



# Behavioral responses of Herring Gulls, *Larus argentatus*, to lobster fishing in the eastern Gulf of Maine



Yoko Bowen  
Island Research Center, College of the Atlantic, 105 Eden Street,  
Bar Harbor , ME 04609 ybowen@coa.edu



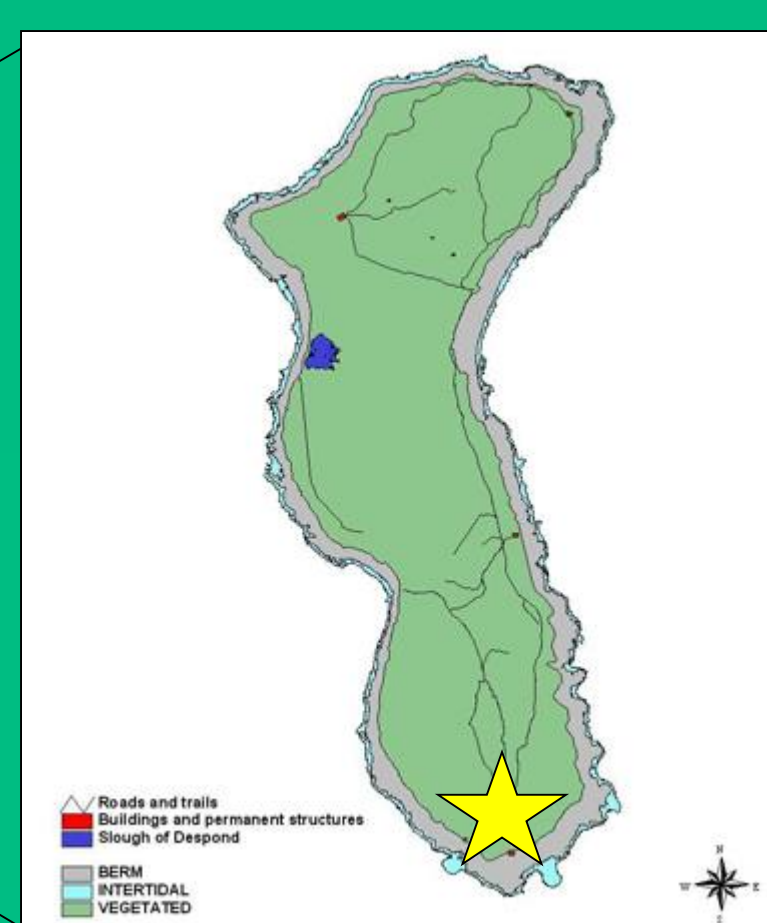
## Abstract

Lobster fishing is an iconic element of communities in Downeast Maine. Lobster traps are typically baited with herring, *Clupea harengus*, which is discarded when traps are pulled. Some lobstermen toss bait immediately overboard, while others bucket the bait for later disposal. Prior studies show that a significant portion of food fed to young gulls in Maine consists of lobster bait discards. During the summer of 2008, I observed gulls responding to lobster boats fishing in the vicinity of Great Duck Island, an off-shore island in the western Gulf of Maine. Over the course of 6 weeks I was able to observe gull behavior around 30 boats, with repeat observations of vessels concentrating their activity in the immediate vicinity of the island. I also analyzed 20 samples of food boli regurgitated by young gulls during banding procedures. Flock sizes around boats were recorded for fishing vessel behaviors that included rapid transit, slow, stop, turn, hauling trap, trap up, toss lobster and bait over. Gull numbers in the vicinity of lobster boats increased in apparent response to visual cues from gulls already over boats and also to lobster boat activity. Peak numbers of gulls (Max = 57) were observed over boats that were actively tossing bait. Some gulls persisted in following boats that were not throwing bait, although flock size never exceeded 12. Eight out of 20 sample food boli contained lobster bait. Bait was found in samples collected on both clear and extremely foggy days, suggesting that gulls may also use aural cues to locate fishing vessels.

## Introduction

Lobster fishing provides easily obtained food with little energy input for Herring Gulls. A survey taken in 2005 determined a mean average of 557 traps in the water per lobsterman (GMRI, 2008). In 2004, 0.45 to 1.6 million Kg of herring and alewives, was harvested for the use of lobster bait (Kircheis *et al.*). All lobster boats dump bait after their traps are hauled up and replace the old bait with new bait. Some boats dump the bait immediately while others keep the bait in a bucket to toss later. With large numbers of traps in the water, copious amounts of bait are available after dumping. Studies in 1999 and 2000 suggest that lobster bait is a major food source in Penobscot Bay, Maine (Goodale, 2001). In 2008, I investigated the foraging behavior of Herring Gulls around lobster boats and looked for the gulls response to specific boat actions or cues from other gulls that signified possible food availability. Logically, gulls would want to follow boats with the most extended dumping period because of the quickness with which bait sinks and thus becomes inaccessible. A boat that tosses bait every time the trap is pulled provides more food for a gull in the long run than bait tossed all at once. I wanted to determine how the gulls foraged around lobster boats and if patterns would show gulls following specific boats based on dumping habits.

My study took place on Great Duck Island, 19km south of Mount Desert Island, Maine, at 43° 9' North and 68° 15' West. The Alice Eno Research Station is located on the southern tip of the island which is also the location of the island's largest breeding gull colony. Observations were taken from the Great Duck Light tower, where about 290° of visibility over the water is available. The remaining arc of visibility is reduced by the woods immediately north of the light. Lobster fishermen place traps in the waters around the island and are visible from the tower for a majority of their work. The lobstermen work a string of traps traveling slowly around the southern tip of the island, providing a long period of boat interaction with the gull colony and making the tower an ideal place for observations.



Study site –Great Duck Island

## Methods

Tower observations took place every day, weather permitting, with the exception of Sunday (Maine fishermen do not fish on Sundays), from 0500h-0700h, and then again from 0730h until the boats were out of view. A Kowa spotting scope with 20-60x magnification was used for observations. For each boat, the following information was recorded: date, time, boat name, buoy color, boat action with regards to bait, boat number, and harbor of origin. In addition, gull behavior around lobster boats was recorded. I also recorded the number of gulls behind each boat during the following activities: slow, stop, hauling trap, trap up, toss lobster, bait over, turn, and rapid transit. Observed gull behaviors included distance from boat, number of gulls circling overhead, number of gulls on the water, and whether the gulls flocked immediately or slowly trickled closer to the boat.



Two boats lobster fishing off Great Duck Island with flocks of Herring Gulls after bait has been tossed.



The tower Located at the southern end of Great Duck Island where observations took place.

## RESULTS

BOAT ACTIVITY	MEAN # OF GULLS	STANDARD DEVIATION	SAMPLE SIZE N=
SLOW	8.86	11.47	7
STOP	7.13	10.45	31
HAULING TRAP	4.00	7.48	18
TRAP UP	6.46	7.71	28
TOSS LOBSTER	8.75	9.27	12
BAIT OVER	14.83	14.61	12
TURN	2.75	2.87	4
RAPID TRANSIT	5.98	5.82	48

## Discussion

Tossing of bait increased the numbers of gulls observed in the immediate area around a boat. The largest mean number of gulls recorded was 14.83 when bait is being tossed. The smallest mean number of gulls observed was 2.75 when boats were turning on a new course or towards a new string of traps.

The foraging behavior of gulls was different for each boat. The greatest number of gulls was recorded around boats when food was available with minimum effort. *Courtney Jean* and *Linda Sea* are two boats that actively toss bait straight from traps, providing an almost constant stream of easily accessible bait. These boats attracted the greatest numbers of gulls – between 28 and 57 immediately after bait was tossed. Additional gulls did not flock at earlier cues such as “stop” or “boat moving” when numbers in close proximity were between zero and four. One boat provoked a consistent reaction from gulls when crew-members pulled bright yellow bait bags from traps. In one instance numbers around the boat went from 10 to 27 as soon as the bait bag was visible. Another boat, *Sandi Lee*, had the highest number of gulls (14) around it when it was in rapid transit. Further observation showed that gulls were picking bait off the side of the boat where the sternperson dropped it while dumping old bait into a bucket for later tossing. This behavior of stealing directly off the boat itself was only seen with this vessel.

Consistent observations for all boats, both while tossing and holding bait, showed that two or three gulls typically followed the boat while it was in rapid transit and the majority stay behind. As the boat came to a stop, the rest of the gulls slowly trickled closer one or two at a time. In one case, one gull followed the boat while 31 stayed behind, then these birds slowly trickled to the boat after it stopped. Often as the boat tossed “short” lobsters the gulls nearby congregated closer but the number of gulls did not increase. While the gulls were in close proximity to one another, I observed that when one gull “twitched” or lunged at prey all others reacted even if no bait was tossed. This suggests that the gulls are using visual cues from other gulls in addition to cues from boats.

Another component of my study involved checking chick regurgitations for the type of food being fed to determine what amount of food was bait. Not enough samples were collected to get conclusive evidence on the amount of bait in the herring gull diet but there is some suggestion that bait is the primary food of choice on foggy days and fresh-caught fish is the choice on clear days. Further study may show more conclusive evidence of a pattern between food and weather.

In conclusion, this study shows that the behavior of gulls is affected by the activities of lobstermen, and the amount of gull food from this source may in turn be limited by changes in patterns of lobstermen's behavior. Given the importance of bait in Herring Gull's diet (Goodale 2001; this study) , changes in the fishery may have important consequences in feeding patterns and population dynamics

## Sources

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