## MAHONEY LAKE ER #130

**ORIGINAL PURPOSE** To conserve a southern interior saline lake having very unique limnological features

### OVERVIEW

| | | | |
|---|---|---|---|
| **Date established:** | 5 July 1990 | **Location:** | 6 km S of Okanagan Falls and 3 km W of Vaseux Lake |
| **Date amended (boundary revision):** | 30 April 1996 | | |
| **ORC #:** | 3130 | **Latitude:** | 49º17'N |
| **Map number:** | 82 E/5 | **Longitude:** | 119º35'W |
| **Total Area:** | 39 ha | **Elevation:** | 470-520 m |
| **Land:** | 21 ha | | |
| **Lake:** | 18 ha | | |
| **Access:** | Accessible by road via Green Lake Rd from Okanagan Falls or Oliver. | | |
| **Biogeoclimatic Zone:** | Ponderosa Pine (PP) | | |
| **Biogeoclimatic Variant:** | PPxh1 Okanagan Very Dry Hot | | |
| **Ecosection:** | Southern Okanagan Basin | | |
| **Region:** | Okanagan | | |
| **Management Area:** | South Okanagan | | |

### COMPOSITION

**Physical:** Mahoney Lake (surface area 18 ha; shoreline length 2.7 km) is the main feature. The reserve boundary follows its sinuous shoreline, except where two upland parcels totalling 7.65 ha are included at the south end and another parcel of land at the northeast corner of the lake. The 18 m deep lake occupies a kettle basin of glacial origin. Its maximum surface level variation is 75 cm. Although ice-covered in winter, near-surface temperatures in summer are warm. The lake has very low oxygen levels and a pH of 7.5 to 9.0.

The 385 ha Mahoney Lake watershed includes soft highly fractured lavas of the Marron formation, characterized by high alkali composition. That fact, together with lack of outflow and high evaporation rates, has resulted in high salinity and alkalinity.

Mahoney is one of few meromictic lakes in British Columbia. Much of the water in these lakes remains unmixed with the main water mass during normal circulation periods. Typical spring and fall overturns do not occur. Mahoney Lake is very saline, and mixing in it is inhibited by a sharp chemical density gradient. Total dissolved solids vary from 10 000 mg/litre at the surface to 85 000 mg/litre near bottom, with rapid change at a mid-depth chemocline. Another striking feature of this lake involves microstratification of its upper waters in spring and early summer, resulting in a most unusual four-layered system having two chemoclines. Topographic conditions which inhibit wind-generated mixing may also contribute to the meromictic nature of Mahoney Lake.

**Biological:** The most striking feature of Mahoney Lake is its layer or "plate" of purple sulphur bacteria which extends completely across the lake on top of the chemocline at about seven metres in depth. This plate has been recorded at various times of the year for over two decades. International experts have declared this to be the finest example of a purple sulphur bacterial plate known to occur in the world. The strong chemocline in Mahoney Lake provides the necessary $H_2S$ and $CO_2$ which enable massive concentrations of the bacteria to develop.

The phytoplankton community of Mahoney Lake is not diverse. Two species of blue-green algae dominate in the upper five metres and no phytoplankton occur below seven metres. The zooplankton community, dominated by a species of rotifer and a calanoid copepod, is largely restricted to waters above 7.5 m. Benthic invertebrates, chiefly insects, occur down to the six metre level. Rainbow trout introductions have failed to survive, evidently due to seasonal oxygen deficiencies.

**MANAGEMENT CONCERNS**

| SIGNIFICANT SPECIES | BC LIST STATUS | COSEWIC STATUS | CF PRIORITY |
|---|---|---|---|
| Blotched Tiger Salamander | Red listed | Endangered (2001) | 2 |

**THREATS**

**Climate Change:** Mahoney Lake is the first Ecological Reserve documented to display effects of climate change.

The lake has no inflows and is fed only by precipitation. Rates of evaporation have been increasing more quickly than levels of precipitation, resulting in lower lake levels. Changes in water quality could impact purple sulphur bacteria.

**Non-native species:** Blue weed (aka Viper's bugloss), Canada thistle, common hound's-tongue, sweet clover, and diffuse knapweed are aggressively invading the reserve.

**Recreation:** In the past, motorized vehicles (mostly dirtbikes) would drive in the mud around the lake's edge, potentially introducing/spreading non-native species and damaging the habitat. Wire fencing has been erected since 2000 along the northeast, north, and west side of the reserve, and in 2007 a post and rail fence was installed along the southern boundary, all of which have been successful in preventing motorized vehicle use in the ER.

**RESEARCH OPPORTUNITIES** The lake has been used as a research and teaching site for over 30 years, and is of international interest. Published papers on the limnology of Mahoney Lake are available, as well as a plant list compiled when the reserve was established and a bird list from a 2004 survey.

## SCIENTIFIC NAMES OF SPECIES MENTIONED IN THE MAHONEY LAKE ER ACCOUNT

**Flora**

bugloss, viper's (*Echium vulgare)*
hound's-tongue, common (*Cynoglossum officinale*)
knapweed, diffuse (*Centaurea diffusa)*

**Fauna**

Salamander, Blotched Tiger (*Ambystoma mavortium)*
Trout, Rainbow (*Oncorhynchus mykiss)*