

## **Remote Sensing, Fish and Zooplankton**

As you know from studying Whitney Point Reservoir and from your lab experiment with fish, temperature can affect most living things. Most living things have a preferred temperature range because of their individual **physiology**. This is because the chemical reactions that happen during every second of life work best at certain temperatures. These temperatures vary from creature to creature because of the different **enzymes** used in the reactions (like digestion of food).

You have all ready seen some different types of remote sensing in class, and now you are probably wondering what temperatures have to do with remote sensing. Well, because of physiology it is possible to use temperature to predict where you will find different organisms like fish and zooplankton. For some zooplankton (**copepods**, remember them?), you can even use temperature to tell how many of them are present. To examine this idea, go to the first web site listed below and check the remote sensing section. Click on the link for Figure 1 and for Figure 2. Print both Figures on the color printer.

### **Mr. Warner's website about remote sensing**

<http://www.people.cornell.edu/pages/dmw33/remsens.htm>

Now you should go to the following web pages and print each one on the color printer (one copy for each group).

### **Lake Ontario Sea Surface Temperature Maps**

May 9<sup>th</sup> 2001

<http://superior.ceegs.ohio-state.edu/NOWCAST/ontario/01/s0112912.gif>

August 31<sup>st</sup> 2001

<http://superior.ceegs.ohio-state.edu/NOWCAST/ontario/01/s0124312.gif>

October 26<sup>th</sup> 2001

<http://superior.ceegs.ohio-state.edu/NOWCAST/ontario/01/s0129912.gif>

### **Worldwide Sea Surface Temperature Map**

[http://www.ssec.wisc.edu/data/sst/latest\\_sst.gif](http://www.ssec.wisc.edu/data/sst/latest_sst.gif)

Using the maps you have, the handout about alewives, and the information provided in the tables below come up with 1 or more hypotheses related to fish or zooplankton distribution that YOU THINK would help you as a scientist locate a species or creature in Lake Ontario or the world's oceans.

Example hypothesis: Sea surface temperature in Lake Ontario varies with the seasons.

Hypothesis 1

Hypothesis 2

Hypothesis 3

If you come up with 3 hypotheses, then try to answer the questions below.

1. Locate the spots on each map of Lake Ontario where you would expect to find lake trout (use a square as a mark), King salmon (circle), and alewives (use an X).
2. Does the amount of suitable surface water temperature for each species change over the summer?
3. Do the different species have much overlap?
4. Locate the spots within the Atlantic Ocean where you would expect to find albacore tuna (use a triangle as a marker). You will need to use the World Sea Surface temperature map and the temperature converter web site below.
5. What is the primary food of the alewife?
6. Does the preferred temperature of the alewife overlap with the best temperature for its food?

**Calculator to convert degrees Fahrenheit to Celsius**

<http://students.washington.edu/kyle/temp.html>

**Sites about albacore tuna**

<http://www.wfoa-tuna.org/>

<http://www.worldwaters.com/retail/common/currents/species/albacore.asp>

Preferred temperatures for locally and internationally important fish.

Species	Temperature range (degrees Celsius)
Lake trout	4-10
Alewife	11-19 (adult) 17-19 (young)
King salmon	11-12
Albacore tuna	14-20 (adults) 16-18 (young)

Lake trout and King salmon are economically important because a great deal of money is spent each year by fisherman trying to catch them. In some cases whole towns near Lake Ontario depend on the money spent by fisherman. Alewives are economically important because they are the main food for lake trout and King salmon. Albacore tuna are only found in the oceans, but they are important because they are the tuna you find in the little round cans at the grocery store.

### **Copepod densities at different temperatures in Lake Ontario**

Temperature	Density (number per liter)
2	0.6
4	2.1
6	4.4
8	7.5
10	11.2
12	15.5
14	20.6
16	26.2
18	32.4
20	39.3