SPRAY LAKES RECLAMATION PROJECT

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INTRODUCTION

The Spray Lakes Reservoir, located 16 km south of Canmore, is in the subalpine ecoregion of Kananaskis Country. Developed in 1951 after the construction of Three Sisters and Canyon Dams, the Reservoir provides water for three power generating stations. The lake reaches its peak elevation (full supply) in late July to early August. Drawdown is approximately 12.5 metres with its lowest level occurring during the winter months. The lake is widely used by fishing, boating and camping enthusiasts.

The Three Sisters Dam at the lake's north end was not originally designed for the probable maximum flood (pmf) risk. This risk combined with known seepage beneath the dam led to a decision in 1987 to permanently lower the full supply level (fsl) of the lake from 1701.7 metres above sea level (masl) to 1697.6 masl so the pmf could be maintained. The dam was also upgraded to control seepage. As a result of the lower lake level, 208 hectares (ha) of shoreline was exposed offering little to no wildlife benefit and limited recreation potential.

In 1991, TransAlta Utilities developed a reclamation plan for 128 ha of shoreline and an earthen spillway adjacent to Canyon Dam. Input from Alberta Forest Service, Trout Unlimited, Kananaskis Country as well as public and interest groups was incorporated into the plan. The objectives of the project were to sustain the integrity of the lake by enhancing the aesthetic value for recreational users, as well as to provide forage and habitat to wildlife by establishing a palatable, self-sustaining vegetative cover. Work would take place from 1992 to 1995.

METHODS AND PROCEDURES

The shoreline was subdivided into high, moderate or low priority areas based on public accessibility, visibility and usage. Further subdivision of the shoreline was done based on slope, substrate conditions and the presence or absence of tree stumps. In this manner specific reclamation prescriptions could be developed and applied to each site category. On the high and moderate priority areas, exposed tree stumps not removed in the original construction of the Reservoir were removed and either burned, buried, or salvaged for artificial reef construction by Trout Unlimited. Most of these shoreline areas were scarified by dragging the teeth on the bucket of a tracked excavator. Scarification improved the seedbed by loosening the fine soil material which underlay the cobbly material. This process would enhance seed germination by aerating the soil as well as improve moisture infiltration.

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On less cobbly areas, diamond harrows were used to scarify the soil before and after seeding. On some sites, seed was track-packed using a tracked excavator. This technique improved the seed/soil contact as well as created soil microsites for moisture to be retained.

All areas were broadcast-seeded by electric spreaders mounted on a six wheel drive all-terrain type of vehicle. On steep slopes and riparian areas, hand seeders were used. The seed mix, applied at a rate of 28 kg/ha, was composed of creeping red fescue, Canada bluegrass, wheatgrasses, hard fescue, alfalfa and white clover with an approximate percent by weight composition at 7, 5, 12, 11, 28, and 23%, respectively. The species were selected based on their adaptation to alkaline soils, drought tolerance, persistence in a stand and rooting characteristics, as well as palatability to wildlife. Alfalfa and white clover were used because of the plant's characteristic nitrogen-fixing ability in the soil which would, in turn, enhance the self-maintenance of the vegetative stand. Fall rye was also included in the mix at 14% by weight. Used as a cover crop, this annual grass helped to protect the soil from further erosion while providing a rapid cover for the slower-establishing perennial grasses and legumes. Following seeding, fertilizer was applied at a rate of 30-50-100-20 kg/ha of nitrogen, phosphorus as P_2O_5, potassium as K_2O and sulfur, respectively.

Other reclamation work included the extension of a boat launch at the Driftwood Day Picnic area to allow easier access to the lake. Also in this area, due to intensive use by the public, silt from a plateau located below full supply was hauled onto the cobbly shore and respread providing a more favorable seedbed which could withstand heavy use.

At the Sparrowhawk Day Picnic area, a steep cliff which had eroded as a result of wave action at the lake's original fsl was recontoured to reduce the hazard to public users of the area.

At Spurling Creek, stream channels flowing into the reservoir which were between the former fsl and the new fsl had no defined channel and erosion had occurred. Therefore, a channel was contoured and its bank lined with riprap to prevent further erosion and silt from entering the lake.

At various locations, log jams resulting from the initial clearing of the reservoir had developed along the forested edge of the lake, posing a forest fire threat as they dried out. To eliminate the hazard, the piles were pulled away, burned and buried below the full supply level. The areas were then seeded and fertilized.

A high priority area was identified at a campground near the Three Sisters Dam which, unlike other shoreline areas, was relatively flat and therefore caused a larger shoreline area to be exposed at the new fsl. To break up the openness of the landscape, trees would be planted along with the grass/legume mix. In the spring of 1992, 7800 willow and poplar cuttings were collected from stock near the dam and raised in a greenhouse over the summer. In the fall, the trees were planted by volunteers from Scouts Canada.

In the spring of 1993, reclamation work continued on an additional 14 ha of shoreline and a 13 ha earthen spillway at Canyon Dam. These areas were scarified, seeded and fertilized as in the previous year. Straw mulch was applied to the entire spillway area. Mulch aided in protecting the seedbed from erosion as well as protecting the soil from moisture loss and temperature extremes. Fertilizer was reapplied to approximately 60 ha of the shoreline which was seeded in 1992.

In 1994 and 1995, reclamation activities included refertilizing areas seeded in 1992 and 1993 and monitoring of the vegetative establishment on the shoreline. Areal application of fertilizer was performed by helicopter in the spillway while shoreline areas were fertilized by hand or mechanically .

RESULTS AND DISCUSSION

In total, 131 ha of shoreline and a 13.35 ha spillway have been revegetated with grasses and legumes. Of these areas, approximately 90 ha was scarified, and/or had tree stumps removed prior to seeding. Approximately 40 ha was seeded and fertilized only. The remainder of the shoreline, approximately 77 ha, was not revegetated mainly due to limited access. These areas will be allowed to re-establish naturally from the forested edge.

In general, all areas outlined in the reclamation plan are successfully revegetated. Areas which were recontoured and riprapped are stable and non-eroding. Establishment success was most significant in areas which had been scarified then seeded and trackpacked. The areas where silt was respread or straw mulched showed good plant establishment within the first growing season.

Areas which were seeded and fertilized without scarification or harrowing operations were less established in the first growing season, however, these sites were better established in their second and third years of growth.

Overall, the changes made to the shoreline and public use areas have improved their usage by both wildlife and the public. In the future, TransAlta will continue to monitor the Spray Lakes Reservoir to ensure the reclaimed vegetation is self-sustaining and that the aesthetic and biological improvements will be enhanced for years to come.

CANADIAN LAND RECLAMATION ASSOCIATION

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Conservation and Reclamation:

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