

## What's in the Pond?

A biological research company, Fish Inc., stocked five ponds with 20 fish each. The following amounts were used for stocking the different ponds with three different kinds of fish.

	Trout	Catfish	Bass
Pond 1	6	14	0
Pond 2	4	4	12
Pond 3	6	8	6
Pond 4	2	4	14
Pond 5	16	0	4

Now, several months later, Fish Inc. would like to determine which pond has the best conditions for increasing the number of fish. Unfortunately, no one wrote down which pond number above corresponded to the actual ponds: *The Spot*, *Fishing Hole*, *Retreat*, *Lonely*, and *What-a-catch*. The current fish populations are represented in the provided bags with each tile representing one fish.

**Objective 1:** Determine which pond number corresponds to each pond name.

The current fish populations are represented in the provided bags with each tile representing one fish.

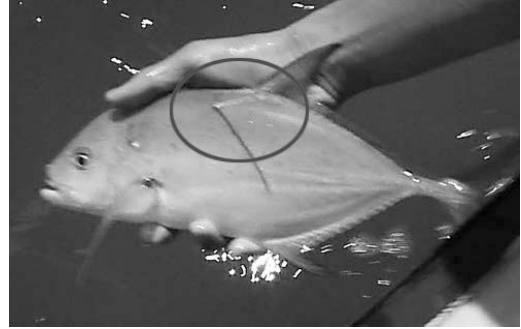
There are some restrictions to your investigation, however. Resources are limited as in real life such that it is impossible to count every fish individually. You may remove only 10 fish from any one bag as a sample. \*\*Before you return your "fish" to the bags, tag them by placing a mark on each sampled fish for the next objective. \*\* Record your results in the table to the right along with the pond name that you can justify matching each pond.

	Trout	Catfish	Bass	<b>Pond Number</b>
The Spot				
Fishing Hole				
Retreat				
Lonely				
What-a-catch				

Using appropriate equations and specific numbers, explain the reasoning that led to your matching of pond numbers with pond names.

**Objective 2:** Estimate the fish population in each pond.

A common technique in counting fish or other wildlife in similar situations is to catch some number, tag them, put them back and then catch another group looking for the number of tagged fish that you get in the second catch. Resample each bag catching a sample 10 fish. Record the number of tagged and untagged fish from each bag in the table below.



	The Spot	Fisherman's Friend	Retreat	Lonely	What-a-catch
Tagged					
Untagged					
<b>Estimated Population</b>					

Using appropriate equations and specific numbers, explain the reasoning that led to your population estimates.

## What's in the Pond?

Class Data: Record the pond numbers that match each pond name

	The Spot	Fisherman's Friend	Retreat	Lonely	What-a-catch
Group 1					
Group 2					
Group 3					
Group 4					
Group 5					
Group 6					
Group 7					
Group 8					
Group 9					
Group 10					

Class Data: Record the population estimate for each pond name

	The Spot	Fisherman's Friend	Retreat	Lonely	What-a-catch
Group 1					
Group 2					
Group 3					
Group 4					
Group 5					
Group 6					
Group 7					
Group 8					
Group 9					
Group 10					

## Sample Data

**Objective 1:** What conclusions can you draw from the following data?

	Trout	Catfish	Bass	Pond Name
Pond 1	5	5	0	
Pond 2	2	4	4	
Pond 3	4	4	2	
Pond 4	1	3	6	
Pond 5	5	0	5	

**Objective 2:** What conclusions can you draw from the following data?

	The Spot	Fisherman's Friend	Retreat	Lonely	What-a-catch
Tagged	6	4	2	5	4
Untagged	4	6	8	5	6
<b>Estimated Population</b>					

## Mathematical Ideas

### Connections

- Connections between scientific procedures for counting populations and sampling populations
- Connections between mathematical ideas of proportions and ratios, statistical variability, probability and fractions

### Proportions

- Comparing proportions occurs in the first part of the activity, match equivalent or close ratios
- The second activity through algorithms or nonstandard procedures uses known ratios to solve for a related value
- Percentages and flexibility with other forms of rational numbers becomes important in both activities

### Statistical Variability and Probability

- Ideas about sampling, likelihood and possible results occur in both activities
- Variation from true proportions addresses theoretical and experimental probabilities

## Bag Compositions

Original Pond Proportions (out of 10)				scale factor	New Pond Numbers					
	Trout	Catfish	Bass			Trout	Catfish	Bass	Population	Pond Names
Pond 1	3	7	0	2	Pond 1	6	14	0	20	What-a-catch
Pond 2	2	2	6	1.5	Pond 2	3	3	9	15	The Spot
Pond 3	3	4	3	4	Pond 3	12	16	12	40	Retreat
Pond 4	1	2	7	2	Pond 4	2	4	14	20	Lonely
Pond 5	8	0	2	2.5	Pond 5	20	0	5	25	Fisherman's Friend
					Totals/set	43	37	40	120	

## Alternatives

Managing so many manipulatives can be a struggle. Here are a few alternatives to the method used in the workshop.

- Instead of having students mark the tiles, have them put a different color tile in for the tagged fish.
- Use paper instead of tiles although it works best if crumpled.
- Each group could be in charge of one pond instead of all of them.
- Each objective can be a stand-alone activity.
- An online version can be found at [www.jillcochran.com/fishing](http://www.jillcochran.com/fishing)

Here are some ideas to keep in mind.

- As you set up the bags it helps to have about the same number of each color of fish in a set.
- When considering pond proportions and population sizes some distinctive pond and some very similar ponds make for good discussion.
- I generally do not give my students the “right” answer at the end because I want them to understand this situation in a real context.