ACTIVITY: FISH FETCH – FISHERIES SURVEY ACTIVITY

GRADE LEVEL PreK-8; can be scaled to older students

OBJECTIVE

Students will learn how to use sampling to estimate the size of a fish population.

BACKGROUND

Fish Fetch asks the question "How many fish are there?" and answers it using methods based on the surveys that Alaska Fisheries Science Center biologists use to estimate the size of fish populations in the Bering Sea and Gulf of Alaska. The participants take samples of fish and learn how to estimate population size from samples. Fish Fetch is targeted at all age groups, with the capacity to scale up or down given the audience's comprehension of math. The activity has engaged participants as young as 3 years old, with accompanying adults asking questions about details of population estimation. The activity can be used as a math activity or a science activity, and shows how concepts learned in school are used in real-world research.

MATERIALS

- Blue tarp with a 10 x 10 grid of 1 square foot cells laid out with yellow duct tape
- 1000 Fish-shaped craft beads, approximately 1" in length and in assorted solid colors, (this is the total fish population)
- 5 plastic sand pails, referred to as "scientifically calibrated sample buckets"
- 5 sample selectors (e.g. soft foam boat, preferably one that bounces erratically rather than rolling)
- Whiteboard or flipchart to write on
- Whisk broom (optional) to redistribute fish after sampling

PROCEDURES

This activity can be done with one participant or several, depending on the situation. If several participants are taking part, each person can take one sample. If one person takes part, he/she can take several samples.

1. Scatter the 1000 fish around on the grid.

2. Ask participants, "How many fish do you think are on the grid?" (This is their initial guess – some will take a wild guess, others will try to figure it out visually in a more systematic way).

3. Ask participants to go "out into the ocean" and throw their squishy boat onto the grid. The square that the ship lands on is the random sample.

4. Tell participants to count all the fish in the blue part of the square and put the fish into their bucket.

5. Write the number of fish in each sample on the whiteboard. Counts of zero are valid observations.

6. Ask participants, "How can you figure out, on average, how many fish were in the squares that you counted?" (Answer: add up the number of fish in the samples, and divide by the number of samples). Participants can do the math themselves on the whiteboard, or the presenter can do it for them.

7. Ask participants, "If this is the average number of fish per square, how can you figure out how many fish there are in all?" (Answer: count the number of squares in the grid – 100 – and multiply the average number by 100).

8. Compare their initial guess of how many fish there were to their estimate using the samples.

9. Throw the fish "back into the sea." The whisk broom can be used to re-distribute the fish around the grid. You can experiment with an even distribution of fish or a clumped distribution (where some squares have a lot of fish in them and others have none).

Discussions on how the math works visually are very useful. Depending on the level of engagement from the participants, discussions can range from how to estimate jelly beans in a jar, to how observations of zero and other real-life factors affect the population estimate. In an informal environment, the youngest participants (ages 2-5) can collect fish and then practice counting them and "tossing them back into the sea."

There are further applications for more in-depth interactions, like classroom demonstrations, where parameters such as species (color) composition, patchiness, catch efficiency, and depth distribution, are discussed. The effect of survey design can also be discussed (e.g. what effect would including the fish on the yellow border line have? What if we sampled squares in a line instead of randomly?). The activity is highly scalable in this way, and effectively presents the basic components of fisheries science.

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