

REPORT OF SURVEY
 BAKEWELL LAKE, KETCHIKAN
Chickamaas Area

Bakewell Lake is located about the point fixed as Lat. 55° 15' N, Long. 130° 38' W. The area is little developed and outside of the usual land developmental surveys. It lies south of the head of Bakewell Arm of Smeaton Bay which in turn is tributary to South Behm Canal. The drainage into the lake is spruce-hemlock-cedar forest with muskeg "meadows" and alpine area in the elevations above 1800 ft. The lake lies in the Tongass National Forest and is 42 miles by water from Ketchikan. There is a trail $\frac{1}{2}$ mile long from the lake to the salt water. There is also a road part way to the lake up the outlet stream.

A profile map of the lake is included and has the contours of the lake bottom plotted. The profile was taken from the U.S.G.S. Topog Maps, Scale 1:63,360, of the Ketchikan District.

Does this mean
 Aug 17, 19/87 → The lake was visited by Robert Baade and Richard Smith on August 17-18. Gill nets were set for fish evaluation, observations noted on the physical and biological features of the lake including a plan of transects with a recording fathometer.

There is increasing interest in this lake as a fish producer and the survey was proper at this time.

Bakewell Lake has a famous reputation for its fine trout fishing dating back many years. A trail showing considerable use starts near the mouth of the outlet stream at tide water and goes through the woods and muskegs approximately one half mile to the lake shore near the outlet. A skiff can normally be found there. A shelter cabin was installed at the outlet Narrows by the U.S. Fish and Wildlife Service in 1953 and has since been maintained by the U.S. Forest Service.

There is no industrial development of the watershed altho its potential is estimated in the Federal Power Commission Report of Water Powers of Southeast Alaska.

The fishery has been centered on the cutthroat trout which are lake resident. Specimens over 20 inches long are not uncommon. The sport fishery noted the presence of dolly varden, cottoids and stickleback with word of an occasional landlocked sockeye salmon (Kokanee).

By normal standards of fishing pressure in lakes comparably accessible in the other 49 states, the effort in this lake has been very light - possibly 150 man days per year for the past 10 years. No creel census in the usual manner has been practical for this lake. There are no angler service developments on the lake.

The lake is one of the better fishing waters of the Ketchikan Area. Trout are to be had for the fishing. It is a summer fishery as winter travel by boat or plane is not indulged in by most anglers. It is important that this lake be managed to maintain the high level of return to the angler for his effort. Development beyond the present status may well be accomplished when angler pressure warrants.

The Bakewell Lake basin is a glacial gouge, steep sided and deep. The ice has relatively recently receded and comparatively little alluvial fill has reduced the original lake basin to a minor degree.

The lake surface is 665 acres by planimeter from the 1:63,360 Topog map. The length of shoreline is 9 miles by the same source. The axis of the long narrow lake is 30° east of north. The compass axis is due north - south. A depth of 192 feet was noted with the fathometer toward the head of the lake from the center. There are two rises in the bottom as can be easily seen on the map. The shorelines are quite steep with a minimal area for water plants. Shoreline development is nil and composed of much bedrock, slab rock with very narrow beaches when they exist. The tributaries have fill at their mouths and the usual dropoff is as steep as the sand and gravel will stand. These are close to the bedrock contour indicating relative recent recession of the ice that gouged the basin.

The lake is comparatively narrow being nowhere over 1/3 mile wide and averaging nearly 1/4 mile wide. There are no islands or reefs and shallows are narrow and peripheral.

The lake bottom is largely bedrock and slab rock with alluvial material at the stream mouths. The most extensive fill is at the head of the lake (south end) where enters the largest stream. Here the fill extends across the lake basin and is of small gravel and sand. There is some organic detritus to be noted around the lake shores and off the stream fills. However, it is rather meagre when one examines that found in older lakes.

The water carries some muskeg stain limiting visibility to about 20 feet. No Secchi disk readings were taken. Suspended materials are at minimum levels and it may be said the water is quite clear.

Bakewell Lake lies at the lower end of a drainage basin of 16,020 acres as measured by planimeter from the 1:63,360 topography maps. The land levels are steep hills and mountains with narrow drainages between. Many of the slopes are covered by climax spruce-hemlock-cedar forest with muskeg openings. Soils are sparse or non-existent. Ground cover is forest or muskeg (that mat of organic material dominated by mosses and grasses, sprinkled with puddles of semi-permanent nature and clumps of stunted cedar, hemlock and pine, this commonly reaching a thickness of over 15 feet and continually saturated with water heavily stained with tannins). Marginal vegetation includes alder, lodgepole pine, mountain ash, and Oregon crab apple trees with a wide range of shrubs such as blue berry, elder berry, false azalea, dwarf juniper, cranberry, etc. making quite a tangle.

Water levels of the lake fluctuate approximately 3 feet. The low flows usually occur during the winter when precipitation is in the form of snow and air temperatures are below freezing for extended periods of time. The odd year, at irregular intervals, has extended dry periods during the summer during which flows may drop to unusual lows.

The inlets to Bakewell Lake are several in number. Three are large enough to be considered spawning streams and flow continually. Many others vary from low or zero flows to relative torrents depending on the rate and type of precipitation. The larger two normally flow 15-25 c.f.s. and are located (1) on the east side of the lake about half way between outlet and head and normally flowing 10-20 c.f.s. and (2) the head or south end of the lake draining Badger Lake above and normally flowing 20-30 c.f.s. The side tributaries are characterized by narrow beds in the bedrock with gravel fans at the lake edge. The main stream at the head has widths of 20-40 feet, gravel bottomed and a barrier falls below Badger Lake.

The three major inlets are quite well endowed with spawning gravels and the trout population maintains itself very successfully. Beaver use the stream and the lake and are very much in evidence.

The outlet of Bakewell Lake is mostly bedrock bottomed and about $\frac{1}{2}$ mile from break to tidewater. A fish barrier in the form of a 40 foot falls has been relieved with a steep pass. There is some spawning area below the falls. The average flow is 220 c.f.s. (F.P.C.) with a range of 45 to 15,000 c.f.s. and a normal flow of some 75-100 c.f.s.

The steep sides, great depths and lack of fill at the tributary mouths tell of recent emergence from the glacial ice cover. The fish populations indicate the lake was accessible up the outlet stream before the barrier established. Depths of the lake extend 24 feet below sea level and surface elevation is 168 feet.

There are no dams in the system other than those temporary structures engineered by beaver.

In considering the temperature and chemistry of Bakewell Lake one must remember it lies in a cool climate having a normal rainfall in excess of 150 inches per year.

Temperatures for the lake are not unusual compared to the large lakes of the area. Summer surface readings often run into the low 70's toward the end of a prolonged warm dry spell. Winter ice covers enforce the usual maximum density reading for approximately 5 months beginning about December 1 and rising early in May. A thermocline establishes and fluctuates in depth according to the set of the wind. Below 50 feet, temperatures can be expected to read 39-41 degrees F. at all times.

Oxygen is at or near saturation at all times in all depths. The pH is slightly acid and normally checks out around 6.5. Carbon dioxide was not checked. Normal alkalinity expressed as calcium carbonate does not exceed 15 parts per million. Pollution, in the normal sense of the word, does not exist in the Bakewell drainage at the present time.

Vegetation in the lake runs the list from algae to nuphar. Some of the common plants noted were Valisnaria, Potamogeton, Nuphar, Ceratophyllum, Hippurus, Anachris, Sparganium and Myriophyllum. These are noted in depths of 15 feet or less. The indentations along the shores and the head and outlet of the lake embrace the shallow areas where most of the plants are found.

Fish foods as noted by observation and stomach contents go the whole range of availability and as they occur. Scuds, insects - both aquatic and terrestrial, fish and an occasional mouse are noted in stomachs. Scuds are rather scarce due to the relative purity of the water. Insects are taken as larvae and adults of both aquatic and terrestrial forms. Midges make up a large volume of the stomach contents. Sticklebacks, cottoids, dolly varden and other small salmonoids are regularly noted. The large cutthroat trout can be expected to show a mouse or two in every catch of 4 or 5 fish. Due to the degree of water purity, food organisms and fish are not as numerous as in richer lakes.

The indigenous fish in Bakewell Lake are as follows:

Cutthroat trout	Salmo clarkii clarkii
Dolly varden char	Salvelinus malma
Cottoids	Cottus aleuticus, C. asper
Stickleback	Gasterosteus aculeatus
Kokanee	Oncorhynchus necka kennerlyi

Since the installation of the steep-pass at the barrier in the outlet stream, the following fish may also be found in Bakewell Lake:

Sockeye salmon	Oncorhynchus nerka
Silver salmon	" kisutch
Steelhead trout	Salmo gairdneri

The cutthroat is presently the dominant fish in Bakewell Lake. The cottoids, sticklebacks and kokanee are forage fish for the cutthroat. The dolly varden has not been taken over 10 inches long and apparently is also forage for the cutthroat. However, since the advent of the fishway, some of this may have changed. The cutthroat is still the dominant species but large searun dolly varden may have usurped the position to some degree. No great population changes have been noted altho it is somewhat early to determine them.

Previous management measures concerned only the catch by limit under the Fish and Wildlife Service. The Alaska Department of Fish and Game introduced sockeye and silver salmon fry to the lake just prior to the installation of the fishway. To date, no runs of these fish have established that could not be of natural population sources or by straying as these species are known to do.

Fishing in Bakewell Lake is limited by transportation facilities at the present time. It is a 42 mile boat trip or a plane flight from Ketchikan and no winter fishery because of the above and inclement weather. The fish population is presently satisfying the existing sport fishery. This is foreseeably not always to be and projected management measures are in order.

It seems that if fishing is to improve, the environment must be changed to produce more fish. The broodstock is quite adequate to produce an upsurge in the fish population if the environment will support it. A look at the water purity suggests that a carefully planned program of addition of nutriment materials to encourage the plankton crop and support a larger desirable fish population may well be the solution of the problem.

The lake is presently a trout lake and may best stay that way. The introduction and success of any other fish will be at the expense of the cutthroat fishery. However, if higher production is desired of either cutthroat trout or one or more other salmonoids, it will be necessary to make a place for them. The addition of nutriments by whatever method is best suited seems a possible answer to the dilemma.

Further study is in order to determine the amount of nutriment, type, application procedure, method of evaluation of results and costs of such a plan.