

NMT Network News

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Northwest Marine Technology, Inc.

Stocking Naked Carp into Qinghai Lake, China

by John Ransier

Qinghai province was named after Qinghai Lake, the largest saltwater lake in China. The people of this province represent diverse cultures, religions, and ethnicities but they are all connected to Qinghai Lake. Qinghai Lake, which in Chinese means “Green Sea”, is 3,200 m above sea level and has an area of approximately 4,700 km². Its circumference is greater than 360 km. One of the lake’s most valuable resources is the scale-less naked carp.

The Qinghai Lake ecosystem thrives on the interaction between naked carp and residential or migrating birds. Approximately 70% of the birds that use this lake during their migration are waterfowl (Anseriforms) which depend on naked carp as their main food source. These birds eat an estimated 800 tons annually. The decline of naked carp affects the migratory movement, reproduction and growth of these birds. A decline in the number of birds negatively impacts the grassland ecosystem. Naked carp also play an important role in controlling the level of aquatic plants (*Chaetomorpha linum*) in Qinghai Lake. If naked carp disappeared, the number of aquatic plants would rapidly increase and the water quality would deteriorate.

The value of this unique system has been recognized by both the Chinese and American governments. Qinghai Lake has been listed as an important international wetland in 1992. In 1997, the lake was endorsed as a national natural conservation site by the Chinese government and United States Fish and Wildlife Service.

Naked carp were once plentiful in the Qinghai Lake. In 1960, the estimated biomass of naked carp in Qinghai Lake was over 230,000 tons. By 1995, that biomass had dropped to 7,500 tons. These fish provided a significant source of food as well as being an important part of religious ritual. In the early 1960s, the water level of Qinghai Lake began to decline due largely to overuse for irrigation and livestock. Rivers that once fed the lake were diverted elsewhere, preventing naked carp from reaching their spawning grounds. In 1950, naked carp had over 100 rivers and streams into which they could spawn; now there are only eight.



Qinghai Lake – over the past 4 decades, weirs have blocked most of the rivers that feed the lake and the water has been diverted for irrigation. Although current regulations prohibit water diversion from May to July, the weirs prevent the naked carp from reaching their spawning grounds. Removal of these weirs would go far towards the restoration of the species but would also displace approximately 12,000 people who depend on the water for their crops and livestock.



*Naked carp (*Gymocypris perzewaiskii*) are predominantly found in Qinghai Lake on the Qinghai-Tibet Plateau. During the period from 1960 to 1995, the estimated biomass of naked carp in this lake has dropped approximately 90%.*

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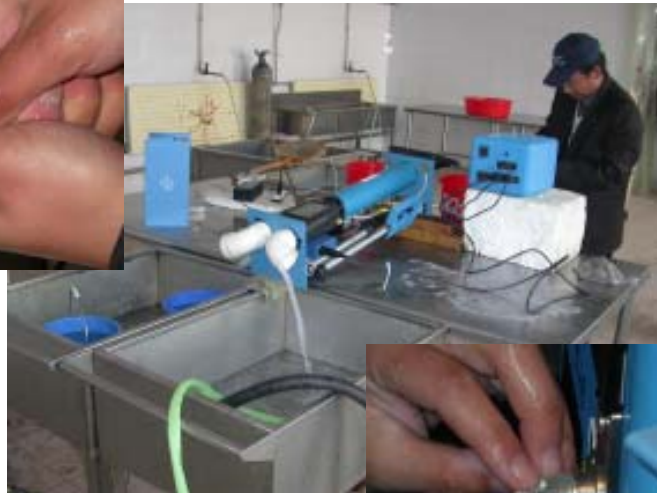
Stocking Naked Carp

Scientists from the Qinghai Fishery Department approached Northwest Marine Technology in 2002 during a Coded Wire Tag Workshop that was held in conjunction with the World Aquaculture Society meeting in Beijing, China.



Tagging at Qinghai Fisheries Department's naked carp hatchery.

Discussions of the naked carp stock enhancement program compelled NMT's Stan Moberly to return and visit Qinghai Lake in late 2002. The Qinghai Fishery Department then decided to use NMT's naked carp growth and migration trends.



Upper left – free hand tagging large fish.

Lower right – using a fish positioning jig to tag small fish.



In October 2003, a team of NMT's biologists returned to Qinghai Lake to help local research teams launch the Naked Carp Tagging Program. Working together, 11,000 large (10 cm to 25 cm total length) and 5,500 small (5 cm total length) carp were implanted with CWTs. Both the tag retention and survival rates were over 94% after 3 to 5 days. The large fish were released into the Shaliu River which feeds into Qinghai Lake. The small fish were held in the hatchery for further observation. Once the lake thaws in early May, the effectiveness of the stocking program will be evaluated.



Photos by Russ Haycock

Effort to survey endangered frogs in Canada continues

by Russ Haycock

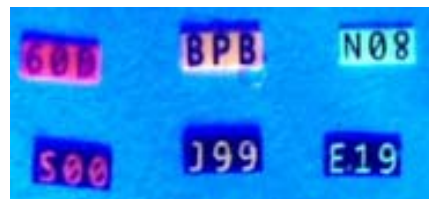
The Oregon spotted frog is the most endangered amphibian in Canada. Historically, the Oregon spotted frog was quite common.

The primary goal of the Canadian Oregon Spotted Frog Recovery team is to remove the Oregon spotted frog (*Rana petiosa*; OSF) from the endangered list in Canada. This frog is a Pacific Northwest endemic and is Canada's most endangered amphibian with a mean effective population size of 372 breeding adults from 1997-2003.

Now, through habitat destruction and introduction of non native predators like the bull frog, efforts must be made to monitor and evaluate this amphibian.

For the past three years, stakeholders in the recovery process have provided the team with equipment developed by Northwest Marine Technology, Inc. to assist in the recovery process.

A small-scale captive rearing program has been started at three facilities and has resulted in the release of approximately 1500 froglets into wild. To monitor the progress of these frogs in the wild, each one is marked according to size. Over 300 froglets were of sufficient size to be marked with Visible Implant Alphanumeric tags. The remainder were marked with Visible Implant Elastomer tags. The future plans are to release more young froglets into the marshlands.



VIA alpha tags are implanted into the toes of larger frogs so that individuals can be identified.

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....endangered frogs

As we capture, mark and recapture frogs, the data we collect will allow us to understand the demographics of this species and will guide future management efforts. The Recovery Team has conducted intensive trapping for OSF during the breeding season for the past three years and has marked every frog caught using NMT tagging systems.

In the first year, the team used VI Elastomer color combinations to individually mark frogs. In the last two years we have switched to VI Alpha tags. Both systems provide an excellent method of identification without upsetting nature's way.



The Recovery Team and volunteers continually search for new populations of Oregon spotted frog and care for their habitat.

Coded wire tagging of longfin eels transplanted into a high country lake in South Island, New Zealand

by Dr. Michael Beentjes



Lake Hawea is a glacial, cool, deep-water, oligotrophic lake at an altitude of 347 m in South Is. New Zealand.

National Institute of Water & Atmospheric Research (NIWA, New Zealand) fisheries scientists, Dr. Mike Beentjes and Dr. Don Jellyman, tagged longfin eels with coded wire tags to determine the fate of eels transplanted into a high country hydro lake. Lake Hawea is a glacial, cool, deep-water, oligotrophic lake at an altitude of 347 m in the South Island of New Zealand. Hydro dams have prevented recruitment of young eels into the lake and the density of eels at the time of stocking was very low following more than 35 years of commercial fishing. This offered a rare opportunity to study the outcome of stocking a largely eel-free lake and to test the efficacy of coded wire tags on freshwater eels.

In 1998, Lake Hawea was stocked with about 9500 juvenile longfinned eels (*Anguilla dieffenbachia*) (mean weight 173 g) caught from the downstream lower Clutha River. A sub-sample of 2010 eels was tagged with sequentially-coded wire tags inserted into the top of the head. Three years later, the eel population in Lake Hawea was sampled and captured eels were 'wanded' to check for the presence of the tags. A total of 42 tagged eels were recaptured. During the three years since eels had been in Lake Hawea they had grown an average of 4.1 cm per year, almost double the growth rate that these eels were achieving before transfer. Eels transferred into Lake Hawea experienced accelerated growth and increased condition as a result of low density (density-dependent) and abundant food.

Eels dispersed throughout the lake (138 km²) but density was highest at the point of release.

Eels caught elsewhere were larger and in better condition, further evidence of density dependent growth. An interesting finding was that recaptured eels were all females, indicating that either eels differentiated into females because density was low, or that males moved out of the lake to more preferred habitat downstream. The study concluded that enhancement or stocking with longfins is viable for low density, recruitment-limited, high country lakes in New Zealand, but growth is likely to be density dependent.

Coded wire tagging of freshwater eels appears to be a useful tool for studying growth and movement of eels as tag retention was high and tagging had no apparent adverse effect on growth.

For more details see:

Beentjes, M.P. and Jellyman, D.J. (2003). Enhanced growth of longfin eels, *Anguilla dieffenbachii*, transplanted into Lake Hawea, a high country lake in South Island, New Zealand. *New Zealand Journal of Marine and Freshwater Research* 37: 1–11.



Juvenile eels being released into Lake Hawea in 1998 as a crowd gathers to witness the event.

Electronic Detection for Coded Wire Tags

In the Pacific Northwest, adult salmon are beginning to return, and electronic sampling for coded wire tags at hatcheries and in fisheries will soon be in full swing. Northwest Marine Technology and the Pacific States Marine Fish Commission recently sponsored a workshop in Portland, Oregon focussing on use and maintenance of wands, tunnel detectors and V-detectors. Other workshops are being planned for this region. If you are involved in electronic sampling, it is a good idea to check out your equipment before you begin and to review how the equipment should be used and maintained for optimal performance. NMT provides free support for all of these activities. Please call if you would like further information. Tel: 360-468-3375 or 360-596-9400

Duane Knudsen (Washington Department of Fish and Wildlife) uses a feeding table and R9500 tunnel detector to scan coho salmon for coded wire tags at George Adams Hatchery near Olympia, WA.

Tunnel Detector Seasonal Maintenance Checklist

...and other equipment updates can be found on the website.

www.nmt.us



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