

# Geese in Humboldt Help Eelgrass

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## Background

On their annual northward migration, tens of thousands of brant geese descend on Humboldt Bay to feed on the long green ends of eelgrass. It might seem grazing could hurt eelgrass, which provides important vegetation and habitat for many marine species. However, this is not the case. California Sea Grant research shows that grazing by geese, at its current intensity level, stimulates eelgrass growth.

“We were concerned people might automatically assume that anything eating eel grass must be bad for eel grass,” said botany professor Frank Shaughnessy of Humboldt State University, explaining his interest in studying the effects of geese on eelgrass ecosystems in Humboldt Bay. “It is not true.”

## Findings

Brant geese eat the innermost, nitrogen-rich leaves. They do not pull the plants out of the ground or eat their shoots. This is why they are not destructive. “They leave the rest of the plant in excellent condition to produce more leaves and shoots,” Shaughnessy explained, citing the research results of colleague Jeffrey Black, a wildlife professor also at HSU.

The professors and their graduate students, Sea Grant Trainees Susannah Ferson and Adam Frimodig, theorize that grazing benefits eelgrass by increasing sunlight to the plants and by fertilizing plants with fecal material.

Eelgrass cannot survive in murky water. “Its need for light is its Achilles heel,” Shaughnessy said. This is why water quality issues are so important in conserving eelgrass beds.

“With the grazing, you have given eelgrass more light,” he said. “It is going to grow more quickly, but now its demand for nitrogen has increased.” This is where the fecal material kicks into action. Feces provide nitrogen. “If you don’t have fertilizer, you don’t get the effect.”

## Project

The scientists’ conclusions are based on a series of field experiments in Humboldt Bay, home to about 45 percent of the state’s eelgrass beds. In these, they mimicked the effects of brant geese by clipping eelgrass and depositing fecal material in control sites.

“Eelgrass growth rates did not increase if you only clipped leaves or only added fecal matter,” he said. “We had to do both.”

The intensity of clipping was based on the current size of the visiting geese population—about 80,000 birds annually. If there were many more geese or a lot fewer, the eelgrass beds could suffer.

A second component of the Sea Grant project was to examine the influence of geese on marine animals. The idea was to look at whether increased eelgrass growth caused by grazing could also be linked to patterns in marine animal ecology.

“The geese increase the productivity of the eelgrass,” Shaughnessy said. “Ultimately, this grass is consumed by animals. So, if the geese make the eelgrass grow faster, they are supporting more animals.” Though the concept is solid, in practice it has proven difficult to observe because two other factors appear to swamp the relatively subtle influence of geese—weather and predatory fishes.

“When it is stormy, the bigger fish are gone,” he said. “We think ocean currents and waves prevent fishes and their larvae from entering eelgrass beds. We saw larger Dungeness crabs in the study sites that received both clipping and fecal material, when the weather was calm and the larger fish predators were absent.”

The scientists will soon be sharing their findings with managers to help them improve eelgrass conservation in the region.

### California Sea Grant College Program

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## Collaborators

California Department of Fish and Game; Humboldt Bay National Wildlife Refuge; Humboldt Bay Harbor District; and Humboldt State University's Telonicher Marine Laboratory

## Students

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## Publication

Ward, D., A. Reed, J. Sedinger, J.M. Black, D. Dirkson and D. Castelli. 2005. North American brant: effects of anthropogenic and climate events on habitats and population dynamics. *Global Change Biology*, 11:869-880.

## Presentations

Ferson, S.L., A.J. Frimodig, F.J. Shaughnessy and J.M. Black. 2004. Poster: Eelgrass response to simulated grazing by black brant. Western Society of Naturalists, Rohnert Park, Calif.

Ferson, S.L., A.J. Frimodig, F.J. Shaughnessy and J.M. Black. 2005. Poster: Eelgrass response to simulated grazing by black brant. 11th North American Arctic Goose Conference, Reno, Nev.

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Frimodig, A.J., S.L. Ferson, F.J. Shaughnessy and J.M. Black. 2004. Poster: Animal responses to the grazing and fecal fertilization of eelgrass by brant geese. Western Society of Naturalists, Rohnert Park, Calif.

Frimodig, A.J., S.L. Ferson, F.J. Shaughnessy and J.M. Black. 2005. Poster: Animal responses to the grazing and fecal fertilization of eelgrass by brant geese. Meet the Scientists Day, Natural History Museum, Arcata, Calif.

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Frimodig, A.J., S.L. Ferson, F.J. Shaughnessy and J.M. Black. 2005. Poster: Animal responses to the grazing and fecal fertilization of eelgrass by brant geese. Pacific Estuarine Research Society, Charleston, Ore.

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