Bolander's Quillwort Research and Monitoring in Waterton Lakes National Park, Alberta

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Extended Abstract: Bolander's quillwort (*Isoetes bolanderi*) is a true aquatic plant—it only rarely occurs as an emergent along lakeshores. The species is characterized by having a cluster of soft, straight leaves that project 3–7 cm from a corm. The corms are usually not visible because they are buried in the sediment. The leaves are loosely attached and readily separate from the corm in response to even gentle physical impact. *Isoetes* reproduces sexually and frequently establishes large populations; the spores mature in late summer. *I. bolanderi* grows in small, cold water, oligotrophic lakes in higher elevation subalpine areas. In Canada, it was known historically from only two sites: Summit Lake and Carthew Lakes in Waterton Lakes National Park, Alberta. In 1995, *I. bolanderi* was designated as a species of Special Concern by the Committee on the Status of Endangered Wildlife in Canada (COSEWIC 2004).

In 2002, a project was undertaken to (1) determine the veracity of a 1946 collection of *I. bolanderi* from near Carthew Lakes, (2) determine if *I. bolanderi* was still present near Carthew Lakes, (3) conduct surveys of lakes with known populations and those with potential habitat in Waterton Lakes National Park and nearby Akamina-Kishenina Provincial Park in British Columbia, and (4) assess the population size of the species where present.

The identity of the 1946 Carthew Lakes collection was determined to be accurate. Sites of potential habitat were identified based on the following characteristics: relatively small (little wave action) lake size, location in the subalpine ecoregion, and presence of shallow water with silt/sand substrate and quartzitic (i.e., non-calcareous) bedrock around the lake. Sites were also oligotrophic, and were lightly glaciated or unglaciated. Thirty-one lakes and ponds were identified as known or potential sites. In 2002–2003, surveys were conducted at 25 of these sites; the remaining six ponds were considered to be very low priority and unlikely habitat. All suitable habitat at the 25 lakes was searched by wading along the shoreline out to a depth of about 1.2 m. A 'viewing scope' of plastic pipe with a clear plastic bottom was used to look into the water more clearly. *I. bolanderi* was observed only in Summit Lake. Carthew Lakes was surveyed in both years, but *I. bolanderi* was not found.

Detailed sampling at Summit Lake was conducted to estimate the total population size of *I. bolanderi* and to assess what sample size was sufficient to monitor future population change. Sampling of 101 quadrats (20 cm x 50 cm) was conducted along 10 randomly-located transects, of which 79 quadrats contained plants. It was estimated that 0.5% of the lake was sampled. Calculations indicated that only 18 quadrats were required to estimate the population mean with 95% confidence. The estimated population size of *I. bolanderi* for Summit Lake was 12,025,923 ± 2,058,614 (95% C.I.). For future monitoring, it was determined that 65 quadrats would be sufficient to be 95% confident of detecting a 30% change in frequency of plant presence. Detailed resampling of Summit Lake is planned for 2004 to confirm the robustness of the survey methodology.

The apparent extirpation of *I. bolanderi* from one of only two known sites in Canada is of concern. An updated status report has been prepared for COSEWIC review in May 2005.

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References

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