Acoustic pingers protect porpoises

To the surprise and delight of conservation biologists, a new study shows that sound-emitting devices called acoustic pingers help at least some marine mammals avoid accidental entanglement in commercial fishing nets.

During 2 months in the fall of 1994, Gulf of Maine fishermen using nets equipped with acoustic pingers snared only two harbor porpoises, while those whose nets carried unactivated pingers caught 25 such animals.

This "is the first evidence that [pingers] actually work. . . . We didn't anticipate such a dramatic difference," says Scott D. Kraus of the New England Aquarium in Boston, who discussed the study at this week's Biology of Marine Mammals conference in Orlando, Fla.

Scientists estimate that only about 45,000 harbor porpoises dwell in the Gulf of Maine. That small population is threatened because each year a few thousand porpoises are killed unintentionally by the nets local fishermen use to capture cod and pollack.

"We don't believe [that depletion] is sustainable," says Andrew J. Read of Duke University's Marine Laboratory in Beaufort, N.C., another member of the acoustic pinger study.

To protect the harbor porpoises, federal officials have resorted to closing certain regions of the Gulf of Maine to commercial fishing in the last few years. As an alternative to such closures, a few researchers, with the encouragement of the local fishing industry, have explored the use of underwater alarms that send out sound waves near the low end of the porpoises' auditory range. These pingers are designed to warn the porpoises away from nets.

In the summer of 1994, however, a scientific panel reviewed available data on acoustic pingers and concluded that the few trials conducted with them had been too small or poorly designed to establish any benefit. "There was a lot of skepticism about the use of acoustic alarms," says Kraus.

Skeptics and advocates of the idea, says Read, then joined together to design what they hoped would be a definitive study of the pingers' ability to protect harbor porpoises.

Using standardized nets and carrying independent observers, 15 boats fished for cod and pollack in an area closed to other fishing off the coast of New Hampshire and southern Maine. From one day to the next, neither the fishermen nor the observers knew whether the pingers attached to their nets were active.

The reduction in the porpoise bycatch pleased conservationists, and the fishermen were relieved that the active pingers did not seem to scare off their intended catch, notes Kraus. "There was no significant difference in the amount of cod or pollack caught," he says.

Kraus and Read caution against reading too much into the results of the Gulf of Maine study. They say it's possible that the porpoises will gradually come to ignore the warning.

The fishermen also worry that seals or sea lions might learn to associate the pinging sound with food-laden nets.

Furthermore, researchers stress that success in the Gulf of Maine may not extend to similar situations elsewhere, such as the widely publicized problem of Pacific dolphins caught in tuna drift nets. Other animals may not avoid the pingers' noise, they explain.

"You might put a sound in the water that they do not hear or that even attracts them," says Kraus. "I don't want people to think that because it works on harbor porpoises it will protect every dolphin and porpoise in the world."

"We've taken an important first step . . . but it's not a panacea," agrees Read.

While Gulf of Maine fishermen plan to continue using the pingers, additional tests of the devices are planned in the waters off New Zealand. There, fishing nets threaten a fragile population of only a few thousand dolphins, says Kraus. —*J. Travis*

Hope for transgenic medflies comes alive

Genetic engineering of everything from plants to mice may seem commonplace nowadays, but scientists have only recently succeeded in genetically engineering any insects other than *Drosophila*, the fruit fly long favored in laboratory experiments.

The hope of genetically disarming important pests, however, just got a little brighter. Scientists have successfully altered the genetic makeup of the Mediterranean fruit fly (*Ceratitis capitata*), which destroys fruit and coffee crops worldwide, report Thanasis G. Loukeris and his colleagues at the Foundation for Research and Technology in Heraklion, Greece.

The researchers have yet to diminish the insect's bite, but they have taken the first step in using genetics to achieve that goal, they report in the Dec. 22 SCIENCE.

"Will the successful transformation of the medfly result in better methods to control this pest? Yes, in the long run," predicts Michael Ashburner of the University of Cambridge in England in an accompanying commentary. The result should also "relieve the frustration of those trying to transform other insects . . . [and] allow us to learn much more about the basic biology of this beast," notes Ashburner.

After learning how to engineer *Drosophila* in the early 1980s, scientists had thought that the medfly would pose a fairly easy target, says Charalambos Savakis, who led the Greek group. The medfly resembles *Drosophila* in key ways, including the simplicity of its genome. But discovering how to modify the *Drosophila* techniques took many years, he notes.

Scientists needed a new transposable element, a sequence of DNA that can transport a new gene into unsuspecting hosts' sperm and egg cells, which impart it to the offspring. Savakis and his colleagues eventually succeeded with an element called minos, taken from another fruit fly, *Drosophila hydei*.

Like other transposable elements, minos has two important characteristics: It can replicate inside its host's chromosomes, and it produces an enzyme, transposase, that enables it to jump into different chromosomes in its host.

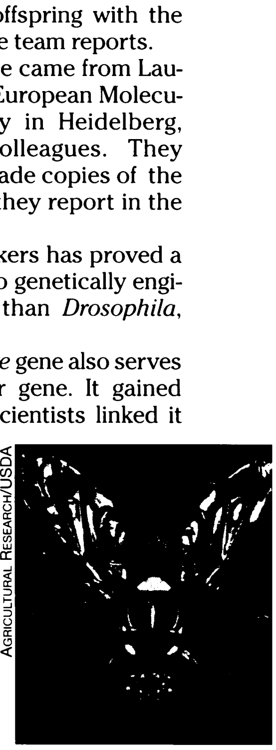
Using tools developed for *Drosophila*, the Greek scientists combined two minos elements into a package that they used to carry a marker gene called *white*. Despite its name, *white* produces eyes of a normal red color. The investigators used the *white* gene to find out whether their technique works before they try inserting genes expected to be useful in pest control. They injected the *white* gene package into the embryos of almost 4,000 medflies.

They used mutant medflies that, thanks to a genetic whim of nature, have white eyes and normally produce white-eyed descendants. When they gazed into the eyes of their flies' descendants, the researchers knew that *white* had penetrated the sperm and egg cells. The *white* marker gene made some of the white-eyed insects produce offspring with the normal red eye color, the team reports.

The medfly *white* gene came from Laurence J. Zwiebel of the European Molecular Biology Laboratory in Heidelberg, Germany, and his colleagues. They recently isolated and made copies of the gene for the first time, they report in the Dec. 22 issue of SCIENCE.

A lack of genetic markers has proved a "substantial obstacle" to genetically engineering insects other than *Drosophila*, they note.

In *Drosophila*, the *white* gene also serves frequently as a marker gene. It gained some notoriety when scientists linked it to male-male courtship in *Drosophila* (SN: 7/1/95, p.13). — *T. Adler*



AGRICULTURAL RESEARCH/USDA

Scientists have tried to control the medfly by flooding populations with large numbers of sterilized males but are now on the road to using genetic engineering also.