BOW RIVER BACKCHANNEL REHABILITATION

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ABSTRACT

In the 70's a section of the Bow River about 20 km south of Calgary, was diverted to protect a school bus road. A dyke with a 1.5 metre diameter culvert was constructed across the upstream end of the original channel. Accumulation of aquatic and floating debris at the culvert inlet caused continual maintenance problems and the resultant inadequate flow to the original channel produced a stagnant water situation - a source of complaints by local residents.

To remedy the situation, water was reintroduced into the backchannel and pools created for waterfowl habitat by means of: (1) a coarse rock infiltration structure at the Bow River, (2) gated culverts to control the flow into the backchannel, (3) low rock drop structures to form pools, and (4) islands for waterfowl nesting.

The work was completed in late 1987 and with minimum maintenance has performed well over the 1987/1988 winter and in 1988. Some minor modifications to the rock infiltration structure are expected to be undertaken in the next year.

INTRODUCTION

In 1985, the Fish and Wildlife Division developed a fisheries access facility on the Bow River to provide public access. It consisted of an access road, parking lot, and a hand boat launch.

Prior to the involvement of the Fish and Wildlife Division the site had a interesting history. The channel of the Bow River that passed to the south of the island had been eroding the banks and the toe of the road that serviced homes in the river flats. In 1974, Alberta Environment constructed a "T head" spur (rock deflection berm, to divert the main flow of the Bow River away from the South

During the design phase, Wim. M. Veldman was President, Hydrocon Engineering (Continental) Ltd. channel to curb this erosion (Figure 1). A 1.2 metre diameter culvert was constructed in the spur to allow the passage of some flow into the backchannel. However, a number of problems were experienced including tremendous weed and debris accumulation at the inlet of the culvert, unsightly appearance, unpleasant smell and regular maintenance requirements. The Fish and Wildlife Division inherited these problems when they assumed licencing for the site. Local residents lobbied strongly for improvements to the backchannel.

The low flow of water entering the backchannel resulted in a slough-like condition and allowed for the development of various marsh plants. Waterfowl discovered this marsh-like complex and utilized it for breeding and nesting. The habitat was, however, limited because of lack of permanent water and encroachment of cattails. Debris accumulation further limited open water and thus deterred waterfowl.

As part of the development of the Fisheries Access facilities, it was decided to close off the inlet to the backchannel to eliminate the debris accumulation in the marsh and upstream of the culvert. The debris was cleaned up using heavy equipment while ensuring the habitat that had developed was not disturbed excessively.

Very little water was now able to percolate through the gravel "plug" used to close off the inlet and the marsh plants were closing in further on the open water areas.

To improve conditions for waterfowl, and to address continuing landowner complaints it was decided that major rehabilitation of the backchannel marsh was necessary.

OBJECTIVES

The objectives of the rehabilitation measures were defined as:

- To improve upon the inherent habitat value of the marsh by re-introducing an adequate flow of water,
- (2) To leave the marsh in as natural a state as possible,
- (3) To eliminate or reduce weed build-up,
- (4) To create two or three permanent ponds that would provide good brood rearing habitat, and adequate water depth of 0.6 -].0 metres.
- (5) To have the capability to "draw down" these ponds to manipulate marsh vegetation.
- (6) To construct nesting islands to prevent terrestrial predation.



- (7) To be able to manipulate the flow of water into the marsh as required to maintain habitat values and for maintenance reasons, and
- (8) To minimize maintenance requirements.

DESIGN

CRITERIA: The design criteria adopted to meet the stated objectives of the project were:

- (1) A minimum depth of 2 feet (0.6 metres) in the marsh to at least the end of July. Flow in the marsh throughout the year is the ultimate goal. Typical March releases by Transalta from the Bearspaw Dam on the Bow River upstream were selected as the minimum low flow.
- (2) Periodic infrequent water shortages are acceptable, although not desirable
- (3) Two pools of water at a nearly constant water level are desired in the backchannel,
- (4) The inlet structure at the Bow River should be functional under varying flow and ice conditions, require no operation and should be relatively maintenance-free,
- (5) Compelte control over the flow of water into the backchannel and,
- (6) The total cost of construction should be less than \$100,000.

INLET OPTIONS CONSIDERED: For operations and design reasons, a gated inlet structure was unacceptable. If flush with the river bank, it would be subject to significant ice forces - the Bow River in this reach experiences major ice accumulations and movements. If a conventional intake structure was set back into the river bank, debris and weed accumulation problems associated with the original intake structure would be repeated.

To accomodate fluctuating Bow River levels, a coarse rock inlet structure flush with the bank of the Bow River combined with gated culverts in the access road downstream was selected. The culverts are expected to be operated only during extreme flows or during cleanup or maintenance activities in the backchannel. All other times, the culverts will be fully open. DESIGN FEATURES: To create the pools in the backchannel, broad crested weirs constructed of cobbles were utilized for drop structures (Figure 2). Water levels in the pools are nearly constant for a wide range of flows. The structures consist of a granular core with coarse cobbles in the 10 metre wide normal overflow section and slightly smaller cobbles covering the remainder of the structure. During moderate flood events, assuming the upstream gates are not operated to reduce flows, the capacity of the 10 metre wide overflow sections will be exceeded and the entire length of the rock structures across the backchannel will be overtopped. During extreme floods on the Bow River when the island between the main river and the backchannel is overtopped, the structures will be fully inundated with the water level slope in the backchannel approaching natural conditions.

A "pilot" channel with a minimum width of 5 metres was excavated between the gated culverts and the drop structures. Excavated material was disposed of locally or placed in nesting islands. Below the lower drop structure, minimum grading was done to direct the flow back into the Bow river.

PERFORMANCE

The construction of the back channel marsh project was completed in the fall of 1987. The Fish and Wildlife Division has been very pleased with the performance of the works to date and local residents have also passed on favourable remarks.

Virtually all of the objectives have been met. The flow of water into the backchannel has proven to be more than adequate to maintain suitable water depths in the ponds. Even during low spring flows in 1988 there was adequate water in the ponds to attract nesting waterfowl.

Weed build-up in the marsh has been eliminated. It appears that one or two visits a year to remove weed accumulation from the upstream face of the rock infiltration gallery will achieve adequate flow into the backchannel. Weed deposition seems to increase in late summer and into the fall. If the weeds are removed in early August and again in late September, flow-through capacity is not a problem. Some relocation of the rock at the base on the Bow River side of the structure is contemplated next year to reduce the intensity of weed accumulation particularly during high flows.

During construction a number of nesting islands were built utilizing river gravels removed from the excavated channel. The Calgary Fish and Game Club placed topsoil on the islands and seeded them. They also reclaimed other disturbed areas including the main haul trails. These islands are well grassed in now and ready for the 1989 nesting season.



With the two control gates on the access road the flow into the marsh can be manipulated to control aquatic plants. If required, the gates can also be fully closed to allow the water in the ponds to seep out and facilitate the mechanical removal of excessive cattail accumulations. During high flows in the river the gates can be adjusted to prevent excessive water from flushing out the marsh or perhaps drowning nests located near the normal water level.

The most obvious sign of success has been the response by waterfowl. Within hours of introducing water for the first time in the spring of 1988, ten geese flew in and began preening and loafing on one of the islands. Ducks and geese have made use of the marsh all summer long and good nesting success is expected in the Spring of 1989. In addition, a number of other animals are known to use the marsh and immediate area including red-winged blackbirds, great blue herons, pheasants, coyotes, deer, skunk, muskrat and an assortment of other song birds and small mammals.

As a bonus, fish from the Bow River have found the increased flow of water and clean gravels in the backchannel attractive for spawning.

Funding for this project came from the "Buck for Wildlife" program. Sportsmen contribute to the fund when they buy hunting and fishing licenses. Monies from this fund are meant to maintain, enhance or develop wildlife and fisheries habitat in the province. It is not general revenue.

The total project cost was \$90,000 consisting of \$75,000 for construction (by Shawne Excavating & Trucking Ltd.) with the remainder for surveying, design, permitting and construction supervision.



РНОТО 1

Upstream end of the backchannel prior to rehabilitation



РНОТО 2

Coarse rock layer placed at base of inlet structure - the main infiltration zone. Gabion baskets filled with cobbles complete the structure (see Photo 3).



РНОТО 3

Looking upstream at gated culverts and inlet structure at Bow River.



PHOTO 4 Completed rock drop structure under normal flow conditions.



рното 5

Upstream end of backchannel with island during construction.



PHOTO 6 Present upstream end of backchannel. Compare to Photo 1.

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