MERCURY MONITORING

Water Quality Stakeholders Meeting, October 17, 2018

Northern Water
Monitoring Fish Tissue Mercury

Public Health and Permitting Requirements
“Condition 22. [...] Within six months of issuance of the last Record of Decision for the 2012 WGFP, the Subdistrict shall submit to the County for review and approval a monitoring plan for manganese, bioavailable mercury, dissolved oxygen, and chlorophyll a in the Three Lakes.”

However …

- Total Hg – historically, systematic non-detects
- Inconsistent with WQCD methodology
Mercury Cycling, Bioaccumulation & Biomagnification
Tiered Advisories

The FDA recommends that you eat two or three servings of fish per week. However, some fish contain high levels of mercury, which can make them unsafe to eat.

One fish, two fish. Bad fish, good fish.

Mercury is a metal that is found in soil, rock, air and water. Fish are exposed to mercury that is in the water and their food. Nearly all fish have at least traces of mercury in them. The mercury builds up in their tissues over their lifetime. If humans consume fish with high levels of mercury, it can interfere with the developing nervous system. Mercury in fish can also harm older children and adults but requires larger amounts. Usually, the harmful effects can be corrected if a person stops eating fish that contain high levels of mercury.

Big fish, small fish. Old fish, new fish.

The amount of mercury in a fish depends on its age and what it eats. Smaller, younger fish may have more mercury, especially if they eat other fish with mercury. Some fish may be safe to eat when they are small, but unhealthy when they are large.

Cooked fish, raw fish. Caught fish, bought fish.

Cooking or cleaning fish does not change mercury. The guidelines provided here only apply to fish caught in Colorado. Fish from restaurants and stores may also have high levels of mercury. Guidelines for safely eating these fish can be found through the FDA at www.fda.gov.

Green fish, red fish. Live fish, dead fish.

The fish in Colorado are routinely tested for mercury levels. The map below displays locations where fish have been tested. Green dots mean that the location has no advisories. Red dots mean that there are advisories for some of the fish in that location. You should check our website before eating fish from these locations.
Useful Patterns

- **Food Web**
  
  Producers < Herbivores < primary predators < secondary predators

- **Within species:**
  
  older/larger > younger/smaller.
Fish Tissue Mercury: A Better Alternative

- A good surrogate for bioavailable mercury.
- Routinely Used to establish general guidelines and site-specific fish consumption advisories (FCAs).
- Can be conducted easily during normal fisheries surveys using non-lethal sampling methods when possible.
“Condition 16. The Applicant will work with the Division and Colorado Parks and Wildlife (CPW) to support a program to monitor mercury in fish tissue in six lakes in the project area […]. Field work to collect the fish will be performed as directed by CPW, and the goal will be to obtain adequate representation of the important species as per the Division’s protocol. The sampling effort for Chimney Hollow Reservoir will begin in the first field season after the reservoir has filled and will continue annually until five years after project becomes fully operational [...]”

“[...] If fish tissue analyses show that a FCA is required, the Applicant will work with the Technical Advisory Team (TAC) of the Colorado Fish Consumption Advisory Committee to provide public education including the posting of signs with associated consumption advisories. The TAC will determine design of the signs and the information to be included. The Applicant will incur the costs of the signs and be responsible for proper posting of such signs.”
Fish Tissue Sampling
Cooperation
Common Predator and Prey Species
Non-Lethal Sampling

Biopsy punch \rightarrow \text{Fixodent Original} + \text{Antibiotic Cream} = \text{Bandage}
Analysis & Results

West Slope Update
Lab and Data Analysis

- Mercury, relative to wet weight (ACZ Labs)
- Data Analysis (WQCD)
  - Data summarized by species and size-class
  - FCA’s proposed as needed.
## Overall Summary

<table>
<thead>
<tr>
<th></th>
<th>Brown Trout</th>
<th>Kokanee</th>
<th>Lake Trout</th>
<th>Longnose Sucker</th>
<th>Rainbow Trout</th>
<th>White Sucker</th>
</tr>
</thead>
<tbody>
<tr>
<td>Granby Reservoir</td>
<td>0.17 (12)</td>
<td>0.32 (27)</td>
<td>0.33 (7)</td>
<td>0.05 (10)</td>
<td>0.22 (10)</td>
<td></td>
</tr>
<tr>
<td>Grand Lake</td>
<td>0.23 (5)</td>
<td>0.2 (7)</td>
<td>0.3 (2)</td>
<td></td>
<td>0.11 (2)</td>
<td></td>
</tr>
<tr>
<td>Shadow Mountain Reservoir</td>
<td>0.1 (20)</td>
<td>0.06 (4)</td>
<td>0.14 (5)</td>
<td>0.2 (5)</td>
<td>0.03 (10)</td>
<td>0.21 (10)</td>
</tr>
</tbody>
</table>
Granby Lake Trout Scatter

Size Class Threshold
630mm (~25”)

![Graph showing Granby Lake Trout Scatter with size class threshold at 630mm (25”)](image)
Granby Lake Size Classes

Larger Size Class
Averages above level of concern for Hg
# Lake Granby Possible FCA

<table>
<thead>
<tr>
<th>Species</th>
<th>Size</th>
<th>General population</th>
<th>Women who are pregnant, nursing, or may become pregnant</th>
<th>Children age 6 years and younger</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lake trout</td>
<td>smaller than 25&quot;</td>
<td>3 servings per month</td>
<td>2 servings per month</td>
<td>1 serving per month</td>
</tr>
<tr>
<td></td>
<td>larger than 25&quot;</td>
<td>1 serving per month</td>
<td>1 serving per month</td>
<td>Do not eat</td>
</tr>
<tr>
<td>Longnose sucker</td>
<td>legal size or bigger</td>
<td>2 servings per month</td>
<td>1 serving per month</td>
<td>1 serving per month</td>
</tr>
</tbody>
</table>
Wrap Up

- Fish tissue mercury monitoring conducted to meet requirements of Conditional 401 Certification and 1041 Permit for WGFP.
- Worked with WQCD and CPW to develop and implement sampling plan for 2018.
- 2018 West Slope data collection and analysis completed, East Slope still in progress.
- WQCD FCA TAC will likely propose advisories for Lake Trout and Longnose Suckers at Lake Granby.
Questions or comments?

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