#13

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F-M-2

MONTANA DEPARTMENT OF FISH, WILDLIFE AND PARKS

MYSIS INTRODUCTIONS INTO WESTERN MONTANA LAKES

In June and September of 1968, *Mysis relicta* (Opossum shrimp) organisms were collected from Emerald Bay of Waterton Lake (near the Waterton Lake Townsite) Alberta, Canada, and introduced into several large northwestern lakes of Region 1. An estimate of 3,000 mysis were collected during a three day period in June with a ratio of adult to juveniles being about 1:10. The initial collections were introduced into Whitefish and McGregor lakes. The second attempt to collect mysis in September of 1968 was much more successful. An estimate of 21,000 individuals were collected over a three day period. The estimated ratio of adults to juveniles was 1:30. Lakes selected for introductions were McGregor, Ashley, Little Bitterroot, Whitefish and Crystal lakes. These imprint plants were made in an attempt to establish a viable mysid population to supplement a source of food organisms for trout and salmon.

Mysids were collected by towing a meter net with a mesh size of 1.33 mm from a motorboat at depths ranging from 20 to 40 feet below the surface. The net tows were made between the hours of dusk and midnight over depths ranging from 60 to 80 feet. Mysids were held in a small hatchery truck at water temperatures cooled down by ice to 45°F. Transport time to Montana took approximately three hours with an additional four hours needed to complete the stocking of lakes selected for introductions. Mysis were transported by boat, acclimated with a mixture of 50:50 source water and receiving water, and released over depths of 100 feet or more.

The first attempt to determine the successful introduction of mysis was in August of 1973. Several evening mid-water net tows were attempted in Little Bitterroot Lake without success. However, in August of 1974, mysis were caught in meter tow nets at depths of 70 to 100 feet near the bottom in McGregor, Ashley, Little Bitterroot and Whitefish lakes. The number of organisms taken ranged from two in Ashley Lake to several hundred in McGregor Lake. Mysis began to show up in a few stomach samples of juvenile lake trout taken from McGregor Lake in the fall of 1974 and by 1975 comprised a major food item. Meter tow net sampling in Crystal Lake (1974) was unsuccessful. It is believed that this initial introduction did not succeed because of anerobic conditions at the lake bottom. Mysids are not known to survive at oxygen levels of less than 20 percent saturation.

Mysis populations were well established in Whitefish Lake by 1976. In August of that year, an estimated 2,400 individuals were collected from four 5-minute and one 10-minute meter net hauls.

In August and September of 1975, additional mysid releases were made into eight other large lake systems in northwestern Montana. These include Lake Blaine, Middle Thompson, Dickey, Bull, Spar, Tally, and Swan lakes. Mysids were introduced into Holland Lake in August of 1976. The source of the 1975 and 1976 introductions was from McGregor Lake. The location of lakes where mysid have been introduced is shown in Figure 1.

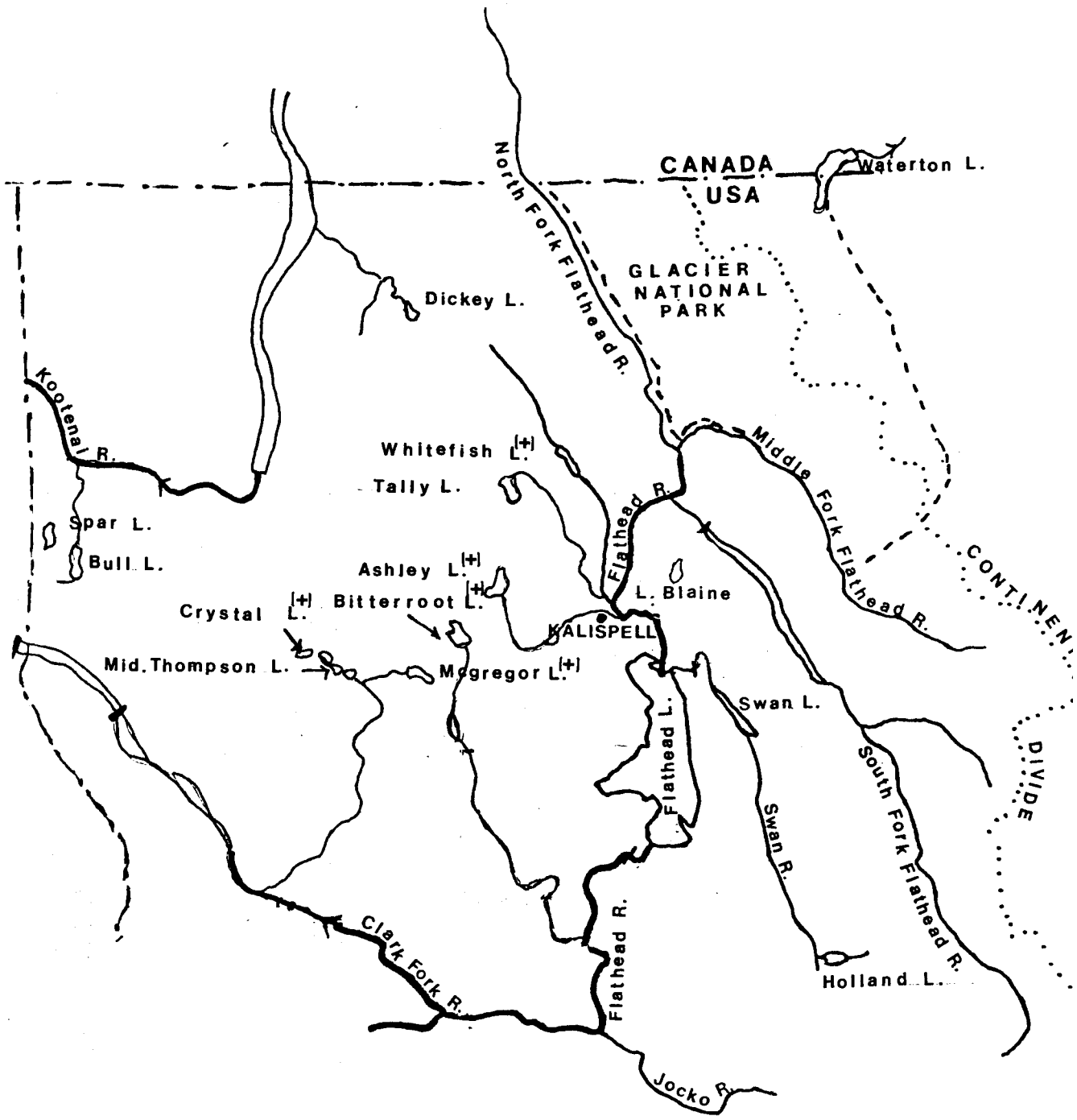


Figure 1. Location of mysid introductions into Northwestern Montana lakes. (+) denotes initial introductions made in 1968.

The collections were taken at night by use of several meter net tows. Mysis were stored in fiberglass coolers, cooled down to 50°F and transported immediately to their destination. In many instances, the survival rate was low due to high mortality experienced from crowding mysids against the collection jar while being towed through the water. All releases were made from a boat in open water.

All lakes previously stocked in 1975 and 1976 were sampled in 1980 to document the survival or failure of initial plants. All sampling efforts, with the exception of Swan Lake, appear to have been unsuccessful. However, sampling efforts should be resumed in 1982 and possibly 1984 in the event of a delayed population build-up. A summary of these initial introductions and subsequent follow-up sampling is presented in Table 2.

The first recorded occurrence of mysids in Flathead Lake was in the fall of 1981. On three separate occasions, (9/9, 10/21 and 11/23) three mysids were collected in mid-water trawls. These individuals were taken incidental to trawling for small kokanee at night on the north end of the lake at depths ranging from 30 to 82 feet below the surface. The trawls have a dimension size of 2.4 meters square with a graduated mesh size of 2.3 mm stretch mesh on the cod end.

The recent establishment of Flathead Lake mysid populations is believed to have originated from either Whitefish or Swan Lake populations by downstream drift through connecting river systems. Mysis released into the Faxäluen and Indalsaluen river systems in Sweden spread to lakes downstream 10 to 12 years later (Fürst 1965).

Several successful mysid populations have been introduced into large oligotrophic lakes following a period of from three to 10 years after initial introductions. Mysids introduced into Kootenay Lakes British Columbia in 1949 and 1950 were firmly established 10 years later (Northcote 1962). Following introductions of 330,000 mysids into Lake Tahoe (1963-1965), 123 mysids were recovered from a bottom trawl in 1968. In 1969, 850 shrimp were recovered from a 15 minute trawl (Sheehan 1972). Annual plants of 50,000 to 300,000 mysids (1966 through 1970) in Lake Pend Oreille, Idaho, were successful in establishing large mysid populations by 1972 (Rieman and Bowler 1980). These are but a few documented successes of mysid plants.

Established mysid populations following initial introductions into Montana lakes ranged from a period of five to six years. Although only limited quantitative measurements have been made, present densities are believed to be the greatest in McGregor and Whitefish lakes.

Table 2. Mysis introductions into eight northwest Montana lakes with subsequent follow-up sampling efforts.

| Lake | Introduction date | Estimate number planted | Condition of plant | 1980 Sampling | | | |
|---|---|---|---|---|---|---|---|
| | | | | Water depth planted (feet) | No. of 10 min. tows (horizontal) | Vertical tows (# in parenthesis) Depth (feet) | Number of mysids collected |
| Blaine | 8-6-75 | 5,000 | Very good | 80 | 2[1/] | 90(2) | 0 |
| Dickey | 8-15-75 | 2,000 | poor | 70 | 2 | 70(2) | 0 |
| Tally | 8-15-75 | 2,000 | poor | 400 | 2 | None | 0 |
| Middle Thompson | 9-12-75 | 14,000 | poor* | 100 | 2[1/] | 120(1) | 0 |
| Swan | 9-12-75 | 14,000 | poor* | 100 | 3 | 120(1)<br>135(1) | 53 |
| Bull | 9-19-75 | 6,000 | poor* | 50 | 2 | 30(1)<br>50(1) | 0 |
| Spar | 9-19-75 | 6,000 | poor* | 100 | 2 | 100(1) | 0 |
| Holland | 10-19-76 | 8,000 | poor** | 140 | 2 | 150(1) | 0 |

1/ Five minute tows

* Estimate 50 percent mortality
** Estimate 75 percent mortality

SUMMARY

This is a brief report on the introduction of Mysis relicta (opossum shrimp) into 35 northwestern Montana lakes starting in 1968. It includes information on capture and transporting methods and the procedure for evaluating survival of the plants.

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March 2, 1982

Waters referred to:

| | |
|---|---|
| McGregor Lake | 5-9216 |
| Ashley Lake | 7-5220 |
| Little Bitterroot Lake | 7-7300 |
| Whitefish Lake | 7-9540 |
| Crystal Lake | 7-5940 |
| Flathead Lake | 7-6400 |
| Lake Blaine | 7-5380 |
| Middle Thompson Lake | 5-9232 |
| Dickey Lake | 8-8510 |
| Bull Lake | 7-5540 |
| Spar Lake | 11-9640 |
| Talley Lake | 7-9060 |
| Swan Lake | 7-9000 |
| Holland Lake | 7-6780 |

Key words:
Mysis