

## Computer Coding Challenge #2

**Problem:** It is cumbersome to do fish counts from video transects.

**Challenge:** Address this issue by harnessing the power of cloud computing, machine learning/artificial intelligence, and image recognition/processing. Create a program that counts how many fish are seen at any one instant during a video transect.

Video transect: [Computer Coding Challenge #2](https://vimeo.com/515388373/99dee8df99) video from the Gray's Reef National Marine Sanctuary. Video courtesy of diver/videographer Randy Rudd/Gray's Reef National Marine Sanctuary Foundation. <https://vimeo.com/515388373/99dee8df99>

Found in the western Atlantic Ocean, the black sea bass, *Centropristis striata*, is an important species for both commercial and recreational fisheries. In Gray's Reef National Marine Sanctuary (GRNMS), it is one of the predominant predators found on the reef. Researchers at the sanctuary use the abundance of fish, particularly the black sea bass, to help them assess the health of the ecosystem and create a management plan for the reef. However, current AI used by GRNMS researchers for seafloor/fish faunal surveys performs poorly. Scientists and researchers are left performing general counts manually, and entering that data into a spreadsheet. This is where you come in!



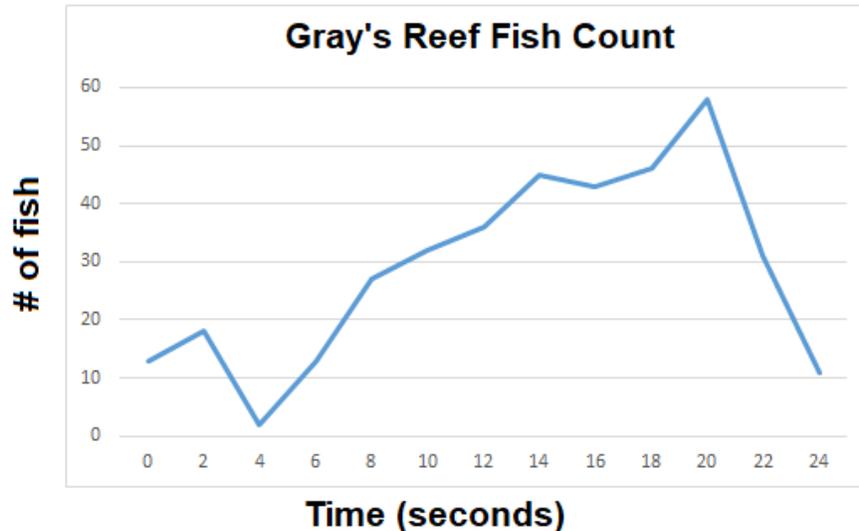
Photo from fisheries.noaa.gov

Your challenge is to design a computer program that counts how many fish are seen in any one frame of the video transect. You are to provide a graph showing how many fish are seen in a frame at a given interval.

The interval (how often you count fish in a frame) is up to you, but all teams must provide a fish count at every 10 second mark (0 second mark, 10 second mark, 20 second mark, etc.). Programs will be judged on the accuracy of their fish counts and how often the program is able to perform a count. For example,

a program that plots an accurate fish count every 2 seconds will rate higher than a program that plots an accurate fish count every 10 seconds.

Teams must submit a plot of the number of fish seen over time. The example graph below, plots the fish count every 2 seconds over a 24 second time period.



Example fish count graph covering 24 seconds of a video transect

Teams with the top programs will advance to the next round of the Computer Coding Challenge.

#### **Submissions:**

Teams undertaking the Computer Coding Challenge will have 4 weeks to create their program and deliver that program, the resulting graph with fish counts at intervals, an explanation of how the program/algorithm counts fish, and a video demonstrating your solution working real time, to MATE ROV Competition officials. The program, graph, explanation, and video must be submitted no later than 11:59 PM, Hawaii time, May 3, 2021. The following naming convention should be used for your submissions: School or organization name\_company name\_ document type 2021, where document type is either the program, graph, or explanation. The program, the graph, and the explanation of the algorithm should be submitted as PDF files. The explanation can include flow charts, tables, and code snippets, etc. The video should be uploaded to YouTube or Vimeo and a link provided to that video.

The program, spreadsheet, and video link should be submitted to the [2021 MATE Computer Coding Challenge #2 Submission](#) form.