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Flounder Silhouette Modification Aids Lobster Catch more than Mirror Modification

Nestor P.
Center for Teaching and Learning, Edgecomb, Maine

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Nestor
Abstract:
Lobstering has a big impact on the community, and these trap modifications could have an impact on the lobstermen. It would give Maine lobsterman more money per trap and make it easier to lobster. We used basic materials to make the silhouettes, and bought the mirrors, we taped them on and put them into the water for one week. We did this in Boothbay Harbor ME. The silhouette traps caught the least bycatch per lobster and caught the most lobsters with seven. The control caught two, and mirrors only with one. With all of this information we have figured out that you should use flounder silhouettes to help attract lobsters. Our data may have not been completely perfect because we only set them six times. I would not use the mirrors because they are dangerous and hard to put onto that trap and seems to repel lobsters. We know this from the graphs of the data. You should use flounder silhouettes on your traps.

Introduction
Lobstering brings in 484 million per year to the Maine economy. From last year that number was increased by 46 million, they caught 120 million pounds of lobster. There are about 4,600 lobstermen in Maine that have a license. They haul around 2 million to 3 million traps per year. Lobstering is very important to Maine because in a way it is Maine's trademark and draws millions of visitors each year, and the lobstermen aren't the only people living off of the lobster catch, some lobster shacks, and restaurants sell the lobster, increasing there sales and keeping them running. Also, the lobster industry is the most valuable ocean product in all of the United States.

Every week a lobsterman will set between 300 and 600 traps, re-baiting, checking lobsters, and throwing away bycatch for each one. The costs for the fish in the re-baiting per trap are $1.50 (using 1lb. of pogey) and it is predicted to double over the next two years. The bait bag itself is about $1 (homemade) and tools for measuring lobster are about $5 along with knives, banding pliers, and other tools that can run anywhere from $10 to hundreds of dollars. For the keepers, they then band the lobsters which are five cents for each band. On top of those costs, lobsterman pay for insurance, the cost of boats, licensing, and any other fees associated with the marine business. And also the time every day and the man-power and labor.

Research shows that some modifications to traps are more successful than others. Bycatch reduction like sinking lead lines and putting holes in the traps to let immature lobsters escape have been used in the past and are law now. Some ways to reduce bycatch are having sinking lines and multiple traps attached to one line (The Office of Protected Resources, NOAA). Another way is using escape hatches for juvenile lobsters to escape, reducing bycatch (Lee G. Murray, Lewis Le Ve, Julia R. Pantin, Giulia Cambee). Before the 1970s most traps were made from wood, which eventually rotted and let trapped juveniles out. That's why the escape vent was invented. Modern-day lobster by-catch research includes "conservation engineering or gear design; spatiotemporal monitoring/management; and alternate strategies such as catch cap initiative…"(Chris Glass, Steve Eayrs, Jamie M Cournane). There have been multiple advancements in the trap, but the traditions of life-long lobstermen carried over and were not fully embraced by users (Chris Glass, Steve Eayrs, Jamie M Cournane).

I wanted to do this project because I wanted to see if lobster trap modifications could increase trap catch and/or reduce by-catch. One idea came from my dad who was a sternman or assistant to a lobsterman who set out 600 traps. The lobsterman he worked, William Coffin, said that his father put flounder silhouettes on the trap and was an old idea to increase trap catch. I wanted to see if that was

true. What he said it did was attract the lobsters because to lobsters poor eyesight the silhouettes look like a dead flounder for food. I am here to see if it is true and to find a logical reason that the flounder silhouette should flounder would attract the lobsters or deter them. The mirror idea was for reducing bycatch, so the predatory fish like a striper would see itself and be afraid.

So, in summary, I studied two research questions: 1. Do putting mirrors on a lobster trap effect the number of bycatch or lobsters caught? And 2. Does putting silhouettes of flounder on a trap affect the number of lobsters caught?

For the mirror experiment, I didn't think it would work because stripers and other fish don't use their eyesight to find dead food, they use scent, so I don't think they would even see themselves in the mirror. For the silhouettes, I don't think I will do anything because of the lack of eyesight the lobsters have.

So far we don't know anything about the topic prior to the research that we have done I think my research will have a big impact on the lobster community. This study has never been done before and would affect the lobster community by increasing the number of lobsters caught per year or the number of pogies eaten by bycatch saving both money and time to the lobsterman community.

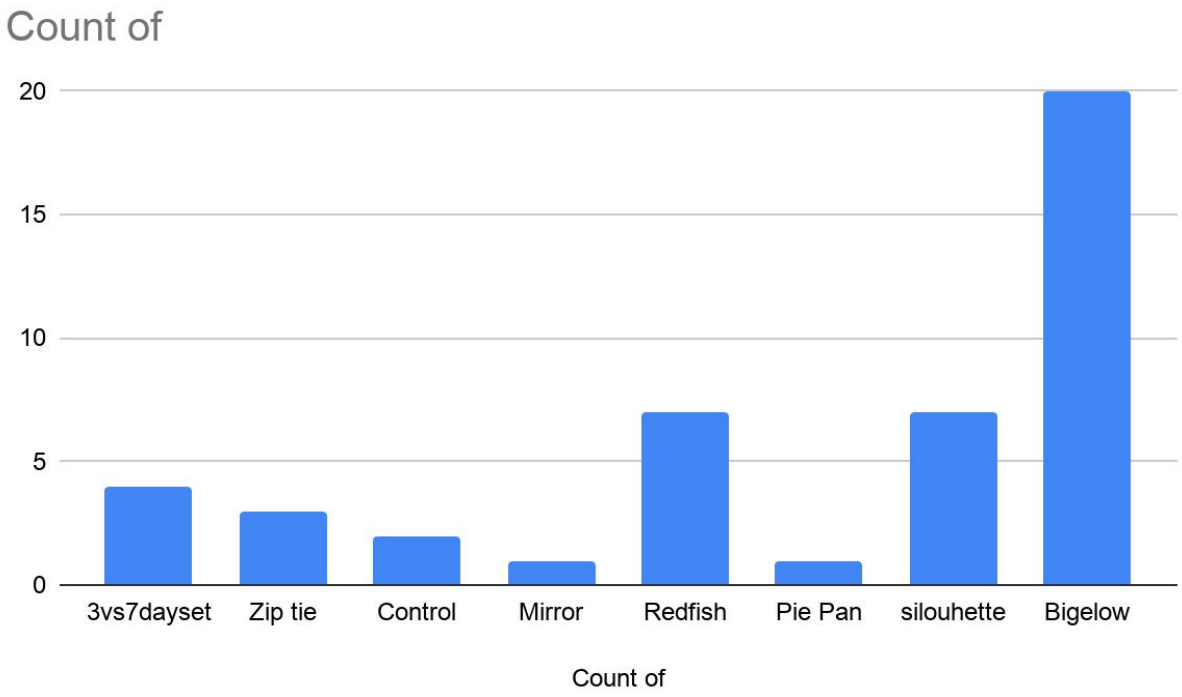
METHODS

After we bought the materials including mirrors, white and block foam, and hot glue, we created the modifications to each trap. In the mirror trap, we used a standard wire trap, cutting strips of mirror that we attached to the frame around the entrance. We used hot glue and zip ties to secure the mirror in place. To create the silhouette trap, we found black silhouettes of flounder online and printed them. Then, we cut thin black foam used to line kitchen drawers in the outline of the flounder about 7 inches from tip to the end. We then cut white foam slightly larger than the black cut out and hot glued them together. We heard from local lobstermen, that creating a flounder with a bright side and a dark side was supposed to attract lobster. We created two silhouettes and placed them with zip ties in the "parlor" of the standard wire trap.

To start our experiment, we brought the modified traps, and control traps out to a dock in West Boothbay Harbor behind the Aquarium at McKown Point Road (43°50'40.3"N 69°38'27.5"W). Then we would bait them with two pogies each and set them for seven days.. Then after the seven days, we would come back out and pull the traps, then we recorded every creature in the traps, size, gender, claws, eggs, and if it was soft shell or hard shell. Then we would re-bait the trap and throw the all of the traps back into the water.

The data we collected is reasonable because we gathered all the information we needed and all of the traps had the same number of days being set before being pulled. We pulled all of traps the same number of times, so there would be no bias that way. The data we collected was numeric and over six days, we wrote down everything that was caught in the trap each time we pulled it to analyze the data. We first used a table when we went out and turned it into a graph. I got this data from comparing the variables to the control trap. All of the traps were within 5 feet of each other.

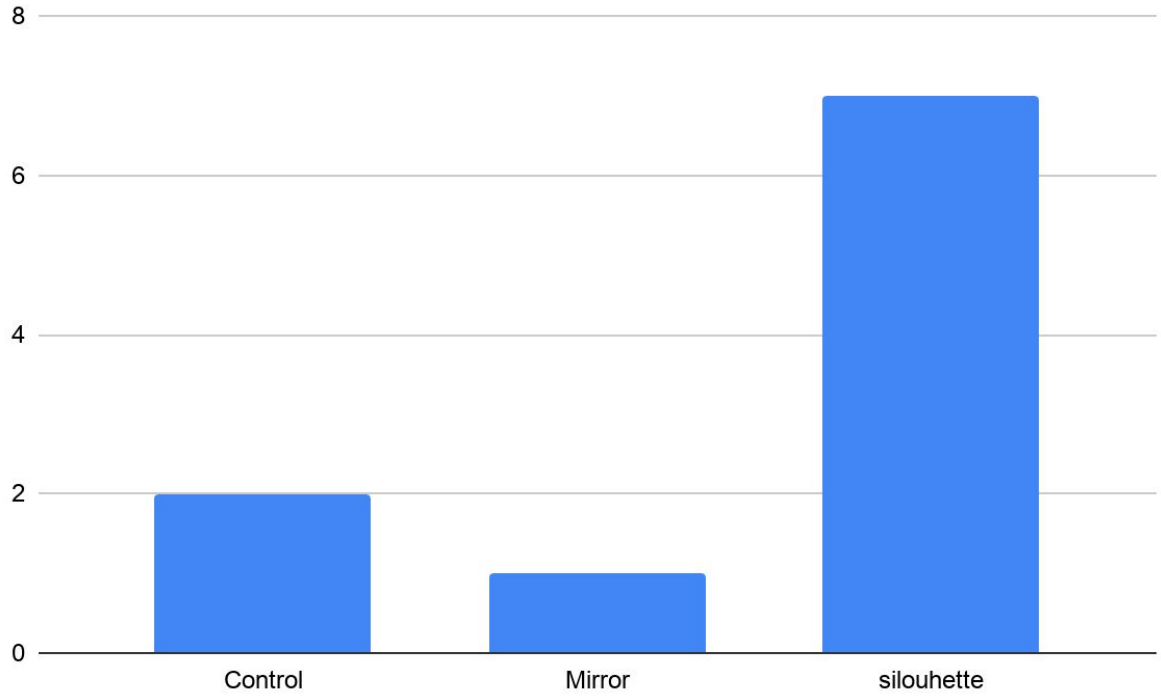
RESULTS



Graph #1

<u>Count of all Lobsters Caught in the Trap</u>

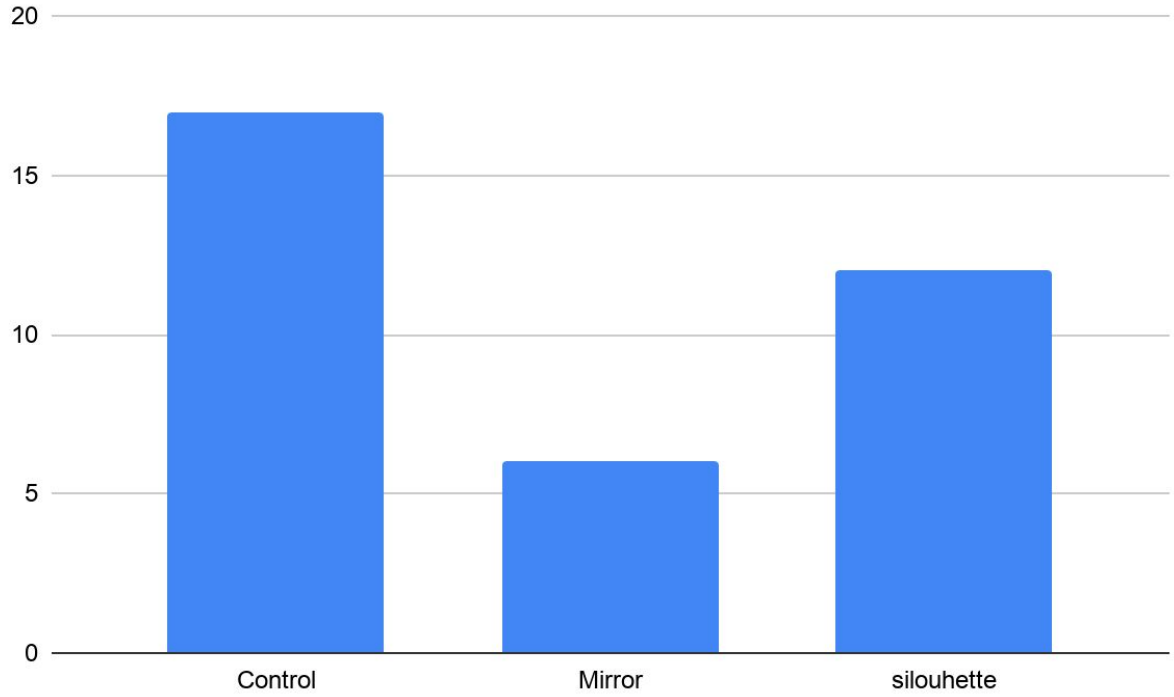
Although our study focussed on mirror and flounder modifications, Graph #1 depicts all of the lobsters caught in the specific trap to compare our modifications to all the rest. This is important to give some idea if the numbers of lobster caught in our traps was significant versus all of the other modifications and the control. As you can see, the mirror trap was the modification with the least lobsters caught (1). The 3vs7 day set was seeing if one trap would catch more based on the time in the water. The zip ties were where we put zip ties on the kitchen door so bycatch could not get in. The control was a regular trap. The redfish we used redfish instead of pogies. The pie pan was if putting doors on the traps would keep the lobsters inside the traps. And the Biglow was setting the trap at a different location. On the other hand, the silhouette modification is the second most lobsters caught with seven. The control has two lobsters caught. The mirror is half of the control (1) and the silhouette is almost four times more lobsters caught (7).



Graph #2

All Lobsters Caught by Only These Three

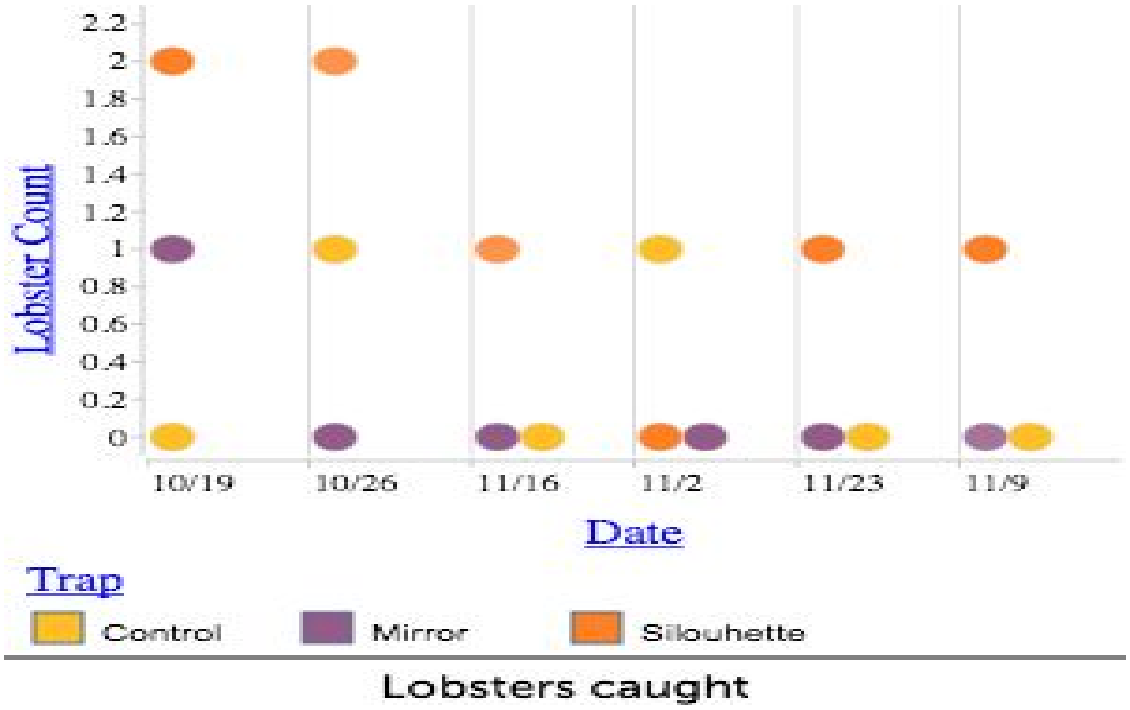
Graph #2 is a part of the chart above, but this graph only includes the modifications I am researching. The control caught two lobsters over the time;, the mirror trap caught one; and the silhouette trap caught seven. We can see that the silhouette trap caught more lobsters then both the control and mirror trap combined.



Graph #3

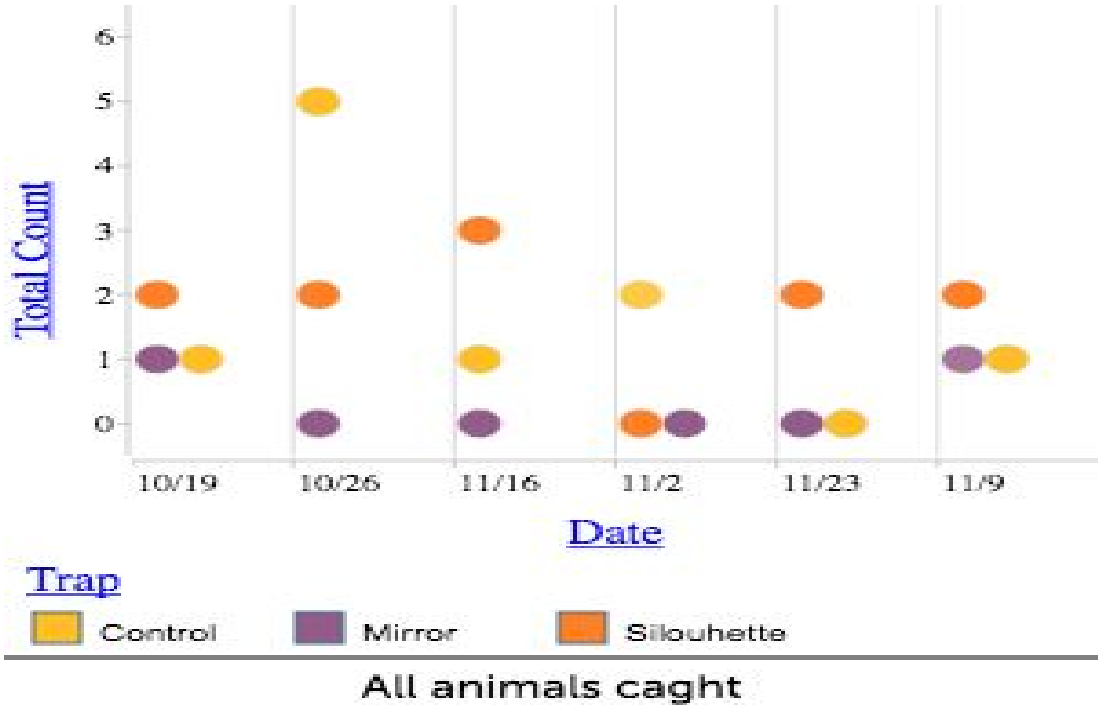
All Animals Caught

Graph #3 is focussed on my topics again, but depicts all of the species caught: green crabs, Jonah crabs, rock crabs, and lobsters. Here you can see that the Control had seventeen animals caught, only two of them were lobsters. For the mirror trap, you can see that only caught six creatures, and only one of which was a lobster. The flounder silhouette traps caught twelve animals in all, and a whopping seven of them were lobsters. This shows how many more lobsters to others were caught in the silhouette trap.



Graph #4

Graph #4 shows the total number of lobsters caught on a time series dot plot. The mirror traps data is purple and its high was one lobster only on 10/19. For the control traps, which is yellow, the highest number of lobsters caught in one day was also one on both 10/26 and 11/2. The silhouette modification trap which is in orange, had a high of two lobsters caught (on 10/19 and 10/26), with an average of 1.166 lobsters per day. For the control, the average was .33 lobsters caught per day. For the mirror, the average number of lobster caught per day was .166 lobsters per day.



Graph #5

Graph #5 is a time series dot plot of all the animals caught by each trap. Now the mirror traps have a high of one animal still (on 10/19). For the control trap, the biggest catch was 5 animals on 10/26 and silhouette trap's high is three animals caught. The mean number of animals caught for the control traps was 1.66 animals caught per day. The mirror traps averaged .33 animals caught per day. The silhouette trap averaged 1.83 animals caught per day.

Discussion & Conclusions

Based off of the data collected, I think that the flounder silhouette modified traps worked better to catch lobsters than a control trap.

Here is the data that proves my point. In terms of the mirror modifications, we found out that the mirror traps were too dangerous to pull, with mirrors being broke when the traps were hauled. The mirror traps were not worth the extra money and were more expensive than the flounder silhouettes. In all, the mirrored trap only caught two creatures, only one was a lobster after being set 8 times. The control only caught two lobsters but attracted ten animals total. Maybe this means that the mirror trap can reduce by-catch, but also means that it showed lower lobster catch numbers too.

The flounder silhouette modification has proven to be the way to go with five lobsters caught and 14 animals in all. You can see from Graph #4. The silhouette trap caught the most lobsters in one day (2). The control traps had more bycatch caught per lobster, this is not necessarily a bad thing but you don't want bycatch to eat your bait and keep out lobsters.

The patterns in the data show that throughout the fall dates the total number of all animals went down. This could be due to colder weather or wear on the modifications. The silhouette trap consistently caught more lobsters than the others. This helps prove my point by showing that the silhouette is catching more over time as well as in total.

There is no way that the mirrors could be better because they caught one lobster over six weeks or being in the water. The control can't be better because it had the highest by-catch to lobster ratio, which is, ¼ so ¼ of all bycatch caught there was a lobster.

Because we only had a limited number of samples (8), we may not gathered enough data, so our conclusions might not be one hundred percent true. There may be some biased in miss measurement and the number of traps pulled but it would not make a big difference because any lobster counts as a lobster do no matter the size. In order to fix each of these, we could pull the traps over an entire lobstering season, place the traps off a boat not tied to a dock, and double checked all of our measurements when we pulled the traps. But we had limited time and only could pull the traps a limited number of times and couldn't find a lobsterman that would place our traps. I think having a lobsterman put flounder silhouettes in 10% of his traps and then gathering data over a summer would give more conclusive results.

Even so, are results are important because this could have a big impact on the lobster community and change lobstering forever. Lobsterman could increase their catches simply by adding a flounder silhouette to the parlors of their traps. Even though the cold fall temperatures might have effected the catch towards the end of the data sets, we could test this theory in the summer. In fact, some lobstermen already put flounder silhouettes on their traps and they also think that they attract lobsters, but now we may have some proof. If you are a lobsterman and reading this, try it out for a few sets and see how it catches. I don't think you will be disappointed.

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