D.W. ALLEY & Associates aquatic biology

SOQUEL CREEK LAGOON MONITORING, 1995

May, 1996
Project #106-05

Prepared for

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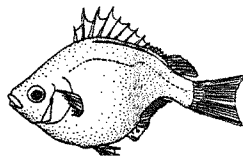

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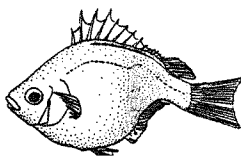


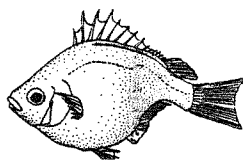
SOQUEL CREEK LAGOON MONITORING REPORT, 1995

ACKNOWLEDGMENTS

We wish to acknowledge the two funding entities for this, the fifth year of lagoon monitoring and enhancement. They include the Coastal Conservancy, with Jim King being the project analyst who obtained state funds. Secondly, the other funding entity in implementing the **Soquel Creek Lagoon Management and Enhancement Plan (1990)**, has been the City of Capitola. This has been the first implementation of a plan to manage one of California's coastal lagoons, and to educate the public and encourage their involvement. The quality of aquatic habitat and management techniques have been followed to acquire knowledge of yearly fluctuations in natural processes in an urbanized setting. This process has begun a new chapter in the story of a coastal city and management of its beautiful landmark and traditional focus, the Soquel Creek Lagoon.

Initially Susan Westman and now Kathy Barbaro, the Planning Director, have facilitated the project. The monitoring was greatly assisted by the many observant and diligent Public Works personnel, including Ed Morrison and Jim Turcotte. Sandbar closure in 1995 offered the greatest challenges to the City and Bill Casalegno, the sandbar builder, since we began monitoring five years ago. We had heavy streamflow, a shortage of sand on the beach and high tides. Still, they secured the the lagoon and its valuable steelhead habitat. As all ways, Nels Westman and the Begonia Festival organizers were effective in cleanup after the Festival. We thank Yehudit Sherman for facilitating and overseeing the refurbishment of interpretive signs and design of a new sign for pet management along the lagoon path.

We are grateful to local residents of the watershed, including Tom and Carla Mader (Friends of Soquel Creek), Steve Leinau (Earth Links), Jennifer Tate, Phil King and members of Citizens for Responsible Forest Management (the Morganthaler and Schlosser families) for helping to census lagoon fishes. The lagoon's valuable aquatic habitat will require the care of the City and community members in the future.



EXECUTIVE SUMMARY

Over the winter we have been able to refurbish the interpretive signs around the lagoon and along the beach with remaining funds from the Coastal Conservancy grant. New stainless-steel frames were constructed locally by Custom Fabrication, and new lexan protective covers were installed. Additional signs were constructed and stationed along the lagoon path to remind pet owners to do the proper clean-up.

In June, 1995, Soquel Creek cut east across the beach to the jetty before emptying into the Monterey Bay, as it had in 1992-94. Fish that may have been in this lateral channel were herded back into the main estuary with a 1/8-inch mesh seine at the advisement of the Department of Fish and Game. Then the channel was closed off for sandbar construction. The periphery of the lagoon was walked and seined in search of tidewater gobies before sandbar construction began, but none were found. Sandbar construction was delayed until 12-14 June, due to heavy streamflow. It involved opening the sandbar at low tide near dawn, raking out the plant material furiously for 2-3 hours and closing the sandbar to prevent salt water from washing in. On 12 June the sandbar was closed midday for high tide and re-opened afterwards for more raking time. Tides were very high during the period. City personnel and the biologist hand-raked decomposing kelp, sea grass and decomposed ooze out of the lagoon through the opening each day. The biologist searched the upper estuary for tidewater gobies on 13 June to beyond the Rispin Mansion. He observed none. A turtle (most likely western pond turtle) was observed sunning itself on woody debris in the upper lagoon.

More than 90% of the decomposing plant material was removed before sandbar closure. The bottom had little ooze in 1995. The shroud was unnecessary for freshwater conversion because of heavy streamflow.

In 1995 there was much less algae and pondweed than previous years, except at the mouth of Noble Gulch. Algae was densest in early September and then again in early October. Surface algae

was non-existent through the summer. Pondweed was absent except for a small patch under the trestle and an area of 10-15% of Reach 1 near the restaurants in September. The Begonia Festival apparently eliminated approximately half of the algae covering the lagoon bottom, based on before and after monitoring.

Noble Gulch continued as a source of pollution to the lagoon in 1995, as indicated by the filamentous algal bloom that existed at its mouth all summer. Gray water was visible on 7 of 11 monitorings at the mouth of Noble Gulch, with plumes commonly spreading 100 feet or more into the lagoon. It appeared much worse than in other years. Many of our monitorings were on weekend mornings when the restaurant upstream on Capitola Avenue was closed, indicating that the pollution was from another source. The water ran clear at the Bay Street Park when turbidity was noted at the lagoon.

In 1995 the lagoon's coliform levels were generally similar to 1993-94, with some weeks better and some weeks worse at the flume in 1995. Counts were similar to 1993 at the trestle and slightly worse than 1994 at the mouth of Noble Gulch. The important point was that bacterial levels were too high to meet the safety standards when counts were taken in 1995, except once in October at the railroad trestle. This was despite the lower gull densities in 1995 compared to 1993-94 (**Table 4**).

The similarly high fecal coliform counts in 1995 as in 1993-94 were unfortunate and somewhat surprising. The bridge construction at Highway 1 and Bay Street was over, yet the counts at Nob Hill where the stream empties into the lagoon were similar or only somewhat lower than previous years. Data were lacking later in the summer at Nob Hill. It could be that with the high streamflow, bacteria produced by pigeons at Soquel Avenue Bridge were better transported to the lagoon than earlier years. There appeared to be more storm drain water entering from Noble Gulch in 1995, particularly on weekends, and storm drain runoff is typically high in bacteria. The number of pigeons using the trestle and their associated excrement entering the lagoon in 1995 was down slightly from 1994, it being 6.4 compared to 7.2 birds per censusing (**Table 4**).

We suspect that the amount of bird excrement washed off the window panels at Larry's Surf and Turf Restaurant is similar each year, probably making bacterial counts in Reach 1 similar from year to year. Also, there may have been enough gulls bathing to bring bacterial counts to high levels, despite the fewer gulls in 1995. We talked to the proprietor at Larry's Surf and Turf about extending wires across the glass panels in order to prevent gulls from roosting on them. At first the proprietor was in favor of testing ways to eliminate the problem. However, later he stated that the building was going to be sold and that nothing could be done until after it changed hands.

Water quality for aquatic life in the lagoon was generally good with regard to oxygen, salinity, conductivity and cover. Many of the willows were overhanging nicely to enhance fish cover, and should be left for that purpose. Oxygen levels were lowest at the bottom, with them being fair-to-good within 0.25 meters of the bottom at all but the mouth of Noble Gulch throughout the summer. The lower 0.25 meters of the water column at Noble Gulch had oxygen depleted to a poor levels in mid-October, when a brown oily slick entered the lagoon from the Gulch. The lower oxygen levels near the bottom at Noble Gulch corresponded to high levels of filamentous algae.

The site at the trestle consistently had the lowest oxygen concentration (poor rating) at the bottom on 10 of 11 monitorings, except in October. We have no good explanation for increased oxygen depletion at the trestle so early in the season. Pigeon use of the trestle was not detected to be greater than previous years, and oxygen levels were still fair-to-good higher in the water column at the trestle. Oxygen was at a poor level at the bottom at the mouth of Noble Gulch on 3 of 11 monitorings. Lagoon water temperature was fair or good all summer and fall, 1995 (**Table** 2). Morning water temperatures were the lowest of the five years of monitoring (**Figure** 7) due to the high streamflow into the lagoon in 1995.

A response from the Water Resources Control Board was made in 1995 to a water right complaint regarding the drying up of 0.4

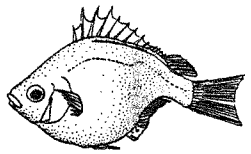
miles of Soquel Creek. Its conclusion was that the Main Street well operated by the Soquel Creek Water District appears to have no direct hydraulic effect on the flow in Soquel Creek. It stated that the Tiedemann Nursery should cease all pumping from the surface flow of Soquel Creek when the downstream reach of Soquel Creek is dry. Enforcement action may be taken if diversions continue at the nursery when visible surface flow does not exists in the downstream reach of Soquel Creek.

A poor rating for lagoon water level in early July 1995, occurred when additional flume boards were needed as streamflow declined (**Table 2**). The poor lagoon level in late July and mid-October occurred when boards were absent when needed. There was water seepage through the sandbar under the flume for much of the summer, which added to the difficulty of maintaining the highest possible lagoon depth. The City added flume boards at our request after we detected low lagoon levels.

Passage for steelhead smolts was adequate throughout the summer and fall of 1995. The wooden baffle inside the flume had blown out in winter 1995. However, even without it, water depth at the flume inlet began at 1.5 feet on 24 June and only dropped to 1.0 feet by 11 August, well after the smolt out-migration was complete. In 1995, the lowest measured in-flow to the lagoon was 2.49 cfs on 15 October. On 6 July we had measured 12.27 cfs coming in. In 1993, the lowest estimated in-flow to the lagoon was 1 cfs in September. In 1994, in-flow declined below 1 cfs in late July and fell to an estimated 0.05 cfs by late September.

The first rain of the season came at the end of October and did not cause any detected fish mortality. The sandbar breached on 11 December. A notch was cut in the sandbar, and shovels were used to initiate the breach to prevent flooding.

Our steelhead population estimate for fall 1995 was only 360 juveniles +/- 60. Other species captured were Sacramento sucker (Catostomus occidentalis) and threespine stickleback (Gasterosteus aculeatus). More than 500 juvenile Sacramento suckers were seined from near Larry's Surf and Turf Restaurant.



After eight seine hauls with the 1/8-inch mesh seine, no tidewater gobies were captured in 1995. In fall, 1994, 35 tidewater gobies had been captured after four seine hauls. In fall, 1992, two tidewater gobies were captured during sampling. In fall, 1993, no tidewater gobies were captured after a total of six seine hauls on two weekends with the fine-meshed seine. The low number captured in 1992-95 probably indicates the lack of backwater areas in Soquel Lagoon, which would be used as refuges for tidewater gobies during high winter stormflows.

We expected more steelhead in the lagoon in 1995 because the stream flowed to the lagoon all summer. Reasons for the low number was probably related to the general shallowness of the lagoon and episodes of very shallow conditions related to flume management. The lagoon had aggraded from the winter stormflows and was more shallow than previous years. The extensive pondweed forest that was present in some years did not develop in 1995. the pondweed provides escape cover and plant life to support insect larvae that steelhead feed upon. The lagoon depth decreased from late June into early July under the Stockton Avenue Bridge, a location where many juvenile steelhead congregated in past years. The maximum depth there was a meter (3.2 feet) or less from early July onward in 1995, even when the gage height was more than 2.00 feet. On October 15 it was only 0.55 meters (1.8 feet) deep under the bridge with a gage height of 1.40 feet. The lagoon underwent four episodes of large water depth fluctuations, with a reduction of 0.5 feet twice in July and a third time in October, due to a lack of flume boards. These fluctuations caused very shallow conditions in an all ready shallow lagoon. In late September the lagoon was nearly drained.

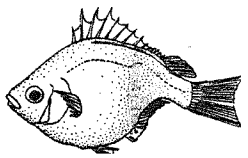
The most probable cause for finding so few steelhead in the lagoon in October 1995 was that on 23 September (a Saturday), the lagoon mostly drained after apparently some vandals had jammed a log between lower boards at the flume. The lagoon was reduced to 1 foot maximum depth, according to one observer. Such shallow conditions mean a loss of escape cover for steelhead and increased predation. Steelhead will make an effort to avoid shallow conditions. They probably became crowded into a small area under the bridge. Unable to move upstream with only 3 cfs

coming downstream, most steelhead probably decided to go downstream, ending up in the ocean. Some of the larger juveniles (6-8 inches in length) may have survived the sudden exposure to seawater, but many probably perished. Predation was probably quite high from fish-eating birds. We probably lost 80-90% of the steelhead that were living in the lagoon. Another explanation for the draining was that the tidal surge inside the flume jarred the boards upward and the log entered the crack between the boards as the lagoon drained. At any rate, the lagoon mostly drained before the police were notified. The City re-secured the flume boards, and lagoon level was back to normal two days later.

Regarding waterfowl, the 1995 density of mallards was less previous years, with more them using mostly Reach 3, as occurred in earlier years. This may have resulted in the lower density of mallards at Soquel Lagoon. The range of mallards counted was 3-20 in 1995 and generally between 15 and 30 individuals in 1994. One clutch of young were observed in 1995, three clutches in 1994, four clutches in 1993 and only two clutches in 1992. In 1995 there may have been more wetlands in the region than previous years due to high winter rainfall. The lower abundance of aquatic plants may have reduced the food supply for ducks.

Although there were clutches of mergansers raised at the lagoon in 1993 and 1994, only one merganser was observed in 1995, and it did not appear until 15 October. Regarding other piscivorous birds, only 2 pied-billed grebes used the lagoon in 1995, compared to 3-6 of them in 1994. One green-back heron and one black-crowned night heron were back in 1995 (**Table 5**). Three black-crowned night herons were seen during one censusing on 12 June 1994, but were not seen again. A cormorant was seen on 3 occasions in 1995 and once in 1994. A great blue heron was seen once in 1995 and 1994.

Pigeon sightings in 1995 on the trestle were similar to 1994 and only about 60% of 1993 levels. Pigeon feeding in Reach 2 was much reduced. They appeared to forage more on the beach in 1994 and 1995 than in previous years.



Regarding sandbar breaching, by 0700 hr on 11 December we had removed 2 boards on either side of the flume. The gage height reached 3.24 and was receding by 0900 hr. A notch was put in the sandbar with some sand left nearest the lagoon so that only minor shoveling could open the sandbar. The sandbar had to be breached between 1000 and 1100 hr to prevent flooding. By 1130 hr the sandbar was open, with a 30-foot wide channel through the sandbar (**Appendix A**).

New Recommendations

1. Re-install the wooden baffle inside the flume.

2. Do not reduce the lagoon level for the Begonia Festival.

3. Secure the flume boards so that vandals cannot pry them up and drain the lagoon. This will prevent tidal surges through the flume from doing the same thing.

4. Discontinue the use of aquazine for the control of lagoon algae.

5. Remove flume boards only after the first small storms have begun in fall (instead of removing boards before the storm actually occurs), and replace the boards immediately after stormflow has subsided. The effort should be to minimize lagoon fluctuation until the sandbar actually breaches. Many forecasts for rain and storm intensities are incorrect in the early fall. It is harmful to steelhead and tidewater goby if flume boards are removed in anticipation of a storm that fails to develop or fails to raise the streamflow. Then if the boards are not re-installed, increased fish mortality is likely due to predation.

6. In addition to the signs to encourage pet owners to clean up after their pets, install a dispenser of plastic bags and a refuse container at the Stockton Avenue end of the path.

7. If the streamflow in Soquel Creek in the vicinity of Soquel Village approaches the point of losing surface flow, notify

Tiedemann Nursery and the Fish and Game Department of the streamflow conditions so that direct water pumping from the stream may be reduced or discontinued until flow improves. Loss of surface flow should be prevented.

8. Check the gage height at the lagoon once a week (preferably the same day each week and keep a log of measurements so that the biologist may contact the City to obtain a weekly update.

Former Recommendations that Deserve Emphasis

1. The most critical recommendation yet to be implemented would be the installation of gutters on the lagoon-side of the restaurants to capture garbage and excrement-laden water to be transported away from the lagoon. This approach or installation of wires on the roofs to prevent roosting of gulls would significantly reduce nutrient and bacterial inputs to the lagoon.

2. One educational tool implemented in 1995 was dissemination of an explanation for not feeding the birds. Copies were given to rental property owners and restaurant managers along the lagoon, in particular. This should be done again if rental property owners need more copies. Rental property owners may be reminded of the need to discourage feeding of birds.

6. New management recommendations resulted from the fish mortality that occurred after the first rain in October, 1994. If the lagoon bottom becomes invisible due to turbidity for more than one day after the first rain of the season that does not breach the sandbar, immediately lower the lagoon level to the point where the bottom is visible. This will allow algal growth despite the high turbidity. In this way, plant photosynthesis may continue to produce oxygen and prevent anoxic conditions lethal to fish. A previous recommendation in the Management Plan (1990) should be emphasized to prevent further fish mortality. It stated that parking lots and streets draining into the lagoon should be cleaned thoroughly before the first rain of the season.

7. Road work involving repaving and application of petrochemicals should be done early in the summer. This will allow sufficient time for these substances to penetrate and dry before fall rains can wash them into the lagoon.

8. Look into better ways of sealing the cracks between the boards in the flume inlet. Sandwiching rubber strips between the boards may solve the problem.

Sandbar Construction, 1995. **Appendix A** provides pictures of the various activities associated with sandbar closure.

The City utilized a multiple-year Fish and Game Permit (**Appendix B**) to close the sandbar. It stated that no vehicles were to enter the wetted creekbed except within 25 feet of the flume. The Creek was flowing east of the flume across the beach to the rock jetty, as in 1992 and 1993. The stream went laterally east from the flume and parallel to the coastline for approximately 150 meters, then bent abruptly south at the jetty to empty into the surf. It was decided that fish in the east-coursing channel across the beach would be herded back into the lagoon before the sandbar was constructed around the lagoon.

27 April, 1995. With the heavy winter stormflows, streamflow was still quite high. Ed Morrison requested that we monitor streamflow to help in the timing of sandbar closure. On this date the streamflow was 60.4 cfs exiting the estuary. Ed and his son assisted on "Take-Your-Son/Daughter-to-Work Day."

10 May, 1995. Streamflow was monitored. Streamflow to the ocean was 66.7 cfs. It had rained since 27 April.

12 June 1995. In preparation of sandbar closure, sampling was done to rescue fish from the area near the flume and in the lateral channel across the beach. Eight seine hauls were done around the lagoon margin, downstream of Stockton Avenue Bridge. No tidewater gobies were found. Two juvenile prickly sculpin were captured. We electrofished around all rocky objects in the lateral channel, searching for steelhead. This was not tidewater goby habitat. No steelhead were found. Then Jim Turcotte and I seined the entire lateral channel. No fish were detected. Mr. Casalegno cut a channel along the flume at 0730 hr. Kelp and sea grass had washed in the past weekend and was concentrated at the upper end of the lateral channel. We raked it into the lagoon area before Mr. Casalegno blocked off the lateral channel. Three prickly sculpin and one staghorn sculpin were rescued from the sea grass and put into the open water of the estuary.

The sandbar was closed midday before high tide and was re-opened after the tide receded. We raked plant material out of the lagoon until 1730 hr. There were three rakers, including Jim, Michael and myself. The sandbar was closed at 1800 hr. The flume was not operational yet.

13 June, 1995. The sandbar was about to breach itself when Mr. Casalegno opened it at 0600 hr. The lagoon had mostly drained by 0700 hr. A large slug of kelp/sea grass had become beached in the lower east portion of the lagoon near the flume. Mr. Casalegno shoveled it into the main channel near the flume. Raking occurred until 1100 hr when the sandbar had to be closed to prevent saltwater from entering. We had 6 rakers helping this day, including Ed, Jim, Mark, Michael, Tim and myself.

Sherman and I surveyed upstream looking for stranded steelhead and other fish. We found none. A turtle was observed near woody debris. No tidewater gobies or mergansers were observed. The sand on the lagoon bottom was fairly clean and not much sediment was deposited at Noble Gulch compared to the previous year. Algae had begun growing in a riffle at the upper end of the lagoon. Small juveniles were observed in backwater areas, possibly being Sacramento suckers or roach. The flume was open and flowing nicely by 1900 hr.

14 June, 1995. The lagoon was draining at 0700 hr. There was a split channel with a large dry area in the center. One channel of water went under the flume. Water was directed down the center of the lagoon away from the flume so that the flume could be prepared for final sandbar closure. The caterpillar tractor was kept out of the water as the center channel was cut and crossed only near the flume. Four steelhead and one lamprey juvenile were rescued from the remnant channel. The flume was prepared and the sandbar was closed by 0940 hr. Mr. Casalegno hurried to build up the sandbar to prevent tidal overwash. A high tide of 6.1 feet was scheduled at 1201 hr. The baffle inside the flume was gone and needed replacement. High flows this year eliminated the need to do it in 1995.

That evening there was overwash near Venetian Court. A small amount of kelp washed into the lagoon.

15 June, 1995. A sandwall had been constructed around the top of the sandbar to keep the tide from overtopping the berm. No overwash occurred.

16 June, 1995. The flume was wide open with the lagoon level one foot above the flume and holding.

Recommendations for Lagoon Preparation and Sandbar Construction

1. Continue to rake as much kelp and sea grass out of the lagoon as possible before final closure, including plant material trapped under the restaurants, in depressions around the bridge and at the mouth of Noble Gulch.

2. Dispose of kelp from the lagoon during sandbar closure in the bay rather than bury it in the sandbar. Disperse it up and down the beach so as to spread it out. Continue to include this in the Fish and Game permit for sandbar construction. County environmental health has no problem with this so long as kelp is spread out over a wide area (**J. Ricker, County Environmental Health, pers. comm.**).

3. Bring back the wide rakes that were used in 1995.

4. Evaluate the structural integrity of the flume and its supports. Repair cracks and supports as necessary.

5. During sandbar construction, continue to close the lagoon each day before the incoming tide can wash salt water and kelp into the lagoon. Re-open the sandbar and unplug the flume, if necessary, each morning at low tide to drain out more kelp.

6. Search under the bridge and in Reaches 2 and 3 for stranded fish to rescue as the lagoon drains each day during raking.

7. Seal off storm drains on the west side of the street in front of the Esplanade. This should be the case from May 15 to after the clean-up from the Wine Festival in mid-September. Seal off any storm drain pipes leading from the street to the lagoon in front of the restaurants. This will reduce pollution from restaurant clean-up.

8. Attempt to make the area around the flume the deepest part of the lagoon so that heavy salt water will collect there and be pulled out easily by the shroud.

9. Continue to maintain the underwater portal in the flume for out-migration of adult steelhead until June 1, while maintaining a notched top plank for out-migration of smolts until 1 July.

10. Continue to maintain the 1-foot high baffle inside the flume until July 1 for smolt fish passage.

11. Continue to maintain a 6 to 8-inch depth at the outlet of the flume until July 1. Install two 4"x 4" planks in the outlet if necessary as per Fish and Game's suggestion.

Sandbar Breaching During the 1994-95 Rainy Season.

11 December 1995. The biologist was notified early on 11 December that the lagoon level was rising. It had rained the previous night and a full week of rain was forecasted. By 0700 hr we had removed 2 boards on either side of the flume. The gage height reached 3.24 and was receding by 0900 hr. A notch was put in the sandbar with a wall near the lagoon where minor shoveling could open the sandbar. I left the lagoon at 0900 hr. I returned home at 1100 hr, obtaining a message that a managed breach was necessary to prevent flooding. I returned to the lagoon at 1130 hr to note that the sandbar was open with a 30-foot wide channel quickly draining the lagoon (**Appendix A**).

Recommendations Regarding Sandbar Breaching

1) As stated in the Management Plan (1990), make sure that parking lots and streets draining into the lagoon are cleaned before the rainy season. This will reduce the pollutants entering the lagoon during the first storm of the season. Street sweepers with water and suction may be necessary. In addition, road-work such as repaving and application of fresh petro-chemicals to pavement should be done early in the summer to allow sufficient time for penetration and drying before the rainy season. These chemicals can be lethal to fish.

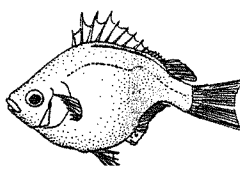
2) Recommend to the owners of 443 River View that they build a better bulkhead to replace the old sandbag wall.

3) The notch in the sandbar should be cut slightly lower than the piling bolt. The City may have to periodically re-establish the notch if it does not rain or high tides obliterate it. If a storm is predicted, the sandbar needs a notch as preparation.

4) Just as the first storm of the fall season begins, remove one board from each side of the flume if a small storm is anticipated. Remove two boards from either side if a large storm is anticipated. Clear the exit to the flume by removing the plate from one side of the exit. Clear the sand away from the top of the flume back to the first hole cover.

Replace the boards after the stormflow subsides, removing them for each succeeding storm until the sandbar is eventually breached during later, larger storms usually occurring after Thanksgiving. Remove the first flume portal cover and screen it if the entrance of the flume cannot handle the volume of the stormflow in October and early November. After the stormflow subsides, replace the cover until the next storm.

5) If the sandbar breaches early in the rainy season, followed by a period of 2-4 weeks of a reformed sandbar that prevents water exchange with the ocean, attempt to pull the decomposing kelp out of the stagnating lagoon. Open the flume and encourage streamflow out with the shroud installed.



6) If a stagnant, kelp-filled lagoon forms in fall after an early breach and a dry period, do not empty the lagoon by breaching the sandbar. Instead, use the flume to pull salt water out. Breaching of the lagoon will increase the opportunity for more kelp to enter and probably will not empty the entire lagoon anyway. Fish passage need not be maintained through the flume because it should be discouraged until sufficient stormflows develop to provide passage up the Creek. If adult salmonids enter too early, they will become stranded in the lagoon and unable to migrate upstream because of insufficient streamflow.

MONITORING OF PONDWEED AND ALGAL DENSITIES

The lagoon was divided into 3 reaches. Reach 1 extended upstream from the flume to Stockton Avenue Bridge (**Figure 10**). Reach 2 extended upstream from Stockton Avenue Bridge to the railroad trestle. Reach 3 extended upstream to a point just past the Shadowbrook Restaurant. **Appendix A** provides photographs of pondweed and algae through the summer and fall months.

Table 1 provides a summary of pondweed and algal densities for 1995. In 1995 there was much less algae and pondweed than previous years, except at the mouth of Noble Gulch. Algae was densest in early September and then again in early October. Surface algae was non-existent through the summer. Pondweed was absent except for a small patch under the trestle and an area of 10-15% of Reach 1 near the restaurants in September.

Activity of the Begonia Festival had apparently eliminated approximately half of the algae in the lagoon when comparing September 8 to September 15.

Noble Gulch continued to provide a nutrient in-flux to the lagoon in 1995, as indicated by the filamentous algal bloom that existed at its mouth all summer. Gray water was visible on 7 of 11 monitorings at the mouth of Noble Gulch, with plumes commonly spreading 100 feet or more downstream. The County's water sampler also noted the pollution. Many of the monitorings were on weekends when the restaurant upstream on Capitola Avenue was closed, indicating that the pollution was from another source. It appeared worse than in other years.

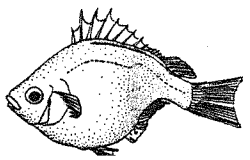


Table 1. Changes in Pondweed and Algae Densities, 1995.

Date	Reach #	Pondweed & assoc. Algae % covering bottom	Algae % bottom	Algae % surface
12-14Jun95		Sandbar Constructed.		
24Jun95	1,2,3	Algal film covered lagoon bottom		
6Jul95	1	0	10(.1-.3'thick)	0
"	2	0	15(.2-.4'thick)	0
"	3	0	25(.3-.5'thick)	0
	Noble G.	0	90(.2-.3'thick)	0
14Jul95	1	0	25(.2-.6'thick)	0
"	2	1	20(.1-.4'thick)	0
"	3	0	30(.1-.4'thick)	0
	Noble G.	0	100(.1-.3'thick)	0
28Jul95	1	0	20	0
"	2	1	10	0
"	3	0	15	0
11Aug95	1	0	15	0
"	2	1	10	0
"	3	0	10	0
26Aug95	1	0	50(.2-.6'thick)	0
	2	1	30(.2-.6'thick)	0
	3	0	35(.3-1.0'thick)	0
	Noble G.	0	70(.5-1.0'thick)	0
8Sep95	1	15(1'-2.5')	65(.8'thick)	0
"	2	1	90(.3-1.0'thick)	0
"	3	0	70(.3-.8'thick)	0
	Noble G.	0	100(.2-.8'thick)	0
10Sep95	Day of the Begonia Festival			
15Sep95	1	10(2')	30(.2-.5'thick)	0
"	2	1	30(.2-.5'thick)	0
"	3	0	35(.2-1.0'thick)	0
"	Noble G.	0	70(.2-.5'thick)	0
25Sep95	1	0	25(.2-.8'thick)	0
"	2	0	30(.1-1.0'thick)	0
"	3	0	35(.2-1.0'thick)	0
"	Noble G.	0	50(.2-1.0'thick)	0
15Oct95	1	0	40(.3'-1')	0
"	2	0	50(.2-.8')	3
"	3	0	60(.3-1.5')	0
"	Noble G.	0	100(.3-.8'thick)	0
1Nov95	Rained.			
11Dec95	Rained and the sandbar was breached.			

Recommendations for Control of Algae

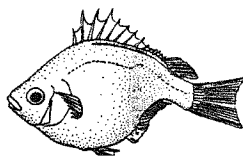
1. Establish criteria which may be used to decide when algae is excessive, keeping in mind that pondweed and algae provide necessary cover for fish from bird predators. If aquazine is used in mid-summer, apply a low dose to the lower lagoon to clear out the algae, making it easier for fish to move around and feed on invertebrates, as well as give pondweed a competitive advantage over the algae.

2. Discontinue the use of aquazine. However, if a mid-summer treatment of aquazine is deemed necessary, apply it in a low dose (3 pounds or less) well below the Stockton Avenue Bridge so that no pondweed is killed and only Reaches 1 and 2 will be affected. If pondweed is not present in Reaches 2 and 3 at the time of aquazine treatment, algae control will leave little or no cover for fish, requiring special concern about aquazine spreading upstream of Reach 1 after treatment. In such cases, we recommend that just 2-3 pounds of aquazine be applied near the flume only and in early morning before the onshore breeze develops.

3. Choose to skim off floating algae until just before the Begonia Festival, at which time aquazine may be used to reduce algae before people walk around in the lagoon. The skimming off of algae removes the nutrients stored in the algae and may slow future algal growth. Use of aquazine returns the nutrients to the lagoon during bacterial decomposition. This release of nutrients stimulates faster algal growth afterwards. Offer to donate funds to a volunteer group, if necessary, to skim off algae the lagoon surface instead of paying to have the lagoon treated with aquazine.

4. Require the restaurant operator on Capitola Avenue near City Hall to wash mats inside and locate the chronic source of the gray water entering the lagoon from Noble Gulch.

5. Again disseminate an explanation for not feeding the birds. Copies will be given to rental property owners and restaurant managers along the lagoon, in particular.



ANALYSIS OF FECAL BACTERIA MONITORING

Fecal Coliform Counts from Santa Cruz County Monitoring

The summer months were focused on, from the normal time of sandbar closure (mid-May before Memorial Day weekend) to just after the Begonia Festival (first weekend in September). In 1995 the high streamflow delayed sandbar closure until mid-June, however. These are the months in which recreational use of the lagoon would potentially be highest, and when reductions in fecal bacterial counts would allow swimming. A management goal is to reduce fecal coliform counts below the 200/100 ml level, which is deemed hazardous to health by the Environmental Protection Agency. If this can be done, the lagoon may once again be used for swimming, assuming that the Endangered Species Act will allow it with regard to the endangered tidewater goby. After 5 years of our summarizing of bacterial counts, it appears that unless 1) pollution from Noble Gulch is eliminated, 2) gull use of the lagoon for bathing is reduced, and 3) the restaurant roof panels are not washed into the lagoon, meeting the health requirements appears unlikely.

Reach 1 (lower lagoon) spanned from the flume to the Stockton Avenue Bridge (**Figure 10**). Reach 2 (middle lagoon) included the area from the Stockton Avenue Bridge to the railroad trestle. Reach 3 (upper lagoon) went from the trestle upstream to beyond the Shadowbrook Restaurant.

The County's Department of Environmental Health collected weekly samples at primarily the flume entrance in the Soquel Creek Lagoon. Another weekly station was on the Creek near Nob Hill. Additional stations in the lagoon were occasionally monitored at the mouth of Noble Gulch and at the railroad trestle.

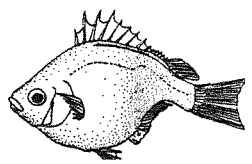
The raw County data, from which graphs of bacterial counts were derived, may be found in **Appendix C.** Coliform bacterial counts were graphed for Reach 1 from the station near the flume in 1990-93 (**Figure 1a**) and in 1993-95 (**Figure 1b**). Upper Reach 2 and lower Reach 3 were represented by the trestle station data

which were graphed for 1990-93 (**Figure 2a**) and 1993-95 (**Figure 2b**). Data for the site in Noble Gulch near Bay Street (not in the lagoon) for 1993-94 were graphed (**Figure 3**). Upper Reach 3 at a potential problem spot was represented by data collected at the mouth of Noble Gulch in the lagoon. These data were compared for 1991-92 and 1995 (**Figure 4a**) and 1991-94 (**Figure 4b**). However, samples were sporadically collected there. The counts at the site behind Nob Hill Shopping Center represented fecal bacterial levels entering the lagoon. They were graphed for 1992-95 (**Figure 5**).

The discussion will focus primarily on Reach 1 at the flume and at the upstream end of the lagoon at Nob Hill because sampling was more restricted in 1993 and 1994 than previous years.

The station at the flume was sampled weekly. The station at the trestle was was monitored 7 weeks in 1993, twice in 1994 and 9 times during closed sandbar conditions in 1995. The station at the mouth of Noble Gulch represented upper Reach 3 and was monitored twice in 1993, 10 weeks (14 times) in 1994 and 6 times in 1995. Unfortunately in 1994, samples were not taken consistently at the mouth of Noble Gulch until September, making comparisons difficult. It must also be understood that bacterial concentrations may vary considerably from one place to another. Coliform counts varied widely from day to day. Therefore, the data only indicated bacterial levels in a general way.

Fecal Bacterial Counts in Reach 1. The sandbar was closed in week 2 in 1994 and week 5 in 1995. Week 20 was a week after the Begonia Festival. The only consistent differences between 1994 and 1995 were that 1995 lacked the large spikes of 1994 in weeks 4 and 10, and counts in 1995 were higher than in 1994 for weeks 12-16 (**Figure 1b**). In both years, bacterial counts went up the week after the Begonia Festival. At no time during the summers of 1993-95 did coliform counts fall below the 200/ 100 ml health standard of safety for swimming. Apparently, significant amounts of bacteria were suspended from the sediments during Festival activities. This could be expected from other recreational activity in Reach 1 involving wading.



The City inspected the pipes under the restaurants that border the lagoon prior to lagoon formation, and pipes were repaired as needed (**Appendix D**).

Fecal Bacterial Counts in Upper Reach 2 and Lower Reach 3. Comparisons could be made between 1993 and 1995, mid-summer, and counts appeared to be similar. No data were available mid-summer in 1994. In October 1994 and 1995, fecal coliform counts were similar (**Figure 2b**). There were two weeks in October 1994 and 1 week in October 1995 when it was safe to swim according to the health standards.

Fecal Bacterial Counts in Noble Gulch. The monitoring station was located at the entrance of the tunnel at Bay Avenue. Fecal coliform counts fluctuated considerably in 1993 and 1994, except in weeks 12-15 (25 July to 15 August). There were some weeks when they were quite low and others when they were relatively high (**Figure 3**). Data were lacking in 1995.

Fecal Bacterial Counts in Reach 3 at the Mouth of Noble Gulch. The fecal coliform counts taken early in the season in 1995 indicated that they were above the safe health standards, but not by much (**Figure 4a**). They may have decreased later, but no data were collected. In 1994, the counts were quite high in Week 5 (14 June), but near or below the safety level for swimming in September, October and November (**Figure 4b**), except for a count of 860/ 100 ml on October 4, though on October 3 it was only 240/ 100 ml. Grayish water was observed on several occasions by county personnel and every monitoring time by ourselves in 1995.

Comparison of Fecal Coliform Counts at the Flume, Railroad Trestle and the Mouth of Noble Gulch, 1995.

Fecal coliform bacterial counts in 1995, as in previous years, were consistently higher in Reach 1 than in Reaches 2 and 3 when

all three were monitored (**Figures 1b, 2a and 4a-b**). Late in the season, counts were similarly low in Reaches 2 and 3 (**Figures 2b and 4a**).

Comparison of Fecal Coliform Counts at Nob Hill, 1992-95.

Counts were higher in 1994 than 1993 in 6 of the 11 common monitoring weeks (**Figure 5**). Counts in 1995 were either somewhat lower or similar to those in 1993 and lower than those in 1994 in 7 of 9 weeks monitored. The construction of the two bridges upstream were completed in 1994, which may have resulted in lower bacterial counts in 1995, entering the lagoon.

Conclusions from Fecal Bacterial Monitoring

In 1995 during the period of sandbar closure, coliform levels were generally similar to 1993-94, with some weeks better and some weeks worse at the flume, with similarity between 1993 and 1995 at the trestle, and with slightly worse conditions in 1995 than 1994 at the mouth of Noble Gulch. The important point is that bacterial levels were too high to meet the safety standards in 1995 when counts were taken, except once in October at the railroad trestle. This was despite the lower gull densities in 1995 compared to 1993 and 1994 (**Table 4**).

The reason for similarly high fecal coliform counts in 1995 as in 1993 and 1994 cannot be explained from the available data. The bridge construction at Highway 1 and Bay Street was over, and counts at Nob Hill early in the summer of 1995 were similar or somewhat lower than previous years. Data were lacking later in the summer at Nob Hill. It could be that with the high streamflow, bacteria produced by pigeons at Soquel Avenue Bridge were better transported to the lagoon than earlier years. There appeared to be more storm drain water entering from Noble Gulch in 1995, particularly on weekends, and storm drain runoff is typically high in bacteria. The number of pigeons using the trestle and their associated excrement entering the lagoon in 1995 was down slightly from 1994, it being 6.4 compared to 7.2

birds per censusing (**Table 4**). This was much less than during 1993 (13 birds per censusing. But the bacterial counts at the trestle were similar in 1993 and 1995 (**Figure 2b**).

We suspect that the amount of bird excrement washed off the panel at Larry's Surf and Turf is similar each year, making bacterial counts in Reach 1 similar from year to year. Also, there may have been enough gulls bathing to bring bacterial counts to high levels, despite the fewer gulls in 1995. We talked to the proprietor at Larry's Surf and Turf about extending wires across the glass panels on the roof in order to prevent gulls from roosting on it. We measured the dimensions of the panels and examined potential attachment points. At first the proprietor was in favor of testing the effectiveness of trying something over the panels. However, later he stated that the building was going to be sold and that nothing could be done until after it changed hands. The plans were then dropped.

Monitoring of Dog Excrement - Yes Again!

The amount of excrement on the path and at the trestle park was higher early in the summer than later. However, Toby, the Great Dane/Labrador mix (**Photos in Appendix A**) was a regular visitor at the trestle park. The amount of excrement in 1995 appeared to be down from 1994. Signs to remind pet owners to clean-up after their pets were installed along the path over the winter. This may curtail some of the problem.

Recommendations Regarding the Monitoring and Reduction of Fecal Bacteria

1. In addition to the signs of encouragement to dog walkers to clean up after their pets, install a dispenser of plastic bags for that purpose and a refuse container at the Stockton Avenue end of the path.

2. Continue to enforce the no bird-feeding ordinance at the lagoon. Discourage feeding of fish at the lagoon, as well.

3. Continue to dispose of kelp/sea grass from the lagoon along the beach during sandbar closure rather than bury it in the sandbar. Disperse it up and down the beach to spread it out.

4. Continue to open and close the sandbar during outgoing tides and before incoming tides, respectively, during sandbar construction and the raking out of decomposing plant material.

5. Spend the necessary time to remove as much kelp/sea grass as possible from the lagoon with hand tools during the time required for sandbar construction.

6. Remove the remaining domestic geese and ducks from the lagoon and transplant them to an acceptable private pond.

7. Maintain weekly fecal bacteria sampling stations at the flume, the park at Stockton Avenue Bridge (in front of Mrs. Hubback's house), near the railroad trestle and at the mouth of Noble Gulch for the period 15 May to 15 September.

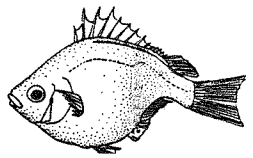
8. Discuss the feasibility of opening Reaches 2 and 3 to swimming if fecal coliform counts are consistently less than 200/ 100 ml in the samples. This requires that these reaches be monitored, however.

9. Continue to maintain a log of complaints/reports of pollution entering the lagoon, as well as excessive algae. Record the date, time and names of the concerned parties.

10. Choose to manually skim off floating algae from the lagoon instead of using aquazine, except possibly before the Begonia Festival.

11. Continue to seal off storm-drains on the west side of the street in front of the Esplanade. This should occur from May 15 to after the clean-up from the Wine Festival in mid-September.

12. Continue to seal the drain under the restaurants during the period of sandbar closure.



13. Require that bypass tubes be connected to the drain pipes from the roof of Larry's Surf and Turf Restaurant such that they drain away from the lagoon for the period, 15 May until the sandbar is breached in the fall/winter. Require that they construct a gutter system under their windows which will prevent window-washing water from entering the lagoon.

14. Require that the Stockton Bridge Grille and Margaritaville Restaurants attach gutter systems to the concrete wall that will prevent wash-water and food particles from entering the lagoon where they presently hose off their decks into the lagoon.

15. Require that repairs of plumbing under the Esplanade restaurants be done with double-walled pipes to prevent sewage leaks.

16. Continue the annual inspection program for evaluating the plumbing under Esplanade restaurants. Continue to send a copy of the sign-off sheet to the consultant for the monitoring report.

WATER QUALITY MONITORING, 1995

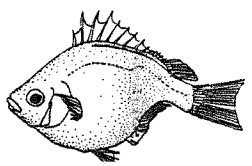
Reports From the Public Regarding Pollution Entering the Lagoon and Other Problems Related to Aesthetics, Recreation, Etc.

When the lagoon drained in late September, 1995, Joe Urbanik reported it to the police department. He noticed the condition on Saturday, September 23. We became aware of it on September 25 while monitoring, when we talked to him at the lagoon. He explained that the lagoon had drained to the point that it was only 1 foot deep at most, with the entire cove near the restaurants being above the water line.

Rating Criteria

Water quality parameters were rated according to the tolerances of steelhead. This was because other fishes were more tolerant to low oxygen, higher salinity and higher temperatures than steelhead. Stress to freshwater acclimatized steelhead would probably not occur until conductivity levels reach 12,000 to 15,000 umhos, associated with sudden increases in salinity to 10-12 parts per thousand. Water temperatures above 22 C (72 F) and oxygen levels below 5 parts per million (mg/l) are thought to stress steelhead. However, steelhead have been found surviving in pools in the Carmel River at 1-2 ppm for 1-2 hours at dawn. Based on 1988 monitoring, steelhead appear to survive in Soquel Lagoon at water temperatures of 23-25 C for 1-2 hours toward the end of the day (Habitat Restoration Group 1990). Water temperature may rise 3-4 degrees C by the end of a sunny day.

Oxygen levels critical to the survival of steelhead were classified as those measured in the lower 0.25 meters from the bottom, where steelhead would inhabit. Morning oxygen levels below 2 mg/L were rated critical. Morning oxygen levels below 5 mg/L were rated poor. Morning oxygen levels of 5 to 7 mg/L were rated fair with above 7 ppm rated as good. Morning water temperatures in the lower 0.25 meters of the water column of less than 20 C were rated good while those 20-21.5 C were rated fair. Temperatures above 21.5 C were rated poor.



High levels of dissolved carbon dioxide in water will inhibit absorption of oxygen by fish. However, in the alkaline conditions that exist in Soquel Creek Lagoon, carbon dioxide is poorly dissolved and believed not to be a problem (Jerry Smith, pers. comm.). Therefore, monitoring of carbon dioxide was unnecessary.

Lagoon water level was monitored with the staff gage on the eastern bulkhead, upstream of the Stockton Avenue Bridge. Readings less than 1.85 were rated poor. Readings between 1.85 and 2.2 were rated fair. Readings above 2.2 were rated good. These criteria were somewhat arbitrary, being based on an as yet poorly defined relationship between lagoon depth and associated fish cover, water temperature and algal growth. If the upper lagoon becomes too shallow, steelhead habitat is eliminated and algae growth may be stimulated. An important factor that is not directly under control by the City is change in streambed elevation resulting from scour or fill during the winter. The lagoon shallowed in 1995 due to sedimentation during the winter and apparent sand movement after the sandbar was closed in June.

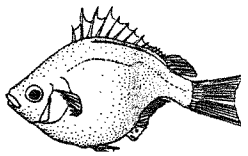
Results of Water Quality Monitoring After Sandbar Closure

Appendix E provides detailed data on water quality. **Table 2** summarizes conditions at each monitoring time, based on the rating criteria.

Table 2. Water Quality Ratings in Soquel Creek Lagoon, 1995.

Date	Flume Passage	Gage Height	Water Temperature	Oxygen	Salinity	Lagoon In-flow (cfs)
24Jun95	open	fair 1.91	good	good	good	12 (visual)
6July95	open	poor 1.41	good	good good* fair* good*	good	12.3 (measured)
14Jul95	open	good 2.37	fair	good fair good good	good	8-9 (visual)
28Jul95	open	poor 1.64	fair fair good	fair	good	
7Aug95	open	fair 1.95				
8Aug95	open	fair 1.97				
11Aug95	open	fair 2.18	fair fair good	good good fair good	good	
14Aug95	open	good 2.27				
26Aug95	open	fair 2.09	good	good good good fair	good	3 (visual)
3Sep95	open	fair 2.05				
8Sep95	open	fair 1.95	fair fair good	good good fair fair	good	3 (visual)
10Sep95	Begonia Festival					
11Sep95	open	fair 2.03	good	good	good	
15Sep95	open	fair 2.06	good	good	good	
23Sep95	open	<1.00				
25Sep95	open	fair 2.12	good	good good fair fair	good	2.5 (visual)
15Oct95	open	poor 1.40	good	good good good poor	good	2.49 (measured)
25Oct95	open	fair 1.94				
--Dec95	Rained.					

* If 4 ratings are listed, they refer to Reaches 1, 2, 3 and Noble Gulch. If one rating is listed, it includes all reaches and Noble Gulch, as well.



Lagoon Level. As of the first monitoring, from 9 days after sandbar construction on 15 June 1995, until 15 October 1995, 11 water quality monitoring periods were performed at approximately 2-week intervals (except more frequently before and after the Begonia Festival). Lagoon level (gage height) was checked at those times and five additional occasions. Lagoon level on September 23 was estimated based on anecdotal evidence. In 1995, lagoon level was rated good on two occasion, fair on 11 occasions and poor on four occasions (**Table 2**). In 1994, lagoon level was rated good once, fair on 6 occasions and poor on four others.

Instances of poor lagoon level in early July, 1995, occurred when additional flume boards were needed as streamflow declined. The poor lagoon level in late July was due to leakage between the flume boards and seepage under the flume. The poor level in mid-October occurred when boards were removed by the City. The City sealed the lagoon under the flume as much as possible, partially sealed the flume boards with plastic and added flume boards at our request after we detected low lagoon levels. The seriously poor lagoon level on September 23 was presumably caused by vandalism in which a log was apparently jammed between two lower flume boards. This would have taken a concerted effort to accomplish and came after a tidal overwash of the sandbar. Another possibility was that the tidal surge inside the flume jarred the boards upward and the log entered the crack between the boards as the lagoon drained. At any rate, the lagoon mostly drained before the police were notified. The City re-secured the flume boards, and lagoon level was back to normal two days later. At a later monitoring, we detected that the uppermost board had moved upwards, leaving a crack between it and the next lower one, presumably from observed back surges caused by tidal action inside the flume. We requested that the City secure the boards to prevent further problems. Public Works personnel did so. However, the wooden spacers that were wedged into the board slots of the flume caused difficulty when efforts were made to remove boards during stormflows later on. In conclusion, despite the high streamflow in 1995, the lagoon level dropped into the poor range several times during a summer at a time when the lagoon was unusually shallow anyway due to sedimentation from the upper watershed (**Figure 6**).

Flume Passability. According to the Management Plan (**1990**), fish passage was to be maintained until July 1. Passage for steelhead smolts was adequate throughout the summer and fall of 1995. The wooden baffle inside the flume had blown out in winter 1995. However, even without it, water depth at the flume inlet began at 1.5 feet on 24 June and dropped to 1.0 feet by 11 August, well after the smolt down-migration was complete. It dropped to 0.9 feet by 8 September and to 0.7 feet by 25 September. On 15 October the water depth at the flume inlet was 0.8 feet. Water depth at the flume outlet shallowed to 0.5 feet by 26 August with an estimated lagoon in-flow of 3 cfs, and held at that depth until 15 October when depth went to 0.4 feet.

The first rains of the season came in November, 1995, at which time the flume was passable to adult salmonids until the time of sandbar breaching on **11 December.** A notch was cut in the sandbar the day of the breach, and shovels were used to initiate the breach to prevent flooding.

Water Temperature. Lagoon water temperature was fair or good all summer and fall, 1995 (**Table 2**). Morning temperatures were the lowest of the five years of monitoring (**Figure 7**) due to the high streamflow into the lagoon in 1995. This was much better than in the dry year, 1992, when in July and August the lagoon was warmer and entered the poor category much of the time (**Figure 7**). The improvement during the low in-flow year 1994, compared to 1992, was partly because the lagoon surface was mostly kept 0.2-0.4 feet higher in 1994 compared to 1992 (**Figure 6**).

On 14 July, water temperature was measured at lagoon stations in early morning (0630-0730 hr) and in late afternoon (1630-1711 hr) to measure temperature increases through the day. At the flume the water temperature at the bottom went from 20.2 to 21.5 C (1.3 C increase). At Stockton Avenue bridge it increased from 19.7 to 23.2 C (3.5 C increase). At the trestle it increased from 19.0 to 23.1 C (4.1 C increase). At Noble Gulch it increased from 17.4 to 21.5 C (4.1 C increase). At all stations the surface temperature was greater than the bottom temperature except at the Stockton Avenue Bridge. The afternoon temperatures above 23 C

were probably stressful for steelhead, but not high enough to cause mortality. Many of the steelhead captured in October suffered from a trematode ecto-parasite, which appears under warm water conditions in Santa Cruz County.

Dissolved Oxygen. Critical oxygen levels are lowest in the early morning after oxygen has been depleted by cell respiration and before plant photosynthesis can produce much oxygen. This was the time that levels were measured and rated. Oxygen levels were rated "fair" or "good" within 0.25 meters of the bottom all summer and fall in 1995, except for a "poor" rating at the mouth of Noble Gulch on 15 October (**Figure 9**). A poor rating was not registered after the Begonia Festival, unlike 1993 and 1994 (**Figure 8**).

The site at the trestle consistently had the lowest oxygen concentration right at the bottom except in October, with a poor rating at the bottom on 10 of 11 monitoring times. We have no good explanation for increased oxygen depletion at the trestle so early in the season. Pigeon use of the trestle was not detected to be greater than previous years, and as oxygen levels were still fair-to-good at the trestle higher in the water column, they posed no problem. Oxygen was at a poor level at the bottom at Noble Gulch on 3 of 11 monitoring times.

Salinity. Salinity was no problem all summer in 1995, despite some tidal overwash of the sandbar. Though there was some tidal overwash the day after the sandbar was constructed, no salt water was detected in the lagoon 6 days later. In late September there was significant tidal overwash, but the lagoon drained through a crack between flume boards immediately afterwards and filled with freshwater within two days.

Conductivity. Conductivity was not a problem in 1995.

Recommendations to Improve Water Quality and Fish Habitat in the Lagoon

1. Re-install the wooden baffle inside the flume.

2. Do not allow the pedal boat operator to dictate the lagoon level.

3. Maximize lagoon depth throughout the dry season, while maintaining passage through the flume for adult steelhead until June 1 and steelhead smolts until July 1. If the lagoon level begins to drop below the notch for steelhead smolts on one side of the flume because of the hole for adult steelhead on the other side after June 1, close up the hole for adults. Close the adult hole by July 1 in any event. If adult steelhead are seen in the lagoon after June 1 and the adult hole has been closed up to raise the lagoon level, open the hole for a week, allowing the adults an opportunity to out-migrate.

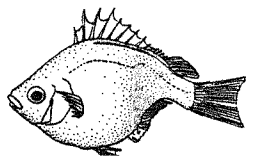
4. After July 1, do not open the flume exit after it closes, unless flooding is eminent. Install plastic sheeting on the outside of the flume boards to prevent leakage into the flume. Put as many boards as possible into the flume entrance to raise the lagoon level as much as possible.

5. If the lagoon bottom becomes invisible due to turbidity for more than one day after the first rain of the season that does not breach the sandbar, immediately lower the lagoon level to the point where the bottom is visible. This will allow algal growth despite the high turbidity. In this way, plant photosynthesis may continue to produce oxygen and prevent anoxic conditions lethal to fish. A previous recommendation in the Management Plan (1990) should be emphasized to prevent further fish mortality. It stated that parking lots and streets draining into the lagoon should be cleaned thoroughly before the first rain of the season.

5. Road work involving repaving and application of petro-chemicals should be done early in the summer. This will allow these substances to penetrate and dry before fall rains.

6. Do not reduce the lagoon level for the Begonia Festival.

7. Check the gage height at the lagoon once a week (preferably the same day each week and keep a log of measurements so that the biologist may contact the City to obtain a weekly update.



BIRD CENSUSING

In 1992, there were 16 censuses before the sandbar breached (27 May - 27 October) and 6 more after (5-12 November). In 1993, there were 19 censuses (3 June - 27 November), with the breaching occurring 9 December. In 1994 there were 14 censuses (1 June - 10 October) before the sandbar breached early on 6 November. In 1995 there were 11 censusing (24 June - 15 October) with the sandbar breaching on 11 December.

The 1995 density of mallards was less than in 1994 and 1993, with more lagoon use in Reach 3 as 1993 and 1994, though they were more common in Reach 2 in 1995. We saw only one clutch of ducks at the lagoon in 1995. In 1995 there may have been more wetted pond area in the region than previous years due to high winter rainfall. This may have resulted in the lower density of mallards at Soquel Lagoon. The range of mallards counted was 3-20 in 1995 and generally between 15 and 30 individuals using the lagoon in 1994.

American coots again returned to the lagoon, having arrived sometime between our 25 September and 15 October monitorings.

Comparisons were made regarding bird distribution between the results obtained in 1991 (**Alley 1992**), 1992 (**Alley 1993**), 1993 (**Alley 1994**), 1994 (**Alley 1995**) and 1995. In all five years, the highest bird use of the lagoon was in Reach 1, it being dominated by gulls, domestic geese and mallards in 1991-94 and gulls and geese in 1995 (**Tables 3 and 4**). In 1995 in Reach 1 there were comparable numbers of bathing gulls (15) as in 1993 (16) and 1994 (11) in early morning, despite the fewer gulls using the Capitola beach in 1995 (**Table 4**). Reach 3 had more non-gull bird sightings than other reaches. The reduction in pigeon densities on the trestle in 1994 and 1995 compared to 1993 resulted in a lower density of birds censused in Reach 2 (**Table 4**).

Gulls roosted on building rooftops along the Esplanade. When the sun-bathers appeared in sufficient numbers, the gulls went to the roof. This was a common routine. Any bird excrement left on the

window panels was then washed into the lagoon the following morning. This was probably a significant source of fecal coliform bacteria for the lagoon. If this wash-water was funneled away from the lagoon with an effective gutter system, coliform bacterial counts would probably decrease. Of course, if the water was diverted to a capped storm drain along the Esplanade, that drain would require suction-pumping and disposal periodically. If the gulls could be kept from roosting on the roof, coliform bacterial counts would decrease, also.

A significant decrease in pigeon density on the trestle occurred from 1993 to 1994 and 1995 (**Table 4**). The average number seen on the trestle went down from 13 in 1993 to 7.2 in 1994 to 6.4 pigeons per census in 1995. The lower density of trestle pigeons was probably due to the absence of bird seed near Mrs. Hubback's house. Pigeons seemed to have moved to the beach to forage in 1994 and 1995, though fewer were counted in 1995 on the beach. Pigeon nests were observed on the trestle for the first time in 1994.

Table 3. Comparison of bird densities by Reach in Soquel Creek Lagoon, including American Coots. Pigeons on the railroad trestle (Reach 2) were excluded in 1991 and included in 1992-95. Birds on the sand at Venetian Court were not included in Reach 1.

YEAR	DATES	# OF CENSUSES	TOTAL BIRDS COUNTED	PERCENT COUNTED BY REACH		
				REACH 1	REACH 2	REACH 3
1991	19Aug-13Oct	24	1746 (55 coots)	58%	19%	23%
1992	27May-27Oct	16	952 (145 coots, more counted later)	66%	20%	14%
1993	3June-27Nov	19	1266 (304 coots)	45%	37%	18%
1994	1June-10Oct	14	585 (49 coots)	41%	25%	35%
1995	24Jun-15Oct	11	355 (31 coots)	57%	17%	25%

Wild mallards were observed primarily in Reach 3 in early morning, though they were seen in Reaches 1 and 2, particularly if humans were offering hand-outs. They roosted most visibly along primarily the margins of Reach 2 on the bulkhead, on the concrete base of the trestle and on the sand near Venetian Court (at least early in the morning). One clutch of young were observed in 1995, three clutches in 1994, four clutches in 1993 and only two clutches in 1992.

Fish-eating Birds Observed at the Lagoon

Although there were clutches of mergansers was raised on the lagoon in 1993 and 1994, only one merganser was observed at the lagoon in 1995, and it did not appear until 15 October.

As in 1993, a clutch of mergansers was produced in 1994, with the mother hen and 4 young feeding throughout the lagoon. There were twice the merganser sightings in 1994 compared to 1993, despite the fewer censuses in 1994 (**Table** 5). In 1993 the mergansers more often roosted near Venetian Court and went uncounted in the lagoon reaches. They did not stay the entire lagoon season in 1994, however, having last been sighted on 30 July. In 1993 the mother and three young decreased to the mother and two young that stayed on the lagoon until 3 September. This was presumably due to the higher steelhead density in 1993 than 1994. In 1994, the mother left the lagoon at least 2 weeks before the offspring. She originally had a clutch of 12 young at the time of sandbar closure.

Regarding other piscivorous birds, only 2 pied-billed grebes used the lagoon in 1995, compared to 3-6 pied-billed grebes in 1994. The one green-back heron and one black-crowned night heron were back in 1995 as in 1994 (**Table** 5). Three black-crowned night herons were seen during one censusing on 12 June 1994, but were not seen again. A cormorant was seen on 3 occasions in 1995 and once in 1994. A great blue heron was seen once in 1995 when the lagoon level was down and once in 1994.

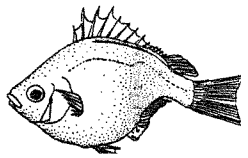


Table 4. Comparison of Average Bird Densities in Soquel Creek Lagoon during each censusing for 1991-95. (Pigeons on trestle excluded in 1991 only.)

Group	Reach 1 Density					Reach 2 Density					Reach 3 Density				
	91	92	93	94	95	91	92	93	94	95	91	92	93	94	95
Gulls*	30	32	16	11	15	3.2	0	.2	0	.1	1.1	0	.1	0	.3
Mallards (some domestic)	8.1	2.5	3.6	3	.6	1	4.1	4.7	1.8	2.5	14	3.3	4.8	7.4	4.4
Domestic Ducks	.4	2	1.7	1	1.5	1	.1	.2	.4	.4	.6	.4	.2	.5	.7
Geese	2.3	.3	2.6	1.5	.8	.2	.6	.6	0	0	.9	0	.2	.6	.8
Pigeons	.8	.1	.9	-	-	7.8	3.5	13	7.2	6.4	0	0	0	0	0
Coots	1.6	6.6	8.2	.4	0	.8	5.1	12	.8	2.5	3.3	9	10	2.6	.4
Pied-billed Grebes		.2	.3	.3	0		.3	.4	.8	.1		.1	.8	.7	.5
Mergansers				1.1	.1				.4	0				.7	0
Cormorants		.1	0	0	0		.3	0	0	0		.1	0	.1	.2
Green-back Herons				0	0				.2	.1				.3	.1
Kingfishers				0	0				.2	0				.3	0
Black-crowned Night Herons				0	0				0	0				.2	.2
Great Blue Heron				.1	0				0	.1				0	0

***Birds on Capitola Beach Between the Wharf and Jetty:**

Year	# of Censusings	Average # of Gulls	Range in # of Gulls	Avg # Pigeons	Range in # Pigeons
1992	8	183	61-367		
1993	13	196	141-347		
1994	8	301	179-570	15	10-31
1995	10	155	78-307	8.4	0-16

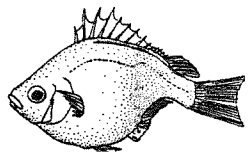
Five domestic geese used the lagoon in 1991, three in 1992, four in 1993, four in 1994 and three in 1995. The total domestic duck (non-mallard) sightings was 28 in 1995, which was similar to previous years on a per censusing basis, indicating a stable number of these birds (**Table 4**). In 1993 there were at most four "popcorn ducks" censused at any one time at the lagoon. Three of these popcorn ducks were present in 1994. One of the three disappeared part way through 1995.

Table 5. Sightings of Fish-eating Birds at the Lagoon.

SPECIES	1992 Frequency (Sightings/17 day visits)	1993 Frequency (Sightings/19 day visits)	1994 Freq. (Sightings/ 13 day vis.)	1995 Freq. (Sightings/ 11 day vis.)
Black-crowned night heron	0	1	3	2
Cormorant	8	0	1	3
Great blue heron	1	1 (night)	1 (Early morning)	1
Green-back heron	0	3	5	2
Kingfisher	8	5	6	0
Common merganser	1	14	28	1
Pied-billed grebe	18	28	22	7

Bird-feeding by Humans

In 1995, three bird feeding incidents were observed, two being near rentals and one by a restaurant worker. In 1994 there was one instance observed. Fewer censusings were done later in the day in 1994 than previous years. No afternoon censusings were done in 1995. Therefore, the likelihood of observing bird



feeding was reduced. This was compared to 6 instances in 1993 and 1 instance in 1992. With the passing of Mrs. Hubback in 1994, pigeons were not seen in front of her house and continued to forage more out on the beach in 1995. The "no bird-feeding sign" was re-established at the trestle park this past winter. The bird brochure distributed to the rental properties was not completely effective.

Waterfowl as Biological Control of Aquatic Plants

The effectiveness of ducks that grazed on pondweed and algae was evident in 1995 as in previous years because no algae grew to the surface. Geese were occasionally seen feeding on natural vegetation in previous years, but not in 1995. The restaurant workers still feed them at the walkway to the beach. The geese continue to roost upstream in Reach 3. Their population had decreased from four to three individuals in 1995. The domestic popcorn ducks were seen feeding on algae, with one of them disappearing in 1995. Ducks, in general, were fewer in number at the lagoon in 1995, but more than able to control algae.

Recommendations Regarding Management of Bird-Feeding and Domestic, Non-native Waterfowl

1. Maintain enforcement of the no bird-feeding ordinance. Discourage fish-feeding, as well.

2. Request that restaurant owners put devices on their roofs to discourage roosting of gulls. Artificial owls that rotate on poles may be more effective than stationary ones. The bird droppings washed into the lagoon are pollution.

3. Maintain the presence of no bird-feeding signs at the lagoon.

4. Re-locate the remaining geese before they reproduce.

5. Continue to distribute the explanation for not feeding the birds to rental property owners and restaurant owners. The owners should be encouraged to disseminate the explanation to their clients and customers.

FISH CENSUSING

Steelhead Plantings in Soquel Creek

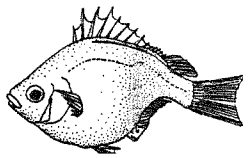
In March 1995, 950 pounds (9,025 steelhead) were planted behind Tiedemann Nursery. In March 1996, 650 pounds (4,095 steelhead) were planted in the same location (Dave Strieg, Monterey Bay Salmon and Trout Restoration Project, pers. comm).

Results of Fish Sampling in Soquel Creek Lagoon

On 1 October 1995 the biologist made eight seine hauls for tidewater gobies with a 30-foot x 4-foot x 1/8-inch mesh beach seine in lower Soquel Lagoon near the beach. This was adjacent to Venetian Court, around to the flume and between the flume and the restaurants. This lower lagoon, downstream of the Stockton Avenue Bridge, is the only location where a seine could be adequately beached to capture tidewater gobies. After eight seine hauls, no tidewater gobies were captured.

In fall, 1994, 35 tidewater gobies had been captured after four seine hauls. In fall, 1992, two tidewater gobies were captured during sampling. In fall, 1993, no tidewater gobies were captured after a total of six seine hauls on two weekends with the fine-meshed seine. The low number captured in 1992-95 probably indicates the lack of backwater areas in Soquel Lagoon, which would be used as refuges for tidewater gobies during high winter stormflows.

Fall sampling for steelhead was undertaken on 1 and 8 October, 1995, in the same vicinity as the tidewater goby sampling. Refer to **Appendix A** for photographs of fish sampling activities. With the larger, coarser-meshed seine, no tidewater gobies were captured. Fifty-nine juvenile steelhead were marked from four seine hauls on 1 October. On 8 October, 122 juvenile steelhead were captured with 10 being recaptures. Our steelhead population estimate for fall 1995 was only 360 juveniles +/- 60. Other species captured were Sacramento sucker (Catostomus occidentalis)



and threespine stickleback (Gasterosteus aculeatus). More than 500 juvenile Sacramento suckers were seined from near Larry's Surf and Turf Restaurant. We would have expected large numbers of steelhead in the lagoon in 1995 because the stream flowed continuously all summer. However, we did not see much surface feeding as we had in 1993 when the population was higher.

In 1994 the juvenile steelhead estimate was 1140 +/-368. In 1993 the juvenile steelhead estimate had been 2,787 +/- 306. That year 1,046 fish were marked from two seine hauls. A very rough estimate of the lagoon's juvenile steelhead population in 1992 was probably a few hundred. This should be considered a significant number in terms of the population in the Creek, though it was considerably less than the lagoon could support in other years. By comparison, in July, 1989, Jerry Smith had observed approximately 900 juvenile steelhead at the mouth of Noble Gulch during one observation.

There may be several reasons for the low density of steelhead found in October, 1995. The lagoon had aggraded from the winter stormflows and was more shallow than previous years. The extensive pondweed forest that was present in some years did not develop in 1995 to provide escape cover and plant life to support insect larvae that steelhead feed upon. The lagoon depth decreased from late June into early July under the Stockton Avenue Bridge, a location where many juvenile steelhead congregated in past years. The maximum depth there was a meter (3.2 feet) or less throughout the remainder of the summer, 1995, even when the gage height was more than 2.00. On October 15 it was only 0.55 meters (1.8 feet) deep under the bridge. In addition, the lagoon underwent four episodes of large water depth fluctuations, with a reduction of 0.5 feet twice in July and a third time in October, due to removal of flume boards. These fluctuations caused very shallow conditions in an all ready shallow lagoon. Then in late September the lagoon was nearly drained.

The most important cause for finding so few steelhead in the lagoon in October 1995 was that on 23 September (a Saturday), the lagoon mostly drained after apparently some vandals had jammed a

log between lower boards at the flume. We were informed by Joe Urbanik the following Monday during monitoring and, therefore, were unable to observe the lagoon conditions when it occurred. He stated that the lagoon drained down to a foot deep at most. Such shallow conditions mean a loss of escape cover for steelhead and increased predation. Steelhead will make an effort to avoid shallow conditions. They probably became crowded into a small area under the bridge. Unable to move upstream with only 3 cfs coming downstream, most steelhead probably decided to go downstream, ending up in the ocean. Some of the larger juveniles (6-8 inches in length) may have survived the sudden exposure to seawater, but many probably perished. Predation was probably quite high from fish-eating birds. We probably lost 80-90% of the steelhead that were living in the lagoon. In 1995, the larger piscivorous birds (merganser, cormorant, great blue heron, green-back heron and black-crown night heron) were more apparent at the lagoon after the Begonia Festival.

In past years, the water depth was significantly greater under the Stockton Avenue Bridge compared to the 1 meter (3.2 feet) in 1995. In 1994 the water depth under the bridge was generally 1.25 meters (4 feet) or deeper throughout the summer. In 1993, when steelhead densities were highest of the past 5 years, the water depth was 1.65 meters (5.3 feet) or greater under the bridge throughout the summer. In order to maintain good steelhead nursery habitat in Soquel Lagoon, the sediment input from the watershed must be reduced, and the City must maintain the water level as high as possible throughout the summer until sandbar breaching, without large fluctuations. If the lagoon becomes too shallow, habitat in the upper lagoon is lost for steelhead use. This is another reason to keep the lagoon as deep as possible during summer. The flume boards must be secure so that vandals cannot raise them and drain the lagoon.

In 1995, the lowest measured in-flow to the lagoon was 2.49 cfs on 15 October. On 6 July we had measured 12.27 cfs coming in. In 1993, the lowest estimated in-flow to the lagoon was 1 cfs in September. In 1994, in-flow declined below 1 cfs in late July and fell to an estimated 0.05 cfs by late September.

Response of the Water Resources Control Board to a Water Right Complaint regarding the Drying Up of Soquel Creek

A response from the Water Resources Control Board was made in 1995 to a water right complaint regarding the drying up of 0.4 miles of Soquel Creek. Its conclusion was that the Main Street well operated by the Soquel Creek Water District appears to have no direct hydraulic effect on the flow in Soquel Creek. It stated that the Tiedemann Nursery should cease all pumping from the surface flow of Soquel Creek when the downstream reach of Soquel Creek is dry. Enforcement action may be taken if diversions continue at the nursery when visible surface flow does not exists in the downstream reach of Soquel Creek.

Biological Opinion by U.S. Fish and Wildlife Service Pursuant to Section 7 of the Endangered Species Act Regarding Tidewater Goby

The U.S. Fish and Wildlife Service provided a biological opinion regarding terms and conditions for the City of Capitola to minimize impacts to tidewater goby during sandbar closure, lagoon maintenance, and the Begonia Festival (**Appendix G**). It allows the take of tidewater gobies during sandbar construction provided that the City conforms to the Soquel Creek Lagoon Management and Enhancement Plan, dated 1990, including all appropriate revisions outlined in the City's annual monitoring reports. The City shall be responsible for annual monitoring of the lagoon as outlined in "Soquel Creek Lagoon Monitoring, 1994."

Recommendations Regarding Fish Management

1. If the streamflow in Soquel Creek in the vicinity of Soquel Village approaches the point of losing surface flow, notify Tiedemann Nursery and the Fish and Game Department of the streamflow conditions so that direct water pumping from the stream may be reduced or discontinued until flow returns. Loss of surface flow should be prevented.

2. Maximize lagoon depth after 1 July by adding boards to the flume as streamflow declines and by sealing them with plastic.

3. Secure the flume boards so that vandals cannot pry them up and drain the lagoon. This will prevent tidal surges through the flume from doing the same thing.

4. Look into better ways of sealing the cracks between the boards in the flume inlet. Sandwiching rubber strips between the boards may solve the problem.

5. Do not unplug the flume exit after 1 July unless necessary to lower the lagoon before the Begonia Festival.

6. Do not remove flume boards for the Begonia Festival or prior to taking fall vacation time.

7. Remove flume boards as the first small storms begin in fall and replace the boards after the stormflow has subsided. The effort should be to minimize lagoon fluctuation until the sandbar actually breaches. Many forecasts for rain and storm intensities are incorrect in the early fall. It is harmful to steelhead and tidewater goby to drop the lagoon level in anticipation of a storm that fails to develop and then not re-install the flume board afterwards.

8. Maintain the lagoon in fall until streamflow has increased enough (20-25 cfs) to prevent stranding of spawning adult steelhead or coho salmon and to prevent osmotic stress in lagoon-inhabiting steelhead. If necessary, install a perimeter fence with 2"x 4" mesh with 6-foot panels around the flume entrance by October to prevent plugging of the flume's screen with aquatic vegetation during the first minor storms of fall. The goal should be to maintain the lagoon until approximately Thanksgiving in late November, before allowing stormflow to breach the sandbar.

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Soquel Creek Lagoon Management and Enhancement Plan. 1990. Donald Alley, Project Manager. Prepared by Habitat Restoration Group for the City of Capitola and the Coastal Conservancy.

Fecal Coliform Bacterial Counts
Soquel Creek Lagoon Weekly Samples
At the Flume Inlet

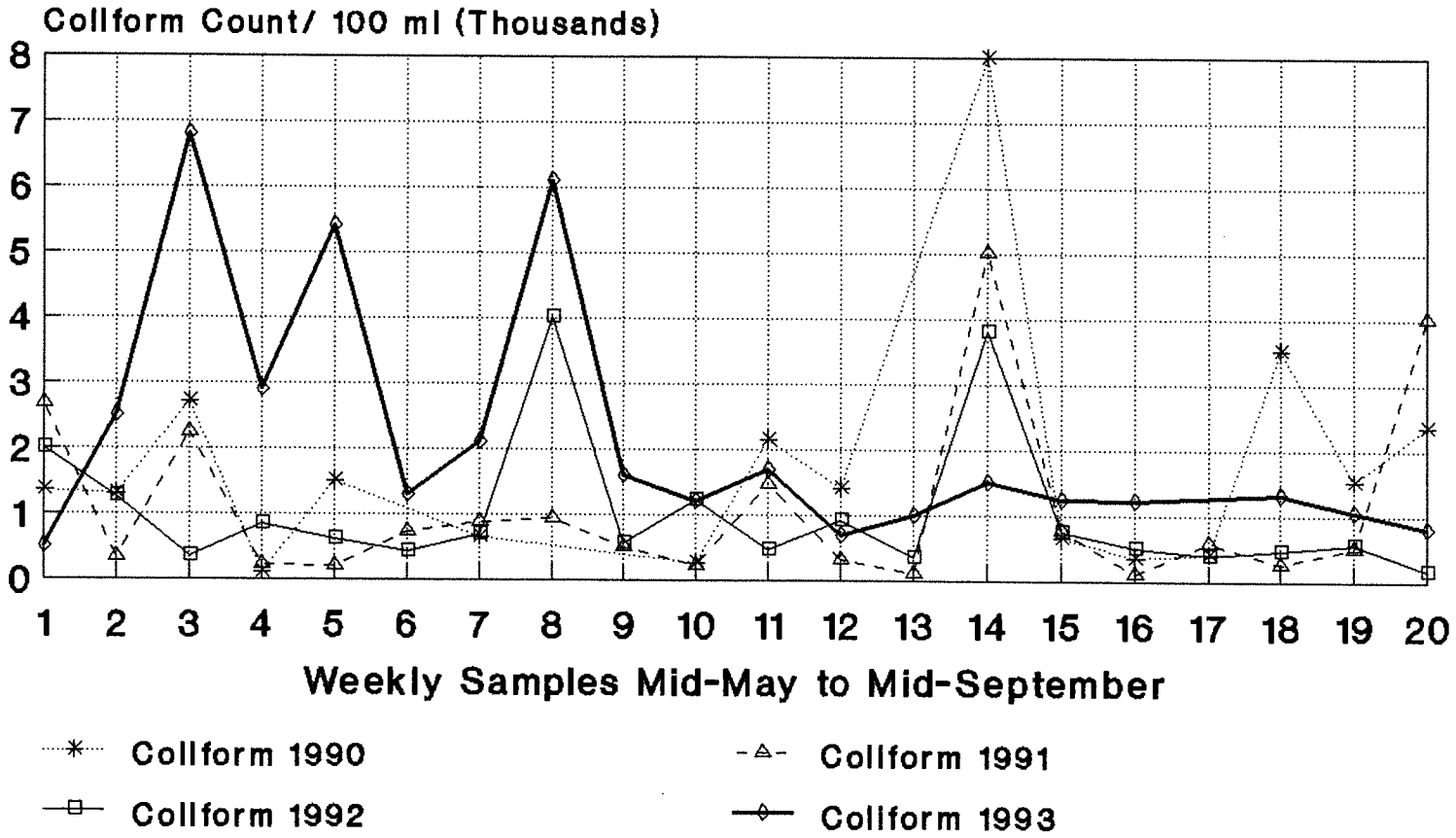


Figure 1a. Fecal Coliform Counts
at the Flume Inlet, Comparing 1990-1993.
(Santa Cruz County Data)

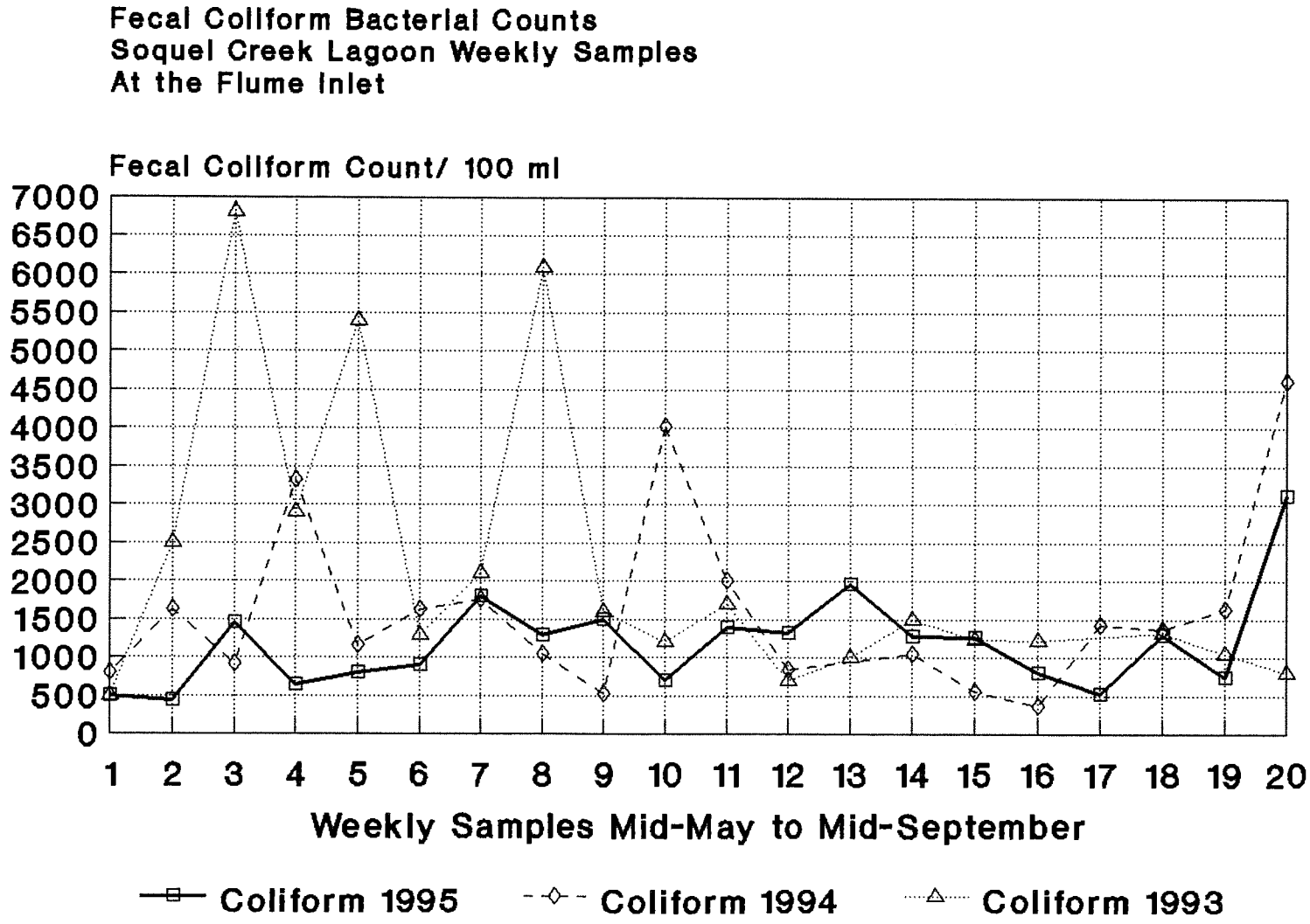


Figure 1b. Fecal Coliform Counts
at the Flume Inlet, 1993-95.
(Santa Cruz County Data)

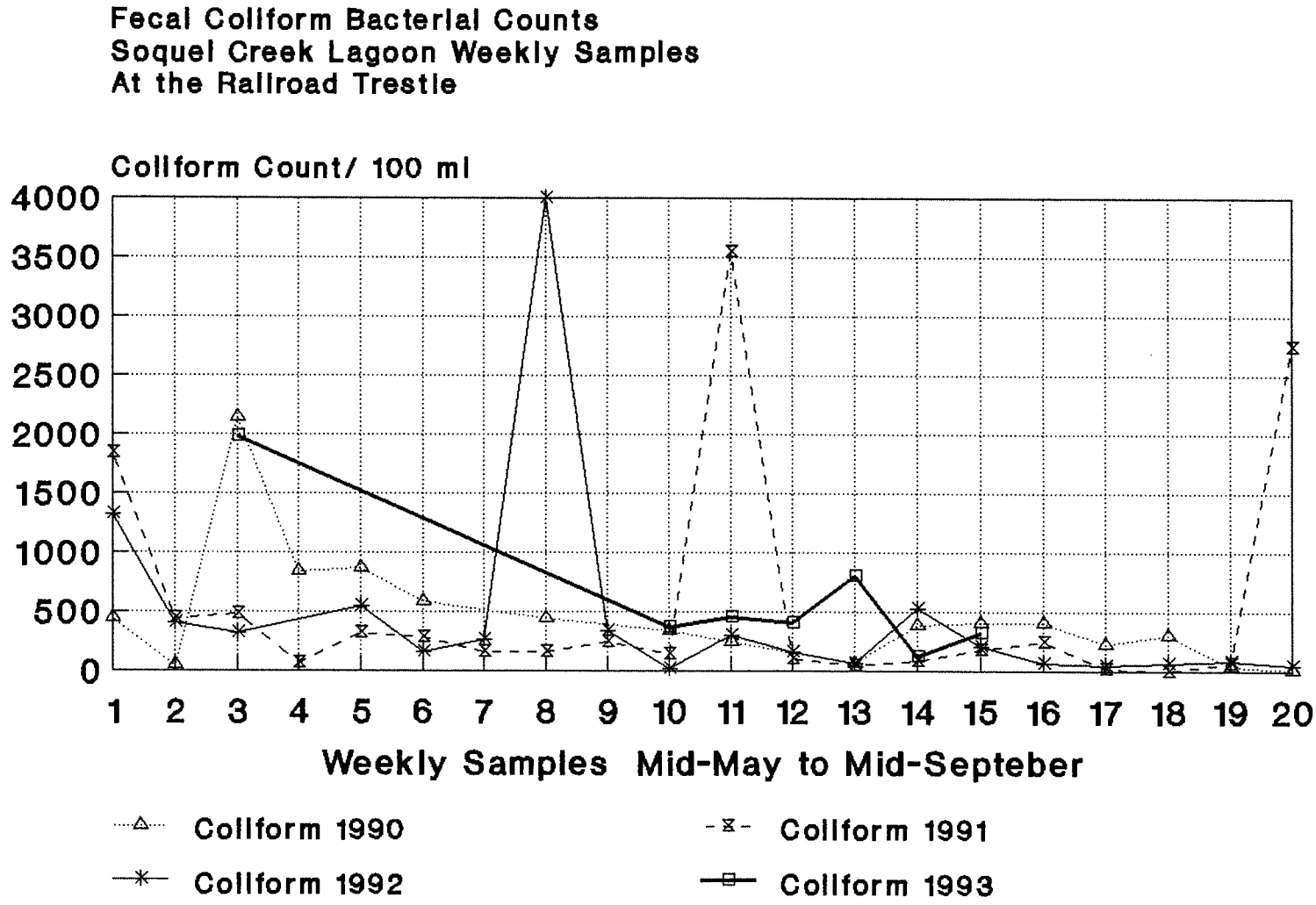


Figure 2a. Fecal Coliform Counts at the Railroad Trestle, Comparing 1990-93. (Santa Cruz County Data)

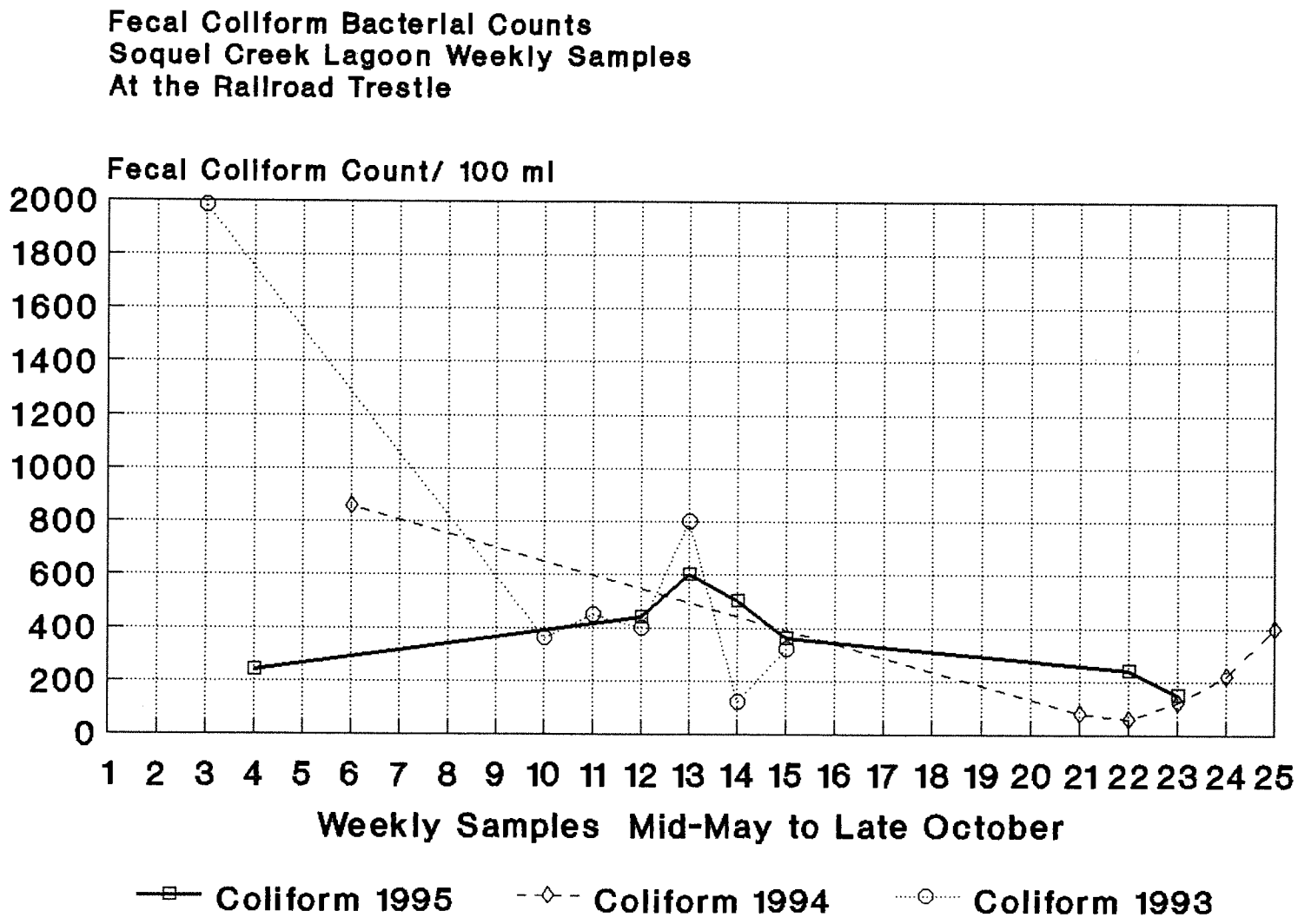


Figure 2b. Fecal Coliform Counts at the Railroad Trestle, 1993-95. (Santa Cruz County Data)

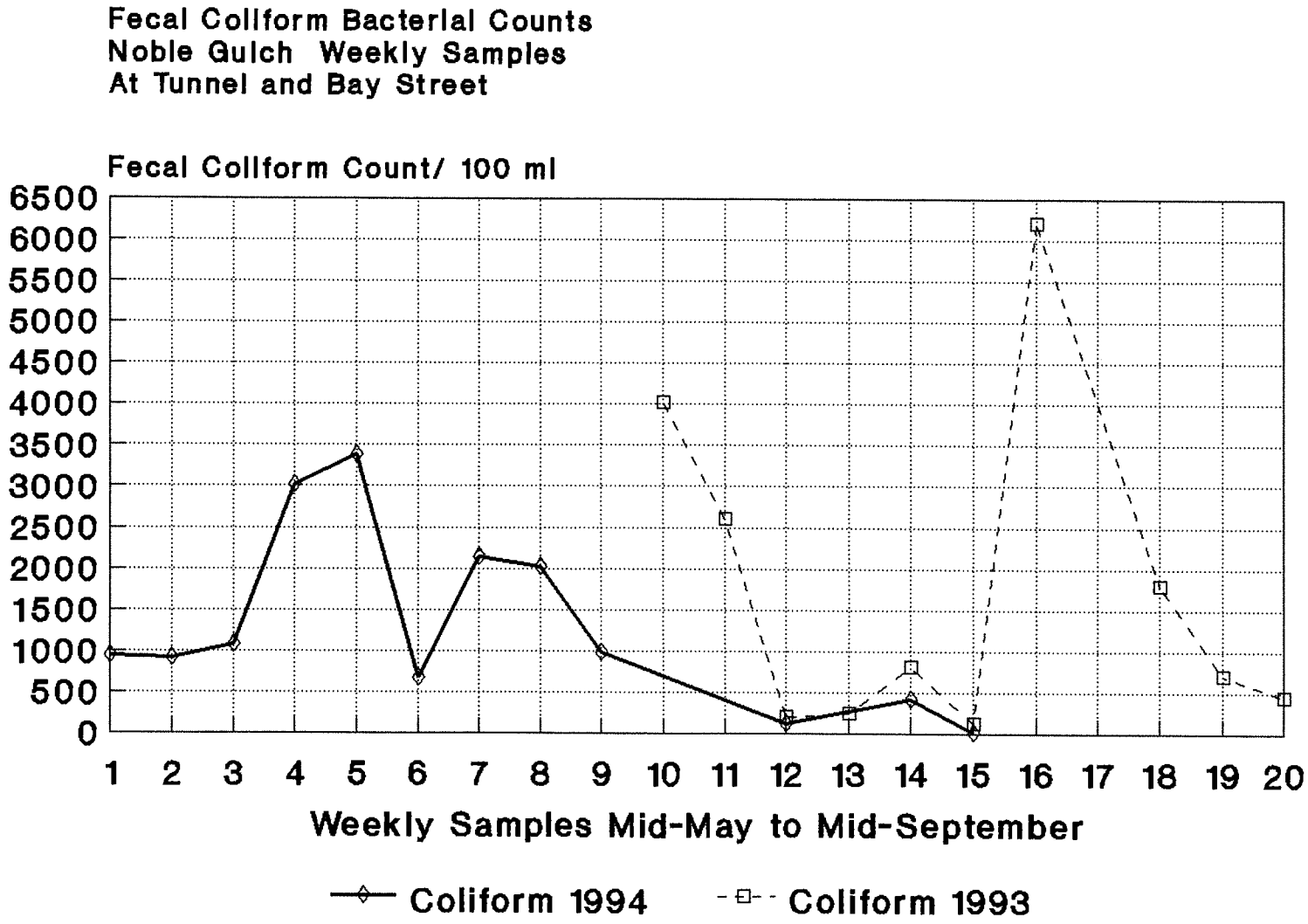


Figure 3. Fecal Collform Counts at Bay St. Tunnel on Noble Gulch, 1993 and 1994. (Santa Cruz County Data)

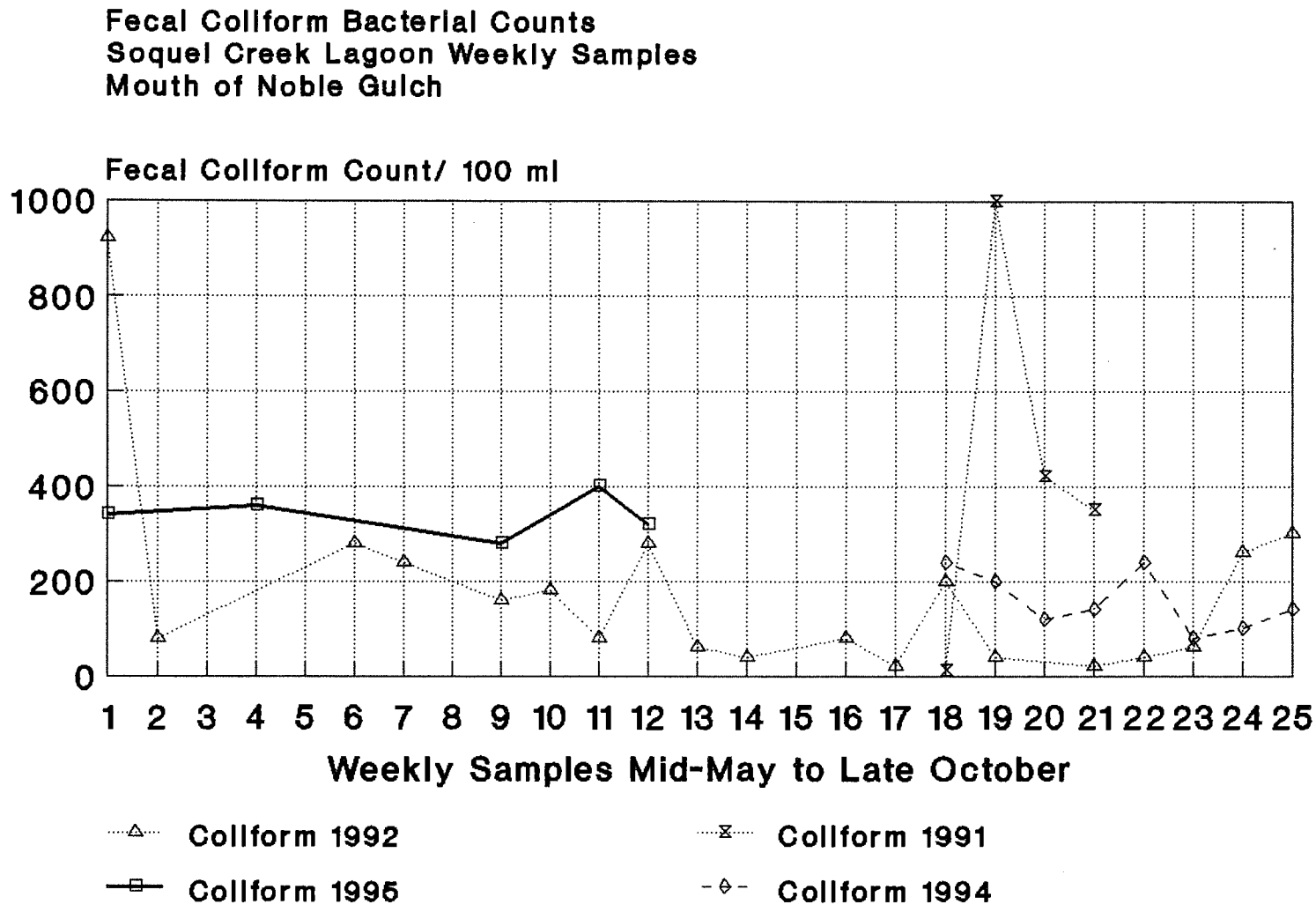


Figure 4a. Fecal Collform Count at the Mouth of Noble Gulch, 1991-92; 1994-95. (Santa Cruz County Data)

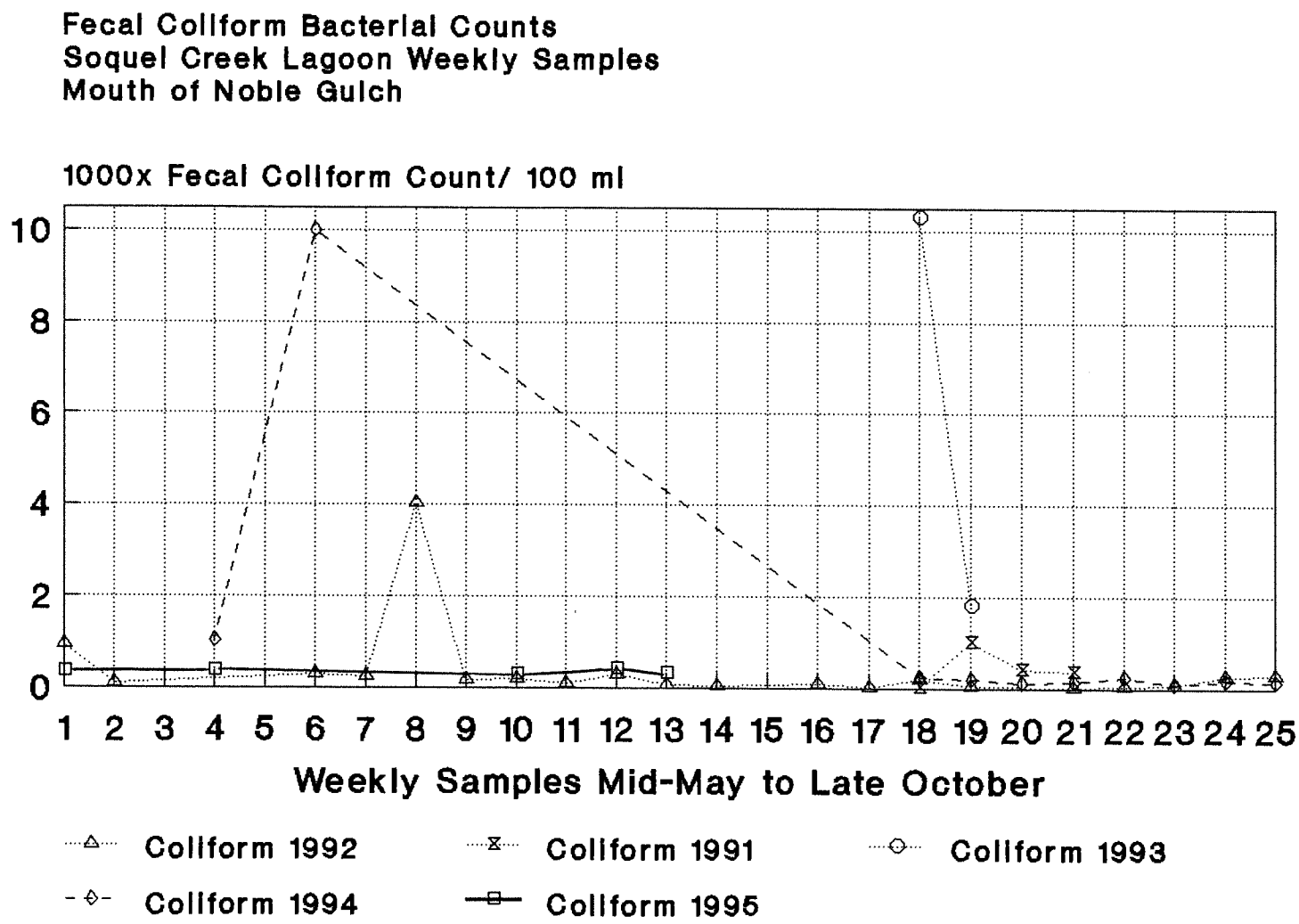


Figure 4b. Fecal Collform Count
at the Mouth of Noble Gulch, 1991-95.
(Santa Cruz County Data)

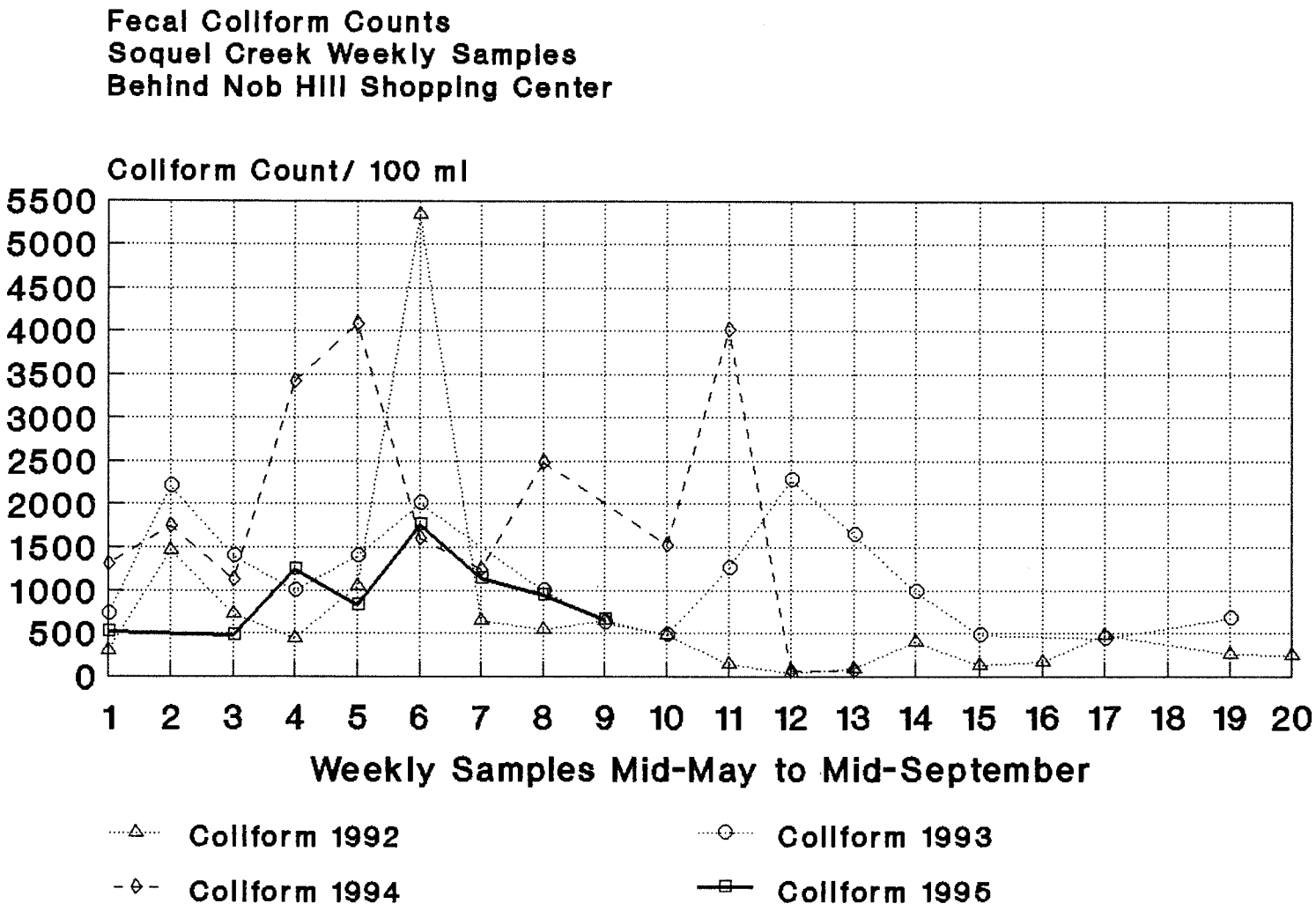


Figure 5. Fecal Coliform Counts at
Nob Hill, 1992-95.
(Santa Cruz County Data)

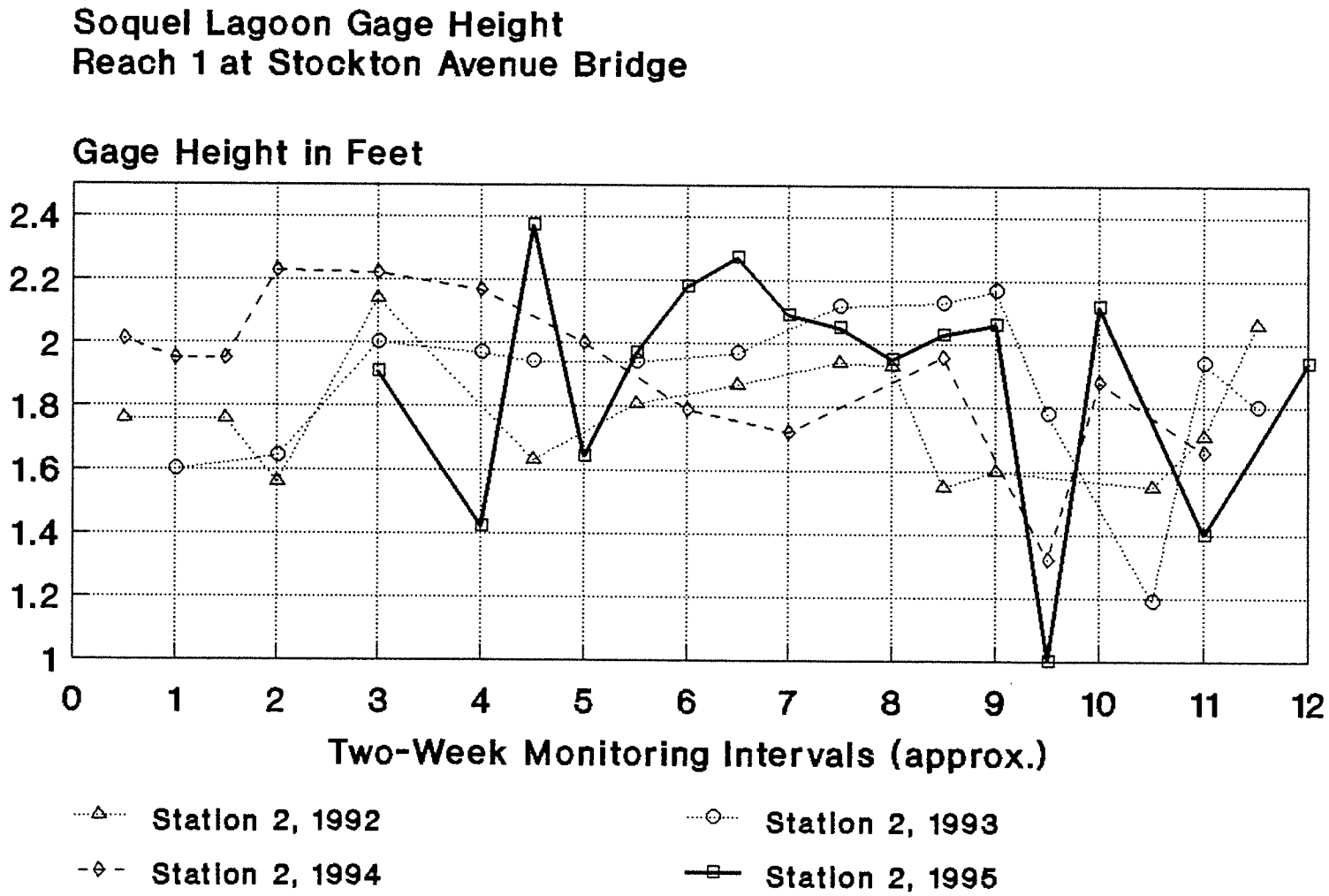


Fig 6. Soquel Lagoon Gage Height
Near Stockton Avenue Bridge
Late May to Late October, 1992-95.

Soquel Lagoon Water Temperature
Reach 1 at Stockton Avenue Bridge
Within 0.25 M of Bottom, 1992-95

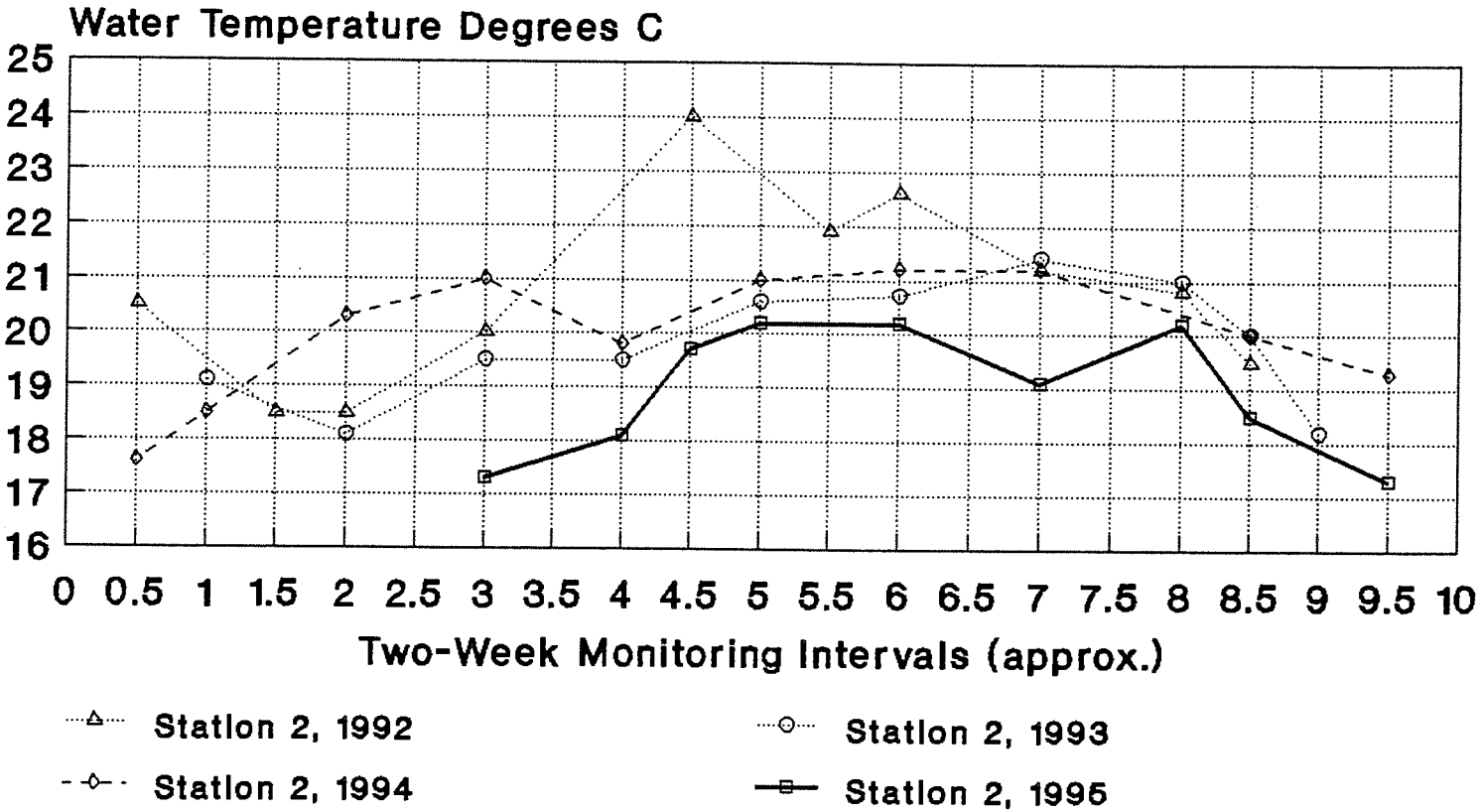


Fig 7. Soquel Lagoon Water Temp. Near Bottom at Dawn, Rch 1 at Stockton Avenue Bridge, Late May to Late Sept. 1992-95.

Soquel Lagoon Oxygen, 1994
Within 0.25 Meters of the Bottom, At
the Flume, Bridge, Trestle and Noble G.

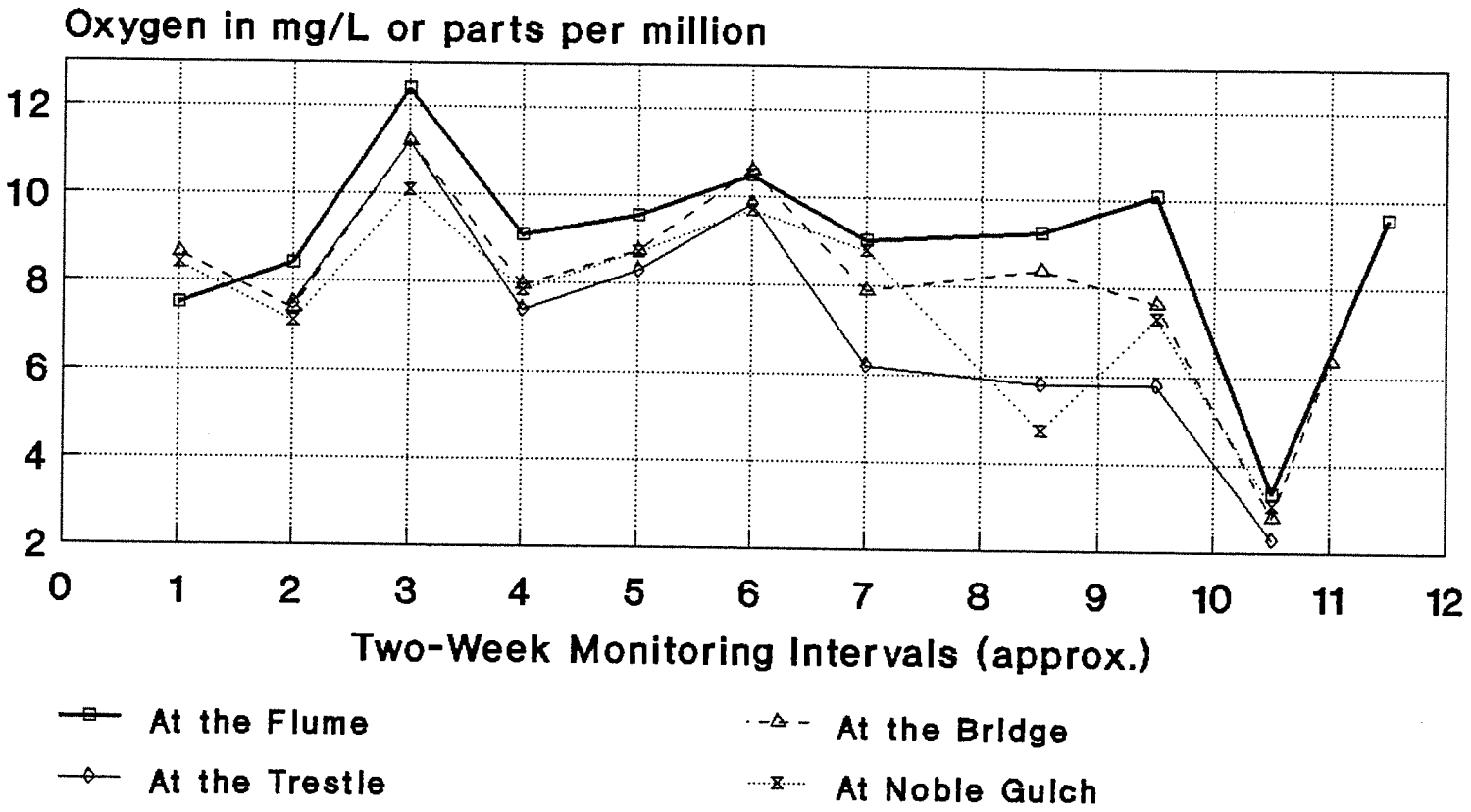


Fig 8. Oxygen Levels at Four Stations,
Soquel Lagoon Near the Bottom at Dawn;
24 May - 23 October, 1994.

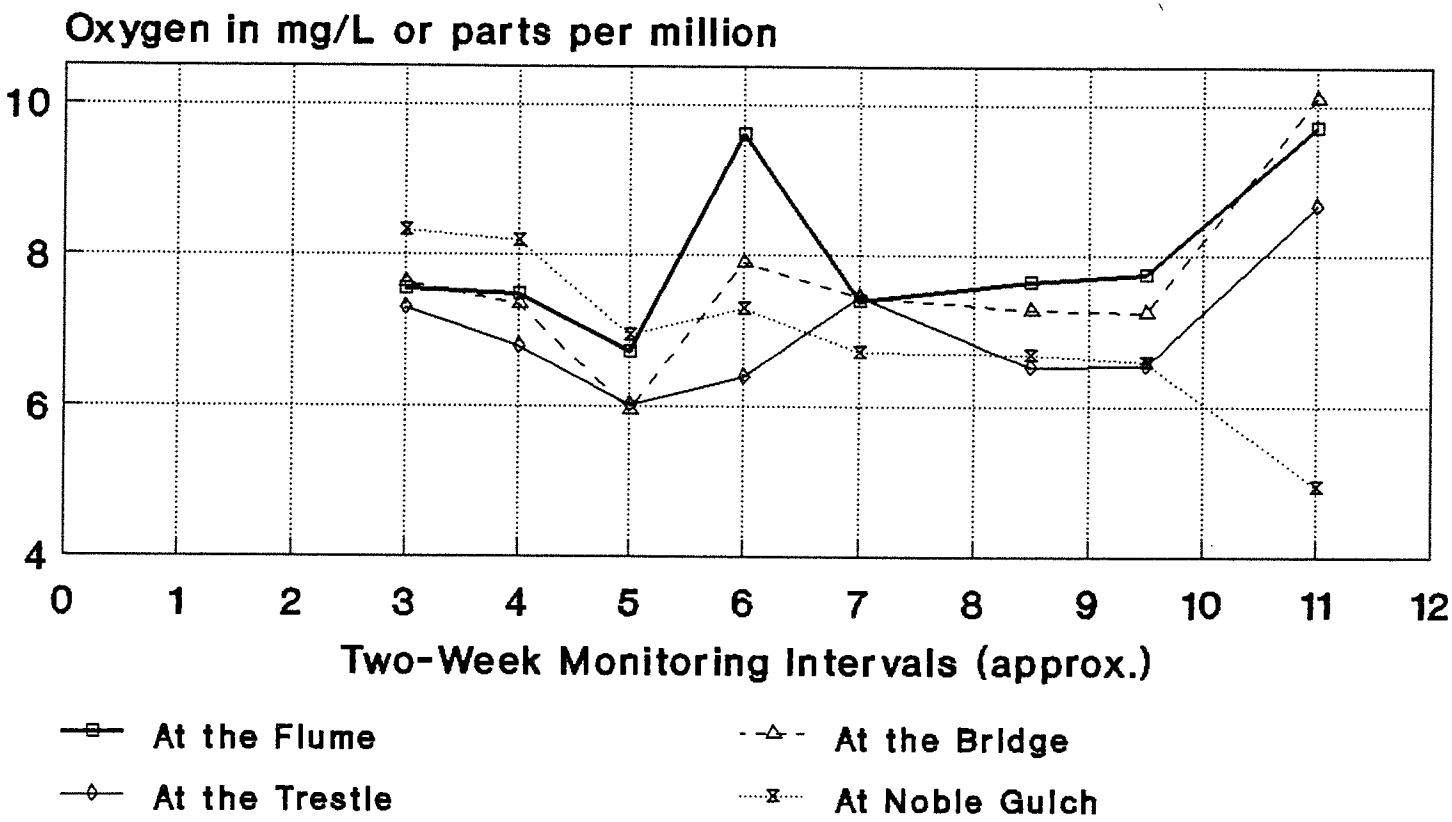


Fig 9. Oxygen Levels at Four Stations,
Soquel Lagoon Near the Bottom at Dawn;
24 June - 15 October, 1995.

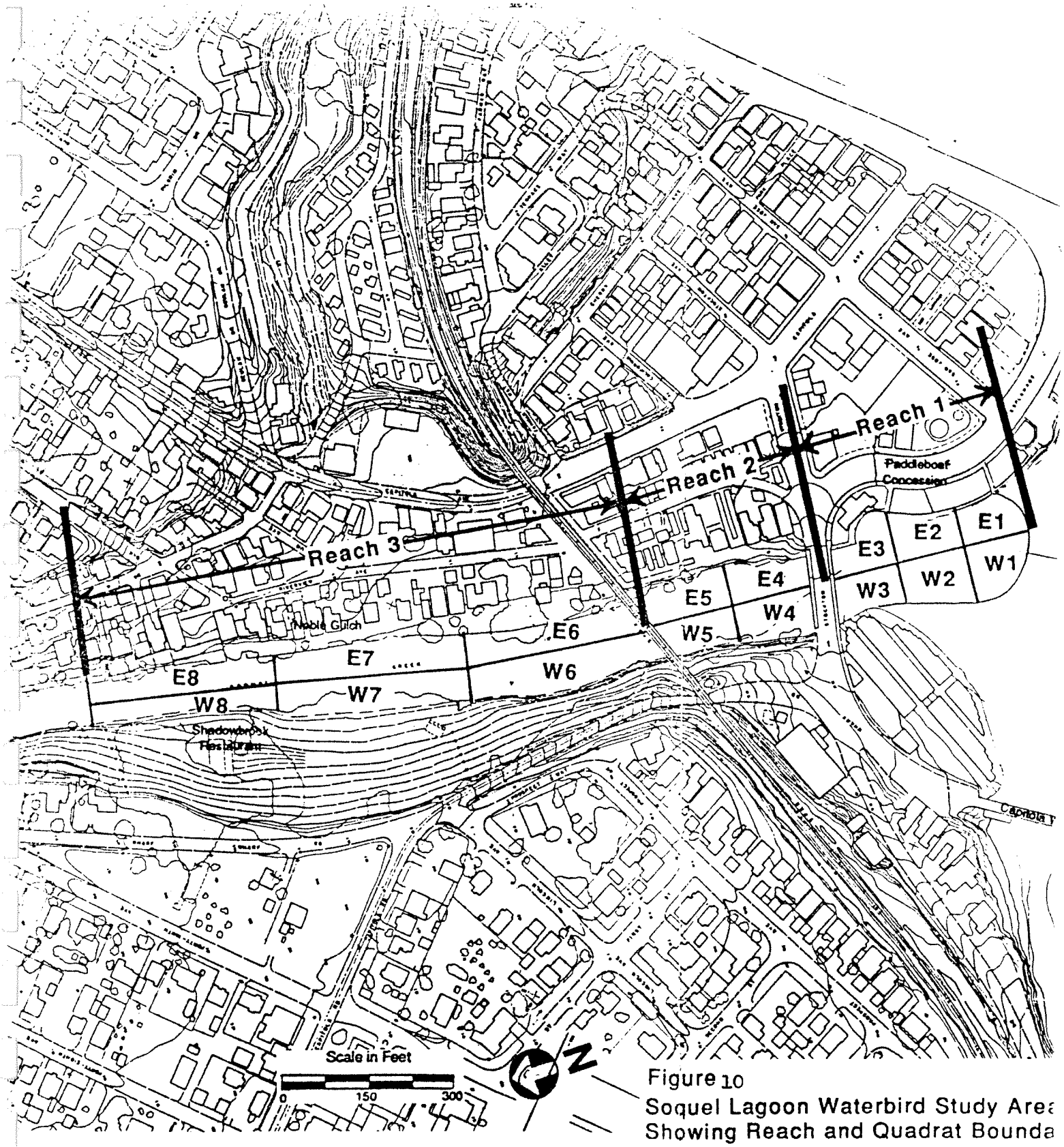
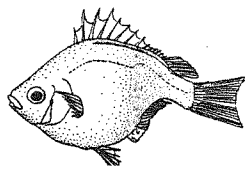


Figure 10
Soquel Lagoon Waterbird Study Area
Showing Reach and Quadrat Boundaries

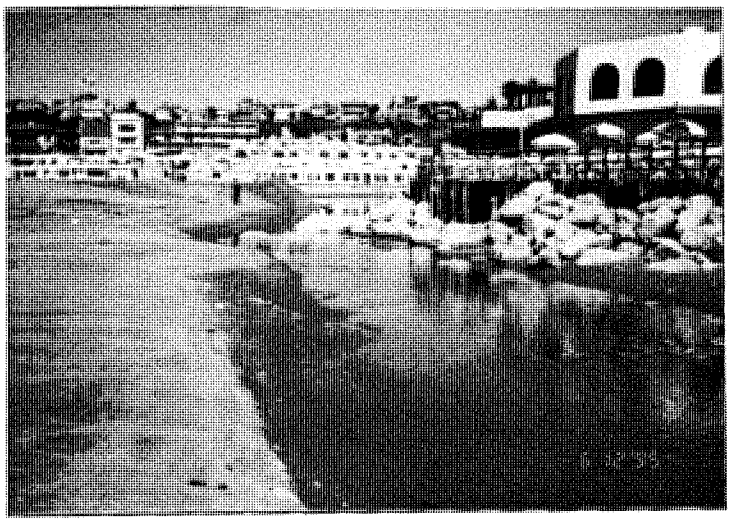
SOQUEL LAGOON Management & Enhancement Plan	Habitat Restoration Group	May 19 424-0

APPENDIX A.

PHOTOGRAPHS, 1995



Lateral Channel Across Beach, Looking Toward Jetty 12Jun95



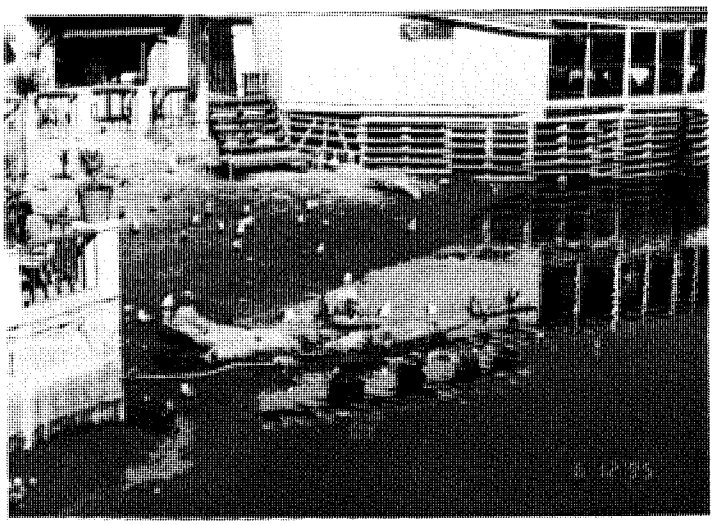
Lateral Channel Across Beach, Looking Toward Estuary 12Jun95

Lateral Channel Blocked with Sand Berm 12Jun95

Lateral Channel Draining after Sand Berm is Established 12Jun95

Sandbar Closed before High Tide 12Jun95

Clean Sand on Bottom as Lagoon Fills 12Jun95

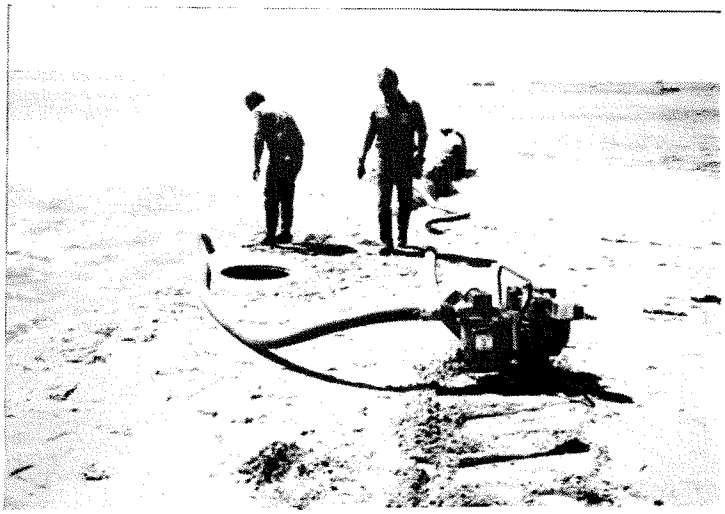


Woody Debris Left in Restaurant Cove for Fish Cover 12Jun95

Plug of Seagrass an Kelp Near Flume 12Jun95

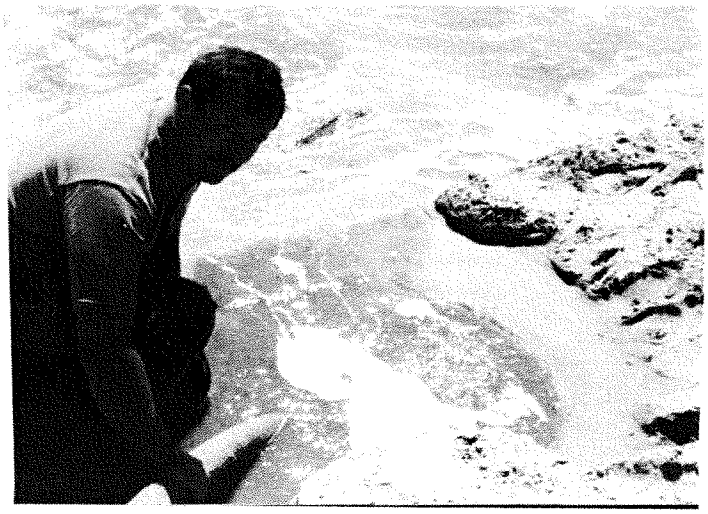
Kelp Removal Near Flume 13Jun95

Moving the Generator/Pump to a Flume Portal 13Jun95

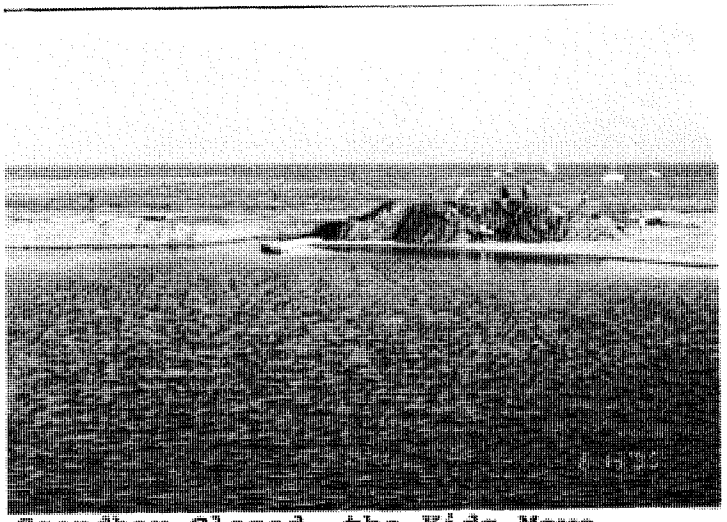


Pumping Sand Out of the Flume 13Jun95

Cleaning out the Pump Intake 13Jun95

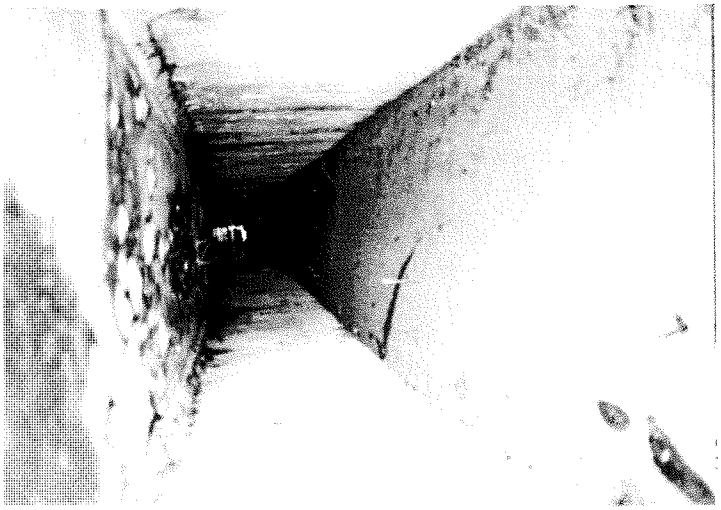


Jim Turcotte, Pumping out the Sand as Tide Comes in 13Jun95

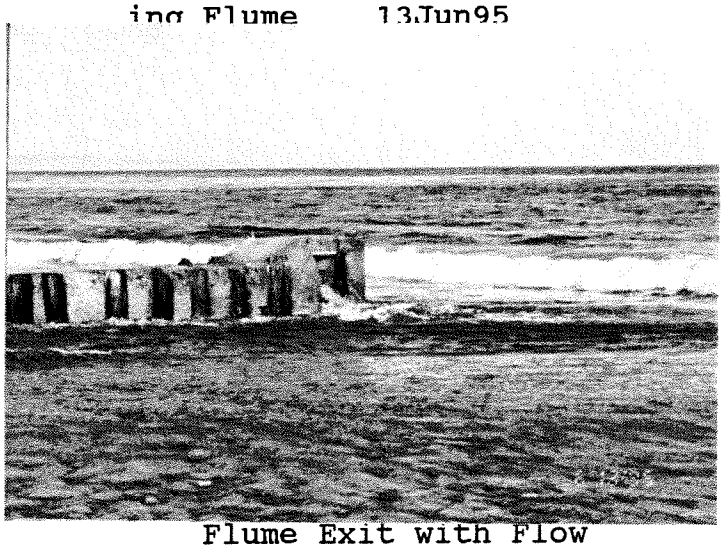


Ssandbar Closed, the Kids Move in to Play 13Jun95

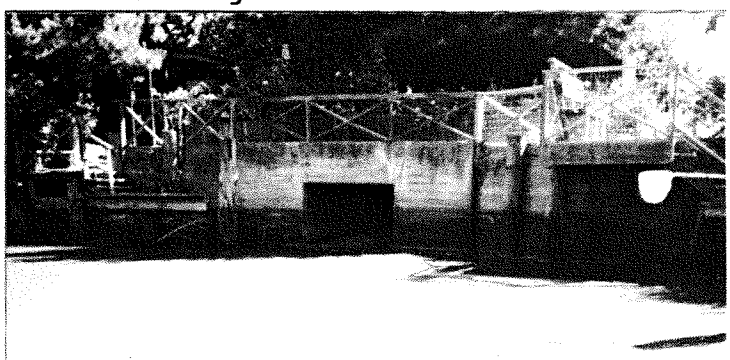
Screens in Place on a Functioning Flume 13Jun95



Flume Cleared of Sand, Baffle Missing 13Jun95



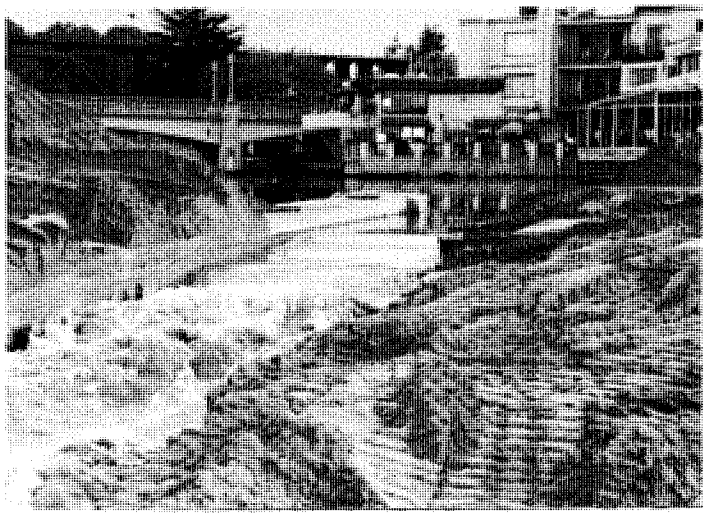
Flume Exit with Flow 13Jun95



Sandy Bottom at Noble Gulch 13Jun95

Survey Upstream for Tidewater Gobies with Sherman 13Jun95

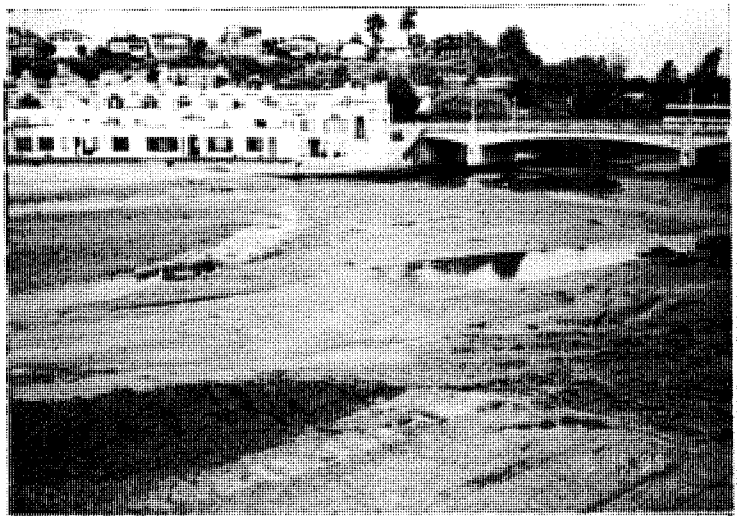
Landslide in the Making in Upper Lagoon 13Jun95



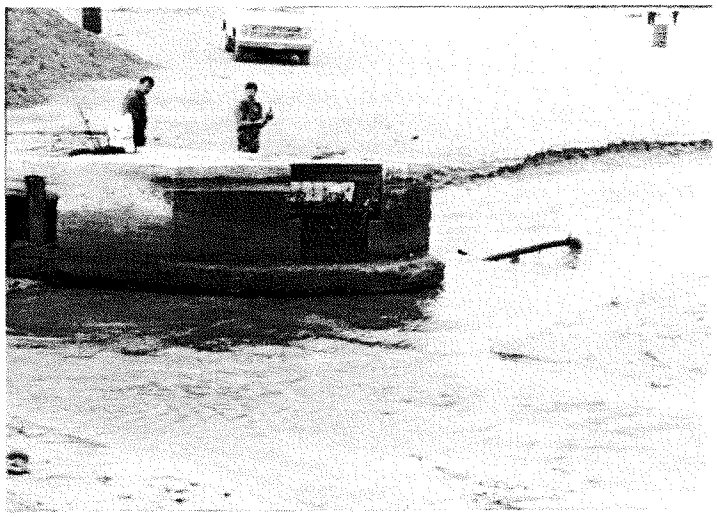
Sandbar Opening 14Jun95

Flume Draining as Channel Cuts Through Sandbar 14Jun95

Sedimentation of the Lagoon 15Jun95



Sandy Bottom, Reach 1

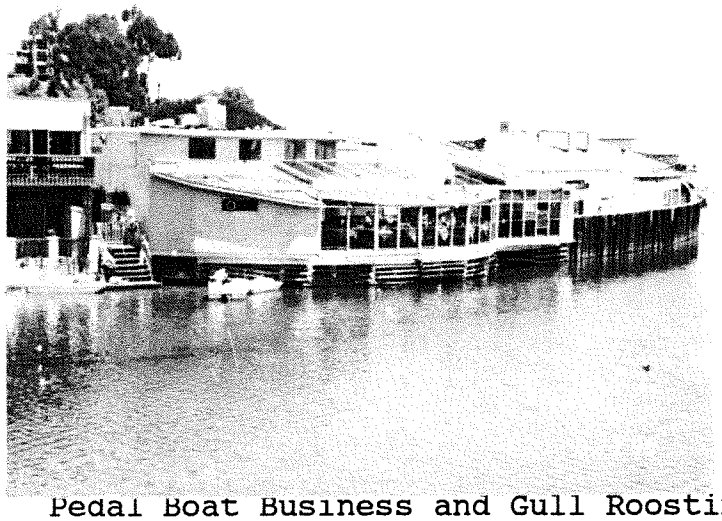


Flume Undercut by Flow 15Jun95

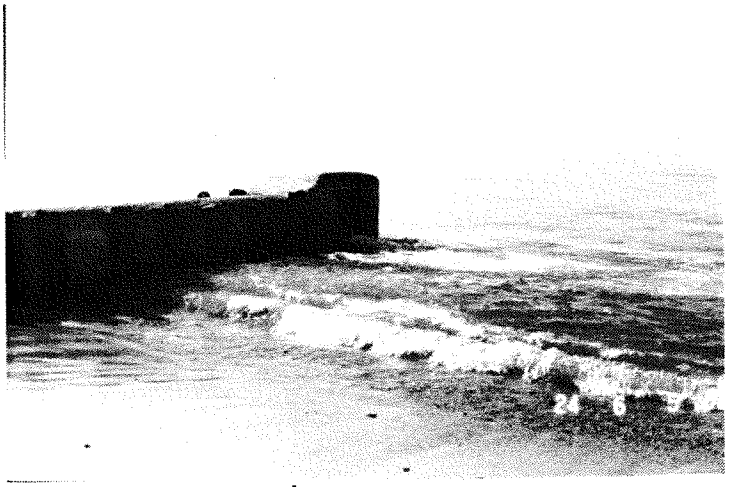
Flume Entrance 15Jun95

Flume Prepared for Final Closure 15Jun95

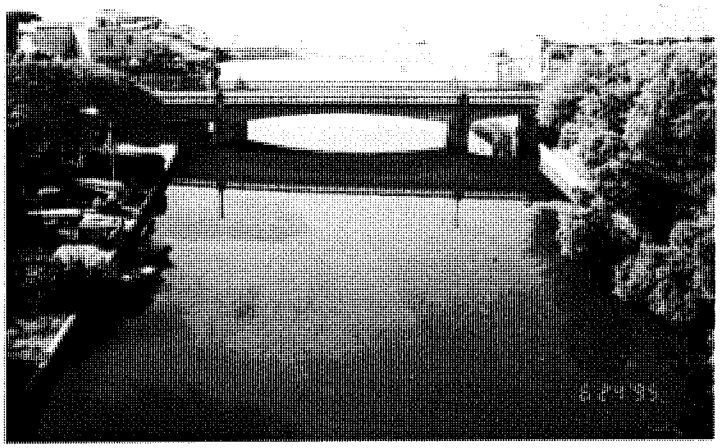
Health Warnings Come Early 23Jun95



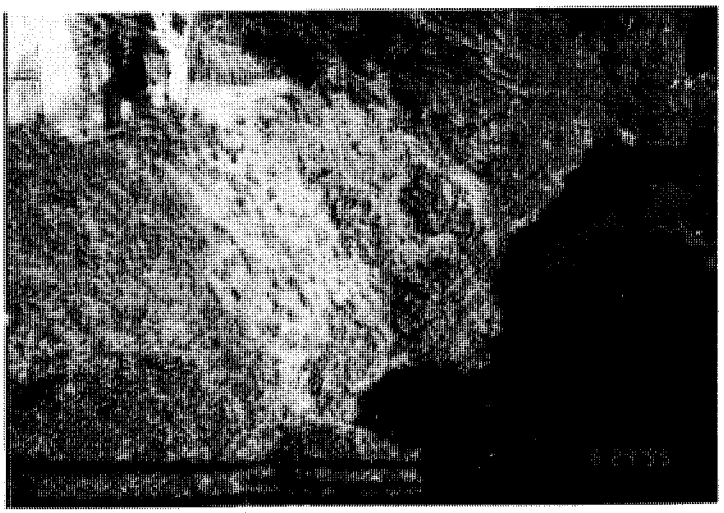
Pedal Boat Business and Gull Roosting on Restaurant Windows 23Jun95



Flume Exit 24Jun95

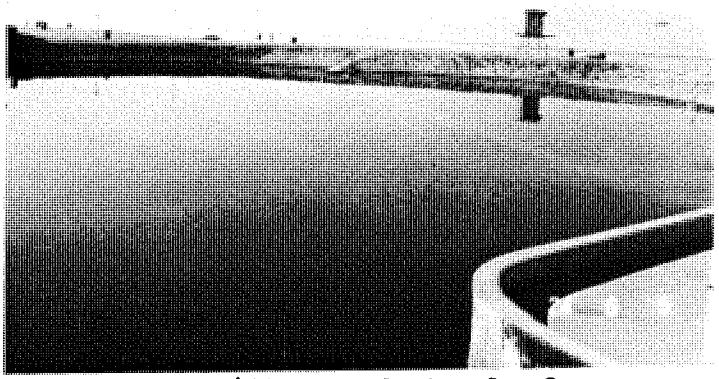


Reaches 1 & 24Jun95

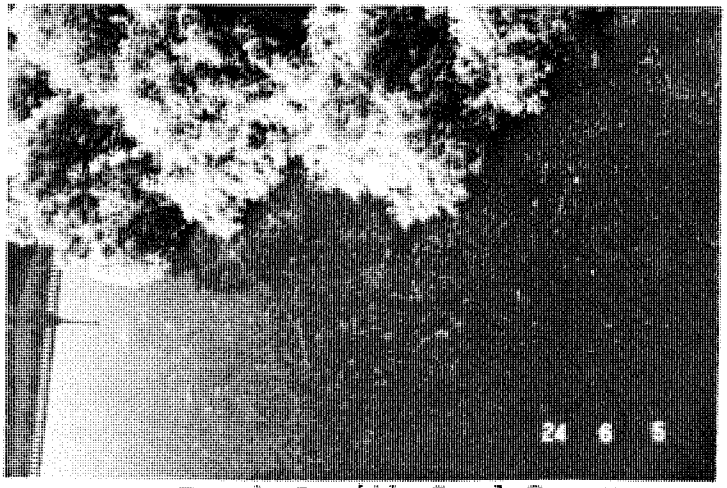


Bank Erosion, Reach 3, 24Jun95

Doggy Business at Trestle Park
24Jun95

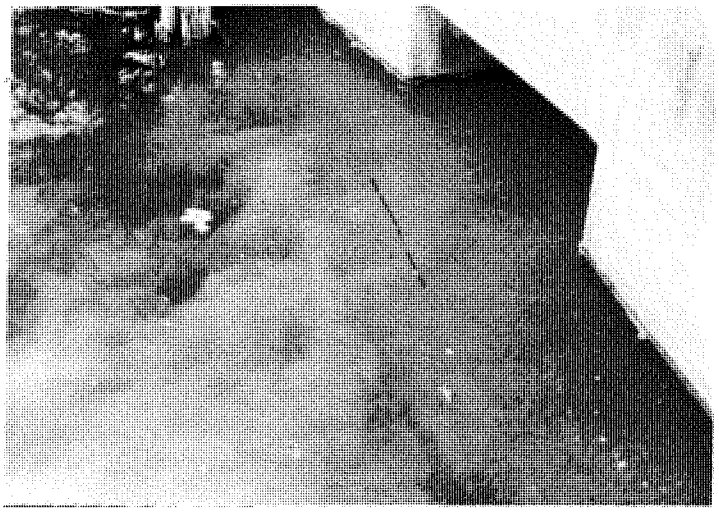


Reach 1 with Beach Ready for
Visitors 24Jun95

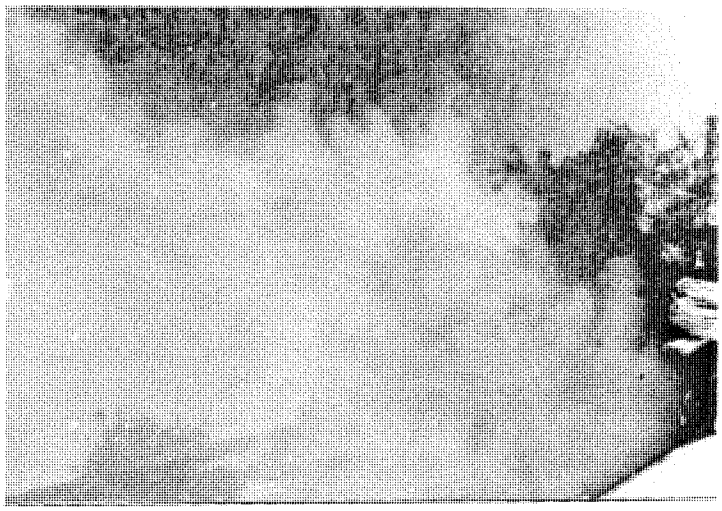


Reach 2 with Good Cover
24Jun95

Reach 2 with Sandy Bottom
24Jun94

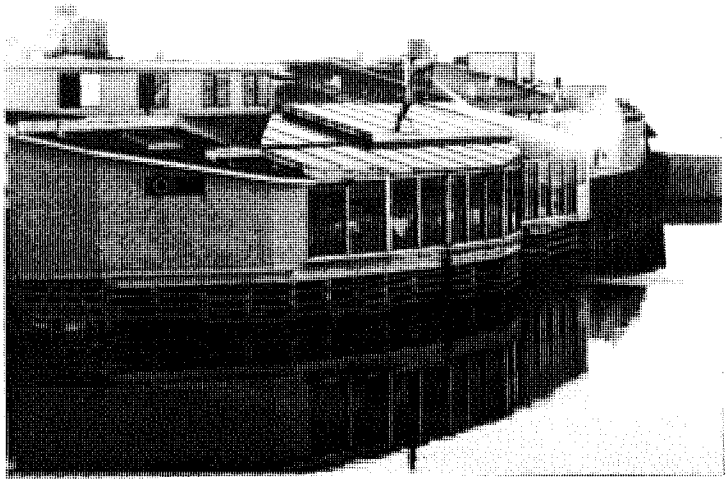


Water Pollution at Noble Gulch
24Jun95

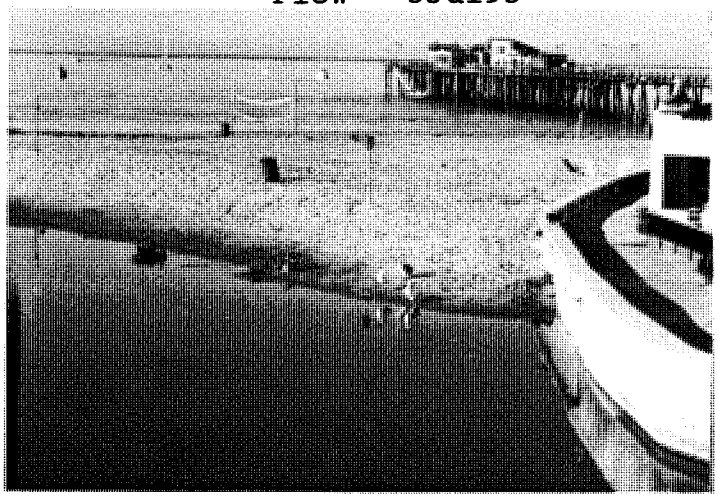


Gray-water Plume Spreads
From Noble Gulch 24Jun95

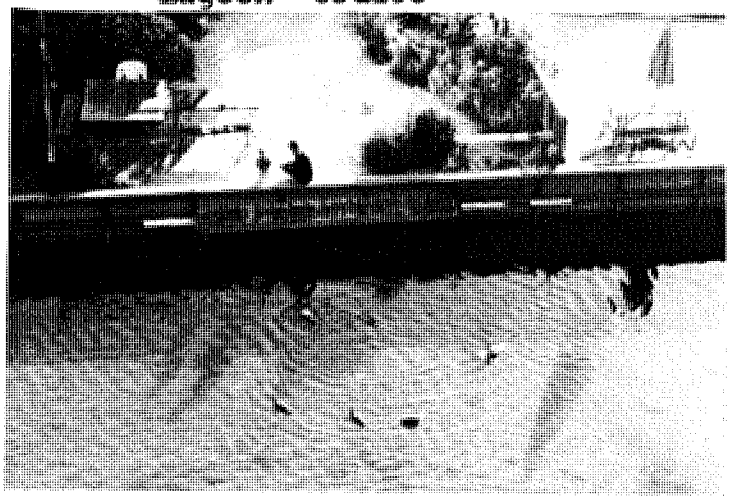
Lagoon Level Declines with Stream-
Flow 5Jul95



Washing Bird Waste into the
Lagoon 6Jul95



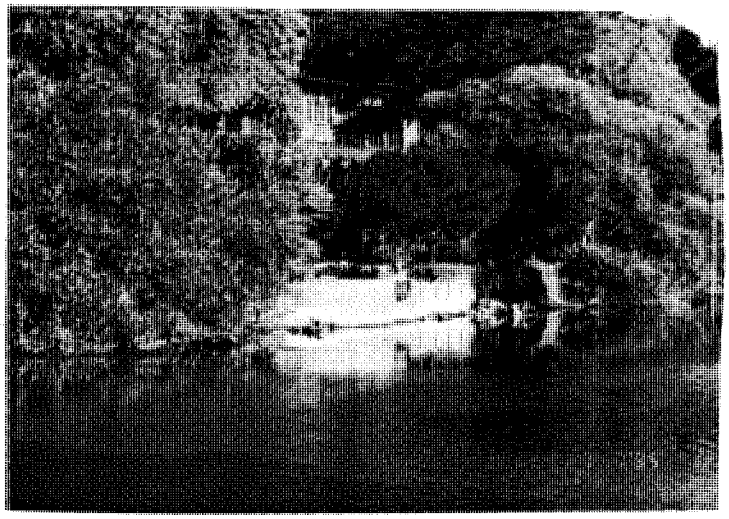
Three Geese Left in 1995
6Jul95



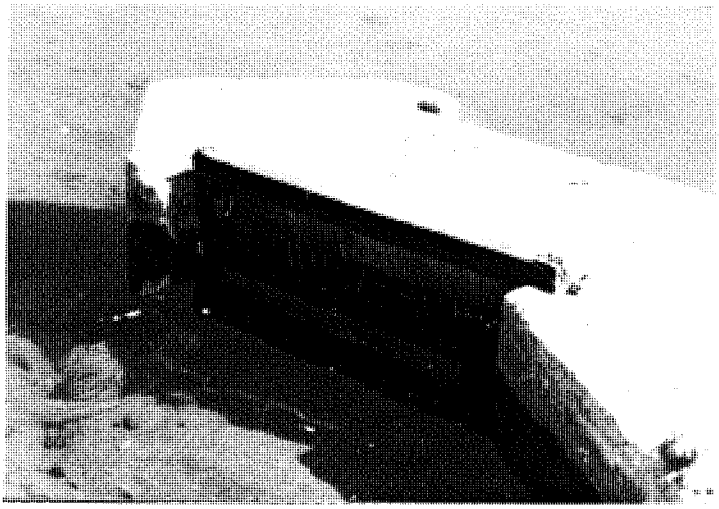
Bird-Feeding, Reach 2 7Jul95

Reaches 1 and 2 7Jul95

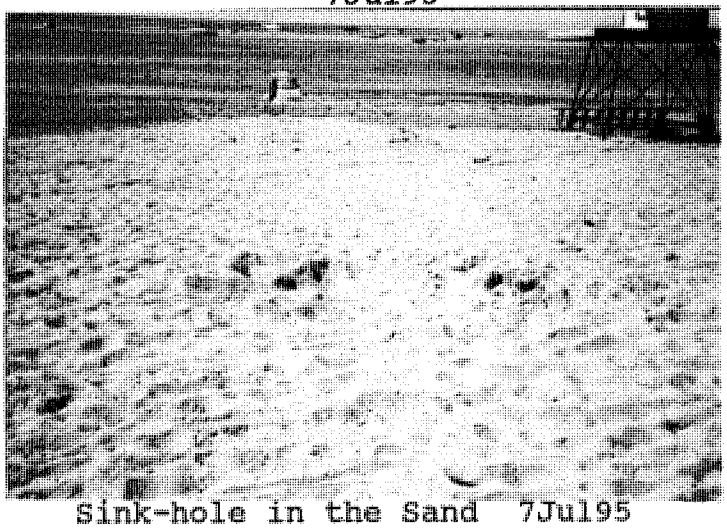
Reach 3, 7Jul95



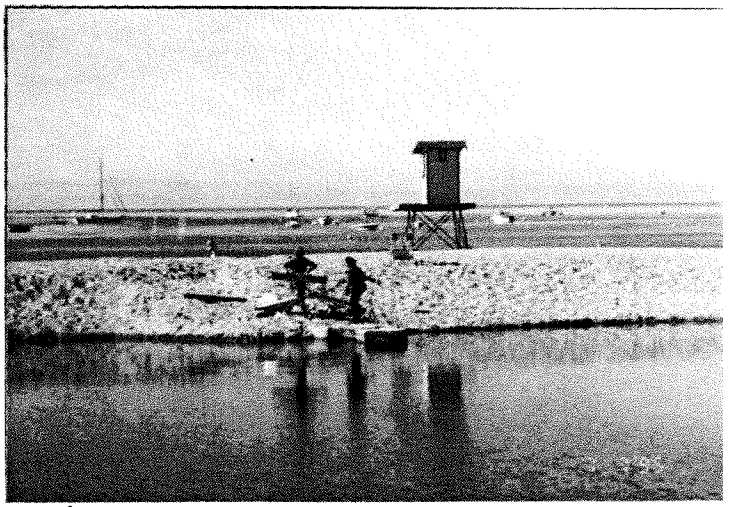
Shadowbrook Restaurant, Reach 3 7Jul95



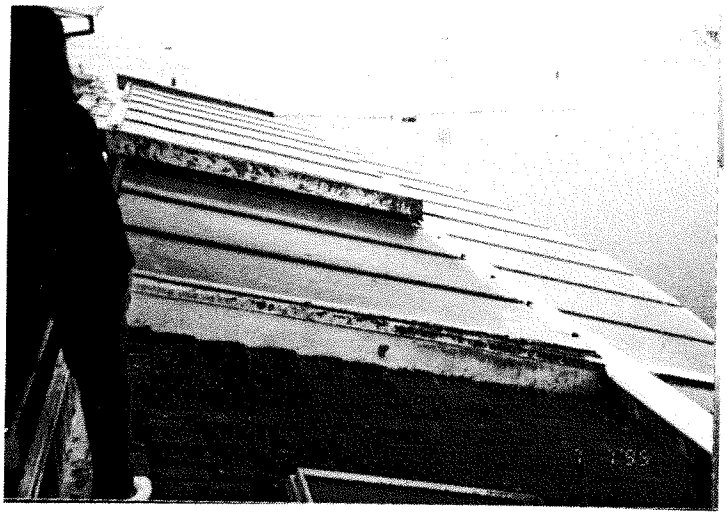
Flume Entrance 7Jul95



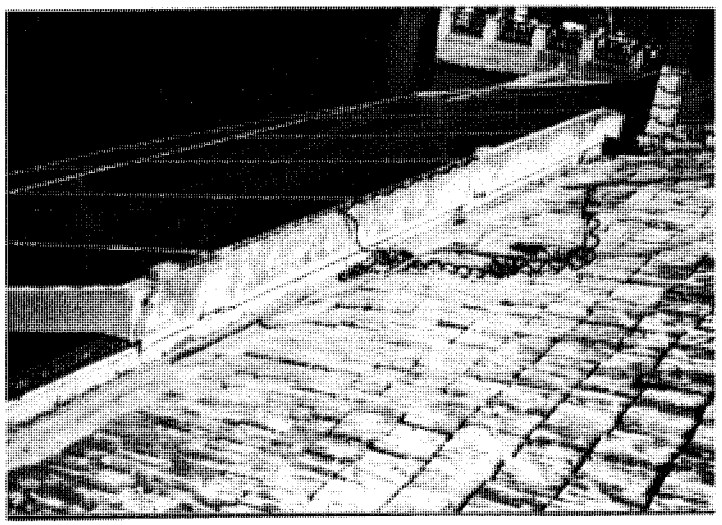
Sink-hole in the Sand 7Jul95



Adding Boards to Increase Lagoon Depth 7Jul95



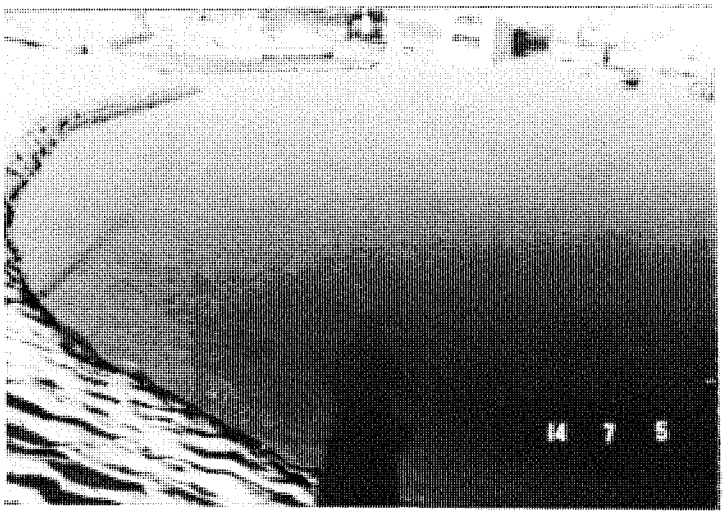
Window Panels on Restaurant 7Jul95



Up on the Roof 7Jul95

Tiered Window Pannels, Movable and Immobile 7Jul95

Potential Attachment Points for Gull Barrier 7Jul95



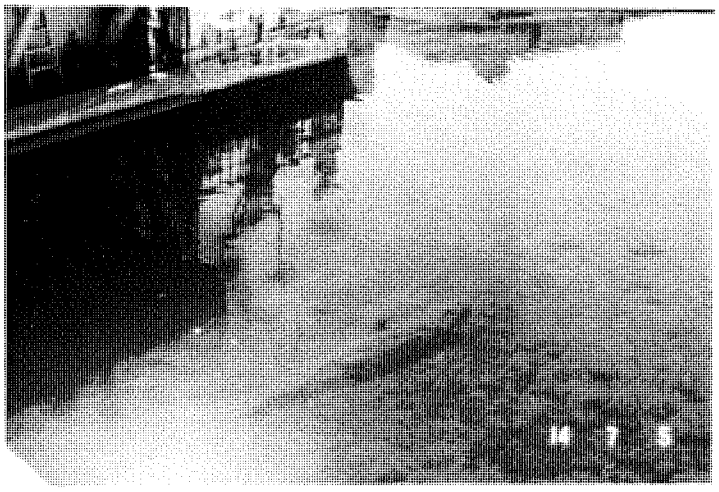
Lagoon Level at Gage Height = 2.37 14Jul95

Base of Flume Plugged with Sand Bags 14Jul95

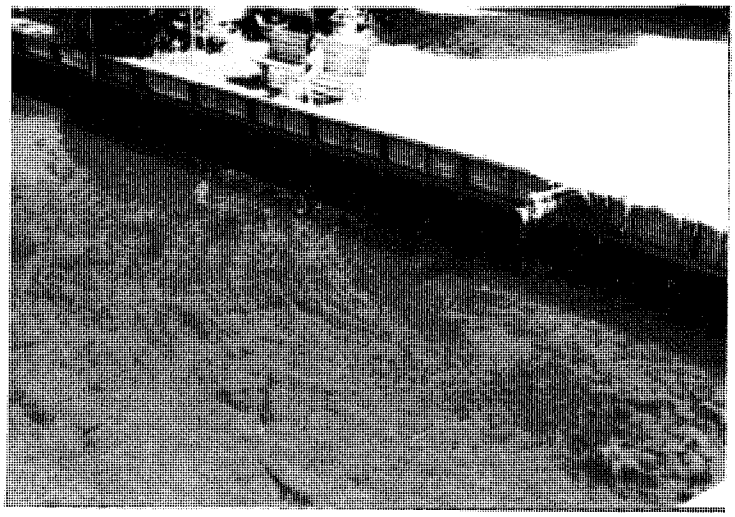
Seepage Under Flume Plugged with Sand Bags 14Jul95

Flume Exit 14Jul95
Flow at 9 cfs

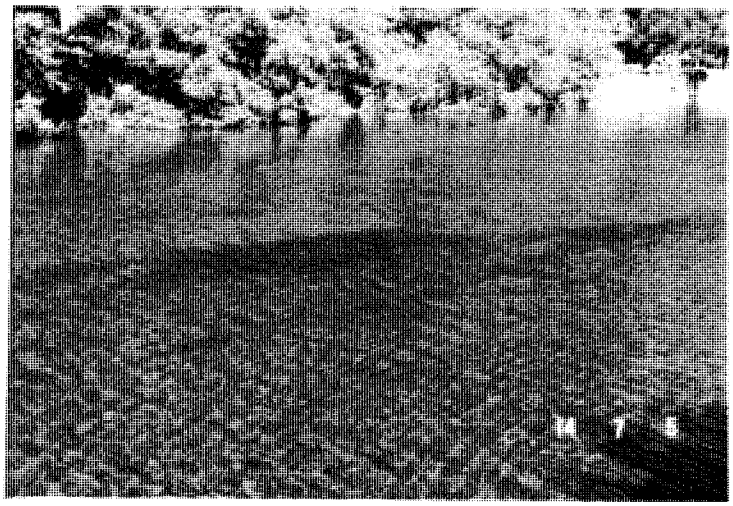
Flow from Flume Leakage 14Jul95



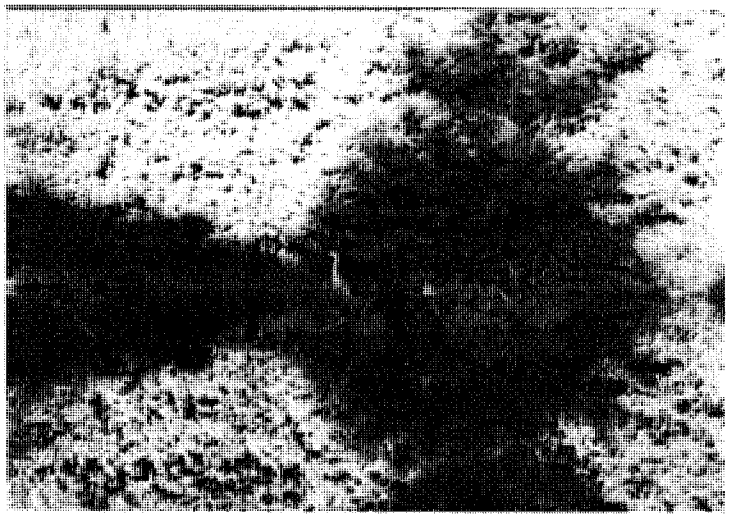
Bottom Algae, Reach 1 14Jul95



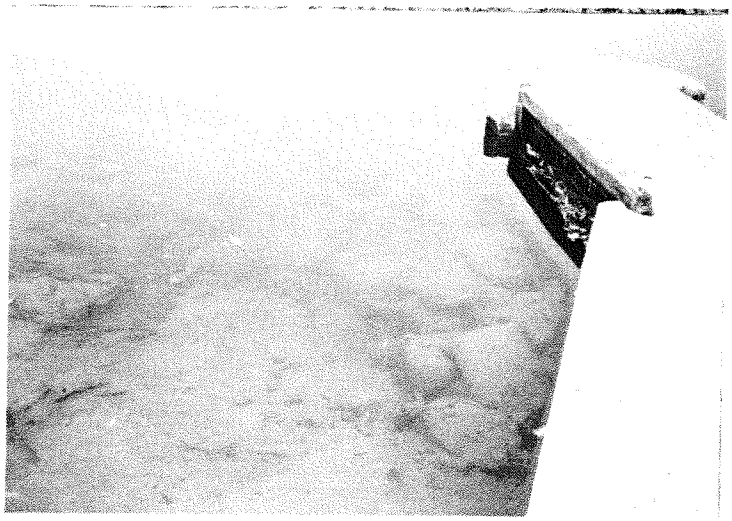
Bottom Algae, Reach 2 14Jul95



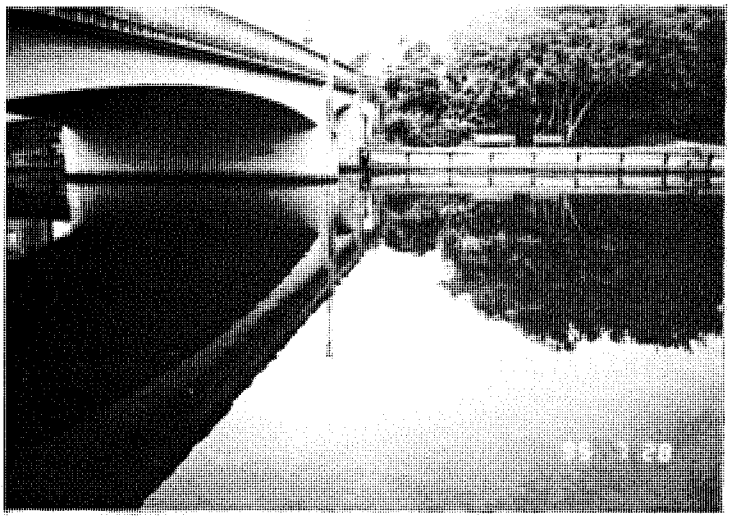
Riparian Cover with Full Lagoon, Reach 3 14Jul95



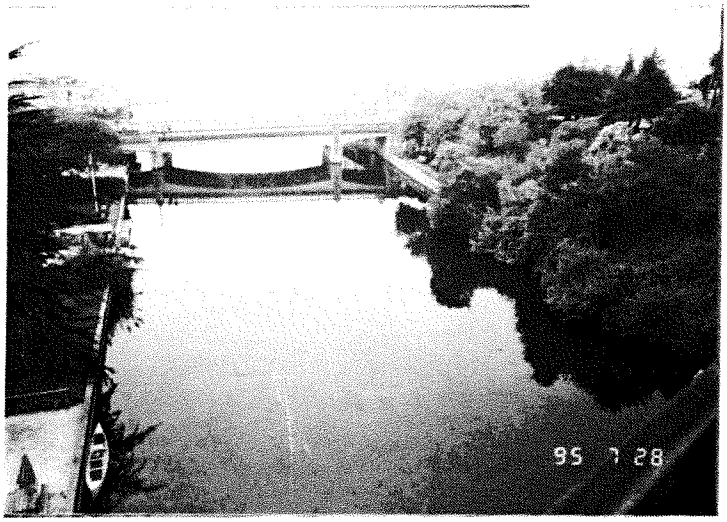
Great Blue Heron on Tree Island 14Jul95



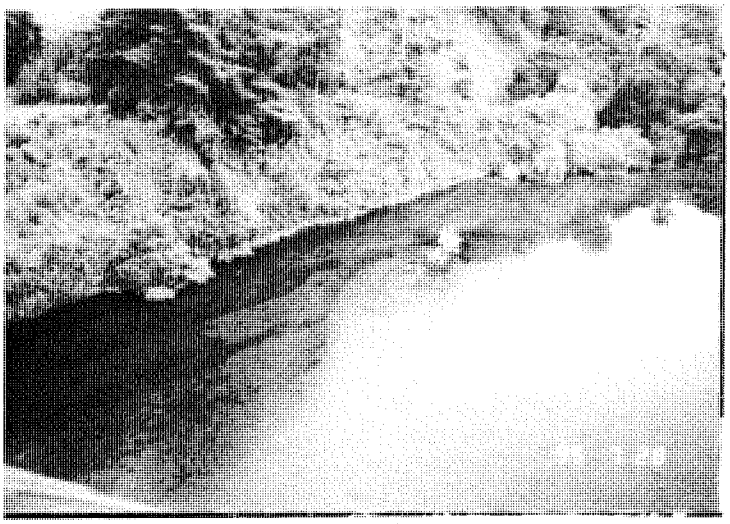
Sandbags Around Flume, Gage Height = 1.64 28Jul95



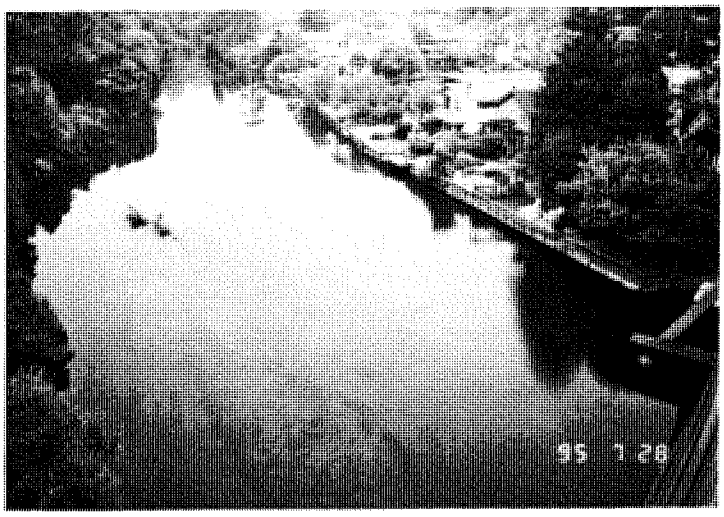
Fish Cover Under the Stockton Avenue Bridge 28Jul96



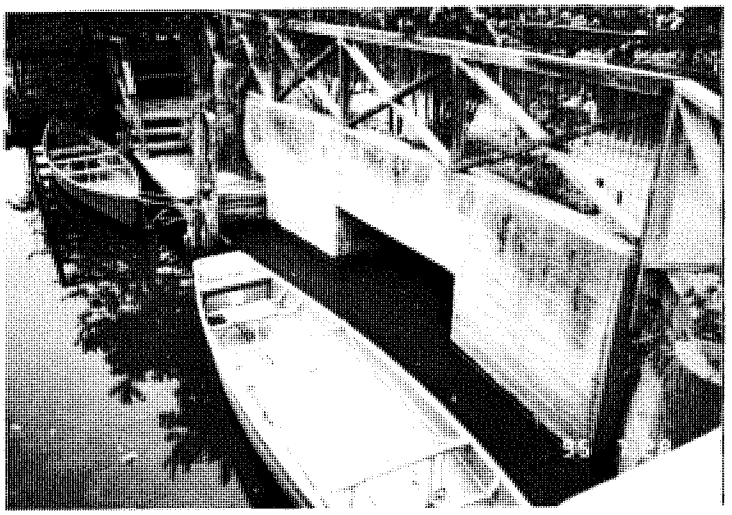
Reach 2 Mostly Sandy Bottom
28Jul95



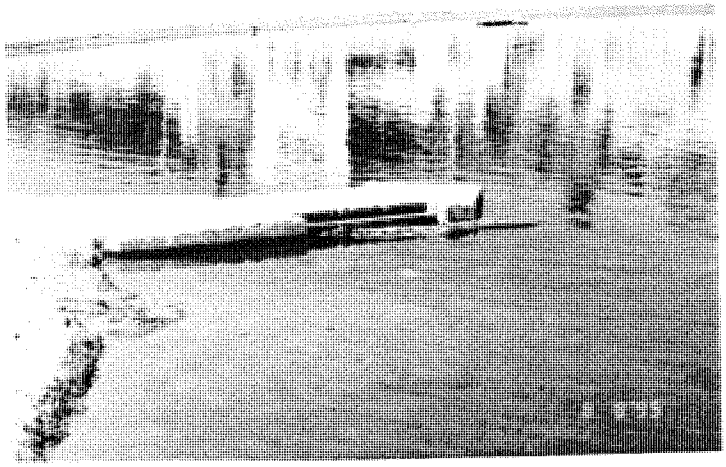
Reach 3, West Side
28Jul95



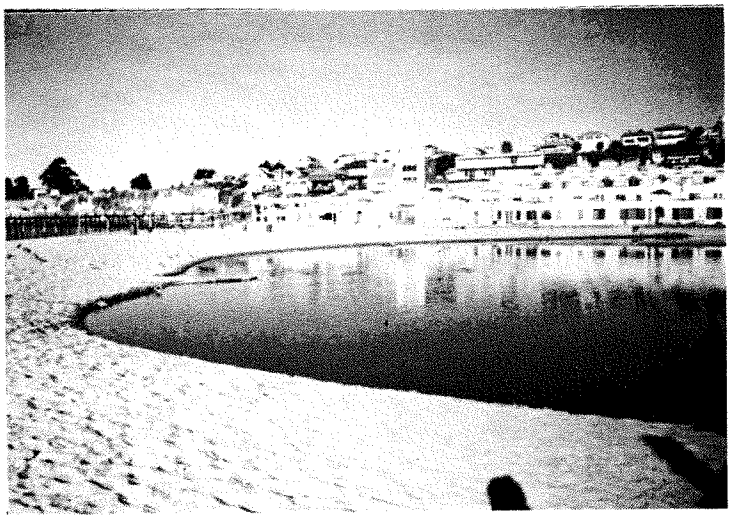
Reach 3 Mostly Sandy Bottom
28Jul95



Noble Gulch 28Jul95



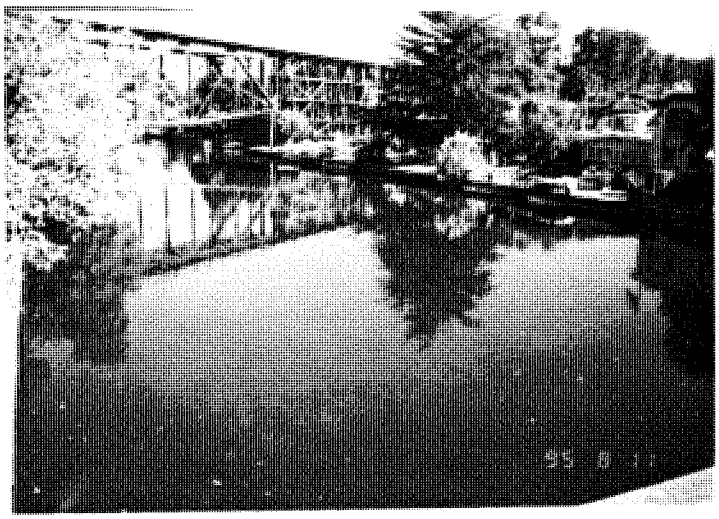
Lagoon Level at Gage Ht.= 1.97
8Aug95



Reach 1 with Gage Ht.= 2.18
11Aug95

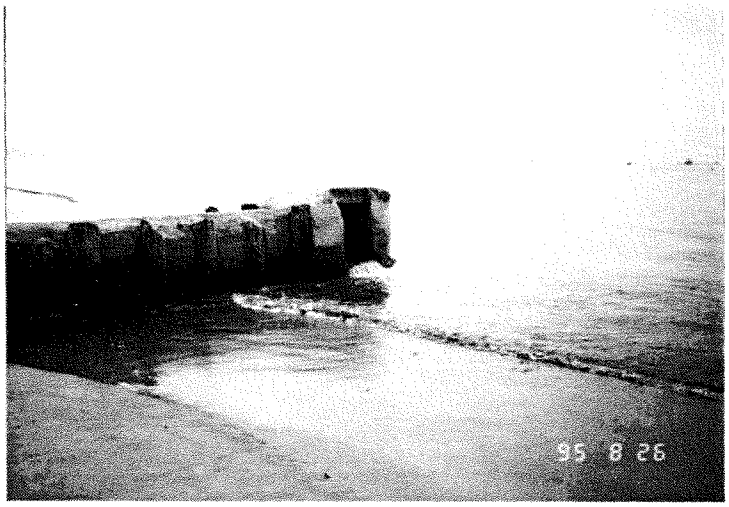
Rch 1, Tidewater Goby Habitat 11Aug95

Reach 1 Lagoon Margin 11Aug95

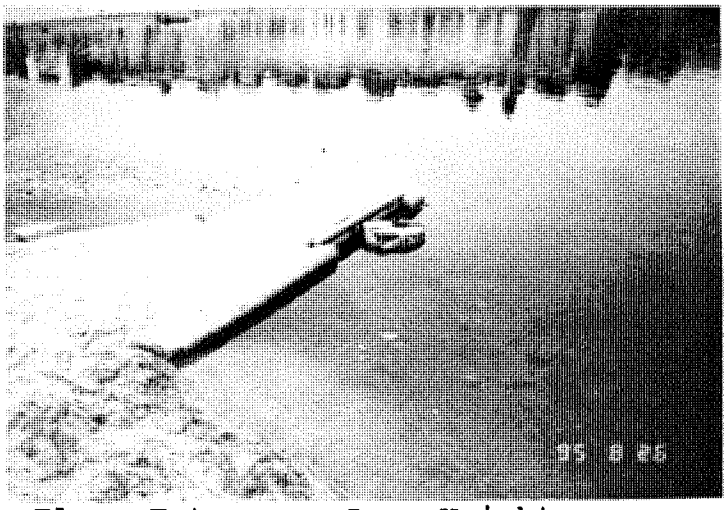


Reach 2 11Aug95

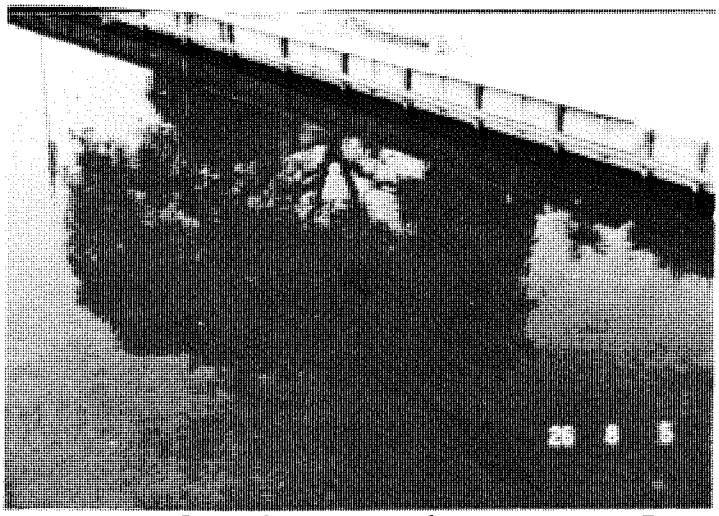
Reach 2, Fish Cover on Right 11Jul95



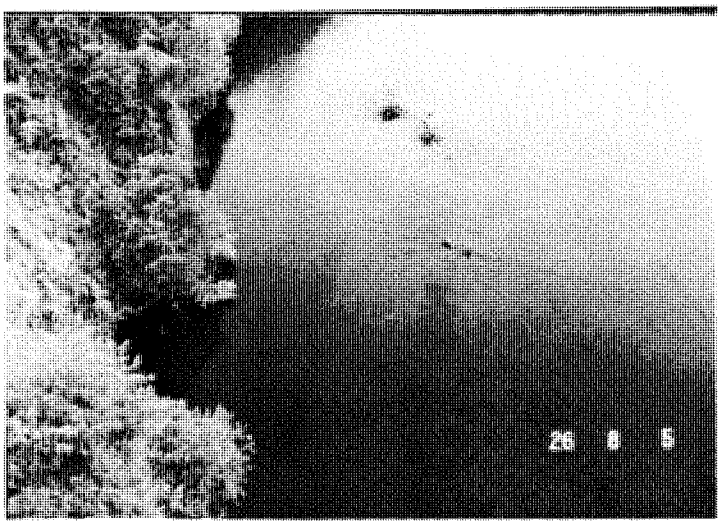
Flume Exit Passable 26Aug95



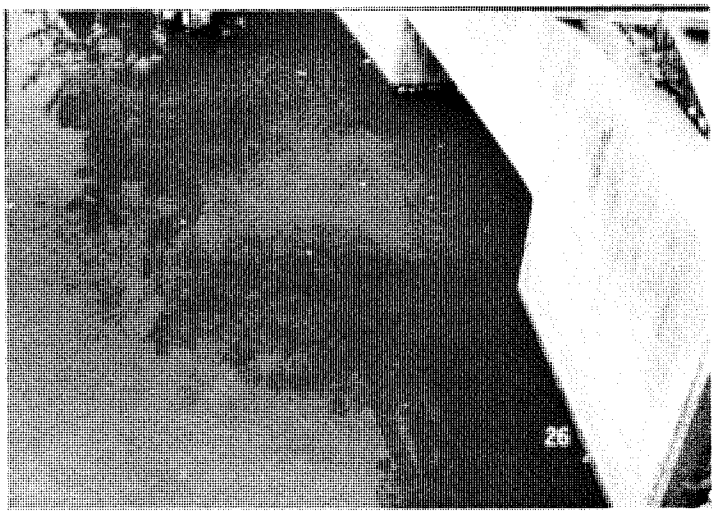
Flume Entrance, Gage Height = 2.09 26Aug95



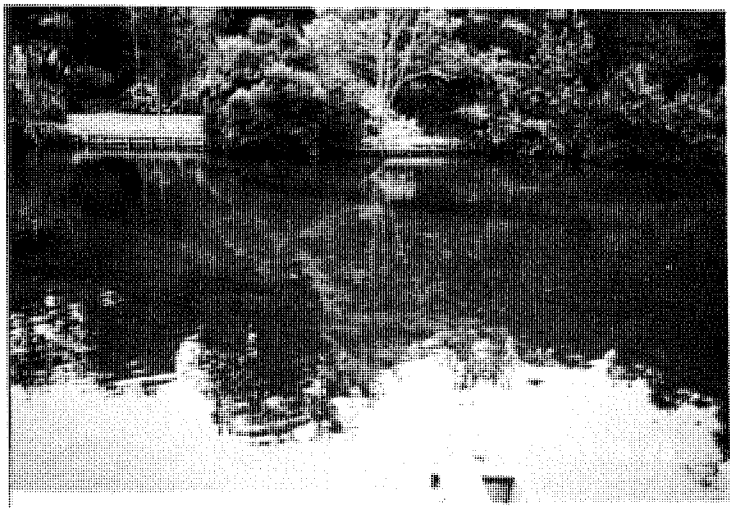
Algal Tufts, Reach 2 26Aug95



Reach 3 with Tree Island
Two Popcorn Ducks Left 26Aug95

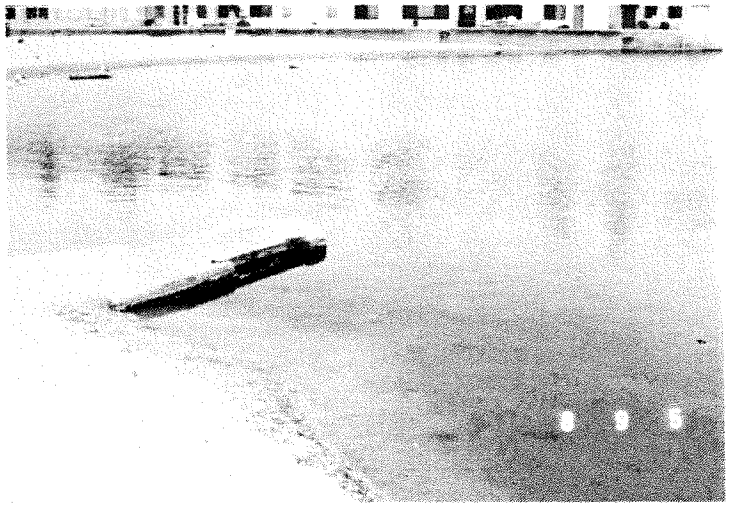


Murky Water at Noble Gulch
26Aug95

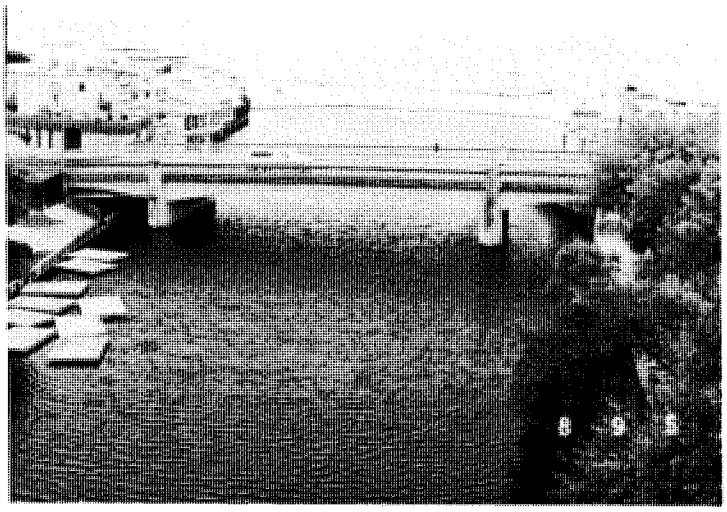


Algal Carpet Downstream of Noble
Gulch 26Aug95

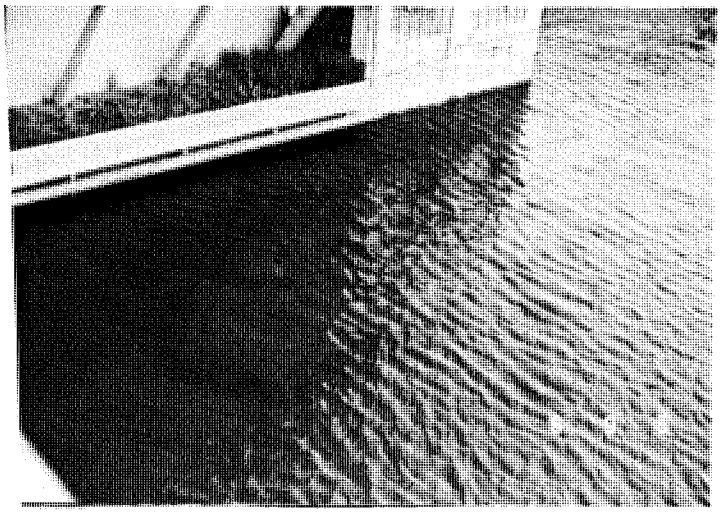
Streamflow at Nob Hill at
Baseflow of 3 cfs 27Aug95



Flume Entrance, Gage Height =
1.95 8Sep95

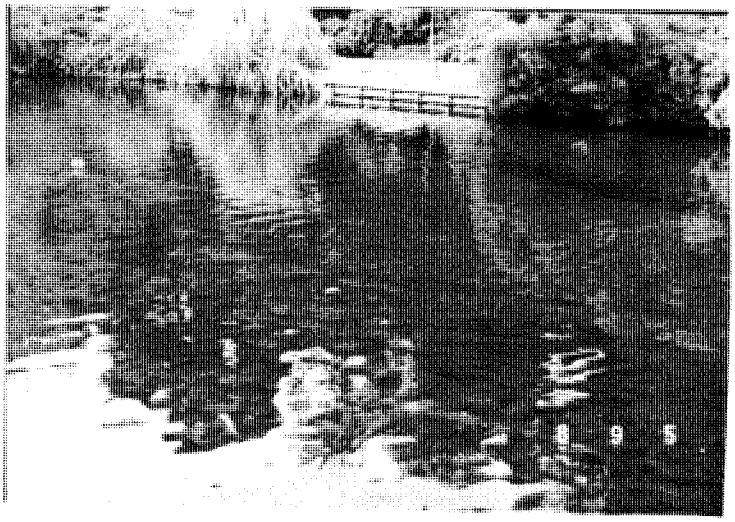


Reaches 1 and 2 Before Begonia Festival 8Sep95

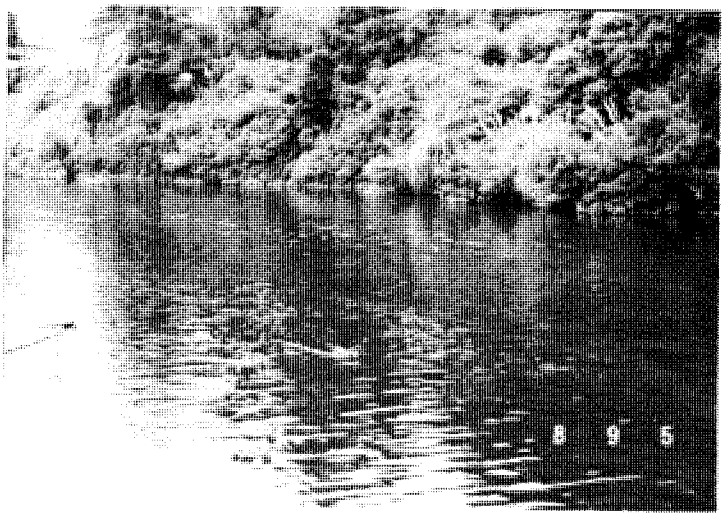


Pondweed in Reach 1 8Sep95

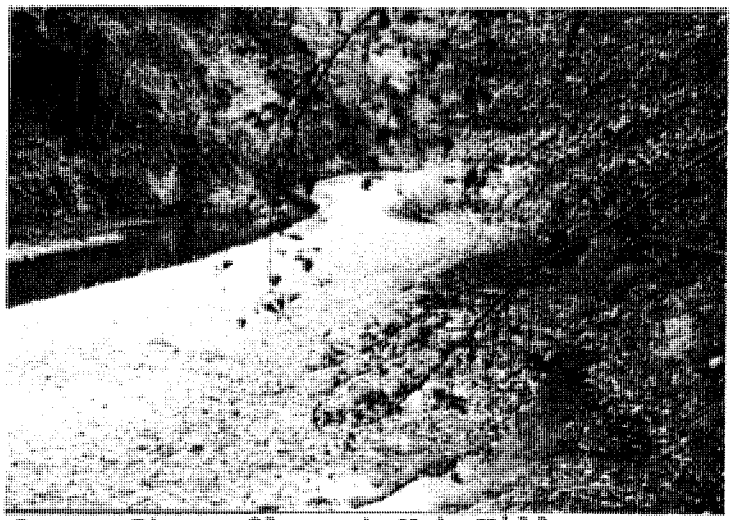
Reach 2, Fish Cover 8Sep95



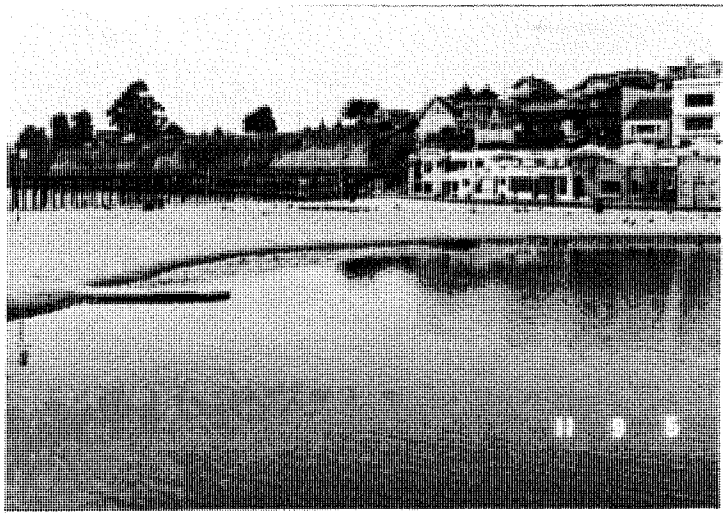
70% Coverage of Algae in Reach 3 8Sep95



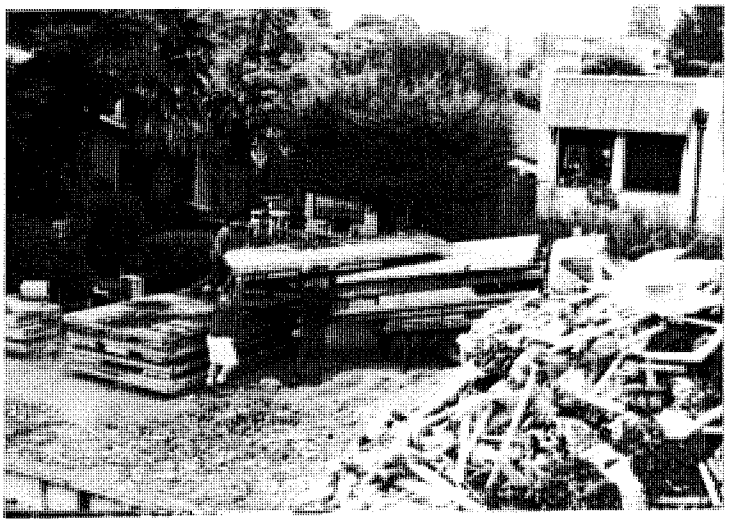
Ducks Looking for A Handout, Reach 3 8Sep95



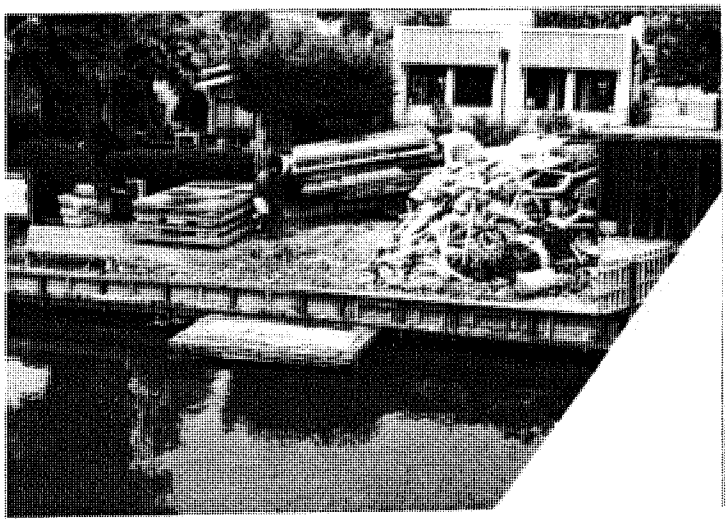
Streamflow at Nob Hill 3 cfs Baseflow 8Sep95



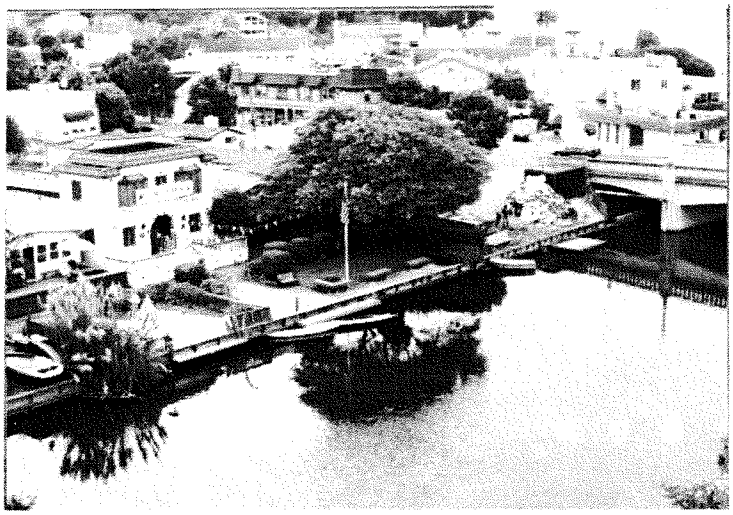
Begonias Collect Near Flume 11Sep95



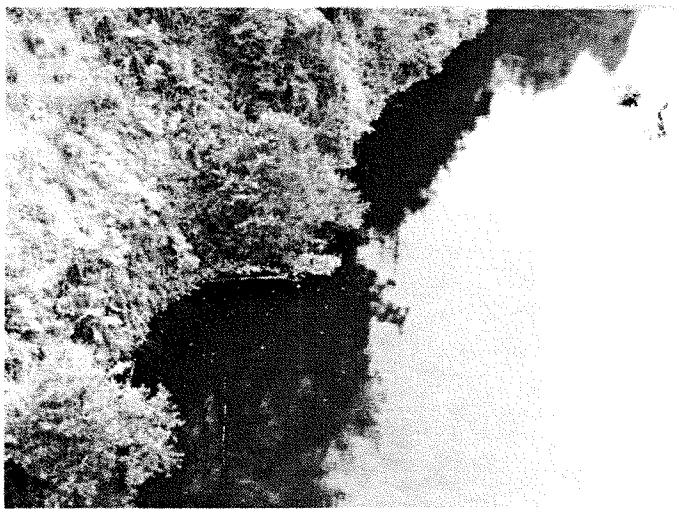
Poster in the Window 11Sep95



Begonia Festival Cleanup 11Sep95

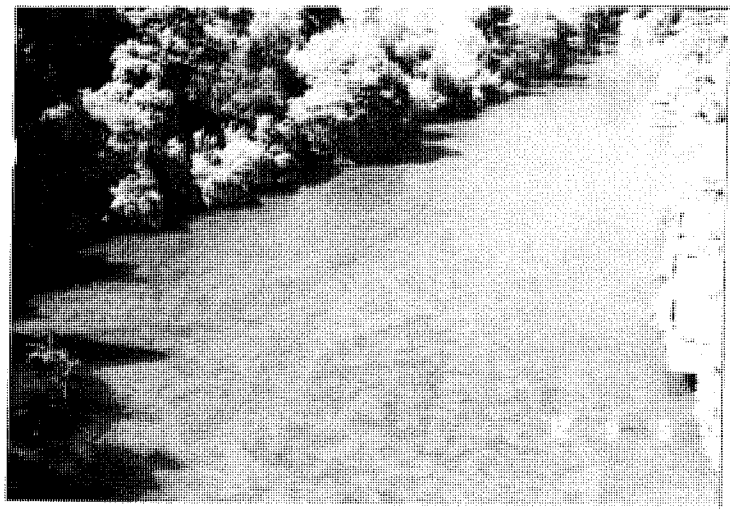


Begonia Festival in Progress 11Sep95

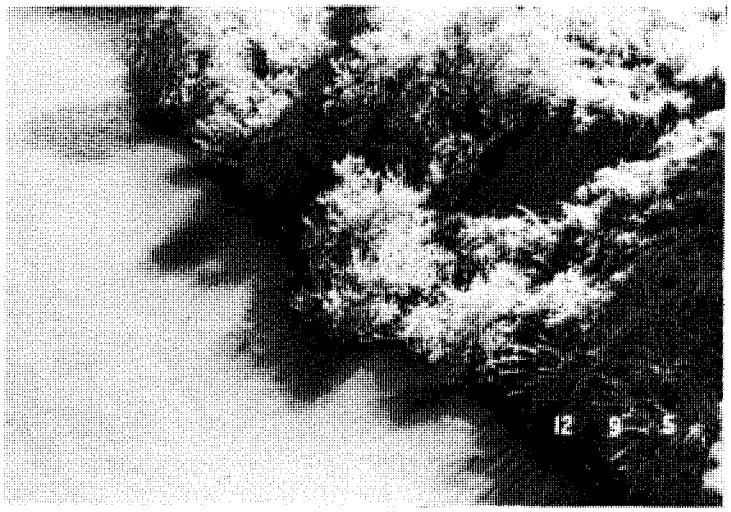


Begonias Along West Margin, Reach 3 11Sep95

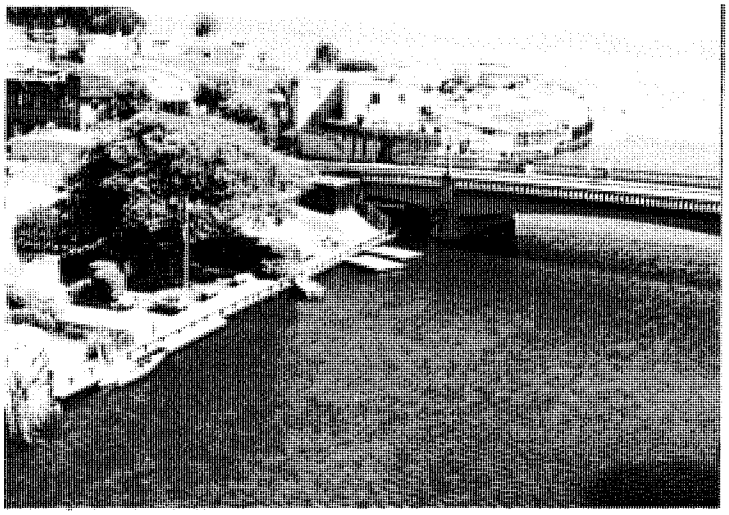
Begonias Collected from West Margin 12Sep95



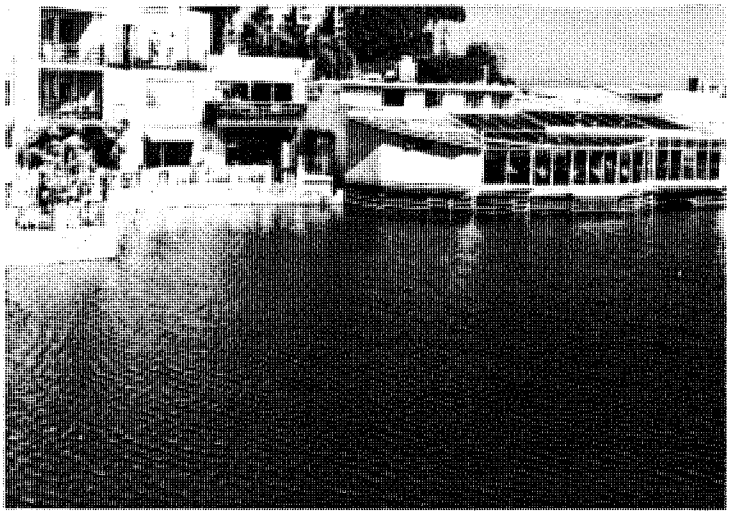
Reach 3 Cleared of Begonias, Less Algae on Bottom 12Sep95



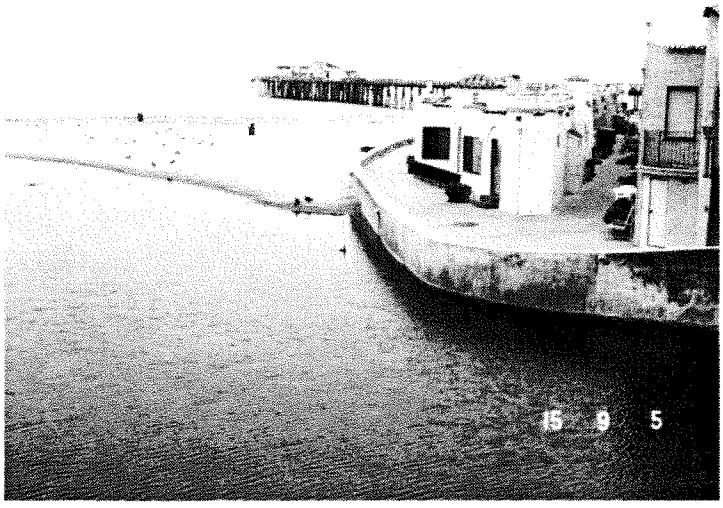
Reach 2 Cleared of Begonias, Willows Senescing 12Sep95



Reach 2, East Side 12Sep95

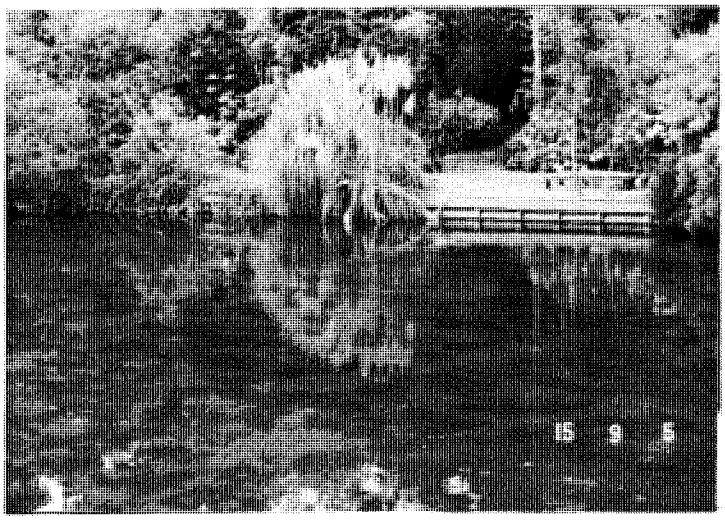


Reach 1, Restaurant Cove 12Sep95

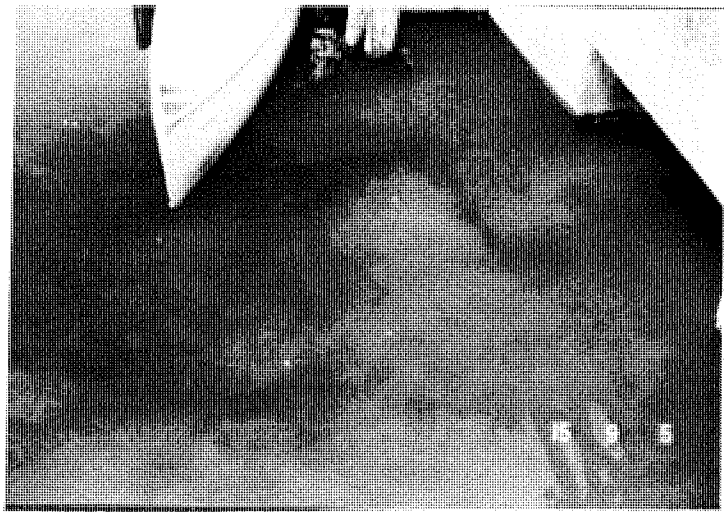


Reach 1, Venetian Courts, Note Cormorant 15Sep95

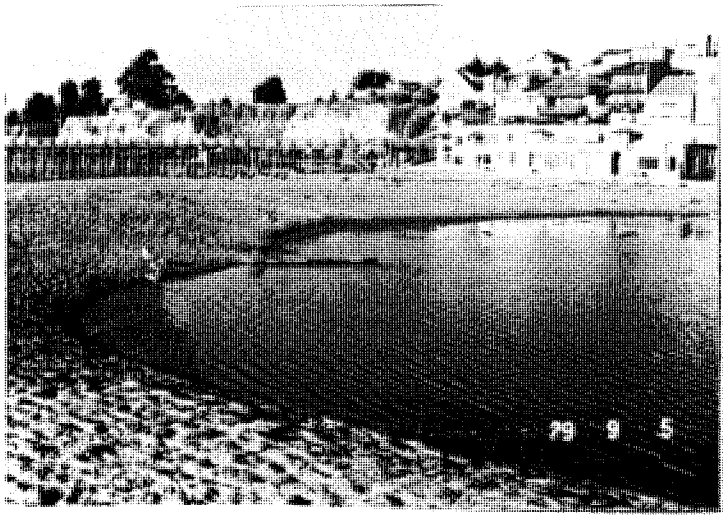
Pondweed and Algae, Reach 1 15Sep95



Reach 3, West Side 15Sep95



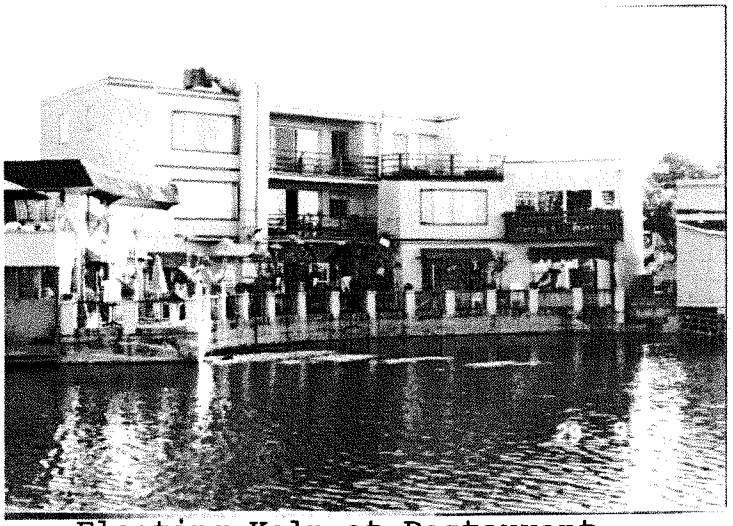
Water Pollution at Noble Gulch
a Common Sight 15Jul95



Flume Entrance, Gage Ht. = 2.12
25Sep95 (Photo date incorrect)

Beach after Tidal Overwash
25Sep95

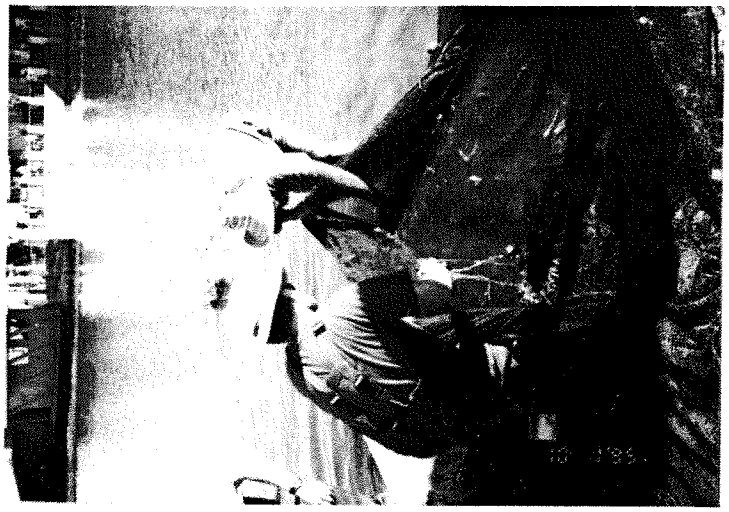
Reach 1, Sandbar Evidence of Tidal
Overwash 25Sep95



Floating Kelp at Restaurant
Cove 25Sep95

Fish Seining, Beaching the Seine 10ct95

Pulling in the Seine, Wondering How Many Steelhead? 10ct95

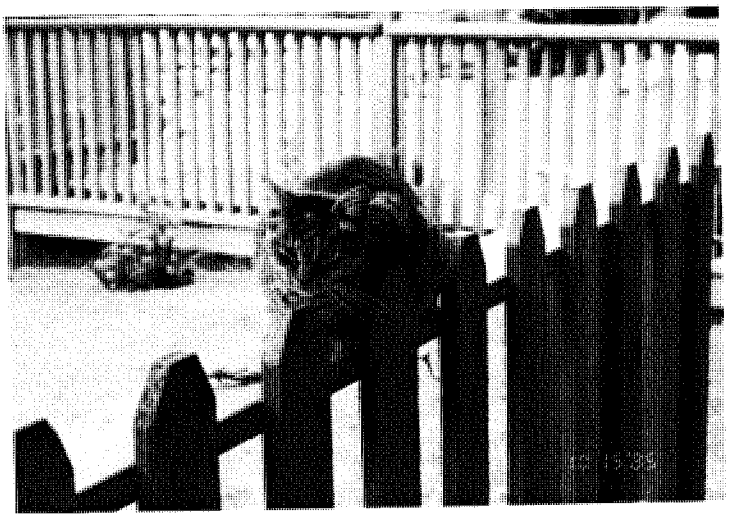


Capturing the Steelhead 10ct95

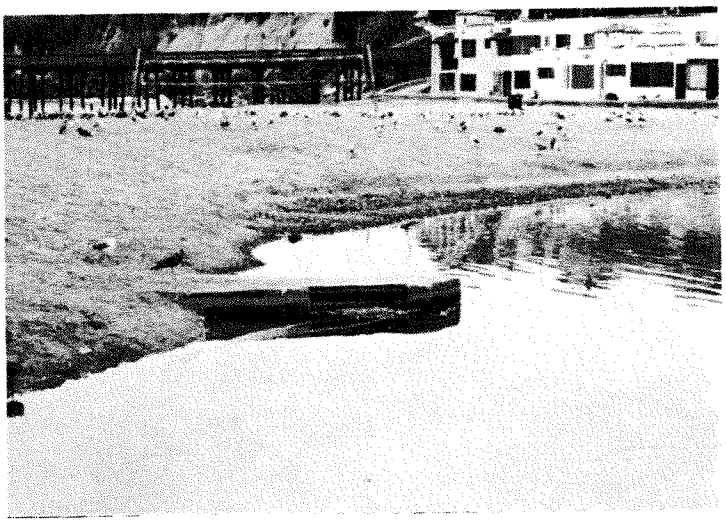
Capturing the Steelhead 10ct95

Holding Without Squeezing the Steelhead 10ct95

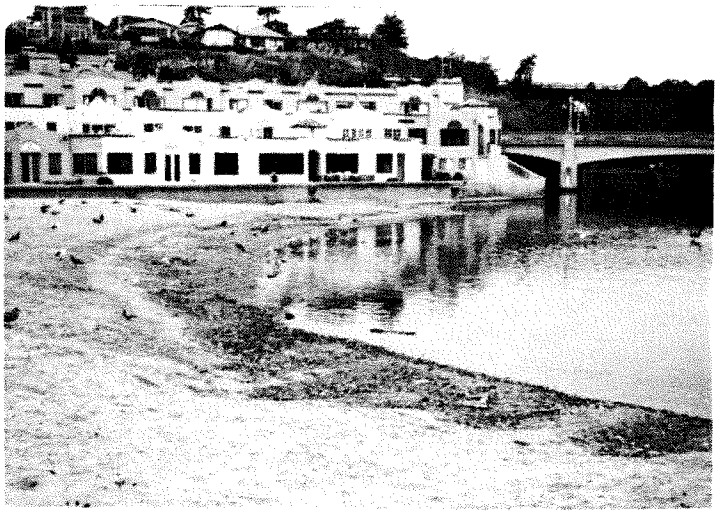
Large Yearling Steelhead 80ct95



Feline Friend Since the Beginning
150ct95

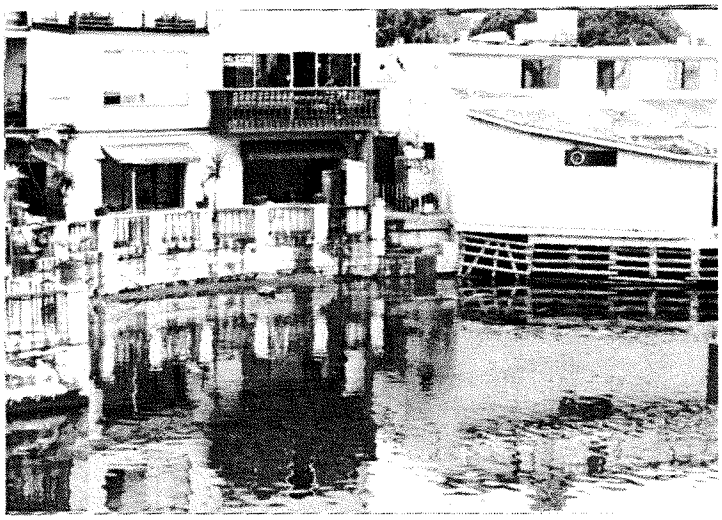


Lowered Lagoon, Gage Ht = 1.4
150ct95

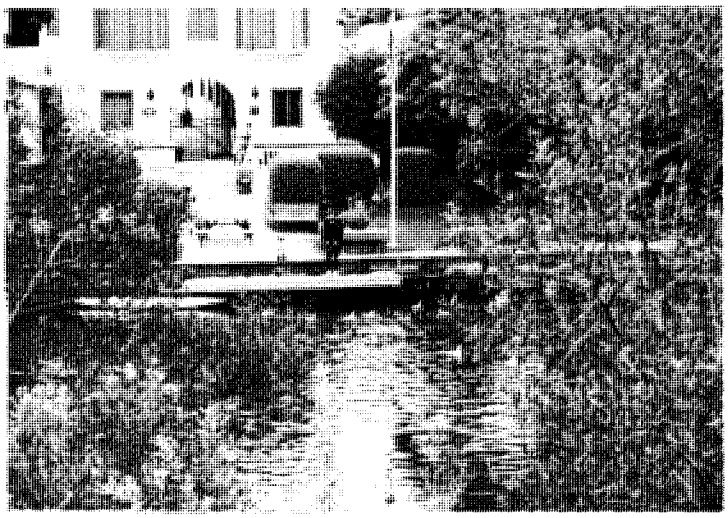


Reach 1 Adjacent Venetian Court
150ct95

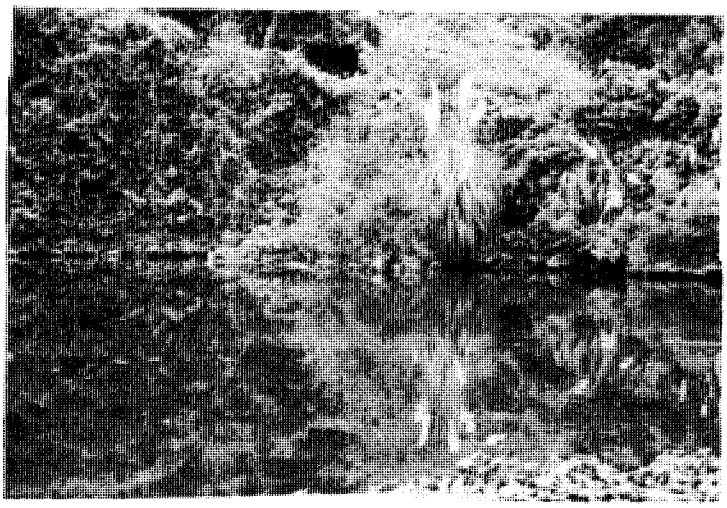
First Merganser Seen 150ct95



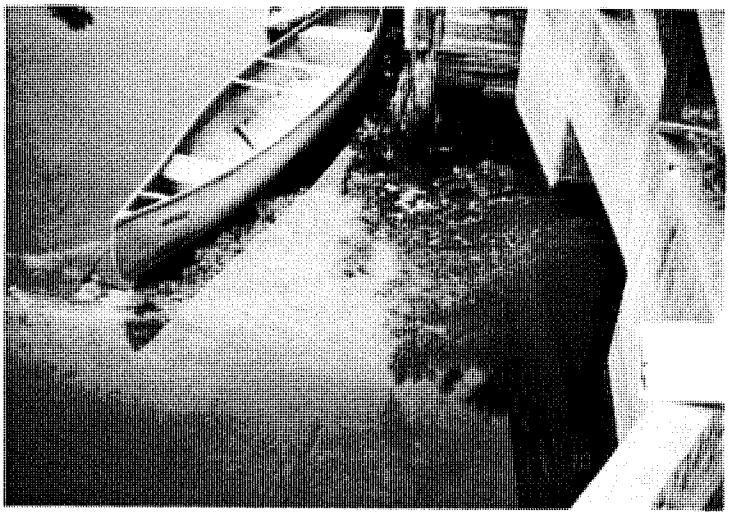
Sand Visible at Restaurant Cove
150ct95



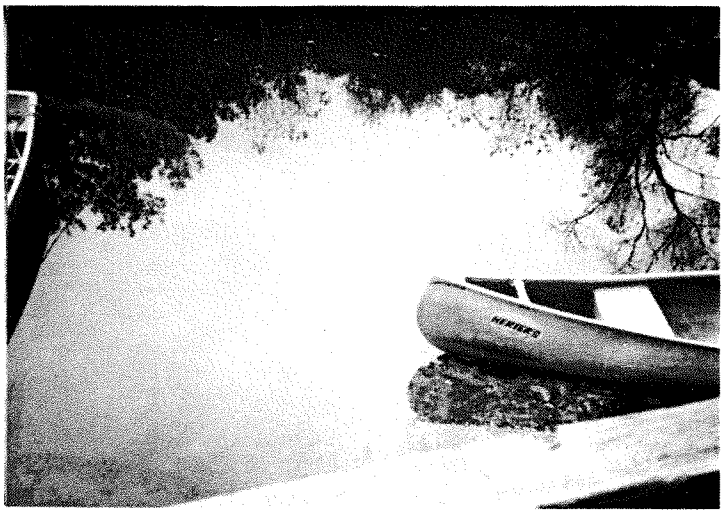
Bird-Feeding 150ct95



Gap Between Riparian and Water, Reach 3 15Oct95



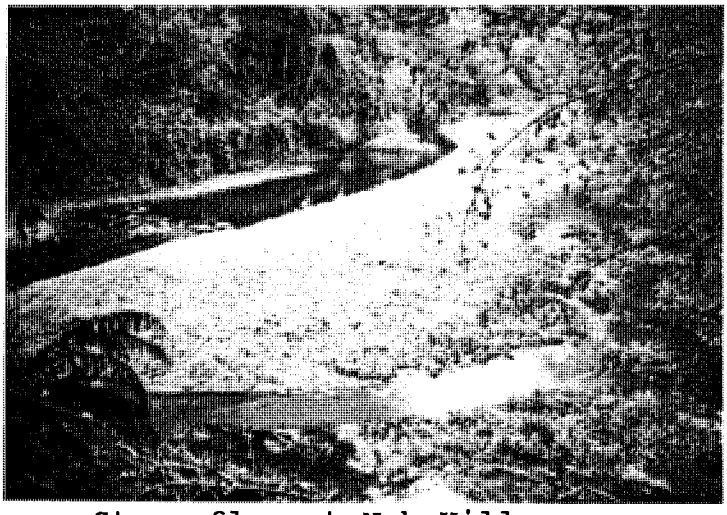
Serious Pollution at Noble Gulch 15Oct95



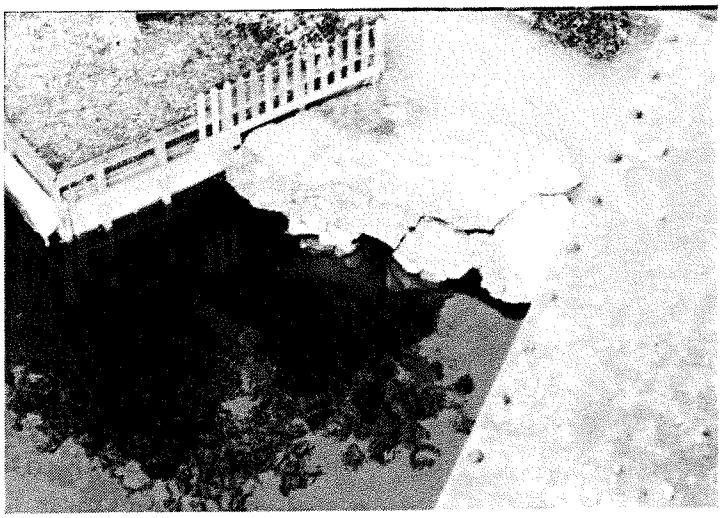
Oily Slick Leads Away from Noble Gulch 15Oct95

Coots Return to Soquel Lagoon 15Oct95

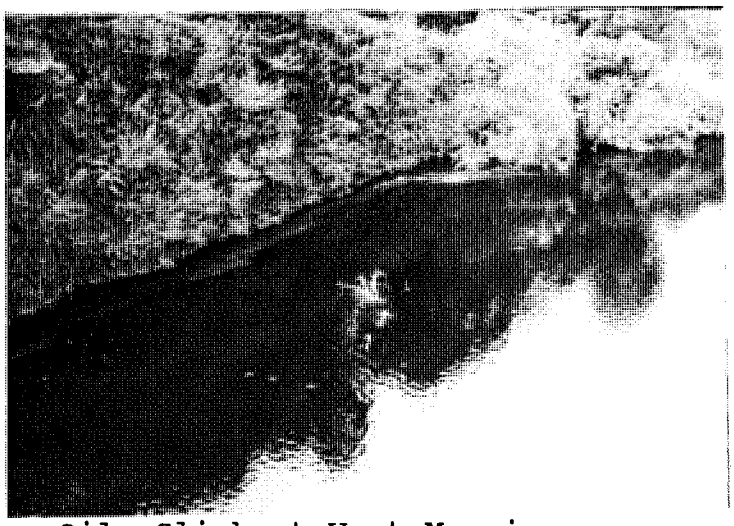
Reach 2, Last Water Quality Monitoring of the Season 15Oct95



Streamflow at Nob Hill After First Rain 1Nov95

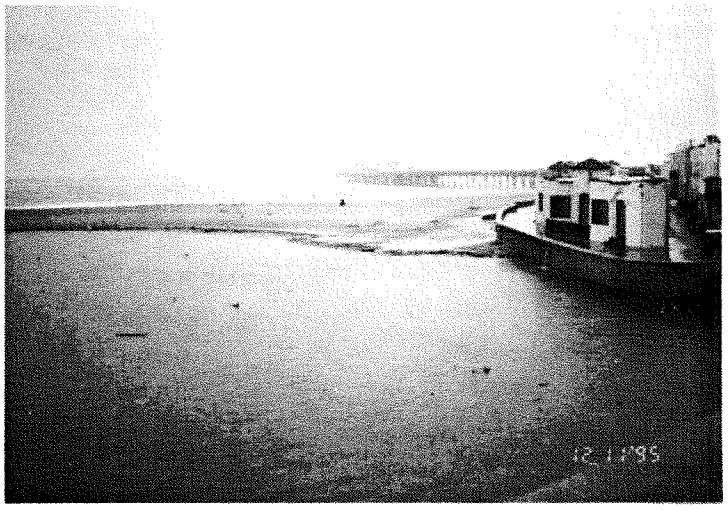


Tea-colored Water Below Trestle with Concrete Cracking 1Nov95



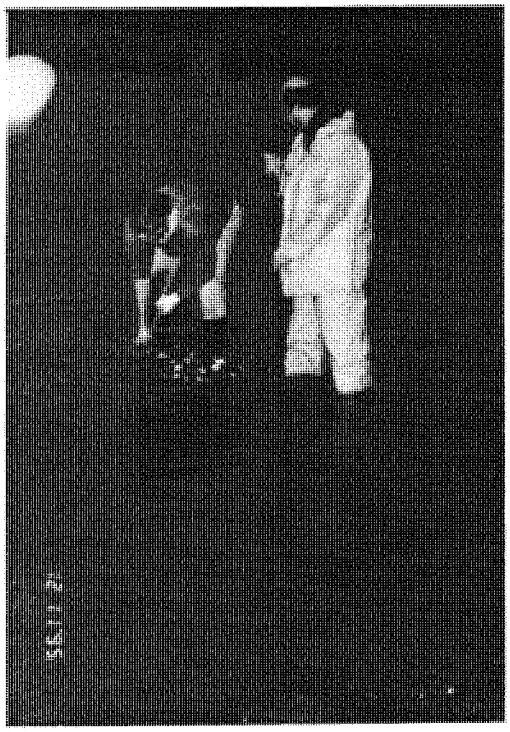
Oily Slick at West Margin, Reach 3 1Nov95

Reach 1 18Nov95

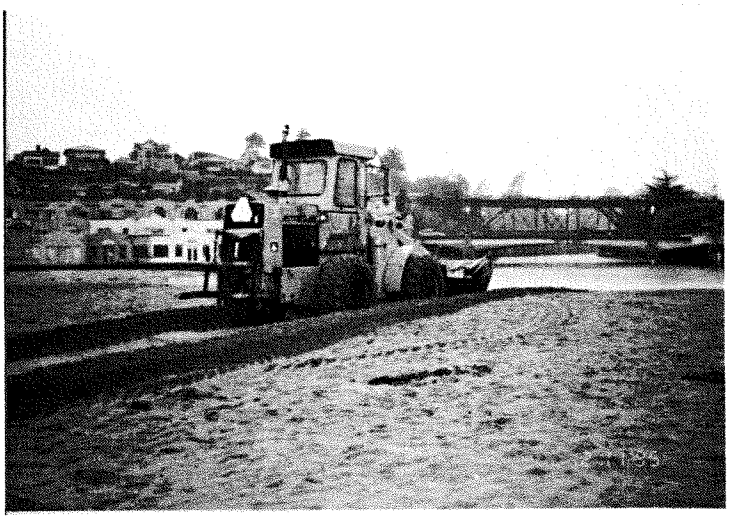


Reach 1, 11Dec95, During Storm

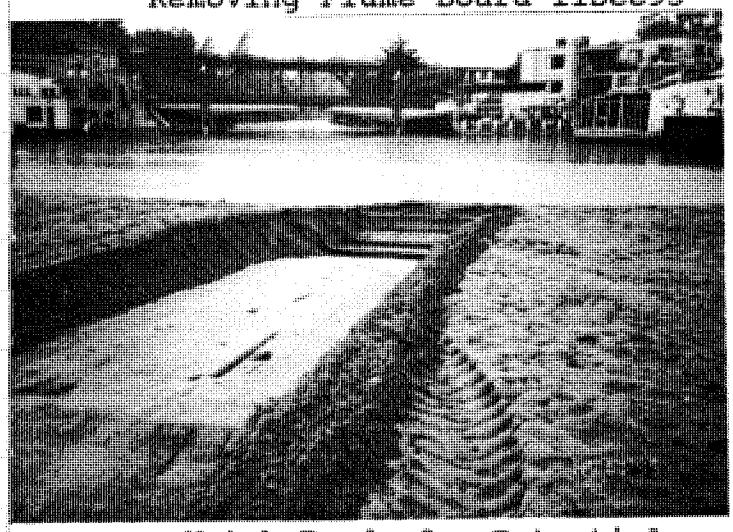
Flume at Full Capacity 11Dec95



Ed Morrison and Ed Garcia,
Removing Flume Board 11Dec95



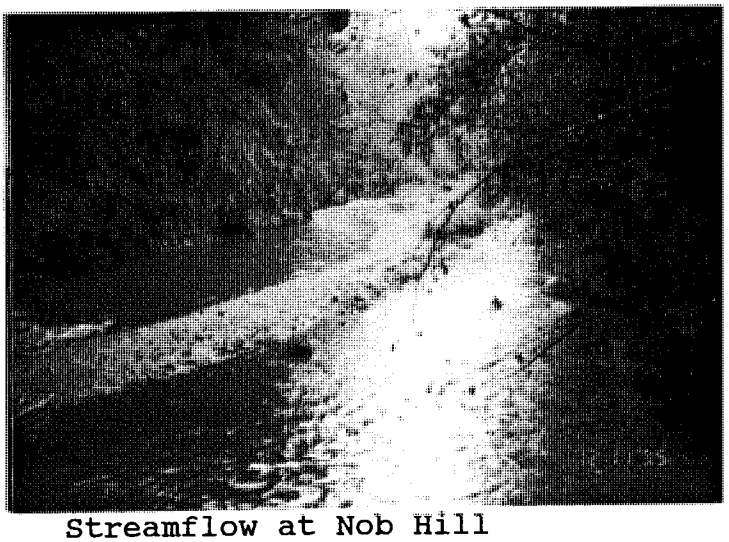
Preparing the Notch for Sandbar
Breach 11Dec95



Notch Ready for Potential
Sandbar Breach 11Dec95

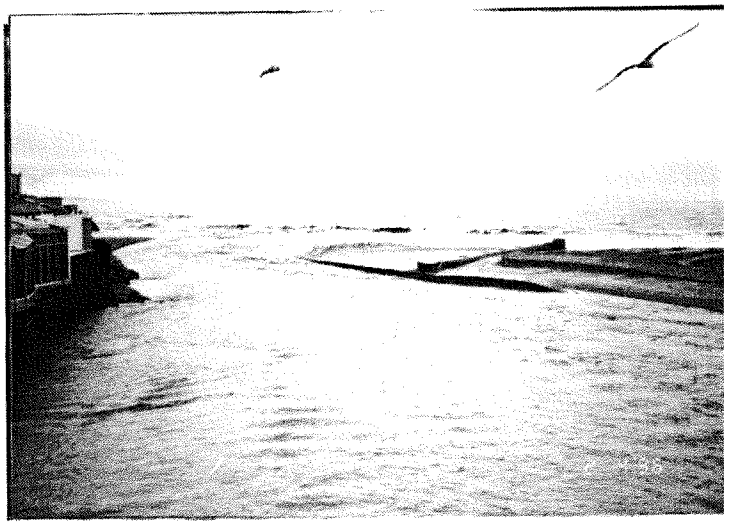
Sandbar Breach Later on 11Dec95

Soquel Creek to the Ocean 11Dec95



Streamflow at Nob Hill
After Breach 11Dec95

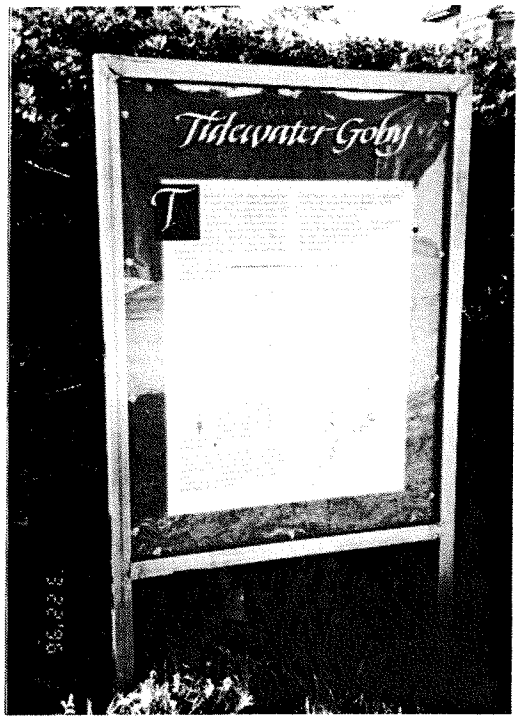
Winter Channel 25Jan96



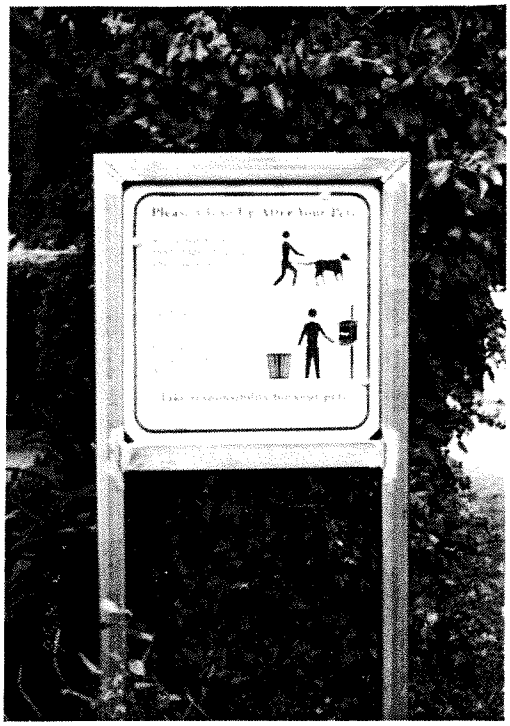
Winter Channel 4Feb96

Refurbished Signs with Stainless-
Steel Frames and New Lexan Covers
4Feb96

Refurbished Steelhead Sign
22Mar96



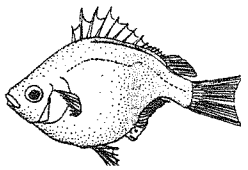
Refurbished Tidewater Goby Sign
22Mar96



Sign for Pet Clean-up
4Feb96

APPENDIX B.

FISH AND GAME AGREEMENT REGARDING PROPOSED STREAM OR LAKE ALTERATION, 1995.



Notification No. 0374-93 TEP No._____

AGREEMENT REGARDING PROPOSED STREAM OR LAKE ALTERATION

THIS AGREEMENT, entered into between the State of California, Department of Fish and Game, hereinafter called the Department, and City of Capitola of Capitola, State of California, hereinafter called the operator, is as follows:

WHEREAS, pursuant to Division 2, Chapter 6 of California Fish and Game Code, the operator, on the 28 day of April, 1993, notified the Department that he intends to substantially divert or obstruct the natural flow of, or substantially change the bed, channel, or bank of, or use material from the streambed of the following water: Soquel Creek, in the County of Santa Cruz, State of California, S__-__ T__-__ R__-__.

WHEREAS, the Department (represented by Dennis Baldwin has made an inspection of subject area on the 28 day of April 28, 1993, and) has determined that such operations may substantially adversely affect existing fish and wildlife resources including: Salmon, steelhead, Tidewater gobies, non-game fish, riparian strip birdlife and animal life.

THEREFORE, the Department hereby proposes measures to protect fish and wildlife during the operator's work. The operator hereby agrees to accept the following recommendations as part of his work: Numbers 7, 10, 20, 21, 22 (649-2870) from the list of recommendations on the back of this page and the following special recommendations:

*THIS IS A THREE (3) YEAR AGREEMENT, VALID FOR THE TIME PERIODS:
1. All work in or near the stream or lake shall be confined to the period May 10, 1993 - October 15, 1993
May 10, 1994 - October 15, 1994
May 10, 1995 - October 15, 1995
2. This agreement does not take effect until the appropriate yearly fees have been received in the Regional Office and yearly approval has been received from the warden for the area of your project. It is the operator's responsibility to contact DFG at (707) 944-5520 for the fees for each year.
3. This project shall be limited to damming of Soquel Creek at the mouth, subject to the below conditions:
4. A new, straight line breech may be made. The existing channel shall be seined, with all fish being placed in the Lagoon, prior to a plug of sand being placed at the head of the outflow channel. Prior to the filling of any holes along the edge of the Lagoon, these areas shall be seined and netted off to prevent fish from re-entering the area.
5. Operator shall put the flume in operation during all construction and during all daily closures during construction.
6. All seaweed shall be removed from the channel bottom before damming occurs.
7. The steel shroud put in place in 1992, shall be placed on the flume. A minimum of 8-12 inches of water shall be maintained through the flume. The flume shall be kept open to the ocean until at least July 1 of each year. After final damming, no draw down will be allowed without prior DFG approval. Operator shall contact DFG prior to breeching unless flooding is imminent.

The operator, as designated by the signature on this agreement, shall be responsible for the execution of all elements of this agreement. A copy of this agreement must be provided to contractors and subcontractors and must be in their possession at the work site.

If the operator's work changes from that stated in the notification specified above, this agreement is no longer valid and a new notification shall be submitted to the Department of Fish and Game. Failure to comply with the provisions of this agreement and with other pertinent Code Sections, including but not limited to Fish and Game Code Sections 5650, 5652 and 5948, may result in prosecution.

Nothing in this agreement authorizes the operator to trespass on any land or property, nor does it relieve the operator of responsibility for compliance with applicable federal, state, or local laws or ordinances.

THIS AGREEMENT IS NOT INTENDED AS AN APPROVAL OF A PROJECT OR OF SPECIFIC PROJECT FEATURES BY THE DEPARTMENT OF FISH AND GAME. INDEPENDENT REVIEW AND RECOMMENDATIONS WILL BE PROVIDED BY THE DEPARTMENT AS APPROPRIATE ON THOSE PROJECTS WHERE LOCAL, STATE, OR FEDERAL PERMITS OR OTHER ENVIRONMENTAL REPORTS ARE REQUIRED.

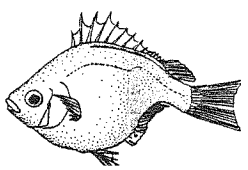
This agreement becomes effective on when signed by both parties.

Operator T.L. Morrison
Title Maint. Supt.
Organization City of Capitola
Date May 3, 1993

Department Representative Dennis L. Baldwin
Title Patrol Lieutenant
Department of Fish and Game, State of California
Date May 3, 1993

APPENDIX C.

SANTA CRUZ COUNTY WATER MONITORING DATA FOR FECAL COLIFORM BACTERIA.



ENVIRONMENTAL HEALTH WATER QUALITY MONITORING PROGRAM - LOWER SOQUEL CREEK

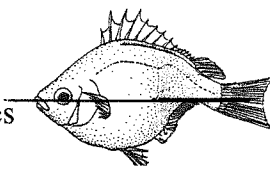
STANUM	LOCATION	DATE	TIME	TEMP-C	FECOLI	NOTES
S25	SOQUEL C ABOVE SOQUEL DR	25-Jan-95		12	100	BROWN WATER. RAIN 1/24.
S25	SOQUEL C ABOVE SOQUEL DR	01-Feb-95		14.5	120	BROWN WATER.
S25	SOQUEL C ABOVE SOQUEL DR	29-Mar-95			10	BROWN WATER.
S25	SOQUEL C ABOVE SOQUEL DR	05-Apr-95		15	60	GREYWATER.
S25	SOQUEL C ABOVE SOQUEL DR	18-Apr-95			0	CLEAR WATER. FECAL COLI-<20.
S25	SOQUEL C ABOVE SOQUEL DR	07-Jun-95		16	180	CLEAR WATER.
S25	SOQUEL C ABOVE SOQUEL DR	26-Jul-95			60	CLEAR WATER.
S25	SOQUEL C ABOVE SOQUEL DR	02-Aug-95			80	
S25	SOQUEL CREEK @ SOQUEL BRIDGE	04-Oct-95	03:35 PM		45	GREEN ALGAE. SOME LEAF ACCUM., BROWN H2O
S25	SOQUEL CREEK @ SOQUEL BRIDGE	18-Oct-95	02:40 PM		320	GREEN ALGAE. SOME LEAF ACCUMULATION
S24	SOQUEL C BELOW SOQUEL DR	25-Jan-95		12	60	BROWN WATER. RAIN 1/24.
S24	SOQUEL C BELOW SOQUEL DR	05-Apr-95		15	60	GREYWATER.
S24	SOQUEL C BELOW SOQUEL DR	18-Apr-95			40	CLEAR WATER.
S24	SOQUEL C BELOW SOQUEL DR	07-Jun-95		16	220	CLEAR WATER.
S24	SOQUEL C BELOW SOQUEL DR	26-Jul-95			340	CLEAR WATER.
S24	SOQUEL C BELOW SOQUEL DR	02-Aug-95			140	
S24	SOQUEL CRK BELOW SOQUEL BRIDGE	12-Oct-95	02:25 PM		360	2 DUCKS. SOME LEAVES. GREEN ALGAE
S2305	SOQUEL C ABOVE STORM D#2	19-Jul-95			1100	CLEAR WATER.
S23043	STORM D @ MAZDA DEALER	19-Jul-95			ERR	DRY-SALESMAN SAID THEY HAVE FILTRATION
S23041	STORM D @ CHEVROLET DEALER	19-Jul-95			201000	WASHING CARS. FECAL COLI=TNTC.
S2303	STORM D #2 @ SOQUEL C @ HWY 1	08-Jun-95			2400	SUDSY WATER, GOOD FLOW.
S2303	STORM D #2 W SOQUEL C BELOW H1	22-Jun-95			20100	FECAL COLI=TNTC.
S2303	SOQUEL C @ STORM 2 BELOW H. 1	12-Jul-95			4020	FECAL COLI=TNTC; GREYWATER.
S2303	STORM D#2 @ SOQUEL D BEL HY 1	19-Jul-95			201000	DARK GREEN WATER. FECAL COLI=TNTC.
S2302	SOQUEL C BELOW STORM D #2	08-Jun-95			720	CLEAR WATER.
S2302	SOQUEL C BELOW STORM D#2.	17-Jul-95			920	CLEAR WATER.
S23	SOQUEL C @ NOB HILL	05-Jan-95			1000	BROWN WATER. RAIN 1/5/95.
S23	SOQUEL C @ NOB HILL	12-Jan-95			300	BROWN WATER. RAIN 1/11.
S23	SOQUEL C @ NOB HILL	25-Jan-95		12	60	BROWN WATER. RAIN 1/24.
S23	SOQUEL C @ NOB HILL	01-Feb-95		14.5	70	BROWN WATER.
S23	SOQUEL C @ NOB HILL	29-Mar-95			100	BROWN WATER.
S23	SOQUEL C @ NOB HILL	05-Apr-95	12:30 PM	14	20	GREYWATER.
S23	SOQUEL C @ NOB HILL	12-Apr-95		14	400	CLEAR WATER.
S23	SOQUEL C @ NOB HILL	18-Apr-95		13	140	CLEAR WATER.
S23	SOQUEL C @ NOB HILL	17-May-95			520	CLEAR WATER.
S23	SOQUEL C @ NOB HILL	07-Jun-95		15	480	CLEAR WATER.
S23	SOQUEL C @ NOB HILL	08-Jun-95			440	CLEAR WATER.
S23	SOQUEL C @ NOB HILL	12-Jul-95			1240	CLEAR WATER.
S23	SOQUEL C @ NOB HILL	17-Jul-95		19	820	CLEAR WATER.
S23	SOQUEL C @ NOB HILL	17-Jul-95			560	CLEAR WATER.
S23	SOQUEL C @ NOB HILL	26-Jul-95			1760	CLEAR WATER.
S23	SOQUEL C @ NOB HILL	02-Aug 95			1140	ALGAE.
S23	SOQUEL C @ NOB HILL	07-Aug-95			940	CLEAR WATER.
S23	SOQUEL CRK @ NOB HILL	14-Aug-95	01:00 PM		660	A LOT OF PERI., 2 KIDS & 1 DOG IN STREAM
S23	SOQUEL CREEK @ NOB HILL	16-Aug-95	01:00 PM		300	FOAM,LOT'S OF GREEN ALGAE IN SUNNY AREAS
S23	SOQUEL CREEK @ NOB HILL	27-Sep-95	04:15 PM		1760	GREEN ALGAE
S23	SOQUEL CREEK @ NOB HILL	02-Oct-95	03:25 PM		600	GREEN ALGAE GROWING, CLEAR WATER, LEAVES
S23	SOQUEL CREEK @ NOB HILL	04-Oct-95	03:45 PM		500	LOT'S OF GREEN ALGAE. SOME LEAF ACCUM.
S23	SOQUEL CREEK @ NOB HILL	10-Oct-95	02:30 PM		900	LEAF ACCUM., SOME GREEN ALGAE. CLEAR H2O
S23	SOQUEL CRK BELOW NOB HILL	12-Oct-95	02:35 PM		560	GREEN ALGAL GROWTH. LEAF ACCUMULATION
S23	SOQUEL CRK @ NOB HILL	12-Oct-95	02:45 PM		1940	CLEAR WATER, LEAF ACCUMULATION
S23	SOQUEL CRK BELOW NOB HILL	18-Oct-95	03:00 PM		380	16 BIRDS. LOT'S OF GREEN ALGAE. LEAF ACC
S23	SOQUEL CREEK @ NOB HILL	18-Oct-95	02:50 PM		200	LEAF ACCUMULATION. CLEAR WATER. NO ALGAE
S12	NOBEL G @ TUNNEL @ BAY	05-Jan-95			1100	BROWN WATER. RAIN 1/5/95.
S1	NOBEL G @ SOQUEL C	05-Apr-95	12:20 PM		820	
S1	NOBEL G @ SOQUEL C	12-Apr-95		14	40	CLEAR WATER.
S1	NOBEL G @ SOQUEL C	18-Apr-95			280	CLEAR WATER.
S1	NOBEL G @ SOQUEL C	03-May-95			2100	BROWN WATER.
S1	NOBEL G @ SOQUEL C	15-May-95			280	GREYWATER.

PRINT DATE: 04/24/96

ENVIRONMENTAL HEALTH WATER QUALITY MONITORING PROGRAM - LOWER SOQUEL CREEK

STANUM	LOCATION	DATE	TIME	TEMP-C	FECOLI	NOTES
S08	SOQUEL C @ NOBEL G	05-Apr-95	12:15 PM		160	GREYWATER.
S08	SOQUEL C @ NOBEL G	18-Apr-95		14	220	CLEAR WATER.
S08	SOQUEL C @ NOBEL G	03-May-95			400	BROWN WATER.
S08	SOQUEL C @ NOBEL G	15-May-95			310	GREYWATER.
S08	SOQUEL C @ NOBEL G	07-Jun-95		16	360	CLEAR WATER.BROWN-CLOUDY WATER NOBEL G
S08	SOQUEL C @ NOBEL G	12-Jul-95			280	CLEAR WATER.
S08	SOQUEL C @ NOBEL G	26-Jul-95			400	CLEAR WATER.
S08	SOQUEL C @ NOBEL G	02-Aug-95			320	ALGAE.
S08	SOQUEL CREEK @ NOBEL GULCH	04-Oct-95	04:00 PM		300	GREEN WATER & ALGAE ON TOP
S08	SOQUEL CREEK @ NOBLE GULCH	06-Nov-95	02:40 PM		460	GREEN WATER. 30 DUCKS. CAN'T SEE BOTTOM
S07	SOQUEL C @ TRESTLE	05-Apr-95	12:40 PM	14	260	GREYWATER.
S07	SOQUEL C @ TRESTLE	07-Jun-95			240	CLEAR WATER.
S07	SOQUEL C @ TRESTLE	26-Jul-95			440	CLEAR WATER.
S07	SOQUEL C @ TRESTLE	02-Aug-95			600	ALGAE.
S07	SOQUEL C @ TRESTLE	07-Aug-95			500	CLEAR WATER.
S07	SOQUEL C @ TRESTLE	14-Aug-95	01:15 PM		360	YELLOWISH GREEN WATER W/ 2 DUCKS.
S07	SOQUEL C @ TRESTLE	27-Sep-95	03:50 PM		240	3 DUCKS. GREEN H2O. SOME AQUATIC PLANTS
S07	SOQUEL C @ TRESTLE	04-Oct-95	04:15 PM		150	LOT'S OF GREEN ALGAE. FILM FROM TREES
S07	SOQUEL C @ TRESTLE	06-Nov-95	02:25 PM		160	GREEN ALGAE GROWING IN CLUMPS. 20 DUCKS
S01	SOQUEL C @ VENETIAL APTS.	07-Jun-95		17.5	860	SEAGULLS, CLEAR WATER.
S01	SOQUEL C @ VENETIAN APTS	13-Jun-95		19	450	CLEAR WATER.
S001	CAPITOLA BEACH @ JETTY	13-Sep-95	03:55 PM		304	GREEN WATER WITH SOME SEAWEED
S00	SOQUEL C @ FLUME	03-Jan-95			5200	GREYWATER, RAIN 1/3.
S00	SOQUEL C @ FLUME	05-Jan-95			2300	RAIN 1/5/95.
S00	SOQUEL C @ FLUME	11-Jan-95		13	1200	BROWN WATER, RAIN.
S00	SOQUEL C @ FLUME	12-Jan-95			500	BROWN WATER. RAIN 1/11.
S00	SOQUEL C @ FLUME	23-Jan-95		12	1800	BROWN WATER. RAIN 1/22.
S00	SOQUEL C @ FLUME	25-Jan-95		12.5	420	BROWN WATER.RAIN 1/24.
S00	SOQUEL C @ FLUME	30-Jan-95			280	BROWN WATER.
S00	SOQUEL C @ FLUME	01-Feb-95			220	BROWN WATER, HIGH TIDE.
S00	SOQUEL C @ FLUME	06-Feb-95		13	160	GREYWATER.
S00	SOQUEL C @ FLUME	13-Feb-95		12	820	CLEAR WATER.
S00	SOQUEL C @ FLUME	15-Feb-95			2100	CLEAR WATER. SEAGULLS.
S00	SOQUEL C @ FLUME	21-Feb-95		14	1780	CLEAR WATER.
S00	SOQUEL C @ FLUME	27-Feb-95		15	60	CLEAR WATER. 25 SEAGULLS.
S00	SOQUEL C @ FLUME	15-Mar-95		13.5	350	BROWN WATER.
S00	SOQUEL C @ FLUME	27-Mar-95		11.5	260	BROWN WATER.
S00	SOQUEL C @ FLUME	29-Mar-95			40	GRAY WATER
S00	SOQUEL C @ FLUME	03-Apr-95	01:00 PM	15	400	GRAY WATER
S00	SOQUEL C @ FLUME	05-Apr-95	12:05 PM	15	160	GRAY WATER
S00	SOQUEL C @ FLUME	12-Apr-95		15	380	CLEAR WATER.
S00	SOQUEL C @ FLUME	18-Apr-95		15	800	CLEAR WATER.
S00	SOQUEL C @ FLUME	24-Apr-95		15	270	CLEAR WATER.
S00	SOQUEL C @ FLUME	01-May-95			1700	BROWN WATER. RAIN 5/1/95.
S00	SOQUEL C @ FLUME	03-May-95			300	BROWN WATER.
S00	SOQUEL C @ FLUME	15-May-95		15	500	CLEAR WATER. 20 SEAGULLS.
S00	SOQUEL C @ FLUME	17-May-95			140	CLEAR WATER.
S00	SOQUEL C @ FLUME	22-May-95		15	440	CLEAR WATER.
S00	SOQUEL C @ FLUME	30-May-95			1300	10 SEAGULLS. CLEAR WATER.
S00	SOQUEL C @ FLUME	01-Jun-95			1460	
S00	SOQUEL C @ FLUME	05-Jun-95		20	4980	CLEAR WATER.
S00	SOQUEL C @ FLUME	07-Jun-95		17.5	640	CLEAR WATER.
S00	SOQUEL C @ MOUTH	08-Jun-95			260	CLEAR WATER.
S00	SOQUEL C @ FLUME	13-Jun-95		19	800	CLEAR WATER.
S00	SOQUEL C @ FLUME	20-Jun-95		16	900	POSTED. CLEAR WATER.
S00	SOQUEL C @ FLUME	26-Jun-95			900	SAMPLE TAKEN IN AFTERNOON.
S00	SOQUEL C @ FLUME	26-Jun-95		20	1680	CLEAR WATER. 11 SEAGULLS.MORNING SAMPLE.
S00	SOQUEL C @ FLUME	28-Jun-95			1800	CLEAR WATER.
S00	SOQUEL C @ FLUME	05-Jul-95		19	1300	CLEAR WATER.

PRINT DATE: 04/24/96

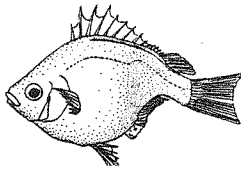


ENVIRONMENTAL HEALTH WATER QUALITY MONITORING PROGRAM - LOWER SOQUEL CREEK

STANUM	LOCATION	DATE	TIME	TEMP-C	FECOLI	NOTES
S00	SOQUEL C @ FLUME	10-Jul-95		21	1500	CLEAR WATER. 10 SEAGULLS.
S00	SOQUEL C @ FLUME	12-Jul-95			1060	CLEAR WATER.
S00	SOQUEL C @ MOUTH	17-Jul-95		20	700	CLEAR WATER, 6 BIRDS.
S00	SOQUEL C @ FLUME	24-Jul-95			1400	30 SEAGULLS. CLEAR WATER.
S00	SOQUEL C @ FLUME	26-Jul-95			1220	CLEAR WATER, SEAGULLS.
S00	SOQUEL C @ FLUME	31-Jul-95			1320	CLEAR WATER. 30 SEAGULLS.
S00	SOQUEL C @ FLUME	02-Aug-95			820	ABOUT 200 WATERFOWL.
S00	SOQUEL C @ FLUME	07-Aug-95			1960	CLEAR WATER.
S00	SOQUEL C @ FLUME	14-Aug-95	01:15 PM		1280	40 WATERFOWL. GREENISH YELLOW WATER
S00	SOQUEL C @ FLUME	16-Aug-95	01:15 PM		400	50 WATERFOWL. GREEN WATER
S00	SOQUEL CRK @ FLUME	22-Aug-95	05:10 PM		1266.6	40 WATERFOWL. GREEN WATER
S00	SOQUEL C @ FLUME	30-Aug-95			800	200 WATERFOWL. SOME GREEN ALGAE
S00	SOQUEL C @ FLUME	05-Sep-95	03:45 PM		1040	CLUMPS OF GREEN ALGAE GROWING. 250 BIRDS
S00	SOQUEL C @ FLUME	07-Sep-95	02:30 PM		520	150 BIRDS. GREEN ALGAE. GREEN WATER
S00	SOQUEL C @ FLUME	11-Sep-95	01:20 PM		1020	150 WATERFOWL, GREEN ALGAE. GREEN WATER
S00	SOQUEL C @ FLUME	13-Sep-95	04:05 PM		1300	200 WATERFOWL. GREEN WATER
S00	SOQUEL C @ FLUME	18-Sep-95	01:00 PM		740	150 BIRDS. GREEN ALGAE & GREEN WATER
S00	SOQUEL C @ FLUME	25-Sep-95	05:10 PM		0	TNTC, 20 BIRDS, SEAWEED & SOME ALGAE
S00	SOQUEL C @ MOUTH	27-Sep-95	03:40 PM		3120	40 BIRDS, A LOT OF SEAWEED, GREEN WATER
S00	SOQUEL C @ FLUME	02-Oct-95	03:35 PM		1000	100 BIRDS. GREEN WATER W/SOME SEAWEED
S00	SOQUEL C @ FLUME	10-Oct-95	02:40 PM		580	LOT'S OF GREEN ALGAE GROWING. 70 BIRDS
S00	SOQUEL C @ FLUME	16-Oct-95	12:00 PM		1260	SEAWEED. GREEN ALGAE. 20 BIRDS
S00	SOQUEL C @ FLUME	16-Oct-95	12:00 PM		1260	SEAWEED, GREEN ALGAE. 20 BIRDS
S00	SOQUEL C @ FLUME	18-Oct-95	03:15 PM		400	GREEN ALGAE. FOAM ALONG 1 SIDE. 160 BIRD
S00	SOQUEL C @ FLUME	23-Oct-95	12:00 PM		800	30 BIRDS. CAN SEE BOTTOM. GREEN ALGAE
S00	SOQUEL C @ FLUME	30-Oct-95	04:00 PM		340	100 BIRDS. 1 DEAD IN WATER. GREEN ALGAE
S00	SOQUEL C @ FLUME	02-Nov-95	02:10 PM		0	TNTC (11,316), 150 BIRDS. VISIBILITY 2'>
S00	SOQUEL C @ FLUME	06-Nov-95	02:10 PM		100	GREEN ALGAE, DECAYING SEAWEED. 100 BRIDS
S00	SOQUEL C @ FLUME	08-Nov-95	04:00 PM		430	200 BIRDS. SOME GREEN ALGAE & SEAWEED
S00	SOQUEL C @ FLUME	13-Nov-95	04:50 PM		620	100 BIRDS. SEAWEED. GREEN ALGAE
S00	SOQUEL C @ FLUME	20-Nov-95	03:30 PM		1100	DECAYING SEAWEED. GREEN ALGAE. 50 BIRDS
S00	SOQUEL C @ FLUME	27-Nov-95	05:15 PM		920	20 BIRDS. SOME LEAVES
S00	SOQUEL C @ FLUME	04-Dec-95	12:35 PM		400	BROWN WATER. 75 BIRDS. GREEN ALGAE
S00	SOQUEL CRK @ FLUME	11-Dec-95	01:10 PM		19000	2 SURFERS, 10 BIRDS. LRG VOLUME OF WATER
S00	SOQUEL C @ MOUTH	17-Dec-95	03:50 PM		700	
S00	SOQUEL C @ FLUME	27-Dec-95	01:05 PM		220	YELLOW FOAM. 30 BIRDS. GREEN WATER
S00	SOQUEL C @ FLUME	02-Jan-96	02:40 PM		800	10 BIRDS. 10 KIDS. CLEAR WATER
S00	SOQUEL C @ FLUME	08-Jan-96	12:45 PM		2650	LARGE YEL. & WHITE FOAM SPOTS. 75 BIRDS
S00	SOQUEL C @ FLUME	17-Jan-96	01:20 PM		1200	WHITE FOAM. 40 BIRDS. MUDDY WATER
S00	SOQUEL CRK @ FLUME	22-Jan-96			550	BROWN WATER
S00	SOQUEL C @ FLUME	30-Jan-96			640	CLEAR WATER
S00	SOQUEL C @ FLUME	06-Feb-96			360	BROWN WATER. 25 SEAGULLS
S00	SOQUEL C @ FLUME	13-Feb-96	12:30 PM		740	BROWN. MURKY WATER. 2 CHILDREN IN WATER
S00	SOQUEL C @ FLUME	20-Feb-96			600	BROWN WATER
S00	SOQUEL CRK @ FLUME	29-Feb-96			200	BROWN WATER
S00	SOQUEL CRK @ FLUME	06-Mar-96			520	
S00	SOQUEL CRK @ FLUME	14-Mar-96			100	

APPENDIX D.

DRAIN LINE TEST FOR RESTAURANTS CONTIGUOUS WITH SOQUEL CREEK LAGOON, 1995.



1995

DRAIN LINE TEST FOR RESTAURANTS CONTIGUOUS WITH SOQUEL CREEK LAGOON

RESTAURANT	INITIAL CONTACT	TEST DATE	COMMENTS	SIGN OFF
Beach House 207 Esplanade Linda Simpson 475-5846	MAILED 4/17/95	4/27/95 sewer sanitary ok	Called 4/20/95 message	4/27/95
Ocean View 209 Esplanade Perry Choy 475-0205	4/13/95	5/5/95	Called 4/20/95 site visit 4/27/95	5/5/95
Pizza My Heart 209(A) Esplanade Keith Holtaway 426-1411 426-2511	4/13/95	5/5/95	Called 4/20/95 message site visit 4/27/95 phone response 4/28/95	5/5/95
Fog Bank 211 Esplanade Jim Williams 462-1881	4/13/95	4/27/95 sewer sanitary ok	Called 4/20/95	4/27/95
Larry's 215 Esplanade ~~Chip Vorezzio~~ Larry 475-6215	4/13/95	4/27/95 sewer sanitary ok	Called 4/20/95	4/27/95

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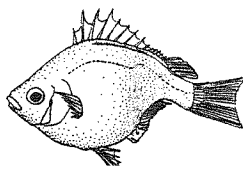
To DON ALLEY	From DANIEL
Co.	Co.
Dept.	Phone # 475-7330
Fax # 338-6045	Fax # 427-8879

APPENDIX E.

WATER QUALITY DATA AND GENERAL OBSERVATIONS OF BIRDS AND AQUATIC VEGETATION 24 JUNE - 15 OCTOBER, 1995.



24 June, 1995. It was Saturday morning. Concentrated gray, cloudy water was entering from Noble Gulch. A tree offered instream cover on west side of Reach 3. The last portal on the flume was loose, and the City was notified. Ten dogs were walked along the path during monitoring. Seven were on leashes. Three dog piles were at the Trestle Park with 5 piles on the path. Algal film covered lagoon bottom, and the water was clear. The visual estimate of streamflow at Nob Hill was 12 cfs. A mid-channel island existed that split the flow upstream of Nob Hill. Water temperature entering the lagoon was 16.5 C.

Station: Flume at 0650 hr, clear. Depth at flume entrance > 18 inches. Depth at flume exit = 18 inches. Gage Height= 1.91

Depth(m)	Temp.(C)	Salin.(ppt)	Oxygen(ppm)	Cond. (umhos)
surf.	18.7	0.00	7.75	580
0.25	18.6	0.00	7.75	580
0.50	18.6	0.00	7.75	580
0.75	18.6	0.00	7.55	580
1.00	18.8	0.00	7.40	580

Station: Stockton Avenue Bridge, Center bridge thalweg, 0705 hr. Secchi depth to bottom.

surf	17.4	0.00	8.45	580
0.25	17.4	0.00	8.20	580
0.50	17.3	0.00	7.90	580
0.75	17.3	0.00	7.85	580
1.00	17.3	0.00	7.63	580
1.15(bot)	17.2	0.00	6.15	580

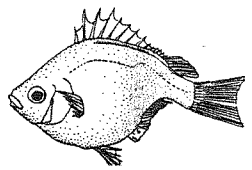
Station: Railroad trestle, 0730 hr. Water clarity to bottom.

Depth(m)	Temp.(C)	Salin.(ppt)	Oxygen(ppm)	Cond. (umhos)
surf	17.0	0.00	7.60	570
0.25	17.0	0.00	7.40	570
0.50	17.0	0.00	7.35	570
0.75	17.1	0.00	7.30	570
1.00(bot)	17.2	0.00	4.80	570

Station: Mouth of Noble Gulch, 0750 hr. Water clarity to bottom.

surf	16.6	0.00	8.40	560
0.25	16.5	0.00	8.25	560
0.50	16.4	0.00	8.32	560
0.75(bot)	16.4	0.00	6.75	560

Birds in Reach 1: 133 gulls and one pigeon on beach. 3 geese on beach near Venetian Court. 5 gulls bathing. 3 domestic (popcorn) ducks near flume.



Birds in Reach 2: 1 domestic mallard, 1 wild make mallard. 3 pigeons on trestle.

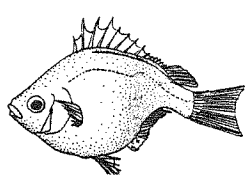
Birds in Reach 3: 2 wild mallards plus 2 wild mallards from Reach 2 had moved upstream. 2 domestic mallard mixes.

Conclusion: In 8 days after final sandbar closure, the lagoon was flushed of salt water. Water quality was excellent for aquatic organisms regarding oxygen in the upper water column and fair near the bottom at Stockton Avenue Bridge and Noble Gulch. It was poor at the bottom at the railroad trestle. Conductivity was typical of a freshwater lagoon and less than the previous year. Water quality was good with cool enough water temperature (< 19 C). The 2 degree increase in water temperature from Nob Hill to the flume (0.66 miles) with so much streamflow was surprising. Some oxygen depletion was observed at the bottom near the railroad trestle and Noble Gulch. The gray water appeared not to cause an oxygen problem at Noble Gulch. It may stimulate algal growth later on. The lagoon appeared 0.3 feet shallower at the bridge than the previous year due to sediment deposition.

6 July 1995. The gage height was very low, and it appeared that water was seeping under the plastic base at the flume and escaping through the sandbar. Ed and crew added boards to the flume at 0900hr. Lagoon height was 1.71 feet by 1015hr. Portal still loose on flume. One lady walked dog at 0600hr. Later saw fresh dog pile on path. 9 dog piles at trestle park, one fresh. 8 dogs walked on path during monitoring period. Cloud of gray water near Noble Gulch worsened from 0645hr to 0815hr. In Reach 1, 10% of bottom with algae 0.1- 0.3 feet thick. Remainder with film of algae. Reach 2, 15% of bottom with algal tufts 0.2- 0.4 feet thick. Remainder with film of algae. Reach 3, 25% of bottom with algal tufts 0.3- 0.5 feet thick. Remainder with film of algae. At Noble Gulch, 90% of bottom with algae 0.2- 0.3 feet thick. Black ooze present on bottom. Restaurant on Capitola Avenue was closed and could not have been the source. Streamflow was measured near Nob Hill to be 12.3 cfs. We measured dimensions of Larry's Surf and Turf glass panels after monitoring.

Station: Flume at 0547 hr, Clear. Gage Height= 1.42. Flume entrance at 1.8 feet depth. Flume exit at 1.2 feet depth. Air temperature 14.8 C at 0600hr.

Depth(m)	Temp.(C)	Salin.(ppt)	Oxygen(ppm)	Cond.
surf.	19.0	0.0	7.60	580
0.25	19.0	0.0	7.55	580
0.50	19.0	0.0	7.55	580
0.75	19.0	0.0	7.48	580
0.95(bot)	18.9	0.0	7.32	580



Station: Stockton Avenue Bridge, Center bridge thalweg, 0609 hr. Secchi depth to bottom.

surf	18.2	0.00	7.40	580
0.25	18.2	0.00	7.35	580
0.50	18.1	0.00	7.27	580
0.75	18.1	0.00	7.35	580
0.95(bot)	18.1	0.00	5.80	580

Station: Railroad trestle, 0628 hr.

surf.	18.0	0.0	7.05	580
0.25	17.9	0.0	6.94	580
0.50	17.9	0.0	6.84	580
0.75	17.8	0.0	6.80	580
0.93(bot)	17.7	0.0	4.35	580

Station: Mouth of Noble Gulch, 0643 hr.

surf	17.3	0.00	8.20	580
0.25	17.3	0.00	8.08	580
0.50	17.2	0.00	8.20	580
0.63(bot)	17.7	0.00	4.43	580

Birds in Reach 1: 3 domestic (popcorn) ducks. Too early for geese.

Birds in Reach 2: 0 ducks early, but 8 wild and 1 domestic mallard being fed by people at 0755hr. Saw one juvenile steelhead. 4 pigeons on trestle.

Birds in Reach 3: 3 geese until 0640hr at which time they moved downstream. 11 wild mallards moving toward food handouts in Reach 2 at 0755hr.

Birds on the Beach: 185 gulls. 10 pigeons.

Conclusion: Water quality conditions were fair to good for steelhead in all reaches except for oxygen below 5 ppm at the bottom at the trestle and Noble Gulch for a poor rating and fair at the Stockton Avenue Bridge. This indicated higher rates of respiration near the bottom.

7 July 1995. Lagoon level at 2.43 feet. Boards were removed, but leak under flume was extensive.

10 July 1995. Geo-fabric was laid around the flume to stop leak under flume. It appeared successful.

14 July 1995. Mid-July is typically the warmest time in the lagoon. Data were collected in early morning, mid-morning and afternoon this day. A bit of pondweed was growing under the trestle on the east side. People from the rentals were feeding 6 ducks. Good news- no new dog piles at the trestle park. No piles were on the path. Three dogs walked during monitoring

period. Streamflow visually estimated at 8-9 cfs at Nob Hill. Reach 1, 25% covered with algae 0.2- 0.6 feet thick with remainder a thin film covering. Reach 2, 20% covered with algae 0.1- 0.4 feet thick with remainder thin film covering. Reach 3 same algae thickness as Reach 2 with 30% of bottom covered with algae. At mouth of Noble Gulch, 100% carpet of algae 0.1- 0.3 feet thick.

Station: Flume (in hole) at 0620 hr, Clear. Gage Height= 2.16 feet on 12 July and 2.37 on 14 July at 0650hr; 2.30 at 0820hr; 2.40 at 1650hr. Flume entrance at 2.8 feet depth. Flume exit at 1 foot minimum.

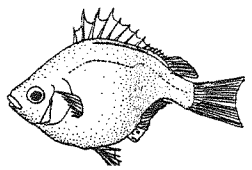
Depth(m)	Temp.(C)	Salin.(ppt)	Oxygen(ppm)	Cond.
surf.	20.4	-	8.90	-
0.25	20.4	-	9.03	-
0.50	20.3	-	8.96	-
0.75	20.3	-	8.83	-
1.00	20.2	-	8.85	-
1.25	20.2	-	8.85	-
1.50	20.3	-	8.60	-
1.65(bot)	20.3	-	6.65	-
Flume at 1630 hr.				
surf.	22.1	-	-	-
0.25	22.1	-	-	-
0.50	21.9	-	-	-
0.75	21.8	-	-	-
1.00	21.5	-	-	-
1.25	21.5	-	-	-
1.50	21.6	-	-	-
1.58(bot)	21.8	-	-	-

Station: Stockton Avenue Bridge, Center bridge thalweg, 0650 hr.

surf	19.8	-	7.31	-
0.25	19.7	-	7.20	-
0.50	19.7	-	7.16	-
0.75	19.7	-	7.08	-
1.00	19.7	-	7.12	-
1.15(bot)	19.7	-	5.47	-

Station: Stockton Avenue Bridge, Center bridge thalweg, 0827 hr.

surf	19.7	-	7.25	-
0.25	19.5	-	6.95	-
0.50	19.5	-	6.70	-
0.75	19.5	-	6.63	-
0.95(bot)	19.5	-	4.30	-



Station: Stockton Avenue Bridge, Center bridge thalweg, 1650 hr.

Depth(m)	Temp.(C)	Salin.(ppt)	Oxygen(ppm)	Cond.
surf	22.8	-	-	-
0.25	22.7	-	-	-
0.50	22.7	-	-	-
0.75	22.7	-	-	-
1.00	23.2	-	-	-

Station: Railroad trestle, 0710 hr.

surf.	19.0	-	7.29	-
0.25	19.0	-	7.15	-
0.50	19.0	-	7.15	-
0.75	19.0	-	7.16	-
1.00	19.0	-	7.13	-
1.15(bot)	19.0	-	4.85	-

Station: Railroad trestle, 0843 hr.

surf.	18.9	-	7.29	-
0.25	18.8	-	7.15	-
0.50	18.8	-	7.15	-
0.75	18.7	-	7.16	-
1.00	18.8	-	7.13	-
1.05(bot)	18.8	-	4.50	-

Station: Railroad trestle, 1658 hr.

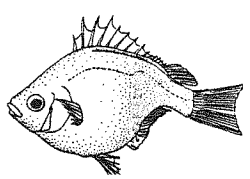
surf.	23.1	-	-	-
0.25	23.1	-	-	-
0.50	22.9	-	-	-
0.75	22.9	-	-	-
1.00	22.9	-	-	-
1.08(bot)	23.1	-	-	-

Station: Mouth of Noble Gulch, 0730 hr.

surf	18.2	-	7.45	-
0.25	17.9	-	7.35	-
0.50	17.5	-	7.65	-
0.75	17.3	-	7.95	-
0.87(bot)	17.4	-	5.95	-

Station: Mouth of Noble Gulch, 1711 hr.

surf	24.2	-	-	-
0.25	23.8	-	-	-
0.50	23.5	-	-	-
0.75	20.8	-	-	-
0.78(bot)	21.5	-	-	-



Birds in Reach 1: 12 gulls bathing. 3 geese by 0800hr. 2 popcorn ducks (one missing).

Birds in Reach 2: No ducks. 1 hummingbird. 5 pigeons on trestle.

Birds in Reach 3: 6 mallards being fed.

Birds on the Beach: 122 gulls. 6 pigeons.

Conclusions: Water temperature actually decreased slightly from 0650hr to 0827hr in the morning. Water temperature at the bottom increased 1.5, 3.7, 4.1 and 4.1 C at each succeeding upstream station from morning to afternoon. By afternoon, water temperature at the bottom had risen into the poor range at all stations except Noble Gulch, which was on the borderline. In the morning, oxygen levels were poor at the bottom at all but the flume site. Elsewhere in the water column they were fair to good.

28 July 1995. In Reach 1, 20% of the bottom covered with algae, no pondweed and no surface algae. In Reach 2, 10% of bottom covered with algae, some pondweed under trestle and no surface algae. In Reach 3, 15% of bottom covered with algae, no pondweed and no surface algae. One dry dog pile at trestle park.

Station: Flume (in hole), 0601 hr. Foggy. Air temperature = 15.5 C. Gage height = 1.64.

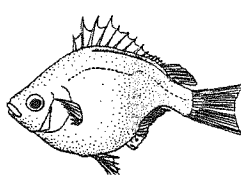
Depth(m)	Temp.(C)	Salin.(ppt)	Oxygen(ppm)	Cond. (umhos)
surf.	21.2	0.00	8.70	690
0.25	21.2	0.00	7.90	710
0.50	21.3	0.00	7.10	710
0.75	21.0	0.00	6.73	710
1.00	20.9	0.00	6.60	700
1.25	20.8	0.00	6.33	700
1.35(bot)	20.8	0.00	4.90	700

Station: Stockton Avenue Bridge, 0730hr. Cannot see bottom.

surf.	21.2	0.00	7.30	690
0.25	21.2	0.00	7.23	690
0.50	21.2	0.00	7.05	700
0.75	20.2	0.00	5.95	680
0.83(bot)	20.2	0.00	4.00	670

Station: Railroad trestle, 0705 hr.

surf.	20.5	0.00	7.0	690
0.25	20.4	0.00	6.95	680
0.50	19.9	0.00	6.05	680
0.75	19.8	0.00	6.02	670
0.95(bot)	19.8	0.00	4.30	670



Station: Mouth of Noble Gulch, 0740 hr.

Depth(m)	Temp.(C)	Salin.(ppt)	Oxygen(ppm)	Cond. (umhos)
surf.	18.9	0.00	7.15	660
0.25	18.8	0.00	6.97	660
0.50	18.8	0.00	6.95	650
0.65(bot)	18.1	0.00	6.55	590

Birds on the Beach: 118 gulls. 12 sandpipers. 16 pigeons. 1 tractor.
Birds in Reach 1: 2 domestic (popcorn) ducks. 3 geese. 39 gulls bathing.

Birds in Reach 2: 2 wild female mallards. 8 pigeons on trestle.

Birds in Reach 3: 3 geese (moved upstream from Reach 1). 2 wild mallards.

Conclusions: Water temperatures were fair to good but approaching poor in the lower lagoon early in the morning. The gage height was quite low, allowing greater lagoon heating. Oxygen levels were poor at the bottom at all stations except Noble Gulch. They were mostly fair in the remainder of the water column.

7 August 1995. Gage height back up to 1.95 feet. Morrison and Turcotte had modified the flume to raise it. Morrison said he would add more boards.

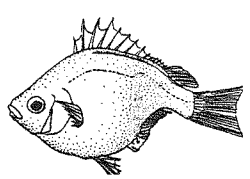
11 August 1995. In Reach 1, 15% of bottom covered with algae and none on surface. In Reach 2, 10% of bottom covered with algae, 2 meter square area of pondweed under trestle and no algae on surface. In Reach 3, 10% of bottom covered with algae and none on surface.

Station: Flume (in hole), 0625 hr. Weather clear and cool. Air temperature 13.2 C. Gage height = 2.18.

surf.	20.3	0.00	9.9	670
0.25	20.3	0.00	9.6	680
0.50	20.2	0.00	9.6	680
0.75	20.2	0.00	9.6	680
1.00	20.2	0.00	9.6	690
1.25	20.2	0.00	9.6	690
1.50	20.2	0.00	9.6	680
1.65(bot)	20.2	0.00	8.6	670

Station: Stockton Avenue Bridge, thalweg north side, 0655 hr.

surf.	20.2	0.00	8.4	690
0.25	20.3	0.00	8.3	700
0.50	20.3	0.00	8.1	710
0.75	20.2	0.00	7.9	700
1.00(bot)	20.2	0.00	4.9	690



Station: Railroad trestle, 0720 hr.

Depth(m)	Temp.(C)	Salin.(ppt)	Oxygen(ppm)	Cond. (umhos)
surf.	19.7	0.00	7.3	690
0.25	19.8	0.00	7.2	690
0.50	19.8	0.00	6.8	690
0.75	19.8	0.00	6.7	680
1.00	19.7	0.00	6.4	680
1.30(bot)	19.7	0.00	4.8	680

Station: Mouth of Noble Gulch, 0750 hr. Secchi depth = 0.4 meters. Water murky.

surf.	17.9	0.00	7.4	620
0.25	18.0	0.00	7.3	630
0.50	18.0	0.00	7.3	630
0.75	17.9	0.00	7.3	630
1.00(bot)	17.8	0.00	0.6	620

Birds on the Beach: 78 gulls on beach. 24 blackbirds. 11 pigeons.

Birds in Reach 1: 31 gulls bathing.

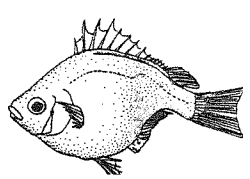
Birds in Reach 2: 6 mallards.

Birds in Reach 3: 2 mallards. 2 domestic ducks.

Conclusion: Water temperature had cooled slightly since the last monitoring. Oxygen levels in the column were slightly higher, especially at the flume. Oxygen more depleted upstream. There was critically low oxygen concentration at the bottom at Noble Gulch where water was murky. Poor oxygen levels at the bottom occurred at the Stockton Avenue bridge and the trestle.

14 August 1995. The gage height was at 2.27.

26 August 1995. It was a Saturday. Steelhead hit the surface in Reach 1 at 0630hr. They hit the surface at a rate of 6 hits/minute in Reach 2 at 0830hr. Hits in Reach 3 were occasional. Willows were senescing across from Hubback's dock near Noble Gulch. Popcorn ducks were roosting on tree in water in Reach 3 above the trestle. The lagoon was green soup but the bottom was visible. Water a Noble Gulch was again gray soup. Streamflow at Noble Gulch was visually estimated at 3 cfs. Two dog piles were at the Stockton Avenue Park, 7 at the trestle park and one on the trail. The black lab/dane mix (Toby) dumped at the trestle park during the monitoring. Reach 1, 50% of bottom covered with algae 0.2- 0.6 feet thick and remainder with thin film. None on surface. Reach 2, 30% of bottom covered with algal tufts 0.2- 0.6 feet thick with film over remainder. None on



surface. Reach 3, 35% of bottom covered with algal tufts with some algal mats, 0.3- 1.0 feet thick, and remainder with film. None on surface. Noble Gulch, 70% of bottom with algal mat 0.5-1.0 feet thick, with remainder having a film. None on surface.

Station: Flume (in hole), 0630 hr. Weather overcast. Gage height = 2.09. Air temperature = 12.2 C

Depth(m)	Temp.(C)	Salin.(ppt)	Oxygen(ppm)	Cond. (umhos)
surf.	19.4	0.00	7.94	710
0.25	19.5	0.00	7.77	710
0.50	19.7	0.00	7.71	710
0.75	19.5	0.00	7.60	710
1.00	19.6	0.00	7.60	710
1.25	19.4	0.00	7.55	710
1.50	19.8	0.00	7.41	700
1.75(bot)	19.8	0.00	6.85	710

Station: Stockton Avenue Bridge, thalweg middle, 0650 hr.

surf.	19.0	0.00	7.68	690
0.25	19.0	0.00	7.60	690
0.50	19.1	0.00	7.55	690
0.75	19.1	0.00	7.45	690
1.00(bot)	19.1	0.00	5.45	690

Station: Railroad trestle, 0713 hr.

Depth(m)	Temp.(C)	Salin.(ppt)	Oxygen(ppm)	Cond. (umhos)
surf.	18.7	0.00	7.65	690
0.25	18.8	0.00	7.65	690
0.50	18.8	0.00	7.68	690
0.75	18.8	0.00	7.45	690
1.00(bot)	18.9	0.00	4.93	690

Station: Mouth of Noble Gulch, 0735 hr.

surf.	17.2	0.00	6.45	670
0.25	17.3	0.00	6.30	665
0.50	17.3	0.00	6.25	650
0.75	17.0	0.00	6.72	630
1.00(bot)	17.0	0.00	5.50	620

Birds on the Beach: 178 gulls and 6 pigeons beach.

Birds in Reach 1: None

Birds in Reach 2: None until 0840hr, at which time there were 4 wild mallards and 1 gull. 12 pigeons on trestle.

Birds in Reach 3: 3 geese. 4 domestic ducks (2 of which were popcorn ducks). 7 wild mallards (4 of which were young of the year). 1 pied-billed grebe. 1 green-back heron. 8 swallows overhead. 1 gull with food.

Conclusion: Water temperature progressively cooling slightly from last monitoring. Algae concentration was highest recorded for summer. Oxygen depletion was greatest at Noble Gulch and the lowest readings of the season, though morning concentrations were fair to good throughout except for a poor rating at the bottom at the trestle., but very good near the flume. Air temperature was particularly cool for the season, and it felt like an early fall coming. Streamflow had dropped dramatically from 9 to 3 cfs since 10 July.

3 September 1995. Gage height = 2.05.

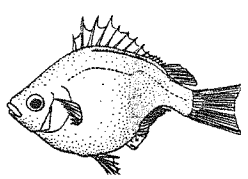
8 September 1995. It is Friday. Streamflow was holding at approximately 3 cfs since pervious monitoring, by visual estimation. Overhanging willows in Reach 2 provided excellent cover for fish. Begonia Festival is on Sunday. Again, an influx of gray water came in at Nob Hill at about 0.75 meter depth with higher oxygen there. Cottonwoods continue to senesce across from Noble Gulch. Willows losing their leaves. Box elder above trestle turning yellow. Mallards are observed reaching for algae on bottom. Popcorn duck observed dipping for algae (companion is missing but seen later). In Reach 1, 65% of bottom covered with algae to 0.8 feet thickness. None on surface. Pondweed with algae had developed near restaurants with 1.0- 2.5 feet thickness, totaling 15% of bottom in Reach 1. In Reach 2, 90% of bottom covered with algae 0.3-1.0 feet thick and bright green tufts along east side. In Reach 3, 70% of bottom covered with algae 0.3- 0.8 feet thick and 2% surface algae. At Noble Gulch, 100% of bottom covered with algae 0.2-0.8 feet thick and none on surface.

Station: Flume (in the hole), 0717 hr, cloudy and windy with street lights still on. Gage height 1.95. Air temperature 15.2 C.

Depth(m)	Temp.(C)	Salin.(ppt)	Oxygen(ppm)	Cond. (umhos)
surf.	20.0	0.00	8.23	720
0.25	20.1	0.00	7.97	720
0.50	20.1	0.00	8.04	720
0.75	20.1	0.00	7.98	720
1.00	20.2	0.00	7.94	720
1.25	20.2	0.00	7.90	720
1.50	20.2	0.00	7.80	720
1.65(bot)	20.3	0.00	5.00	720

Station: Stockton Avenue Bridge, middle thalweg. 0746hr.

surf.	19.8	0.00	7.67	720
0.25	20.0	0.00	7.57	720
0.50	20.0	0.00	7.38	720



0.75	20.0	0.00	7.30	720
1.00	20.2	0.00	7.28	720
1.08(bot)	20.2	0.00	5.35	725

Station: Railroad trestle, 0810 hr.

Depth(m)	**Temp.(C)**	**Salin.(ppt)**	**Oxygen(ppm)**	**Cond. (umhos)**
surf.	19.2	0.00	6.73	710
0.25	19.3	0.00	6.58	710
0.50	19.5	0.00	6.55	710
0.75	19.5	0.00	6.52	710
0.95(bot)	19.5	0.00	4.40	710

Station: Mouth of Noble Gulch, 0827 hr

			main/backwater	
surf.	17.9	0.00	5.90/5.50	680
0.25	18.0	0.00	5.52/5.60	680
0.50	18.0	0.00	5.60/6.05	680
0.75	18.0	0.00	6.70	680
1.00(bot)	18.0	0.00	5.85	620

Birds on the Beach: 184 gulls. 2 pigeons (flock of 15 flying over beach.

Birds in Reach 1: 2 popcorn ducks at Venetian Court on sand.

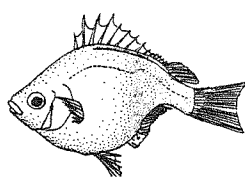
Birds in Reach 2: None. 1 pigeon on trestle.

Birds in Reach 3: 6 wild mallards. 1 pied-billed grebe.

Conclusions: The lagoon was slightly warmer than last monitoring, presumably because the depth had decreased by 0.14 feet and the air temperature was warmer. Though oxygen levels at the flume were slightly higher than last monitoring, oxygen was slightly more depleted at the trestle (poor rating at bottom) and Noble Gulch, presumably due to increased algae in lagoon. The station at the flume did not have algae in close proximity. Very few ducks were seen. Had they started migrating away?

11 September 1995. This was the day after the Begonia Festival. Some begonias had washed mainly down to the flume-side of the lagoon and by the restaurant cove. There was a large gray plume of water leading out from Noble Gulch, extending downstream 100 feet by 25 feet wide. Some begonias collected along the west margin under will branches in Reaches 2 and 3. No estimates of bottom algae were made. No surface algae was seen. Water was clear enough to see the bottom. Dog piles at trestle park had been cleaned out.

Station: Flume (in hole), 0655hr. Air temp. 13.3 C. Gage height = 2.03.



Depth(m)	Temp.(C)	Salin.(ppt)	Oxygen(ppm)	Cond. (umhos)
surf.	18.1	0.00	7.86	690
0.25	18.2	0.00	7.80	690
0.50	18.3	0.00	7.80	690
0.75	18.4	0.00	7.70	690
1.00	18.4	0.00	7.70	690
1.25	18.4	0.00	7.68	700
1.50	18.4	0.00	7.65	710
1.75(bot)	18.5	0.00	5.40	710

Station: Stockton Avenue Bridge, 0715 hr

surf.	17.9	0.00	7.40	690
0.25	18.1	0.00	7.30	690
0.50	18.1	0.00	7.45	690
0.75	18.1	0.00	7.40	690
1.00	18.1	0.00	7.30	690
1.05(bot)	18.2	0.00	4.80	695

Station: Railroad trestle, 0738 hr.

surf.	17.7	0.00	7.30	670
0.25	17.8	0.00	7.12	670
0.50	17.8	0.00	7.10	670
0.75	17.8	0.00	7.00	670
0.95(bot)	17.8	0.00	4.60	680

Station: Mouth of Noble Gulch, 0805 hr.

Depth(m)	Temp.(C)	Salin.(ppt)	Oxygen(ppm)	Cond. (umhos)
surf.	16.8	0.00	7.75	625
0.25	16.9	0.00	7.35	650
0.50	17.0	0.00	7.38	660
0.75	17.2	0.00	7.52	670
0.80(bot)	17.2	0.00	4.02	680

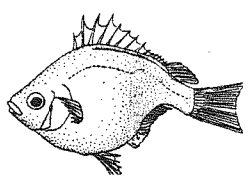
Birds on the Beach: Not counted due to disturbance on beach.

Birds in Reach 1: 6 gulls bathing. 3 geese at Venetian Court.

Birds in Reach 2: None in water. 1 green-back heron on wooden float platform. Three pigeons on trestle.

Birds in Reach 3: 6 wild mallards. 1 gray mallard, 2 popcorn ducks. 1 black-crowned night heron. 2 pied-billed grebes. 2 gulls.

Conclusion: The oxygen levels at the bottom had slipped into the poor range at the Stockton Avenue Bridge and Noble Gulch, with



levels at the trestle continuing to be poor at the bottom as before the Begonia Festival. All oxygen levels higher in the water column continued to be good after the festival. We saw an increase in piscivorous birds after the Begonia Festival. Mallards appeared to stay up in Reach 3 in early morning.

15 September 1995. Overcast and breezy. Fifth day after the Begonia Festival. Again a gray plume leading away from Noble Gulch, 100 feet long by 30 feet wide that was less dense than after the Begonia Festival. An occasional steelhead strike observed on the surface. Trash from Begonia Festival still piled up at the Stockton Avenue Park. Restaurant owners cleaning sidewalks with soap and water. Three new dog piles at trestle park since the Begonia Festival.

Station: Flume (in the hole), 0703 hr. Air temperature = 13.8 C. Gage Height = 2.06.

Depth(m)	Temp.(C)	Salin.(ppt)	Oxygen(ppm)	Cond. (umhos)
surf.	18.2	0.00	8.95	690
0.25	18.25	0.00	8.76	690
0.50	18.3	0.00	8.80	690
0.75	18.4	0.00	8.77	690
1.00	18.4	0.00	8.70	690
1.25	18.3	0.00	8.65	690
1.50	18.3	0.00	8.60	690
1.75(bot)	18.2	0.00	6.15	690

In Reach 1, no algae at surface. 30% of bottom with algae 0.2-0.5 feet thick. 10% pondweed with algae to 2 feet thick near restaurants.

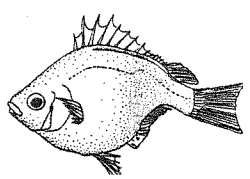
Station: Stockton Avenue Bridge, 0725 hr.

Depth(m)	Temp.(C)	Salin.(ppt)	Oxygen(ppm)	Cond. (umhos)
surf.	17.9	0.00	8.23	680
0.25	18.1	0.00	8.25	680
0.50	18.2	0.00	8.20	680
0.75	18.2	0.00	8.10	680
1.00(bot)	18.2	0.00	7.33	680

Station: Railroad Trestle, 0747 hr.

surf	17.6	0.00	7.60	675
0.25	17.7	0.00	7.48	675
0.50	17.8	0.00	7.33	675
0.75	17.8	0.00	7.33	675
1.00(bot)	17.8	0.00	4.75	675

Reach 2: 0% surface algae, 30% algae 0.2-0.5 feet high, remainder thin film.



Station: Mouth of Noble Gulch, 0800 hr.

Depth(m)	Temp.(C)	Salin.(ppt)	Oxygen(ppm)	Cond. (umhos)
surf.	17.1	0.00	6.75	660
0.25	17.2	0.00	6.60	660
0.50	17.25	0.00	6.60	650
0.75	16.9	0.00	7.20	610
0.80(bot)	16.8	0.00	6.24	590

Reach 3: 0% surface algae, 35% of bottom with algae 0.2-1.0 feet high. Remainder a thin film.

Noble Gulch: Algae 70% of bottom 0.2-0.5 ft thick. 0% surface algae at the Gulch.

Birds on the Beach: 121 gulls, 11 pigeons and 2 piper-type birds.

Birds in Reach 1: 12 bathing gulls early. 1 cormorant at 0830hr.

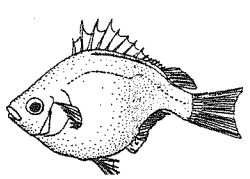
Birds in Reach 2: None.

Birds in Reach 3: 1 pied-billed grebe. 1 black-crowned night heron, 3 wild mallards. Cormorant had moved up from Reach 1.

Conclusion: The algal bloom from before the Begonia Festival had become reduced in percent coverage. Oxygen levels had improved since before and immediately after the Begonia Festival except at trestle bottom and at Noble Gulch in the water column, presumably due to the reduction in algae and lower water temperature. There was still considerable algae at Noble Gulch. No evidence of Begonias was found except a few under the willows on the west side. Decomposition of plant material after the Begonia Festival caused minimal and short-lived reduction in oxygen levels this year. Gray plume at Noble Gulch was disturbing.

25 September 1995. It was Monday morning. Lagoon was slightly deeper. Had tidal overwash with kelp bladders still on surface near the flume. Crevices remained in sandbar after overwash. Kelp was along margins at Venetian Court with evidence of overwash there. Some kelp in restaurant cove. Joe-Joe said that someone jammed a log in between the flume boards and drained the lagoon over the weekend. The restaurant cove had been dry. Water depth in the middle of the lagoon was only 1 foot deep. He called the police on Saturday morning. The stream was flowing at 2.5 cfs at Nob Hill based on visual estimation. Another murky plume radiated out from Noble Gulch 25 feet in diameter. Toby's human companion cleaned up after the big dog after he unloaded it at the trestle park! That was a first.

Station: Flume (in hole), 0640 hr. Clear. Gage height of 2.12. Air temperature = a chilly 11.2 C. Flume entrance at 0.7 feet deep. Flume exit at 0.5 feet deep.



Depth(m)	Temp.(C)	Salin.(ppt)	Oxygen(ppm)	Cond. (umhos)
surf.	17.5	0.00	7.98	720
0.25	17.5	0.00	7.90	720
0.50	17.5	0.00	7.86	720
0.75	17.5	0.00	7.85	720
1.00	17.5	0.00	7.70	720
1.25	17.6	0.00	7.75	720
1.40(bot)	17.6	0.00	5.10	720

In Reach 1 5% surface kelp. 25% of bottom with algae 0.2-0.8 feet thick and remainder with algal film.

Station: Stockton Avenue Bridge, 0720 hr.

surf.	17.3	0.00	7.35	680
0.25	17.3	0.00	7.30	680
0.50	17.3	0.00	7.30	680
0.75	17.3	0.00	7.26	680
1.00	17.3	0.00	7.25	680
1.05(bot)	17.3	0.00	5.76	680

In Reach 2, 2% surface kelp, 30% of bottom with algae only 0.1-1.0 feet thick, remainder a film of algae.

Station: Railroad trestle, 0745 hr.

surf.	16.5	0.00	6.80	660
0.25	16.8	0.00	6.64	660
0.50	17.0	0.00	6.60	660
0.75	17.2	0.00	6.55	660
1.00(bot)	17.2	0.00	4.12	660

In Reach 3, 1% surface kelp, 35% of bottom with algae 0.2-1 feet thick with remainder having algal film.

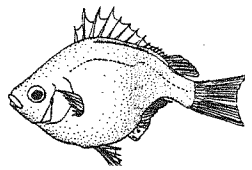
Station: Mouth of Noble Gulch, 0742 hr.

Depth(m)	Temp.(C)	Salin.(ppt)	Oxygen(ppm)	Cond. (umhos)
surf.	15.9	0.00	6.52	640
0.25	15.9	0.00	6.30	640
0.50	16.0	0.00	6.21	630
0.75	16.2	0.00	6.60	620
0.80(bot)	16.2	0.00	5.10	620

At Noble Gulch with no surface algae and 50% of bottom with algae 0.2-1.0 feet thick. Remainder of bottom with algal film.

Birds on the Beach: 127 gulls and 1 pigeons, some black birds and a cat.

Birds in Reach 1: 11 gulls bathing. 2 popcorn ducks. 3 wild mallards. 3 geese on beach at Venetian Court.



Birds in Reach 2: 2 male mallards. 1 pied-billed grebe. 2 popcorn ducks had moved up from Reach 1. 3 pigeons on trestle.

Birds in Reach 3: 1 cormorant. 4 coots. 1 pied-billed grebe.

Conclusions: No salt water lens was on the lagoon bottom because the lagoon had been partially drained. The sudden shallowing of the lagoon was not good for the steelhead. I don't know what they did to find cover, particularly those that were at the upper end of the lagoon. Some steelhead may have been stranded in side pockets. The lagoon filled in a day or so with the 2.5 cfs. Oxygen levels were somewhat less than the previous monitoring with the bottom below the trestle still in the poor range while elsewhere oxygen was fair to good.

15 October 1995. The last monitoring of the season. It was Sunday morning. A large gray plume extended out from Noble Gulch, combined with an oil slick that was 20 feet wide and extended several hundred feet down to the trestle and into Reach 2 by 0930hr. It was brown near the Gulch. The surface water at the Bay Street Park was running clean, indicating that someone below that point was washing something into the storm drain. There were 5 large dog piles at the trestle park, the mark of Toby no doubt. The lagoon was very shallow because some boards had been removed. It was just another day at pristine Soquel Lagoon.

Station: Flume (in hole), 0730 hr. Gage height = 1.40

Depth(m)	Temp.(C)	Salin.(ppt)	Oxygen(ppm)	Cond. (umhos)
surf.	17.0	0.00	10.0	650
0.25	17.0	0.00	9.8	650
0.50	17.0	0.00	9.7	650
0.75	17.0	0.00	9.7	650
1.00	17.0	0.00	9.7	650
1.05(bot)	17.0	0.00	7.45	650

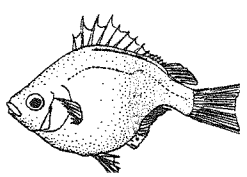
In Reach 1, no algae near at surface. 40% of bottom with algae 0.3-1.0 feet thick. Bright green near restaurant.

Station: Stockton Avenue Bridge, 0750 hr.

surf.	17.0	0.00	10.20	660
0.25	17.0	0.00	10.15	660
0.50	17.0	0.00	10.10	660
0.55(bot)	16.8	0.00	3.45	660

Station: Railroad Trestle, 0815 hr.

surf	17.0	0.00	8.95	670
0.25	17.0	0.00	8.75	670
0.50	17.0	0.00	8.67	670
0.75(bot)	17.0	0.00	5.24	660



Reach 2: 3% surface algae, 50% of the bottom bright algae tufts 0.2-0.8 ft thick.

Station: Mouth of Noble Gulch, 0825 hr.

Depth(m)	Temp.(C)	Salin.(ppt)	Oxygen(ppm)	Cond. (umhos)
surf.	16.0	0.00	8.45	590
0.25	16.2	0.00	5.10	650
0.50	16.0	0.00	4.95	660
0.55(bot)	16.0	0.00	3.20	660

Reach 3: 0% surface algae, 60% of bottom with algae tufts, 0.3-1.5 feet thick.

Noble Gulch: 100% of bottom with algae 0.3-0.8 feet thick. No surface algae.

Birds on the Beach: 307 gulls. 4 crows.

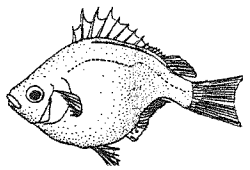
Birds in Reach 1: 54 bathing gulls. 4 mallards, 2 popcorn ducks, 1 merganser.

Birds in Reach 2: 6 mallards roosting on west park bulkhead near Stockton Avenue Bridge. 1 cormorant. 27 coots. Merganser has moved upstream from Reach 1. 7 pigeons on trestle.

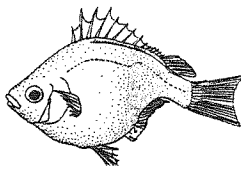
Birds in Reach 3: 2 pied-billed grebe, 4 coots.

Conclusion: Algae is experiencing another bloom. Oxygen levels at the bottom at Stockton Avenue and Noble Gulch are poor. But water temperature is cool this time of year, making metabolic needs of fish lower. Shallowness of lagoon was alarming. I contacted City to raise the level. Pollution from Noble Gulch has been the worst in five years of monitoring. It has been very noticeable all summer. Eutrophication with accelerated algal growth has been in evidence at the mouth of Noble Gulch all summer.

25 October 1995. Gage height to 1.94.



APPENDIX F. WATER RIGHT COMPLAINT REGARDING SOQUEL CREEK.



SOQUEL CREEK
WATER DISTRICT
5180 SOQUEL DR.
P.O. BOX 158
SOQUEL, CA 95073
TEL 408-475-8500 / 408-688-2288
FAX 408-475-4291

September 21, 1995

Councilperson Stephanie Harlan
City of Capitola
420 Capitola Avenue
Capitola, CA 95010

Subject: Water Right Complaint Regarding Soquel Creek

Dear Councilperson Harlan:

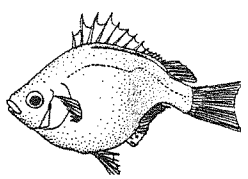
The State Water Resources Control Board has completed the investigation of a complaint filed by Laurence Frommhagen concerning the dewatering of Soquel Creek. Mr. Frommhagen's complaint alleged that the District's Main Street Well pumpage was responsible for dewatering the creek. The District in response to this complaint hired Luhdorff & Scalmanini, Groundwater Consultants, to conduct well tests. Test results indicated that the Main Street Well does not have any effect on the Soquel Creek. A summary of the investigation in enclosed for your review. The District's Board of Directors thought that you would be interested in this decision and have directed me to forward these documents to you.

Sincerely,

SOQUEL CREEK WATER DISTRICT

Jeffery N. Gailey
Engineering Manager

JNG:jjy
Enclosure



STATE OF CALIFORNIA - CALIFORNIA ENVIRONMENTAL PROTECTION AGENCY

PETE WILSON, *Governor*

STATE WATER RESOURCES CONTROL BOARD

PAUL R. BONDERSON BUILDING
1 P STREET
CRAMENTO, CALIFORNIA 95814
(916) 657-1359
FAX: 657-1485

Mailing Address
DIVISION OF WATER RIGHTS
P.O. BOX 2000, Sacramento, CA 95812-2000
In Reply Refer To:
363:VSD:262.0(44-13-)

AUGUST 24 1995

Mr. Laurence H. Frommhagen
5059 Old San Jose Road
Soquel, CA 95073

R. A. Hartman
Tiedemann Nursery
P.O. Box 926
Soquel, CA 95073

Mr. Robert M. Johnson, Jr.
General Manager - Chief Engineer
Soquel Creek Water District
P.O. Box 158
Soquel, CA 95073

S.C.W.D.

SEP - 5 1995

RECEIVED

Dear Messrs. Frommhagen, Hartman and Johnson:

WATER RIGHT COMPLAINT REGARDING SOQUEL CREEK IN SANTA CRUZ COUNTY

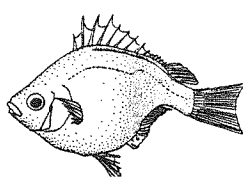
The Division of Water Rights (Division) has completed a review of Mr. Frommhagen's complaint alleging the Soquel Creek Water District's (District) Main Street well, Tiedemann Nursery and other diversions from Soquel Creek system have dried up 0.4 mile of Soquel Creek. Enclosed for your information is a copy of the staff report that summarizes the results of this complaint investigation. The staff report concludes that:

1. The basis for complaint, that there is always water flowing in Soquel Creek in Soquel, has not been validated through stream flow data for the period 1925 through 1993. Soquel Creek at Soquel has been dry at various times throughout this period.

2. Staff has reviewed the District's report and concurs with the District's conclusion that the pumping of the Main Street well appears to have no direct hydraulic effect on the flow in Soquel Creek.

3. Tiedemann Nursery may be operating in a manner that is not within the limits of the decree. As a second priority user, the Nursery should cease all pumping from the surface flow of Soquel Creek when the downstream reach of Soquel Creek is dry. Enforcement action may be taken if it becomes known to the Division that diversions have continued at times when visible surface flow does not exist in the downstream reach of Soquel Creek.

Mr. Frommhagen's complaint expresses concern about the lack of water in Soquel Creek. This perception may stem from all the users taking water from Soquel Creek, thereby noticeably reducing the flow in Soquel Creek from what the quantity once was. However, there appears to be local planning efforts that are seeking to define the problems of the watershed and derive possible solutions. We encourage Mr. Frommhagen to participate in the Santa Cruz County Resource Conservation District's implementation of the Coordinated Resource Management Planning process.



The Division concludes that no further action will be taken regarding this water right complaint. If you have further questions, please call me at (916) 657-1359.

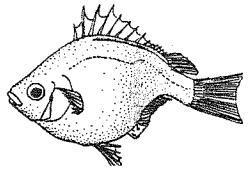
Sincerely,

Edward C. Anton, Chief
Division of Water Rights

Enclosure

cc: Ms. Patricia Anderson (w/enclosure)
Department of Fish and Game
P.O. Box 4008
Aromas, CA 95004

Mr. Thomas C. Goddard (w/enclosure)
County of Santa Cruz
Planning Department
701 Ocean Street, 406B
Santa Cruz, CA 95060



Memorandum

To : File 262.0(44-13-)

Date: AUGUST 18 1995

Virginia S. Dong
Associate Water Resources Control Engineer
Division of Water Rights
From : STATE WATER RESOURCES CONTROL BOARD
901 P Street Sacramento, CA 95814
Mail Code G-8

Subject: COMPLAINT REGARDING THE DIVERSION OF SOQUEL CREEK IN SANTA CRUZ COUNTY

INTRODUCTION

On October 3, 1994, the Division of Water Rights (Division) received a water right complaint from Laurence A. Frommhagen. Mr. Frommhagen alleges that the Soquel Creek Water District's (District) Main Street well and all diverters of the Soquel Creek system including Tiedemann Nursery on Cherryvale Road have dried up 0.4 miles of Soquel Creek impacting the fish and wildlife. Mr. Frommhagen states that, prior to the District's installation of the Main Street well in 1989, Soquel Creek was a viable stream from the Main Street well downstream to just past the Highway 1 overpass. (See Figure 1.)

BACKGROUND

The headwaters of the Soquel Creek watershed lie to the north and northeast of the town of Soquel and Santa Cruz. (See Figure 2.) There are more than twelve tributaries that contribute to the flow of Soquel Creek before it flows into Monterey Bay. The major tributaries include Love Creek, Hester Creek, West Branch Soquel Creek, Laurel Creek, Amaya Creek, Hinckley Creek, Burns Creek, Grover Gulch, Moores Gulch, Fern Gulch, Ashbury Gulch and Caldwell Gulch. There are approximately 300 legally recognized diversions of the Soquel Creek system, including riparian and pre- and post-1914 diversions.

On June 9, 1971 the city of Capitola petitioned the State Water Resources Control Board (SWRCB) to determine the rights to water in the Soquel Creek stream system. SWRCB staff conducted an investigation of the Soquel Creek system and Decree No. 57081 was issued by the Santa Cruz County Superior Court on March 14, 1977. The adjudication of Soquel Creek was modified in 1982 for the purpose of defining additional limits to unexercised riparian rights. The adjudication set up a schedule of allotments that identified the diverters and spelled out when and where they were allowed to exercise their water rights.

RESPONSE TO COMPLAINT

In response to the Division's request, both the District and Tiedemann Nursery submitted written responses to Mr. Frommhagen's complaint.

EVIDENCE SUBMITTED BY SOQUEL CREEK WATER DISTRICT: The District submitted the following evidence to counter the allegation that their Main Street well is dewatering Soquel Creek.

Flow Records: An inherent assumption in Mr. Frommhagen's complaint is that Soquel Creek is a perennial stream. The District submitted USGS stream gauge records of gaging station 11160000, Soquel Creek at Soquel, for the years 1951 through 1977. This gaging station is located 200 feet downstream of the well site. Staff has also reviewed other available stream flow data on Soquel Creek including the Army Corps of Engineers (Corps) records of flow in Soquel Creek for the years 1925 through 1961 and USGS stream flow records of Soquel Creek for the years 1978 through 1993.

For the years 1925 through 1961, the Corps identified seven months when there was no flow throughout the month in Soquel Creek at Soquel: October 1929, September and October 1931, September 1932 and 1934, and October and November 1939. The Corps' records were not broken down into daily flows and there may have been more occasions where Soquel Creek at Soquel was dry for one or more days.

The USGS streamflow data for the period 1951 to 1977 indicates that no flows occurred on July 30 to August 2, August 28 through 30, and September 8 of 1977. A review of the USGS records for the years 1978 to 1993 revealed that the creek was dry for a total of twenty-nine days in 1992 (twelve days in August, six days in September and eleven days in October).

Main Street Well Test: The District's Main Street Well was drilled in August of 1986 and went into production in 1988. The well is 656 feet deep. The well is solid cased to a depth of 232 feet (ft) and has five perforated casing section at the following depths down-well; 232 to 246 ft., 280 to 376 ft., 424 to 448 ft., 472 to 496 ft., and 544 to 644 ft.. In 1991, the District authorized Luhdorff and Scalmanini, hydro-geologic consultants, to review the construction and original testing of the Main Street well completed in 1986 and to conduct additional testing and analysis of the well to interpret the interrelationship between the well aquifer and nearby Soquel Creek.

Prior to the construction of the Main Street production well, two onsite monitoring wells were constructed to evaluate the site for potential groundwater production. The consultants evaluated the set of stepped drawdown pumped well tests and the short term (8 hour) constant rate pumping test performed in 1986. There were no water level impacts observed in any of the monitoring wells to indicate a positive, or recharge boundary. In May 1991, a longer term (72 hour) constant rate pumping test was conducted at the Main Street well. The consultants found the 1991 water level responses at the Main Street production well and the two onsite monitoring wells that resulted from pumping the Main Street well were nearly identical to the initial 1986 pumped well testing. Their analysis and report concluded that, despite the close proximity of the Main Street well to Soquel Creek, pumping of the Main Street well has no direct hydraulic effect on the flow in Soquel Creek.

In their response to the complaint dated September 15, 1994, the District's General Manager, Robert M. Johnson, Jr., stated that (1) the creek has dried up in years prior to the construction of the Main Street well, and (2) the

District well has no direct hydraulic effect on Soquel Creek based on their consulting engineers' (Luhdorff and Scalmanini) report. After review of the initial response, Division staff requested that the Soquel Creek Water District provide further clarification of their consultant's 1991 report. The District provided additional information by letter dated October 20, 1994.

EVIDENCE SUBMITTED BY TIEDEMANN NURSERY: In their response to the complaint dated June 16, 1995, the owner of Tiedemann Nursery, R.A. Hartman, stated that Tiedemann Nursery has been a user of Soquel Creek water since 1954. Based upon the March 1977 Santa Cruz County Soquel Creek Adjudication Decree No. 57081, they have a second priority allotment of 96,000 gallons per day (gpd). Mr. Hartman also stated that "during the drought years of 1976/77 and the dry years of the 1980s, the flow of Soquel Creek remained continuous to the lagoon in Capitola throughout the year without interruption." But that "this changed abruptly when Soquel Creek Water District put their new Main Street Well on line in 1988." The nursery is located approximately two miles upstream from the District well. Soquel Creek surface flow ceases immediately downstream from the well. He also added "that the number of irrigation users has decreased significantly with the closing of four wholesale nursery operations along the creek during the last 20 years."

Mr. Hartman indicated that even during heat wave conditions, their maximum usage would require pumping for less than eight hours a day at a rate of 200 gpm. They pump from May 1 to October 15 and rely on well water during the remainder of the year. And he stated that "Water experts from various governmental agencies have explained to us many times that whether we use creek water or well water (water table 18 ft.) the source of the water is the same."

The Tiedemann Nursery diverts water from Soquel Creek under a second priority allotment of 96,000 gpd. In the decree, second priority use is restricted as follows:

> Water may be diverted under second and third priority class rights for consumptive purposes in any schedule of allotments only during such times as there is a visible surface flow at the downstream end of the stream or reach of stream for any particular schedule.

It appears that Tiedemann Nursery may have been pumping at times when the creek has been dry in the downstream reach of the stream and therefore may be in violation of the decree.

ACTIONS OF THE COUNTY OF SANTA CRUZ: In 1994 Mr. Frommhagen wrote to the County Board of Supervisors concerning the lack of visible surface flow in the lower reach of Soquel Creek. Mr. Frommhagen requested the Santa Cruz Planning Department (Department) conduct a survey of surface water diversions in the Soquel Creek watershed and solicited the County's support to petition the Superior Court to set aside the 1977 Soquel Creek Adjudication Decree. By September 22, 1994 the Department had surveyed stream flow conditions at fifteen locations along Soquel Creek and its tributaries. The Department concluded that maximum discharge in Soquel Creek occurs below the confluence of Moore Creek. Stream flow then gradually decreased downstream until it dried up near Bridge Street in Soquel.

In responding to Mr. Frommhagen, the Department's letter of October 24, 1994 stated "that there is insufficient information about factors contributing to the problem of lack of flow in the lower reach to warrant a staff recommendation to modify the Adjudication Decree at this time. The amount of stream flow in the channel is influenced by many variables, including annual rainfall, local elevation of the groundwater table, transpiration, geomorphology of the stream channel as well as the timing and amount of the surface and groundwater extraction." The Department concluded that it was not feasible for County Planning staff to devote the amount of time and effort needed to walk Soquel Creek and its tributaries to document the number of active diversions and to ascertain the quantity of water being withdrawn from the creek. They informed Mr. Frommhagen that a mapping effort of this magnitude is the responsibility of the SWRCB.

In addition, the Department informed Mr. Frommhagen that the Santa Cruz County Resource Conservation District was initiating the Coordinated Resource Management Planning process which will emphasize attention to the watershed as a whole and may lead to better understanding of the problem and possible solutions.

CONCLUSIONS AND RECOMMENDATION

Mr. Frommhagen bases his complaint on the premise that there has always been water flowing in Soquel Creek at Soquel, that the District's Main Street well draws water from the creek and the Districts's use, along with the diversion of upstream users, is dewatering Soquel Creek. From a review of the available flow data, there is no way to ascertain that there has always been water flowing in Soquel Creek at Soquel. Soquel Creek at Soquel has been dry at various times throughout the period 1925 through 1993. There are many factors affecting the flow in the stream including the quantity of upstream users and the fact that California has been in seven years of drought.

Staff has reviewed the consultant's analysis and report of the District's Main Street well test and agrees with the conclusion that the pumping of the Main Street well does not appear to have any direct hydraulic effect on flow in Soquel Creek. Since there does not appear to be a valid basis for complaint against the Soquel Creek Water District, that portion of the complaint should be closed.

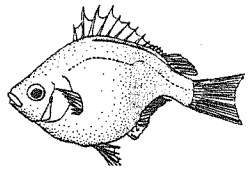
Based on the response from Mr. Hartmann regarding the operation of Tiedemann Nursery's water usage, the nursery may not be operating within the limits of their adjudicated allotment. The Nursery should cease its pumping from Soquel Creek when the downstream end of Soquel Creek is dry.

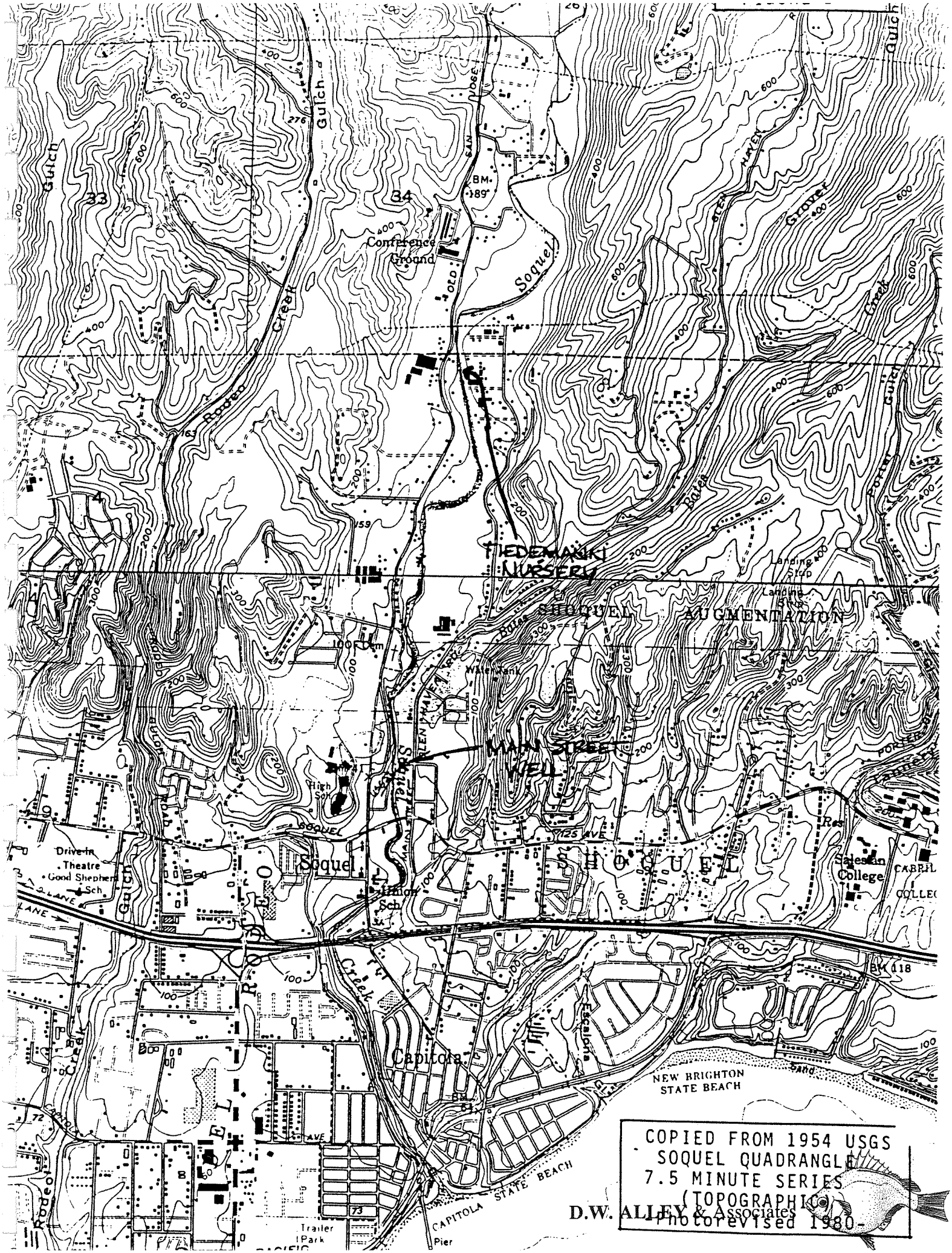
Mr. Frommhagen and the County commented that it was within the SWRCB's purview to map the number of active diversions and to ascertain the quantity of water being withdrawn from the creek. The SWRCB delineated the water rights of the various claimants during the adjudication process; however, once a decree is issued by the courts, the court and the appointed watermaster maintain the terms of the adjudication. The SWRCB's policy is to consider complaints against individual diverters where the evidence appears to indicate that unauthorized diversions may be occurring. Where the matter involves a prior

adjudication and decree, the jurisdiction lies with the courts and the SWRCB will only proceed at the request of the courts.

Mr. Frommhagen alleges that all the diversions of the Soquel Creek system impact the stream. An investigation of all the diverters of the Soquel Creek system would require reopening the Soquel Creek Adjudication as defined by the Santa Cruz County Superior Court. Mr. Frommhagen was advised that there was insufficient evidence for the Division to consider requesting the court to reopen the adjudication. However, if Mr. Frommhagen wished to take the matter back to the courts as a private citizen he may do so.

Attachments

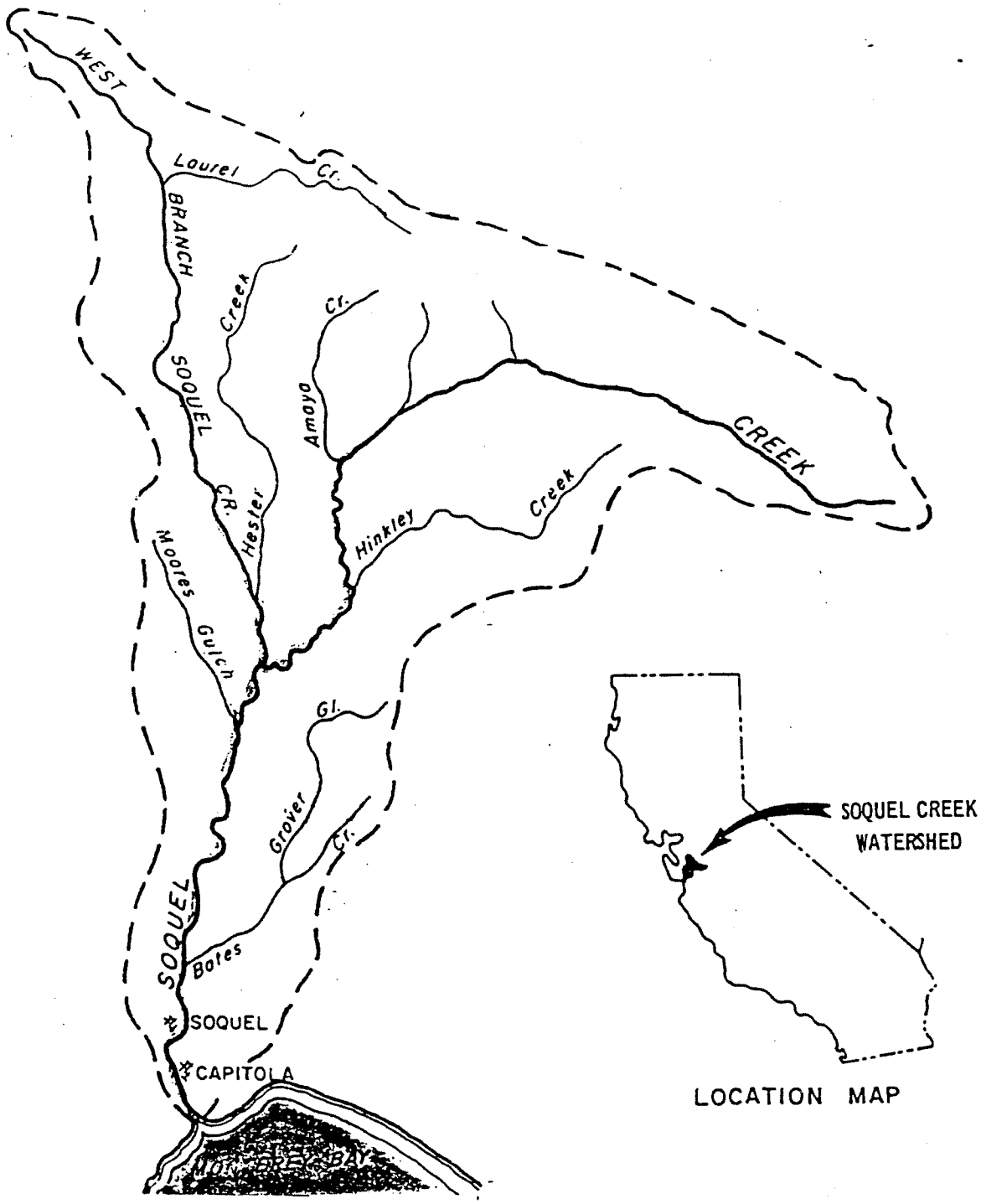




COPIED FROM 1954 USGS
SOQUEL QUADRANGLE
7.5 MINUTE SERIES
(TOPOGRAPHIC)

D.W. ALLEY & Associates Photorevised 1980

FIGURE 2

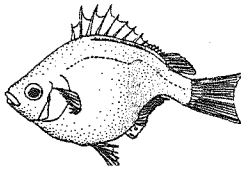


State of California
The Resources Agency
STATE WATER RESOURCES CONTROL BOARD

Soquel Creek Stream System

APPENDIX G.

Biological Opinion by U.S. Fish and Wildlife Service Pursuant to Section 7 of the Endangered Species Act Regarding Tidewater Goby



United States Department of the Interior

FISH AND WILDLIFE SERVICE

Ecological Services
Ventura Field Office
2493 Portola Road, Suite B
Ventura, California 93003

March 27, 1996

Post-it™ brand fax transmittal memo 7671 | # of pages ▸

To D Alley	From Ed
Co.	Co.
Dept.	Phone #
Fax # 338 6045	Fax # 479-8879

Calvin C. Fong
Department of the Army
San Francisco District, Corps of Engineers
211 Main Street
San Francisco, California 94105-1905

Subject: Biological Opinion for the Issuance of a Permit for the Excavation and Placement of Fill into Soquel Creek in the City of Capitola, Santa Cruz County, California (Permit Number 20705S25) (1-8-96-F-19)

Dear Mr. Fong:

This biological opinion responds to your request for formal consultation with the U.S. Fish and Wildlife Service (Service) pursuant to section 7 of the Endangered Species Act of 1973, as amended (Act). Your request was dated December 6, 1995 and received by the Service on December 11, 1995. At issue are the impacts that the issuance of a permit, pursuant to section 404 of the Clean Water Act and section 10 of the Rivers and Harbors Act, for the proposed excavation and placement of fill into Soquel Creek to facilitate the construction of a temporary dam structure within the streambed of Soquel Creek in the City of Capitola, Santa Cruz County may have on the tidewater goby (*Eucyclogobius newberryi*), a federally listed endangered species.

This biological opinion was prepared using the following sources of information: your December 6, 1995 request for consultation, the Public Notice for the proposed project, informal discussions between our staffs, and the Service's files.

Consultation History

Informal consultation on the issuance of a section 404 permit for the excavation and placement of fill into Soquel Creek and its potential effects to tidewater gobies was initiated through a telephone conversation between the Corps and the Service on January 5, 1995. In that request, the Corps informed the Service of the proposed project and the status of tidewater gobies in the Soquel Creek Lagoon. The Corps requested the Service's attendance at a meeting with the Corps and the City of Capitola to discuss the project at the end of January, but the Service was unavailable to attend the meeting at that time.

The public notice for the proposed project (number 20705S25) was issued on February 2, 1995 requiring a response by March 4, 1995. The Service did not provide comments at this time, but was contacted again by the Corps on June 1, 1995 to solicit Service input on the Soquel Lagoon closure. The Corps was concerned because tidewater gobies were found in the lower lagoon where the City of Capitola was proposing to rake out kelp and other organic debris to prevent oxygen depletion due to decomposition. The Service advised that consultation would be required if tidewater gobies might be taken during raking or closure. However, the severe winter storms likely washed any tidewater gobies from the lagoon and reduced the potential for take to where it was extremely improbable. The Service also recommended that the Corps require the City of Capitola to coordinate with the Corps and the Service to prepare and initiate formal consultation within the next six months since sandbar construction and kelp removal in future years may affect tidewater gobies. The Service followed up on this telephone conversation with written correspondence on June 5, 1995. The Corps submitted the written request for formal consultation to the Service on December 6, 1995.

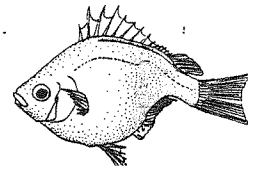
Biological Opinion

It is the biological opinion of the Service that the proposed action is not likely to jeopardize the continued existence of the tidewater goby. Critical habitat has not been designated for this species. Therefore, the proposed action would not result in the adverse modification of critical habitat.

Description of the Proposed Action

The City of Capitola proposes to construct a temporary dam structure within the streambed of Soquel Creek. Construction of the dam would require the excavation of material and placement of fill within waters of the United States. The Corps has issued a permit that authorizes the proposed action until July 1, 2000.

The proposed project is located south of Highway 1 at the end of Beverly Avenue in the City of Capitola. The proposed project would involve excavation of approximately 3,500 cubic yards of sand from a 1.50 acre area of beach adjacent to Soquel Creek. The excavated material would be used as fill material to construct a temporary sandbar across the channel of Soquel Creek, creating a freshwater lagoon. This activity would directly affect approximately 0.50 acres of stream channel. The depth of the fill will vary from 0 to 6 feet, with an average depth of 4 feet. All fill material will be obtained from the project site with no imported material anticipated. An existing concrete box culvert at the mouth of Soquel Creek would allow for the movement of fish between the lagoon and Monterey Bay. The temporary dam would be installed approximately 2 weeks after Memorial Day and remain until the structure is breached by rains in October or November. The purpose of the proposed project is to enhance public recreational opportunities and wildlife habitat.



The Corps and the City of Capitola proposed specific measures to minimize negative impacts to the tidewater goby at Soquel Creek which were included as special conditions of the Corps' permit. The specific measures proposed by the Corps and the City of Capitola are:

1. The City of Capitola shall conform with the Soquel Creek Lagoon Management and Enhancement Plan, dated 1990, including all appropriate revisions outlined in the City's annual monitoring reports. All revisions must be submitted to the Corps for approval prior to their implementation.

2. The City of Capitola shall be responsible for annual monitoring of the lagoon as outlined in "Soquel Creek Lagoon Monitoring, 1994". A copy of the annual report shall be submitted to the Corps by May 31 of each year.

3. A fisheries biologist shall be present during fish seining operations to monitor the removal of tidewater gobies, juvenile steelhead, and other species during lagoon closure.

4. A fisheries biologist shall be on-hand during and after the Begonia Festival to supervise the removal of all organic debris characteristic of the festival.

5. A fisheries biologist shall supervise kelp removal from the lagoon during construction.

6. The surface elevation of the lagoon shall not be lowered to accommodate the Begonia Festival.

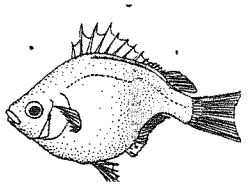
7. The Corps, the Service, and the National Marine Fisheries Service will be notified two weeks prior to the sandbar construction activities.

8. The City of Capitola shall coordinate with the Corps and the Service to prepare and initiate formal consultation on the tidewater goby. Consultation will be conducted to facilitate appropriate analysis of the beneficial and potential adverse impacts to tidewater gobies, and provide necessary authorization for any incidental take of the tidewater goby.

Effects of the Proposed Action on the Listed Species

Species Account

The tidewater goby was listed by the Service as endangered on March 7, 1994. No recovery plan has been published, and critical habitat has not been proposed. Detailed information regarding the biology of the tidewater goby can be found in Irwin and Soltz (1984), Moyle et al. (1989), and Swift et al. (1989).



The tidewater goby, a member of the Gobiidae family, is the only species in the genus *Eucyclogobius*. It is a small fish, rarely exceeding 50 millimeters standard length (mm SL), and is characterized by large pectoral fins and a ventral sucker-like disk formed by the complete fusion of the pelvic fins.

The tidewater goby, endemic to California, is almost unique among fish along the Pacific coast in its restriction to brackish waters of coastal wetlands. The tidewater goby historically occurred in at least 87 California coastal lagoons (Swift et al. 1989). Since 1900, it has disappeared from approximately 50 percent of formerly occupied habitats.

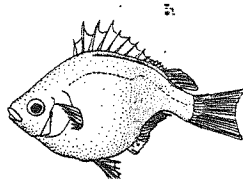
Habitat for the tidewater goby is characterized by brackish shallow lagoons and lower stream reaches where the water is fairly still but not stagnant (Miller and Lea 1972, Moyle 1976, Swift 1980, Wang 1982, Irwin and Soltz 1984). Tidewater gobies have been documented in waters with salinity levels from 0 to 40 parts per thousand, temperature levels from 8 to 23° Celsius, and water depths from 25 to 100 centimeters (Irwin and Soltz 1984, Swift et al. 1989).

The tidewater goby seems to spend all life stages in lagoons. It may enter the marine environment only when forced out of the lagoon by strong storm events. Small crustaceans, aquatic insects, and mollusks are the primary components of the tidewater goby's diet (Swift 1980, Wang 1982, Irwin and Soltz 1984). The tidewater goby seems to be an annual species although some variation has been observed (Swift 1980, Wang 1982, Irwin and Soltz 1984). Reproduction occurs year-round although distinct peaks in spawning, often in April and May, do occur (Moyle et al. 1989). When breeding, males dig vertical burrows for females to deposit eggs (Swift et al. 1989). Within nine to ten days larvae emerge and are approximately five to seven mm SL (Moyle et al. 1989). The larvae live in vegetated areas within the lagoon until they are 15 to 18 mm SL (Moyle et al. 1989).

The decline of the tidewater goby can be attributed to upstream water diversions, pollution, siltation, and urban development on surrounding lands. These threats continue to affect the remaining populations of tidewater gobies. In addition, given the lack of a marine life history stage and the high level of fragmentation between existing populations, the probability for exchange between the populations and natural colonization of suitable habitat is low.

Tidewater gobies are known to occur within Soquel Creek Lagoon (Alley 1995). Until recently, this population was previously undocumented by Swift et al. (1989). Recent surveys for tidewater gobies were conducted at Soquel Creek Lagoon by D.W. Alley and Associates on August 26 to 28 and October 10, 1994. The entire lagoon was snorkeled during the August survey, but no tidewater gobies were observed at this time. Seining of the lower lagoon during the October survey captured a total of 35 tidewater gobies of which 3 individuals were adults.

Surveys were conducted previously during the fall of 1992 and 1993. In the fall of 1992, two tidewater gobies were captured during sampling. In the fall of 1993, no tidewater gobies were captured after a total of six seine hauls on two weekends with a fine-meshed seine. The low



numbers during these surveys may have been due to the lack of backwater areas in Soquel Lagoon, which would be used as refuges for tidewater gobies during high-winter stormflows.

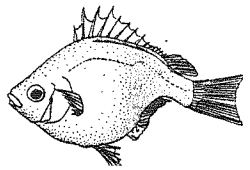
Analysis of Effects

Potential impacts to tidewater gobies resulting from the sandbar construction activities at the Soquel Creek Lagoon include loss of 0.50 acres of habitat; the capturing, handling, and transporting of tidewater gobies for upstream translocation; changes in the water quality of the lagoon; and potential increase of predators in the lagoon.

Grading activities associated with construction of the sandbar may disturb the lagoon and its substrate in the immediate vicinity of the construction area. Tidewater gobies using the construction area could also be harassed and killed by the grading activities. To some extent, tidewater gobies may be able to avoid the grader by moving away from it. Intentional removal and exclusion of tidewater gobies from the work area could reduce the level of take. The impacts of grading activities would also be reduced by confining these activities to the minimum work area necessary and by ensuring that these areas are clearly marked. Alley (pers. comm. 1996) estimates that very few of the tidewater gobies within the lagoon may occur in the proposed construction area at the time of construction because they are usually breeding farther upstream from the lagoon at this time of year.

Potential impacts to tidewater gobies resulting from capture and translocation would include both harassment and mortality. All individuals captured in the net would be harassed from being captured, removed from the lagoon, and handled. Tidewater goby mortality could result in several ways. The stress from the harassment expected from entrapment, as listed above, could result in the deaths of tidewater gobies. Individuals could be crushed in the net by the weighted lead line if it rolls inward while being pulled to shore. Some individuals could be entangled in algae pulled in with the net and go unseen in the sampling. If the algae is left onshore when sampling is completed, tidewater goby mortality could result. In addition, entrapment of males guarding burrows could affect the success of these burrows in that the males could suffer mortality or might not be able to find the burrow once returned to the lagoon. Alley (pers. comm. 1996) estimates that most of the tidewater goby breeding activity within the lagoon occurs farther upstream than the proposed project area.

Changes in water quality associated with the proposed action have the potential to adversely affect tidewater gobies. Impacts to water quality could result from organic debris accumulating in the lagoon and contamination from leaking oil or gas from the grader. Chemicals in oil products are known to have adverse effects on fish. Degradation of water quality could be avoided by removing accumulated debris and preventing chemicals from entering the lagoon during construction. The level of these effects on the tidewater goby would be dependent to some extent on the amount of accumulated debris and chemicals released into the lagoon.



Activities associated with the City's annual Begonia Festival also have the potential to adversely affect tidewater gobies. The Begonia Festival, which is held annually every fall, includes a parade of floats composed of begonias and other flowers in the lagoon. This activity would not be occurring without issuance of a Corps permit. People assisting the floats could dislodge pondweed, cause increased turbidity in the lagoon, and trample or harass individual tidewater gobies. Decomposition of organic debris from the festival and dislodged pondweed could result in a reduction of dissolved oxygen in addition to stimulating the growth of algae. Special conditions have been included into the Corps permit for this project that would minimize or eliminate some of these adverse effects. For example, maintenance of the water level during the festival should assist in preventing a decrease in the dissolved oxygen levels. The presence of a fisheries biologist during removal of organic debris should reduce the mortality of individual tidewater gobies. Additionally, most tidewater gobies are likely to be upstream of the lagoon area where the festival occurs during August. Finally, the festival has been conducted for years without the implementation of measures to reduce the take of tidewater gobies and the species has persisted in the lagoon.

Other recreational activities occurring as a result of lagoon closure, including swimming and non-motorized boating, may also have adverse effects on tidewater gobies. The effects of these activities are expected to be similar to those of the Begonia Festival.

Tidewater gobies may sustain harassment and mortality from predators. Should the impoundment of water behind the sandbar inadvertently create favorable habitat for non-native predators, such as bullfrogs and centrarchid fishes, tidewater gobies may suffer losses or extirpation by predation.

In the case of the tidewater goby, the quantification of take by harassment and mortality is difficult because of the species' small size, aquatic habitat, and annual life history. All of these factors make it difficult to detect where tidewater gobies are and if any have been affected by an action. For this project some harassment and mortality could be directly observed from those captured during relocation. However, mortality resulting from stress would not be as easy to observe.

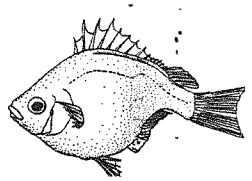
The Service believes the impacts described above are not likely to jeopardize the continued existence of the tidewater goby. We present this conclusion for the following reasons.

1. The proposed action would not result in the permanent loss of tidewater goby habitat in the Soquel Creek lagoon.

2. The Corps has proposed to implement actions that would reduce the likelihood of mortality or injury to tidewater gobies in the course of the project.

Cumulative Effects

Cumulative effects are those impacts of future State and private actions that are reasonably certain



to occur in the action area considered in this biological opinion. Future Federal actions will be subject to the consultation requirements established in section 7 of the Act and, therefore, are not considered cumulative to the proposed project. No State or private actions that would affect tidewater gobies in the project area are known at this time.

Incidental Take

Section 9 of the Act prohibits the take of listed species without special exemptions. Taking is defined as harassing, harming, pursuing, hunting, shooting, wounding, killing, trapping, capturing, collecting, or attempting to engage in any such conduct. Harm is further defined to include significant habitat modification or degradation that results in death or injury to listed species by significantly impairing essential behavior patterns, including breeding, feeding, or sheltering. Under the terms of section 7(b)(4) and 7(0)(2) of the Act, taking that is incidental to and not intended as part of the agency action is not considered to be prohibited taking under the Act provided that such take is in compliance with this incidental take statement. The stipulations described as reasonable and prudent measures and terms and conditions are non-discretionary, and must be undertaken by the agency or made a binding condition of any grant or permit, as appropriate.

The Service anticipates the following forms of take:

1. All tidewater gobies within the construction area at Soquel Creek in the form of mortality or harassment from construction activities.

2. All tidewater gobies within the Soquel Creek Lagoon in the form of harassment from disturbance of the lagoon substrate and water as a result of the Begonia Festival.

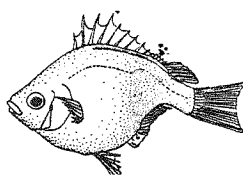
The actual number of tidewater gobies that would be taken cannot be accurately anticipated because precise surveys of this species are not possible and the number of individuals in a population varies greatly during the year. This biological opinion does not authorize any form of take that is not incidental to the completion of the proposed excavation and placement of fill into Soquel Creek.

Reasonable and Prudent Measures

The Service believes that the following reasonable and prudent measures are necessary and appropriate to minimize the incidental take authorized by this biological opinion.

1. Proposed project activities shall conform to local management plans for Soquel Creek Lagoon.

2. Worker education programs and well-defined operational procedures shall be implemented, with the cooperation of the on-site qualified biologist, to reduce the



mortality of tidewater gobies during implementation of all phases of the proposed project activities in the Soquel Creek Lagoon.

3. Appropriate agencies shall be notified prior to the sandbar construction activities.

Terms and Conditions

To be exempt from the prohibitions of section 9 of the Act, the Corps is responsible for compliance with the following terms and conditions, which implement the reasonable and prudent measures described above. Terms and conditions 1a, 1b, 2a, 2c, 2d, 2e, and 3 are based on the special conditions to the Corps permit for the proposed project. Several of the proposed measures are combined or modified herein.

1. The following terms and conditions are established to implement reasonable and prudent measure 1:

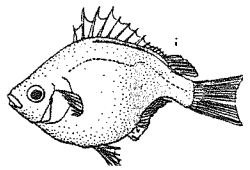
   a. The City of Capitola shall conform with the Soquel Creek Lagoon Management and Enhancement Plan, dated 1990, including all appropriate revisions outlined in the City's annual monitoring reports. All revisions shall be submitted to the Corps for approval prior to their implementation.

   b. The City of Capitola shall be responsible for annual monitoring of the lagoon as outlined in "Soquel Creek Lagoon Monitoring, 1994". A copy of the annual report shall be submitted to the Corps and the Service by May 31 of each year.

2. The following terms and conditions are established to implement reasonable and prudent measure 2:

   a. Prior to the onset of construction activities, tidewater gobies shall be removed from the work area through seining. The removal of tidewater gobies may be conducted incrementally as the sandbar progresses if this procedure enhances the protection of tidewater gobies or facilitates work activities without decreasing protection of the species.

   b. Only qualified personnel authorized under this biological opinion shall participate in activities associated with the capture, translocation, and monitoring of tidewater gobies, and water quality sampling. Don Alley is hereby authorized to conduct these activities as described in this biological opinion. If the City wishes to use other employees or outside contractors to participate in the these activities as described, the names and credentials shall be supplied to the Service for its review and approval at least 15 days prior to the onset of the activities which they are being authorized to conduct.



c. Don Alley and persons working directly under his supervision shall be present to supervise the removal of all organic debris characteristic of the Begonia Festival.

d. Don Alley and persons working directly under his supervision shall supervise kelp removal from the lagoon during construction.

e. The surface elevation of the lagoon shall not be lowered to accommodate the Begonia Festival.

f. All workers involved with construction activities shall be informed of the protection afforded the tidewater goby by the Endangered Species Act and measures being implemented to protect it during implementation of the proposed action.

g. The Corps shall ensure that construction activities are confined to the minimum work area necessary and that these areas are clearly marked. All workers shall be notified that their activities must be confined to the defined work areas.

3. The following term and condition is established to implement reasonable and prudent measure 3:

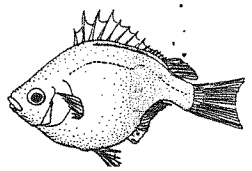
The Corps, the Service, and the National Marine Fisheries Service shall be notified two weeks prior to the sandbar construction activities.

Reporting Requirements

The Corps shall provide a report to the Service of the results of activities conducted under this consultation within 90 days after the completion of construction activities. The report shall include a brief discussion of project activities completed; effects of the sandbar construction activities on tidewater gobies; occurrences of incidental take, if any, including known harassment; problems encountered in implementing mitigation measures; results of biological surveys and sighting records; and any other pertinent information. This document will assist the Service and the Corps in evaluating future mitigation measures for conservation of the tidewater goby during similar construction projects.

Disposition of Dead Tidewater Gobies

Upon locating dead tidewater gobies, initial notification must be made to the Service's Division of Law Enforcement Office in Burlingame, California, by facsimile at (415) 876-9701 and the Ventura Field Office at (805) 644-3958 within three working days of their finding. The Ventura Field Office may also be contacted by telephone at (805) 644-1766. Written notification must be made within five calendar days and include the date, time, and location of the carcass(es), a photograph, cause of death, if known, and any other pertinent information. Care must be taken in



handling dead specimens to preserve biological material in the best possible state. The remains of intact tidewater gobies shall be placed with educational or research institutions holding the appropriate State and Federal permits.

Conservation Recommendations

Section 7(a)(1) of the Act directs Federal agencies to utilize their authorities to further the purposes of the Act by carrying out conservation programs for the benefit of endangered and threatened species. Conservation recommendations are discretionary agency activities to minimize or avoid adverse effects of a proposed action on listed species or critical habitat or regarding the development of information. To further the purposes of the Act, the Service offers the following recommendation:

> The Service recommends that the Corps implement actions that reduce sedimentation of the lagoon and creek as a result of the fill and damming activities.

To be kept informed of actions minimizing or avoiding adverse effects or benefitting listed species or their habitats, the Service requests notification of the implementation of any conservation recommendations.

Conclusion

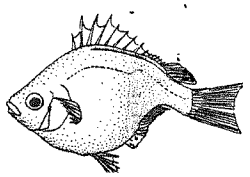
This concludes formal consultation on the issuance of a permit pursuant to section 404 of the Clean Water Act and section 10 of the Rivers and Harbors Act for the excavation and placement of fill into Soquel Creek in the City of Capitola, Santa Cruz County, California. Reinitiation of formal consultation is required if: 1) incidental take is exceeded; 2) new information reveals effects of the agency action that may adversely affect listed species or critical habitat in a manner or to an extent not considered in this biological opinion; 3) the agency action is subsequently modified in a manner that causes an effect to a listed species or critical habitat that was not considered in this biological opinion; and 4) a new species is listed or critical habitat is designated that may be affected by this action (50 CFR 402.16);

Any comments or questions should be directed to David Pereksta of my staff at 805/644-1766.

Sincerely,

Diane K. Noda

Diane K. Noda
Field Supervisor



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