

Factor(s) that may influence the number of striped bass that congregate near the Marine Biological Laboratory

Background

A group of striped bass assemble in Eel Pond, Woods Hole, MA during the spring/early summer. The fish remain in shallow water behind the Marine Resources Center (MRC; a building that is part of the Marine Biological Laboratory [MBL] campus) during the day and can be counted. The fish were fed daily by the counter, generally between 7:00am and 9:00am.

The striped bass react to the presence of humans and movements that they make (i.e., they associate humans with feeding). Thus the presence of humans may affect the fish count. The database is chosen for July/August 2020, in part, because Covid 19 restricted the access of the study area to scientists and the public. Thus, the number of people that might feed or trigger expectation of feeding was reduced.

The Gemma is the MBL collecting vessel that nets squid and fishes off of Martha's Vineyard. These organisms are brought back to the MBL for use by resident and visiting scientists. Generally, the Gemma leaves Eel Pond at 8:00am through a channel that has a drawbridge and returns between 12:30 and 2:30pm. The Gemma goes to catch squid 2-3 times per week from May until November. We have chosen data during July and August when the fish counts are relatively constant.

Are the number of fish behind the Marine Resources Center(MRC) affected by factors that occur in and around Eel Pond? For example, do the number of fish change when the MBL collecting vessel (Gemma) returns to Eel Pond with squid? One might hypothesize that striped bass would move from their gathering location behind the MRC towards the boat (sites are about 50' apart) as it docks to feed on fish and squid that drop into the water from the nets. You can test this and other hypotheses with this database.

Possible factors that affect striped bass numbers:

1. The MBL collecting boat (Gemma) leaves Eel Pond 2-3 times/week to collect squid and fish from the offshore waters of Menemsha, Martha's Vineyard. Do striped bass follow the Gemma out of Eel Pond? The fish might identify the engine signature in conjunction with the lifting of the drawbridge. One might hypothesize that the number of fish behind MRC would decrease.

When the boat returns to deliver organisms to scientists, dead fish and squid are dropped over the side and are available to the striped bass. Could striped bass sense the return of the Gemma and move from behind MRC to where the boat docks?

2. Early in the morning outside lights go off and inside lights come on. Might striped bass use these signals to congregate behind MRC?

3. A MRC garage door just above the location that striped bass congregate is generally opened by 8:00am in the morning and may be a signal to striped bass that food will follow.
4. When striped bass are fed, their activity creates noise that might be a signal to other striped bass in the vicinity of the presence of food. One might hypothesize that the number of fish behind MRC will increase during feeding.

Questions:

1. Can you think of other factors that might influence the number of fishes that congregate?
2. How do you control for the multiple variables that might affect the number of striped bass that congregate?
3. The fish disperse in the evening—Why?
4. How early do you think the fish arrive in the morning?
5. Are there other experiments you can think of that you can suggest for future study?

Description of the Dataset:

There are three tabs in the Excel database as listed below. Each tab contains 7 columns: date, time of count, fish count, whether the Gemma is in Eel Pond or not, whether the outside lights are on or off and whether the inside lights are on or off.

1. Controls; Gemma in, Door is closed; 7/15-8/8/2020
Fish counts were taken with the garage door closed. The counter was the first individual behind MRC in the morning and counts were made before fish were fed.
2. Counts when door is open or is closed; 7/18-8/8/2020
Counts made when either the garage door was open or was closed. In addition, the counts were made after a first feeding and before a second feeding (about 15 minutes between the two). One can determine the possible effect of the garage door on the counts within this data set. One can also determine the possible effect of feeding on fish counts by comparing data in tab 1 (door closed) with that in tab 2 (door closed).
3. Gemma in or out of Eel Pond; 7/13-8/6/2020
Exiting Eel Pond to catch squid
Prior to 8:00am a fish count was taken while the Gemma was docked and at about 8:10am after the Gemma left Eel Pond and the drawbridge was closed.

Returning to Eel Pond to deliver squid

Prior to entering Eel Pond and before the drawbridge was up, fish were counted and then the fish were counted again after the Gemma docked.

This database will allow you to test whether the presence or absence of the Gemma affects fish counts.