

## What happened next?

### Activity sheet A – Hannah

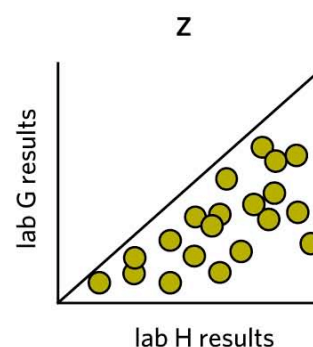
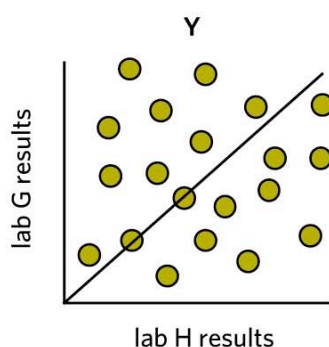
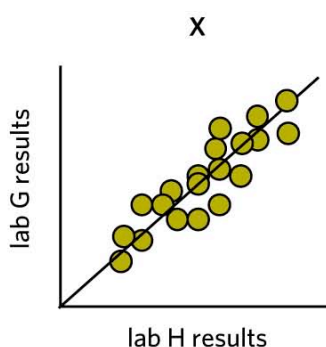
Hannah works in an environmental health laboratory in California. As part of her job, she must write a report about the mercury levels in fish living in the lakes and rivers of an old gold rush mining area of California. Samples of fish from these lakes and rivers have been analysed by two specialist labs (lab H and lab G), using different methods of analysis. Before Hannah can make any recommendations, she needs to check through all the results.

- 1 Hannah first looked at the duplicate (repeat) results from each lab. They showed good agreement – both with the original results from that lab, and with those from the other lab. What does this tell Hannah?
- 2 Each lab was given a blank sample of fish to test, containing no mercury. This sample was put through the same preparation and test processes as all the others. Hannah was pleased to see that both labs got a zero reading for this sample. What would it have meant if either lab had detected mercury in the blank sample?
- 3 Each lab was also given some standard fish samples containing  $4.64 \text{ mg kg}^{-1}$  mercury to test. The results were as follows.

Lab H – average of standard samples tested:  $4.59 \text{ mg kg}^{-1}$ .

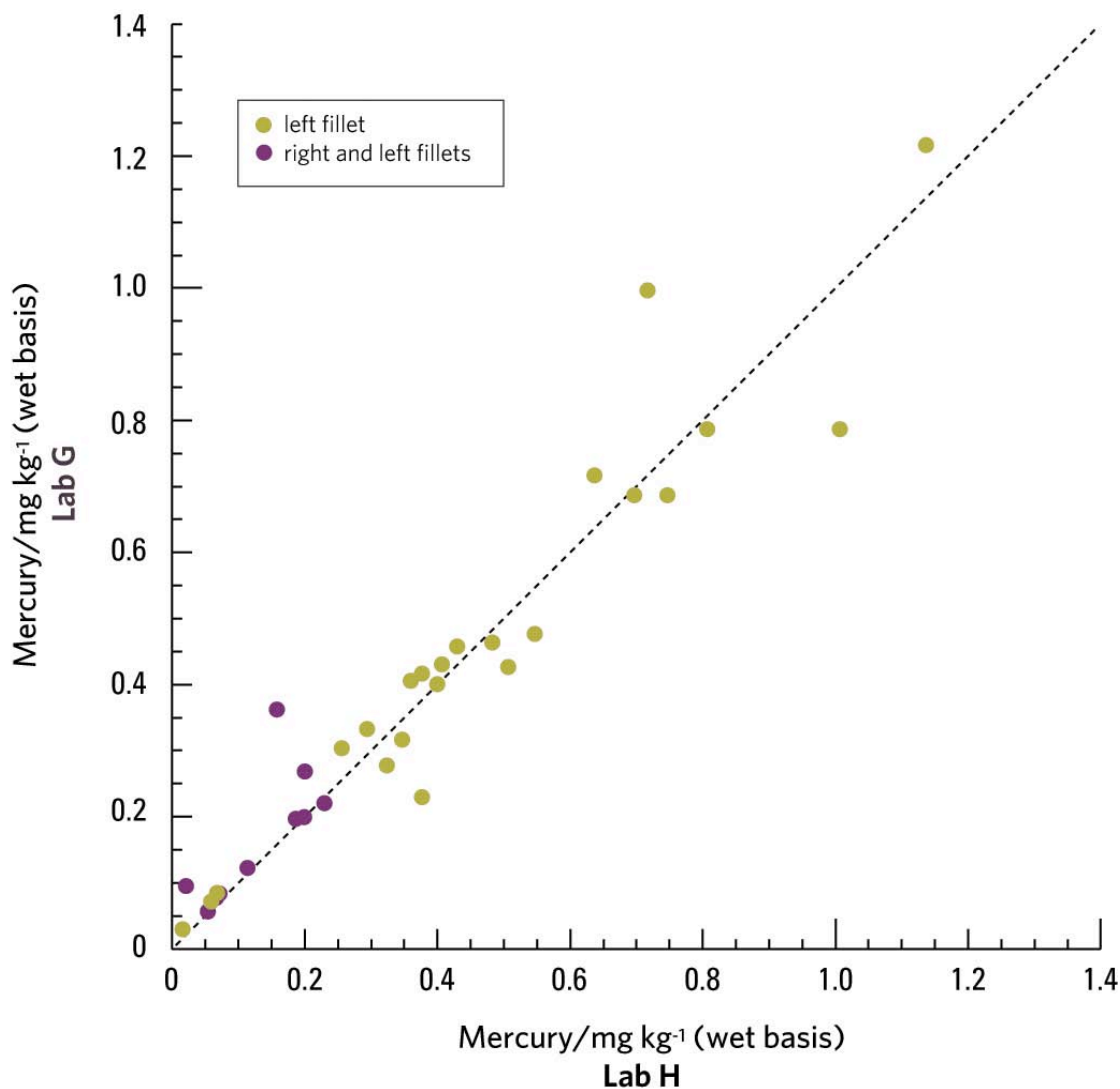
Lab G – average of standard samples tested:  $4.31 \text{ mg kg}^{-1}$ .

- a) Do you think Hannah should be concerned about these results?
  - b) What could she conclude from them?
- 4 Hannah has a lot of data from the two labs. She decides to compare the results from the two labs by plotting a graph. Which of the graph shapes shown below would Hannah see if:
    - a) the results from lab G are always lower than those from lab H
    - b) the results from lab H and lab G don't agree at all – sometimes the results from lab H are bigger than those from lab G, and sometimes smaller
    - c) the results from lab H and lab G are similar most of the time?



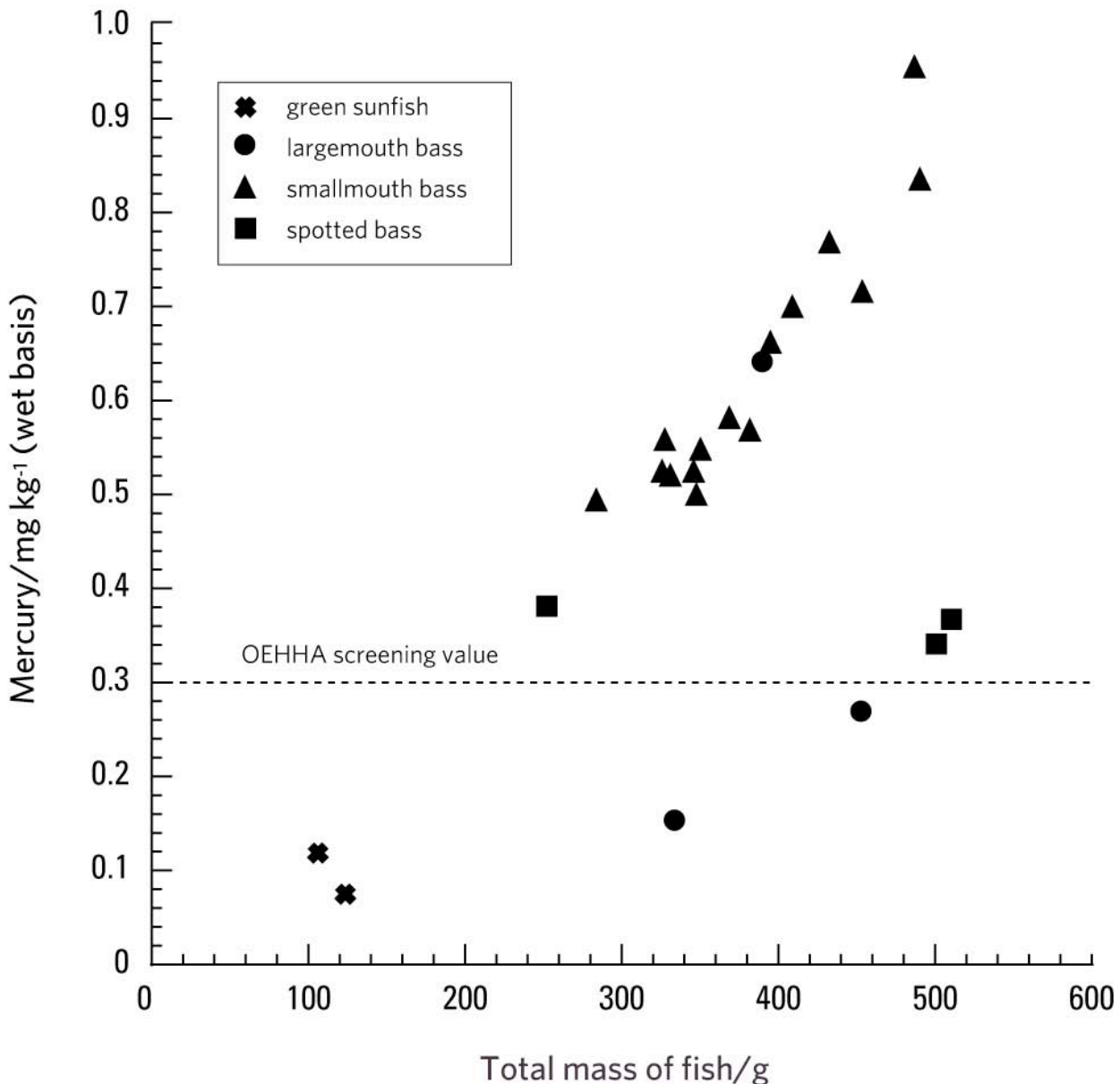
# Gold rush!

5 What does this graph comparing the results of lab H and lab G tell Hannah?



# Gold rush!

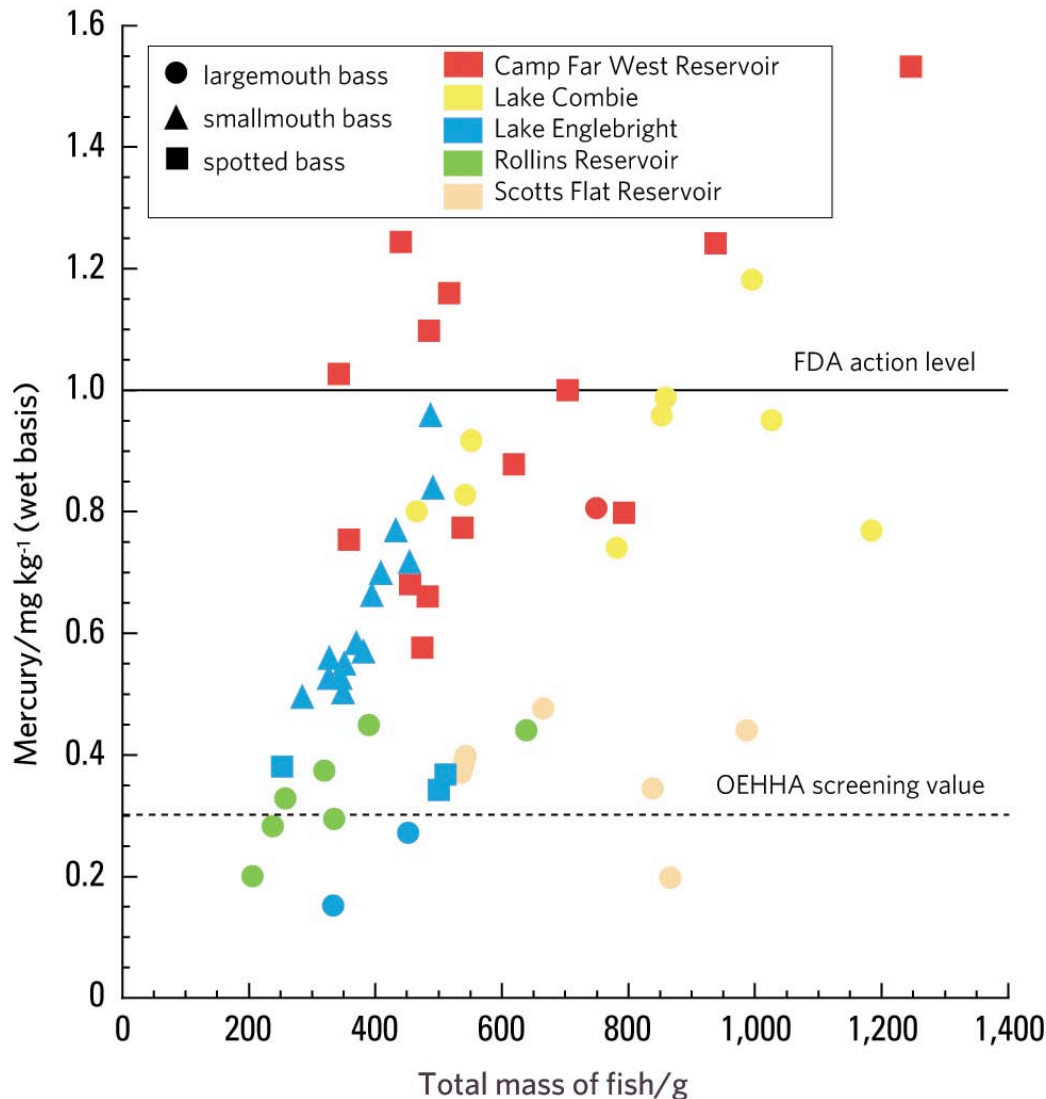
- 6 Hannah produced a graph to show the results for the different species of fish caught in Lake Engelbright.



- What general conclusion can be drawn from the data shown on this graph?
- Which type of fish contained the highest levels of mercury?
- Which type of fish contained the lowest levels of mercury?
- Which fish do you think is the top predator in the food web in Lake Engelbright?

# Gold rush!

7 After processing the results from all the different lakes and reservoirs in the 'gold rush' mining area, Hannah produced a graph to show the overall results.



- Where were fish with the highest levels of mercury caught?
- Fish cannot be sold if the mercury level is higher than the Food and Drug Administration's (FDA) action level. Below this level, fish is considered safe to eat. What is the FDA action level for mercury in fish?
- What advice should Hannah give to fishermen in the 'gold rush' area?

8 Hannah would like to investigate whether there is a link between the amount of mercury in fish in the reservoirs, and the water flow from old mines. What other information might she need?