

Preliminary Biological Survey of Log-Rafting and Dumping Areas in Southeastern Alaska

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ABSTRACT

A preliminary qualitative study by scuba divers of one raft storage site and four log dumps in marine waters indicated little effect from storage of floating rafts, but fauna and flora adjacent to log dumps were nearly eliminated. The log dumps were characterized by a thick layer of silt, bark, twigs, and other debris which appears to last at least several years. Recommendations for further studies include measurements of physical and chemical changes in the water and substrate, changes in species and abundance of plants and animals, length of time effects of dumps persist, and measurements of changes in biological productivity in the area influenced by the dump.

Most large-scale logging operations in southeastern Alaska store rafts of floating logs in saltwater bays and inlets before towing them to a mill (Figure 1). Logs for these rafts are dumped from trucks that haul the logs to the site from the woods. Some of these sites are used for many years. There has been widespread concern and speculation by fishermen and conservationists that log dumping and long-term log storage in protected bays may be harmful to the marine fauna (especially crabs) that normally inhabit these areas. Some studies of this potential problem have been made in Washington and Oregon, but conditions in Alaska are so different from those farther south that full extrapolation of results would not be warranted. Facts are urgently needed to take the place of speculation concerning the effects of log rafting and dumping on marine fauna. In early June 1970, the NMFS Auke Bay Fisheries Laboratory

made a brief study to obtain some of these facts.

The general objective of the study was to familiarize investigators with the physical situation and the fauna involved. This knowledge would then provide a basis for designing a program to determine whether log dumping, rafting, and storage produce significant effects on marine fauna in the vicinity.

METHODS

Underwater observations with scuba were made to observe the amounts of bark, wood, and other debris on the bottom and the numbers of large invertebrates such as crabs, snails, and sea anemones in these areas. Observations were made within study areas and at nearby control areas assumed to be unaffected by logging operations. The data taken consist of a record of subjective impressions of the scuba divers and a

Table 1.—Sites visited and number of dives at each during the log-rafting and dumping survey, Peril Strait, June 6-9, 1970.

Site	Date	No. of dives ¹	Minutes under water ²
Rodman Bay	June 6	1	25
Rodman Bay	June 8	2	50
Appleton Cove	June 6	1	35
Hanus Bay	June 7	2	75
Control Cove	June 7	2	45
Saook Bay	June 8	2	40
False Island	June 6	3	60
False Island	June 8	2	40
Sitkoh Bay	June 9	3	80
Total		18	450

¹A dive is underwater examination of the area by a team of two divers using scuba. In most instances, each team made extensive examination of shallow-water portions via snorkel diving before each scuba dive.

²Time is the sum for teams, not divers.

report of the plants and animals observed.

The NMFS research vessel *Murre II* was used for transportation from Auke Bay to the study sites and as a base of operations (Figure 2).

LOCATIONS OF STUDY SITES

Five sites in North Tongass National Forest in southeastern Alaska that had been used in the past or that are now in use for log dumping or raft storage were studied (Figure 3): Rodman Bay, Appleton Cove, False Island, Hanus Bay, and Saook Bay. In addition, two similar but unused sites were studied as controls: Control Cove in Hanus Bay and Sitkoh Bay. All of the areas are in Peril Strait near Rodman Bay. The sites visited, the number of dives, and the time spent diving at each site are listed in Table 1.

Observations were made in one of each of the following situations: (1) An active log dump and raft-forming site that has been in use for several years (False Island); (2) Three log dumps and raft-forming sites that had been used intensively in the past but have not been

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Figure 1.—View of abandoned log dump site at Rodman Bay. The log dump consists of a bulkhead of large logs, backfilled with rock and rubble. The hillside is part of the logged area.

used for at least the last 2 years (Appleton Cove, Saook Bay, Rodman Bay); (3) An active raft storage area (Hanus Bay); (4) Nearby unused areas—for controls or comparison (Control Cove, Sitkoh Bay).

DESCRIPTION OF SITES AND DIVERS' OBSERVATIONS

Rodman Bay Log Dump

Rodman Bay log dump was used from 1961 to 1966 to dump about 160.6 million board feet of spruce and hemlock logs. The littoral area showing effects of the dumping begins at the shore and extends beyond a depth of 75 feet and laterally for about 50 yards each side of the center of the dump much like the delta or outfall of a stream.

Scuba divers saw remnants of the dumping activities on the bottom such as old cables, bundle straps, miscellaneous inorganic debris (e.g. cast iron stove, head gaskets from an engine, and bottles); a few sinkers (logs too heavy to float); and, most significantly, a relatively deep layer of rotting bark, twigs, chips, and silt.

Animals in the area of the dump included sea cucumbers, Dungeness

crabs, hermit crabs, sea anemones, shrimps, and clams. The animals were present but markedly less abundant on the outfall of the dump and became more abundant toward the lateral margins of the outfall. The lower limit or greatest depth of the outfall was not determined.

Appleton Cove Log Dump

Appleton Cove dump was used from 1964 to 1968 to dump about 42 million board feet of logs.

The divers found that the entire cove in front of the dump was shallow—no water deeper than 30 feet. Deposits of decomposing debris were observed in scattered depressions. The ocean bot-

tom in front of this dump lacked the extensive deep deposits of woody debris seen at other dumps. No hydrographic reasons for this difference are apparent, and the lack of debris may be simply the result of comparatively fewer logs being dumped here than at other locations such as Rodman Bay. The environment seemed normal except for an accumulation of cables, straps, and other refuse. Only two or three sunken logs were seen, and the few scattered pieces of bark were so rotten that they fell apart when moved.

Animals in the area included three juvenile king crabs, several mature Dungeness crabs, hermit crabs, shrimps, sea cucumbers, sea anemones, clams, and tube worms.

Saook Bay Log Dump

Saook Bay dump was used from 1960 to 1963 to dump about 12 million board feet of logs.

Although this is a relatively small volume of logs, the accumulation of woody debris appeared to the divers to be comparable to Rodman Bay dump rather than Appleton Cove. Decomposing debris was several feet deep, black and foul, and obviously anaerobic. A layer of very flocculent material was easily stirred up at the interface of the deposit and the overlying water. The divers reported a decrease in depth and intensity of the debris with depth down to 50 feet (maximum depth of the dives here).

Animals were very scarce on this soft flocculate bottom but were present on a few sunken logs protruding from the de-



Figure 2.—General view of logged area adjacent to Rodman Bay with *Murre II* in foreground and log rafts beyond.

bris. The thick layer of rotting organic material was confined to a narrow strip along shore immediately in front of the dump. Normal kinds and numbers of animals were present in the areas adjacent to the dump.

False Island Log Dump

False Island log dump is being used now and has been used since 1966. About 102 million board feet of logs had been dumped to May 1970.

The area in front of the dump was covered down to a depth of 75 feet and beyond with a layer of wood and bark debris, needles, twigs, sand, gravel, and steel bands. Here the surface layer consisted of loose, newly deposited material with no signs of decomposition. Visibility was very poor because of the dark color of the water and much suspended fibrous material.

Very few animals were seen on the loose debris but some were present on the few rocks projecting through the debris. Animals on the rocks included serpulid worms, rock jingles, limpets, chitins, and a small cottid fish. A few sea cucumbers and starfish were on and in the loose debris immediately in front of the dump. Present along the margin of the thick debris were a few *Mya truncata* (a soft shell clam), burrowing sea cucumbers (*Cucumaria?*), and one juvenile king crab.

Hanus Bay Log Raft Storage Area

Hanus Bay has been used for storage of floating log rafts since 1963. It has an annual turnover of about 30 to 45 rafts (or 10 to 15 million board feet). No logs have been dumped in Hanus Bay, but a future dump is planned for the northeast corner of the bay.

Two dives were made along and under the rafts—one group of divers went toward the head end of the bay (southwest) and the other group toward the outlet (northeast). In general, conditions in the vicinity of the log rafts appeared to be similar to adjacent areas. All of the bottom in Hanus Bay was covered with a layer of silt, which may

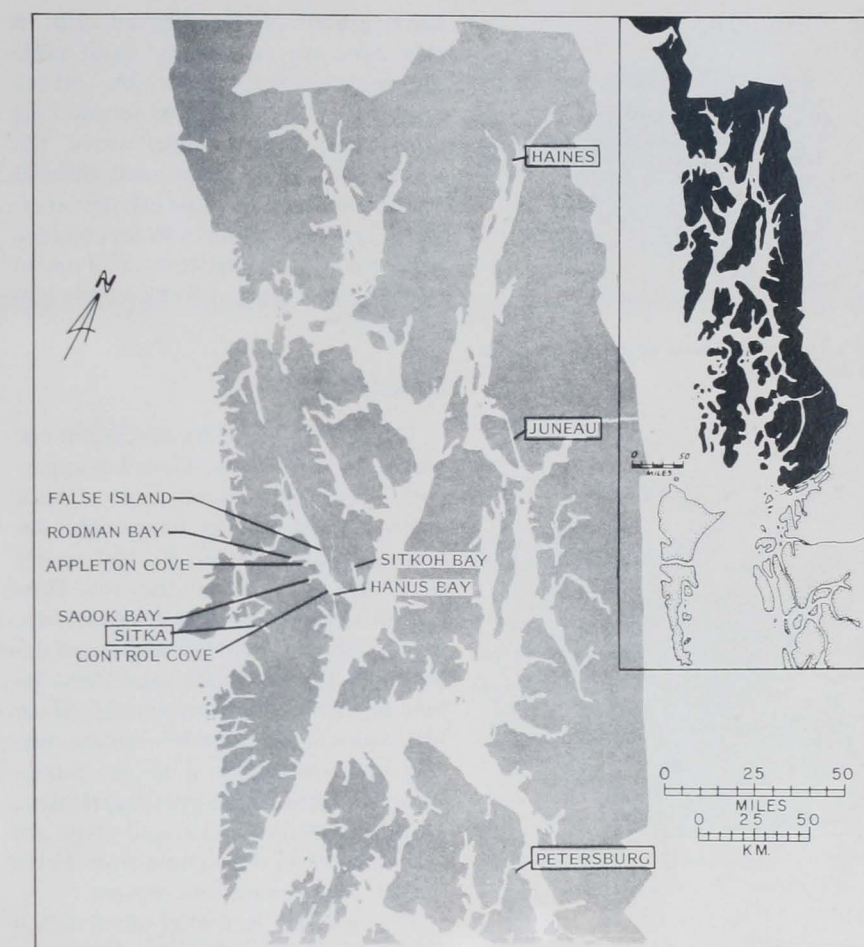


Figure 3.—Locations of study sites.

be a normal condition because it was seen later at Control Cove and Sitkoh Bay where no dumping or rafting has occurred.

Plants (kelp and smaller algae) and animals were abundant. The only apparent effect of the rafts was a marked decrease in abundance of plants directly under the rafts—possibly the result of shading. Animals observed included many shrimp, horse crabs, sea cucumbers, hermit crabs, sea anemones, sand lance, blennies, and cottids. Only a few adult Dungeness crabs were seen close to the raft, but closer to the stream at the head of the bay, many female Dungeness crabs were seen. Several yellowfin sole were caught by hook and line fishing.

Control Cove

Control Cove is the first cove inside

Point Moses and was selected as an example of a local area with no history of logging activity.

Two dives were made in Control Cove—one from the head of the bay down to about 50 feet and the other farther out where the bottom was about 100 feet deep. The deeper dive covered the bottom from shore to 100 feet and up the other side to about 30 feet. The bottom was of rock, gravel, sand, and shell. No accumulations of wood debris were seen.

Plants and animals were abundant in Control Cove. Animals observed included juvenile king crabs, pink scallops (*Chlamys*), sea cucumbers, many hermit crabs, shrimps, and sea anemones. No Dungeness crabs were seen.



Figure 4.—Debris from False Island log dump, collected June 8, 1970.



Figure 5.—Debris from Saook Bay log dump, collected June 8, 1970.

Sitkoh Bay

Sitkoh Bay has had no logging activity but is scheduled to be the site of a log dump and rafting area.

We made three dives in the vicinity of the proposed site of the dump and booming grounds immediately adjacent to the delta of Sitkoh River. The bottom was rock or firm gravel and sand to a depth of 100 feet in the vicinity of the delta. The bottom was softer below about 70 feet in depth in areas away from the delta.

Plants and animals were abundant in this area. The shallower areas (down to about 30 feet) were covered with a

heavy growth of broad-leaved kelp. In this zone we saw many adult male Dungeness crabs, horse crabs, and sea cucumbers. Immature and female king crabs were seen in deeper water. Sea anemones, hermit crabs, and shrimps were abundant in most of the area. Hook and line fishing in 90 feet yielded halibut and sole. The stomach of one of the halibut contained five juvenile tanner crabs.

DISCUSSION

The outstanding feature noted in our surveys was the tremendous but apparently localized accumulation of bark and wood debris at log dumps. This debris eliminates the plants and nearly eliminates animals from the area. How long this debris will persist is unknown. Photographs of the bark and wood debris from the Saook Bay and False Island log dumps (Figures 4 and 5) show the nature of the material. Spruce needles and soft black mud are recognizable in the sample from Saook Bay. Hemlock needles, bark, and chips are recognizable in the sample from False Island, but no mud was present.

The apparent lack of residual debris at the Appleton Cove dump and the inordinately large amount of debris at Saook Cove raise questions as to the relative "dirtiness" of different logging and dumping techniques. The dumping method at False Island entails banding the logs on the truck and lifting them up and lowering them nearly to the water before dropping the bundle. Although this technique would be expected to dislodge a minimum of bark and wood, debris is still very abundant on the bottom.

Clearly, the dumping of bundles of logs into the water changes the normal marine environment of the immediate area. The extent, persistence, and significance of the changes remain to be determined.

Observations of the vicinity of the

Hanus Bay raft storage area indicated little or no abnormal appearance in littoral plants and animals; however, there was a marked decrease in abundance of plants directly under the rafts.

RECOMMENDATION FOR FURTHER STUDY

The apparent damage caused by dumps, the probability of a great proliferation of log-dumping sites, and the alternative possibility of utilizing a dry storage and barging technique for getting logs to the mill combine to make further study of the effects of log dumps on the littoral ecology imperative. The proposed Sitkoh Bay log dump and booming site is in a highly productive littoral area, and this site could be the subject of a serious attempt at answering several important questions: (1) What are the chemical and physical changes in the water and substrate accompanying the establishment and use of the log dump? (2) What is the extent of the area affected by the log dump? (3) What kinds and how many plants and animals are removed from the dump site? (4) How long do the effects of the dump remain? (5) Does the biological productivity of the area around a dump increase and compensate in any way for the loss at the site itself?

ACKNOWLEDGMENTS

Information on the study sites was provided by Richard L. Davis of the U.S. Forest Service Timber Management Division, Regional Office, Juneau, Alaska.

The following divers participated in this survey: Robert Ellis, Project Leader; Robert Dewey, Biologist; John Helle, Biologist; David Hoopes, Biologist; Louis Barr, Biologist; Set-suwo Tsunoda, Biologist; Richard Williamson, Biologist; and Robert Budke, Technician.

MFR Paper 980. The paper above is from Marine Fisheries Review, Vol. 35, Nos. 5-6. Copies of this reprint, in limited numbers, are available from D83, Technical Information Division, Environmental Science Information Center, NOAA, Washington, DC 20235.