

Managing Invasive Species: How Much Do We Spend?

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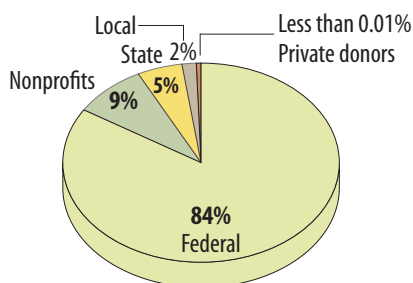
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Invasive species: they're along roadways and up mountain trails; they're in lakes and along the coast; chances are they're in your yard. You might not recognize them for what they are—plants or animals not native to Alaska, brought here accidentally or intentionally, crowding out local species. This problem is in the early stages here, compared with what has happened in other parts of the country. But a number of invasive species are already here, and scientists think more are on the way. These species can damage ecosystems and economies—so it's important to understand their potential economic and other effects now, when it's more feasible to remove or contain them.

Here we summarize our analysis of what public and private groups spent to manage invasive species in Alaska from 2007 through 2011. This publication is a joint product of ISER and the Alaska Sealife Center, and it provides the first look at economic effects of invasive species here. Our findings are based on a broad survey of agencies and organizations that deal with invasive species.¹ The idea for the research came out of a working group formed to help minimize the effects of invasive species in Alaska.² Several federal and state agencies and organizations funded the work (see back page).

Figure 1. Who Pays to Manage Invasive Species in Alaska?
Total Spending, 2007-2011: \$29 Million • Average Annual Spending: \$5.8 Million



Source: ISER/Alaska Sealife Center survey, 2011-2012

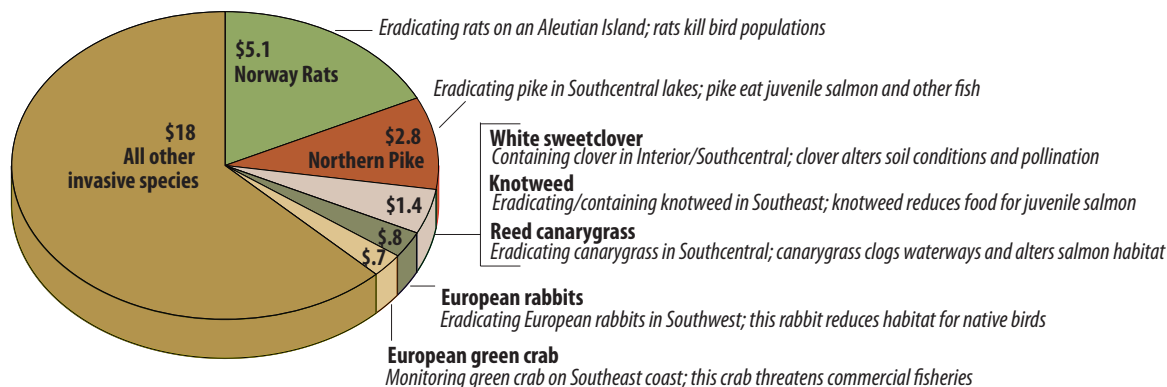
Who Paid?

Governments, nonprofits, and private donors spent about \$29 million to manage invasive species in Alaska from 2007 through 2011, with an annual average of \$5.8 million. The federal government put up most of the money—84%. Nonprofits and state and local governments supplied almost all the rest (Figure 1).

Which Were the Costliest Species ?

The biggest expenses were \$5 million for eradicating Norway rats on an Aleutian Island where they had destroyed bird populations, and \$2.8 million for killing Northern pike in Southcentral lakes; pike are voracious eaters of juvenile salmon and other fish. Nearly \$1.5 million went for controlling a few damaging invasive plants. About \$700,000 went for monitoring the European green crab, which is moving toward Southeast and threatening commercial fisheries (Figure 2).

Figure 2. What Were the Most Expensive Species to Manage, 2007 - 2011?
(In Millions of Dollars)



Source: ISER/Alaska Sealife Center survey, 2011-2012

What are Invasive Species?

Invasive species are non-native species that establish themselves, dominate habitats, and cause or are likely to cause economic loss, environmental damage, or harm to human health. These are primarily plants or animals that come from outside the state, but some—like Northern pike—are native in parts of the state but invasive when introduced elsewhere in Alaska.

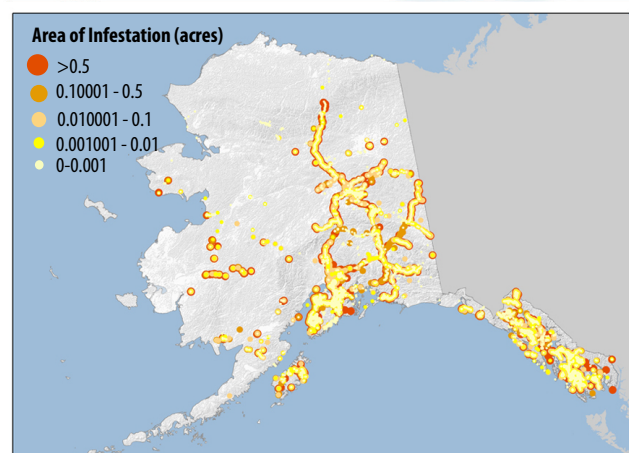
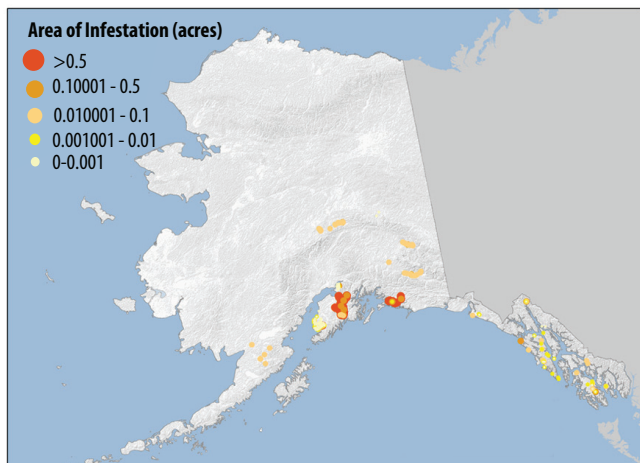
Some invasive species pose much bigger risks than others. Also, some non-native species aren't invasive and in fact benefit people. For example, non-native crops and livestock support the agricultural industry in Alaska and elsewhere.

In 2007, there were 283 known non-native plant species and 116 non-native animals species (fish, amphibians, birds, mammals, invertebrates, parasites, and pathogens) in Alaska. Between 1968 and 2007, the number of known non-native plant species in the state nearly doubled. That means more than 10% of Alaska's 2,100 known plant species are non-native.³

Invasive plants have just recently begun to take hold in much of Alaska. Maps from the Alaska Exotic Plant Information Clearinghouse at the University of Alaska Anchorage (below) show how invasive plants spread just from 2000 to 2011. In 2000, known invasive plants were mostly confined to limited areas of Southeast and Southcentral Alaska. Ten years later, invasive plants were far more widespread in those regions and had reached into Interior and Southwest Alaska.

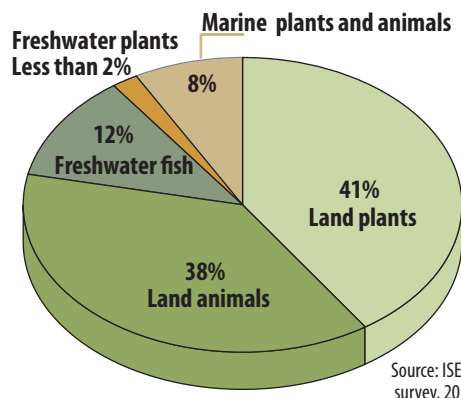
But in recent years there's also been more funding available for those who study invasive plants, so part of the reason for the sharp increase may simply be that the extra funding has allowed more observations of plants in more places. It's certainly likely that invasive plants are also in more remote areas of the state where they have yet to be observed.

Spread of Invasive Plants, 2000 to 2011



Source: Alaska Exotic Plant Information Clearinghouse, UAA

Figure 3. Distribution of Spending to Manage Invasive Species in Alaska, By Type, 2007-2011



Where Did the Money Go?

Figure 3 shows the distribution of spending for managing invasive species in Alaska, by type, from 2007 through 2011. More than 40% went for managing invasive land plants and another 38% for invasive land animals. As we discussed earlier, the biggest single expense for animals was for eradicating Norway rats.

Managing invasive freshwater fish accounted for another 12% of spending, but most was for eradicating a single species—Northern pike—in Southcentral Alaska, where it is invasive. In the Interior and the Arctic it is native.

Only about 8% of spending was for invasive marine life from 2007 through 2011. But big potential threats to Alaska's commercial fisheries have recently been identified, and spending to manage invasive marine plants and animals is likely to be up in the coming years. Those species include a dangerous marine animal called the glove leather tunicate (adjacent page) recently found in Sitka. It encrusts marine infrastructure and non-mobile marine animals like oysters and mussels, killing them. Another is the European green crab (adjacent page), which biologists fear could soon reach the Southeast coast of Alaska, threatening Dungeness and other native crabs.

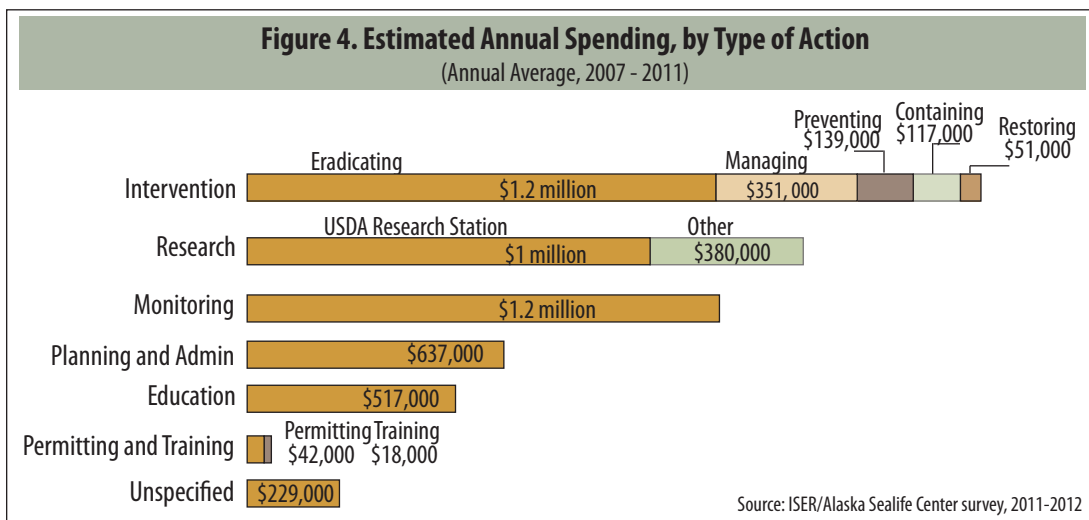


Northern pike (*Esox lucius*)
Photo courtesy of Alaska Department of Fish and Game

What Are the Management Actions?

There are a number of possible management actions for government agencies and nonprofits dealing with invasive species in Alaska. Figure 4 shows average annual spending for various management actions from 2007 to 2011.

- **Intervention.** About \$1.9 million went to intervention activities annually. That included *eradicating* species considered very dangerous; *managing* them



to keep established invasions from spreading; *preventing* them from reaching the state; *containing* new invasions when they reached Alaska; and *restoring* ecosystems to their original state, after invasive species were removed.

- **Research.** About \$1.4 million went for research annually. The U.S. Department of Agriculture's Agricultural Research Station in Fairbanks accounted for most research spending from 2007 to 2011. The station studied effects of invasive species on ecosystems, and also advised government agencies about ways to control invasive plants. It will close in 2012, due to federal budget cuts.

- **Monitoring.** About \$1.2 million went to monitoring invasive species every year. Monitoring mostly tracks worrisome invasive species—like the European green crab—that may be finding their way to Alaska. It also includes monitoring species thought to be eradicated in Alaska, to make sure they are entirely gone.

- **Education.** Roughly \$500,000 of annual spending from 2007 to 2011 was to make Alaskans more aware of the dangers invasive species pose.

- **Other Spending.** Several other kinds of spending support management of invasive species. That includes spending for planning and administration; for getting required permits; and training volunteers. Together, spending for those expenses averaged close to \$700,000 annually in recent years.



European green crab (*Carcinus maenas*)
Photo courtesy of National Oceanic and Atmospheric Administration



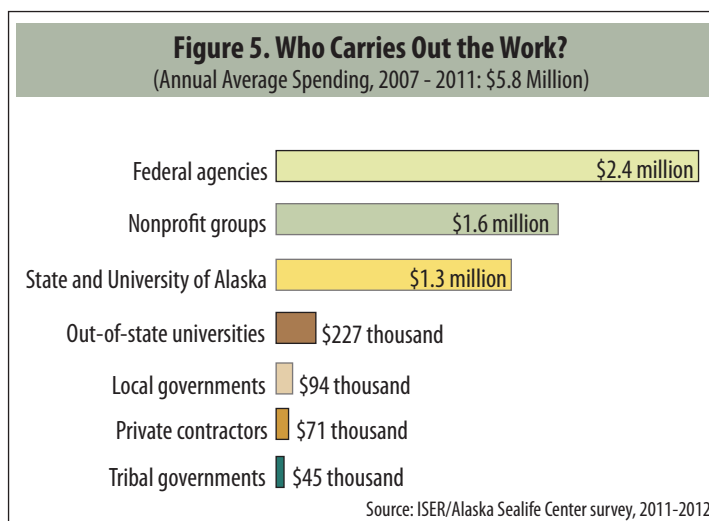
Glove leather tunicate (*Didemnum vexillum*)
Photo courtesy of Alaska Department of Fish and Game

Who Does the Work?

Figure 1 on the front page shows who pays for managing invasive species in Alaska. But the agencies and organizations that put up the money don't always do the management work. Figure 5 shows which entities actually carried out the work and their average annual spending from 2007 through 2011.

Federal agencies spent about \$2.4 million on an annual average. Nonprofit groups were next at \$1.6 million, followed by state entities (including the University of Alaska) at \$1.3 million.

Others—out-of-state universities, local and tribal governments, and private contractors—spent much smaller amounts.



Jobs and Payroll

Managing invasive species in Alaska also generates jobs and payroll, as Figure 6 shows. During the study period, annual numbers ranged from 31 in 2007 to 73 in 2010. Payroll increased as job numbers went up, peaking at \$3 million in 2010.

But job and payroll figures for 2010 and 2011 were boosted by one-time money from the federal American Recovery and Reinvestment Act, which Congress passed to help bring the U.S. economy out of recession. That money has now essentially been spent, so figures for 2012 are likely to be lower.

Volunteers have also become increasingly important in efforts to control invasive species, especially plants. For example, the Alaska Parks Foundation, Mat-Su Conservation Services, and other organizations coordinate volunteer efforts, and the National Park Service hires crews of students (at nominal pay). And it was a community-based monitoring program in Sitka—BioBlitz—that recently discovered one of the more dangerous invasive marine species, the glove leather tunicate (pictured on page 3).

Conclusions

We know that numbers of invasive species are increasing in Alaska, but that's a fairly recent phenomenon, and ways of dealing with the problem are still in their infancy. Because the problem is at an early stage—compared with other areas of the country—Alaska has opportunities to develop cost-effective solutions and create institutions to coordinate a multitude of stakeholders.

But the state government will need to take a bigger role in managing invasive species. We know that in recent years state funds made up only about 5% of spending, with the federal government supplying 84%. Federal spending cuts will close the Agricultural Research Station in 2012, and further cuts in federal money for managing invasive species seem likely.

Also, as the problem becomes increasingly important, coordinating limited resources will become more critical in the future. Yet several attempts in recent years—including proposed legislative action—have failed to establish a formal Alaska Invasive Species Council.

The bulk of funding so far has been targeted toward terrestrial plants and animals, although funds for marine organisms have increased slightly over the last few years. A shift toward more spending for marine plants and animals seems likely, as more species that pose threats to Alaska's commercial fisheries are being identified. Much of the spending to combat invasive species in recent years has been in Southcentral and Southwest Alaska, but spending in Southeast Alaska has steadily increased over the past 5 years, with the arrival of invasive marine species in Alaska waters.

Finally, our study found increased employment, payroll, and volunteer effort in dealing with invasive species—which may suggest that Alaskans are becoming more aware of this important problem.

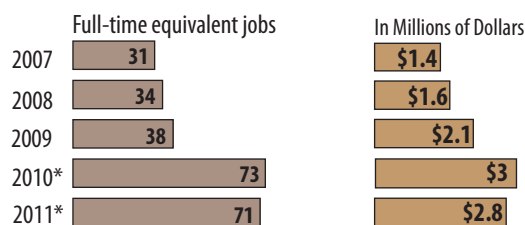
Acknowledgements

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About the Authors

Tobias Schwörer is an ecological economist at ISER, focusing on regional economic analysis, ecosystem services valuation, and energy economics. Rebekka Federer and Howard Ferren are with the Alaska SeaLife Center in Seward. Rebekka Federer manages the marine invasive species program and Howard Ferren is the director of conservation. The findings and conclusions of this report are those of the authors. For questions, contact Tobias Schwörer at ttschwoerer@alaska.edu.

Figure 6. Jobs and Payroll in Management of Invasive Species in Alaska



*The big jump in both jobs and payroll in these years is probably due largely to one-time money under the federal American Recovery and Reinvestment Act. Figures for 2012 will likely be lower.

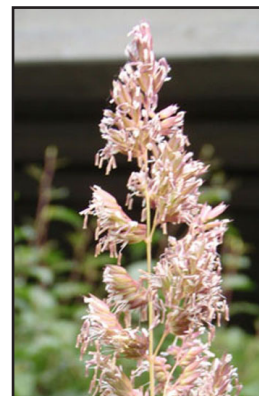
Source: ISER/Alaska Sealife Center survey, 2011-2012

Endnotes

1. We e-mailed questionnaires (and followed up with phone calls) to 112 people at 64 organizations: 11 federal, 8 state, 20 nonprofit, 7 private, 6 tribal, 7 university, and 4 local government. We asked for budget information from 2007 to 2011 on spending related to invasive species—employment, personnel cost, hourly effort, expenditures on equipment and supplies, volunteer effort, source and recipient of funds spent, and targeted invasive species. We also asked respondents to provide detailed information by species, action taken, location, and aerial extent of the action. We collected information from 84 of the 112 people we contacted, for a response rate of 75%. We were especially careful to try to avoid double-counting spending in the complex web of agencies and organizations involved in managing invasive species.

2. In 2006, representatives of federal, state, university, and nonprofit organizations that deal with invasive species in Alaska created the Alaska Invasive Species Working Group, an informal organization with a number of goals, including coordinating resources and activities to improve management of invasive species and developing a statewide plan for managing invasive species. Group members hope to establish a formal council, but legislative action hasn't yet succeeded.

3. Carlson, M.L. and Shephard, M. 2007. "Is the Spread of Non-Native Plants in Alaska Accelerating?" In *Meeting the Challenge: Invasive Plants in Pacific Northwest Ecosystems*, General Technical Report GTR-694, U.S. Forest Service Pacific Northwest Research Station; and McClory J. and Gotthardt T. 2008. *Non-Native and Invasive Animals of Alaska: A Comprehensive List and Select Species Status Reports*, Final Report, Alaska Natural Heritage Program, UAA.



Reed canarygrass (*Phalaris arundinacea*)

Photo courtesy of Alaska Natural Heritage Program, UAA



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