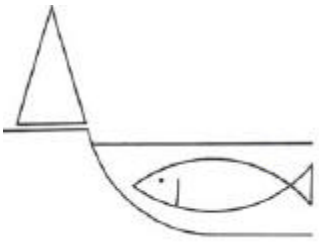
Proposal for Spring Draw Down Fish Exclusion and Removal Measures for Ghost Village Bay Ghost Lake Reservoir

TransAlta Utilities Corporation



BVHD

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1.0 Introduction

The Ghost Reservoir is located approximately 22 kilometres west of the Town of Cochrane. The dam was built in 1929 by then Calgary Power Ltd. The Reservoir has created approximately 11 square kilometres of surface area, 32 kilometres of shoreline and a maximum depth of approximately 30 metres, right next to the dam.

Presently, the impoundment has a sport fish population of lake trout and mountain whitefish, with limited numbers of brown trout, Lake Whitefish, cutthroat trout, brook trout and bull trout. The Ghost Lake was stocked with both rainbow trout and cutthroat trout during the 1930's, 1940's and one stocking of rainbow trout in 1950. Lake trout were stocked into the reservoir in the late 1940's and once in 1952.

Although it is assumed that there is natural reproduction of lake trout in the Ghost Reservoir, it has been accepted that the survival rate of lake trout to maturity is limited. No studies have been conducted to back up this claim.

There is a large forage base for lake trout that consists of a variety of course fish such as mountain and longnose sucker, longnose dace, lake chub, stickle back, burbot, sculpin, etc. The health of this population of forage base fish determines the survival rate of mature lake trout that reside in the lake.

During spring dewatering of the reservoir in preparation of spring run-off from its mountain tributaries, shallow water bays on the lake are left exposed and fish populations are forced to move into the deeper waters of the lake. This migration from a relatively safe habitat to a more vulnerable deep water habitat has a negative impact on the survival of both sport and non-sport species of fish in the Ghost.

Most of the shallow bays on the reservoir are sloped to allow natural escapement of fish as the water levels drop in the spring. Fish will instinctively migrate to deeper water during this transition.

On the large backwater bay located near the Ghost Village on the lake (Figure 1.0), numbers of fish are trapped in shallow pocket ponds as the water levels recede. This entrapment leaves these fish vulnerable to predation from fish eating birds and thermal kill from intolerant water temperatures created by the shallow water.

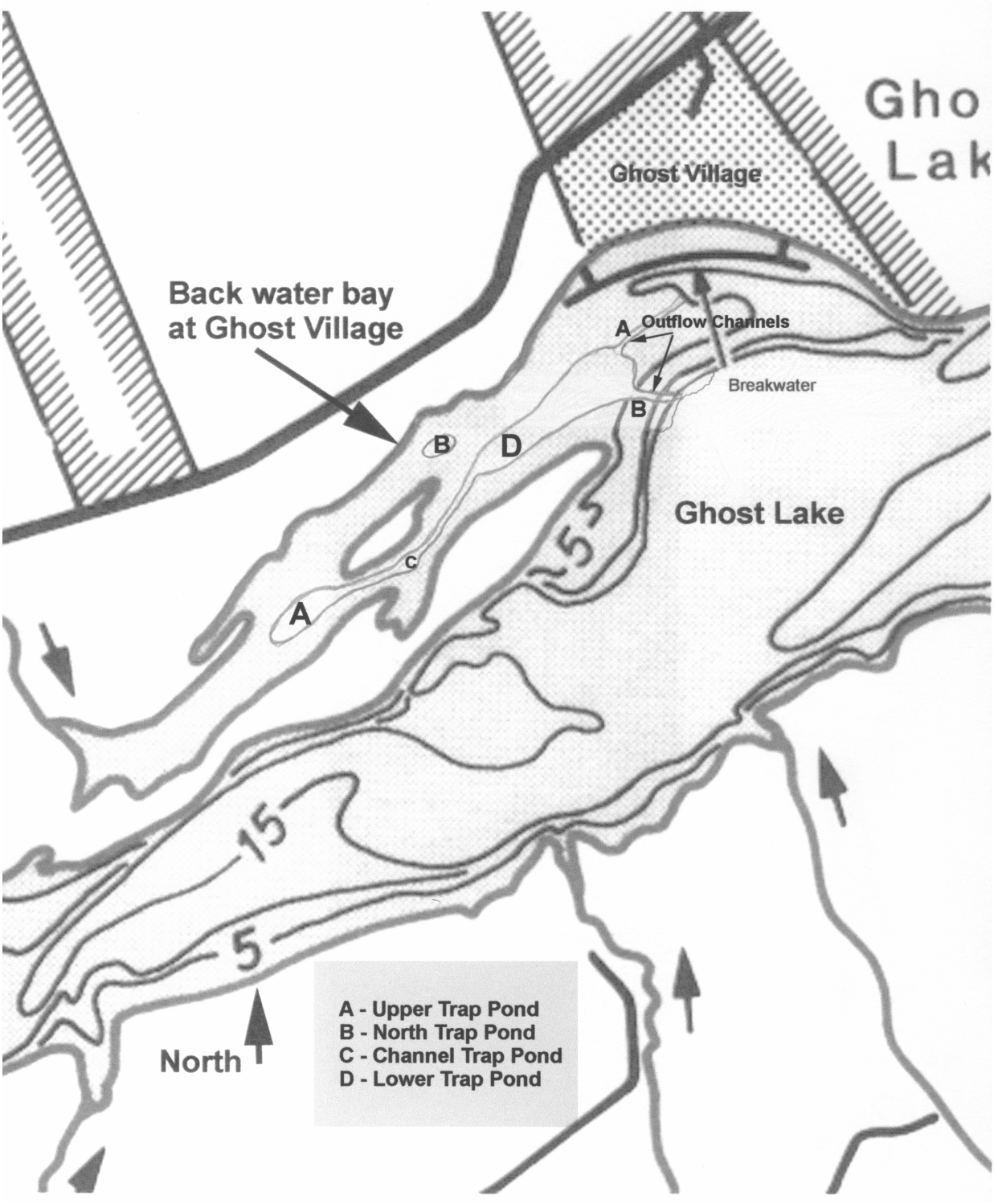

Figure 1.0 – Map of the backwater bay at Ghost Village

2.0 Background

During the spring draw down of 2007 on the Ghost Reservoir, there were 4 isolated ponds left in the bay area at the Ghost Village. In May of 2007, Bow Valley Habitat Development completed an inspection to assess the impacts of spring dewatering of the Ghost Village Bay on fish populations and identify the species impacted. All of these ponds contained fish that had been trapped as the bay was dewatered.

In the upper pond (A), a large number of mature fish, including mountain sucker and brown trout were trapped in a shallow pond that was approximately .5 m in depth. On the north side of the bay there was a small pool (B) that contained a huge number of mature stickleback minnows. This shallow pool was approximately .10 m in depth. In the channel below pond (A), there were a large number of coarse fish trapped in shallow depressions in the lakebed at pond (C). There was a mix of longnose dace, suckers and stickleback.

The lower pond (D) which was approximately 6 acres in size, there were a large number of mature fish, including lake trout. One that was observed from the shoreline was approximately 70 cm in length. On the two trips that BVHD made to the site, Osprey were observed diving for some of the larger fish in the lower pond. The depth of the lower pond was estimated to be about 1 m in depth.

On May 29th, BVHD met with Roger Drury of TransAlta Utilities and a regional Habitat Biologist from the Department of Fisheries and Oceans Canada to tour the site and discuss some possible options to address the existing situation. Observations made during the tour confirmed that as the main body of water in the bay receded that spring, fish were trapped in low lying depressions in the lakebed.

The results of that tour and discussion centred on two primary lines of approach; the re-contouring of the bay's lakebed to prevent entrapment and the exclusion and removal of fish from the bay during dewatering and any planned excavation work. BVHD was retained by TransAlta Utilities to prepare a proposal for the exclusion and removal of fish during spring draw down.

The following is a proposed plan for this part of the program:

3.0 Project Approach

It was determined that the most cost effective method of removing fish from the Ghost Village Bay during dewatering would be to "Herd" the fish out of the bay using fine mesh netting. This approach would reduce the complexity of extracting fish and transporting them to the main lake. However, it would still be necessary to seine net and trap smaller fish left behind in low depressions after the water levels are at maximum draw down.

The use of a fine mesh net would provide an imposing barrier to fish as it is worked across the two primary trap pools in the bay. Smaller fish would also be moved along to safe deeper water habitat in the process. A net with a ¼ " mesh that is approximately 400'X 6'in size, with floats on the top and a cable on the bottom for weight. Using steel cable as a weight as apposed to lead weights would facilitate the netting process, making it easier to pull. Because the objective is to Herd fish rather than catch them, this approach would be adequate.

Starting in the spring of the year 2008, close monitoring of the planned spring draw down would be undertaken. When water levels are at a given level, the netting program could begin. Starting in the upper area of the bay, the upper pond could be netted in a down slope direction toward the outflow channel. When the net reaches the outflow area below the upper pond, it could be left in the bay until the water levels recede further and the next phase of netting the channel pond (C) could begin. By leaving the net in the bay at this point, it would prevent any fish from traveling back into pond A during the night.

When the water levels are right for the next phase of netting, the next would be pulled through the channel pond C, down to the main trap pond D, where it would be left until conditions were right for the final netting phase on pond D. After pond D is netted, both outflow channels below D could be blocked until the channel work or contouring is completed or the water levels in the Bay start to return to normal.

The netting program would require the use of a large raft too tow the net into place. Two boats and two quad 4x4 ATV's would be used to tow the net across the bay. Conditions around all of the isolated ponds would be very muddy.

The smaller pools that contain fish could be bottle trapped and seine netted with a 7 m X 1 m net with 2 mm mesh size. Some of the smaller areas where fish are trapped have small pot holes where the net program would not be as effective. These pot holes could be bottle

trapped quite easily and fish could be transported from the seine netting and trapping site to deeper water, using a live well. BVHD has access to 35 bottle traps.

A record of wet weight of all small fish will be kept. A volume to weight ratio formula would be used to estimate the number of fish netted and trapped. A 1 litre volume of small fish will be counted to create a baseline for the total weight. An approximation of size range average will be recorded. Fish in all average size ranges will be individually weighed and recorded. The data collected will be passed on to regional fisheries managers and should be helpful in establishing lake coarse fish populations and species.

4.0 Project Costs

The following is a cost estimate for the exclusion and removal of fish from the bay area:

Category	Rate	Total
400'X6' of netting -1/4"mesh	$4.00 per linear foot	$1,600.00
450' of ¼ " steel cable	$1.50 per linear foot	$675.00
450' of ½ " Poly rope	$.50 per linear foot	$225.00
80 net floats	$1.00 per float	$80.00
Tie straps	$30.00	$30.00
Shipping costs	$350.00	$350.00
Cost to build net	10 hours @ $43.75 per hour	$437.50
Cost plus 20%	20% of costs to build net	$679.50
Project Manager	100 hours @ $43.75 per	$4,375.00
Four Fish Habitat Tech's	5 days @ $350.00 per day	$4,000.00
Truck rental	10 days @ $100.00	$1,000.00
Trailer rental	5 days @ $20.00 per day	$100.00
Boat rental – 2 boats- 3 days	2 boats @ $100.00 per day	$600.00
Quad rental – 2 quads–3 days	2 quads @ $100.00 per day	$600.00
Quad Trailer rental	3 days @ $20.00 per day	$60.00
Final Report publishing	$43.75 per hour, plus costs	$1,375.00

Sub total--$13,277.00

6 % GST-------$796.62

Total cost estimate---------$14,073.62