



Division of Environmental Contaminants

Environmental Contaminants Survey of Spectacled Eiders from St Lawrence Island, Alaska

Spectacled eiders were listed as threatened in 1993 under the Endangered Species Act (Federal Register, May 10, 1993).

Purpose of Study

Exposure of spectacled eiders to environmental contaminants may be contributing to the decline of this species. Therefore, the U.S. Fish and Wildlife Service in coordination with the people of Gambell, Alaska conducted a contaminants survey of male spectacled eiders. Birds migrating from their wintering grounds in the Bering Sea to their nesting areas in Alaska and arctic Russia were the subject of the survey.

Why Are We Concerned About Contaminants in Spectacled Eiders?

1. Past studies have found higher than expected levels of trace elements and metals in several spectacled eiders found dead on their nesting grounds in the Yukon-Kuskokwim Delta. Many of these birds died of lead poisoning from eating spent shot left in wetland soils.
2. Higher than expected levels of some of these elements have also been found in other Alaskan waterfowl, such as white-winged scoters and emperor geese.
3. Water birds in arctic latitudes may be exposed to global contamination from the releases of radioactive compounds (for example, from the explosion of the nuclear power plant at Chernobyl, Russia).



Male spectacled eiders wintering in the Bering Sea were examined for the presence and effects of contaminants.
Photo by Greg Balogh, USFWS

4. Finally, atmospheric and marine transport may be exposing spectacled eiders to industrial and agricultural chemicals while they are at sea.



Study site: spectacled eiders winter in the Bering Sea near St Lawrence Island. This study would not have been possible without the assistance of Gambell residents.

Partnership With a Remote Alaskan Community

The Service appreciates the assistance of the IRA Traditional Council, the Sivuuq Corporation, and local guides and boat captains from the village of Gambell, Alaska. The guides and boat captains worked with Service biologists to collect tissues from 20 migrating male spectacled eiders.

What Did We Measure?

Tissues were analyzed for presence and amount of:

- 19 trace elements and metals (such as lead and cadmium);
 - 22 chlorinated organic and pesticide compounds (such as PCBs and DDT); and
 - Radioactive cesium.
- Additionally, tissues were examined for effects of contaminants.

Results: Chemical Analysis

Only a few samples had measurable amounts of chlorinated organic compounds. Two birds had low concentrations of a DDT metabolite. We were unable to detect PCBs in any of the eiders.

Copper, cadmium and selenium concentrations were higher than normal in spectacled eider tissues when compared to other marine birds.

Radioactive cesium in breast muscle was not detected in any of the eiders.

Results: Contaminant Effects

Microscopic examination of livers, kidneys and testes did not reveal any tissue damaged by contaminant exposure. A minor parasitic infection caused inflammation in the livers and kidneys of a few birds.

Metallothionein (MT) is a protein that helps protect animals from toxic effects of exposure to heavy metals, such as cadmium. MT concentrations in spectacled eiders were lower than we expected.

Discussion

Although high concentrations of organic chemicals, such as PCBs, have been reported in other high-latitude animals, chlorinated organic compounds were barely measurable in spectacled eiders.

However, high concentrations of some metals, including copper, cadmium and selenium, were found. Chronic exposure of wild birds to copper has not been well-studied. However, spectacled eiders in this study had higher concentrations than Barrow's goldeneyes from southeast Alaska or snow geese that winter in Pacific waters.

Spectacled eiders had high concentrations of cadmium, so we expected their concentrations of MT to be high as well. However, their MT concentrations were lower than we expected, and were much lower than in other marine birds that have been exposed to high levels of cadmium.

This could be affecting their ability to fight the toxic effects of certain metals that MT helps to eliminate.

Selenium concentrations in spectacled eiders were some of the highest yet found in marine birds. Although selenium poisoning can cause reproductive failure and death in other water birds, this has not been investigated in spectacled eiders.

Other metals of concern, such as lead and mercury, were not found to be unusually high in spectacled eiders in this study.

Conclusion

Male spectacled eiders migrating through the St. Lawrence Island area were apparently in good condition. However, high concentrations of metals and subtle biochemical changes may have long-term consequences not measured in this study.

*People of the St Lawrence Island village of Gambell provided snowmobile, boat, and guiding assistance.
Photo by Kim Trust, USFWS*



The complete investigation is published under the following citation:

Trust K.A., Rummel K.T., Schuehammer A.M., Brisbin Jr. I.L., Hooper M.J. 2000. *Contaminant Exposure and Biomarker Responses in Spectacled Eiders (Somateria fischeri) from St. Lawrence Island, Alaska*. Archives of Environmental Contamination and Toxicology 38:107-113.

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April 2001