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The Management of Bait in Ontario: A Review

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June 2012

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Preface

This document has been prepared to assemble information on the live bait industry in Ontario prior to a policy review of live bait management in the province. Various types of live bait are described and the feasibility of aquaculture for different bait species is investigated. Licence sales, reported harvests, and economics are provided for the Ontario bait industry. Management of the Ontario bait industry is reviewed. Results of a North American jurisdictional scan on bait policies and management practices are presented. Finally, problems and issues currently facing the bait industry are identified. An emphasis has been placed on ecological issues associated with the use of live bait. More than 370 citations have been provided as additional reference material.

It is hoped that this report will serve as a useful reference document for both internal and external committees who will be involved in the development of a new provincial bait policy.

Steven J. Kerr
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June 2012

Préface

Le présent document a été rédigé pour y réunir des renseignements sur l'industrie ontarienne des appâts vivants avant de réaliser un examen des politiques sur la gestion des appâts vivants. On y décrit plusieurs types d'appâts vivants et y examine la faisabilité de l'aquaculture pour l'élevage de différentes espèces d'appâts. On y trouve des données sur l'industrie ontarienne des appâts, dont le nombre de permis vendus, les prélèvements d'appâts qui ont été déclarés et divers indicateurs économiques. On y examine la gestion de l'industrie ontarienne des appâts. On y présente les résultats d'un survol des politiques relatives aux appâts et des modes de gestion des appâts dans divers territoires nord-américains. On y décrit les problèmes et les enjeux auxquels est confrontée l'industrie des appâts. Une large place y est accordée aux questions écologiques associées à l'utilisation d'appâts vivants. Plus de 370 citations y sont données à titre de références supplémentaires.

Nous espérons qu'il sera un bon ouvrage de référence pour les comités internes et externes qui participeront à l'élaboration des nouvelles politiques provinciales sur les appâts.

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Background

Angler Use of Bait

Bait may generally be defined as any substance used to attract and catch fish. The use of live organisms as bait has traditionally been popular among anglers. The type of bait used often varies with the species of fish being sought (Lowry et al. 2006). Surveys indicate that nearly 80% of Ontario anglers use live bait, mostly worms and baitfish, with a small percentage using frogs and crayfish (OMNR 2006). Leeches are used by approximately 20% of anglers.

In Ontario, anglers have the option of either harvesting their own bait or purchasing bait from a retailer. Prior to the implementation of a resident angling licence in 1987, resident anglers could use bait traps and dip nets without a permit but were required to obtain a permit to use a seine net. Currently, under authority of an angling licence, resident anglers can use one bait trap or dip net to harvest baitfish for personal use. It is illegal for anglers to sell their baitfish. In the 2005 recreational angler survey, the second-most popular bait/tackle was found to be live baitfish (54% of anglers) (OMNR 2009a). The survey also indicated that approximately 3% of anglers harvest bait for their personal use. Anglers are restricted to a limit of 120 baitfish in their possession at any time.

Figure 1. In Ontario, licensed resident anglers are allowed to either capture their own bait or purchase bait from a commercial bait dealer (Brenda Koenig photo).

Types of Bait

Types of bait used for recreational angling includes species of crayfish, fish, frogs, leeches, and earthworms. The regulated bait industry in Ontario applies only to fish and leeches however.

Crayfish

There are 9 species of crayfish in Ontario (BAO and OMNR 2005b). Seven of these species are native and two have been introduced from the United States (Hamr 1997).

Anglers may harvest their own crayfish and the limit is 36 per person. When compared to baitfish, crayfish comprised only a small portion of the Ontario live bait industry (Brousseau 2002). The commercial harvest and sale of crayfish was prohibited in 2007. At that time, crayfish represented only a small (<0.03%) proportion of the live bait industry.

In Ontario, crayfish are harvested almost exclusively by baited minnow traps using cut fish parts or commercial pet food. Crayfish are most active at temperatures between 15-20ºC. Momot (1991) concluded that, as long as habitat remained intact, removal of up to 50% of the population was possible without any danger of growth or recruitment over-fishing. As long as their body and gill chambers are kept damp, crayfish can live out of the water for extended periods of time and can survive transport over long distances (Huner 1997). In Ontario, however, crayfish can only be used in the waterbody from which they were captured. Crayfish, whether dead or alive, cannot be moved overland.

Fish

Although many species of fish may be suitable as live bait for angling, there are only 48 species designated as baitfish for the purpose of harvest and sale in Ontario (see Appendix 1). This listing is based on species which are native to Ontario. In actuality, the bulk of the baitfish harvest and sales consists primarily of only 10-11 different species.

Figure 2. Baitfish are the most common type of live bait used by anglers in Ontario (Brenda Koenig photo).

A number of factors ultimately determine the capability of a waterbody to produce baitfish (Table 1).

Table 1. Characteristics of a good baitfish lake or pond (from Hildebrand-Young Associates Ltd. 1981 and Eddy 2000).

• Simple fish community with an absence of predatory game fish species.
• Relatively shallow and constant depth of water with some deeper (e.g., 3-4 m) overwintering areas.
• High levels of dissolved oxygen throughout the year.
• Small surface area .
• Brushy shoreline with deadfalls and beaver lodges.
• Presence of inlet and outlet streams which may serve as spawning habitat.
• Soft substrate (e.g., mud).
• Abundance of submerged aquatic vegetation.
• Presence of broken rock substrate along lake shoreline

Harvest equipment for baitfish includes traps, dip nets, and seine nets. Traps are usually baited except perhaps during spring runs in creeks (Winterton 2005). Fish are often sorted (by species) and graded (by size) before being moved to some form of holding tank. Seining is another preferred means of capture for species such as shiners which are a schooling fish. The use of seine nets is usually restricted to areas which have substrate free of obstructions. Since seine nets usually capture more fish than a baited minnow trap, there is often more time and effort required to sort and grade fish at the site.

Sales of baitfish in the winter are usually comprised of species such as emerald shiner (*Notropis atherinoides*), common shiner (*Luxilus cornutus*), and spottail shiner (*Notropis hudsonius*), which are captured in large numbers during their fall movements. During the summer, the most common baitfish are species of dace (*Rhinichthys, Phoxinus* and *Margariscus* spp.), fathead minnow (*Pimephales promelas*), common shiner, suckers (*Catostomus* spp.), and chubs (*Semotilus, Nocomis* and *Couesius* spp.). Emerald shiners are seldom available in the summer since they do not survive well in warmer water.

There has been some experimentation with alternate gear types for harvesting baitfish. Mohr (1985) experimented with the use of small mesh trap nets and found them to be a viable alternative to minnow traps under certain conditions and in certain lakes.

Historically, large volumes of baitfish (primarily emerald shiners), harvested from Lakes Erie and Simcoe, were transported long distances to markets as far away as Cochrane and Thunder Bay.

Frogs

There are thirteen species of frogs which are native to Ontario. Frogs are widely used as bait predominantly by bass anglers.

Both active and passive techniques are used to harvest frogs. Frogs are often subject to stress during transport (Winterton 2005). At all times they need to be kept cool and moist.

Prior to 2001, anyone could harvest and sell frogs without a licence. In 2001, regulations were introduced which:

- Allowed commercial bait licence holders to harvest and sell only northern leopard frogs (*Rana pipiens*).
- Restricted the harvest of frogs to several designated counties in southeastern Ontario.
- Permitted an individual harvesting frogs under authority of a sport fishing licence to catch and possess up to 12 northern leopard frogs and one specimen of any other frog species that was not specially protected.

Based on a 2002 survey (Brousseau et al. 2003), almost 7,000 dozen frogs, valued at over $46,000, were harvested from southern Ontario.

The commercialization of bull frogs (*Rana catesbeiana*) was stopped in Ontario based on concerns about their population status. In response to concerns about the decline in other Ontario frog populations (Shirose 2000), the commercial harvest and sale of frogs was prohibited in 2007. At that time, frogs accounted for only a small portion (< 0.02%) of the live bait industry. Anglers are still allowed to harvest northern leopard frogs for personal use. The limit is 12 frogs per person.

Leeches

There are believed to be 35 species of leeches in Ontario (Walther-Landon 1986). The primary species used as bait is the ribbon leech (*Nephelopsis obscura*). Due to the difficulty in identification, most anglers and bait dealers are unable to identify the species of leech being used or sold.

Figure 3. Leeches are a bait preferred by many walleye anglers (Brenda Koenig photo).

Leeches are found in a diversity of habitats and can tolerate a wide range of water quality parameters (Walther-Landon 1986). Peterson (1982) found that productive ponds for leeches were situated near agricultural lands, supported green algae blooms, and contained few fish species. Until the early 1980s, leeches were seldom used for

angling (Winterton 1998a). Today, leeches are a bait especially preferred by many walleye anglers. Leeches are sensitive to temperature and are most effective when angling in cool (i.e., 15º C) waters. The demand for leeches increased greatly in the late 1980s and 1990s. The increased demand for leeches resulted in increased importation.

Leeches are harvested with baited traps set in warm, shallow areas of ponds and lakes. Since leeches are nocturnal, traps are set in the evening and checked in early morning. Leeches can be held for periods of 8-10 weeks while being transported to market. Proper handling techniques and maintenance of good water quality are required to minimize holding mortality (Friesen 2000). They can be sold either by the dozen or by the pound. Anglers may harvest their own leeches but are restricted to a maximum of 120 leeches per person regardless of whether they were harvested or purchased from a commercial dealer.

Historically, many American anglers brought leeches into Ontario from the United States (Walther-Landon 1986). It has been estimated that 50-60% of the leeches used by anglers in Ontario originated from outside the province (Friesen 2000). This practice was discontinued in 1999 when anglers were banned from importing leeches into Ontario. By 2005 the ban had been extended to commercial operators.

Earthworms

Records of anglers using earthworms to catch fish date back to the 15th century (Anonymous 1962). Although no native earthworms exist in Ontario, there are a total of at least 19 species which are currently found in the province (Evers et al. 2012). Earthworms are a very popular and widely-used bait. They are marketed under a variety of names including angle worms, leaf worms, night crawlers, dilly worms, and wigglers (Keller et al. 2007). The dew worm or night crawler (*Lumbricus terrestris*) is probably one of the most widely used earthworms sold commercially. Other species of earthworms may be used by anglers who collect their own bait. There are currently no restrictions regarding the harvest or sale of earthworms in Ontario.

Other Types of Bait

Several other invertebrates are less commonly used as bait by anglers. This includes caterpillars, crickets, garden slugs, grasshoppers, grubs, maggots, and wax worms. None of these products are currently regulated in Ontario. Salamanders cannot be used as bait in Ontario.

Some trout and salmon anglers utilize salted roe (spawn) as bait. The sale of roe is regulated under the provincial Fish and Wildlife Conservation Act. Roe may not be sold under authority of a commercial bait licence or by an angler.

Propagation of Bait

As a general rule, propagation is considered to be the artificial rearing of gametes obtained either from a wild or domesticated source. Propagation may either be intensive or extensive in nature. Intensive propagation occurs when fish are reared at high densities under controlled environmental conditions. Conversely, extensive propagation is when fish are reared at lower densities when environmental conditions cannot be controlled.

In Michigan and Wisconsin, cultured baitfish accounts for approximately one-third of all baitfish sales (Busiahn 1996), Although the culture of bait species is a well developed industry in the United States, there are few operations in Canada. Golden shiners (*Notropis crysoleucas*), white suckers (*Catastomus commersonii*), creek chub (*Semotilus atromaculatus*) and fathead minnows are the most common baitfish species which have been cultured in the United States (Hedges and Ball 1953, Stone et al. 1997).

Suckers are often reared intensively in a hatchery environment after wild egg collections. Fry are then subsequently transferred to ponds. Conversely, the propagation of fathead minnows and golden shiners usually involves the release of adult brood fish into ponds where they are allowed to spawn naturally. In some instances the brood fish are removed after spawning so as not to compete with their progeny (Davis 1993). Fish are harvested from the ponds once they have achieved the desired size.

Brubacher (1962) concluded that competition from wild supplies, high capital investments, and a relatively short growing season, made the commercial propagation of baitfish in Ontario difficult. As a result, there have only been a few attempts to culture baitfish in Ontario over the years. In 1967, an experimental project was conducted in the Kenora District to rear suckers to meet baitfish supply shortfalls in the summer (Saunders 1967). A wild spawn collection was conducted in the spring. Eighty percent of the eggs hatched and approximately 104,000 fry were introduced into a rearing pond within 48 hours after hatching. The rearing pond was drained and seined in early November to determine sucker production. It was estimated that 30% of the sucker were of marketable size in early August and the remainder would have been marketable in late August or early September. In 1969, a total of 130,000 eggs were collected, hatched and the sac fry were placed in two artificially constructed ponds on the Matachewan Indian Reserve (Atkinson 1969). The goal of the project was to raise baitfish to sell to retailers. Unfortunately, the results of the project were not reported.

Probably the most intensive experimentation with regard to baitfish culture in Ontario occurred at the provincial Westport Fish Culture Station in the late 1960s. The project was designed to evaluate the feasibility and economics of rearing golden shiners. Over a three year (1968-1970) period, various ponds were used as spawning and rearing areas. Problems which were encountered included heavy mortality when moving shiner fry, unwanted algae and aquatic vegetation, predation, parasite infestation, and a short growing season. It was concluded that the profit margin was too low for the propagation of golden shiners (McNee 1971).

Leeches can be cultured in hatcheries or in ponds. Ponds need to be fertile and relatively free of fish. Under good conditions, leeches can be grown to market size in 9-

10 weeks. In Minnesota, Collins et al. (1983) concluded that commercial leech production was cost competitive with natural harvest costs. Stocking juvenile leeches into commercial harvested ponds or lakes to supplement natural populations has not been found to be a practical management tool (Peterson and Hennagir 1980a, Peterson 1982).

It is possible to propagate some species of frogs. Propagation techniques can range from stocking ponds with tadpoles (extensive culture) to intensive culture in outdoor pens. Sanitation problems have frequently been encountered in frog propagation operations.

Crayfish are cultured in the southern United States (e.g., Louisiana). They are usually reared in small ponds (Forney 1957). Ponds are stocked in the fall or the spring with mature (fall) or egg carrying (spring) crayfish that mate and expel their eggs. Young crayfish reach bait size by July and are removed by seining (Brown and Gunderson 1997) or the use of baited traps (Bardach et al. 1972). The expense and length of harvest period are problems which are commonly experienced in crayfish culture (de la Bretonne and Romair 1990). In northern climates, crayfish display slow growth, reduced juvenile survival rates and a long lifespan. Momot (1991) concluded that these characteristics were counterproductive for commercial aquaculture.

Earthworms can be reared relatively easily in large containers filled with peat, sawdust, sand and other organic material. Moisture content of the bed is a critical factor. High fibre content food is often used to promote growth. Worms can first be harvested from new beds after 3 months and then harvested every 2-4 weeks thereafter (Masson et al. 1992).

There are several advantages for the propagation of bait to supplement wild harvest (Markus 1934, Burtle undated). Under controlled rearing conditions the possibility of transferring disease or exotic species is minimized (Goodwin 2012). Potential overharvest of wild bait stocks could be avoided. Finally, artificial propagation could serve to provide a stable source of bait throughout the year. If wild stocks of bait decrease and wholesale prices increase, the economic feasibility of bait culture in Ontario becomes more attractive (Winterton 2005).

Managing Ontario's Bait Industry

Some of the earliest baitfish records date back to 1925 when a total of 99 licences were issued provincially (Goodchild 1997). At that time the capture and sale of live bait was generally considered to be a means of supplementary income for children and others (Brubacher 1962). Initially, the harvest and sale of bait was a localized affair since holding and transporting facilities were inadequate (McNee 1966). The baitfish industry in southern Ontario expanded considerably between 1930 and 1960 (Appendix 2).

The live bait industry in northern Ontario developed later than in the south. The baitfish industry in northwestern Ontario commenced in the 1950s (Hilldebrand-Young Associates Ltd. 1981). Licensed areas on Crown land were poorly defined resulting in many conflicts among harvesters. A licence was required to harvest baitfish but there was no annual reporting requirement.

Historically, the live bait industry was comprised of harvesters, dealers, preservers and importers. A harvester was an individual who was licensed to harvest live bait from a designated area using harvest equipment specified on the licence. Most harvesters sold the majority of their bait to retailers. A bait dealer was an individual who was licensed to sell bait to anglers. They were required to have a baitfish dealers licence to possess, transport, and sell. A preserver licence allowed for the preserving of bait by freezing, salting, or pickling. Surplus supplies of bait which could not be held were often processed in that fashion. The maximum weight of bait which could be processed annually was limited by regulation. Importers were individuals who could import bait from aquaculturists in the United States in order to alleviate bait shortages during the summer months.

In the early 1960s an angler was allowed to catch (by trap or dip net) and hold up to 50 baitfish without a licence (Brubacher 1962). By the mid 1960s, two different licensing systems were in use. In much of southern Ontario, harvesters were assigned specific waters for their use. Conversely, in northern Ontario, bait harvesters were assigned a defined "block" containing multiple waters. For the most part, only one harvester was allowed in any block. There are some exceptions to the block system. For example, in Lake Erie the baitfish resources are allocated to multiple users fishing the same areas.

In 1965, Payne (1965) reviewed the status of the baitfish industry and called for regulations which would meet market demands while preventing wild stocks from being overexploited.

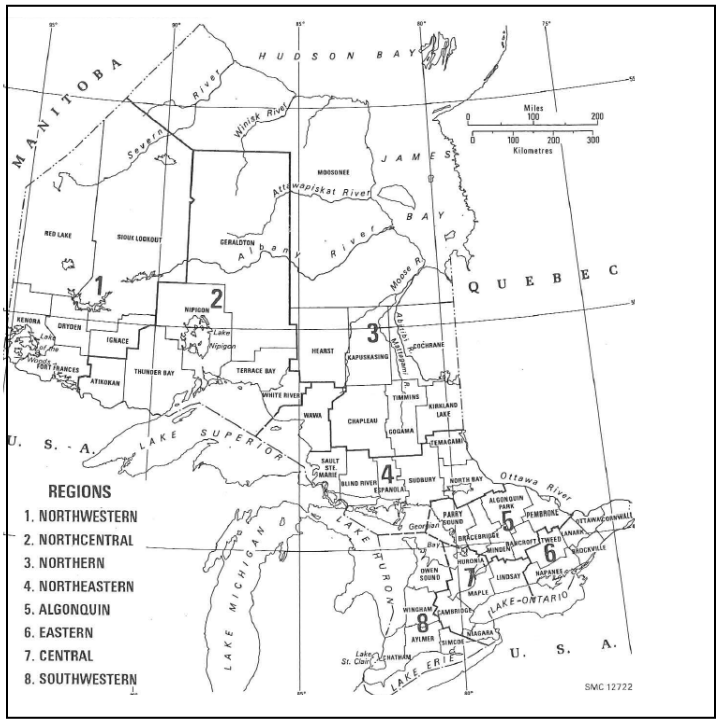
By the 1970s, concerns were emerging about potential overexploitation of baitfish, particularly in southern Ontario. This prompted the formation of a Central Region baitfish subcommittee within OMNR and implementation of several policies intended to prevent overharvest. These policies included:

- Only one licence would be issued to the harvester – the licence was required to be on his person – no duplicate licenses were allowed.
- The amount of gear licensed was limited to one seine net, one dip net and an unlimited number of minnow traps.
- A harvesters licence was only issued to the holder of a licence from the previous year. Licensees who had not fished the previous two years were not renewed.

In 1973, the Ontario Department of Lands and Forests was reorganized to form the Ontario Ministry of Natural Resources. The new organizational structure included eight administrative regions and 47 districts (Figure 4). Bait licences and harvest areas were assigned by local district offices across the province.

A series of new provincial baitfish policies was implemented in 1978. These included:

- Baitfish harvest licences would only be issued to Ontario residents.
- Harvest licences would not be renewed for inactive operators.
- Licence fees would not be less than $20.
- Licensees would be assigned exclusive fishing grounds.



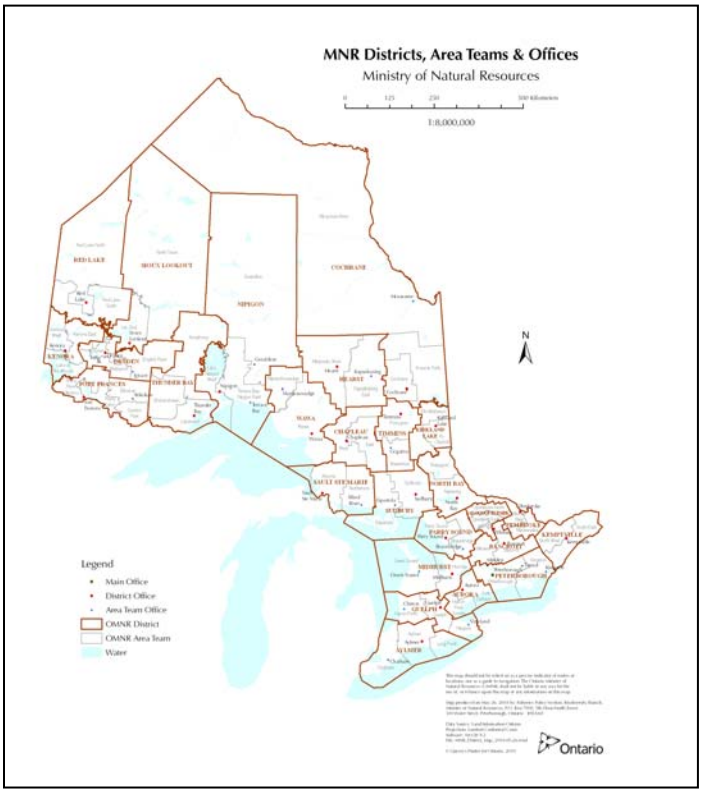


Figure 4. Organizational structure of the Ontario Ministry of Natural Resources in 1973 (top) and today (bottom).

As part of the provincial Strategic Planning for Ontario Fisheries (SPOF) initiative, a working group was established to review the bait industry. They released a report containing several proposals for baitfish harvest policies in Ontario (OMNR 1983). Highlights from that report included the following recommendations:

- Expand research activities to develop a baitfish productivity model.
- Encourage the establishment of local baitfish management councils.
- Retain the exclusive block system as a provincial standard for allocating baitfish resources.
- Amend legislation to separate the baitfish and commercial food fish industries.
- Retain the baitfish dealer's licence.
- Develop new regulations to promote the husbandry of baitfish.

In the late 1990s, MNR initiated a process to create a new business partnership with the bait industry. It was recognized that the commercial bait industry was undervalued and minimally managed. Further, there was the need for more consistent policy and enforcement direction as well as more accurate reporting. A discussion paper (OMNR 1998) was prepared which outlined proposals for consideration. After extensive consultation with the bait industry, the plan was approved in 1998. The plan included increased licence fees to improve bait management, created the Bait Association of Ontario (BAO) as a new industry partner, developed a plan to modernize Ontario's baitfish industry, and began to address many of the ecological issues affecting the industry at that time. The BAO assumed much of the administrative responsibility of bait management including education, training, and reporting.

The number of bait licences, both harvester and dealer, issued in Ontario peaked in the late 1980s-early 1990s (Figure 5). Licence fees were increased in 1999. The basic fee for a bait harvest licence increased to $300 (from $30) with an additional $32.50 for each bait harvest area. Fees for a dealer licence increased from $17.50 in 1998 to $150.00. This fee increase was at least partially responsible for a 28% decrease in the total number of commercial baitfish licences issued in 1999 (Anonymous 2000). Licence fees were directed to a Special Purpose Account and used, in part, to finance administration of the BAO.

Shortly after the formation of the BAO-MNR partnership, action was taken on a number of outstanding issues. This occurred when the new provincial *Fish and Wildlife Conservation Act* replaced the former *Game and Fish Act*. A ban was placed on the use of salted (preserved) minnows by commercial dealers. A ban on the import of leeches occurred in two steps: anglers were banned from importation in 1999 and a complete ban (including commercial dealers) on import was instituted in 2005. Finally, the use of traps and dip nets by non residents was prohibited. Leeches were added to bait harvest licences to recognize their increasing importance. Shortly thereafter, the commercial bait frog industry was regulated.

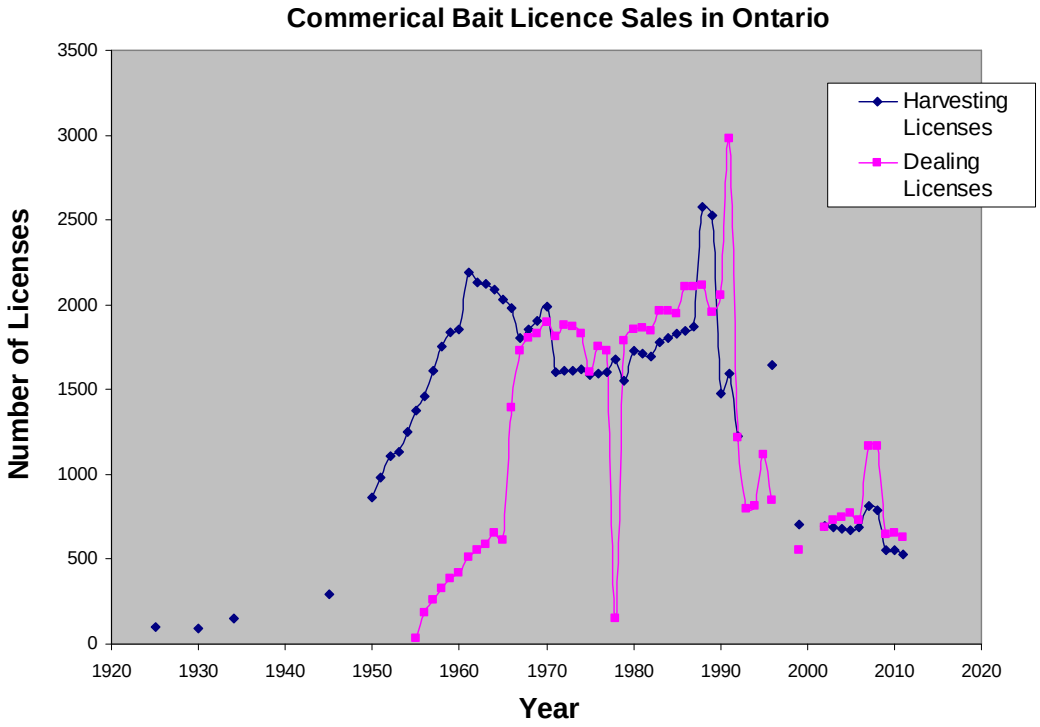


Figure 5. Sales of bait harvest licences and bait dealers licences in Ontario.

An increasing demand for the ability to catch and sell lake herring as bait led to a northwestern Ontario initiative in 2002. A proposal (OMNR 2004a) was developed to allow bait harvesters to use small mesh gill nets on designated lakes, provided incidental catches of non-target species was low. The proposal was posted twice on the Environmental Registry and a decision notice to allow this practice was posted in February 2012.

The discovery of Viral Hemorraghic Septicemia (VHS) in Ontario had major impacts on the bait industry. VHS is a virus that can weaken and kill fish. Although discovered from an archived sample in 2003, VHS was first detected in Ontario waters of the Great Lakes in 2005 and, subsequently, inland in 2011. The pathogen resulted in numerous fish mortalities. In October, 2006, the U.S. Department of Agriculture's Animal and Plant Health Inspection Service placed a ban on all imports and interjurisdictional transport of 37 listed species of fish from eight Great Lakes states and two Canadian provinces. Within Ontario, actions were taken to slow the spread of VHS to inland waters. For the live bait industry this involved harvest and movement restrictions through the establishment of "virus-free", "buffer" and "VHS positive" zones (Figure 6):

- A harvest moratorium was implemented in the VHS positive zone
- Stored bait, harvested prior to the prohibition, could be sold in the VHS positive zone but not in either the buffer or virus free zones,
- Live baitfish which were harvested from the buffer zone could not be moved into the virus-free zone.

- Live bait harvested from either the buffer or virus-free zones could be sold in the infected zone

These measures were effective from January to March, 2007. Upon review, some boundary changes were made and the buffer zone was eliminated effective April 2007 (Figure 7).

Figure 6. VHS management Zones Implemented in January 2007.

In response to increasing concerns about the spread of non-native species and pathogens, the Ministry of Natural Resources in conjunction with the Bait Association of Ontario implemented a Hazard Analysis and Critical Control Point (HACCP) plan requirement for commercial bait licensees and a training program for commercial bait harvesters. The HACCP training program was originally developed for the bait industry in the United States to reduce the spread of invasive species. To ensure uncontaminated fish, water and equipment, the HACCP system is designed to identify invasive species hazards, establish controls and monitor these controls. HACCP is a preventive system to help ensure that fish, water and equipment are free of invasive species.

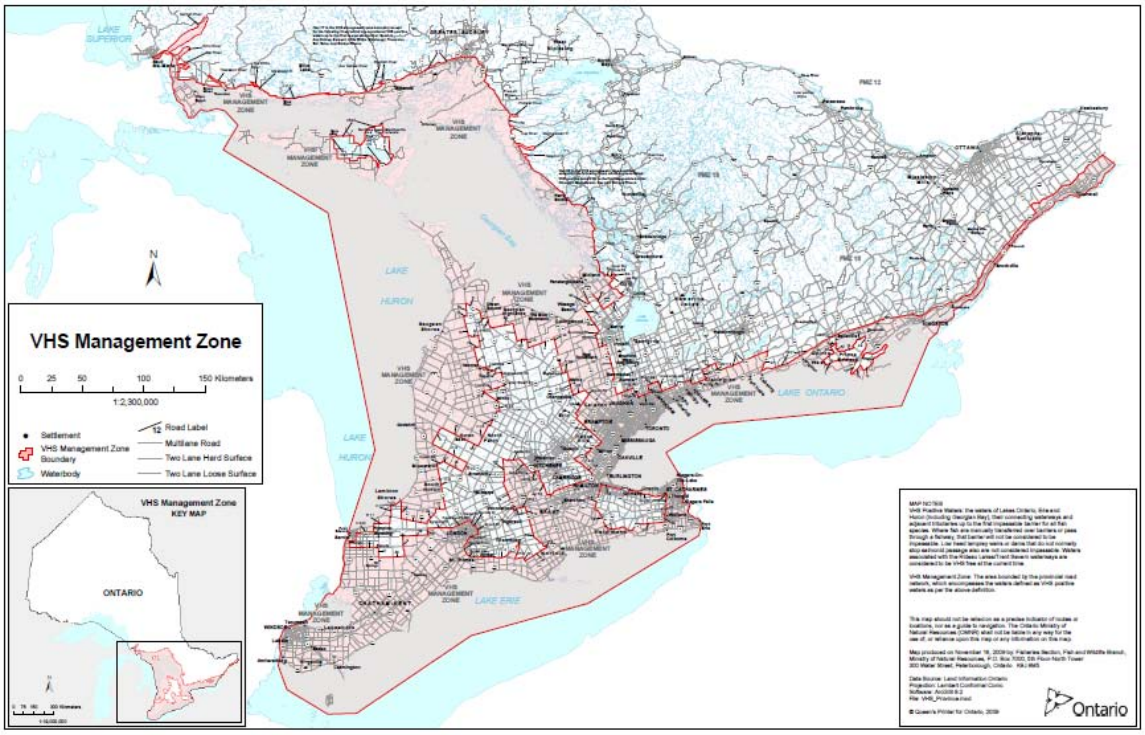


Figure 7. VHS Management Zone which was implemented in April, 2007.

The HACCP concept focuses on the part of the operation that is most likely to spread invasive species and minimize risk (Gunderson and Kinnunen 2002). Due to the more complex nature of bait harvesting operations, mandatory HACCP training was implemented over a multi-year period for bait harvesters while all commercial bait dealers were required to complete a simplified HACCP plan before their licences would be issued. Over a seven (2004-2011) year period, a total of almost 800 harvesters received HACCP training (Table 2).

Table 2. Ontario bait harvesters receiving HACCP training, 2004-2010.

Year	# Training Sessions	# People Trained
2004 (voluntary)	6	30
2005	0	0
2006	6	122
2007	14	184
2008	19	180
2009	15	247
2010-11	9	32

Since 2010 all commercial bait harvesting licensees must complete (and have approved) a HACCP plan before their licence is issued. This requirement has been in place for commercial bait dealers since 2007.

A study was initiated by OMNR in 2011 to evaluate the effectiveness of HACCP training and to determine the frequency of non-target fish in the retail baitfish industry. This

investigation built upon data previously collected by Drake (2011) that focused on the likelihood of human-mediated movement of aquatic species and pathogens using the baitfish pathway in Ontario. From this study there generally was a low occurrence of non-target species in retail products.

Despite measures designed to slow the spread of VHS, the virus was discovered in fish from Lake Simcoe in 2011. As a result, commercial bait operators were prohibited from moving commercial baitfish into or out of a new Lake Simcoe Management Zone (Figure 8) effective January 1, 2012. Anglers were advised to buy baitfish when they arrived to fish in the Lake Simcoe area and not take baitfish into or out of the area.

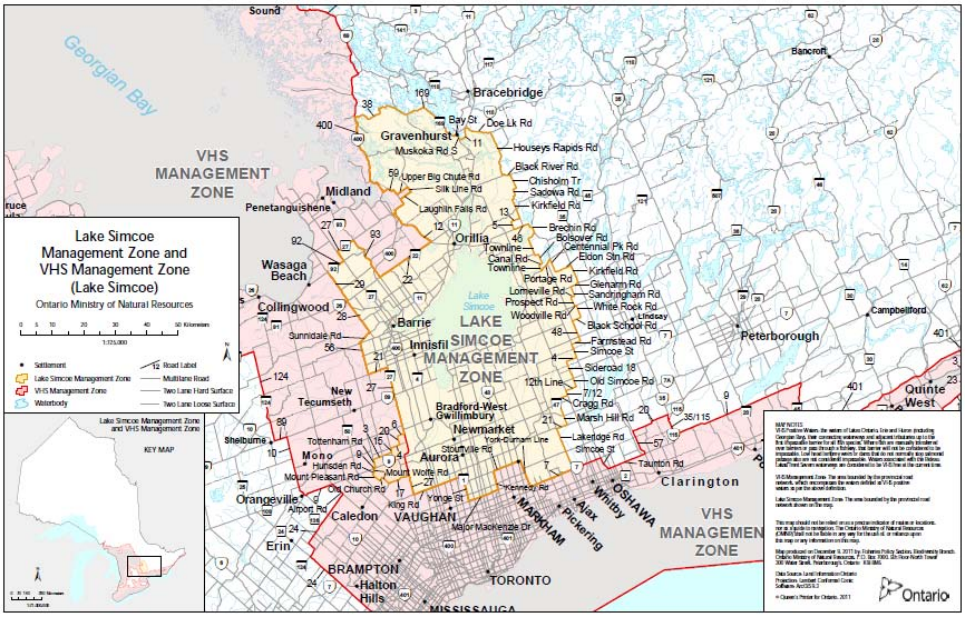


Figure 8. Lake Simcoe Management Zone which was implemented in 2012.

Currently, there are approximately 5,800 bait harvest areas in twenty-five different MNR districts in the province of Ontario (Note: There is no bait harvest allowed in Algonquin Provincial Park). Bait harvest activities are regulated through legislation and conditions of licence. Licence conditions address various issues including the movement of bait, travel corridors, types of gear utilized, and the timing of harvest. Mandatory reporting of fishing effort and harvest is a stipulation and an approved HACCP plan is required before a bait harvest licence is issued.

Current Regulations Involving Live Bait

Over the years, Ontario has established a number of regulations pertaining to the possession, transport and use of live bait (Table 3 and Appendix 3). Most regulations are designed to ensure the sustainability of wild live bait as well as prevent the transfer and introduction of non-native species.

Table 3. A summary of current regulations regarding the harvest and use of live bait in Ontario.

Topic	Regulation
Angler Harvest	• Resident anglers holding a valid recreational fishing licence may capture their own bait for personal use (Note: The capture and use of bait is not allowed in some waters). Non-resident anglers cannot harvest baitfish (except suckers and lake herring) for personal use by any means. • Anglers may only use one baitfish trap (< 51 cm long and 31 cm wide) or one dip net (< 183 cm square). A baitfish trap must be marked with the name and address of the owner. • Anglers are responsible to ensure that any baitfish in their possession are formally designated as legal baitfish. • Only northern leopard frogs may be captured or used as bait. • Crayfish must be only be used in the waterbody from which they were caught.
Commercial Harvest	• Only individuals with a valid commercial bait licence can sell baitfish and leeches. • Harvesters must carry their licence on their person. • Harvesters are not allowed to preserve baitfish with salt for sale to anglers. • A commercial bait licence holder cannot buy or sell baitfish that have been preserved with salt. • Individuals may not possess any species of fish which is not defined as a baitfish.
Import of Bait	• It is illegal to bring any crayfish, salamanders, live fish or leeches into Ontario for use as bait.
Personal Possession Limits	• Maximum of 120 leeches per angler. • Maximum of 36 crayfish per angler. • Maximum of 120 baitfish per angler. • Maximum of 12 northern leopard frogs per angler.
Prohibited Species	• Salamanders cannot be captured, imported, or used as bait in Ontario. • Cannot use an “invasive” or live fish that is not a designated baitfish species (exception for crayfish).
Release of Bait	• It is illegal to release any live bait or empty the contents of a bait bucket, including the water, into any water or within 30 m of any waterbody.
Holding Facilities	• Any live holding box must be clearly marked with the name and address of the user which are visible without raising the device from the water.
Transport	• There are no restrictions on angler movement of live baitfish. • No overland transport of crayfish is allowed. • Commercial bait licence holders may not move live baitfish out of the VHS Management Zone or baitfish into or out of the Lake Simcoe Management Zone.

Bait Harvest from Ontario Waters

Ontario has the largest industry in Canada for the harvest and sale of baitfish (Table 4).

Table 4. An overview of the Canadian baitfish industry (based on a survey conducted by Canadian Aquaculture Systems Inc. 2007).

Province/Territory	Year(s)	# Harvest Licences Issued	# Bait Dealers[1.]
Alberta	2007	0	8
British Columbia	2007	0	16
Manitoba	2007	100	45
New Brunswick	2007	0	3
Newfoundland/Labrador	2007	0	1
Northwest Territories	2007	0	0
Nova Scotia	2007	0	10
Nunavut	2007	0	0
Ontario	2002-2005	1,384 – 1,439	261
Prince Edward Island	2007	0	3
Québec	1985 - 2004	53-66	33
Saskatchewan	1997-2004	2-160	27

1. Value based on number of dealers listed in the Yellow Pages under “bait”.

Reported bait harvests are illustrated in Figure 9. Unfortunately, data is unavailable for much of the period between 1986 and 2002. Harvests declined considerably in 2007 coincident with the implementation of measures to control the spread of VHS.

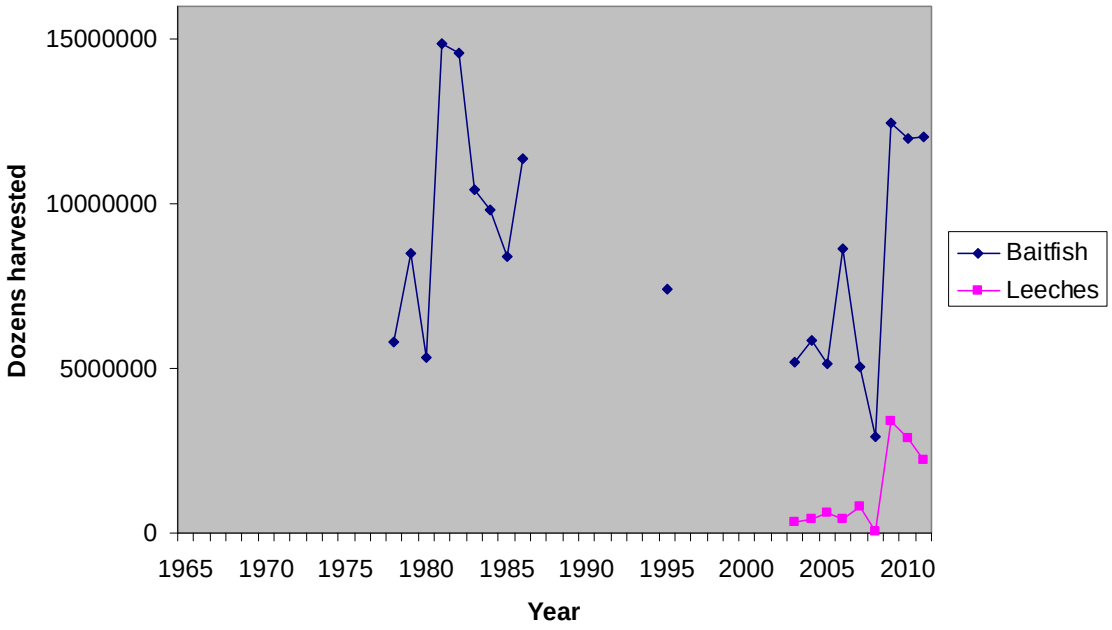


Figure 9. Reported harvests of leeches and baitfish in Ontario, 1970-2011.

Over the past nine years (2002-2010), provincial bait harvests in Ontario have averaged almost 4.7 million dozen baitfish. Comparatively, between 2004-2008, there was an average of 52 baitfish harvest licences issued in Manitoba and a mean annual harvest of 199,282 dozen baitfish (live and frozen) reported (Manitoba Water Stewardship 2009). In 2003, 117 licensees harvested approximately 5,100 kg of baitfish in the province of Saskatchewan (Ashcroft et al. 2006). Between 1985 and 2001, an average of 7.2 million dozen baitfish were harvested annually in South Dakota (Broughton and Potter 2003). The three year (1976-78) average harvest of baitfish in Minnesota was 14.6 million dozen.

Economics of the Commercial Bait Industry

Ontario is believed to have the largest live bait industry in Canada (Goodchild 1997) but estimates of its value vary considerably. Sales of baitfish in Ontario totalled $1.5 million in 1963 (Payne 1965). In 1980, the commercial baitfish industry was valued at $12.4 million (Goodchild 1997). By the mid 1980s the retail value of Ontario's bait industry was conservatively estimated at $29 million (US) (Litvak and Mandrak 1993). In the late 1990s, the value of the commercial bait industry was estimated at between $40-60 million (OMNR 1998). More recently (2005) the commercial bait industry in Ontario was valued at $17 million in direct sales and $23 million when other related sales were considered (OMNR 2009a). In comparison, the 2009 live bait industry in Manitoba had gross sales of $1.04 million (Manitoba Water Stewardship 2009). Maine's winter baitfish industry has been valued at $4.7 million (Kircheis 1998). The value of the 2001 baitfish harvest in South Dakota was estimated at $3.8 million (Broughton and Potter 2003). The direct sales of bait in Wisconsin during 1992 was estimated at $35.2 million (Manwell 1997). Minnesota's baitfish harvest and sale industry has been valued at $50 million (Dickson 2012). In the United States, the freshwater baitfish industry has sales over $170 million annually (Goodwin et al. 2004). In the mid 1990s, Rosen (2005) estimated the value of the baitfish industry in Canada and the United States was approximately $1 billion.

Although prices vary considerably across Ontario, the prices charged for live baitfish have increased steadily over the years. In the mid 1960s the price for one dozen baitfish ranged from 22-39¢. By 1982, the price ranged from 50¢ to $1.50 per dozen. Table 5 illustrates the value of various sizes of baitfishes in 2000. In 2003, retail prices per dozen for various bait species was $3.50 for baitfish, $4.00 for leeches, $7.00 for frogs, $3.00 for crayfish, and $8.00 for lake herring. In a survey of selected bait dealers during the winter of 2012 bait prices varied based on the size of fish (e.g., "small" ranged from $2.5-$6.00 per dozen, "medium" ranged from $4.00 - $8.00 per dozen, and "large" ranged from $4.50 to $12.00 per dozen) (Lauretta Dunford, OMNR, personal communication).

Table 5. Baitfish values in 2000.

Grader Size	Bait used for	Wholesale Value ($) in Gallons	Retail Value ($) in Dozens
16	Fish returned to water	N/A	N/A
17	Crappies and perch	$50	$1
23	Bass	$50	$2
33	Walleye	$50	$4
44	Small pike	$50	$6
51	Large pike	$45	$13
63	Large pike and musky	25-35¢ each	$1-1.25 each
Lake herring	Pike and lake trout	$4 per dozen	$8 per dozen

Note: A grader is a screen or sieve used to sort fish based on their size.

Problems and Issues

Supply and Demand

In a 1980 survey in northwestern Ontario (Hildebrand-Young Associates Inc. 1981), anglers indicated that they placed a high value on the availability of baitfish. A large portion of live baitfish, such as emerald shiners (*Notropis atherinoides*), are harvested during the autumn. Unfortunately, bait of a desired size is a perishable commodity which cannot be stockpiled for long periods of time (Davis 1993). Shortage of bait during certain periods of the year is a common problem in many North American jurisdictions (Noel and Hubert 1988, Meronek et al. 1997, Eddy 2000, Gunderson and Tucker 2000). In Ontario it is not uncommon for bait shortages to occur in mid summer (Anonymous 1956, Hughson 1968, Sandilands 1976) as well as some periods in the winter (Mulligan 1960, Brubacher 1962, Winterton 2005). Shortages may be attributed to the periods of heaviest angling pressure as well as the fact that it becomes more difficult to catch baitfish under ice cover during the winter or as the water warms up in mid summer.

Recently, management actions, such as emergency responses to the detection of VHS, have also served to alter supply and demand.

Capture/Harvest of Species at Risk

Anglers or licensed harvesters capturing bait from waters that contain species at risk (see Table 6) may inadvertently capture a federally or provincially listed species. Under both the provincial Endangered Species Act (ESA) (2007) and federal Species at Risk Act (SARA) legislation, it is illegal to fish (whether angling, commercial or bait harvesting) for or possess species listed as Threatened, Endangered, or Extirpated. Species designated as Special Concern are prohibited from being used as bait under the Ontario Fishery Regulations Under both the ESA and SARA, there is provision for incidental catch of species at risk as long as they are caught in accordance with the terms and condition of their licence and due diligence is exercised to avoid capture and possession. However, some fish species at risk are difficult to identify and may be

missed during the initial sorting at the capture site and, if the harvester can't return them immediately to the original capture site unharmed, the fish must be destroyed as per the conditions of their licence.

Table 6. Small fishes designated as Species at Risk in Ontario.

Black Redhorse (*Moxostoma duquesnei*)
Blackstripe Topminnow *(Fundulus notatus*)
Bridle Shiner (*Notropis bifrenatus))*
Channel Darter (*Percina copelandi)*
Cutlip Minnow (*Exoglossum maxillingua*)
Eastern Sand Darter (*Ammocrypta pellucida*)
Gravel Chub (*Erimyustax x-punctatus*)
Lake Chubsucker (*Erimyzon sucetta*)
Redside Dace (*Clinostomus elongates*)
Pugnose Minnow (*Opsopoeodus emillae*)
Pugnose Shiner (*Notropis anogenus*)
River Redhorse (*Moxostoma carinatum*)
Silver Chub (*Macrhybopsis storeriana*)
Silver Shiner (*Notropis photogenis*)
Spotted Sucker (*Minytrema melanops*)

Incidental capture by Ontario bait harvesters, particularly by those using seine nets, was identified as a potential threat to many of the species identified in Table 6 including redside dace (Redside Dace Recovery Team 2010), cutlip minnow (Crossman and Holm 1996), lake chubsucker (COSEWIC 2008, Vlasman et al. 2008), pugnose shiner (DFO 2011) silver chub (DFO 2010), spotted sucker (DFO 2009), bridle shiner (DFO 2010), and eastern sand darter (Campbell 2009).

Spread of Disease, Parasites, and Exotic Organisms

The collection and sale of non-bait species, whether accidental or intentional, is not uncommon. Litvak and Mandrak (1993) reported finding six illegal baitfish species in four Toronto, Ontario, bait shops. Ludwig and Leitch (1996) found non-bait species in 28.5% of bait samples purchased from 21 bait dealers in North Dakota and Minnesota. Kircheis (1998) found ten illegal species in a survey of Maine bait dealers.

"Bait bucket" releases related to the live bait industry are regarded as the primary cause for the introduction and spread of many non-native aquatic organisms (DiStefano et al. 2009). Studies have shown that 41-46% of anglers empty their bait buckets at the end of their fishing trip (Litvak and Mandrak 1993, Dextrase and MacKay 1999). There are currently no restrictions on angler movement of live bait within Ontario. Historically, a large proportion of live baitfish were harvested from the Great Lakes and shipped inland for sale. This provided the opportunity to introduce many non-native species and fellow travellers to inland waters.

The improper disposal of live baitfish has been attributed as the source of introduction for at least 14 species in Ontario (Litvak and Mandrak 2000). In a two year study in Ohio, Snyder (2000) found that between 17-39% of baitfish purchased from retail outlets

contained non-target fishes. Similarly, in a Pennsylvania survey, LoVello and Stauffer (1993) found seven different species of unapproved fish in bait dealer's holding tanks. A three day inspection of southcentral Ontario bait dealers in 2012 recovered seven non-bait species (44 specimens) (Mark Robbins, OMNR, personal communication). It is believed that the rudd (*Scardinus erythrophthalmus*) was introduced into Ontario via a bait bucket release (Crossman et al. 1992, Kapuscinski et al. 2012). The dispersal of rainbow smelt (*Osmerus mordax*) in Ontario has been attributed to the release of live bait (Litvak and Mandrak 1993). Goodchild and Tilt (1976) attributed the introduction of river chub (*Nocomis micropogon*) to eastern Ontario as the result of release of baitfish. The non-native rusty crayfish (*Orconectes rusticus*) is believed to have been spread through Ontario and the northern United States by anglers using them as bait (Kerr et al. 2005, Berube and Kraft 2010, Hamr 2010). Frogs being sold as bait have been identified as a vector in the spread of the infectious disease Ranavirus (Kidd 2004). Reader (undated) concluded that the risk of spreading VHS, by movements of emerald shiners being sold as bait, was high. Similarly, Ludwig and Leitch (1996) concluded that angler use of live baitfish had a high potential of moving non-native species into new waterbodies and drainage basins.

Lodge et al. (2000) stated that the release of live bait was the most important vector for introductions of non-indigenous crayfish and advocated for a ban on the use of crayfish as bait. Rusty crayfish (*Orconectes rusticus*) were first introduced into Ontario from Ohio by anglers using them as bait (Hamr 2000, Jansen et al. 2009). The introduction of the aggressive rusty crayfish has led to declines of native crayfish species (Taylor et al. 1996). Berrill (1978) concluded that anglers persist in moving crayfish and are likely to promote extension of non-native species. Lodge et al. (2000) advocated making the use of live crayfish illegal in the United States in order to halt the introduction of non-indigenous crayfish.

There are some concerns about the introduction of non-native earthworms to various areas of North America (Hendrix and Bohlen 2002, Hendrix et al. 2008, Evers et al. 2012). Unused worms discarded by anglers is believed to be an important vector in their spread (Cameron et al. 2008, Hale 2008). Keller et al. (2007) concluded that the bait trade and subsequent disposal of nonindigenous worms by anglers constituted a major vector for earthworm introductions.

There are also concerns about the spread of viruses and diseases by anglers using live baitfish (Goodwin et al. 2004, Good 2007). The transfer and release of holding water can also serve to introduce harmful species ("fellow travellers"). A fellow traveller is an organism which inadvertently accompanies the intended or desired species. The spiny water flea (*Bythotrephes longimanus*) is an example of an invasive species which was spread as a fellow traveller through the use of live bait (Kerfoot et al. 2011).

Finally, the gear used for harvesting wild bait can also serve as a pathway for the spread of an invasive species. Organisms may adhere and accumulate on gear (e.g., nets, traps, etc.) which is used in a variety of different waterbodies. Sometimes, non-target species and plant fragments can be collected with baitfish and transported to other waters.

To prevent the introduction, transfer or spread of aquatic invasive species, a number of best management practices have been developed for the live bait industry (Table 7).

Table 7. Best management practices and regulatory requirements for preventing the introduction or transfer of aquatic invasive species in the live bait industry.

- Inspect and remove non-target fish and plant species.
- Separate new and old shipments /catches of fish.
- Dispose of unwanted live bait on dry land – never into a waterbody.
- Never release bait or aquatic plants into different waters from where they came.
- Clean boats, trailers, and equipment on shore before leaving the access point.
- Hand clean and dry nets before reuse.
- Drain water from boats and equipment before leaving the waterbody access.
- Avoid storing live baitfish in holding facilities that are linked through an inflow or outflow to natural waters.
- Do not use water known to contain nuisance species to transport live bait.
- When in areas known to have aquatic invasive species do not use the same equipment in other waters.
- Rinse and dry equipment, boats and trailers for five days. Before reuse, roll out, hand clean and dry nets for ten days.

Figure 10. Extension projects are designed to educate anglers about the negative impacts of unauthorized bait bucket releases (Wil Wegman photo).

Baitfish are known to host several types of parasite. Even dead bait can carry diseases or parasites. In 2011 survey, Purdy (2011) recovered 248 parasites (38 species) from baitfish sampled at a number of collection sites in Wisconsin. The baitfish industry and human movements of baitfish may serve to extend the ranges of some parasites (Peeler and Feist 2011, Passarelli 2010). A recent example was the discovery of the Asian fish tapeworm (*Bothriocephalus acheilognathi*) which was found in a bluntnose minnow (*Pimephales notatus*) captured from the Detroit River in 2002 (Marcogliese 2008). This was the first report of the Asian tapeworm in the Great Lakes.

Management of the bait industry has become increasingly complex as the risks of aquatic invasive species are realized.

Reporting Accuracy

Some bait harvesters and dealers are reluctant or unwilling to provide accurate records of their activities to government (Hildebrand-Young and Associates 1981, Kircheis 1998). Reporting inaccuracy and a low rate of voluntary reporting has historically been a problem resulting in underestimates of harvest and sales (Adair 1970, Sandilands 1976, Buckingham et al. 1978, Busiahn 1996, Goodchild 1997). Lack of knowledge regarding numbers of baitfish harvested and the value of the baitfish industry is a problem common in many North American jurisdictions (Canadian Aquaculture Systems Inc. 2007).

Mulligan (1962) reported that, between 1959 and 1961, the number of bait harvesters submitting annual returns ranged from 36-68% in the Sudbury area. In the Lake Simcoe watershed, Pugsley (1983) found that reporting forms were completed correctly by only 38% of respondents and that return data was inconsistent in 46% of cases. Many harvesters did not report their catch in standard measures (e.g., pounds, gallons, dozens, etc.) or used size (e.g., small, medium, large) instead of identifying different fish species (Sandilands 1976).

One of the potential reasons for inaccuracy is the disconnection between how baitfish are measured when harvested compared to when they are sold. In the field, enumeration of the catch is often done by crude measurements or bulk estimates involving volume or weight. When sold by a retailer, measurements are more accurate often involving numbers of individual fish. In other instances, small fishes are sold by the scoopful thereby making enumeration difficult.

Despite efforts in recent years to improve the accuracy of returns, problems still exist (OMNR and BAO 2004). Undoubtedly, estimates of bait harvested are underestimates (Canada Aquaculture Systems Inc. 2007).

Differential Treatment of Bait Harvesters and Anglers

The bait industry has complained that a potentially unlimited number of anglers can trap the same water as the bait harvester and compete for the same resource at no charge other than the cost of an angling licence.

Anglers are also known to be a vector with regard to the movement and spread of non-native organisms (Kerr et al. 2005, Drake 2011). Members of the live bait industry often cite differential treatment when compared to anglers. A recent example involved restrictions imposed on the movement of live baitfish between VHS management zones by the baitfish industry yet no restrictions were placed on the movement of live bait by anglers. Currently there are no requirements for anglers to inspect their bait traps on a regular basis. There have been complaints that traps are often left unattended for extended periods of time and that captured fish die and are wasted. In a survey of

selected North American jurisdictions, Murray and Lodge (2007) found that few governments had crayfish transport regulations which were consistent for both anglers and bait harvesters.

Compliance

There have been problems of non-compliance with commercial bait regulations. Problems have included not adhering to conditions on the licence, non-reporting, illegal transfers of fish, and unlicenced harvest and sale. Another common problem is that annual bait reports are not completed properly or not submitted at all. The penalty for failure to report is usually a fine. Anglers are known to move and release live bait in waters other than where they were caught. There have also been reports of anglers selling the bait they catch to dealers despite the law prohibiting the sale of baitfish caught under the authority of a sport fishing licence.

In 2006, MNR adopted a risk-based approach to compliance and enforcement operational planning. This process focuses compliance and enforcement efforts to incidents that pose the greatest risk to human health and safety, natural resources protection, and risks to the economy. Since 2006 two of the provincial priorities have had a direct relationship to bait policy. These two priorities fall under the categories of: (i) Biodiversity – preventing the movement and spread of aquatic invasive species, and (ii) Commercial fisheries - unregulated or illegal harvest and sales of fisheries resources. While these issues are broader than bait compliance monitoring, over the past five years, approximately 3,200 enforcement hours and 1,800 enforcement hours, respectively, have been dedicated to these priorities.

Resource Tenure

Although bait harvest areas are designated primarily to individual harvesters, there have been some issues with regard to resource tenure. The issues include harvest by anglers and non-authorized individuals, damage to baitfish waters by competing enterprises (e.g., mining, forestry, etc.), and the absence of any tenure guarantee necessary to encourage investment by the bait harvester.

Ecological Impacts of Overharvest

There have been long standing concerns regarding the lack of knowledge about baitfish productivity and sustainable levels of harvest. There is little biological knowledge on the productivity of bait species which can be used to establish quotas to prevent overharvest (Portt 1985). Currently, there are no quotas or royalties established for bait harvesters.

There is some evidence to suggest that many baitfish species are relatively resilient to harvest by traditional techniques. Duffy (1998) found that moderate levels of harvest had little influence on the dynamics of fathead minnows in prairie wetlands. Topolski et al. (2002) concluded that the current rate of harvest of mummichogs (*Fundulus heteroclitus*) and banded killifish (*Fundulus diaphanous*) for baitfish was not having a

significant effect on the abundance, availability, or reproductive potential of either species. Larimore (1954) removed 76,217 minnows from a 1.5 km stretch of a small Illinois stream over a multi-year (1950-1953) period. He found that removal did not reduce population abundance for longer than a few months. Brandt and Schreck (1975) conducted experimental harvest of baitfish at varying degrees of intensity but found that differing harvest pressure did not appear to affect densities of either bait or game fish species. Conversely, Portt (1985) concluded that, in several Ontario streams, the abundance of baitfish decreased with successive harvests and that the effects of harvest extended beyond the sample site.

There is also a great degree of variance in productivity among waterbodies. For example, harvests of fathead minnows from various South Dakota waters ranged from 1.2 - 246.4 kg/ha (Broughton and Potter 2003). Duffy (1998) reported that densities of fathead minnows varied from 52,000 to 241,000 fish/ha in four prairie wetlands. In three small southern Ontario lakes, Fraser (1981) reported densities of golden shiners ranged from 481 – 2,111 fish/ha. Similarly, Jackson and Harvey (1997) estimated densities of creek chub ranged from 7 – 36 fish/ha in four small southern Ontario lakes.

Some concerns have been expressed about the potential overharvest of bait species including leeches (Friesen 2000, Pennuto undated), baitfishes (D'Agostini 1957, Weir 1957, Sandilands 1976, Noble 1981, Frost and Trial 1993), frogs, and crayfish (Roell and Orth 1988). Resource conservation concerns regarding the potential overharvest of some baitfishes (primarily emerald shiner) in Lakes Simcoe and Erie, was the rationale for banning the commercial harvest and sale of minnows as salted bait in 1999.

In Ontario, the management approach taken to date is to allocate exclusive use of designated areas to active bait harvesters. It is obviously in the harvester's best interest not to overexploit the resource which they have been allocated. The determination of sustainable harvest and yields of various bait species is an area where more research is required.

Transfer and Sale of Bait Harvest Areas

When a bait harvester wishes to discontinue their activities, their bait harvest area(s) (BHA) reverts back to the Crown and MNR must determine if the licence will be reallocated or transferred. Under no conditions can a harvester sell their bait harvest area to another operator. This is believed to occur, however, under the guise that the purchaser is paying for improvements (e.g., dock, trails, boat slips, etc.) to the BHA.

Alteration of Fish Habitat

Some bait harvesting techniques may result in harmful alterations to fish habitat. For example, the use of a seine net can uproot aquatic vegetation, remove woody debris, and disrupt the substrate (Fisheries and Oceans et al. 2011). Walking over spawning and nursery areas may also cause mortality to some non-target species including species at risk. It could also dislodge some species at risk such as mussels and turtles.

Areas where Bait Harvest is Prohibited

One of the concerns which has been expressed by the bait industry is of declining access to waters, particularly on the Great Lakes, for the harvest of wild baitfish (Busiahn 1996). Increasingly, there are more areas of the province in which the practice of harvesting live bait is prohibited. One example is the restriction of commercial bait harvest in protected areas (OMNR 20010). Commercial bait harvest is not permitted in some provincial parks. Existing baitfish operations in park classes and zones where commercial bait harvest is not permitted are planned to be phased out. This will affect activities in 32 provincial parks and approximately 100 bait harvest areas (OMNR 2009). There are no specific restrictions on commercial bait harvest in conservation reserves. There is the need for a broad review on the commercial harvest of bait on protected areas of Crown land. Concerns over bait harvest and use in protected areas include the risk of invasive species introductions, ecological sustainability of activities, and consistency with protected area and park class objectives.

Bait Policies and Regulations in Adjacent Jurisdictions

There have been several comparative reviews of bait regulations in North America (Stanley et al. 1991, Meronek et al. 1995, Goodchild 1997, Dunford 2012). Regulations and policies with regard to live bait vary considerably among North American jurisdictions (Figures 11 and 12).

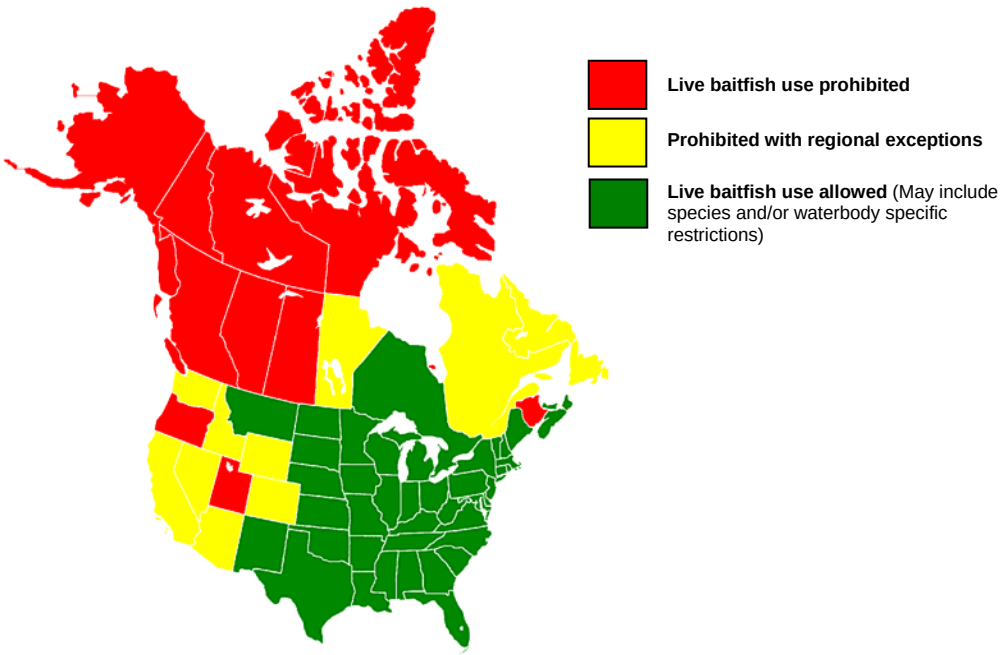


Figure 11. Use of live bait for recreational angling in North America (from Dunford 2012)

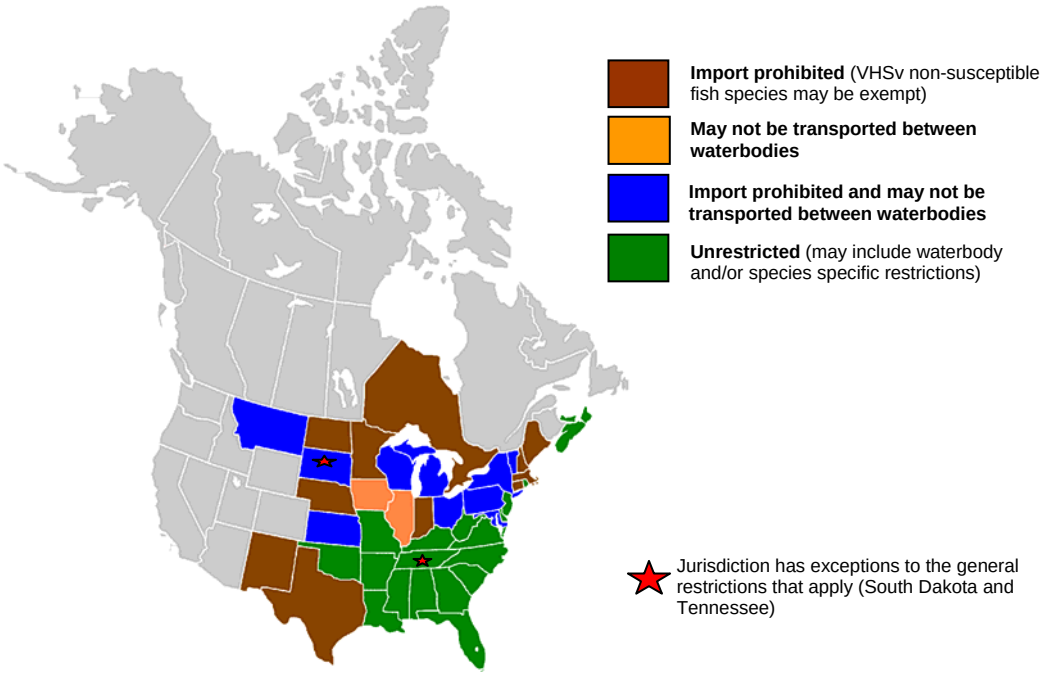


Figure 12. Import and movement restrictions on live bait in North America (from Dunford 2012).

In North American jurisdictions where the use of live bait is allowed, Ontario is one of the least restrictive in terms of regulations. Many Canadian jurisdictions have banned the use of live bait. The province of Québec plans to eliminate the use of live and dead baitfish during the open water season by 2017 (Nadeau 2012). Most jurisdictions in the Great Lakes basin have controls on the transport and use of live bait. Only the southern U.S. states allow the relatively unrestricted use of live bait.

Litvak and Mandrak (1993) found that, in a comparative survey from 1956 and the 1990s, most North American jurisdictions had become more restrictive with regard to live bait regulations.

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Appendix 1. Fish species designated as baitfish in Ontario. While all of these species are allowed to be used as bait, the majority of bait consists of those species which are abundant and easily harvestable (identified by an asterisk).

Blackchin shiner (*Notropis heterodon*)
Blacknose dace (*Rhinichthys atratulus*)*
Blacknose shiner (*Notropis heterolepis*)
Blackside darter *(Percina maculata*)
Bluntnose minnow (*Pimephales notatus*)
Brassy minnow (*Hybognathus hankinsoni*)
Brook stickleback (*Culaea inconstans*)*
Central mudminnow (*Umbra limi)**
Central stoneroller (*Campostoma anomalum*)
Common shiner (*Luxilus cornutus*)
Creek chub (*Semotilus atromaculatus*)*
Emerald shiner (*Notropis atherinoides*)*
Fallfish (*Semotilus corporalis*)
Fantail darter (*Etheostoma flabellare*)
Fathead minnow (*Pimephales promelas*)*
Finescale dace (*Phoxinus neogaeus*)*
Golden shiner (*Notemigonus crysoleucas*)
Hornyhead chub (*Nocomis biguttatus*)
Iowa darter *(Etheostoma exile*)
Johnny darter (*Ethoestoma nigrum*)
Lake chub (*Couesius plumbeus*)
Lake herring (*Coregonus artedii*)*
Least darter (*Etheostoma microperca)*
Logperch (*Percina caprodes*)
Longnose dace (*Rhinichthys cataractae*)*
Longnose sucker (*Catostomus catostomus*)
Mimic shiner (*Notropis volucellus*)
Mottled sculpin (*Cottus bairdii*)
Ninespine stickleback (*Pungitius pungitius*)
Northern hog sucker (*Hypentelium nigricans*)
Northern redbelly dace (*Phoxinus eos*)*
Pearl dace (*Margariscus margarita*)*
Rainbow darter (Etheostoma caeruleum)
Redfin shiner (*Lythrurus umbratilis*)
River chub (*Nocomis micropogon*)
River darter (*Percina shumardi*)
Rosyface shiner (*Notropis rubellus*)
Sand shiner (*Notropis stramineus*)
Shorthead redhorse (*Moxostoma macrolepidotum)*
Silver redhorse (*Moxostoma anisurum*)
Slimy sculpin (*Cottus cognatus)*
Spotfin shiner (*Cyprinella spiloptera*)
Spottail shiner (*Notropis hudsonius*)
Striped shiner (*Luxilus chrysocephalus*)
Tessellated darter (*Etheostoma olmstedi*)
Threespine stickleback (*Gasterosteus aculeatus)*
Trout-perch (*Percopsis omiscomaycus*)
White sucker (*Catosomus commersonii*)

Appendix 2. Bait Management in Ontario – A Chronology of Significant Events.

1925
- Some of the earliest baitfish records indicate 99 licences in Ontario.

1932
- Prohibition of releasing live baitfish in waters other than where they were caught (Lambert and Pross 1967).

1956
- Survey of bait harvests in the Kenora District was conducted (Fraser 1958). One of the recommendations was to require all minnow traps to bear the name of the licensee.
- The term "baitfish" replaced "minnows" in the Ontario Fishery Regulations.

1961
- Baitfish "block" system implemented in northwestern Ontario.

1964
- The Northwestern Ontario Commercial Baitfishermen's Association was formed.
- The "block" system for licensing bait harvest areas was implemented in northwestern Ontario.

1965
- Provincial review of the baitfish industry (Payne 1965)
- Ban on the importation of live baitfish.

1966
- Baitfish workshop held at the White Lake Fish Culture Station.
- Import of baitfish into Ontario was banned.

1967
- The Ontario Baitfish Dealers and Licence Holders Association was organized by the industry.

1970
- Experimental use of bait traps in the St. Lawrence River (Miller 1970).

1976
- Booklet entitled "About Baitfish in Ontario" was published (Wallace 1976).

1978
- New baitfish policies were implemented. This included baitfish licences would only be issued to Ontario residents, licences would not be renewed for inactive operators, licence fees would not be less than $20, and licensees were assigned exclusive fishing grounds.

1981

- Economic study on the northwestern Ontario baitfish industry (Hildebrandt-Young and Associates 1981)

1982

- A survey of baitfish harvesters was conducted. Only 232 harvesters (7.9%) responded (Toth 1983).

1983

- Strategic Planning for Ontario Fisheries (SPOF) Working Group No. 11 issued "A Baitfish Harvest Policy for Ontario" (OMNR 1983).

1984

- Study implemented in northwestern Ontario with the objective of aiding fishers to increase the harvest of baitfish (Mohr 1986).

1988

- Baitfish culture workshop was held (Te Brugge 1988)

1989

- Permitted Uses Amendment Policy ("Phase-Out Policy") – selected activities were to be phased out of provincial parks by 2009. These activities included private recreational camps and commercial harvest of fur, fish, bait and wild rice

1992

- The Ontario Ministry of Natural Resources embarked on a cooperative program with the Ontario Federation of Anglers and Hunters focusing on angler education with respect to live bait.

1997

- MNR decided to conduct a formal review of Ontario's bait management legislation and policies.
- Analysis of the baitfish industry was conducted (Goodchild 1997).
- Survey of the bait industry and affected stakeholders was conducted on a proposal to prohibit the import of leeches for use as bait (Dextrase 1997).

1998

- The Bait Association of Ontario was formed.
- Administrative review of baitfish licensing was conducted (Thede 1998).
- Review of enforcement strategies for the baitfish industry (Winterton 1998).

1999

- Major fee increases for both bait harvesters and dealers.
- The sale of salted (preserved) baitfish was disallowed.
- Leeches were added to the bait harvesters licence to recognize their increasing importance.
- Anglers were banned from importing leeches into Ontario.
- Ban on the use of bait traps and dip nets for non-residents.
- *Fish and Wildlife Conservation Act* replaced the *Game and Fish Act.*

- Ontario's Living Legacy Land Use Strategy provided direction for phase-out activities to continue with exceptions based on class, zone and geography

2000
- A bait harvest daily log was introduced to increase the accuracy of annual returns.

2001
- First regulation of the bait frog industry.
- Survey conducted by MNR/BAO on the capture and sale of crayfish (Brousseau 2002).

2002
- A bait dealers daily log was introduced that required all bait purchases by bait dealers to be recorded.

2003
- An electronic bait licence system was implemented.

2004
- Hazard Analysis and Critical Control Point (HACCP) training provided to bait harvesters and dealers (on a voluntary basis) at 12 locations across Ontario – relatively few participants.

2005
- The Ontario Ministry of Natural Resources and Bait Association of Ontario published two books: "The Comprehensive Bait Guide for eastern Canada, the Great Lakes region, and northeastern United States" (Winterton 2005) and "The Essential Bait Field guide for eastern Canada, the Great Lakes Region and the Northeastern United States" (BAO and OMNR 2005).
- Import of leeches into Ontario was banned for everyone including commercial operators (effective August 31, 2005).
- Survey of tourist operators regarding commercial bait licences.
- VHS was documented for the first time in the Ontario waters of the Great Lakes.
- Ban on the possession of Eurasian ruffe (*Gymnocephalus cernuus*), grass carp (*Ctenopharyngodon idella*), bighead carp (*Hypophthalmichthys nobilis*), silver carp (*Hypophthalmichthys nolitrix*), black carp (*Mylopharyngodon piceus*), snakeheads (*Channidae* spp.), round goby (*Neogobius melanostomus*) and tubenose goby (*Proterorhinus marmoratus*).
- MNR conducted a survey of tourist harvester and dealer licence holders to obtain their feedback on options regarding the tourist licence.

2006
- U. S. ban on import of bait from Ontario and Québec.
- Prohibition on the sale of frogs from outside the designated harvest area.
- Mandatory HAACP training was implement for bait harvesters.

2007
- Actions implemented to prevent the spread of VHS from the Great lakes to inland waterbodies.

- Commercial harvest and sale of frogs and crayfish was prohibited.
- “White list” of 48 fish species eligible for bait harvest was enacted.
- Two year (2007-2008) study initiated to examine the presence of “non-target” fishes in the Ontario live baitfish pathway (Drake 2011).

2008

- BAO and MNR partnership is dissolved. The BAO is initially replaced by three groups: Baitfish Advisory Committee, Eastern Ontario Outdoorsman Association, and the Ontario Live Bait Angling Association.
- Hearing to protest VHS licence conditions.

2010 –

- Phase-Out policy review - Ontario Parks Board of Directors raised concerns regarding impacts of movement of bait and motorized access for commercial bait harvest on ecological integrity of protected areas. Since scope of Phase-Out policy was restricted to commercial bait harvest in select parks, Minister committed review of potential effects of bait use and harvest in all protected areas.

2011

- VHS was detected in Lake Simcoe.
- Final Phase-Out Policy - enabled annual renewals of bait harvest licenses, conditional on the outcome of a policy review of bait harvest and use in provincial parks and conservation reserves

2012

- Actions initiated on the Lake Simcoe watershed to prevent the spread of VHS.
- EBR decision notice posted on the proposal to allow (under designated conditions) bait harvesters the use of small mesh gill nets to capture lake herring for sale as bait.
- Provincial bait policy review was initiated.

Appendix 3. Offence Provisions Related to Sport and Commercial Bait Harvest, Possession and Use in Ontario.

Fisheries Act

33. No person shall, purchase, sell or possess any fish that has been caught in contravention of this Act of the regulations.

49 (1.2). The owner or person in charge of a place that is inspected by a fishery officer or fishery guardian under subsection (1) and every person found in the place shall:

(a) give the officer or guardian all reasonable assistance to enable the officer or guardian to carry out the inspection and exercise any power conferred by this section, and

(b) provide the officer or guardian with any information relevant to the administration of this Act of the regulations that the officer or guardian may reasonably require.

61. (3) A person referred to in subsection (1) shall keep any records, books of account or other documents that may be required by the regulations or by the terms and conditions of any lease or licence issued to the person under this Act and the records, books of account or other documents shall be kept in the manner and form and for the period prescribed by the regulations, lease or licence.

61. (4) A person referred to in subsection (1) shall, on the request of any fishery officer or fishery guardian, provide the officer or guardian or any authority designated by the officer or guardian, with any information relating to a matter mentioned in subsection (2) that the officer or guardian may request.

62. No person shall obstruct or hinder a fishery officer, a fishery guardian or an inspector who is carrying out duties or functions under this Act.

63. (1) No person shall make a false or misleading statement, whether orally or in writing, to an inspector, a fishery officer or a fishery guardian or any authority designated by a fishery officer or a fishery guardian who is carrying out duties or functions under this Act.

63. (3) No person shall produce for examination or copying by an inspector a fishery officer or a fishery guardian or any authority designate by a fishery officer or a fishery guardian any records, books of account or other documents that contain false of misleading information.

Ontario Fishery Regulations (2007)

3. (1) No person shall, except as authorized under a licence,

(a) fish;

(b) ship or transport or attempt to ship or transport live fish other than baitfish;

(c) deposit or attempt to deposit live fish into any body of water other that the body of water from which they were caught.

4. (2) Every person shall comply with the terms and conditions specified in their licence.

4. (6) The licence holder shall, on receipt of the notice, attach the notice to the licence. (Note: Licences may be amended by fax, E-mail, etc. amendments must be immediately attached to the licence)

5. No person shall bring into Ontario, for use as bait,

(a) crayfish or salamanders;
(b) live fish or leeches.

6. (1) No person shall possess live invasive fish without a licence issued under subsection (2).

7. (1) No person shall fish for or possess a specifically protected species without a licence issued under subsection (2).

8. (1) No person shall fish in the waters set out in column I of an item of Schedule V to the *Ontario Fishery Regulations (1989)* during the close time set out in column II of that item. (Note: This deals with harvesting baitfish in a fish sanctuary).

11. No person shall use an artificial light to attract fish except

(a) to fish for lake herring, lake whitefish or smelt by means other than angling; or
(b) when angling as part of a lure attached to a line.

28. No person shall release live bait or live baitfish or empty the contents of a bucket or other moveable container used to hold bait or baitfish into any waters or within 30 m of any water.

28. (1) No person, other than the holder of a commercial baitfishing licence or any other licence that authorizes the culture of baitfish, shall catch and retain in any one day or possess more than 120 baitfish.

29 (1) No person shall use as bait, or possess for use as bait, an invasive fishy or live fish that is not a species of baitfish.

29. (2) No person shall use as bait possess for use as bait

(a) a live baitfish in the waters set out in column I of Part 1 of Schedule 5;
(b) a fish greater than 13 cm in length in Lake Temagami;
(c) a fish in the waters of Clearwater Bay of Lake of the Woods, Echo Bay of Lake of the Woods, or Cul de Sac Lake;
(d) a fish in the waters set out in column I of Part 2 of Schedule 5 during the period set out in column 2;
(e) rainbow smelt in Zones 2, 4 or 5.

29. (3) Despite subsection 1, a person may possess no more than 36 live crayfish for use as bait in the waters in which the person is angling if the crayfish were caught in those waters.

29. (4) No person shall transport crayfish overland except under a Licence to Collect Fish for Scientific Purposes issued under the *Fish and Wildlife Conservation Act (1997).*

35. (1) No person shall sport fish using

(a) a dip net;

(b) a seine net with dimensions that are greater than 10 m by 2 m;
(c) a baitfish trap; of a length that is greater than 51 cm or a diameter that is greater than 31 cm;
(d) more than one dip net, baitfish trap or seine net;
(e) a baitfish trap unless it is legibly marked with their name and address.

35. (2) No person who is sport fishing by means other than angling shall
(a) catch and retain in anyone day of possess more fish of a species set out in column 1 of Part 1 of Schedule 6 from the waters set out in column 3 in an amount that exceeds the quota set out in column 5 or 6 as the case may be.
(b) use any gear other than the gear set out in column 2 of Part 1 of Schedule 6 for fishing for a species set out in column 1.
(c) fish for, or catch and retain, a species of fish set out in column 1 of Part 1 of Schedule 6 from the waters set out in column 3 during the close time set out in column 4.
(d) fish for, or catch and retain, a species of fish set out in column 1 of Part 1 of Schedule 6 from any waters other than the water set out in column 3.

36. (1) No person who is sport fishing shall
(a) catch and retain in any one day by any means other than by angling or possess more baitfish caught than the quota set out in column 5 of Part 2 of Schedule 6.
(b) when sport fishing for bait fish use any gear other than the gear set out in column 2 of Part 2 or Schedule 6.
(c) fish for baitfish by any means other than by angling during the close time set out in column 4 of Part 2 of Schedule 6.

36. (2) Other than suckers or lake herring, no non-resident shall fish for, or catch and retain, baitfish by means other than angling.

37. (1) No person who is sport fishing shall place or use in any waters a live holding box or impounding device unless
(a) it is legibly marked with the licence holder's name and address; and
(b) the markings are visible without raising it from the water.

40. No person who is fishing for baitfish under a commercial baitfishing licence shall use a dip net
(a) with dimensions that are greater than 305 cm by 305 cm if the dip net is angular; or
(b) with a diameter that is greater than 305 cm in the dip net is circular.

41. (1) No person who is fishing under a commercial baitfishing licence shall use a baitfish trap that is not legibly marked with the licence holder"s name and address.

41. (2) No holder of a commercial fishing licence or a commercial baitfishing licence shall place or use in any waters a live holding box or impounding device unless
(a) it is legibly marked with the licence holder's name and address; and
(b) the markings are visible without raising the box or device from the water.
(Note: Only impounding type equipment has to be marked in such a way that it doesn't require lifting to read the information).

43. No person who is fishing under a commercial fishing licence or a commercial. baitfishing licence shall fish for, or catch and retain, a species of fish set out in column 2 of Schedule 7 or 8 as the case may be, in the waters set out in column 1 during the close time set out in column 3. (Note: This allows for a closed season for baitfish harvest).

Fish and Wildlife Conservation Act

37. (1) Except under the authority of a licence, a person shall not possess a gill net, hoop net, pound net, seine net, trap net, trawl net, trammel net, roll net or hook line.

47. (1) A person shall not engage in aquaculture unless the fish that are cultured
(a) belong to a species prescribed by the regulations; and
(b) are cultured under the authority of a licence and in accordance with the regulations.

51. (1) A person shall not buy or sell fish that belong to a species that exists in Ontario waters or fish prescribed by the regulations except under the authority of a licence and in accordance with the regulations. (Note: This provision requires a licence to sell fish in Ontario. Business that import dead (i.e., packaged or preserved) baitfish require a licence if the species "exists in Ontario waters or is a fish prescribed by Ontario regulations.).

57. (1) A person shall not transport a container that contains fish unless the container is plainly marked on the outside with a description of the contents, the name and address of the person who is sending the container and the name and address of the person to whom the container is being sent.

58. (1) A person shall not possess wildlife, invertebrates or fish that
(a) were killed, captured, taken, possessed, transported, bought or sold contrary to the laws of another jurisdiction; or
(b) were removed from another jurisdiction contrary to the laws of that jurisdiction.

62. (5) The holder of a licence shall comply with any conditions to which the licence is subject.

66. A person who is hunting, trapping or fishing shall carry on his or her person any licence or authorization issued under this Act.

67. On the request of a conservation officer, the holder of a licence of authorization shall produce and show it to the officer.

Ontario Regulation 664/98

31.3 (1) Except under the authority of a commercial bait licence that authorizes the holder to take, buy or sell leeches or baitfish a person shall not

31.3 (1.1) Except under the authority of a commercial bait licence that authorizes the holder to take, buy or sell leeches, a person shall not take in one day or possess at any time more than 120 leeches.

31.3 (1.2) The holder of a commercial bait licence shall not buy leeches or baitfish for commercial purposes except from a person who is authorized to sell them.

31.3 (2) A person shall not buy or sell frogs for the purpose of bait for fishing.

31.3 (5) The holder or a commercial bait licence shall

(a) keep a log book, in the form required by the Minister, with information respecting the buying, selling and taking of leeches, frogs or baitfish, including the quantities bought, sold or taken and the relevant dates;

(b) make and submit an annual return in the for required by the Minister not later than one month after the expiry of the licence.

31.3 (6) The holder of a commercial bait licence shall retain the log book for five years after the expiry of the licence that was valid at the time it was kept.

31.3 (7) The holder of a commercial bait licence shall not make a false entry in the log book.

31.5 The holder of a commercial bait licence shall not use salt to preserve baitfish taken under the licence.

32.1 The holder of a commercial bait licence shall not buy or sell baitfish that have been preserved with salt.

Appendix 4. Bait Restrictions in North American Jurisdictions (based on a 2012 survey).

Jurisdiction	Use of Live Baitfish Legal?	Other Live Bait Prohibitions	Transport Restrictions	Other Regulations
Canada				
Alberta	No (banned in 1963)	• Live crayfish. • Carp • Goldfish • Western silvery minnow	• Illegal to possess or move live fish.	• All personally harvested baitfish must be killed immediately. • Dead bait (listed species) may be used in some waters.
British Columbia	No (banned in the 1940s)	• Invertebrates including insects. • The use of any fish (or parts) except roe.	• Illegal to possess or move live fish.	• Personal harvest of fish not allowed. • It is illegal to possess or move any live fish in the wild. • There is a "white" list comprised of 26 species.
Manitoba	Yes (but only in southern part of province).	• Carp • Goldfish • American smelt • "White" list comprised on 26 species which are eligible for use as bait,	• Anglers must kill baitfish before transport from where they were caught. .	• Leeches, frogs, and salamanders can be used as bait but cannot be imported. • Importation of live baitfish banned in 1993. • The use of frozen or preserved bait is permitted.
New Brunswick	No	• Crayfish. • Dead baitfish (from a "white list) may be used.	• Prohibitied – where the use of live baitfish is permitted the fish must be harbvested from the water in which it is used.	• Live fish (including crayfish) may not be possessed.

Jurisdiction	Use of Live Baitfish Legal?	Other Live Bait Prohibitions	Transport Restrictions	Other Regulations
Newfoundland/Labrador	No (with exceptions)	-	• Unknown.	• The use of dead bait is not permitted.
Northwest Territories	No	-	• Unknown.	• Live fish or fish eggs cannot be placed into NWT waters. • The use of dead bait is permissible.
Nova Scotia	Yes (with exceptions)	-	• Allowed but discouraged.	• Only fish taken from Nova Scotia waters can be used as bait.
Nunavut	No	• Fish eggs.	• Unknown.	• Live fish or fish eggs cannot be placed into Nunavut waters.
Ontario	Yes (with exceptions)	• Salamanders and frogs (except leopard frogs). • There is a designated “white” list comprised of 65 species. • Alewife and yellow perch cannot be used for bait anywhere in the province.	• No except crayfish cannot be transported overland.	• Legal possession limit is 120 leeches, 36 crayfish, and 12 frogs per angler. • It is illegal to import any crayfish, leeches, salamanders or fish into Ontario for use as bait. • The use of dead baitfish (or parts) is permissible.
Prince Edward Island (PEI)	Yes (with exceptions)	• Fish eggs. • Only live fish taken from PEI waters can be used as bait.	-	• It is illegal to relocate live fish. • Use of dead fish from a “white” list of species is permissible.

Jurisdiction	Use of Live Baitfish Legal?	Other Live Bait Prohibitions	Transport Restrictions	Other Regulations
Québec	No (with exceptions)	• Species (dead or alive) on a prohibited list.	• The use, possession, and transportation of fish as bait is prohibited.	• There are no restrictions on the use of frogs, worms, crayfish or leeches as bait.
Saskatchewan	No	• Frogs and salamander cannot be used as bait.	• Leeches and frogs may be transported. • It is illegal to transport live fish or fish eggs.	• It is illegal to import any live bait. • It is illegal to capture baitfish without a commercial licence. • The use of dead baitfish is permissible.
Yukon	No	• No edible parts of a fish except cisco.	• It is illegal to possess or transport live fish or fish eggs without authority of a permit.	• It is illegal to import live fish, uncured fish eggs, crayfish, leeches or other aquatic animals. • The use of dead or preserved fish is permissible.
United States				
Alabama	Yes	• Live minnows used for bait in any state fishing lake shall be limited to the following species:goldfish minnows, golden shiners, and fathead minnows.	• Unknown.	• No person shall release in any state-owned public fishing lake any minnow, whether dead or alive, by emptying from a minnow bucket or any other method. • All minnow buckets or other receptacles shall at all times be open to inspection by Conservation Officers.

Jurisdiction	Use of Live Baitfish Legal?	Other Live Bait Prohibitions	Transport Restrictions	Other Regulations
Alaska	No	• Live fish may not be used as bait for sport fishing in fresh water.	• It is unlawful to possess, transport, or release any live fish or live fish eggs without authorization.	• Herring and other species of fish for which no seasonal or harvest limits are specified may be used as live bait. • Whitefish, herring, and other species for which no seasonal or harvest limits are specified as well as the head, tail, fins, and viscera of legally taken sport fish, may be used for bait or other purposes
Arizona	No – live baitfish may be used only in areas for certain species.	• Waterdogs are not considered to be a baitfish. • Crayfish - in waters other than where caught. • Arizona has a “white” list comprised of nine species.	• It is illegal to transport live fish but this does not apply to some live baitfish which is transported from licenced bait dealers. • It is unlawful for a person to import, transport or possess live crayfish other than on the water where it was caught.	• Live bait may be taken by minnow net, dip net, cast net, pole and line, handline, crayfish net or seine. • All legal baitfish and crayfish caught must be for personal use only and are not to be sold or used for commercial purposes. • It is illegal to release live baitfish into any Arizona water.

Jurisdiction	Use of Live Baitfish Legal?	Other Live Bait Prohibitions	Transport Restrictions	Other Regulations
Arkansas	Yes	• There is a listing of approved bait species which includes fish and crayfish.	-	• Restriction on gear types to harvest bait. • Baitfish may not be taken in the area within 100 yards below a dam. • Baitfish may not be disposed of in water other than the water where they were caught.
California	No – only legally acquired and possessed invertebrates, mollusks, crustaceans, amphibians (except salamanders), fish eggs and treated and processed foods may be used for bait. There are some regions where the use of live baitfish is allowed.	• Salamanders or threatened species are not legal bait. • There are some restrictions on the use of crayfish.	• Baitfish may not be purchased, bartered, sold, transferred or traded; or transported alive from the location where taken.	• Approved baitfish may be taken only by hand, with a dip net, or with traps not over three feet in greatest dimension.
Colorado	No – the collection, use, or possession of live fish for use as bait is prohibited in many state waters (some exceptions).	• The only species allowed to be taken and used for consumption or personal use as bait (alive or dead) by fishing, seining, netting, trapping or dipping are minnows, bluegill, hybrid bluegill, carp, sunfish, gizzard shad, sculpin, white and longnose suckers, perch, and rainbow smelt.	• Live baitfish may not be transported or stored for later use. • It is illegal to export, import, or transport 29 designated species.	-

Jurisdiction	Use of Live Baitfish Legal?	Other Live Bait Prohibitions	Transport Restrictions	Other Regulations
Connecticut	Yes	• There is a list of designated species which are considered as legal bait.	• Transport only when authorized by a permit.	• Import is prohibited without authorization.
Delaware	Yes	-	• Unlawful to transport or possess 5 designated species.	• Import is prohibited.
Florida	Yes	• Bass. • Non-native species.	• Unknown	• Unknown.
Georgia	Yes (with exceptions)	• Live blueback herring. • No person recreationally harvesting bait minnows may possess more than two quarts at any time.	• Unknown	• It is illegal to stock or release fish or bait into any public waters except the water from which it was taken.
Idaho	No (with exceptions)	• Leeches. • Frogs. • Waterdogs. • Salamanders. • Shrimp. • Crayfish – other then in the waterbody where they were caught.	• All fish must be killed or released prior to leaving the waterbody which was fished. • It is illegal to import any live baitfish without authorization.	• It is illegal to release or allow the release of any species of live fish (including crayfish and bullfrogs) or fish eggs without authorization. • Crayfish and frogs are considered a game fish.
Illinois	Yes	• Mussels, live rusty and/or red swamp crayfish. • Bluegills or sunfish or illegal size.	• Fish may not be transferred between waterbodies and bait must be used where legally harvested.	• Gear restrictions for harvest of bait. • It is illegal to import, possess, sell or use live rusty crayfish and red swamp crayfish.

Jurisdiction	Use of Live Baitfish Legal?	Other Live Bait Prohibitions	Transport Restrictions	Other Regulations
Indiana	Yes	• "Black" list of species including Asian carps, zebra mussels and quagga mussels. • Live carp or threadfin shad.	• It is illegal to transport more than 100 crayfish across the state boundary within a 24 hour period for personal use.	• Anglers are encouraged to collect their bait from the water in which they will fish.
Iowa	Yes	• Any species not on the approved "white" list of bait. • Gizzard shad, carp, quillback, gar, or dogfish.	• No transport between waterbodies except under the authority of a bait dealers licence. • It is illegal to transport any frogs taken in Iowa across state lines.	• Import is prohibited if species is not on the "white" list. • It is against the law to dump bait into any lake, river, or stream.
Kansas	Yes	• Endangered or threatened species. • Fish exceeding 12 inches in length. • Walking carp, silver carp, bighead carp, snakehead, round goby, white perch and diploid grass carp are "black" listed species.	• No person may possess any live fish upon departure from any designated aquatic nuisance waterbody. • Import permits are not required for any native or naturalized species not on the prohibited list.	• Black listed species cannot be imported into the state. • Live aquatic bait shall be certified free of pathogens listed in the regulations before import. • Wild caught bait may only be used in the water from which they were taken.

Jurisdiction	Use of Live Baitfish Legal?	Other Live Bait Prohibitions	Transport Restrictions	Other Regulations
Kentucky	Yes (includes shad, herring, crayfish, salamanders, all frogs except bull frogs, tadpoles, native lampreys and aquatic invertebrates)	• Any sport fish. • Threatened or endangered species. • Species not native or established in Kentucky.	• No live fish, live baitfish, or live bait organisms that are not native or established in Kentucky waters shall be possessed or in any way used or released.	• No live fish, live baitfish, or live bait organisms that are not native or established in Kentucky waters shall be imported into the state.
Louisiana	Yes	• "Black" list of several species. • Federally listed threatened or endangered species.	• Unknown.	• Unknown.
Maine	Yes (with exceptions)	• Any species not on the approved "white" list which is comprised on 24 species.	• It is illegal to transport live fish without a permit.	• Import of live baitfish, smelts, live freshwater fish or eggs is prohibited without authorization. • It is illegal to dump unused baitfish into any waterway.
Maryland	Yes (with exceptions)	• Crayfish.	• The transport of aquatic species is prohibited.	• The import or introduction of aquatic species is prohibited.
Massachusetts	Yes (with exceptions)	• Smelt. • Sticklebacks. • "White" list consisting of 14 species.	• Transporting live fish (except bait for personal use) without a permit is illegal. • Only commercial baitfish may be imported by a dealer.	• No bait may be used in designated "catch-and-release" areas. • It is illegal to release fish or spawn into inland waters except when authorized by a permit.

Jurisdiction	Use of Live Baitfish Legal?	Other Live Bait Prohibitions	Transport Restrictions	Other Regulations
Michigan	Yes (with exceptions)	• "Black" list comprised of numerous invasive aquatic species. • Threatened or endangered species. • Uncertified bait can only be used in VHS infected areas.	• It is illegal to possess or transport and live transgenic organisms as well as five Asian carps, members of the snakehead family, bitterling, Ide, Japanese weatherfish, rudd, tench, Eurasian ruffe, tubenose goby or round goby.	• It is illegal to import, plant or transplant live game fish including viable eggs of any game fish without a permit. • It is unlawful to import any uncertified baitfish species found on the list of susceptible fish species (for VHS).
Minnesota	Yes	• Mussels, game fish, goldfish and carp. • American smelt. • Lake herring.	• There are restrictions on transporting and possessing on a variety of designated species.	• Crayfish must be used in the waterbody from which they were collected. • Importing live bait into the state is illegal.
Mississppi	Yes	• Unknown	• Unknown.	• Unknown.
Missouri	Yes	• Game fish or their parts. • Live bighead and silver carp. • Bowfin.	• A resident fishing licence is required to pursue, take, possess, and transport fish and live bait from state waters.	• It is illegal to dump bait into Missouri waters. • Live bait taken from public waters may hot be sold or transported from the state.

Jurisdiction	Use of Live Baitfish Legal?	Other Live Bait Prohibitions	Transport Restrictions	Other Regulations
Montana	Yes (with some area exceptions)	• "Black" list of species including black bullheads, carp, goldfish, smelt, sculpins, stonecats, and yellow bullheads.	• It is unlawful to move live fish, aquatic invertebrates or plans from one waterbody to another without formal authorization.	• It is unlawful to introduce any fish or viable fish eggs into any waters without authorization. • Live baitfish or leeches may not be imported without authorization. • Baitfish may not be exported without authorization.
Nebraska	Yes (with exceptions)	• Live carp, carpsucker, bullheads, buffalo, gar, quillback, gizzard shad, alewife, bowfin, or white perch in waters other than those from which they were legally taken.	• Unknown.	• It is unlawful for individuals to import live baitfish from out of state for use in inland waters. • Up to 100 legally captured baitfish and/or listed amphibians may be exported by as resident for personal use for fishing outside of the state if allowed by the other designated state. • It is unlawful to release any non-native fish or amphibian in waters of the state or to release any fish in waters from which they did not originate.

Jurisdiction	Use of Live Baitfish Legal?	Other Live Bait Prohibitions	Transport Restrictions	Other Regulations
Nevada	No (with exceptions)	• Game fish and protected species. • In some designated areas, fish from a "white" list may be used as bait.	• Any person possessing a fishing licence may capture, transport, and use live bait where legal.	• A person in possession of a fishing licence may purchase fish authorized for use as bait from a licensed bait dealer in Arizona, California, or Nevada.
New Hampshire	Yes (with exceptions)	• The use of alewives, carp, or goldfish as live bait while fishing is prohibited.	• Unknown	• The use or possession of live fish for bait in trout ponds is prohibited. • Importation of fish or their eggs, including baitfish, is prohibited without authorization.bb
New Jersey	Yes (with exceptions) ("white" list comprised of 16 species)	• The possession of Asian swamp eel, bighead carp, diploid grass carp, silver carp, brook stickleback, green sunfish, flathead catfish, oriental weather fish, snakehead, warmouth and American eels (less than six inches in length) is prohibited.	• Unknown.	• A permit is required to stock fish or fish eggs into any waters of the state.

Jurisdiction	Use of Live Baitfish Legal?	Other Live Bait Prohibitions	Transport Restrictions	Other Regulations
New Mexico	Yes (with exceptions)	• It is illegal to use nay live protected fish, gar, goldfish, common carp, river carpsucker, smallmouth buffalo, bullfrogs or bullfrog tadpoles as bait in any waters containing protected fish. • It is illegal to use baitfish other than fathead minnows and red shiners in any trout water.	• Unknown.	• It is illegal to release baitfish into fishing waters or to stock fish or fish eggs in any water without authorization. • It is illegal to import live fish or fish eggs into the state without authorization.
New York	Yes (with exceptions) ("white" list comprised of 15 species)	• Native salamanders, carp, goldfish, larval lamprey, round goby, endangered species.	• No transport of live organisms for bait into New York state. • Certified disease-free baitfish are the only form of live baitfish that may be transported overland.	• Any baitfish longer than 20 cm in length must be fished using a quick strike rig. • Frogs may be imported, bought, and sold at any time.
North Carolina	Yes (with exceptions)	• Eels (< 6 inches) may not be possessed or sold. • Blueback herring and alewife. • An state threatened or endangered species. • Species on a designated "black" list.	• It is unlawful to transport or possess any live individuals of species listed ("black" list).	• Unknown.

Jurisdiction	Use of Live Baitfish Legal?	Other Live Bait Prohibitions	Transport Restrictions	Other Regulations
North Dakota	Yes (with exceptions)	• Live American smelt.	• Excluding legal live baitfish, no fish species may be transported in water away from the waterbody in which they were taken.	• No live aquatic organisms may be imported into the state by anglers.
Ohio	Yes	• Carp, goldfish, larval lamprey, endangered species, and native salamaners. • Fish species that are not already established in Ohio waters.	• It is illegal to transport and introduce any species (fish, invertebrate, plant) from one waterbody to another.	• Import is prohibited.
Oklahoma	Yes	• Unknown.	• Regulations which inhibit the possession and transport of aquatic nuisance species.	• Unknown.
Oregon	No	• Gobies and lampreys may not be used as bait or in an angler's possession while angling.	• It is unlawful to transport live fish within the state; hold any live fish in the waters of the state; or release or attempt to release any live fish into waters of the state. • It is illegal to transport live fish eggs from one waterbody to another without authorization.	• It is unlawful to transport live fish into or out of this state. • It is illegal to transport live fish eggs into the state without authorization.

Jurisdiction	Use of Live Baitfish Legal?	Other Live Bait Prohibitions	Transport Restrictions	Other Regulations
Pennsylvania	Yes	• Endangered or threatened species • American eel, goldfish, comets, koi, and common carp.	• Transferring fish from one watershed to another where that species is not present is illegal.	• Releasing fish from another state, province or country in Pennsylvania is illegal.
Rhode Island	Yes (with exceptions)	• Goldfish, American shad, alewife, blueback herring.	• Unknown.	• Releasing any live bait into freshwaters is illegal. • The importation, sale or possession of any type of goldfish is illegal.
South Carolina	Yes	• It is illegal to possess any fish species that is not native to South Carolina waters without authorization.	• Unknown.	• It is illegal to possess, import or sell any fish species that is not native to South Carolina without authorization.
South Dakota	Yes (with exceptions)	• Carp species, rudd, buffalo, carpsuckers, goldfish and gamefish are prohibited as bait for hook and line fishing. • State listed threatened fish such as northern redbelly dace, longnose dace, and pearl dace are not to be possessed.	• A person may not transport an aquatic nuisance species except, in the case of crayfish and fish, if the specimens are dead. • Golden shiners, emerald shiners, spottail shiners, and gizzard shad shall not be transported away from the water in which they were taken.	• Anglers may not import baitfish into South Dakota. • Release of fish and baitfish is prohibited.

Jurisdiction	Use of Live Baitfish Legal?	Other Live Bait Prohibitions	Transport Restrictions	Other Regulations
Tennessee	Yes	• Silver carp, bighead carp, black carp, blueback herring, round goby, rudd, ruffe, snakehead, and swamp eel.	• It is unlawful to transport or possess a prohibited species. • Stonerollers, creek chub, bluntnose minnow, and bullheads may be harvested or imported by anglers for use as bait.	• Amphibians and crayfish shall not be imported into Tennessee or exported from Tennessee for use as bait.
Texas	Yes	• Tilapia, grass carp or any other fish listed as harmful or potentially harmful. • Game fish.	• Unknown.	• It is unlawful to import or possess a wildlife resource taken from outside the state without authorization.
Utah	No	• Live baitfish. • Game fish. • “Black” list of 17 other designated species.	• It is unlawful to transport live fish or crayfish away from the water where they were captured. • Dead fish and crayfish may not be moved between waters.	-
Vermont	Yes	• Species not on the “white” list. • Personally harvested baitfish in waters other that those in which they are caught. • Bait shops have either a statewide (disease-free) or waterbody specific designation	• Illegal to transport bait by motorized vehicle away from where caught. • Transport only when authorized with receipt from dealer with hatchery fish.	• Gear restrictions for personal use. • No person shall have live fish in their possession that are transported in a manner which attempts to keep them alive when leaving waters of the state. .

Jurisdiction	Use of Live Baitfish Legal?	Other Live Bait Prohibitions	Transport Restrictions	Other Regulations
Virginia	Yes (with exceptions)	• River herring and candy darter. • Threatened or endangered species.	• Overland transport of fish and fish eggs is illegal.	• Importation of baitfish is restricted. • Baitfish purchase receipt is required. • Personally harvested baitfish must be used in the water from which they were caught.
Washington	No (with exceptions)	• Prohibited species on a designated “black” list.	• It is illegal to transport, introduce, of use prohibited aquatic animal and plant species in the state.	• Live aquatic animals (other than fish) may be collected from the water being fished and used as bait.
West Virginia	Yes (with exceptions)	• Unknown.	• Unknown.	• Unknown.
Wisconsin	Yes (from a designated “white” list)	• Game fish, alewife, goldfish, live crayfish.	• It is illegal to move live fish away from a waterbody except for minnows which were purchased from a licenced bait dealer. • It is illegal to transport live rough fish (except goldfish, dace and suckers)	• It is illegal to import live rough fish into the state without a permit. • You may not possess or use minnows for bait that are obtained from outside Wisconsin. • Use of crayfish as bait was banned in 1983.

Jurisdiction	Use of Live Baitfish Legal?	Other Live Bait Prohibitions	Transport Restrictions	Other Regulations
Wyoming	No (with exceptions)	• Brook stickleback.	• Wild caught baitfish shall not be transported out of the water from which they were collected. • It is unlawful to transport live fish or live fish eggs from the water of capture.	• Live baitfish, amphibians, reptiles or crustaceans shall not be imported into Wyoming for use as live bait. • It is unlawful to import or export an aquatic invasive species in the state. • It is unlawful to plant or release live fish or fish eggs without authorization.

Appendix 5. Bait Licence Sales in Various Ontario Locations.

		Number of Licences Sold					
Year	**Area**	**Seine**	**Dip**	**Trap**	**Preserve**	**Dealer**	**Reference**
1925	Province of Ontario	98	1	0	-	-	Brubacher (1962)
1930	Province of Ontario	76	15	0	-	-	Brubacher (1962)
1934	Province of Ontario	110	40	0	-	-	Brubacher (1962)
1945	Province of Ontario	178	112	6	-	-	Brubacher (1962)
1950	Province of Ontario	532	276	59	-	-	Brubacher (1962)
1951	Province of Ontario		983[1.]		-	-	OMNR data
1952	Province of Ontario		1,105[1.]		-	-	OMNR data
1953	Province of Ontario		1,137[1.]		-	-	OMNR data
1954	Province of Ontario		1,248[1.]		-	-	OMNR data
1955	Province of Ontario		1,374[1.]		12	32	Brubacher (1962)
1956	Province of Ontario		1,457[1.]		26	188	Brubacher (1962)
1957	Province of Ontario		1,612[1.]		43	256	Brubacher (1962)
1958	Province of Ontario		1,756[1.]		50	324	Brubacher (1962)
1959	Sudbury District	39	24	59	-	23	Hughson (1965)
	Province of Ontario		1,841[1.]		59	387	Brubacher (1962)
1960	Lake Erie District	120	63	0	9	52	Brooks (1966)
	Sudbury District	32	20	55	-	26	Hughson (1965)
	Province of Ontario		1,853[1.]		76	419	Brubacher (1962)

Year	Area	Seine	Dip	Trap	Preserve	Dealer	Reference
1961	Lake Erie District	154	67	2	12	73	Briooks (1966)
	Parry Sound District	20	76	125	1	56	Rettie (1962)
	Sudbury District	36	14	78	-	30	Hughson (1965)
	White River District	9	0	21	0	2	Dore (1970)
	Province of Ontario	872	409	911	88	510	Brubacher (1962)
1962	Geraldton District	5	3	40	0	0	Gow (1963)
	Lake Erie District	152	70	4	12	66	Brooks (1966)
	Parry Sound District	18	77	124	1	45	Rettie (1963)
	White River District	5	0	18	0	6	Dore (1970)
	Province of Ontario		2,133[1.]		84	557	OMNR data
1963	Kapuskasing District	6	1	15	0	0	OMNR data
	Kenora District	58	1	1,228	6	68	Olsen (1964)
	Lake Erie District	144	62	5	12	71	Brooks (1966)
	Lake Simcoe District	109	53	7	74	57	Holder (1964)
	Parry Sound District	16	73	113	0	54	Rettie (1964)
	Pembroke District	8	2	30	0	4	Wilton (1964)
	Sudbury District	33	23	80	0	33	Hughson (1965)
	White River District	5	0	21	0	9	Dore (1970)
	Province of Ontario		2,125[1.]		101	591	OMNR data
1964	Fort Frances District	42	1	58	2	46	Caldwell (1965)
	Geraldton District	4	3	38	0	0	Gow (1965)
	Kapuskasing District	4	2	14	0	-	Hendry (1965)
	Kemptville District	89	7	7	1	35	Irvine (1965)
	Kenora District	63	0	1,031	4	76	Olsen (1965)
	Lake Erie District	142	58	5	13	76	Brooks (1966)
	North Bay District	63	31	63	-	-	Bailey (1965)
	Parry Sound District	13	65	112	0	51	Rettie (1965)
	Pembroke District	10	1	29	0	1	Wilton (1965)
	Sudbury District	33	33	72	-	38	Hughson (1965)
	White River District	7	0	20	0	8	Dore (1970)
	Province of Ontario	841	359	914	121	651	OMNR data

Year	Area	Seine	Dip	Trap	Preserve	Dealer	Reference
1965	Kemptville District	87	9	7	1	38	Irvine (1966)
	Kenora District	51	-	-	9	72	Olsen (1966)
	Lake Erie District	123	44	10	14	73	Brooks (1966)
	Lake Huron District	31	25	11	2	2	Anonymous (1966)
	Pembroke District	13	-	28	0	2	Wilton (1966)
	Sault Ste. Marie District	4	11	48	0	14	OMNR data
	Sudbury District	31	29	58	0	31	Hughson (1967)
	White River District	7	0	19	0	1	Dore (1970)
	Province of Ontario	805	338	885	125	613	OMNR data
1966	Geraldton District	2	2	38	-	-	Chappel (1967)
	Kenora District	55	0	1,764	7	124	Olsen (1967)
	North Bay District	562	19	58	0	117	Buss (1967)
	Pembroke District	11	0	25	0	31	Wilton (1967)
	Sault Ste. Marie District	3	5	39	0	21	OMNR data
	Sioux Lookout District		167[1.]		-	-	Baxter (1967)
	Sudbury District	29	24	56	-	102	Hughson (1967)
	White River District	9	0	15	0	19	Dore (1970)
	Province of Ontario	1	1,977[1.]		121	1,396	OMNR data
1967	Cochrane District	3	0	16	0	16	Wolfe (1968)
	Geraldton District	4	2	40	-	-	Chappel (1968)
	Kenora District	51	0	1,968	9	135	Olsen (1968)
	Pembroke District	7	0	23	0	27	Gostlin (1968)
	Sault Ste. Marie District	4	5	32	0	45	OMNR data
	Sudbury District	27	23	58	0	113	Hughson (1967)
	Thunder Bay District	6	0	59	0	30	Sameluk (1968)
	White River District	7	0	13	0	16	Dore (1970)
	Province of Ontario		1,807[1.]		124	1,729	OMNR data
1968	Fort Frances District	41	2	866	7	48	Caldwell (1969)
	Kenora District	44	0	2,006	11	135	Anonymous(1969)
	North Bay District	47	17	65	0	135	Love (1969)
	Pembroke District	7	0	21	0	27	Gostlin (1969)
	Sault Ste. Marie District	5	3	36	0	50	OMNR data

Year	Area	Seine	Dip	Trap	Preserve	Dealer	Reference
1968	Sudbury District	35	33	69	0	127	Hughson (1970)
(cont'd)	Thunder Bay District	1	0	61	0	97	Sameluk (1969)
	White River District	9	1	23	0	24	Dore (1970)
	Province of Ontario		1,859[1.]		116	1,808	OMNR data
1969	Kenora District	47	0	1,926	11	136	Anonymous (1970)
	Lake Huron District	58	21	34	0	47	OMNR data
	Pembroke District	5	0	23	0	28	Gostlin (1970)
	Port Arthur District	3	0	91	0	39	Rekrut (1970)
	Sault Ste. Marie District	4	2	36	0	48	OMNR data
	Sioux Lookout District	40	7	66	11	117	Adair (1970)
	Sudbury District	34	35	82	0	137	Hughson (1970)
	White River District	7	0	24	0	24	Dore (1970)
	Province of Ontario		1,908[1.]		199	1,832	OMNR data
1970	Sault Ste. Marie District	1	2	39	-	52	Wohlgemuth (1971)
	Province of Ontario		1,993[1.]		129	1,895	OMNR data
1971	Province of Ontario		1,607[1.]		126	1,813	OMNR data
1972	Province of Ontario		1,612[1.]		120	1,876	OMNR data
1973	Province of Ontario		1,611[1.]		111	1,868	OMNR data
1974	Province of Ontario		1,623[1.]		110	1,832	OMNR data
1975	Province of Ontario		1,590[1.]		96	1,606	OMNR data
1976	Province of Ontario		1,595[1.]		107	1,753	OMNR data
1977	Province of Ontario		1,605[1.]		98	1,731	OMNR data
1978	Geraldton District	0	0	26	0	29	Carlson (1979)
	Red Lake District	0	0	26	0	49	Carlson (1979)
	Sioux Lookout District	-	16[1.]	-	0	10	Carlson (1979)

Year	Area	Seine	Dip	Trap	Preserve	Dealer	Reference
1978 (cont'd)	Province of Ontario		1,679[1.]		92	153	OMNR data
1979	Northwestern Ontario		142[1.]			96	Hildebrand-Young and Associates (1981)
	Province of Ontario		1,549[1.]		114	1,791	OMNR data
1980	Province of Ontario		1,728[1.]		124	1,858	OMNR data
1981	Province of Ontario		1,712[1.]		149	1,861	OMNR data
1982	Province of Ontario		1,694[1.]		134	1,847	OMNR data
1983	Province of Ontario		1,782[1.]		148	1,961	OMNR data
1984	Province of Ontario		1,802[1.]		141	1,965	OMNR data
1985	Province of Ontario		1,828[1.]		162	1,945	OMNR data
1986	Province of Ontario		1,845[1.]		160	2,107	Spencer (1988a)
1987	Province of Ontario		1,874[1.]		155	2,105	Spencer (1988b)
1988	Province of Ontario		2,578[1.]		174	2,117	OMNR data
1989	Province of Ontario		2,530[1.]		170	1,959	OMNR data
1990	Province of Ontario		1,476[1.]		175	2,058	OMNR data
1991	Province of Ontario		1,595[1.]		111	2,976	OMNR data
1992	Province of Ontario		1,224[1.]		29	1,217	OMNR data
1993	Province of Ontario		-		0	801	OMNR data

Year	Area	Seine	Dip	Trap	Preserve	Dealer	Reference
1994	Province of Ontario		-		18	814	OMNR data
1995	Province of Ontario		-		3	1,117	OMNR data
1996	Province of Ontario		1,646[1.]		-	850	Goodchild (1997)
1999	Province of Ontario		705[1.]			556	Anonymous (2000)
2002	Province of Ontario		696[1.]			688	OMNR data
2003	Province of Ontario		689[1.]			727	BAO & OMNR (2004)
2004	Province of Ontario		676[1.]			749	BAO & OMNR (2006a)
2005	Province of Ontario		670[1.]			769	BAO & OMNR (2006b)
2006	Province of Ontario		689[1.]			734	Lewis (2012)
2007	Province of Ontario		816[1.]			1,164	Lewis (2012)
2008	Province of Ontario		788[1.]			1,163	Lewis (2012)
2009	Province of Ontario		555[1.]			643	Lewis (2012)
2010	Province of Ontario		557[1.]			651	Lewis (2012)
2011	Province of Ontario		~ 530[1.]			~ 630	OMNR data

1. Includes all bait licences (dip, seine and trap).

Appendix 6. Reported Bait Harvests from Various Ontario Locations.

Year	Area	Reported Harvest (Dozens) Fish[1.]	Leeches	Crayfish	Frogs	Reference
1959	Sudbury District	51,108	-	-	-	Hughson (1965)
1960	Sudbury District	76,691	-	-	-	Hughson (1965)
1961	Chapleau District	40	-	-	-	OMNR data
	Fort Frances District	138,496	-	-	-	OMNR data
	Geraldton District	18,000	-	-	-	OMNR data
	Gogama District	1,140	-	-	-	OMNR data
	Kapuskasing District	1,810	-	-	-	OMNR data
	Kemptville District	87,241	-	-	-	OMNR data
	Kenora District	151,085	-	-	-	OMNR data
	Lake Erie District	1,730,487	-	-	-	OMNR data
	Lake Huron District	19,695	-	-	-	OMNR data
	Lake Simcoe District	483,597	-	-	-	OMNR data
	Lindsay District	160,000	-	-	-	OMNR data
	North Bay District	173,858	-	-	-	OMNR data
	Parry Sound District	131,000	-	-	-	OMNR data
	Pembroke District	27,290	-	-	-	OMNR data
	Port Arthur District	91,072	-	-	-	OMNR data
	Sioux Lookout District	64,676	-	-	-	OMNR data
	Sudbury District	86,682	-	-	-	OMNR data
	Swastika District	40,000	-	-	-	OMNR data
	Tweed District	148,142	-	-	-	OMNR data
	White River District	11,132	-	-	-	Dore (1970)
1962	Chapleau District	570	-	-	-	OMNR data
	Cochrane District	20,000	-	-	-	OMNR data
	Fort Frances District	138,642	-	-	-	OMNR data
	Geraldton District	12,200	-	-	-	OMNR data
	Gogama District	570	-	-	-	OMNR data
	Kapuskasing District	2,588	-	-	-	OMNR data

Year	Area	Fish[1.]	Leeches	Crayfish	Frogs	Reference
1962	Kemptville District	94,127	-	-	-	OMNR data
(cont'd)	Kenora District	240,335	-	-	-	OMNR data
	Lake Huron District	57,625	-	-	-	OMNR data
	Lake Simcoe District	185,468	-	-	-	OMNR data
	Lindsay District	200,000	-	-	-	OMNR data
	North Bay District	125,000	-	-	-	OMNR data
	Parry Sound District	124,000	-	-	-	OMNR data
	Pembroke District	19,413	-	-	-	OMNR data
	Port Arthur District	50,162	-	-	-	OMNR data
	Sioux Lookout District	48,311	-	-	-	OMNR data
	Sudbury District	86,700	-	-	-	OMNR data
	Swastika District	14,600	-	-	-	OMNR data
	Tweed District	393,992	-	-	-	OMNR data
	White River District	8,643	-	-	-	Dore (1970)
1963	Chapleau District	137	-	-	-	OMNR data
	Cochrane District	13,799	-	-	-	OMNR data
	Fort Frances District	169,628	-	-	-	OMNR data
	Geraldton District	18,031	-	-	-	OMNR data
	Gogama District	1,977	-	-	-	OMNR data
	Kapuskasing District	8,469	-	-	-	OMNR data
	Kemptville District	88,383	-	-	-	OMNR data
	Kenora District	290,148	-	-	-	OMNR data
	Lake Erie District	3,556,157	-	-	-	OMNR data
	Lake Huron District	13,799	-	-	-	OMNR data
	Lake Simcoe District	478,842	-	-	-	OMNR data
	Lindsay District	210,000	-	-	-	OMNR data
	North Bay District	147,500	-	-	-	OMNR data
-	Parry Sound District	144,738	-	-	-	OMNR data
	Pembroke District	25,140	-	-	-	OMNR data
	Port Arthur District	51,175	-	-	-	OMNR data
	Sioux Lookout District	68,582	-	-	-	OMNR data
	Sudbury District	103,538	-	-	-	OMNR data
	Swastika District	18,031	-	-	-	OMNR data
	Tweed District	128,912	-	-	-	OMNR data

Year	Area	Fish[1.]	Leeches	Crayfish	Frogs	Reference
1963 (cont'd)	White River District	8,201	-	-	-	Dore (1970)
1964	Aylmer District	1,960,102	-	-	-	OMNR data
	Chapleau District	383	-	-	-	OMNR data
	Cochrane District	23,775	-	-	-	OMNR data
	Fort Frances District	161,610	-	-	-	OMNR data
	Geraldton District	13,932	-	-	-	Gow (1965)
	Gogama District District	1,851	-	-	-	OMNR data
	Hespeler District	43,964	-	-	-	OMNR data
	Kapuskasing District	7,050	-	-	-	Hendry (1965)
	Kemptville District	110,675	-	-	-	Irvine (1965)
	Kenora District	294,479	-	-	-	Olsen (1965)
	Lindsay District	177,700	-	-	-	OMNR data
	Maple District	119,587	-	-	-	OMNR data
	North Bay District	117,491	-	-	-	Bailey (1965)
	Parrry Sound District	155,060	-	-	-	OMNR data
	Pembroke District	26,830	-	-	-	Wilton (1965)
	Port Arthur District	120,000	-	-	-	OMNR data
	Sault Ste. Marie District	36,544	-	-	-	OMNR data
	Sudbury District	80,724	-	-	-	Hughson (1965)
	Swastika District	18,986	-	-	-	OMNR data
	Tweed District	181,936	-	-	-	OMNR data
	White River District	9,538	-	-	-	Dore (1970)
	Province of Ontario					
1965	Aylmer District	3,228,275	-	-	-	Brooks (1966)
	Chapleau District	620-	-	-	-	OMNR data
	Cochrane District	20,000	-	-	-	OMNR data
	Fort Frances District	161,610	-	-	-	Caldwell (1965)
	Geraldton District	36,302	-	-	-	OMNR data
	Gogama District	3,078	-	-	-	OMNR data
	Hespeler District	38,556	-	-	-	OMR data
	Kapuskasing District	9,373	-	-	-	OMR data
	Kemptville District	106,376	-	-	-	Irvine (1966)

Year	Area	Fish[1.]	Leeches	Crayfish	Frogs	Reference
1965 (cont'd)	Kenora District	341,475	-	-	-	Olsen (1966)
	Lindsay District	158,333	-	-	-	OMNR data
	Maple District	443,292	-	-	-	OMNR data
	North Bay District	134,650	-	-	-	OMNR data
	Parry Sound District	155,948	-	-	-	OMNR data
	Pembroke District	31,968	-	-	-	Wilton (1966)
	Port Arthur District	105,700	-	-	-	OMNR data
	Sault Ste. Marie	26,741	-	-	-	OMNR data
	Sioux Lookout District	63,820	-	-	-	OMNR data
	Sudbury District	73,956	-	-	-	Hughson (1967)
	Swastika District	16,530	-	-	-	OMNR data
	Tweed District	180,213	-	-	-	OMNR data
	White River District	13,520	-	-	-	Dore (1970)
1966	Geraldton District	20,030	-	-	-	Chappel (1967)
	Kenora District	337,007	-	-	-	Olsen (1967)
	North Bay District	122,257	-	-	-	Buss (1967)
	Pembroke District	27,738	-	-	-	Wilton (1967)
	Sault Ste. Marie District	22,328	-	-	-	OMNR data
	Sudbury District	67,970	-	-	-	Hughson (1967)
	White River District	17,498	-	-	-	Dore (1970)
1967	Cochrane District	23,033	-	-	-	Wolfe (1968)
	Geraldton District	22,386	-	-	-	Chappel (1968)
	Kenora District	351,092	-	-	-	Olsen (1968)
	Pembroke District	29,130	-	-	-	Gostlin (1968)
	Sault Ste. Marie District	23,755	-	-	-	OMNR data
	Sudbury District	62,432	-	-	-	Hughson (1968)
	Thunder Bay District	72,176	-	-	-	Sameluk (1968)
	White River District	26,285	-	-	-	Dore (1970)
1968	Fort Frances District	190,592	-	-	-	Caldwell (1969)
	Kenora District	321,705	-	-	-	Anonymous (1969)
	North Bay District	113,585	-	-	-	Love (1969)
	Pembroke District	27,859	-	-	-	Gostlin (1969)

Year	Area	Fish[1.]	Leeches	Crayfish	Frogs	Reference
1968 (cont'd)	Sault Ste. Marie District	27,609	-	-	-	OMNR data
	Sudbury District	68,322	-	-	-	Hughson (1970)
	Thunder Bay District	72,732	-	-	-	Sameuk (1969)
	White River District	30,111	-	-	-	Dore (1970)
1969	Kenora District	332,563	-	-	-	Anonymous (1970a)
	Lake Huron District	217,773	-	-	-	Anonymous (1970b)
	Pembroke District	15,164	-	-	-	Gostlin (1970)
	Port Arthur District	117,590	-	-	-	Rekrut (1970)
	Sault Ste. Marie District	26,708	-	-	-	OMNR data
	Sioux Lookout District	343,246	-	-	-	Adair (1970)
	Sudbury District	71,916	-	-	-	Hughson (1970)
	White River District	25,316	-	-	-	Dore (1970)
1970	Sault Ste. Marie District	34,086	-	-	-	Wohlgemuth (1971)
	Sudbury District	60,726	-	-	-	Hughson (1971)
1977	Province of Ontario	5,809,966[1.]	-	-	-	OMNR data
1978	Geraldton District	54,000	-	-	-	Carlson (1979)
	Red Lake District	90,450	-	-	-	Carlson (1979)
	Sioux Lookout District	117,164	-	-	-	Carlson (1979)
	Province of Ontario	8,513,111	-	-	-	OMNR data
1979	Province of Ontario	5,338,761	-	-	-	OMNR data
	Northwestern Ontario	985,000	-	-	-	Hildebrand-Young and Associates (1981)
1980	Province of Ontario	14,871,895	-	-	-	OMNR data
1981	Province of Ontario	14,580,243	-	-	-	OMNR data
1982	Province of Ontario	10,416,393	-	-	-	OMNR data
1983	Province of Ontario	9,800,504	-	-	-	OMNR data

Year	Area	Fish[1.]	Leeches	Crayfish	Frogs	Reference
1984	Province of Ontario	8,416,026	-	-	-	OMNR data
1985	Province of Ontario	11,352,222	-	-	-	OMNR data
1986	Province of Ontario					Spencer (1988a)
1994	Province of Ontario	7,400,000	-	-	-	Goodchild (1997)
2002	Province of Ontario	5,201,407	339,967	16,726	6,924	OMNR (2004b)
2003	Province of Ontario	5,842,644	432,595	15,273	9,819	BAO & OMNR (2004)
2004	Province of Ontario	5,134,987	594,757	20,931	15,544	BAO & OMNR (2006b)
2005	Province of Ontario	8,651,593	437,430	19,110	4,935	BAO & OMNR 2006b)
2006	Province of Ontario	5,030,173	789,457	11,310	3,286	Lewis (2012)
2007	Province of Ontario	2,947,752	30,765	0	0	Lewis (2012)
2008	Province of Ontario	12,454,526	3,410,649	0	0	Lewis (2012)
2009	Province of Ontario	11,979,233	2,860,199	0	0	Lewis (2012)
2010	Province of Ontario	12,035,041	2,227,806	0	0	Lewis (2012)

Note: The following conversion factors were used: (i) Leeches – 1 pound = 20 dozen; (ii) Baitfish – 1 pound = 6 dozen; 1 gallon = 60 dozen.

1. Includes lake herring and all baitfish species.

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