

SURVEY OF THE FISHES OF PINE GULCH CREEK

by

Peter Tupas, Jim Smith

- Comments:
1. Excellent use of field observation.
 2. Good statement of problem.
 3. Conclusions based upon data.
 4. Excellent illustrations.

Summary of work for the Spring Semester 1968 at Bolinas Marine Station, College of Marin, California.

Station # 1-----

Gravel

#2

Deep Bend

#3

SALT MARSH

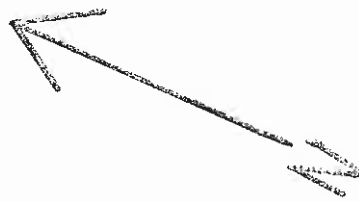
SALT MARSH VEGETATION

Salicornia
Distichlis
Spartina

#4

#5

#6



INTRODUCTION:

Pine Gulch Creek is located in the North-West corner of Bolinas Lagoon. It was found to be an area that could be rich not only in fish but in other animals and plants as well. This is one of the areas in the Lagoon where much more research can be done. A total of five species of fish, according to Mr. Stetson's report, were found in this area. The potential of finding more species of fish there is clear. This area has both a fresh water and a salt water environment. Many salt water and fresh water animals and plants probably live there and have become adapted to the semi-salt and fresh water environment. This, it seems to me, is one of the most interesting places to study ecology in Bolinas Lagoon.

The list of fishes recorded in this area were:

1. Pacific Staghorn Sculpin
2. Topsmelt
3. Arrow goby
4. Rainbow Trout
5. Striped Bass

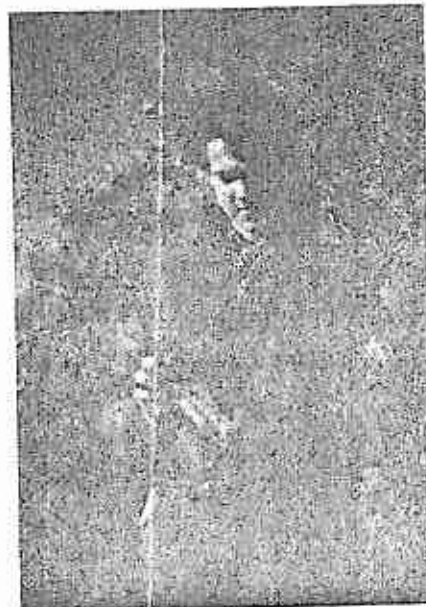
According to Mr. Stetson's report it was the first time

Roccus saxatilis (Striped Bass) was found in the lagoon.

It is our intention, Mr. Jim Smith and myself, to confirm the findings of Mr. Stetson. In our report we will try to give an accurate description of Pine Gulch Creek and determine what species of fish live there. We expect to find a variety of fish; salt, fresh and possibly fish that have developed an ability to live in a semi-salt water environment. We will

also try to determine; the changes of salinity of the water in Pine Gulch Creek as one progresses upstream; the areas in which the different species of fish live; and the validity of Mr. Stetson's hypothesis that Pine Gulch Creek is a good location for adolescent fish to live and grow up. It is our intention to use much photographic data. We will use color and black-white photos in our report so the reader can see the species of fish. We will include a taxonomical classification of all fish caught. Pictures of the banks and general area in which the fish were caught will also be taken. The report will be presented in a basic manner so that even people from Kansas will have a good idea of Pine Gulch Creek.

! - meaning ?
⑥



PROCEDURE:

Mr. Jim Smith and myself first formulated the questions this survey was to answer.

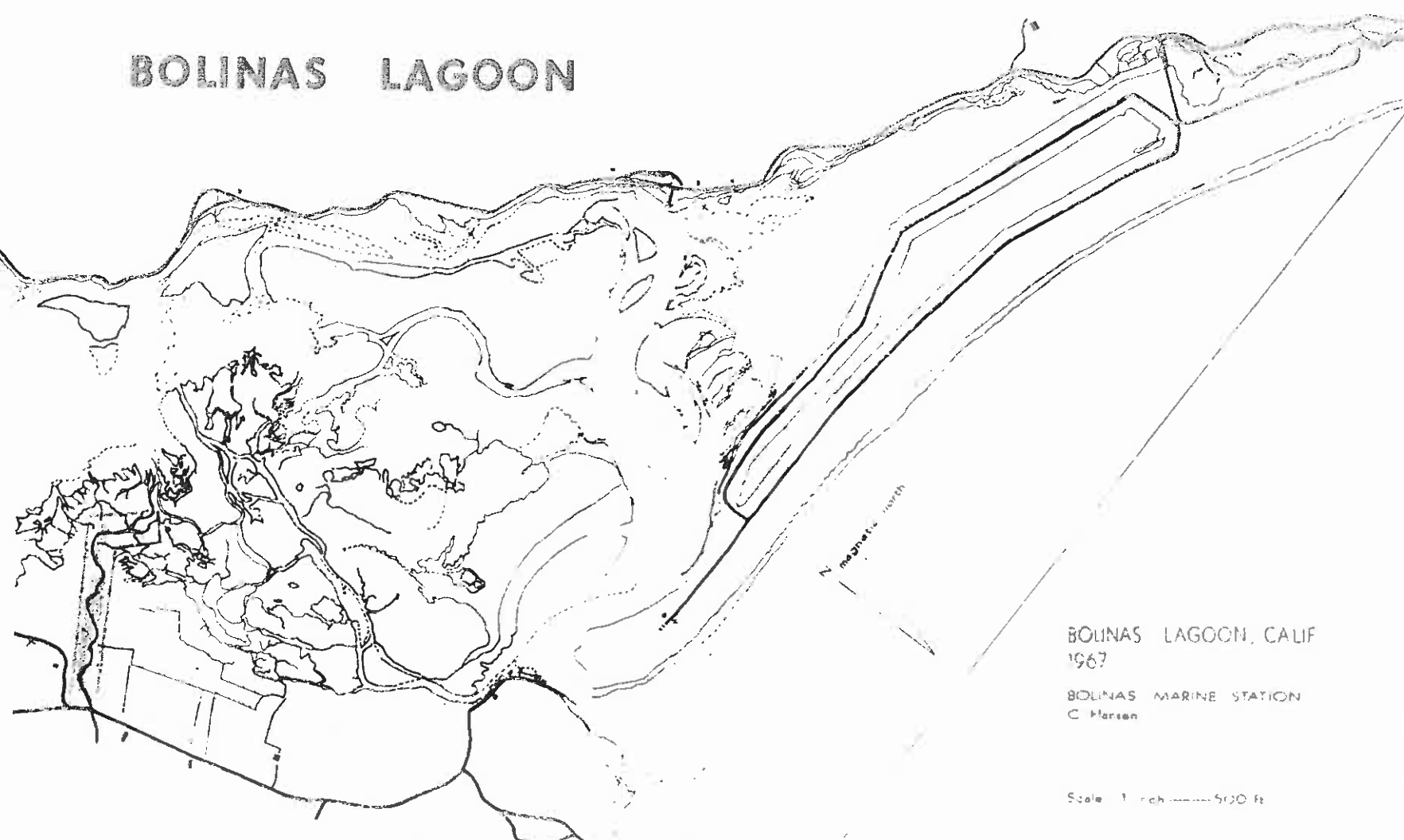
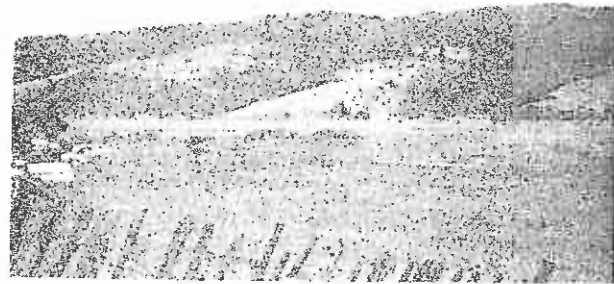
1. What species of fish inhabit Pine Gulch Creek and where are they located?
2. What is the change in salinity as one progresses up the creek?
3. Is this a good area for adolescent fish ?

Mr. Jim Smith and myself then went about this survey by setting up stations in Pine Gulch Creek. They were located at an even distances from each other to insure an accurate coverage of the creek. The stations ranged from the mouth of the creek to the bridge. There were a total of nine stations. We went about periodically seining at each station usually starting at the mouth of the creek and working upstream to the next stations. The fish caught were counted and sample fish from each species was taken back to the lab for classification and photographing. Many were kept alive or preserved so that future students could observe them.

The report also contains all relative data as follows:

- | | |
|----------------------------------|----------------------------|
| 1. Seine station | 9. Water depth |
| 2. Date of seine | 10. Total No. of species |
| 3. Time of seine | 11. Total No. of fish |
| 4. Tide-gate, etc. | 12. Air temp. at station |
| 5. No. of seine hauls | 13. Wind speed & direction |
| 6. Water temp. at seine stations | 14. Cloud cover |
| 7. Water clarity | 15. Substrate composition |
| 8. Seine size & mesh size | |

BOLINAS LAGOON



N magnetic north

BOLINAS LAGOON, CALIF
1967

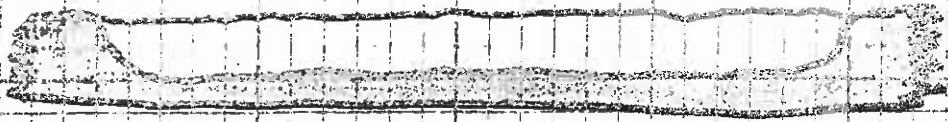
BOLINAS MARINE STATION
C. Hansen

Scale 1 inch = 500 ft

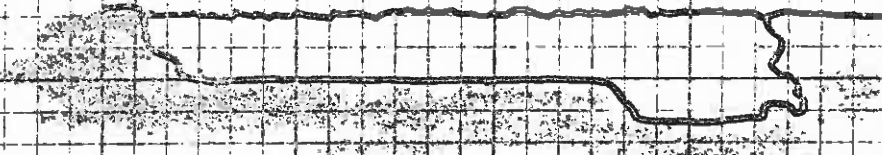


STREAM PROFILES
at
Larsed Stations

#1



#2



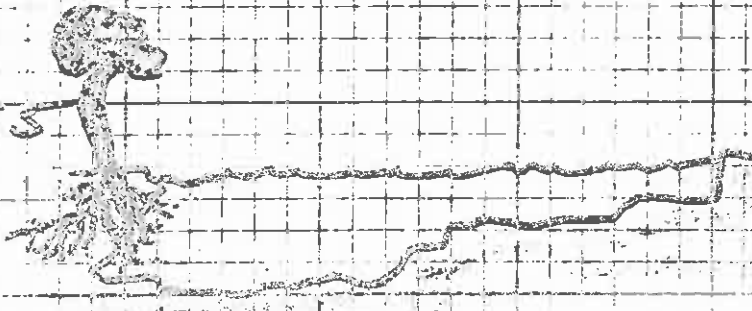
#3



#4



#5



Station # 1-

Location: At the mouth of Pine Gulch Creek.

Stream characteristics: The bottom in this area is washed gravel with a depth variance of 6" to 12". The widest part is around 20 feet. The salinity ranged from 3 to 14 0/00.

Station # 2-

Location: 200 feet upstream from the mouth, including the deep hole at the first bend.

Stream characteristics: Stream channel favors the right side of the stream and is deeper with a overhanging bank. The configuration of the stream changes according to discharge. The bottom is gravel. The width is 12 to 14 feet. Salinity ranged from 1.4 to 8 0/00.

Station # 3-

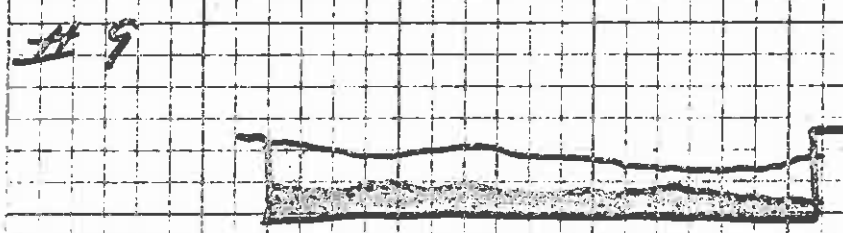
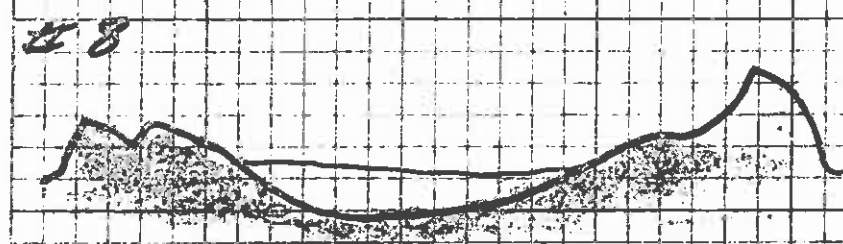
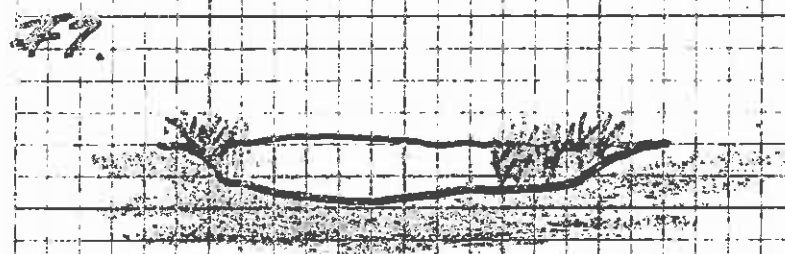
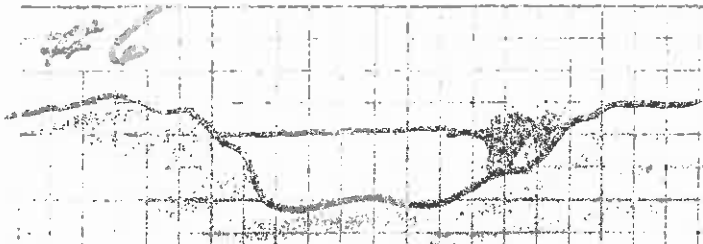
Location: Starting from the deep hole upstream 150 yards. Much of this stretch must be very carefully worked for the bank are alternately undercut. Along with the heavy vegetation, the undercut banks make this a very hard station to work; but it is also very heavily populated. The bottom is mud. The salinity range was 1.2-1 0/00.

Station # 4-

Location: Upstream 320 yards from the bend. Both sides of the bank are undercut. This was one of our most productive stations. The bottom is mud and gravel. The salinity was 1.

Station # 5-

Location: This station is at the beginning of the trees. The stream is narrower in this section. The bank are deeply undercut with many spots exposing the root of the trees. The bottom is gravel. Fresh water no salinity.



Station # 6-

Location: Through the first tree grove at the first fence. Here the stream is narrow and the banks are covered with a high grass. The grass makes it difficult to make a good run. It lifts the bottom of the net and also makes it very difficult to close off. The bottom is gravel. The water is fresh.

Station # 7-

Location: 100 yards above station # 6. The stream is still narrow with grass growing down on both sides. A very good hiding place for the fish. The bottom is gravel. The water is fresh.

Station # 8-

Location: This station is about 300 feet down from the bridge. The configuration is constantly changing. This area is one of the heaviest for stream deposition. Easy to work, with gently sloping banks and no bottom obstructions.

Station # 9-

Location: This was our last station. It the area under and around the bridge. The bottom is gravel. It is over 25 feet wide and fairly shallow (4 inches).

Added notes on this section of pine gulch creek.

The creek is not an easy one to work. It begins with low banks and a good substrate. As you go up stream the banks become under cut and makes it impossible to beach the net up the bank. The undercutting also is very hard to cover with the seine. When you get into the trees you have to steer a course to keep the seine from snagging and ripping. Above Station # 7 up to the bridge there are several very deep holes, but because of the trees and roots it is impossible to get into them.

Station #1

Location: At the mouth of Pine Gulch Creek

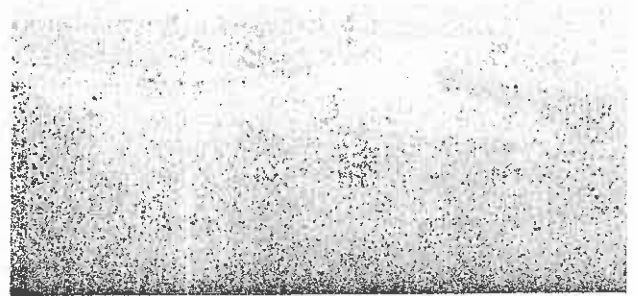
Depth: 6 to 12 inches

Width: 20 feet

Banks: Salt marsh- *Salicornia*, *Spartina*, *Distichlis*

Salinity: 2 to 1 0/00 Bottom- gravel and pebbles

Note: Many *Leptocottus armatus*,



Extension Station # 1

Location: At the mouth of Pine Gulch Creek

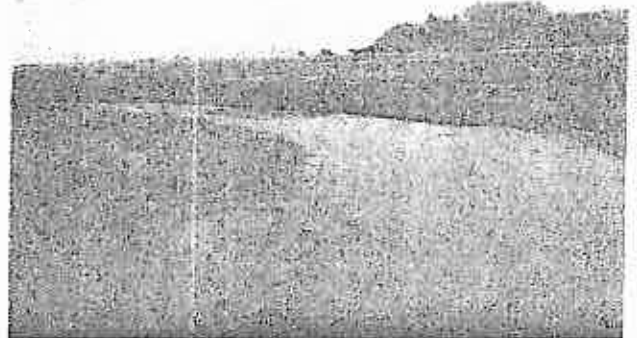
Depth: 6 inches Max.

Width: 10 feet

Salinity: 2 to 1 0/00

Note: Many *Leptocottus armatus*

Bottom: Pebbles



Station# 2

Location: 200 feet upstream of station 1

Depth: 9 inches to 6 feet at bend.

Width: 12 to 14 feet

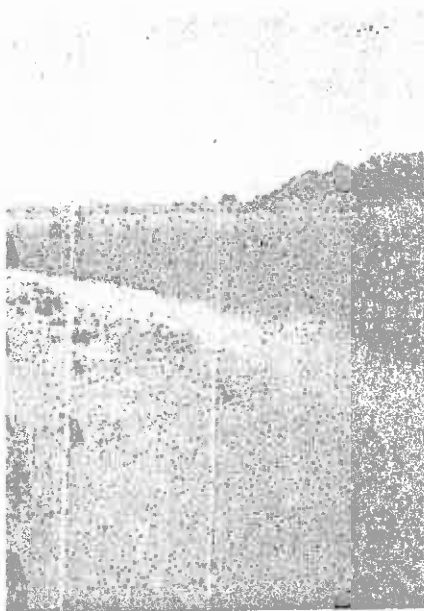
Salinity: Range 1.4 to 1 0/00

Note: Salinity higher at bend

Many *Leptocottus*, some sticklebacks
(BELOW)

New growth of bottom seaweed
(*Ulva* ?)

Station 1 through 5



Station # 3

Location: Starting from the deep hole to
150 yards upstream

Depth: 9 inches to 3 feet

Bottom: Mud

Width: range 12 to 7 feet

Note: Many Striped Bass caught in
deep hole at bend. *
deep undercut *

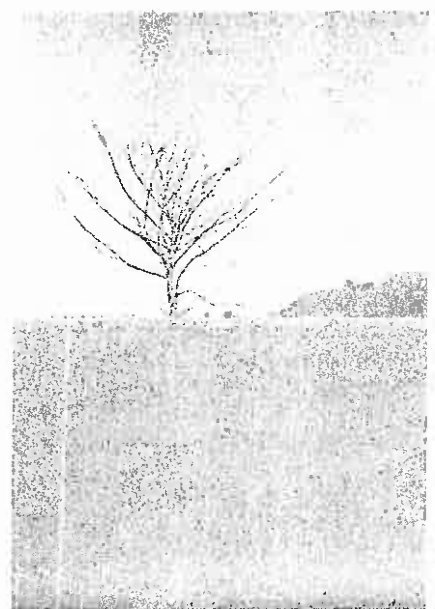


Undercut *



deep hole *

Undercut areas sheltered many fish.
Observation: A frog escaped my capture
Via undercut bench.



Station #4

Location: 300 to 350 yds upstream of bend.

Depth: 2 feet

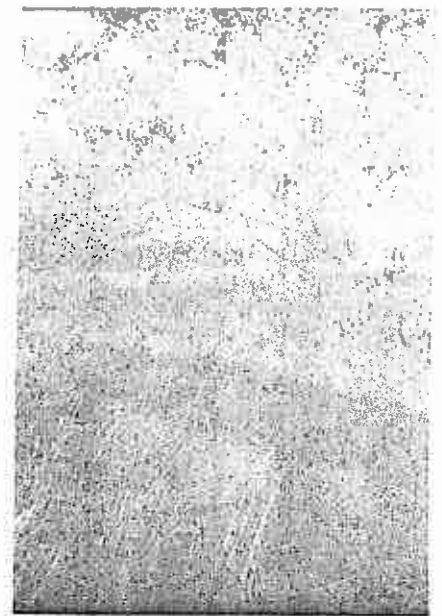
Width: 9 feet to 6 feet

Bottom: Mud and gravel

Banks: Both undercut

Salinity: 1 ‰

Note: A very productive station
Sculpin, Trout, Sticklebacks
and Stripped bass.



Station # 5

Location: Beginning of tree grove

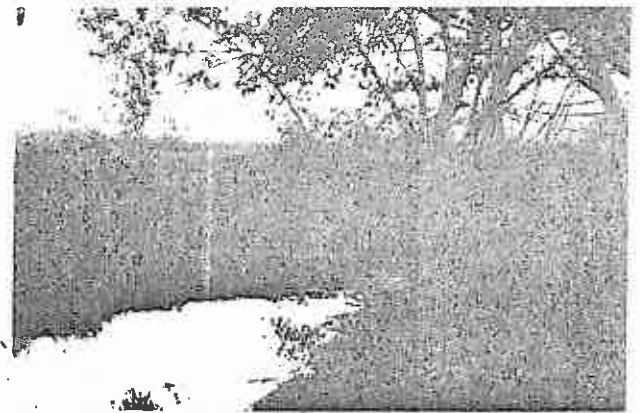
Depth: Few inches to a foot or two

Width: Stream bed measures 9 feet

Banks: Undercut in spots; trees

Salinity: Fresh

Note: Beginning To catch large
numbers of trout and
sticklebacks.



Station # 6

Location: Beyond tree grove, just pass fence.

Depth: Varied

Width: 9 feet

Banks: Covered with grass

Note: Grass growing in creek

Seining difficult. Trout area, esp in grass

Salinity: fresh
(BELOW)



Station # 7

Location: 100 Yds. upstream of station #6

Depth: shallow

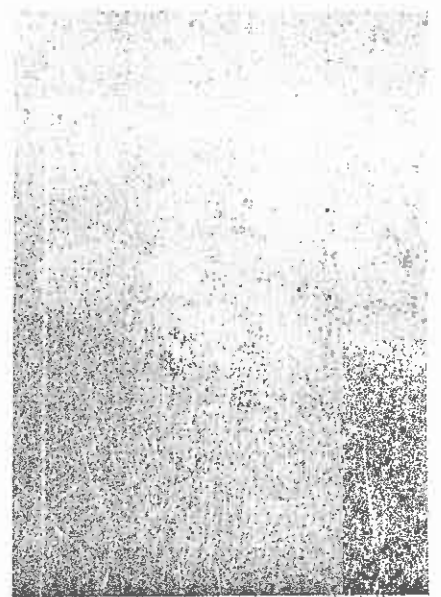
Width: Very narrow 5 feet , Water level

Banks: Grass growing on both sides

Bottom: gravel and silt

Salinity: Fresh.

Note: Plywood board found here at
bottom, good area beneath the
board for insect and crayfish.



Station # 8

Location: 300 feet downstream of bridge.

Depth: Shallow, 6 inches

Width: At water level 5 feet approx.

Banks: Gravel

Bottom: gravel with silt.

Note: Easy to work, gentle sloping banks
Trout and VENUS ROACH area



Station # 9

Location: At the bridge.

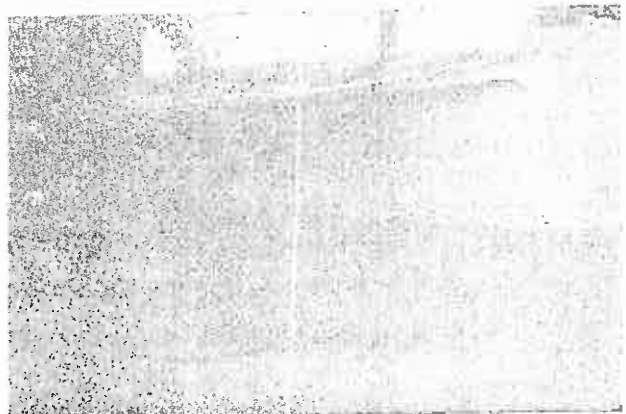
Depth: shallow 6 inches

Width : 25 feet

Banks: none

Bottom: Gravel

Note: Very good area for
Trout and venus roaches



SPECIES OF FISH CAUGHT

The following list of fish was compiled from the fish species which were collected by the seining process which Jim Smith and I used in Pine Gulch Creek. This was done From March 1968 to May 1968.

1. Hesporoleucas Venustus ... Venus Roach (Eddy)
2. Gasterosteus aculeatus Three Spined Stickleback (Clemens) (Barnhart)
3. Salmo Gairdneri Rainbow trout (Miller) (Cannon) (Barnhart)
4. Cottus asper Fresh water sculpin (Eddy)
5. Leptocottus armatus ... Staghorn Sculpin (Roedel) (Lights)
6. Roccus saxatilis ... Stripped bass (Roedel) (Miller)
7. Clevelandia ios Arrow goby (Roedel)
8. Atherinops affinis... Topsmelt (Roedel)

Other animal collected in the area.

1. Orcorectes astacus Crayfish (Ward and Whipple's)
- 2.

Plants found in this area.

1. Spartina ^{foliosa} ... Cord Grass (Dawson)
2. Distichlis ^{spicata} Salt Grass (Dawson)
3. Salicornia ^{virginica} ... Pickle Weed (Dawson)
4. Salix spp..... Willows
5. Alnus rubra ... Red Alders
6. Polygonum ^{lanceolatum} juncus Duckweed

Kingdom ANIMAL

Phylum CHORDATA

Sub-phylum VERTEBRATA

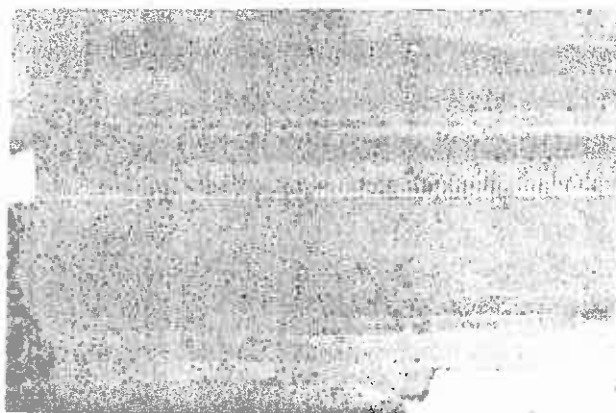
Class OSTEICHTHYES (Bony Fishes)

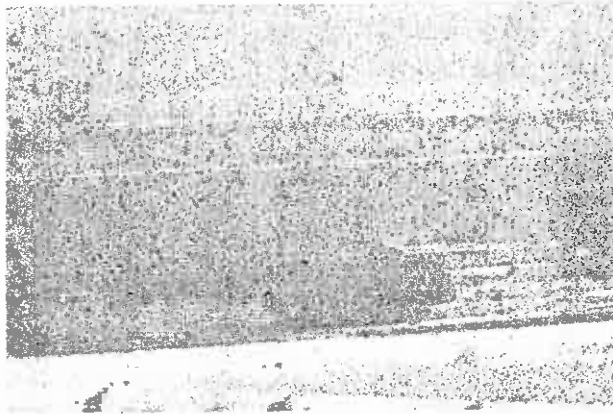
Order PERCIFORMES (PERCOMORPHI: ACANTHOPTERYGII)

Family COTTIDAE (sculpins)

Genus LEPTOCOTTUS

Species ARMATUS (Pacific Staghorn Sculpin)





LEPTOCOTTUS ARMATUS

Staghorn Sulpin

RELATIONSHIP: A member of the sculpin family, Cottidae, which includes almost one-tenth of California's marine fishes. Excepting this species and the cabezone, sculpins are small fishes of no commercial importance. Some of them are very abundant in tide pools.

DISTINGUISHING CHARACTERISTICS: The ventral fins with one spine and four rays (the spine may be so closely attached to the first ray that it can be found only by dissection); the bony support extending from the lower part of the eye back across the cheek just under the skin; the scaleless body; the large, antler-like spine on the preopercle. Length (grown) to about a foot. Color: Back, mottled olive-gray, green or brown; sides: brassy, bordered below by yellow; belly white. Spiny dorsal with a black spot toward its end; soft dorsal and anal fins with gray or green bars; pectoral fins barred with yellow and black.

DISTRIBUTION: Alaska to northern lower California. Common close to shore and in bays; enters brackish and perhaps fresh water.

Kingdom ANIMAL

Phylum CHORDATA

Sub-phylum VERTEBRATA

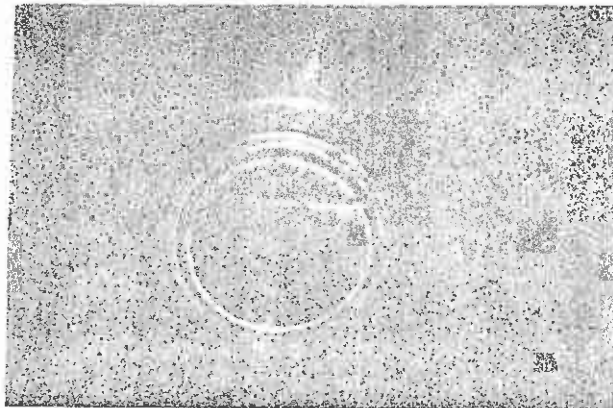
Class OSTEICHTHYES (Bony Fishes)

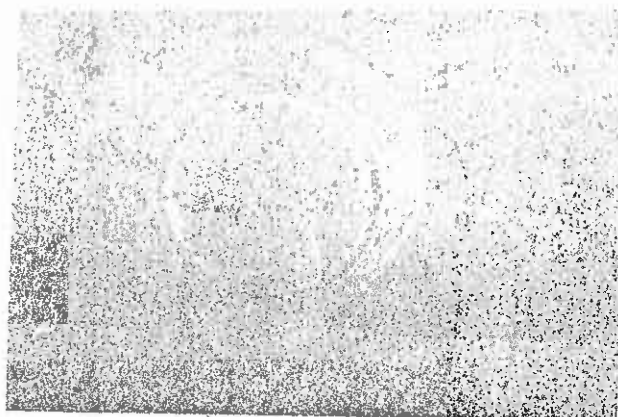
Order PERCIFORMES (Percomorphi, Acanthopterygii)

Family GOBIIDAE (Gobies)

Genus CLEVELANDIA

Species IOS (Arrow Goby)





CLEVELANDIA IOS

Arrow Gobie

RELATIONSHIP: A member of the goby family. Not a commercially important fish.

DISTINGUISHING CHARACTERISTICS: The united ventral fins; the huge mouth with the maxillary greatly developed, Pelvics united, forming together with ventral skin folds a laterally cleft adhesive disk. Scales too small to count. Eyes well developed, fully functional.

COLOR: Tan almost opaque.

Kingdom ANIMAL

Phylum CHORDATA

Sub-phylum VERTEBRATA

Class OSTEICHTHYES (Bony Fishes)

Order

Family

Genus HESPOROLEUCAS

Species VENUSTUS

Common Name: Venus Roach (Eddy)



Kingdom ANIMAL

Phylum CHORDATA

Sub-phylum VERTEBRATA

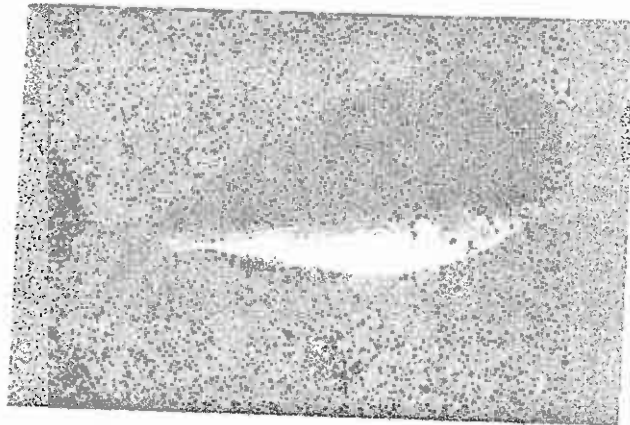
Class OSTEICHTHYES (Bony Fishes)

Order PERCIFORMES (PERCOMORPHI; ACANTHOPTERYGII)

Family ATHERINIDAE (Silversides)

Genus Atherinops

Species Affinis (Topsmelt)



ATHERINOPS AFFINIS

Topsmelt

RELATIONSHIP: Several subspecies are recognized in California, including the San Francisco topsmelt (*A. a. affinis*), Lay topsmelt (*A.a. littoralis*), Kelp topsmelt (*A.a. cedroscensis*), and island topsmelt (*A.a. insularum*)

DISTINGUISHING CHARACTERISTICS: Tip of blunt or rounded upper jaw projects very slightly over tip of lower; teeth forked, set in a single row in the jaws (separating it from the jacksmelt and the grunion;) front of first dorsal fin about over vent. Length to about 12 inches.

COLOR: ~~Bule~~-gray to clear green above, becoming silvery below; a bright silver band bordered above with bright blue or purple extends the length of body.

RANGE: Northern Oregon south into the Gulf of California. A schooling fish, often in company with jacksmelt.

Kingdom ANIMAL

Phylum CHORDATA

Sub-phylum VERTEBRATA

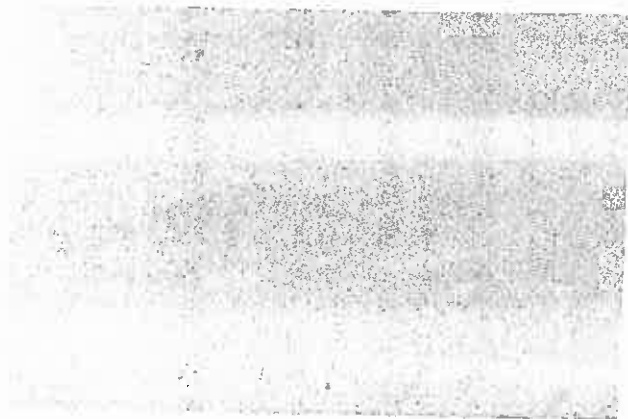
Class OSTEICHTHYES (Bony Fishes)

Order GASTROSTEIFORMES

Family GASTROSTIIDAE

Genus GASTROSTEUS (Sticklebacks)

Species ACULEATUS (3 spined Stickleback)



GASTROSUEUS ACULFATUS

3 Spined Stickleback

CHARACTERISTICS: The sticklebacks are all small fishes with slender stream-lined bodies. They are characterized by a series of free dorsal spines in front of the soft dorsal fin. The pelvic fins are reduced to heavy spines. Sticklebacks lack scales. Body rather stout; brownish green above and light below, profusely speckled with black. Sides may be covered by bony plates or may be naked. Length 4 inches. Fresh water and marine in Northern Hemisphere. In the U.S. it occurs along the Pacific and Atlantic coasts and in the coastal streams. (sidelight) The sticklebacks build elaborate nests. The males construct the nest about the size of a golf ball penetrated by a tunnel used for the eggs. The nest is composed of grasses or fibers cemented together by a secretion of the male. The male cares for the eggs and watches after the newly hatched young. Sticklebacks are noted for their pugnacious habits attacking fishes many times their size who intrude near their nests. They are percaceous feeding on small or minute aquatic animals.

Kingdom ANIMAL

Phylum CHORDATA

Sub-phylum VERTEBRATA

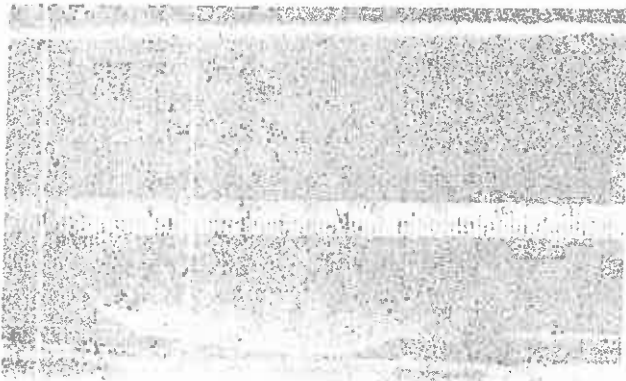
Class OSTEICHTHYES (Bony Fishes)

Order CLUPEIFORMES (Isospondyli)

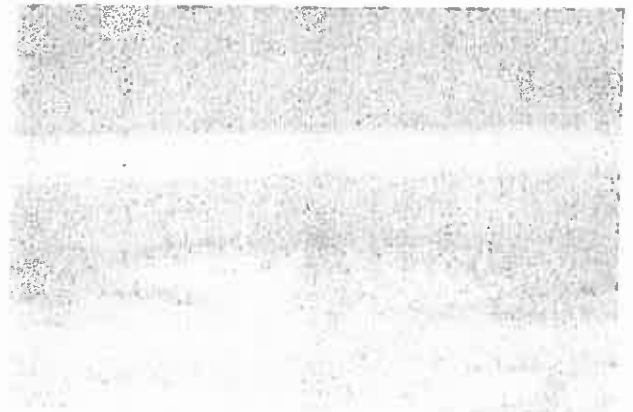
Family SALMONIDAE (Trout, Whitefishes, and Graylings)

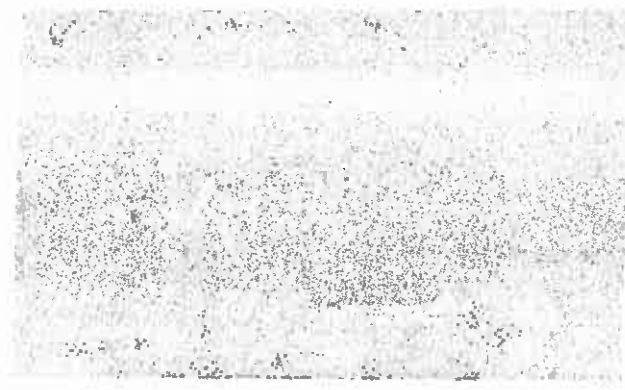
Genus SALMO

Species GAIRDNERI (Rainbow Trout)



Salmo Gairdneri





SALMO GAIRDNERII

Rainbow Trout

RELATIONSHIP: A member of the salmon and trout family, Salmonidae. One of a closely related group of trouts the natural relationships of which have been greatly obscured in the course of fish cultural operations. Some individuals run to sea while others appear to form resident stream populations.

DISTINGUISHING CHARACTERISTICS: The presence of an adipose fin; the single dorsal fin composed of soft rays; the scaly appendage above the base of each ventral fin; a patch of teeth at the tip of the tongue but none on the back of the tongue; the relatively short anal fin with 9 to 12, rarely 13 rays; The white lining of the mouth. Reaches a maximum weight of about 30 pounds. Average fish runs under 10 pounds. **COLOR:** Bluish on back; sides and belly profusely covered with small spots, on the adolescent white tipped fins.

DISTRIBUTION: From Alaska south at least to the Mexican border.

Kingdom ANIMAL

Phylum CHORDATA

Sub-phylum VERTEBRATA

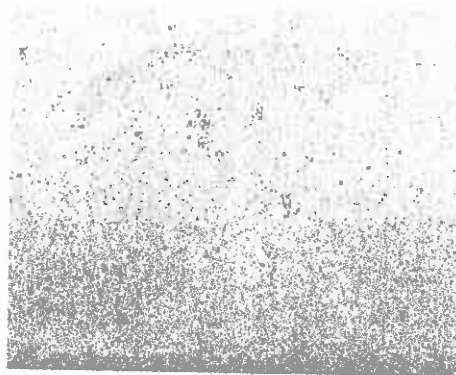
Class OSTIECHTHYES (Bony Fishes)

Order PERCIFORMES (PERCOMORPHI; ACANTHOPTERYGII)

Family SERRANIDAE (Sea basses)

Genus ROCCUS

Species SAXATILIS (Striped Bass)



ROCCUS SAXATILIS

Striped Bass

RELATIONSHIP: A member of the sea bass family. Serranidae, which includes the black sea bass and the kelp, sand, and spotted sand basses. Introduced from the Atlantic coast in 1879.

DISTINGUISHING CHARACTERISTICS: The two dorsal fins; the three spines in front of the anal fin; the presence of vomerine teeth; the series of seven or eight horizontal blackish stripes along the sides; the pectoral fins not reaching back beyond the tips of the ventrals; the relatively small eye which is much less than one-third as long as the head. Average weight 10 pounds or less. COLOR: Striped as described above; steel blue to olive-green above becoming silvery on the sides and belly; everywhere with brassy reflections.

DISTRIBUTION: Southern California to the Columbia River; uncommon south of Monterey Bay. In the Atlantic Ocean from the Gulf of S. Lawrence to the Gulf of Mexico. Ascends streams to spawn.

Kingdom ANIMAL

Phylum CHORDATA

Sub-phylum VERTEBRATA

Class OSTEICHTHYES (Bony Fishes)

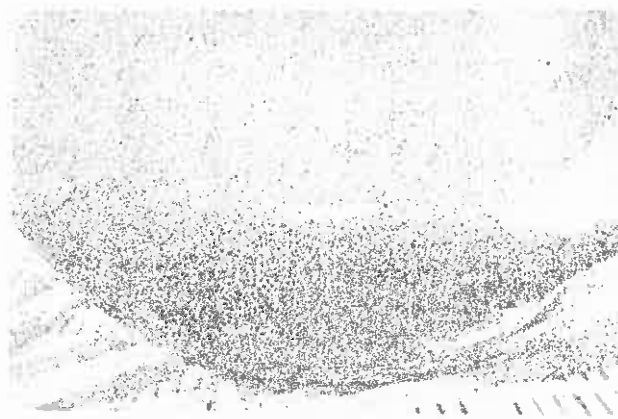
Order PERCIFORMES (PERCOMORPHI, ACANTHOPTERYGII)

Family COTTIDAE (Sculpins)

Genus COTTUS

Species ASPER (Fresh water Sculpin)





COTTUS ASPER

Fresh water Sculpin

RELATIONSHIP: A member of the sculpin family, Cottidae, which includes almost one-tenth of California's fishes. Excepting this species and the cabezone, sculpins are small fishes of no commercial importance.

DISTINGUISHING CHARACTERISTICS: Grayish olive and mottled; blackspot in posterior part of spiny dorsal fin; dorsal fins confluent; body very prickly. Length up to 12 inches.

DISTRIBUTION: Coastal streams from Ventura county, California to Alaska.

Kingdom ANIMAL

Phylum ARTHROPODA

Sub-phylum

Class CRUSTACEA

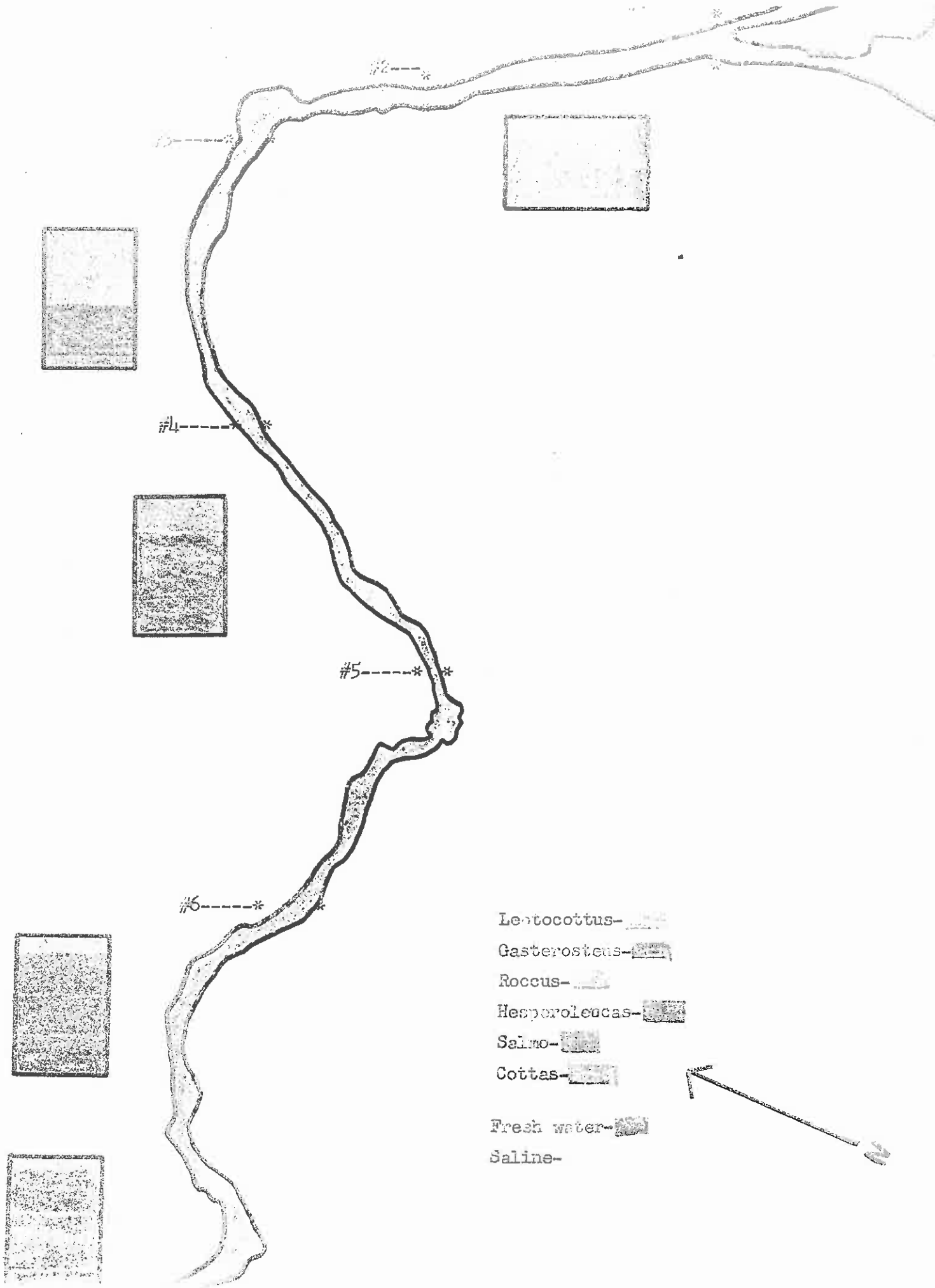
Order DECAPODA

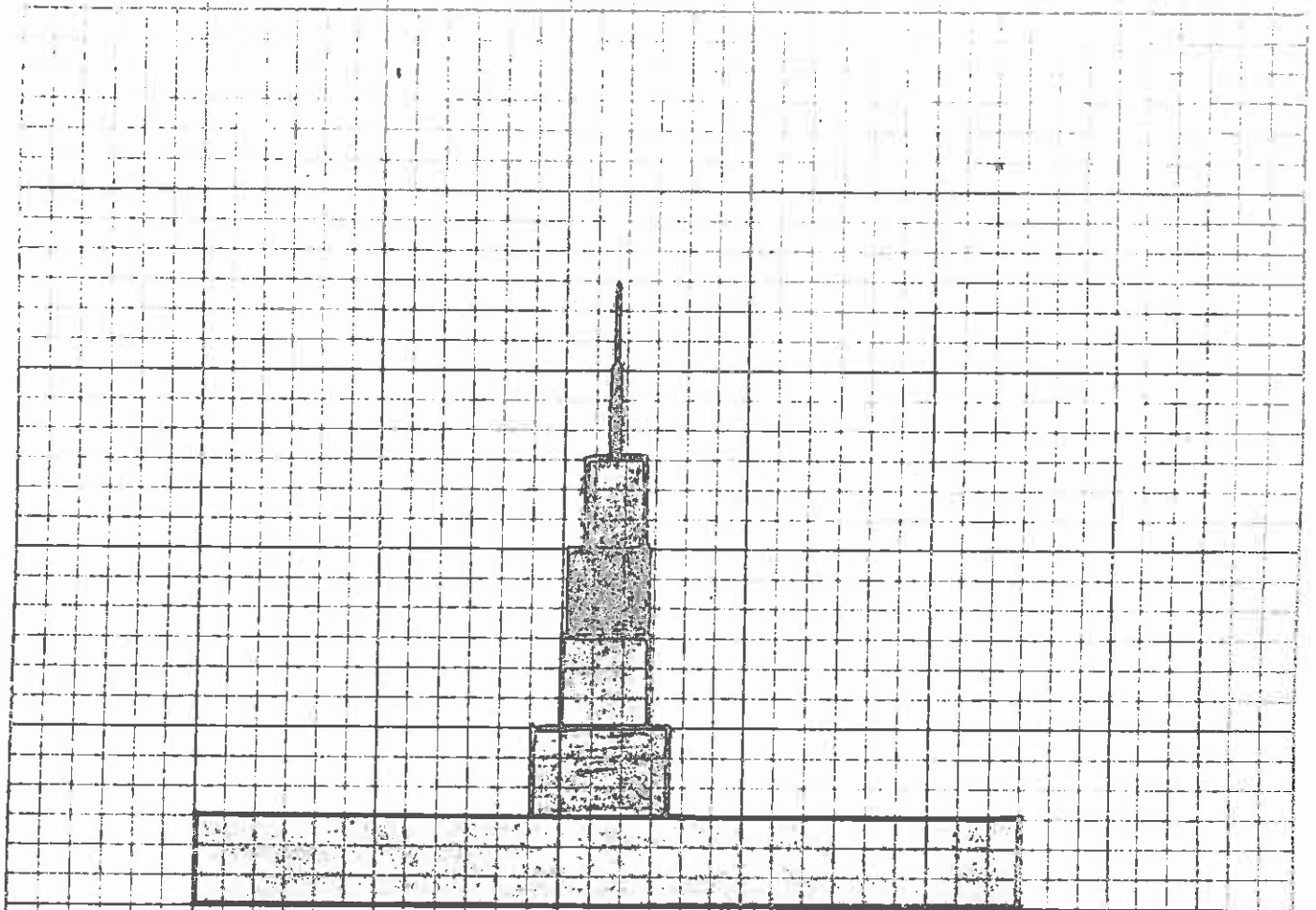
Family

Genus ORCORECTES

Species ASTACUS







Numbers of fish caught:-
 Leptocottus armatus- 273
 Gasterosteus aculeatus- 12
 Roccus saxatilis- 20
 Hesperoleucis venustus- 12
 Salmo gairdneri- 30
 Cottus asper- 2
 Clevernia 105- 1

Total number of fish collected:

392

Station #1, Seine #1

March 9, 1968

12:06 to 1:43

Pine Gulch Creek Mouth

Gravel & Small pebble

3

20 foot by $\frac{1}{4}$ inch mesh

Low-Low 12:36 to 3:30

Clear (bottom visible up to 15 inches) Out going water

LOW:LOW 12:36

Clear

11.5 C

inches to 22 inches

Out going 1.2 Salinity Out

21 C

Clear skys

5-7 knots from North-West

Sal.

ie specie

ave. 1.2 56 Largest 4.5 cm
3cm Smallest 2cm

Leptocottus armatus
(staghorn surpin)
pedel

April 21, 1968

2:00

tree along bank from mouth

Mud

1

20 feet by $\frac{1}{4}$ inch mesh

but

Clear

17C

24 Approx.

1

Sunny

N-W 5 knots

fish
stickelback
leptocottus

5

Number 3

4 seines

April 28, 1968

12:30 to 1:15

Mouth and second station

Mud-gravel

4

20 foot by $\frac{1}{4}$ inch mesh

4.4 out

High 4.4 out

Clear

17 C

9 inches to 23 inches

.9 Salinity

Out going

22 C

Clear but fog advancing

5 knots from North-West

1st seine 4 fish

Leptocottus armatus

2nd seine 7 fish

3 leptocottus

4 stickleback

3rd seine 6 fish

5 roccus saxitilus

4th seine 4 fish

2 stickleback

2 leptocottus

21 fish

3 speices

Drayfish also

specis not known

First station was 50 yard from the m. out

of
Pine Gulch Creek #

4/ 23/ 68

1000

Pine Gulch Creek

Mud

one

35'

three hrs. after low-low

-0.3

5.4 @ I3;36

-0.3 @ M700

clear 6plus inches

14 C.

5'

ebb (Normal flow)

cloudy

unknown

gusty 10-25

Leptocottus
armatus

3.7	2
3.5	27
3.2	
&	
3.0	23
2.3	11
1.8	3
1.4?	2

Algae

Ulva?

4.1 1

total 49

Station- Mouth of Pine Gulch

4 / 28 / 68

1015

G C

Mud

One

three hrs. after low-low

5.4 @ 1336

-0.3 @ 0700

clear

14 C

1.2 salinity

ebb (normal)

cloudy

unknown

gusty 10-25

ptocottus armatus

45

Standard lengths varied from 3.5 centimeters to 1.6

total 45

around bend

1/28/63

1100

gulch Creek

pebbles

one

three hrs. after low-low

5.4 @ 1336

-0.3 @ 0700

Clear

14 C

6-8"

1 fresh

ebb slow

cloudy

gusty 10-25

ocottus Armatus

32 most were of the same general size described before.

erosteus

aculeatus

5.4

2

5.8

3

Total 37

2 Crayfish

3--- 15 yard above station

4/26/58

10.5

Pine Gulch Creek

pebbles

one

three hrs. after low-low

5.4 @ 1336

*0.3 @ 0700

clear

14 C

8-9"

1

ebb, normal

cloudy

gusty 10-25

aptocottus armatus standard lengthh from 3.0 to 1.8

25

asterosteus

aculeatus

5.8

1

5.4

1

5.9

3

total 29

May 10, 1963

1400

McQuinn Creek

gravel

one

no fish

Collecting time and depth

20'

1976 - 1977

clear

2-1/2 ft

below

of depth

Slack

Water Temp.

14 C.

Turbidity

Current Speed and Direction

ATMOSPHERIC CONDITIONS

partly cloudy

Temp.

Clarity

Wind Speed and Direction

LOGICAL CONDITIONS

salinity .8

Collected

Preserved

Released

Salmo gairdneri

8

Gasterosteus aculeatus

4

#7

Cottus asper

2

Salmo gairdneri

2

#8

Gasterosteus aculeatus

2

#9

Salmo gairdneri

7

esperoleus venustus

27

total

54

Mouth of Pine Gulch Creek

May 28, 1968

1:00

gravel

one

201

1201 @ 5.6
1913 @ -0.8

clear

8"

Stocotus armatus

26

Asterosteus aculeatus

5

Total

31

Deep Hole

May 26, 1968

1025

THE GULCH CREEK

mud

one

20'

High-Low 6:2h

Clear

7 feet

Clear

occus saxatilis

22

asterosteus aculeatus

2

Total

24

Date		Time
May 28, 1968		1038
Substrate		# Seine Hauls
Alder grove- Pine Gulch Creek		one
Seine Size		
20'		
Collecting Tide and Depth		

HYDRAULIC CONDITIONS

High-Low	Slack	Water Temp.
low-low		
Water Depth	Turbidity	Current Speed and Direction

ATMOSPHERIC CONDITIONS

Air Temp.	Clarity	Wind Speed and Direction
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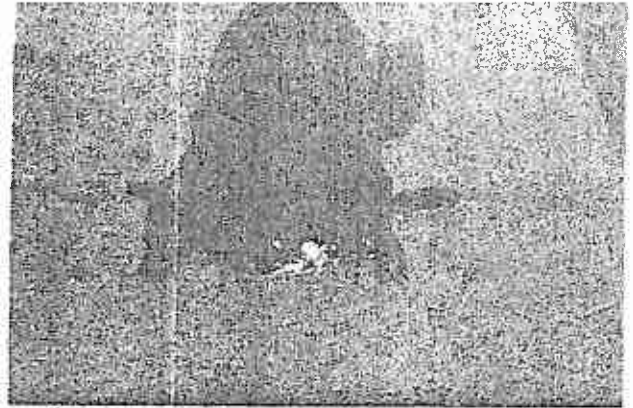
BIOLOGICAL CONDITIONS

# Collected	# Preserved	# Released
Leptocottus armatus		2
Gasterosteus aculeatus		6
Salmo gairdneri		2
crayfish		1
	total	10
		1 crayfish

CONCLUSION:

In conclusion of this survey Mr. Jim Smith and myself found that eight species of fish live in Pine Gulch Creek.

1. *Hesporoleucas Venustus* (Venus Roach)
2. *Gasterosteus aculeatus* (three spined Stickleback)
3. *Salmo Gairdneri* (Rainbow trout)
4. *Cottus asper* (Fresh water sculpin)
5. *Leptocottus armatus* (Staghorn Sculpin)
6. *Roccus saxatilis* (Striped Bass)
7. *Clevelandia ios* (Arrow goby)
8. *Atherinops affinis* (Topsmelt)



We also found a specie of crayfish and a

All the fish we caught during the entire survey were adolescent.

We can say quite safely that Pine Gulch Creek is a good place
for adolescent fish to live and grow up as Mr. Stetson hypothesized.

Good.

As for the location of the different species of fish in Pine
Gulch Creek, we cannot say positively that any particular species
was caught in any one particular spot, But we can say that there
is a general abundance of certain species in certain areas.

We found that Leptocottus armatus could be caught throughout
the entire creek that we seined., But there is a greater
abundance of them at the mouth of the creek than anywhere else,
Roccus saxatilis (Striped Bass) were found in large numbers
at the deep hole (the start of station 3). Trout (Salmo gairdnerii)
was found from station 4 all the way to station 9, but the most
abundant areas were at station 4 and 9 (esp. under the bridge)
Sticklebacks were found in the same areas as the trouts, but
had a higher probability of being found in dark and vegetated areas.

Venus roaches (*Hesperoleucas venustus*) were only in fresh water and ~~above~~ above station 7. The reason for this is probably the ~~the~~ Venus roaches are strictly fresh water fish, and do not at any time go to the ocean as trout sometimes do. Most ^{of} the Venus roaches that we caught came from beneath the bridge (station 9). As for the Fresh water sculpin, the arrow goby and topsmelt, we did not ~~not~~ catch enough to say in what area they are likely to be located.

We do think that this project should be continued for the simple reason that many question are yet to be answered. This area is also very interesting and will provide a very exciting project for those who are at all interested in fish ecology. The excitement of just catching live fish is in itself a rewarding experience.

If you are one of these person who are interested in taking on and continuing this project, Jim and ^I myself have some suggestion, which will make it much more effective and direct. We have already given some idea as to where some species of fish are, but we did not do much seining in the area between station 7 and 8, this is a place in which much research can be done, but the problem is that the water is deep and trees line both sides of the bank. Our suggestion is that you have 3 people to help you. Using the other people to drive the fish down the stream into the large seine. In this way you would not have to fight the deep-water or trees. The seine would only be moved a short distance to close it off. We have observed many large fish in this area.

A useful technique for observing and classifying the fish is to bring them alive to the lab and put the fish into the fresh water tanks. In this way you can get a much better understanding of the fish and its living habits.

Some of the changes that we have noticed in the stream during our study was the change, from a bare uncluttered bottom to a very dense growth of algae. The algae growth was a very large month problem, for it not only offered the fish a excellent place in which to hide but it also would fill out ~~the~~ seine in a distance of 20 feet. In the early months of the project, the fish caught were much lower in number and in species. The water outflow in the early months (March and April) was high and the stream would change the bottom profile ~~would change~~ almost daily. During this period we witnessed a lot of bank ~~erosion~~ erosion. All along the creek the banks are undercut and periodically cave-in. Even in the tree groves where the massive root systems give support to the banks there was several places where the entire bank would be cut away.

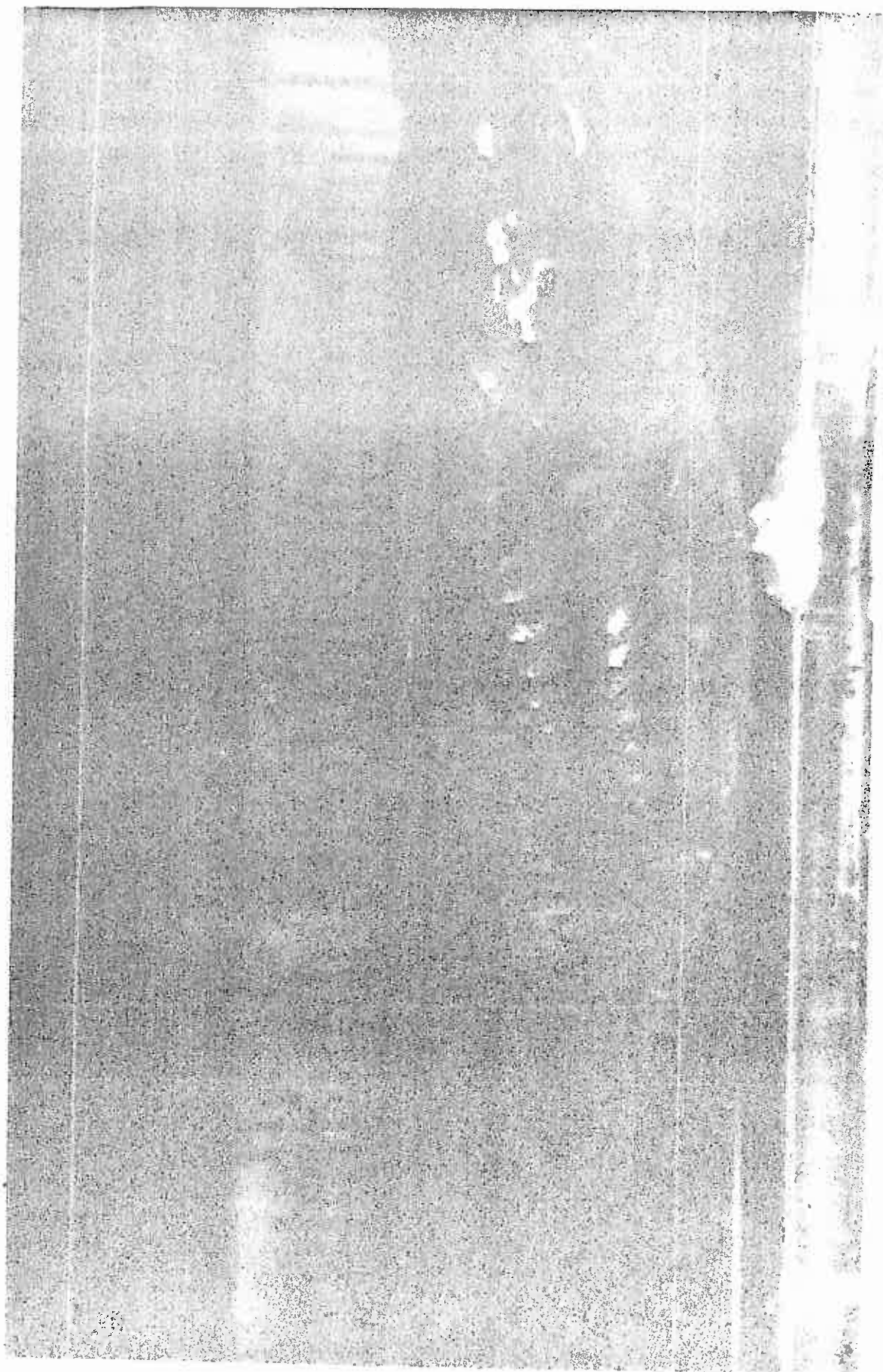
This combination of swift water and sparse vegetation would keep the fish numbers down. In the last month (May) the size of the fish have increased as well as the amounts. It was also during this period that we caught the other types of animals. The crayfish and turtle were a welcome change from the normal types that we had been collecting.

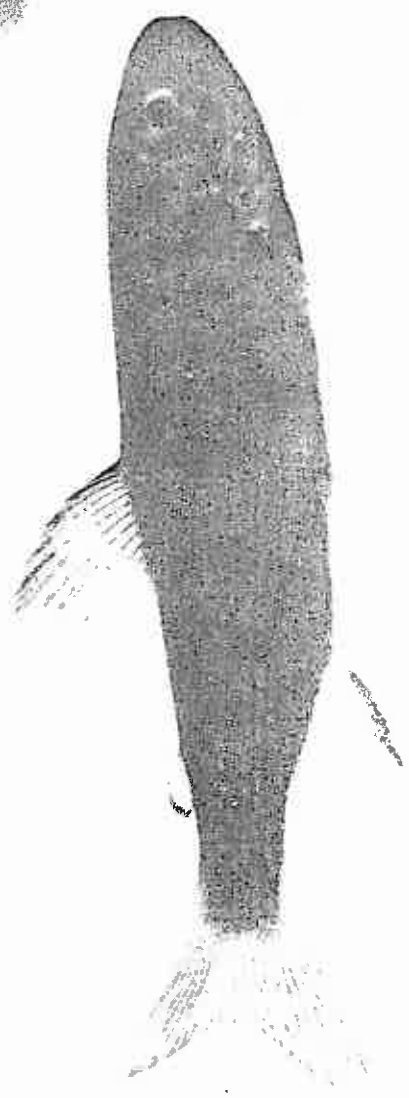
On one of my last trips to the stream for a photo reconnaissance I spotted a very large trout. He must have been at least 18-24 inches long. I returned to the lab and picked up the nets and Pete. After several fruitless attempts to capture him we

decided to name him The Phantom of Pine Gulch Creek. We hope
that you will run across him and have better luck than we did.
A suggestion that might be helpful is to have a large dip net,
so that when you have him cornered with the seines all you'll
have to do is to scoop him up. We tried to corner him just
using the small nets and he would blast his way out the bottom.
Good luck!

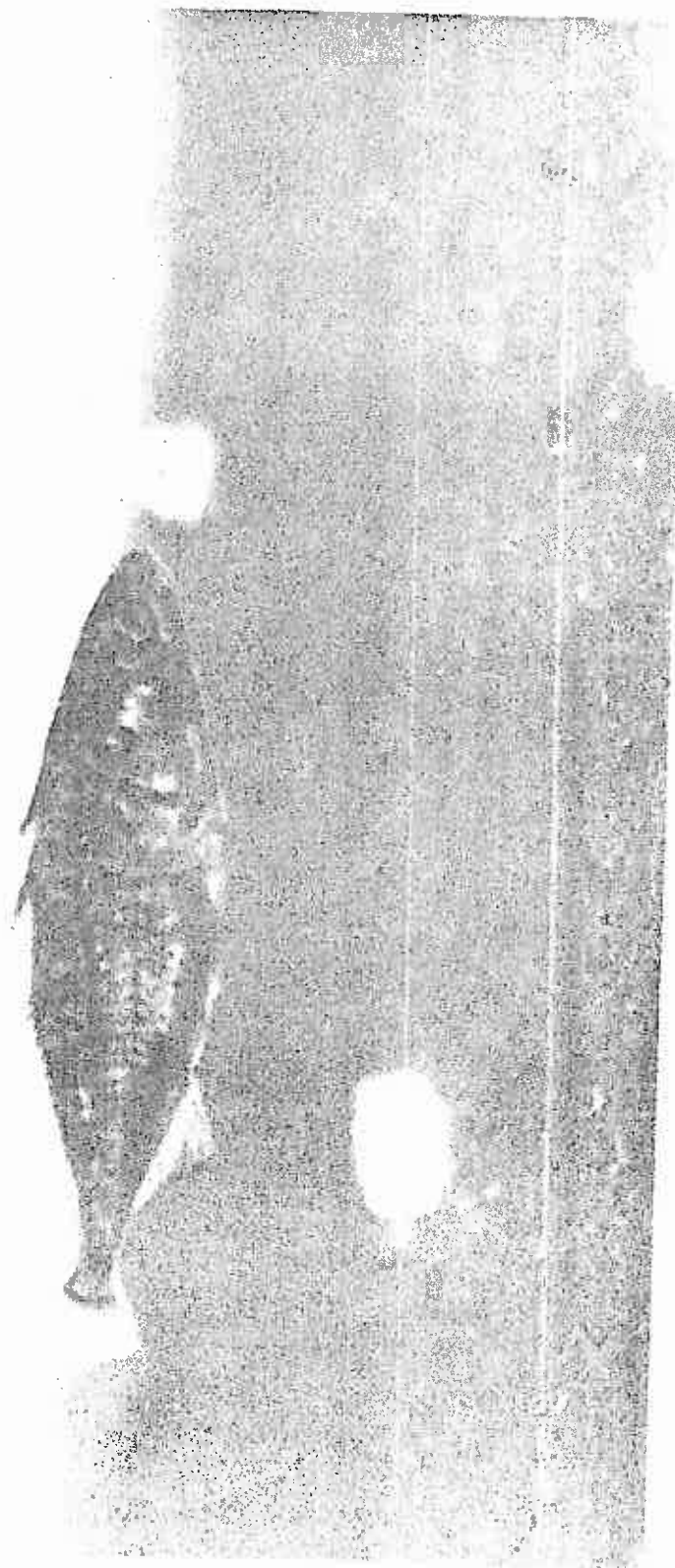
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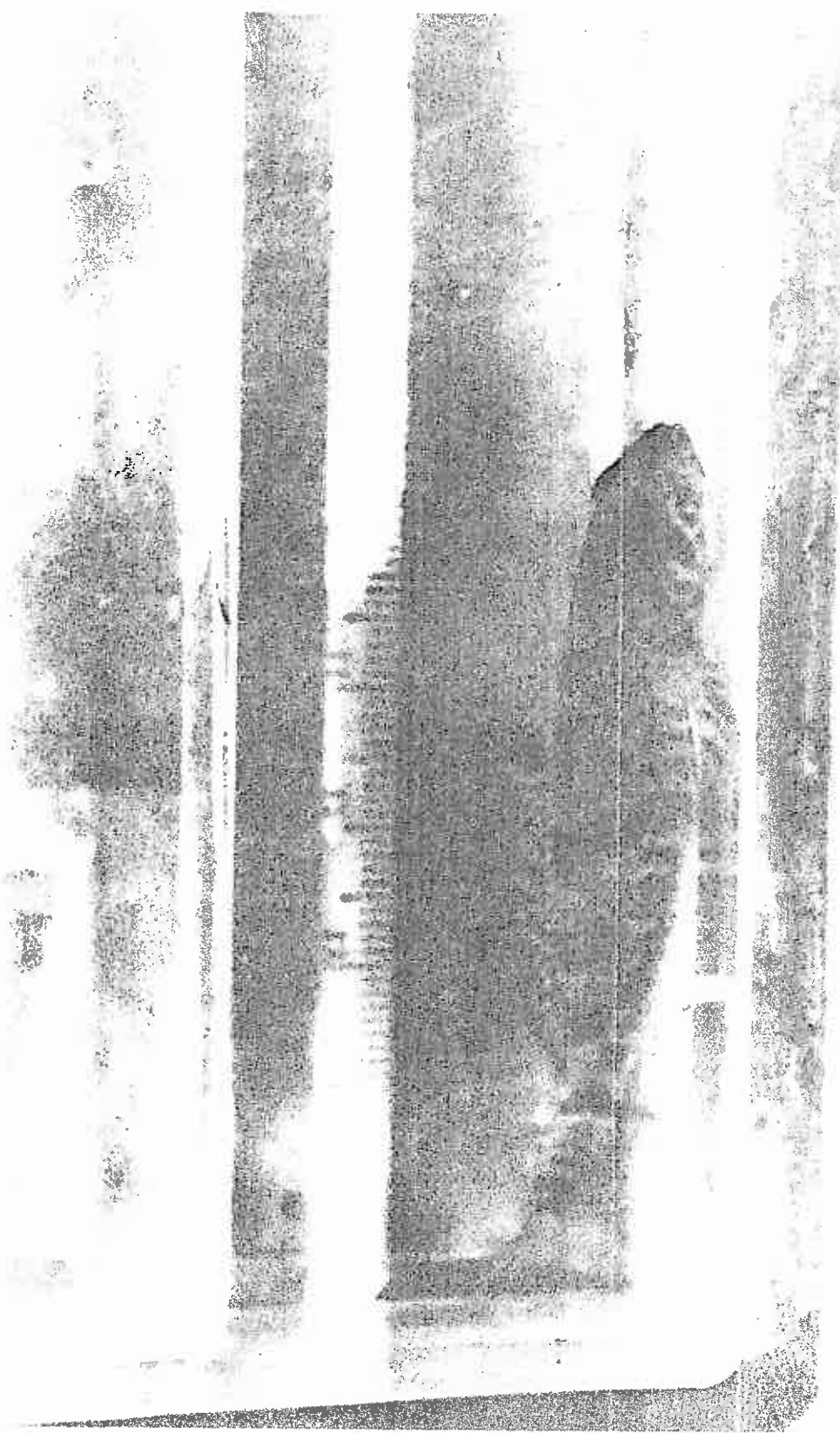
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Rainbow Trout - Salmo gairdneri







3 Species of fish living in tank- (Rainbow trout, 3 Spined Stickleback, Venus Roach)

