Jayla Zimmerman

Dr. Reynolds

Marine Biology-6

October 15, 2015

The Behavior of An Artificial School of Fish

1. Abstract

A school of fish is created in order to protect themselves from predators, fish are able to find more food with a larger group, an increase in the reproduction rate of those species, and improves the way that the fish swim. Usually fish school for mating and to help train the juveniles. In this experiment an artificial school of fish will be tested based on the behavior that they will display over the span of a few months. The artificial school fish consist of a male and a female *premnas*, *paracanthurus hepatus*, *elecatinus*, *siganus vulpinus,* and *zebrasoma flavescens*. This experiment will test the reaction of the fish such as chasing, fleeing, hiding, feeding, swimming. Also the fishes’ position in the tank will be tested along with the daily tank conditions. Over the span of these few months, this artificial school of fish will behave similarly to a school fish that is created naturally.

1. Introduction

Behavior is the way something moves, functions, or reacts. (1) Behavior is determined by the reactions of people and organisms in certain situations. Natural selection also plays an important role in the observing of a school of fish. In this year- long project, data will be collected to test the behavior of a school of fish that consist of*two premnas biaculteas, siganus vulpinus , a elactinus oceanops,* *paracanthurus hepatus,* and *ctenochaetus cf. striatus.* (2)

A school of fish is a well- defined group of fishes of the same species. (3) Fish school because of social and genetic reasons such as finding food in larger quantities, protect themselves from prey, swim more efficiently, etc. (4 &5) These are the most important aspects of why the fish swim because they fulfill the everyday requirements for a fish’s life. The fishes realize the more fish they have, the more chances they will have of collecting food. This especially benefits the smaller fish or juveniles since they are not use to finding their food yet. Feeding gives them the nutrients to stay alive and reproduce more of fish so that gene pool is higher for them to even more obtain food and reproduce.

Predators are an important to the observing of the behavior of marine fish. Fish with a high temperate will most likely be bully to the other fish. These fish are known for showing signs of aggression through nipping and chasing. Aggression can be caused by protection of the fish’s territory. (5) When a fish is bullied, it has a chance of committing suicide by jumping out of the tank. In most cases the fish will fight and the prey will usually end up wounded. Immediately the injured fish or the predator can be temporarily placed in a quarantine tank to heal or to learn “learn its lesson”. (5) This can lead to stress on the other fish, creating problems with the functioning of the school of fish. For example, the *paracanthurus hepatus* and *premnas biaculeatus* are semi- aggressive fish and would most likely fight over territory and offspring. (7, 8 & 9) *Paracanthurus hepatus* show their aggression by thrashing their tail from side to side while *premnas biaculeatus* will target one enemy and attack them. (10&11)

In this year- long project, data will be collected to test the behavior of a school of fish and whether an artificial school of fish’s behavior is similar to a natural school of fish’s behavior. This experiment will consist of observing the reactions of the artificial school of fish and whether or not it is similar to the behaviors of a natural artificial school of fish. Everyday the fishes’ behavior will be observed and recorded on datasheets, which eventually be entered into an excel spreadsheet that will hold all of the fishes’ data. In these datasheets, there are tables for behaviors and feeding for the fish and tank conditions of this two hundred gallon tank. In this experiment lighting will not be changed and water chemistry will stay consistent.

1. Questions:
   1. How does feeding the school of fish twice or three times a day affect their behavior?
   2. When food is placed in the tank, will the artificial school of fish assist each other in obtaining the food for the younger fish as they would in natural school of fish?
   3. How will the school of fish be affected if two of the fish in the tank get into a fight?
   4. How would another fish in the tank effect the behavior of the school of fish?
   5. How will the younger, male *premnas biaculeatus* affect the behaviors of the school of fish as it is transitioning into being on its own and not under the protection of his mother?
2. Hypothesis:
   1. Over the span of these few months, this artificial school of fish will behave similarly to a school fish that is created naturally.
3. Design of Research:
   1. Salinity, temperature, and pH will be collected daily.
   2. This ethogram describes the behavior and areas of the tank e during that day and it will be recorded on the datasheet. Over the past couple of weeks these behaviors and positions in the tanks have been observed and recorded on the datasheets.

|  |  |
| --- | --- |
| Chasing | When a fish follows another fish in order to catch up. |
| Fleeing | When a fish gets scared and quickly swims away. |
| Hiding | When a fish gets scared or is playing a game with another fish and finds shelter. |
| Feeding | When a fish comes out to obtain and eat food. |
| Swimming | When a fish decides to explore the tank for food, other fish, or to find new shelter. |
| Front | The front area of the tank. |
| Back | The back area of the tank. |
| Surface | The top and bottom of the tank the fish can room. |

1. Schedule
2. I will check the tanks every Monday, Tuesday, Wednesday, Thursday, and Friday. I will be recording my data by using a notebook that will contain the datasheets that will represent all of the data that was collected for that day.
3. Supplies and Equipment
4. Two *premnas biaculteas*
5. One *paracanthurus hepatus*
6. One *siganus vulpinus*
7. One *elactinus oceanops*
8. One *ctenochaetus cf. striatus*
9. 200 gallon tank
10. Notebook
11. Refractometer
12. Thermometer
13. Ethogram

Bibliography

1. *Merriam-Webster*. Merriam-Webster, n.d. Web. 06 Nov. 2015. <http://www.merriam-webster.com/dictionary/behavior>.
2. Live Aquaria, n.d. Web. 4 Nov. 2015. <http://www.liveaquaria.com/>.
3. Castro, Peter, and Michael E. Huber. "Glossary." *Marine Biology*. New York: McGraw-Hill, 2010. 445. Print
4. "North Carolina Aquariums » Why Do Fish School?" *North Carolina Aquariums Why Do Fish School Comments*. N.p., n.d. Web. 06 Nov. 2015. <http://www.ncaquariums.com/ask-the-aquarium/why-do-fish-swim-in-schools>.
5. Wickham, Mike. "Aquarium Fish Agression." *Fish Channel*. Coast Tropicals, n.d. Web. 6 Nov. 2015. <http://www.fishchannel.com/fish-health/healthy-aquariums/get-a-grip-on-aggression.aspx>.
6. Graber, Shane. "Why Fish School the Way They Do [video]." *— Advanced Aquarist*. Advanced Aquarist, 31 Aug. 2012. Web. 15 Oct. 2015. <http://www.advancedaquarist.com/blog/why-fish-school-the-way-they-do-video>.
7. "Maroon Clownfish." *Live Aquaria*. N.p., n.d. Web. 6 Nov. 2015. <http://www.liveaquaria.com/product/prod\_display.cfm?c=15+1500+758&pcatid=758>.
8. "Common Problems with Clown Fish: Fighting." *Free Fish Facts*. N.p., n.d. Web. 10 Oct. 2015. <http://freefishfacts.com/common-problems-with-clown-fish-fighting/>.
9. "Saltwater Aquarium Fish for Marine Aquariums: Blue Tang." *Saltwater Aquarium Fish for Marine Aquariums: Blue Tang*. N.p., n.d. Web. 06 Nov. 2015. <http://www.liveaquaria.com/product/prod\_display.cfm?c=15%2B2971%2B330&pcatid=330>.
10. Fatherree, James W. "Aquarium Fish: Surgeonfishes, A.K.A. the Tangs." *— Advanced Aquarist*. Advanced Aquarist, Dec. 2009. Web. 10 Oct. 2015. <http://www.advancedaquarist.com/2009/12/fish>.
11. "Aquarium of the Pacific." *Aquarium of the Pacific*. N.p., n.d. Web. 02 Oct. 2015. <http://www.aquariumofpacific.org/onlinelearningcenter/species/false\_clown\_anemonefish>.
12. Graber, Shane. "Why Fish School the Way They Do [video]." *— Advanced Aquarist*. Advanced Aquarist, 31 Aug. 2012. Web. 15 Oct. 2015. <http://www.advancedaquarist.com/blog/why-fish-school-the-way-they-do-video>.