

## Regulated Research Institutional/Industrial Setting Form (1C)

This form must be completed AFTER experimentation by the adult supervising the student research conducted in a regulated research institution, industrial setting or any work site other than home, school or field.

Student's Name(s) William Hu

Title of Project Environmental Effects on Pelagic Fish Using Generalized Additive Models: Clupea harengus Case Study

**To be completed by the Supervising Adult in the Setting (NOT the Student(s)) after experimentation:**  
(Responses must be on the form as it is required to be displayed at student's project booth; please do not print double-sided.)

The student(s) conducted research at my work site:

1. Did you or your proxy (e.g. graduate student, postdoc, employee) mentor or provide substantial guidance to the student researcher? ☒ Yes ☐ No
- a. If no, describe your and/or your institution's role with the student researcher and his/her project (e.g. supervised use of equipment on site without ongoing mentorship and sign below.

b. If yes, complete questions 2 - 5.

2. Is the student's research project a subset of your ongoing research or work? ☐ Yes ☒ No  
Use questions 3, 4 and 5 to detail how the student's project was similar and/or different from ongoing research or work at your site.

3. Describe the independence and creativity with which the student:
- a. developed the hypotheses or engineering goals for the research project

The student developed the goals independently and prior to my mentorship based on literature. The student also independently modified the existing goals and created additional goals as the project progressed based on literature. The student's idea to use generalized additive models was very creative as generalized additive models are well-suited for explaining the complex relationships between environmental variables and herring biomass, but are not widely used because they are very difficult to develop and evaluate.

- b. designed the methodology for his/her research project

The student developed the research plan prior to my mentorship based on past literature. While the student executed the methodology, I provided general guidance by showing programs, packages, and functions applicable for each task. The student chose the specific methodologies independently based on literature. The student's methods were very creative as they were based mainly on his own statistical knowledge and literature on generalized additive models.

- c. analyzed and interpreted data

The student interpreted all data and evaluated all the models independently based on literature. I provided general guidance by showing him a few evaluation criteria graphs that helped me evaluate my models for my own project to help lead him in the right direction. The student ultimately chose the GAM formation and evaluation techniques based on a combination of his own statistical knowledge and past literature.

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**Continued**

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4. Detail the student's role in conducting the research (e.g. data collection, specific procedures performed). Differentiate what the student observed and what the student actually did.

The student conducted the project independently. I provided general guidance by showing him functions, packages, and graphs on R that I used for my own past projects to help lead him in the right direction. I did not provide specific guidance on exactly how to complete certain tasks as I do not often use generalized additive models in my own research. The student chose the variables, obtained the data, and completed variable analysis based on other literature. I showed the student several model construction and evaluation techniques. The student ultimately chose the specific model construction, penalization, and evaluation techniques based on a combination of literature and his own statistical knowledge.

5. Did the student(s) work on the project as part of a group?  
If yes, how many individuals were in the group and who were they (e.g. high school students, graduate students, faculty, professional researchers)?

☐ Yes ☒ No

I attest that the student has conducted the work as indicated above and that any required review and approval by institutional regulatory board (IRB/IACUC/IBC) has been obtained. Copies are attached if applicable.  
I further acknowledge that the student will be presenting this work publicly in competition and I have communicated with the student research regarding any requirements for my review and/or restrictions of what is publicized.

Adelle Molina

Supervising Adult's Printed Name

Stony Brook University School of Marine and Atmospheric Sciences

Institution

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Address

Signature

PhD Candidate

Title

11/30/19

Date Signed (must be after experimentation) (mm/dd/yy)

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