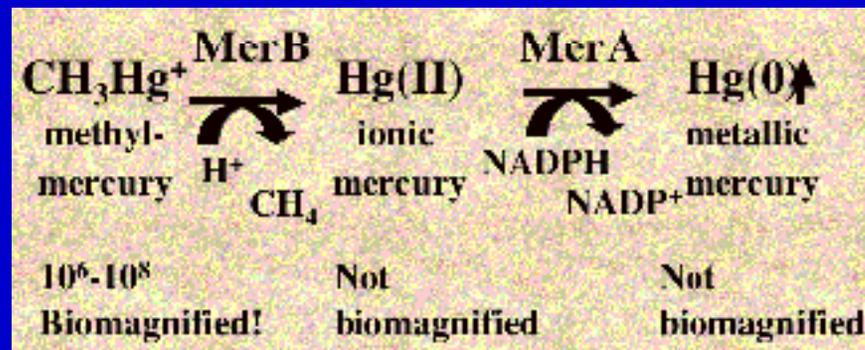




# Mercury and Aquatic Ecosystems

# How Hg gets into the food chain

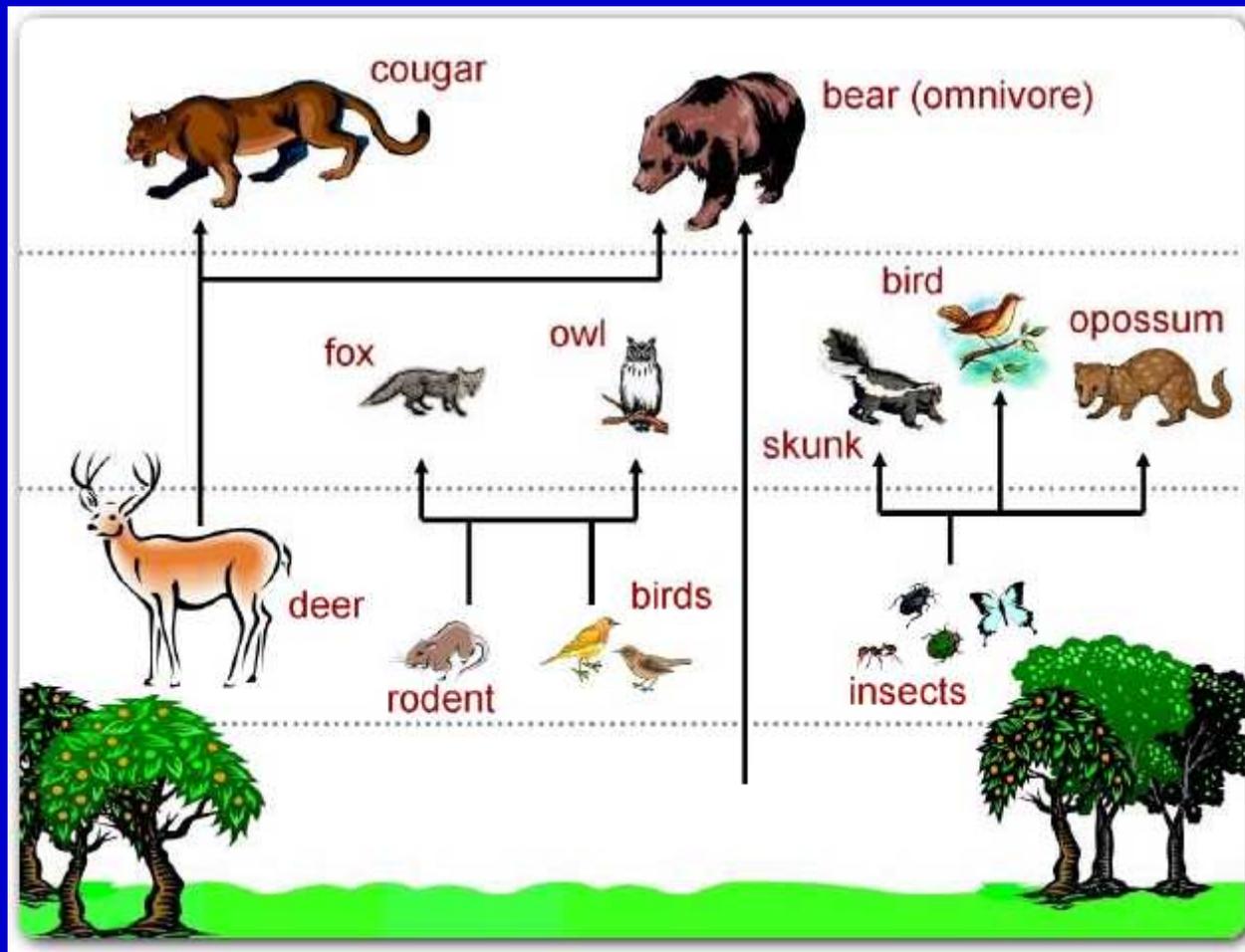
- Elemental mercury can be converted by bacteria into a charged ion known as mercury-two.
- This form is dangerous for two reasons: it dissolves easily in water and it readily reacts with other ions to form new compounds.
- Bacteria can convert mercury-two into one of the most toxic forms, methylmercury.



# Methylmercury



- One of the biggest problems of mercury in the environment is that when mercury reaches an aquatic environment it can be transformed into methylmercury.
- Methylmercury is extremely toxic, dissolves easily in water, and bioaccumulates in the food chain.

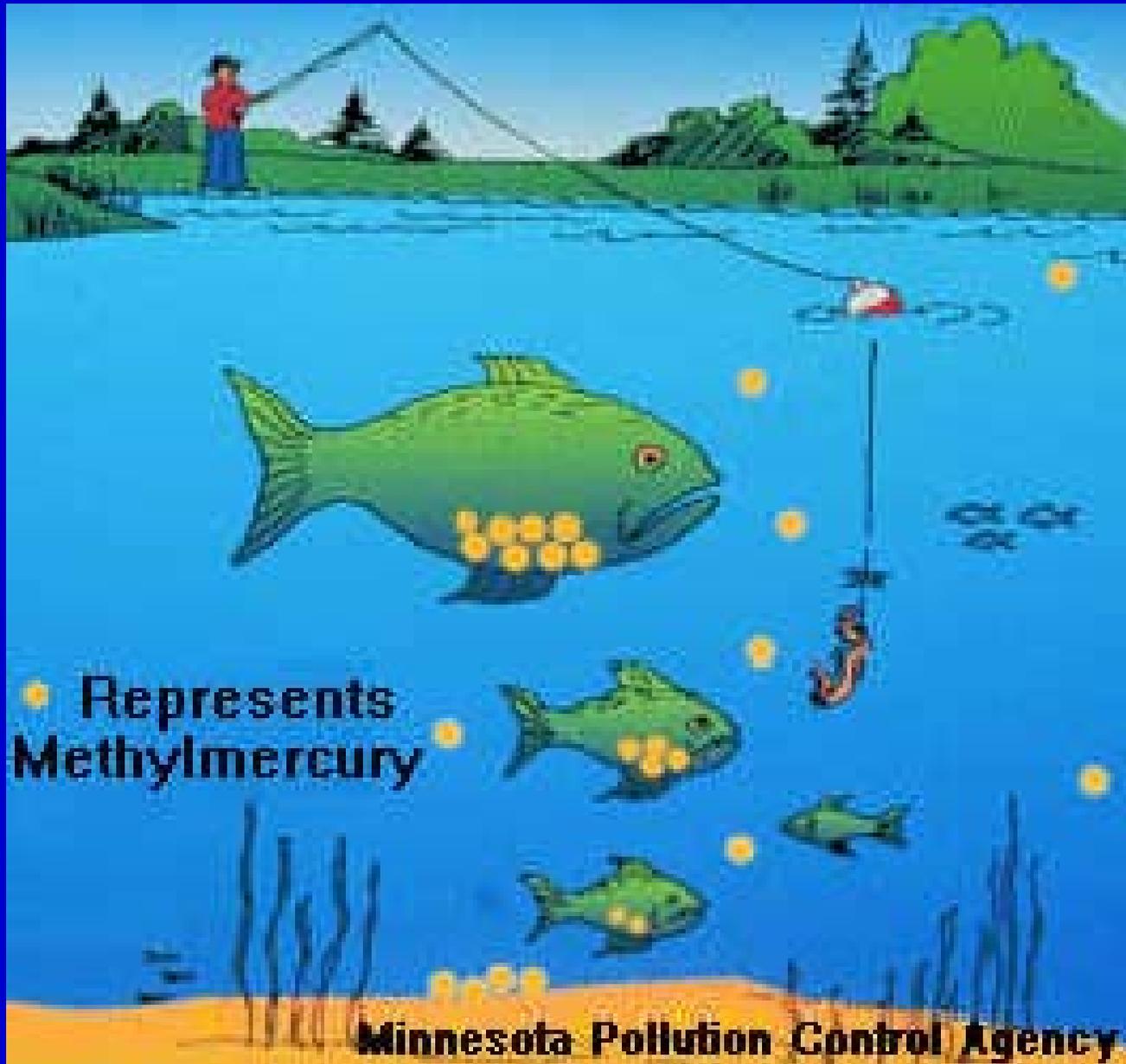




# Bioaccumulation



- Bioaccumulation is the increase in concentration of a substance along the foodchain. MeHg accumulates as you move up the food chain:
  1. Methylmercury is first taken up by bacteria and tiny plants and animals (plankton).
  2. Then the plankton and bacteria are eaten by small fish.
  3. These small fish are eaten by larger predatory fish which accumulate large amounts of methylmercury in their tissues.
  4. The large fish are caught and eaten by humans and animals, exposing them to large amounts of methylmercury which will accumulate in their bodies as well.



• Represents  
Methylmercury

Minnesota Pollution Control Agency

# Steps in biomagnification

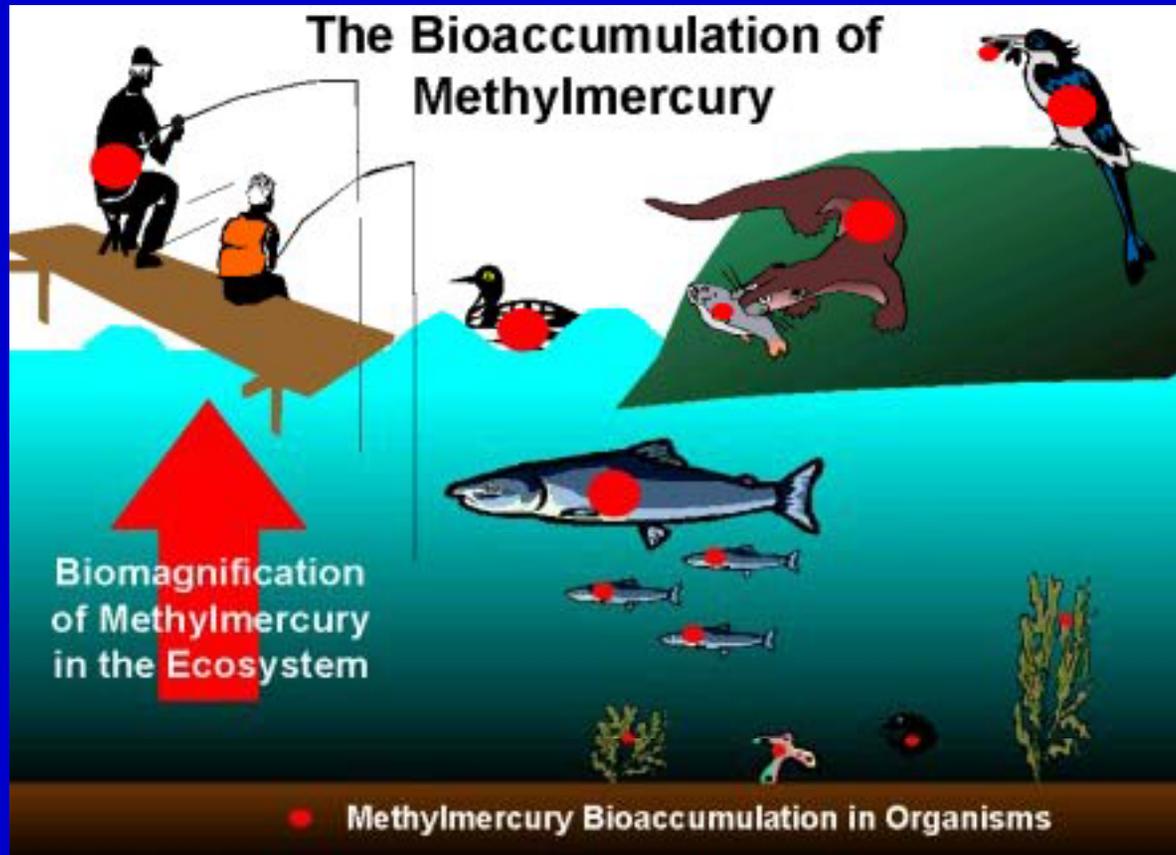


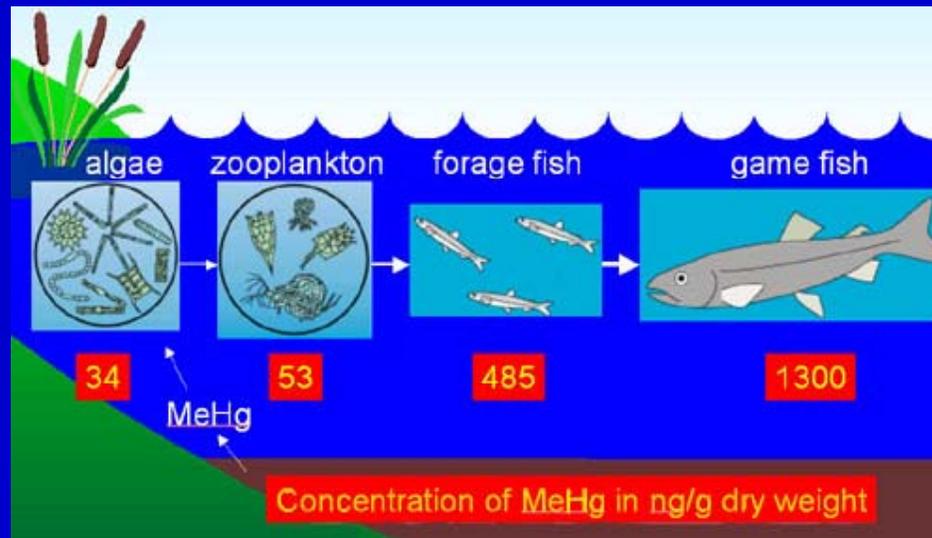
- Chemically pollutants resemble essential inorganic nutrients and are brought into the producer's body and stored "by mistake".
- This is the first step in biomagnification; the pollutant is at a higher concentration inside the producer than it is in the environment.



## Steps in biomagnification

- The second stage of biomagnification occurs when the producer is eaten.
- Relatively little energy is available from one trophic level to the next. This means that a consumer (of any level) has to consume a lot of biomass from the lower trophic level.
- If that biomass contains the pollutant, the pollutant will be taken up in large quantities by the consumer.





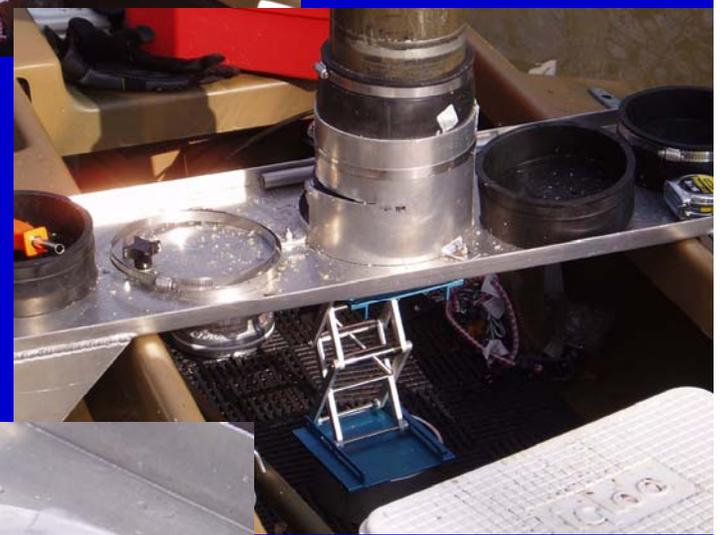
- Biomagnification occurs with pollutants soluble in fat and muscle tissue.
- These materials are digested from the producer and move into the body of the consumer. If the consumer is caught and eaten, its tissue is digested and the pollutant moves to the fat or tissue of the new consumer.
- In this way, the pollutant builds up in the fatty (and muscle) tissues of the consumers.



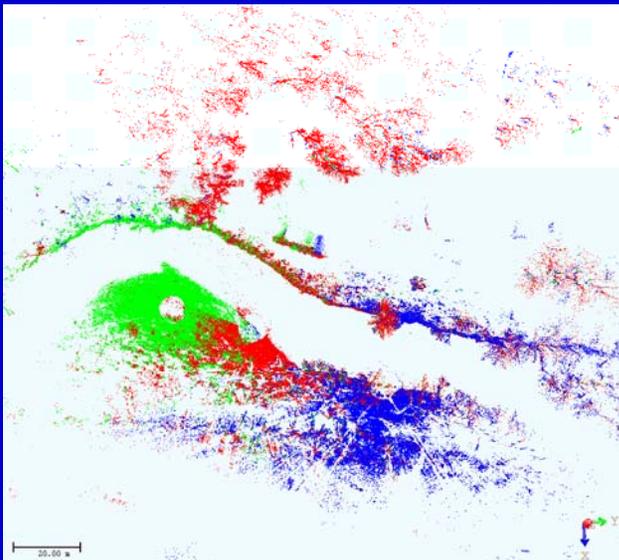
- ❖ Heavy metals like Hg adhere to sediment.
- ❖ My research project focuses on investigating river processes (erosion, deposition) to determine transport of sediment and Hg in a contaminated river.

How do scientists study this problem?





# High resolution land-based LIDAR



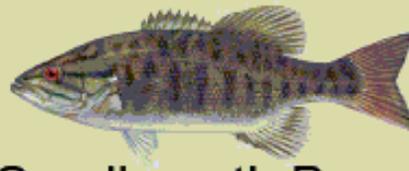
- Can collect millions of data points in minutes
- Provides topography of a land surface
- Gives you exact position of each of the million points
- Can be used to show changes in surface through time



# Some affected species



Largemouth Bass:  
8 lbs or 22"



Smallmouth Bass:  
5 lbs or 20"



Sunfish:  
1 lb or 11"



Channel Catfish:  
12 lbs or 30"



Brown Trout:  
5 lbs or 25"



Rainbow Trout:  
4 lbs or 22"

### Frequently Asked Questions

- Q:** Can I eat trout from the stocked areas in the South River?
- A:** Yes. These trout were raised in a trout hatchery and do not contain unsafe levels of mercury.



Brown trout



Rainbow trout

- Q:** Can I cook the fish to reduce mercury levels?
- A:** Because mercury is tightly bound to proteins in fish tissue, no method of cooking or cleaning fish will reduce the amount of mercury in a meal.
- Q:** What about cooking fish to reduce PCBs?
- A:** Unlike mercury, other contaminants like PCBs are stored in the fat of the fish, so cutting off the skin and fat before cooking the fish can help reduce the amount of PCBs in the meal. You can also broil, grill, or bake the fish on a rack so the fat drips off of the fish. Keep in mind not to use the drippings for sauce or gravy.
- Q:** Should I just stop eating fish?
- A:** No, fish are low in fat and a good source of protein and other nutrients. Just be sure to know and follow the advisory in the area you are fishing.
- Q:** Where can I get more information?
- A:** Additional information can be provided by the contacts listed on the back of this brochure or by visiting the web sites listed on the back of this brochure.

The South River Science Team developed this brochure with help from the Virginia Department of Health, Virginia Department of Game and Inland Fisheries, and the Virginia Department of Environmental Quality. It is intended as a public service tool and should be used in conjunction with the published consumption advisory.

The South River Science Team was formed in 2000 to serve as a focal point for technical issues concerning mercury in the South River and downstream waterways. Members of the team include the Virginia Department of Environmental Quality, Department of Health, and Department of Game and Inland Fisheries and representatives from academia, citizens groups, the Environmental Protection Agency, and DuPont. Contact information is listed below.



540-574-7815



[www.deq.virginia.gov](http://www.deq.virginia.gov)  
540-574-7815



[www.vdh.virginia.gov](http://www.vdh.virginia.gov)  
540-332-7830

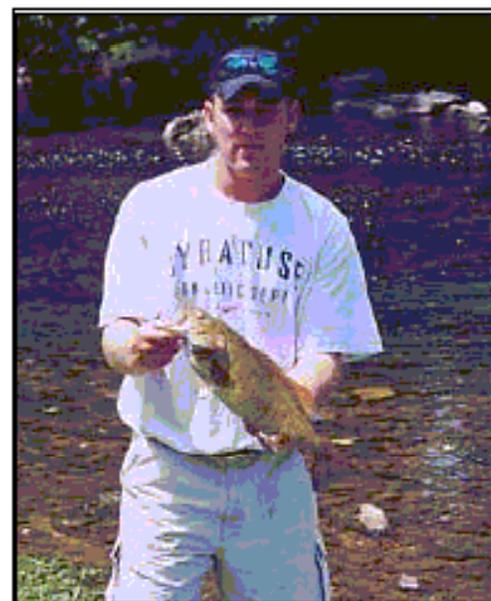


[www.dgif.virginia.gov](http://www.dgif.virginia.gov)  
540-248-9360

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# Should I eat the fish I catch?

**A Guide to  
Safely Eating Fish in the  
Shenandoah River Watershed**





# Cutting Out Risks

- ❖ Avoid eating fish from the waters listed chart.
- ❖ Eat smaller fish of a species.
- ❖ Eat smaller portions of fish and fewer meals of fish.
- ❖ Pregnant women and children avoid eating any species of fish suspected to be a problem.
- ❖ Prepare the fish in a manner that reduces contaminants.

Who is effected by this?