at restoring the native salmonid fishery in the 304 square-mile Mattole River watershed. The focus of MSG's restoration work has been to maintain and enhance the remnant run of native fall-run chinook salmon; to re-establish self-sustaining populations of coho salmon in key tributaries (e.g., Mill Creek, North Fork Bear Creek, South Fork Bear Creek); to assist in the planning, coordination, and implementation of habitat improvement work and resource monitoring on a basin-wide scale; and to inform and involve local residents, citizens' groups, government agencies and others in the course of this work. Because the watershed is remote, sparsely populated, and over 80% privately owned, the Mattole is ideally suited to successful application of such community-based restoration efforts.

The year-by-year history of MSG's native stock supplementation operations is summarized in the following tables and figures, listed below with abbreviated titles. With the exception of Table 1, which appears on page 7, all are included at the end of the Plan on pages 41-58.

Figure 1. Graph of estimated escapements . . .

Figure 2. Graphs of downstream migrant trap catches . . .

Table 2. Summary of adult salmonid capture operations . . .

Table 3. River mouth closures . . .

Table 4. Summary of chinook salmon propagation and production statistics . . .

Table 5. Summary of coho salmon propagation and production statistics . . .

Table 6. Chinook salmon rearing and release summary . . .

Table 7. Coho salmon rearing and release summary . . .

Table 8. MSG funding history . . .

Concurrent Evaluation: Information and data are collected and recorded on standard reporting forms in all phases of MSG's Salmon Stock Rescue Program. During adult capture operations, daily records are kept on the species, sex, number, size, time of capture, physical condition, hatchery marks, and other distinguishing characteristics of all fish trapped, and whether they were released above the weir or retained as broodstock in numbered holding tubes. Other information recorded in the trapping logbook includes weather conditions, rainfall amounts, river levels, river temperatures, water clarity, on-site personnel, and miscellaneous comments. Detailed information on the progress and outcome of adult holding, sorting, spawn-taking, and egg incubation is likewise documented on daily record sheets. At each hatchbox/ponding facility, records are kept on daily minimum/maximum water temperatures, egg and fish mortalities, growth, feeding levels, maintenance performed, marking operations, release data, personnel in attendance, and observations of fish health and behavior. During downstream migrant trapping associated with rescue rearing operations at the Mill Creek facility, important elements include daily records of min/max temperatures (river and rearing units), river flows, weather conditions, number and size of fish trapped by species, estuarine conditions, habitat and snorkel survey results, photo documentation, and miscellaneous observations and interpretations. Detailed documentation of personnel involvement and time commitment in all aspects of program operation is particularly important, since successful implementation and completion of projects often relies heavily on volunteer participation and in-kind contributions of services, materials and equipment.

Long-Term Evaluation: MSG's approach to long-term evaluation of its stock rescue program is based on several key monitoring elements and activities, described as follows:

1) Annual spawning ground surveys, ongoing since the 1981-82 season, to provide estimates of salmon escapement in specific index reaches and for extrapolation to basin-wide population levels, and to determine sex ratios (reproductive potential) and wild-to-cultured fish percentages. Spawning escapement estimates form the basis for documenting the status and trends of stock recovery, and are used to indicate progress toward escapement objectives as outlined on page 1 of this Management Plan (i.e., the enactment of "sunset provisions" [conclusion or termination of propagation measures] is triggered when average annual and minimum annual adult population levels reach 25% and 10%, respectively, of historic escapement numbers).

2) Marking of all artificially propagated fish prior to release, and documentation of in-river recoveries of marked fish, to provide estimates of wild-to-hatchery ratios. Returns of marked adults are monitored during the course of broodstock capture operations, and also on spawning ground surveys through carcass recovery. (Note: All marking will be based on assignments worked out in advance and coordinated through the Department of Fish and Game.) MSG acknowledges that fin marking or maxillary clipping will not help determine the contribution of Mattole salmon to the commercial and sport fisheries since these marks are duplicated in other river systems. Coded-wire tagging is necessary for this type of assessment, and the considerable cost and minimum fish numbers needed may prohibit the use of coded-wire tags.

3) Annual downstream migrant trapping in the lower mainstem Mattole in spring and early summer, ongoing since 1985, to monitor the timing of down-migration and to document the size of emigrating salmonid juveniles, with particular emphasis on chinook. In 1997 MSG began downstream migrant trapping on Bear Creek shortly above its mouth, near Ettersburg. Whenever possible, the sampling of downstream migrants is structured and implemented so as to provide rough estimates of juvenile chinook abundance; this can serve as back-up to, or verification of, the results of spawning ground surveys by providing indications of reproductive success and egg-to-downmigrant survival.

4) Stream habitat survey and inventory for collection of baseline data on existing habitat conditions, identification of limiting factors and carrying capacities, documentation of needed enhancement or restoration projects, evaluation of prior habitat improvement work, and assessment of the status and trends of spawning, rearing and migration habitat with particular emphasis on freshwater factors potentially limiting chinook salmon survival.

As alluded to previously in this document, currently there are informational gaps regarding possible genetic implications of native stock propagation/supplementation on remaining wild stocks of chinook and coho salmon in the Mattole River watershed. More monitoring and evaluative efforts will be undertaken in the future, as additional personnel and funding resources become available, in order to initiate, expand, and/or intensify such activities as spawning ground surveys or other adult census methods, juvenile monitoring through summertime snorkeling, outmigrant sampling, tagging studies, creel surveys (cf. Brown 1973d), habitat inventory, and genetic stock identification studies. MSG's stock rescue operations and the allotment of artificially propagated fish can then be adjusted accordingly so as not to cause adverse genetic effects, and thus provide assurance of biologically sound supplementation to wild stock production.

Literature Cited

Brown, C.J., Jr. 1973a. Standing stock estimates for Mattole River salmonids, July - August 1973. CA Dept. of Fish and Game, Region 1, Redding, CA, in cooperation with the CA Dept. of Water Resources, Northern District, Red Bluff, CA (unpublished report). 3 pp. text + 3 figures + 3 tables.

Brown, C.J., Jr. 1973b. Downstream migrations of salmonids in the Mattole River, April through June 1972. CA Dept. of Fish and Game, Region 1, Redding, CA, in cooperation with the CA Dept. of Water Resources, Northern District, Red Bluff, CA (unpublished report). 5 pp. text + 1 figure + 2 tables.

Brown, C.J., Jr. 1973c. Mattole River water temperatures, June - October 1972. CA Dept. of Fish and Game, Region 1, Redding, CA, in cooperation with the CA Dept. of Water Resources, Northern District, Red Bluff, CA (unpublished report). 4 pp. text + 5 figures + 1 table.

Brown, C.J., Jr. 1973d. Creel census and fishermen-use count of the Mattole River, 1972-73. CA Dept. of Fish and Game, Region 1, Redding, CA, in cooperation with the CA Dept. of Water Resources, Northern District, Red Bluff, CA (unpublished report). 3 pp. text + 3 figures + 5 tables.

Brown, C.J., Jr., R. Haley, and T.B. Stone. 1973. Fisheries enhancement opportunities in the Mattole River basin, Humboldt and Mendocino Counties, with special emphasis on the potential of a flow augmentation reservoir. Office Report, CA Dept. of Fish and Game, Region 1, Redding, CA, in cooperation with the CA Dept. of Water Resources, Northern District, Red Bluff, CA. 61 pp.

California Department of Fish and Game. 1965. California Fish and Wildlife Plan, Volume III, Part B. CA Dept. of Fish and Game, Sacramento, CA. 679 pp.

California Department of Fish and Game. 1972. Fish and wildlife resources relationships and water quality requirements, Basin 1B - North Coastal. Unpublished report dated August 1972, Water Quality Planning Project, Task DF&G - 3, prepared for the State Water Resources Control Board, Sacramento, CA. 39 pp. + 11 figures.

California Department of Water Resources. 1973. Character and use of rivers: Mattole River (a pilot study). Memorandum Report, CA Dept. of Water Resources, Division of Resources Development, Sacramento, CA, April 1973. 145 pp. + 3 appendices.

California Department of Water Resources. 1974. Water management for fishery enhancement on north coastal streams. Memorandum Report, CA Dept. of Water Resources, Northern District, Red Bluff, CA, May 1974. 68 pp.

California Gene Resources Program. 1982. Anadromous salmonid genetic resources: An assessment and plan for California. National Council on Gene Resources, Berkeley, CA. 168 pp.

Coastal Headwaters Association. 1982. Mattole Survey Program, first annual report, August 1981 - August 1982. Unpublished report, prepared under contract to the California Dept. of Fish and Game, Sacramento, CA, by Coastal Headwaters Association, Whitethorn, CA, August 1982. 50 pp. + 6 appendices (8 pp.).

Coastal Headwaters Association. 1984. Final report for Coastal Headwaters Association stream survey contract, 1982-83. Unpublished report, prepared under contract to the CA Dept. of Fish and Game, Sacramento, CA, by Coastal Headwaters Association, Whitethorn, CA. 15 pp.

FEMAT (Forest Ecosystem Management Assessment Team). 1993. Forest ecosystem management: An ecological, economic, and social assessment. USDA Forest Service, USDI Fish and Wildlife Service, USDC/NOAA National Marine Fisheries Service, USDI National Park Service, USDI Bureau of Land Management, and Environmental Protection Agency, Portland, Oregon. ca. 1,000 pp.

Higgins, P., S. Dobush, and D. Fuller. 1992. Factors in northern California threatening stocks with extinction. Unpublished paper, Humboldt Chapter of the American Fisheries Society, Arcata, CA, June 1992. 24 pp.

Leitritz, E., and R.C. Lewis. 1976. Trout and salmon culture (hatchery methods). California Dept. of Fish and Game, Fish Bulletin 164. 197 pp.

Mattole Restoration Council. 1989. Elements of Recovery: An inventory of upslope sources of sedimentation in the Mattole River watershed, with rehabilitation prescriptions and additional information for erosion control prioritization. Unpublished report dated December 1979, prepared by the Mattole Restoration Council, Petrolia, CA, under contract to the CA Dept. of Fish and Game, Sacramento, CA. 47 pp.

Mattole Restoration Council. 1995. Dynamics of Recovery: A plan to enhance the Mattole estuary. Unpublished report dated February 1995, prepared by the Mattole Restoration Council, Petrolia, CA, for the California State Coastal Conservancy, Oakland, CA, in fulfillment of Contract No. 88-079. ca. 165 pp.

Mattole Salmon Group. 1980. Pilot project for citizen involvement in the survival of chinook salmon in the Mattole River watershed: A first-year design for the use of gravel incubation boxes for fall-run chinook salmon. MSG, Petrolia, CA, unpublished report, Sept. 1980. 47 pp.

Mattole Salmon Group. 1982. Mattole Hatchbox Program, August 1981 - April 1982. MSG, Petrolia, CA, Technical Progress Report #1, May 1982. 33 pp.

Moyle, P.B., J.E. Williams, and E.D. Wikramanayake. 1989. Fish species of special concern of California. Final report submitted to the CA Dept. of Fish and Game, Inland Fisheries Division, Rancho Cordova, CA, in fulfillment of Contract No. 7337. Dept. of Wildlife & Fisheries Biology, Univ. of California, Davis, CA. 222 pp.

Nehlsen, W., J.E. Williams, and J.A. Lichatowich. 1991. Pacific salmon at the crossroads: Stocks at risk from California, Oregon, Idaho, and Washington. Fisheries 16(2): 4-21

Peterson, G.D. 1987. Final report: Spawning ground surveys (carcass counts), Mattole River watershed, 1985-86 season. Unpublished report submitted July 1987, prepared under contract to the CA State Coastal Conservancy, Oakland, CA, and Redwood Community Action Agency, Eureka, CA, by Coastal Headwaters Association, Whitethorn, CA, and under contract to the CA Dept. of Fish and Game, Sacramento, CA, by the Mattole Salmon Group, Petrolia, CA. 12 pp. + 4 appendices (18 pp.).

Smith, E.J., Jr., D.H. Fry, Jr., H.W. Frey, J. Speth, A. Rutsch, and L. Fish. 1976. Coastal county fish and wildlife resources and their utilization. (Originally issued August 1, 1973; revised June 1, 1976) Published by the University of California Sea Grant Marine Advisory Program in cooperation with the CA Dept. of Fish and Game. 258 pp.

U.S. Fish and Wildlife Service. 1960. A preliminary survey of fish and wildlife resources of northwestern California. USDI Fish and Wildlife Service, Portland, Oregon. October 1960. 104 pp. + 3 plates + appendix.

Figure 1 - **Estimated number of adult salmon returning to spawn in the Mattole River watershed, 1981-82 through 1999-2000 seasons.**

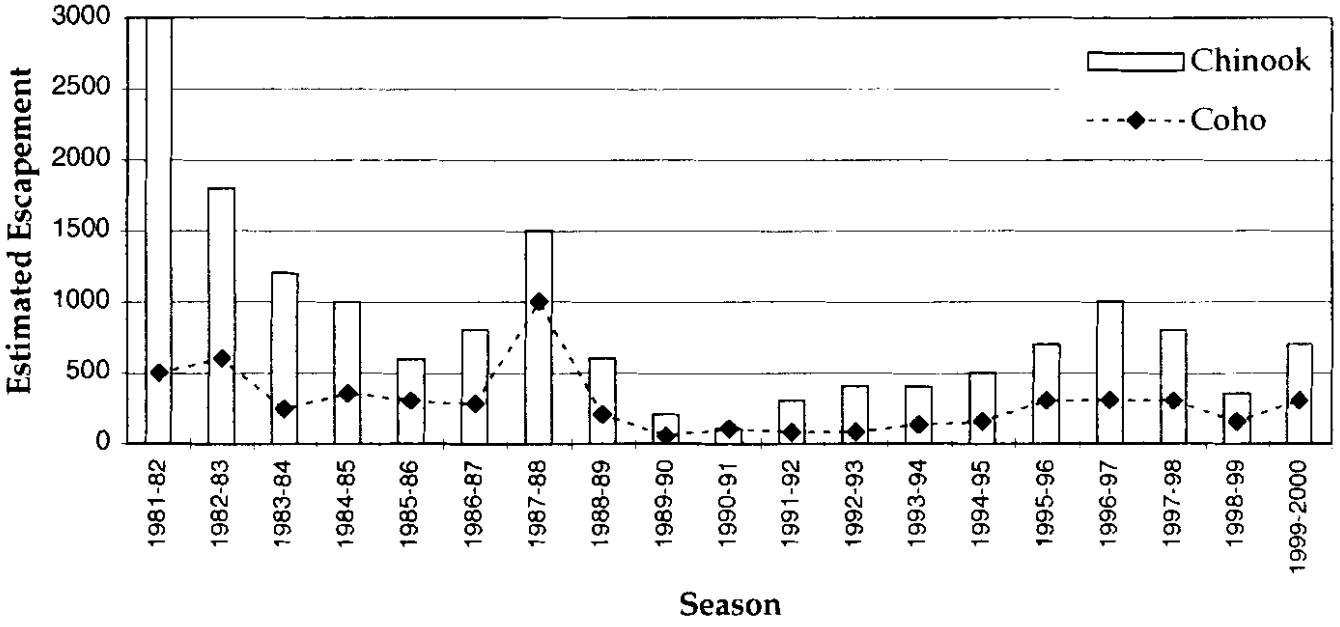


Figure 2 venile chinook salmon sampled by downstream migrant trappin wer mainstem Mattole River near river-mile 3.0, 1996-2000. Grap' 'how ...e total chinook catch each day of trapping, minimum and maximu... water temperatures (°F), and river mouth closure dates. Annual percentages of marked chinook (identified by a clipped right maxillary) are indicated to the right of each graph. A fyke net was used in 1996, and a rotary screw trap (5' diameter cone) was employed from 1997-2000. Data collected by the Mattole Salmon Group.

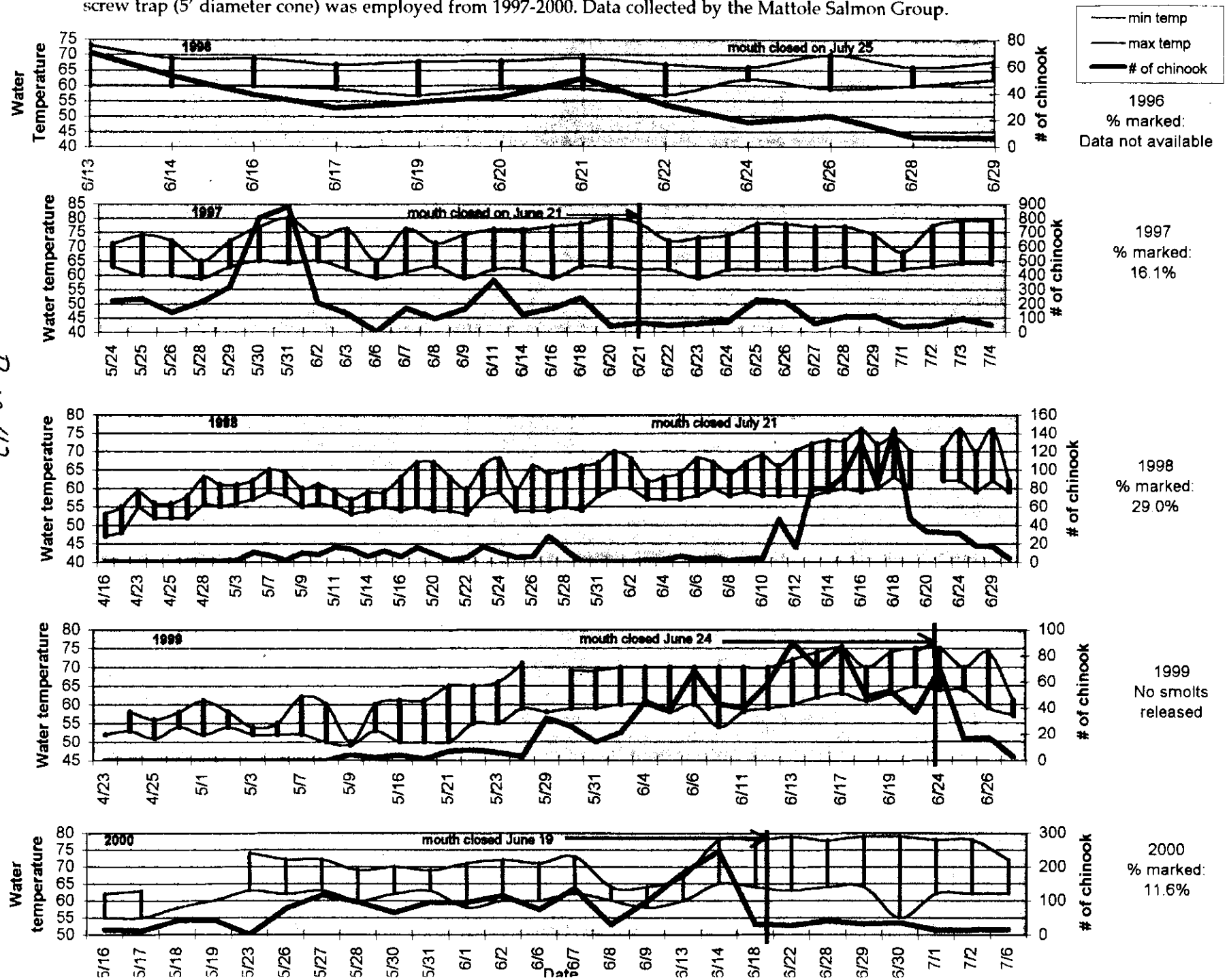


Table 2.

Summary of adult salmonid capture operations undertaken by MWSSG over the course of 19 seasons, 1980-81 through 1999-2000, for procurement of broodstock used in native stock propagation programs to supplement Mattole salmon populations.

Spawning Season	Duration and Description of Adult Salmonid Capture Operations: Period of Operation (inclusive dates)	Capture Codes[a]	# Days Fished	Number of Adult Salmonids Handled, by Species and Sex [# captured in **bold** / # *spawned in italics*]: Chinook Salmon Male	Chinook Salmon Female	Chinook Salmon Grilse[b]	Coho Salmon Male	Coho Salmon Female	Coho Salmon Grilse[b]	Steelhead Male	Steelhead Female	Total # of Fish Handled	Notes
	11/9/80 - 11/19/80	T-1	5	**2**	**2**	**4**	**1**	**1**	**–**	**5**	**5**		
1980-81	11/24/80 - 12/1/80	N-1	6	–	–	–	–	–	–	–	–	**20**	
	10/20/81 - 10/29/81	T-2	9										
1981-82	11/2/81 - 12/11/81	N-2	5	**19**	**5**	**31**	**15**	**4**	**4**	**2**	**3**	**83**	
	12/16/81 - 1/9/82	T-3a	13	–	*1*	*2*	–	–	–	–	–		
				48	**8**	**5**	**11**	**3**	**1**	**1**	**5**		
1982-83	12/1/82 - 1/12/83	T-3b	33	*9*	*5*	–	–	–	–	–	–	**82**	
				14	**9**	**3**	**3**	**4**	**–**	**4**	**3**		
1983-84	11/21/83 - 1/22/84	T-3b	50	*8*	*9*	–	–	–	–	–	–	**40**	
				35	**4**	**21**	**18**	**4**	**1**	**–**	**1**		
1984-85	11/18/84 - 1/22/85	T-3b	64	*11*	*4*	*1*	–	–	–	–	–	**84**	
				24	**1**	**22**	**8**	**9**	**–**	**14**	**8**		
1985-86	12/1/85 - 1/9/86	T-4	29	*3*	*1*	–	*4*	*4*	–	–	–	**86**	
				73	**22**	**51**	**9**	**12**	**9**	**4**	**15**		
1986-87	11/22/86 - 12/23/86	T-5	29	*14*	*14*	–	*4*	*3*	–	–	–	**195**	1
	12/8/87 - 12/17/87	T-6	6	**30**	**17**	**21**	**26**	**22**	**3**	**7**	**7**		
1987-88	12/17/87 - 1/15/88	T-5	16	*17*	*14*	–	*11*	*6*	–	–	–	**133**	2
	11/17/88 - 12/22/88	T-5	20										
	11/20/88 - 12/22/88	T-7	17	**16**	**15**	**1**	**5**	**3**	**–**	**1**	**–**		
1988-89	11/26/88 - 11/29/88	T-3c	4	*14*	*7*	–	*5*	*3*	–	–	–	**41**	
	12/31/88 - 1/3/89	T-3c	2										
	11/17/89 - 11/21/89	T-5	4										
1989-90	12/12/89 - 1/2/90	T-8	8	**2**	**2**	**–**	**–**	**–**	**–**	**7**	**7**	**18**	3
	1/17/90 - 1/29/90	T-5	12	*2*	*2*	–	–	–	–	*1*	*1*		
	12/12/90 - 1/22/91	T-9	25	**2**	**–**	**1**	**2**	**8**	**–**	**23**	**23**		
1990-91	1/14/91 - 2/13/91	T-5	13	–	–	–	*2*	*6*	–	–	–	**59**	
	12/3/91 - 12/23/91	N-3	6										
	12/7/91 - 12/26/91	T-10	9	**15**	**9**	**2**	**6**	**1**	**–**	**15**	**12**		
1991-92	1/9/92 - 1/21/92	T-5	9	*3*	*7*	*1*	–	–	–	–	–	**60**	
	1/15/92 & 1/18/92	N-4	2										
	12/3/92 - 12/6/92	T-9	3	**10**	**7**	**2**	**–**	**3**	**1**	**10**	**7**		
1992-93	12/13/92 - 12/26/92	T-5	12	*10*	*7*	–	–	–	–	–	–	**40**	4
				3	**2**	**5**	**2**	**2**	**–**	**17**	**10**		
1993-94	12/15/93 - 1/20/94	T-5	18	*3*	*2*	*1*	*2*	*2*	–	–	–	**41**	
1994-95	-No Trapping Occurred	-	-										
1995-96	12/7/96-1/1/97	T-5	25	**15**	11	4	5	10	0	7	8	60	5
1996-97	11/24/96-12/21/96	T-5	12	12	9	3	5	5	0	1	1	36	6
1997-98	11/19/97-12/13/97	T-5	9	16	11	13	9	5	0	1	0	55	7
1998-99	11/16/98-12/15/98	T-5	14	9	2	1	0	0	0	5	8	25	8
1999-2000	11/19/99-12/10/99	T-5	10	11	9	5	2	3	0	0	1	31	9

Table 2 cont'd

Totals: 1980-81 ⇒ 1999-2000	Trapping: 480 days	**356**	**145**	**195**	**127**	**99**	**19**	**124**	**124**	**1189**
(19 seasons of operation)	Netting: 19 days	*94*	*73*	*5*	*28*	*24*	–	*1*	*1*	

Notes:

Abbreviations used: KS = king (chinook) salmon; SS = silver (coho) salmon; SH = steelhead; M = male; F = female; G = grilse (small male salmon, also called jacks or chubs; see footnote [b] below); RM = River Mile location on the mainstem Mattole River, as mapped by the CA Dept. of Water Resources (1973); MWSSG = Mattole Watershed Salmon Support Group; DFG = California Department of Fish and Game.

Table 2. Summary of adult salmonid capture operations . . .

[a] Capture Codes – Letter prefix denotes capture method (T = trap & weir; N = netting operation); number specifies the capture location(s).

T-1: MWSSG's first trapping operation, on lower mainstem Mattole @ RM 2.7 (Groeling property); site used only during 1980-81 season. Modular trap served as instream holding pen, & weir consisted of 2" mesh chicken wire supported by metal fenceposts [see MWSSG (1980) for details of trap & weir construction]. Captured1 KSF & 4 KSG; held in trap (instream pen). Weir removed on 11/19/80; trap destroyed by high flows on 12/2/80. Also see N-1 below.

T-2: Trap site at lower boundary of A.W. Way Park, lower mainstem Mattole @ RM 14.6 (Humboldt County property), used only during 1981-82 season. Trap and weir destroyed by flood flows on 10/29/81 after only 9 days of operation; no fish captured. See MWSSG (1982) for details of trap & weir construction and operation.

T-3a: Mattole headwaters trap site @ RM 57.1 ('Dump Hole', @ confluence of Stanley Creek). Trap configuration used in 1981-82 was a temporary "double weir" constructed using 2" mesh chicken wire, metal fenceposts, and feed-sack sandbags. 1981-82 trap catch was 49 adult salmonids, consisting of 13 KSM, 4 KSF, 15 KSG, 10 SSM, 2 SSF, 4 SSG, & 1 SHF. See MWSSG (1982) for details of trap & weir construction and operation. Facilities for adult holding, spawning, and primary egg incubation located at Arcanum facility, about 4 road miles south of trap site.

T-3b: Same trap site as T-3a above, but different trapping gear utilized: trap box of modified-fyke design (7'L x 5'W x 4'H) constructed of redwood & 2" mesh hog wire, with overhead cable & pulley system for quick removal & replacement; redwood weir panels (each 6'W x 4'H), with horizontal slats set 2" apart, supported by metal fenceposts & secured at the bottom by feed-sack sandbags placed on a chicken wire 'skirt'.

T-3c: Same trap site as T-3a & b above, but different trap design employed: modular trap constructed using redwood weir panels to form a large instream pen.

T-4: Mattole headwaters trap site @ RM 54.4 (originally Wes Simpson property, presently Wolfert). Alternative upriver trap site fishable at higher flows because of broad, shallow channel and existing bridge on-site; located 2.7 river-miles downstream from 'Dump Hole' site (T-3a, b, c) described above. Modular trap constructed using redwood weir panels (see T-3b above) to form a large instream pen.

T-5: Primary trap site on middle Mattole mainstem @ RM 42.8, located near Ettersburg immediately upstream from Bear Creek confluence (French property). Fishable at moderate flows, and vehicle access to both sides of river; facilities for adult holding, spawning, and primary egg incubation located 0.6 road miles from trap site.

T-6: Mattole headwaters trap site @ RM 55.0 (Snitchler & Deja property). Alternative upriver trap site, operable at moderately high flows; site used briefly only during 1987-88 season because of access denial at site T-4. Captured 24 fish at site T-6 (5 KSM, 2 KSF, 2 KSG, 9 SSM, 3 SSF, 3 SSG), and retained 11 for spawning (3 KSM, 2 KSF, 3 SSM, 3 SSF).

T-7: Bear Creek trap site, located near Ettersburg about 100 yards upstream from the Bear-Mattole confluence, and only about 250 yards from site T-5 (French property). Auxiliary trapping station, used intermittently to secure native salmon eggs for seeding hatchbox facilities on S. Fk. Bear Creek.

T-8: Lower Mattole trap site @ RM 0.8 ("first riffle" above estuary; BLM property). Intermittent trap operation during extremely low flows in December 1989 and early January 1990 (no salmon caught; one SHM caught and released on 1/1/90).

T-9: Wilson trap site, lower Mattole mainstem @ RM 22.6, located about 3 miles downriver from Honeydew (Wilson property). Persistent drought conditions forced MWSSG to conduct the majority of its trapping at this site during the 1990-91 season. Temporary on-site holding of adults, and subsequent transport of brood-stock by truck to Mill Creek facility (15 road miles west of trap site) for extended holding, spawning, and primary egg incubation. Total of 28 adult salmonids captured at Wilson site in 1990-91, consisting of 2 KSM, 1 KSG, 2 SSM, 8 SSF, 7 SHM, & 8 SHF.

T-10: Lower Mattole trap site @ RM 14.8 [upper boundary of A.W. Way Park, just below mouth of Squaw Creek (Humboldt County property)]. Site utilized in 1991-92 season because of persistent low flows which hindered adult migration and resulted in concentrations of adult chinook holding in pools below this location, as indicated by ocular & snorkel surveys. Five fish captured in 1991-92 (3 KSF, 1 SHM, 1 SHF); kept & spawned 3 KSFs.

N-1: Mobile netting operation, using gill nets supplied by DFG personnel, in pools in the lower mainstem (RM 0.7 to 4.7: Dogleg Hole to Lower N. Fk. Hole). Total of 15 fish netted over 6 days, consisting of 1 KSM, 2 KSF, 1 SSM, 1 SSF, 5 SHM, & 5 SHF; retained the 5 salmon for holding in an instream pen @ RM 2.7 (see description of T-1 above). Freshet on 12/2/90 broke apart the instream holding pen, releasing all 10 salmon being held for ripening.

Table 2 cont'd

N-2: Mobile netting operation by DFG personnel, assisted by MWSSG crews, using gill nets in pools in the lower mainstem (RM 4.7 to 14.8: Lower North Fork to Way Park) and upper mainstem Mattole (RM 52.3 to 58.3: 'Airport Hole' near Thorn Jct. to Thompson Creek). Total of 34 fish netted over 5 days, consisting of 6 KSM, 1 KSF, 16 KSG, 5 SSM, 2 SSF, 2 SHM, & 2 SHF. See MWSSG (1982) for details of 1981-82 netting operations.

N-3: DFG-approved mobile netting operation using 2" mesh herring nets at five mainstem pools between RM 3.0 & RM 15.3 (6 days from 12/3-23/91); captured 3 KSM, 5 KSF, 2 KSG, 1 SHM, & 3 SHF; retained 2 KSM, 4 KSF, & 2 KSG as broodstock, and all were spawned except 1 KSG.

N-4: DFG-approved mobile netting operation using 2" mesh herring nets at two mainstem pools at RM 42.6 & RM 41.2 (2 days: 1/15 & 18/92); captured 4 KSM, 1 KSF, 4 SSM, 10 SHM, & 7 SHF; 1 SSM retained for 4 days and released without spawning.

[b]: Grilse definitions – chinook grilse ('chubs') are males smaller than about 25" FL & 6 lbs; coho grilse ('jacks') are males smaller than about 22" FL & 3.5 pounds.

1: Trapped & released 3 chinook grilse with adipose fin clips; presumed returns from our release of 10,000 coded-wire tagged juveniles in spring 1985. Also trapped & released 3 marked coho: right ventral fin clip on 1 small female and 1 grilse, & double ventral clip on another grilse (hatchery strays from Mad R. or Warm Springs?).

2: Trapped & released 3 chinook grilse with adipose fin clips; presumed returns from our release of 5,000 coded-wire tagged juveniles in spring 1986.

3: Due to a shortage of native salmon eggs, DFG permission was secured to spawn a pair of steelhead (captured at site T-5 on 1/21-22/90) to serve as the egg source for classroom incubator projects in Mattole schools. The SHF was partially spawned on 2/19/90, after which both fish were released at the point of capture. A total of 897 eggs were spawned, and 888 eyed eggs were distributed on 3/15/90 to 6 classroom incubators at 5 local schools.

4: Trapped & released one coho female (est. 6 pounds) with adipose fin clip on 12/16/92; origin unknown.

5 Two Chinook with right maxillary clip trapped

6- Chinook- Two left Maxillary clips, (1993), one right maxillary clip

7- Chinook- Five right maxillary clips out of 40 fish trapped

8- 0 marked fish trapped

9- Chinook-three right maxillary clips out of 25 fish trapped

Table 3

Mattole estuary/lagoon: Timing and duration of mouth closures, and associated river discharge at initial closure.

(Draft compilation – subject to revision) — Compiled by Gary D. Peterson, Staff Fisheries Biologist, Mattole Salmon Group
P.O. Box 188, Petrolia, CA 95558-0188; e-mail: salmon@humboldt.net

Year	Date of Initial Mouth Closure (month/day)	Discharge (cfs) at Initial Mouth Closure (USGS Petrolia gage)*	Number of Close/Open Cycles	Total No. of Days Closed	Approx. Date of Final Sandbar Breaching (month/day)
1981	?	?	?	?	9/27
1982	early to mid-July	~80	?	~120	~10/31
1983	← *mouth did not close in 1983* →			0	–
1984	early July	~100	1	~92	10/11
1985	6/28	65	1	~115	~10/22
1986	6/23	108	2	~126	~10/30
1987	5/26	133	1	~135	~10/8
1988	7/21	63	1	104	11/3
1989	8/4	44	1	79	10/23
1990	9/8	49	1	53	10/31
1991	7/4	67	6	53	11/17
1992	6/11	104	2	97	10/1
1993	8/10	79	2	96	11/29
1994	7/8	89	1	120	11/5
1995	7/16	102	2	138	12/1
1996	7/9	115	3	131	11/17
1997	6/21	122	2	103	10/2
1998	7/21	77	2+	109	11/7
1999	6/24	flow data not available	2+	126	10/28

* Note: The USGS Petrolia gaging station (No. 11469000) is located about 5.2 river miles upstream from the mouth of the Mattole River. Flows at the Mattole mouth can be estimated by multiplying the gaging station value by 1.15 to account for tributary inflows downstream from the gage.

Table 4.

Summary of chinook salmon propagation and production statistics for MSG's native stock hatchbox/rearing program, Mattole River watershed, 1981 through 1999 brood years (Rescue Rearing component and classroom incubator project: The egg source for all brood years was from the native Mattole stock of fall-run chinook.

Brood Year[a]	# of Females Spawned	# of Eggs Spawned	# of Eyed Eggs Produced	% Egg Survival to Eyed Stage	*Number of Juvenile Chinook Salmon Released*		% Survival from Eyed Egg to Fish Release	Overall Survival from 'Green' Egg to Fish Release
					Smolts[b]	Post-Smolts[b]		
1981	1	3,992	3,684	92.3%	3,620		98.3%	90.7%
1982	5	22,185	21,750	98.0%	15,000		70.0%	67.6%
1983	9	29,604	27,236	92.0%	25,850		94.9%	87.3%
1984	4	13,672	13,497	98.7%	13,400		99.3%	98.0%
1985	1	4,719	4,452	94.3%	4,280		96.1%	90.7%
1986	14	61,500	54,000	87.8%	51,400		94.5%	83.6%
1987	14	68,398	56,380	82.4%	50,000		88.7%	73.1%
1988	7	28,455	20,200	71.0%	19,500		96.5%	68.5%
1989	2	5,929	4,887	82.4%		5,000	">100%"	84.3%
1990	0	0	–	–			–	–
1991	7	32,774	29,822	91.0%		23,000	77.1%	70.2%
1992	7	30,274	26,314	86.9%	5,400	17,850	≈89.4% ≈88.6%	≈77.7% ≈77.0%
1993	2	6,314	6,030	95.5%		6,025	99.9%	95.4%

Table 4 cont'd								
1994	0							
1995	9	35,641	29,431	83%	10,486	6,235	57%	47%
1996	8	31,667	22,400	71%	~16,700	~6,500	99%	~70%
1997	7	34,904	21,584	62%	~14,900	6,300	98%	61%
1998	2	5,968	5,067	85%	113	4,954	100%	85%
1999	8	28,547	16,346	57%	10,781	pending	pending	pending
Totals ⇒	107	444,543	363,080	82%	241,430	83,069-c	89%	73%

Notes:

a: Brood year is defined as the year in which the adult spawning run commenced & the majority of eggs spawned (e.g., 1993 brood year = 1993-94 season).

b: Chinook *smolts* are defined as fingerlings released in the spring; chinook *post-smolts* are released in the fall and are often referred to as "yearlings".

c: Not included in this release total are 500 chinook post-smolts from the 1993 brood year which were included in MWSSG's first-year program of "Rescue Rearing", which consisted of springtime trapping, oversummer rearing, and fall release of wild downmigrant chinook.

1: In the 1989 brood year, the computed survival rates are somewhat imprecise, in that the reported number of fish released slightly exceeds the number of eyed eggs available. Apparently, the error is due to an underestimation of eyed egg production by MWSSG personnel, and/or to a generously elevated release total as determined by DFG employee Jim Yarbrough (via volumetric displacement in a DFG planting truck).

Table 5.

Summary of coho salmon propagation and production statistics for MSG's hatchbox/rearing program, Mattole River watershed, 1981 through 1999 brood years (classroom incubator projects excluded). The egg source for all brood years since 1985 was from native Mattole coho; in the 1981 and 1982 brood years, Noyo River coho eyed eggs were provided to MSG by the California Department of Fish and Game (see footnotes 1 and 2 below).

Brood Year[a]	# of Females Spawned	# of Eggs Spawned	# of Eyed Eggs Produced	% Egg Survival to Eyed Stage	*Number of Juvenile Coho Salmon Released* Pre-Smolts[b]	Smolts[b]	% Survival from Eyed Egg to Fish Release	Overall Survival from 'Green' Egg to Fish Release	Notes
1981	–	–	–	–		10,000	49.6%	–	1
1982	–	–	–	–		3,340	29.8%	–	2
1985	4	13,394	6,762	50.5%		5,500	81.3%	41.1%%	3
1986	3	7,375	5,700	77.3%		5,000	87.7%	67.8%	
1987	6	11,901	8,832	74.2%	8,500		96.2%	71.4%	
1988	3	6,704	4,510	67.3%	4,400		97.6%	65.6%	
1990	6	11,050	8,500	76.9%	7,000	1,000	≈95.0% ≈93.0%	≈73.0% ≈71.0%	
1993	2	3,917	3,847	98.2%	3,130		81.4%	79.9%	
1995	3	7,906	5,422	69%	4,680	0	86%	59%	
1996-1999	0								
Totals ⇒	27	62,247	43,573	70%	27,710	12,840	~88.2%	~60.8%	

Notes:

[a]: Brood year is defined as the year in which the adult spawning run commenced & the majority of eggs spawned (e.g., 1993 brood year = 1993-94 season).

[b]: Coho *pre-smolts* are defined as fingerlings (young-of-the-year) released into under-utilized habitat in late spring or early summer; coho *smolts* are released in late winter or early spring as yearlings.

[c]: Survival rates for native Mattole coho stocks only (i.e., excluding 1981 and 1982 brood year projects utilizing eyed eggs from Noyo River coho).

1: Noyo River stock, provided by DFG; 30,240 eyed eggs received at MSG's Mill Cr. facility on 1/20/82 (Shipment No. SS-N-3). In addition to the 10,000 coho smolts that were released into the Mattole, another 5,000 that had been reared to smolt size at the Mill Cr. facility were trucked by DFG to Silverado Fisheries Base near Yountville for later release into the Noyo River. Thus, the computed survival rate of 49.6% is based on a total production of 15,000 smolts from 30,240 eyed eggs. The low overall survival rate was attributed to a combination of poor initial egg quality ('soft-shell'), operational problems with a newly-designed hatchbox, and overcrowding of juveniles during rearing in troughs and doughboy pools.

2: Noyo River stock, provided by DFG; 11,200 eyed eggs received at MWSSG's Mill Cr. facility on 2/7/83 (Shipment No. S-6). The very low survival rate of 29.8% was due to the catastrophic loss of an estimated two-thirds of the fish (about 7,000 juvenile coho) when vandals shut off water to the rearing pool at the Mill Cr. facility over Memorial Day weekend (night of 5/29-30/83).

3: In the 1985 brood year, egg survival to the eyed stage averaged only 50.5% due to very low fertility of the eggs from 2 of the 4 coho females spawned.

Table 6.

Chinook salmon rearing and release summary for MSG's native stock supplementation operations, Mattole River watershed, 1981 through 1999 brood years (classroom incubator projects excluded). Table continued on following page.

Brood Year[a]	Rearing Facility[b]	Date(s) of Release	Number and Size of Chinook Released, by Age Class		Release Location[d] (& notation of *on-station* or *off-station* release)	Mark[e]	Notes
			Smolts[c]	Post-smolts[c]			
1981	Whale Cr.	4/22/82	3,620 @ 350/lb		upper Thompson Cr. @ Danny's Cr. *(off-station)*	–	1
1982	Arcanum	4/13/83	5,200 @ 368/lb		upper mainstem Mattole @ RM 59.8 *(on-station)*	–	
1982	Solitude	4/13/83	6,300 @ 568/lb		upper South Fork Bear Creek *(on-station)*	–	
1982	Solitude	4/13/83	3,500 @ 568/lb		upper Thompson Cr. @ Danny's Cr. *(off-station)*	–	1
1983	Solitude	4/29/84	6,150 @ 393/lb		upper South Fork Bear Creek *(on-station)*	–	
1983	Arcanum	4/30/84	14,000 @ 235/lb		upper mainstem Mattole @ RM 59.8 *(on-station)*	–	
1983	Arcanum	5/1/84	5,700 @ 235/lb		upper Thompson Cr. above Danny's Cr. *(off-station)*	–	1, 2
1984	Arcanum	4/17/85	2,200 @ 680/lb		upper S. Fk. Bear Cr., below Shelter Cove Rd. *(off-station)*	–	1
1984	Arcanum	4/22/85	5,000 @ 650/lb		upper mainstem Mattole @ 'Airport Hole', RM 52.3 *(off-station)*	Ad + half-CWT	3
1984	Arcanum	4/22/85	700 @ 650/lb		upper mainstem Mattole @ 'Airport Hole', RM 52.3 *(off-station)*	–	3
1984	Arcanum, then Mill Cr.	5/28/85	500 @ 150/lb		lower mainstem Mattole @ Mill Cr. confluence, RM 2.9 *(off-station)*	–	4
1984	Arcanum, then Mill Cr.	7/5/85	5,000 @ 80/lb		Mattole lagoon (RM 0.2) after sand bar closed mouth *(off-station)*	Ad + CWT (plus blue anal fin dye)	4
1985	Squaw Cr.	5/9/86	4,280 @ 145/lb		Squaw Cr., 1 mile above mouth *(on-station)*	Ad + half-CWT (code: 5B 5/8)	5
1986	Squaw Cr.	4/28&30/87	22,100 @ 215/lb		Squaw Cr., 1 mile above mouth *(on-station)*	–	
1986	Arcanum	5/5/87	18,000 @ 230/lb		upper mainstem Mattole @ 'Airport Hole', RM 52.3 *(off-station)*	–	3
1986	Solitude	5/6/87	11,300 @ 350/lb		upper S. Fk. Bear Cr., 3 miles below Solitude facility *(off-station)*	–	3
1987	Squaw Cr.	5/14/88	20,000 @ 200/lb		Squaw Cr., 1 mile above mouth *(on-station)*	–	
1987	Arcanum	5/17/88	16,000 @ 220/lb		middle mainstem Mattole near Ettersburg @ RM 42.8 *(off-station)*	–	3
1987	Solitude	5/17/88	14,000 @ 255/lb		Bear Cr., 0.5 mile above mouth near Ettersburg *(off-station)*	–	3
1988	Solitude	5/7-8/89	10,000 @ 190/lb		upper S. Fk. Bear Cr. @ Chemise Mtn. Road *(off-station)*	–	3
1988	Squaw Cr.	5/9&11/89	9,500 @ 175/lb		Squaw Cr., 1 mile above mouth *(on-station)*	–	
1989	Mill Cr.	12/7/90		5,000 @ 14.7/lb	middle mainstem Mattole below Honeydew @ RM 22.6 *(off-station)*	–	6, 7
1991	Arcanum, then Sanctuary	10/31/92		6,100 @ 21.1/lb	Thompson Creek near mouth *(on-station)*	–	8
1991	Solitude	10/31/92		3,600 @ 26.0/lb	upper South Fork Bear Creek *(on-station)*	–	9
1991	Solitude	12/7-8/92		7,600 @ 23.2/lb	upper South Fork Bear Creek *(on-station)*	–	9
1991	Squaw Cr., then Mill Cr.	12/7-8/92		5,700 @ 18.6/lb	Bear Cr. near mouth @ French's bridge, Ettersburg *(off-station)*	–	6, 10

Table 6 cont'd: Chinook salmon rearing and release summary . . .

Brood Year[a]	Rearing Facility[b]	Date(s) of Release	Number and Size of Chinook Released, by Age Class: Smolts[c]	Number and Size of Chinook Released, by Age Class: Post-smolts[c]	Release Location[d] (& notation of *on-station* or *off-station* release)	Mark[e]	Notes
1992	Arcanum	5/19/93	5,400 @ 259/lb		upper mainstem Mattole @ RM 59.8 *(on-station)*	left maxillary clip (marked 5/15-16/93)	
1992	Solitude	11/29/93		4,600 @ 24.0/lb	upper S. Fk. Bear Cr. above Shelter Cove Rd. *(on- & off-station)*	left maxillary clip (marked 10/22-23/93)	11
1992	Solitude	12/10/93		2,750 @ 22.6/lb	upper S. Fk. Bear Cr. above Shelter Cove Rd. *(on- & off-station)*	left maxillary clip (marked 10/22-23/93)	11
1992	Solitude	12/12/93		4,050 @ 22.6/lb	upper S. Fk. Bear Cr. above Shelter Cove Rd. *(on- & off-station)*	left maxillary clip (marked 10/22-23/93)	11
1992	Mill Cr.	12/9/93		1,800 @ 16.3/lb	Mattole Canyon Creek, 2 miles above mouth *(off-station)*	right maxillary clip (marked 10/8-9/93)	1, 7
1992	Mill Cr.	12/12/93		1,300 @ 16.3/lb	Honeydew Cr. at county bridge, 1 mile above mouth *(off-station)*	right maxillary clip (marked 10/8-9/93)	1, 7
1992	Mill Cr.	12/12/93		3,350 @ 16.3/lb	upper mainstem Mattole @ RM 60.0, near Arcanum facility *(off-station)*	right maxillary clip (marked 10/8-9/93)	1, 7
1993	Solitude	12/14/94		6,025 @ 16.0/lb	upper S. Fk. Bear Cr. above Shelter Cove Rd. *(on- & off-station)*	right maxillary clip (marked 11/26/94)	11
1993	Mill Cr.	11/16/94		500 @ 6.6/lb	lower mainstem Mattole @ Mill Cr. confluence, RM 2.9 *(on-station)*	–	12
1994	0	0	0	0	0	0	
1995	Arcanum	5/16/96	8,254@192/lb		on site	Right maxillary	
1995	Squaw	5/18/96	2,332@141/lb		on site	Right maxillary	
1995	Solitude	11/20/96		5,825@11.8/lb	on site	Right maxillary	
1995	Mill	11/25/96		4,150@17.1/lb	Mainstem at Stansbury Creek confluence	Right maxillary	
1996	Arcanum	5/6/97	12,400@142/lb		on site	Right maxillary	
1996	Solitude	5/13/97	4,300@229/lb		on site	Right maxillary	
1996	Solitude	12/2/97		6,000@15.6/lb	on site	Right maxillary	
1996	Mill	10/10/97		500@14/lb	on site	Right maxillary	
1997	Arcanum	5/17/98	14,900@146/lb		on site	Right maxillary	
1997	Solitude	11/14/98		6,300@10.7/lb	on site	Right maxillary	
1998	Solitude	11/25/99		4,954@10.1/lb	on site	Right maxillary	
1999	Arcanum	5/30/2000	9,281@183/lb		on site	Right maxillary	
1999	Solitude	5/14/2000	1,500@180/lb			Right maxillary	
1999	Mill	pending		~140			
Chinook Release Totals for 1981 ⇒ 1999 Brood Years			241,430 smolts	87,309 post-smolts	= Grand Total 328,739 Chinook Released		

Notes:

[a]: Brood year is defined as the year in which the adult spawning run commenced and the majority of eggs spawned (e.g., 1993 brood year = 1993-94 season).

[b]: Rearing facility locations and descriptions are noted elsewhere in this document, except for the Whale Creek site, which was operated only during the 1981-82 season as an interim facility close to the headwaters of Thompson Creek, prior to the establishment of the nearby Arcanum facility in fall 1982.

[c]: Chinook *smolts* are defined as fingerlings released in the spring; chinook *post-smolts* are released in the fall and are often referred to as "yearlings".

[d]: Release locations in the mainstem Mattole are accompanied by RM (River Mile) notations, as defined by CA Dept. of Water Resources (1973) mapping.
[e]: Marking abbreviations used: Ad = adipose fin clip; CWT = coded-wire tag; half-CWT = coded-wire half-tag.
1: Reason for off-station release: Seeding of unoccupied or under-utilized habitat for expansion of chinook distribution into historically productive areas.
2: An additional 100 chinook fingerlings were retained until mid-May 1984 and provided to Dr. Graham Gall at UC Davis for use in salmon genetics research.
3: Reason for off-station release: Low-flow conditions made it necessary to transport chinook for release some distance downstream from the rearing facility.
4: On 4/13/85, 5,600 juvenile chinook were transported from the Arcanum facility to the Mill Creek facility for extended rearing, marking and June release as part of the BLM-funded Mattole Estuary Study by HSU fisheries graduate student Doug Young and MWSSG personnel (Young 1987). These fish provided baseline data for population estimates of juvenile chinook residing in the Mattole lagoon during summer when the mouth was closed.
5: Juvenile chinook were marked (Ad + half-CWT) at the Squaw Creek facility on 4/29-30/86, and exhibited 8.1% tag loss after one week.
6: Oversummer rearing and fall release of chinook as post-smolts received priority beginning with the 1989-90 season, per DFG directive to MWSSG.
7: From the 1989-90 through 1992-93 seasons, all chinook reared at the Mill Creek facility were released as post-smolts at various locations upriver in the mainstem and major tributaries. Upriver off-station releases were instituted because of concerns about chinook imprinting to lower river areas.
8: Fingerling transfer of 6,770 @ 76/lb from Arcanum to brand-new Sanctuary facility on 7/17-18/92.
9: Fingerling transfer of 1,000 @ 220/lb from Solitude to Arcanum facility on 5/10/92 to alleviate pond overcrowding.
10: Fingerling transfer of 1,600 @ 89/lb on 6/21-22/92 from Squaw Creek to Mill Creek facility after catastrophic loss of an estimated two-thirds of the fish (about 3,200 juveniles) due to decreased flow and high water temperatures at the Squaw Creek site.
11: At the Solitude facility on upper S. Fk. Bear Cr., a planting strategy combining on- and off-station release (scatter planting) of chinook post-smolts has been standard practice since the 1992-93 season.
12: First year of "Rescue Rearing" program at Mill Cr. facility, consisting of trapping, rearing, and fall release of wild downmigrant chinook.

Table 7.

Coho salmon rearing and release summary for MWSSG's native stock supplementation operations, Mattole River watershed, 1981 through 1999 brood years (classroom incubator projects excluded).

Brood Year[a]	Rearing Facility[b]	Date(s) of Release	Number and Size of Coho Released, by Age Class: Pre-smolts[c]	Number and Size of Coho Released, by Age Class: Smolts[c]	Release Location[d] (& notation of *on-station* or *off-station* release)	Mark[e]	Notes
1981	Mill Cr.	1/11-21/83		6,000 @ 9.5/lb	Mill Cr., just above Lighthouse Rd. *(on-station)*	–	1, 2
1981	Mill Cr.	1/27-28/83		1,000 @ 11/lb	Mill Cr., just above Lighthouse Rd. *(on-station)*	–	1, 2
1981	Mill Cr.	3/14-15/83		3,000 @ 10/lb	Mill Cr., just above Lighthouse Rd. *(on-station)*	–	1, 2
1982	Mill Cr.	2/28/84-3/1/84		3,340 @ 11.4/lb	Mill Cr., just above Lighthouse Rd. *(on-station)*	–	3, 4, 5
1985	Mill Cr.	3/9-10/87		5,500 @ 14/lb	Mill Cr., just above Lighthouse Rd. and 0.5 miles above mouth *(on- & off-station)*	–	
1986	Mill Cr.	3/18/88		5,000 @ 12.5/lb	Mill Cr., just above Lighthouse Rd. and 0.5 to 0.7 miles above mouth *(on- & off-station)*	–	
1987	Oliver Gap	5/6/88	8,500 @ 270/lb		North Fork Bear Cr., in major south trib. intersecting King Range Road @ T4S, R1E, Sect. 5 *(off-station)*	–	6
1988	Oliver Gap	5/18/89	4,400 @ 210/lb		North Fork Bear Cr., in major south trib. intersecting King Range Road @ T4S, R1E, Sect. 5 *(off-station)*	–	6
1990	Solitude	6/19/91	2,500 @ 140/lb		upper South Fork Bear Cr. *(on-station)*	–	7, 8
1990	Solitude	6/19/91	3,500 @ 140/lb		North Fork Bear Cr., in major south trib. intersecting King Range Road @ T4S, R1E, Sect. 5 *(off-station)*	–	7, 8
1990	Solitude	6/20/91	500 @ 140/lb		upper Thompson Cr. above Danny's Cr. *(off-station)*	–	7, 8
1990	Solitude	6/20/91	500 @ 140/lb		upper mainstem Mattole @ RM 60.0, near Arcanum facility *(off-station)*	–	7, 8
1990	Solitude	3/5/92		1,000 @ 15.8/lb	upper South Fork Bear Cr. *(on-station)*	–	
1993	Arcanum	7/12/94	730 @ 110/lb		upper South Fork Bear Cr. near Wailaki *(off-station)*	–	9
1993	Arcanum	7/12&17/94	1,600 @ 110/lb		West Fork Bridge Cr. *(off-station)*	–	9
1993	Arcanum	7/17/94	800 @ 110/lb		McKee Cr., near confluence of Painter Cr. *(off-station)*	–	9
1995	Oliver Gap	6/13/96	2,350@99.8/lb		North Fork Bear Cr	Rt max	
1995	Mill Cr.	6/24/96	2,330@67.8/lb		on site	Rt max	
Coho Release Totals for 1981 ⇒ 1999 Brood Years			27,710 pre-smolts	24,840 smolts	= Grand Total of 52,550 Coho Released		

Notes:

[a]: Brood year is defined as the year in which the adult spawning run commenced and the majority of eggs spawned (e.g., 1993 brood year = 1993-94 season).

[b]: Rearing facility locations and descriptions are noted elsewhere in this document.

[c]: Coho *pre-smolts* are defined as fingerlings (young-of-the-year) released into under-utilized habitat in late spring or early summer; coho *smolts* are released in late winter or early spring as yearlings.

[d]: Release locations in the mainstem Mattole are accompanied by RM (River Mile) notations, as defined by CA Dept. of Water Resources (1973) mapping.

[e]: Marking of coho has not been implemented by MWSSG.

1: Noyo River stock, provided by DFG; 30,240 eyed eggs received at MWSSG's Mill Cr. facility on 1/20/82 (Shipment No. SS-N-3).

2: On 2/7/83, an additional 5,000 coho that had been reared to smolt size (11.3/lb) at the Mill Cr. facility were trucked by DFG to Silverado Fisheries Base near Yountville for later release into the Noyo River.

3: Noyo River stock, provided by DFG; 11,200 eyed eggs received at MWSSG's Mill Cr. facility on 2/7/83 (Shipment No. S-6).

4: Vandals shut off water to rearing pool at Mill Cr. facility over Memorial Day weekend (night of 5/29-30/83), causing mortality of about 7,000 coho (2/3 lost).

5: Coho eggs not available from DFG in 1984 for continuation of Mill Cr. restocking program; coastwide shortage of coho blamed on El Niño.

6: Experimental pre-smolt release, authorized by DFG, and monitored via DFG electrofishing. Off-station release in DFG-approved location with unutilized, but historically productive, coho habitat.

7: Experimental pre-smolt release, authorized by DFG, and monitored via DFG electrofishing. On- & off-station releases (scatter planting) in DFG-approved locations with unoccupied or under-utilized, but historically productive, coho habitat.

Table 7 cont'd

8: An additional 200 coho fingerlings (125/lb) were transported on 6/29/91 from Solitude facility to Notestine pond near Panther Gap for experimental oversummer rearing via cage culture. Results inconclusive because fish subsequently escaped from cage into earthen pond.
9: Experimental pre-smolt release, authorized by DFG. Off-station releases (scatter planting) in locations with unoccupied or under-utilized, but historically productive, coho habitat.

Table 8.

Funding history of MSG's native stock propagation program for supplementation of Mattole salmon populations, 1980-81 through 1999-2000 seasons (habitat restoration projects excluded). Table continued on following pages.

Season of Operation[a]	DFG Contract No. (and DFG funding source, if known)[b]	DFG Contract Budget for Hatchbox & Rearing Operations[c]	Total Program Budget (DFG contracts plus supplemental funding)	Primary non-DFG Funding Sources and Amounts[d]	Person-Months of Labor Expended: Paid	Person-Months of Labor Expended: Volunteer[e]	Notes
1980-81	–	–	$ 4,500	$ 3,750 - PD 750 - CFRF	–	est. 16.0	
1981-82	81/82 C-1387 (Bosco-Keene funds via AB 951)	$ 29,600	$ 33,873	$ 2,617 - PD 1,100 - PL 556 - NLPF	21.0	est. 10.0	1
1982-83	# C-173 (?) (Bosco-Keene funds via AB 951)	$ 2,000	$ 14,380	$ 5,200 - GD/RF 4,528 - PD 1,152 - DLC 1,000 - PCFFA 500 - TF	8.0	>3.0	2
1983-84	# (?) (Bosco-Keene funds via AB 951)	$ 11,000	$ 19,600	$ 3,200 - BRLF 2,000 - HAF 2,000 - TF 1,400 - PD	11.0	>2.0	
1984-85	–	–	$ 13,000	$ 13,000 - FG/PD	est. 8.0	>4.0	3
1985-86	C-1228 (Bosco-Keene funds via AB 951)	$ 21,000	$ 28,900	$ 4,580 - HAF 3,320 - PD	est. 10.0	>2.0	
1986-87	C-1723 (Bosco-Keene funds via AB 951)	$ 21,000	$ 23,480	$ 2,480 - FG/PD	10.4	>1.1	
1987-88	C-1723 (Bosco-Keene)	$ 20,000	$ 24,300	$ 4,300 - FG/PD	11.9	>1.4	4
1988-89	FG-8302 (Salmon Stamp), and FG-8303 (Bosco-Keene)	$ 12,870 and $ 15,887	$ 36,757	$ 6,000 - PD 2,000 - SCCFA	11.0	2.6	5
1989-90	FG-9320 (Salmon Stamp)	$ 24,617	$ 29,617	$ 5,000 - P	8.0	2.5	6
1990-91	FG-0419 (Salmon Stamp)	$ 14,104	$ 14,104	– –	4.6	8.7	7
1991-92	FG-1247 (Salmon Stamp)	$ 28,603	$ 45,603	$ 12,000 - SF 5,000 - P	13.9	22.2	
1992-93	FG-2203-IF (Salmon Stamp)	$ 34,342	$ 37,942	$ 3,000 - P 600 - PD	12.1	7.4	
1993-94	FG-3028-IF (Salmon Stamp)	$ 15,878	$ 26,365	$ 10,487 - TU	4.8	7.4	8
1994-95	-	-	-	- -	-	-	-

Table 8 cont'd

1995-96	FG-5014 (Salmon Stamp)	$ 30,000	$ 33,228	$3228	M	10.5	14
1996-97	FG 6004 (Salmon Stamp)	$ 29,898	$ 41,936	$ 12,038	M EPA	10.5	8.29
1997-98	FG 7007 (Salmon Stamp)	$ 29,997	$ 34,134	$ 12,300	M CC EPA	10.5	8.64
1998-99	FG 8006 (Salmon Stamp)	$ 11,604	$ 26,904	$ 15,300	M CC EPA	6	3.2
1999-2000	FG 8124 (Salmon Stamp)	$ 19,228	$ 55,219	$ 35,990	M	pending	pending
Totals for 1980-81 ⇒ 1999-2000 (19 seasons of operation)		**$340,361**	**$491,089**	**$159,223**		pending	pending

Notes:

a: Season of operation generally encompasses a full 12-month period (Nov.-Oct., or Dec.-Nov.) and roughly coincides with the freshwater life-history cycle of native Mattole chinook salmon (i.e., upstream migration & spawning of adults, through ocean entry of juvenile progeny).

b: Funds administered by the California Department of Fish and Game (DFG) for fish-rearing contract services are described as follows:
AB 951 = Assembly Bill 951, or "Bosco-Keene" funds, formally entitled the North Coast Cooperative Salmon and Steelhead Restoration Act of 1981. Monies were authorized from the 1981-82 through 1988-89 seasons for funding of salmonid propagation programs statewide. Appropriation of AB 951 funds varied from year to year: in the first two seasons, funds were taken from the Energy and Resources Fund (ERF), with monies generated by tidelands oil revenue; in 1983-84 the source was the Renewable Resources Investment Fund (RRIF), with income originating from geothermal energy leases in CA; in 1984-85 monies came from the California Environmental License Plate (CELP) fund; in 1985-86 a combination of RRIF and CELP monies were utilized; and in the final 3 years the source was RRIF.
Salmon Stamp = Salmon Stamp Account and Augmented Salmon Stamp Account, with revenue consisting of a self-imposed "tax" on annual salmon landings [enabling legislation: SB 782 (1982 - Keene) and SB 2517 (1986 - Keene)]. Projects are selected for funding by the Commercial Salmon Trollers Advisory Committee.

c: DFG contract budget refers to the total amount invoiced and received by MWSSG under contract to DFG for native salmon propagation (usually referred to as the Mattole Hatchbox and Rearing Program); budgets also covered spawning ground surveys in most years.

Table 8cont'd

d: Key to supplemental (non-DFG) funding sources [abbreviations & acronyms]:

BRLF	=	Bertha Russ Lytel Foundation
CFRF	=	California Fisheries Restoration Federation
DLC	=	Darshan Learning Center, Inc.
FG/PD	=	Foundation grants plus private donations
GD/RF	=	Grateful Dead/Rex Foundation
HAF	=	Humboldt Area Foundation
NLPF	=	National Lands Preservation Fund
P	=	Patagonia, Inc.
PCFFA	=	Pacific Coast Federation of Fishermen's Associations
PD	=	Private donations (from individuals, fundraising activities, benefit functions, etc.)
PL	=	Pacific Lumber Company
SCCFA	=	Shelter Cove Commercial Fishermens' Association
SF	=	Sanctuary Forest, Inc.
TF	=	Tides Foundation
TU	=	Trout Unlimited (Six Rivers Chapter), via Embrace-A-Stream program
M	=	Mead Foundation
EPA	=	Environmental Protection Agency

e: Volunteer hours by MWSSG workers were inadequately documented (i.e., under-reported) through the first eight seasons of operation.

CC	=	Coastal Conservancy

1: DFG contributed additionally to MWSSG's 1981-82 program by employing Gary Peterson as a DFG Seasonal Aide from 9/28/81 to 1/9/82 (528 hours @ $4.53/hr).

2: MWSSG's proposal for 1982-83 program funding ($48,200) was denied by DFG; restrictive contract budget granted by DFG did not cover personnel costs or operating expenses, but allocated $2,000 for fish food only. DFG contributed additionally to MWSSG's 1982-83 program by employing Gary Peterson as a DFG Seasonal Aide from 11/24/82 to 1/12/83.

3: No DFG monies were received in the 1984-85 season; MWSSG's $16,343 proposal for program funding was denied by DFG.

4: Total budget for DFG Contract # C-1723 was $22,700 for the 1987-88 season; of this, $20,000 was allocated specifically for the hatchbox/rearing program, and Amendment 1 to this contract authorized an additional expenditure of $2,700 for habitat improvement work (i.e., floating shade and cover structures in the Mattole estuary/lagoon).

Table 8cont'd

5: Beginning with the 1988-89 season, the availability of DFG funding statewide for cooperative fish-rearing programs was substantially reduced. After 1988-89, the primary funding source for salmonid propagation programs was the Salmon Stamp Account (see [b] above).
6: Total budget for DFG Contract # FG-9320 was $31,156 for the 1989-90 season; total expended and invoiced was $24,617.
7: MWSSG's proposal for 1990-91 program funding was $28,000; contract budget granted by DFG was $15,000, of which $14,104 was invoiced.
8: Total budget for DFG Contract # FG-3028-IF was $38,000 for the 1993-94 season; less than half ($15,878) was invoiced due to production shortfalls.