

# Identifying the Impacts of Commercial Oyster Aquaculture on Foraging Behavior of Red Knots in Delaware Bay

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**Red knot (*Calidris canutus rufa*) within a flock of migrating shorebirds on Delaware Bay.**  
Photo - Brian Schumm

Shellfish aquaculture is a rapidly growing industry along the Delaware Bayshore, infusing millions of dollars into local economies each year. A particular area of growth

over the last decade has been off-bottom (containerized) production of eastern oysters. Although a relatively small endeavor at present, the rising public interest in boutique oysters for the half-shell market (termed the “Oyster Renaissance”) coupled with the low-tech nature of oyster tending makes oyster farming an attractive investment for the small-business entrepreneur. Delaware Bay is also a critical stopover site for the *rufa* subspecies of the red knot, which migrates from its wintering grounds in the southern reaches of coastal Argentina to its breeding grounds in the Canadian Arctic. This 7000+ mile migratory journey is energetically taxing, and red knots must stop and ‘refuel’ along the migratory pathway. Red knots rely heavily on the lipid-rich eggs deposited by spawning horseshoe crab females in Delaware Bay to gain enough weight to complete their migration and begin their breeding season. Overexploitation of horseshoe crabs, combined with the loss of their spawning habitat, has reduced this critical food supply and is associated with dramatic declines in red knot populations in recent years, threatening the species’ persistence.

Intertidal oyster aquaculture occurs within portions of the same tidal flats where horseshoe crab spawning and red knot foraging occur. The recent federal listing of red knots as threatened has charged the United States Fish and Wildlife Service (USFWS) with implementing strong protection measures that will ensure

the persistence of the subspecies. As part of this mandate, the USFWS must determine whether oysterculture permits will be issued, and if so, what oyster tending activities are allowed or prohibited during the duration of the migratory stopover. Currently, the potential impacts of oyster aquaculture activities on red knot foraging have not been quantified, severely challenging the development of oyster tending guidelines that minimize negative impacts to red knots without compromising farm viability. As a result, the lack of robust, objective scientific data impedes the acceptance of proposed guidelines by current oyster growers.

Both the USFWS and the oyster aquaculture industry are open to developing tending practices that promote economic growth while allowing red knots to meet their energetic needs. The information to be obtained in this study is key to identifying and resolving potential conflict between the oyster aquaculture industry and red knot conservation groups by providing a baseline understanding of how intertidal rack and bag oyster aquaculture, as it is currently practiced, may be affecting red knot foraging. Results will inform the development of appropriate and effective protective measures for red knots while also facilitating the exchange of information among the oyster aquaculture industry, USFWS, the NJDEP Endangered and Nongame Species Program, and the New Jersey Bureau of Shellfisheries to promote modifications to current practices that will ensure the persistence and growth of a key industry in the region.



**Collection of behavioral observations of red knots during oysterculture activities.**  
Photo - Ethan Gilardi