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PROGRESS REPORT

Amchitka Aquatic Ecology Studies
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Third Quarter -- January through March 1968

INTRODUCTION

The objectives of the aquatic ecology study include an assessment of the fish and aquatic invertebrate populations in the streams and in the ponds throughout the entire year. Most of the work which was to be done on these populations was to be accomplished during the productive or summer months; however, it was necessary to establish observations on these populations during the winter periods. Accordingly, a trip was made in December, 1967, and one in March, 1968, during which both the fish and invertebrate populations were sampled and examined for seasonal variation in terms of both species and numbers. The trip conducted in December, 1967 was reported in the Progress Report for the second quarter. The trip conducted March, 1968, in addition to assessing populations, also included an evaluation of de facto and potential pollution problems resulting from the drilling operations. The discussion of progress toward fulfillment of the objectives is conducted under the appropriate headings.

POLLUTION INVESTIGATIONS

Sites examined for pollution included drill sites F, D, and B. The drilling at site F had ceased during our March visit (March 16-20). The drill site was to be moved and a new operation was to be started within the ensuing month. Since it was not clear to us where the location of the new drill site was to be, further investigation of this site was discontinued. The new site will be examined in the May visit.

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Drill site D was investigated for potential pollution problems. The area outlined for the holding ponds was located below the drill site at the upper end of a rather extensive watershed which culminated in a substantial stream (404089, 2024111 SE). At the time of our visit the ponds were roughed out. The overburden to be used for the dike was piled roughly outlining the dikes. The material looked suitable for dikes, assuming that compaction was utilized in the construction. Above the drill site, water was drained from a pond to avoid seepage into the drill site area. This pond did contain dolly vardens and the three-spined stickleback. We recommend that the drainage ditch utilized to drain the pond be filled after operation of the site has been terminated to restore the pond.

Substantial evidence of pollution existed in Rifle Range Creek, which is on the drainage for drill site B. Presumably the pollution, which was an oil-based pollutant, came from drill site B. The evidence for pollution other than oil slicking on the stream banks and in the silt and sand bars included the loss of invertebrate and fish populations from the stream. No invertebrates were collected in the affected area during the trip, although substantial screen sampling was conducted. Fish populations were also not present; although, during the fall of 1967, the stream held both pink salmon and dolly varden trout. Screening for invertebrates and for evidences of reproduction in the redd areas yielded dead fish eggs and dead, partially decomposed fish embryos. The embryos were identified as pink salmon.

A branch of this stream above the source of the pollution was also examined for invertebrate and fish populations. Abundant populations of salmonids were found in the lakes of the system and adequate populations of aquatic invertebrates were found in the streams and in the shore areas of the lakes.

Clevenger Creek, draining Clevenger Lake (Station AB, Table 1) was revisited. Earlier visits indicated that the stream showed signs of domestic, organic pollution with substantial growths of sphaerotilus occurring. The condition of the stream was materially

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unchanged from the previous fall and winter visits. Fish and invertebrates were present in adequate quantity. Pink salmon embryos and dolly varden eggs were located in redds in the stream.

COLLECTIONS

Nine new stations were established during our March visit. Eleven of the earlier established stations were revisited. All stations were examined for fish and invertebrate populations as well as evidences for salmonid reproduction. The visits are summarized on Table 1. The fish which were collected were examined for stomach contents (Table 2). Fish from each of the stations from which they were collected were frozen and sent to Battelle, Columbus laboratories for radio-nuclide analysis. Mollusk populations were found in one of the lakes on the Silver Salmon Lake drainage (547993). Invertebrate populations were present, though sparse in general.

AGE AND GROWTH OF DOLLY VARDEN TROUT

As stated in our second quarterly Progress Report, scales from 287 fish were mounted and readied for reading. Subsequent reading of the scales for annuli revealed that the circuli did not check with sufficient clarity to establish the annuli clearly. A graphic technique of age determination as described by Koo, 1962, was adopted. This technique involves graphing the distances of the circuli from the focus of the scale. The peaks and troughs thus graphed represent periods of rapid and slow growth, respectively. The period of slow growth is taken for an annulus. The completed summary of age and growth for fish collections from the Island will be presented in the final progress report.

FOOD HABIT STUDIES

The analysis of stomach contents continued throughout the quarter. Summary of the studies is presented in Tables 4 through 8. In

collecting stomachs from the fish for the food habit study, a substantial incidence of parasitism of the fish was observed. These parasites included both round worms and tape worms, both in the intraperitoneal cavity as well as in the gut. The parasites have been collected and currently are undergoing identification (Table 9).

BENTHIC INVERTEBRATE SAMPLING IN LAKES AND STREAMS

Bottom sampling continued during both the collection periods of December and of March. Separation of these samples is continuing. Some invertebrates have been sent out for identification. A completed summary and check list will be included in the final progress report. A summary is included in Table 3.

RECOMMENDATIONS

It has become apparent from our previous visits to the Island, that the lakes and streams on the Island appear, superficially at least, to be homogeneous in their ecological quality. This is particularly true in the eastern portion of the Island. However, this group agrees that the drainage located by our station CA (Table 1) is a drainage which is representative of the other drainages on the Island and can serve, by virtue of its position between drill sites, as a relatively untouched control area. This is the same site which was recommended by Amundson and Koob. We agree that it is a good area to conduct a coordinated effort. To work this site, however, it will be necessary to provide an easier access than now exists. We recommend that a tracked vehicle be made available at least three times each week during the summer, starting the first of May and proceeding through the following October.

Population estimates of the fish can most easily be accomplished in a combination trapping and mark and-recovery system. We propose to construct upstream and downstream traps at the confluence of the streams with the sea and at selected outlets of lakes on each drainage. Fish will be marked either by fin clipping or with tags, to establish numbers and to establish movement patterns.

Table 1. Summary of Freshwater Collections on Amchitka Island - March, 1968

Sta. No.	Date	Sheet No.	Map Coord.	Lake	Stream	S. Malma	Salmoninae		Bottom Sample	Screen Sample	Trap Sample	Gill Net	Shocker
							Sac Fry	Eggs					
<u>New</u>													
BT	3-21-68	2023 1nw	527995	x					x				
CA	3-22-68	2023 1nw	466002		x				x	x			
CB	3-22-68	2023 1nw	481014	x					x				
CC	3-22-68	2023 1nw	484017		x				x				
CD	3-22-68	2023 1nw	487018	x					x				
CA	3-24-68	2023 1nw	466002		x	28							x
CE	3-25-68	2023 1nw	523980	x		0						x	
CF	3-25-68	2023 1nw	527975	x		32						x	
CG	3-25-68	2024 3se	404091		x	3							x
<u>Old</u>													
AF	3-20-68				x		x	x	x	x	x		
AB	3-20-68				x		x	x		x	x		
AF	3-21-68				x	x*	x	x			x		
AB	3-21-68				x		x				x		
AA	3-21-68				x			x		x	x		
AP	3-21-68			x					x				
BI	3-23-68			x		3						x	
AP	3-23-68			x		22						x	
AA	3-23-68				x	27							x
AB	3-23-68				x	26							x
AA	3-25-68				x						x		

* Partial remains of a dead Salmonidae.

Table 2. Samples of Fish Stomachs Obtained From Amchitka Island, December, 1967.

STATION	MAP	STOMACHS		
		No.	Examined	
BI I.	522985	2023 lnw	7	7
BN I.	536986	2023 lnw	1	1
BS I.	562946	2023 lne	1	1
AP II.	529979	2023 lna	12	12
AQ II.	519999	2023 lnw	<u>18</u>	<u>18</u>
TOTAL 5			39	39

Table 3. *Partial Results of Bottom Samples Collected on Amchitka Island
During December, 1967.

12-8-67 BK 549991 LAKE	12-9-67 AA 518018 STREAM
Vegetation (seeds)	Chironomidae larvae
Diptera larvae	Plecoptera nymph
Chironomidae	Oligochaeta
<u>Dicrotendipes</u>	Trichoptera larvae - no case
Tendipedina	
Trichoptera larvae	12-8-67 AP 529979 LAKE
Limnephilidae	Oligochaeta
Podocopa	Podocopa
Isopoda - <u>Asellus</u>	Isopoda - <u>Asellus</u>
Oligochaeta	Isopoda - <u>Cylisticus</u>
	Trichoptera larvae
	Limnephilidae
12-11-67 AQ 519999 LAKE	
Nostoc (colonial balls)	12-7-67 BG 517985 LAKE
Diptera larvae	Chironomidae larvae
Chironomidae	Oligochaeta
<u>Dicrotendipes</u>	Podocopa
Tendipedina	
Isopoda - <u>Asellus</u>	
Podocopa	12-8-67 AL 546991
Oligochaeta	<u>Neomysis mercedis</u>
	Isopoda - <u>Asellus</u>
12-10-67 BO 471041 LAKE	Oligochaeta
Chironomidae larvae	Isopoda - <u>Cylisticus</u>
Nostoc (colonial balls)	Pelecypoda
Pelecypoda	Trichoptera larvae - no case
	Diptera pupae
12-10-67 BP 467048 LAKE	
Chironomidae larvae	
Trichoptera larvae	
Limnephilidae	

* Items in each station listed in descending order according to abundance by number.

Table 4. Food Habits of Dolly Varden From Station BI I.
N=12

ORGANISM	FO	D	DN	DR
AQUATIC INSECTS				
Trichoptera larvae				
Limnephilidae	1			
Diptera larvae				
Tipulidae				
Chironomidae				
TERRESTRIAL INSECTS				
Diptera larvae				
Bibionidae				
MOLLUSCA				
Gastropoda	2			
Pelecypoda				
<u>Sphaerium</u>	2			
CRUSTACEA				
Podocopa				
Isopoda				
<u>Asellus</u>	2			
<u>Cylisticus</u>	7	6		
Amphipoda				
<u>Hyalelba</u>				
OSTEICHTHYES				
<u>Gasterosteidae</u>				
<u>Aculentus</u>	1	1		
DEBRIS				
Inorganic	2			
Plant				
Animal				
STOMACH EMPTY				
FO = Frequency of Occurrence				
D = Dominant food item in both numbers and volume.				
DN = Dominant food item in numbers.				
DV = Dominant food item in volume.				

Table 5. Foot Habits of Dolly Varden From Station AP II.

N=12

ORGANISM	FO	D	DN	DV
AQUATIC INSECTS				
Trichoptera larvae				
Limnephilidae	4	3		1
Diptera larvae				
Tipulidae				
Chironomidae				
TERRESTRIAL INSECTS				
Diptera larvae				
Bibionidae				
MOLLUSCA				
Gastropoda	1			
Pelecypoda				
Sphaerium				
CRUSTACEA				
Podocopa				
Isopoda				
Asellus	2			
Cylisticus	3		1	
Amphipoda				
Hyaella				
OSTEICHTHYES				
Gasterosteidae				
Aculentus				
DEBRIS				
Inorganic				
Plant	1	1		
Animal				
STOMACH EMPTY	7			

FO = Frequency of Occurrence

D = Dominant food item in both numbers and volume.

DN = Dominant food item in numbers.

DV = Dominant food item in volume.

Table 6. Food Habits of Dolly Varden From Station AQ II.

N=18

ORGANISM	FO	D	DN	DV
AQUATIC INSECTS				
Trichoptera larvae				
Limnephilidae	3			
Diptera larvae				
Tipulidae	1			
Chironomidae	9			
TERRESTRIAL INSECTS				
Diptera larvae				
Bibionidae	1			
MOLLUSCA				
Gastropoda	1			
Pelecypoda				
<u>Sphaerium</u>	10			
CRUSTACEA				
Podocopa	8			
Isopoda				
<u>Asellus</u>	13	11	1	
<u>Cylisticus</u>	2	2		
Amphipoda				
<u>Hyaella</u>	4			
OSTEICHTHYES				
Gasterosteidae				
<u>Aculentus</u>	3	1		1
DEBRIS				
Inorganic				
Plant	4			
Animal				
STOMACH EMPTY				
	3			

FO = Frequency of Occurrence.

D = Dominant food item in both numbers and volume.

DN = Dominant food item in numbers.

DV = Dominant food item in volume.

Table 7. Food Habits of Dolly Varden
From Station BS I.

ORGANISM	D
AQUATIC INSECTS	
Diptera larvae	
Chironomidae	1

D = Dominant food item in both numbers
and volume.

Table 8. Food Habits of Dolly Varden
From Station BN I.

ORGANISM	D
AQUATIC INSECTS	
Diptera larvae	
Chironomidae	1
CRUSTACEA	
Podocopa	

D = Dominant food item in both numbers
and volume.

Table 9. Parasites Found in Char From Amchitka Island - December, 1967

STATION	PARASITE OCCURRENCE	NEMATODA		PLATYHELMINTHES [*]	
		BODY CAVITY	INTESTINE	BODY CAVITY	INTESTINE
BI I. n=7	0	-	-	-	-
BN I. n=1	1				1
BS I. n=1	0	-	-	-	-
AP II. n=12	8	8			
AQ II. n=18	17	8			11

* Trematoda and Cestoda
 n = number of fish.

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