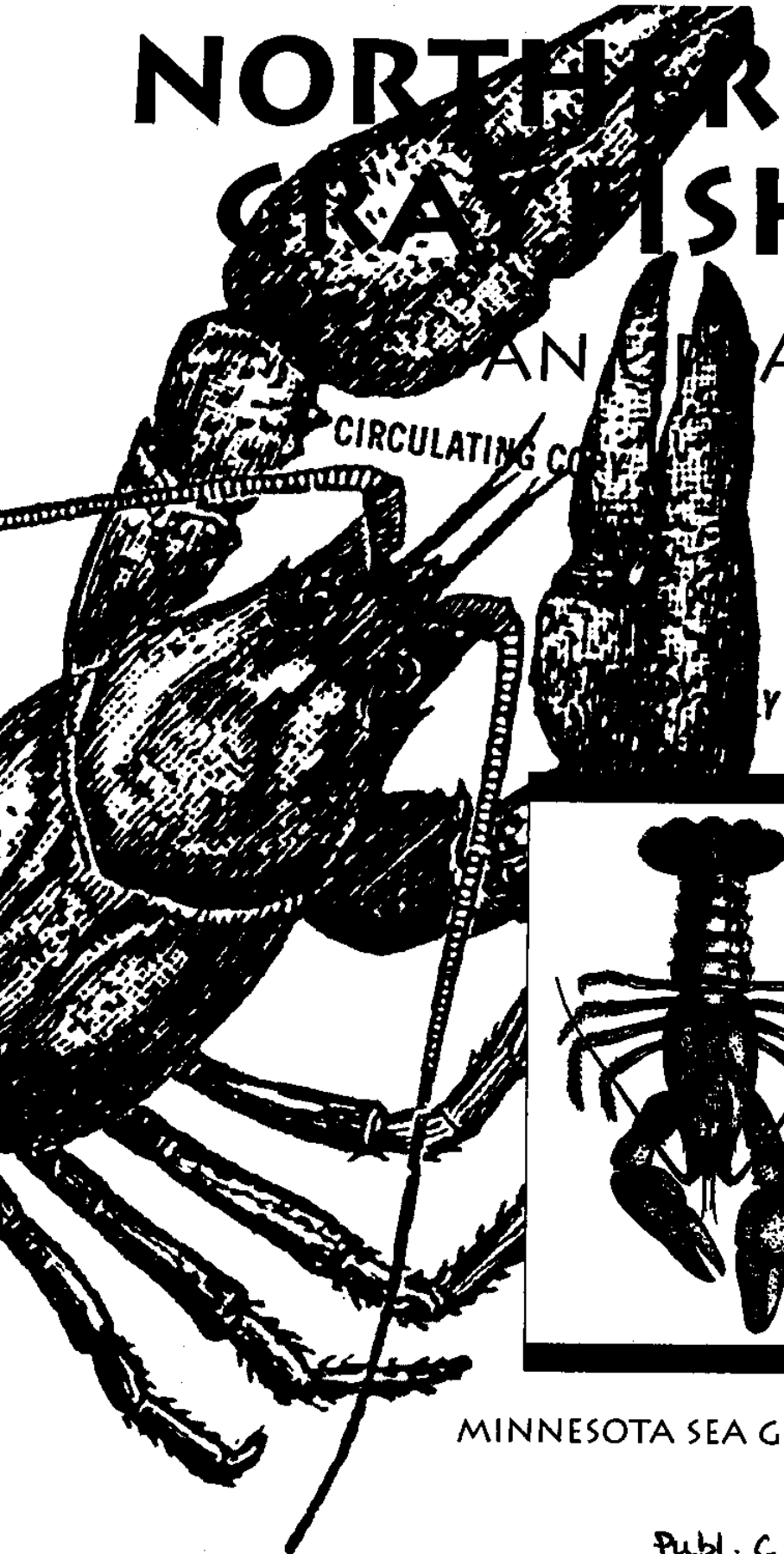


NORTHERN CRAYFISH:

AN ALIEN INVADE

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MINNESOTA SEA GRANT

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NORTHERN CRAYFISH:

AN UPDATE



Introduction

Crayfish wild harvest and aquaculture may have the potential to develop into a significant industry in Minnesota and Wisconsin. It is premature to speculate how large an industry will develop.

As with new commercialization of a natural resource, there will probably be conflicts among user groups and between users and management agencies. Openness and direct communication are important if crayfish wild harvest and aquaculture opportunities are to be realized in an efficient and environmentally sound manner. Well directed research is also needed to answer the many questions that will arise as the industry grows. Some of those questions are listed below.

- Can crayfish be commercially cultured in Minnesota?
- Can soft crayfish be commercially produced with our northern crayfish species?
- Can Midwestern markets be developed for hard-shell, soft-shell, and bait crayfish, and for peeled and deveined tail meat?
- What effects will intensive harvests have on wild crayfish and other fish/wildlife populations?

- What effects are exotic rusty crayfish having on native fish, crayfish, and aquatic plants?
- What user conflicts will arise, and how can they be dealt with?

Hard-shell Crayfish

Between 2,000 and 3,000 metric tons of crayfish are consumed annually at a festival in Sweden. Because of a crayfish plague in Europe, the availability of crayfish from those waters has declined drastically. The rusty crayfish (*Orconectes rusticus*) may be the best substitute crayfish seen in Sweden in 50 years. Swedish importers have placed a large order for rusty crayfish more than 3 1/2 inches long.

The rusty crayfish is not native to either Minnesota or Wisconsin, but it is now found in both states. It was probably brought in as bait. Because the rusty crayfish is much more widespread in Wisconsin, most of the wild harvest was from those waters.

Three of the five other crayfish species in Minnesota may also have market potential. Although smaller and not initially as highly regarded by the Swedish buyers as the rusty

crayfish, *O. virilis*, *O. immunis*, and *O. propinquus* may eventually find a niche in European or U.S. markets. These native species and any rusty crayfish that are smaller than Sweden's 3 1/2 inch minimum import size, may also be suitable for the domestic tail meat market.

Tail meat from cooked hard-shell crayfish is peeled, deveined, and sold fresh or frozen. Development of an efficient tail meat picking machine could increase the potential for economically marketing Minnesota crayfish in the U.S.

Crayfish culture is the largest aquaculture industry in the U.S. in surface acres of water under production. Louisiana's 140,000 acres produce an average of 500 to 600 pounds each. Including wild harvest, Louisiana produces about 120 million pounds (80 percent of the world's supply of crayfish) each year from November to June. The Louisiana species are the red swamp crayfish (*Procambarus clarkii*) and white river crayfish (*P. acutus acutus*).

Aquaculture of crayfish in northern states is in its infancy but a small industry is developing. Native crayfish have become so abundant in some Minnesota wild rice paddies that they are considered a nuisance. Paddies might, therefore, be a suitable environment for commercial crayfish culture. It has also been suggested that small wild-caught crayfish could be grown to marketable size in culture ponds.

The current U.S. market for crayfish is primarily in Louisiana, but demand is beginning to grow elsewhere. Very few crayfish are marketed for food in the Midwest. Nevertheless crayfish production in Minnesota and other Midwestern states during the summer months could help ensure a stable 12-month supply and establish new U.S. markets.

Soft-shell Crayfish

Crayfish periodically molt or shed their hard exoskeleton in order to grow. During the molting process the crayfish expands and forms a flexible new inner shell while dissolving and cracking the old shell. After the crayfish emerges from the old shell, the new, larger shell begins to harden. The new exoskeleton remains soft for only about three hours after molting unless the crayfish is chilled or frozen. Up to 92 percent of a soft crayfish is edible compared to only 10 to 20 percent of a hard crayfish.

Soft crayfish are considered a delicacy and are also popular as fishing bait. Prices to the producer for soft crayfish sold as food range from \$6 to \$9 per pound. Soft crayfish sold as bait may bring \$12 to \$30 per pound at certain times of the year.

There was no way to commercially produce soft crayfish, especially the larger ones used as food, until recently, when Sea Grant researchers at Louisiana State University developed a

recirculating soft crayfish shedding system. Soft crayfish production increased from 10 tons in 1987 to 50 tons in 1988. The potential food market for soft crayfish is estimated at 1,500 tons per year.

It is not known if wild-caught or cultured northern crayfish will respond to the intensive shedding system developed for Louisiana's red swamp crayfish. Research has already begun to address this question.

Developing a shedding system for northern crayfish and a reliable market for soft crayfish would provide a use for crayfish smaller than Sweden's 3 1/2 inch minimum import size and would increase the likelihood of developing a significant crayfish industry in Minnesota and Wisconsin.

Trapping Crayfish

Crayfish are generally harvested by trapping although seines and lift nets can also be effective at times. Traps are typically made from coated wire mesh or plastic mesh. Hardware cloth can also be used. A 3/4 inch mesh allows under-sized crayfish to escape. Of the numerous trap designs available, two of the easiest to construct are the traditional

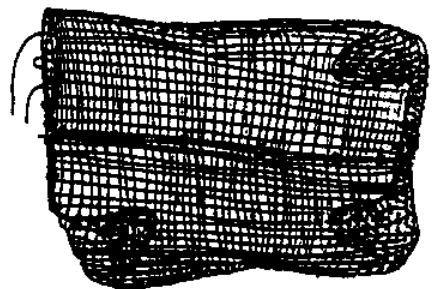
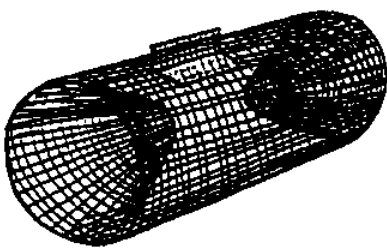
minnow-style trap and the Louisiana-style pillow trap (**Figure 1**).

A recent study by the University of Wisconsin-Stout found the minnow-style trap was more effective than the pillow trap. They also developed a new trap, currently being refined, with the entrance on top. Plans for this trap, which out-performed all the others, may be available soon.

The minnow-style trap is simple to construct and is widely used by crayfish trappers. It is a mesh cylinder about 28 inches long and 10 inches in diameter. Inward pointing funnels are fashioned from mesh and attached to each end of the trap. Entrance holes are two inches in diameter. A door is constructed in the middle of the trap to remove crayfish and add bait. When completed, the trap is shaped like a pillow about 20 inches by 28 inches by 8 inches.

Traps can be baited with fish heads or racks, canned pet food, beef scraps, liver, or commercial pelleted baits. Carp was a more effective bait than either sucker or smelt in a UW-Stout study; suckers were next most effective. Smelt is least

Figure 1. Common designs: from left, minnow-style trap and pillow trap.



effective. Crayfish typically feed at night, but large adults will feed in daylight during the warmer months. Where there are large crayfish populations, they may consume the bait and leave the trap within hours. Check your traps more frequently if this seems to be happening.

Mark your traps with your name and address. Attach a small styrofoam float to each trap with a strong nylon cord or rope. The rope should be slightly longer than the water is deep, but not so long that it obstructs boaters or anglers. Try to avoid placing traps in areas with high boat traffic.

Crayfish can be found in almost any aquatic setting: lakes, ponds, rivers, and streams. They can be found on any type of bottom, from muddy to rocky, and may or may not be associated with aquatic vegetation. Experimenting in each body of water will reveal the best trapping locations.

New Minnesota Department of Natural Resources (DNR) Commissioner's Orders regulating crayfish harvest, transportation, and use as bait went into effect in Spring 1989.

Contact your local DNR office for a copy of the regulations.

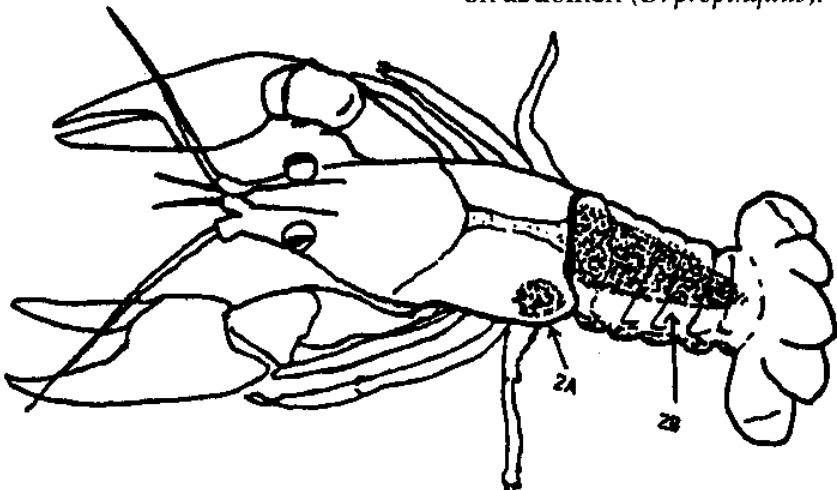
Identification

Identifying crayfish can be very difficult. Positive identification requires looking at a number of characteristics and having enough experience to interpret them. Here are some general, easily observed characteristics that can be used to help you identify mature adults of the four species most often encountered in Minnesota.

They are general identification guidelines and should not be used when positive identification is needed.

Rusty crayfish can generally be identified by their more robust claws than either *O. immunis* or *O. virilis*, and by the dark rusty spots on each side of their carapace (pinchers). The spots are placed as though you picked up the crayfish with paint on your forefinger and thumb (Figure 2A). The spots may be

Figure 2. Composite drawing. 2A: dark spot on carapace (*O. rusticus*). 2B: dark patch and appearance of light colored stripe on abdomen (*O. propinquus*).



obscured by the dark coloration of rusty crayfish from some waters. Compared to the rusty crayfish, *O. virilis* can often be distinguished because its claw is more blue and has distinct white wart-like bumps. The rusty claw, by comparison, is greyish-green to reddish-brown and is smoother.

O. propinquus has a claw very similar to the rusty crayfish, but *O. propinquus* lacks the dark spots on each side of the carapace. Instead, it has a dark brown to black patch on the top of the abdomen ("tail section"). This gives the impression that a light colored stripe runs along each side of the abdomen (Figure 2B).

For more information regarding crayfish identification and life history, refer to *The Crayfishes and Shrimps of Wisconsin* by Hobbs and Jass, published in 1988 by the Milwaukee Public Museum, 800 W. Wells St., Milwaukee, WI 53233, telephone (414) 278-2702.

For more information on crayfish and aquaculture, contact Sea Grant, 612/625-9288 or 218/726-8715.

Figure 3. Claw shape can help distinguish between the various species.



O. rusticus-O. propinquus

Black bands at claw tips. Oval gap when closed. Smooth, S-shaped, moveable claw.



O. virilis

No black bands. Gap is a mere slit. White wart-like bumps on claw.



O. immunis

No black bands. Gap is a definite notch. Claws are narrower and elongate.

Minnesota Sea Grant is a statewide program that supports research, extension, and educational programs related to Lake Superior and the Great Lakes. Offices are located on the St. Paul campus of the University of Minnesota.



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