

Citizen Scientists Study Mercury in Dragonfly Larvae

Colleen Flanagan, Ecologist, National Park Service

Dr. Sarah Nelson, Associate Professor, UMaine

August 14, 2013



Study...by the #'s

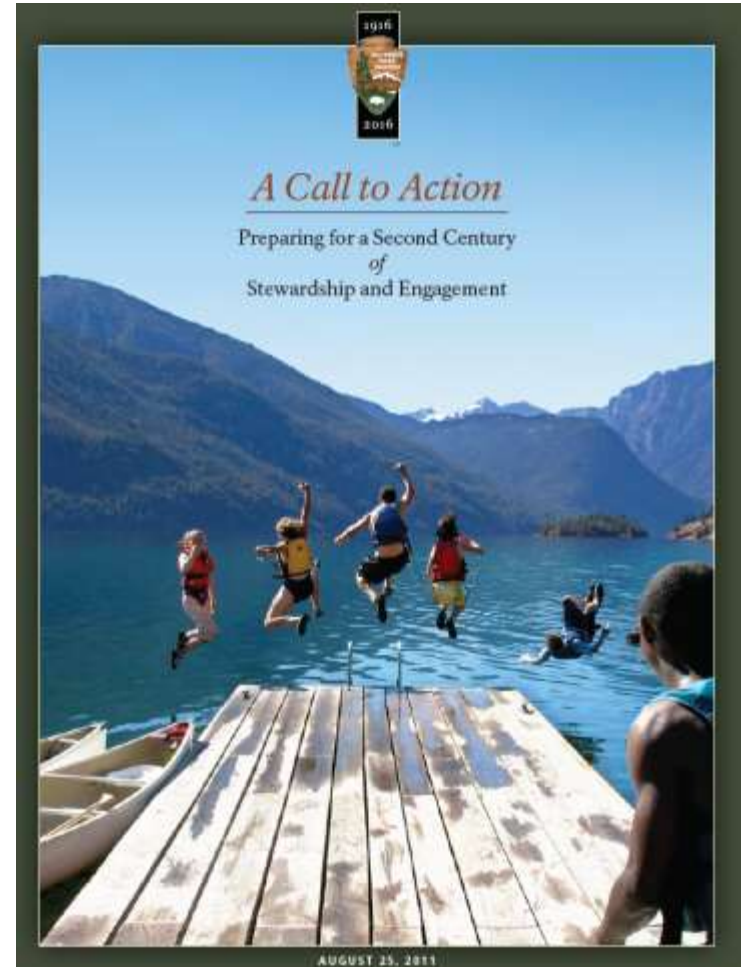
- # parks 25
- # sites sampled 70
- # citizen scientists >300
- # volunteer hours ~1,000
- # dragonfly larvae collected 521
- # coolers shipped 30
- # pounds dry ice used 100
- # mm of biggest dragonfly larva 48
- # cups coffee consumed 35

Rocky Mountain National Park

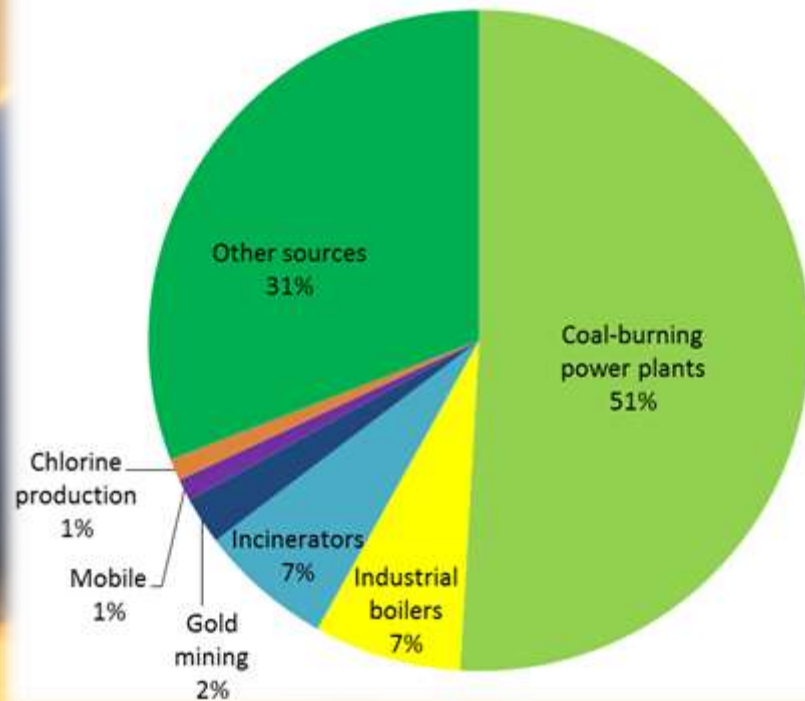


Outreach

- *A Call to Action*
- Align with 2 of 4 themes:
 - Connecting People to Parks
 - Item #7: Next Generation Stewards
 - Advancing the Education Mission



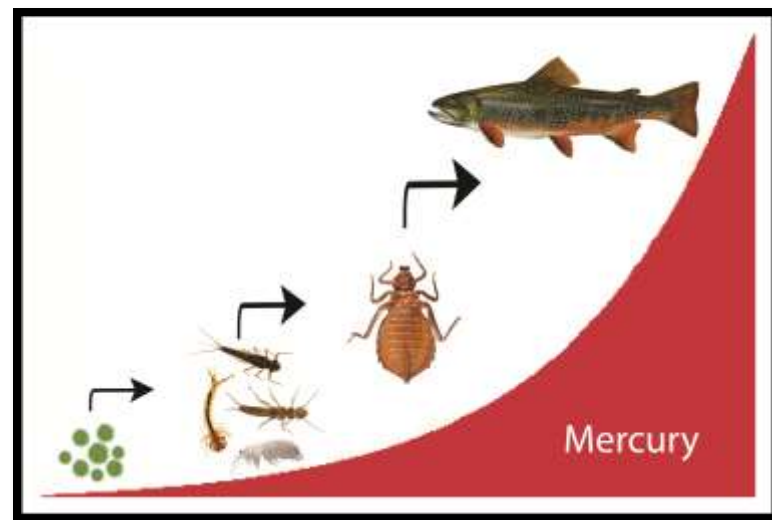
Science – Mercury (Hg)



Source: US EPA National Emissions Inventory 2005

Why Mercury?

- Persistent
- Bioaccumulative
- Toxic



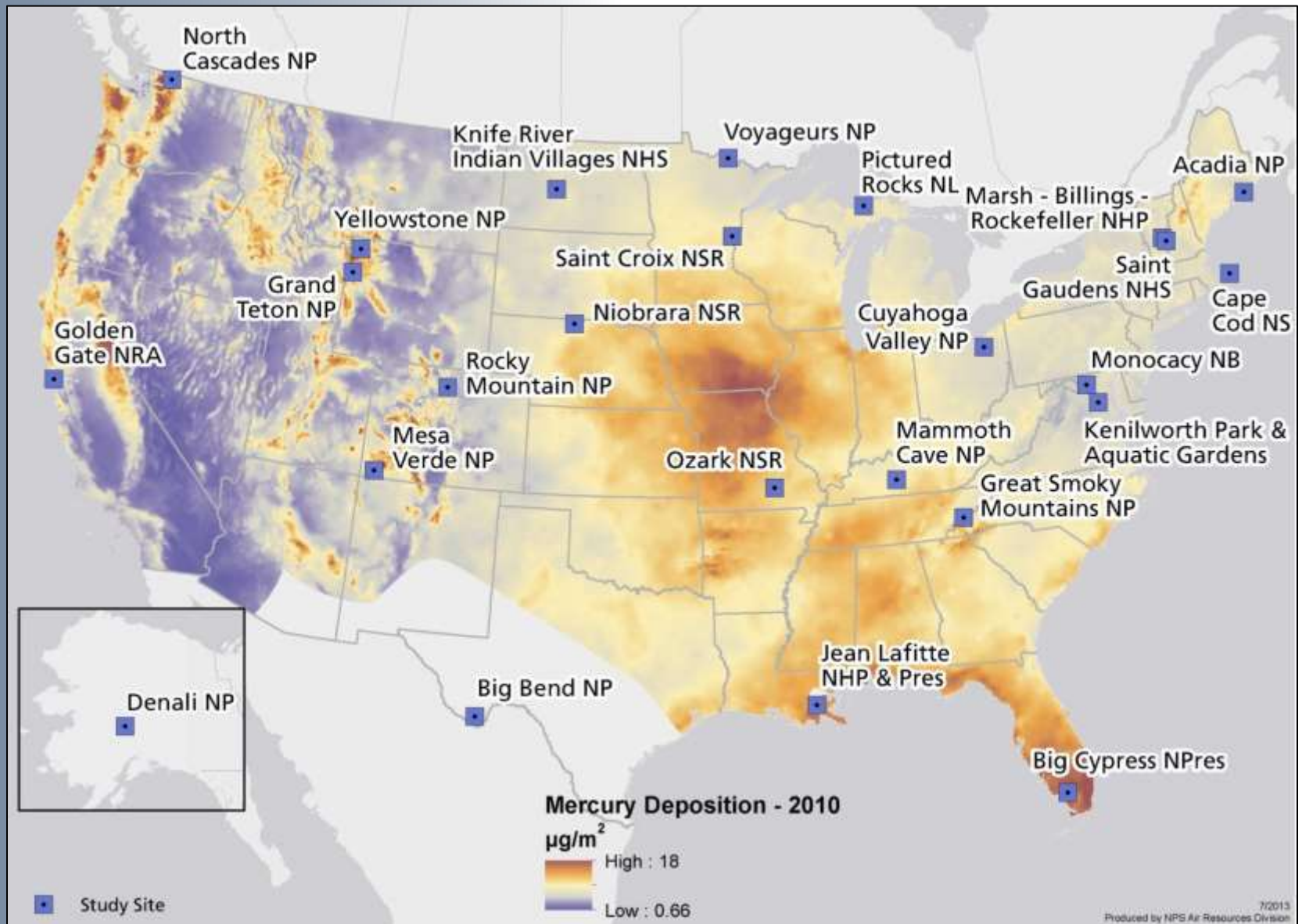
Fish and other biota in national parks contain levels of mercury above human and wildlife health thresholds.

Why Dragonfly Larvae?

- Long-lived
- Widespread
- Predatory
- Important prey species
- Relatively easy to collect
- **Biosentinels: Indicate ecosystem health**
- **Mercury in dragonfly larvae correlated to mercury in fish & water**
(Haro et al. 2013)



2013 Study Sites

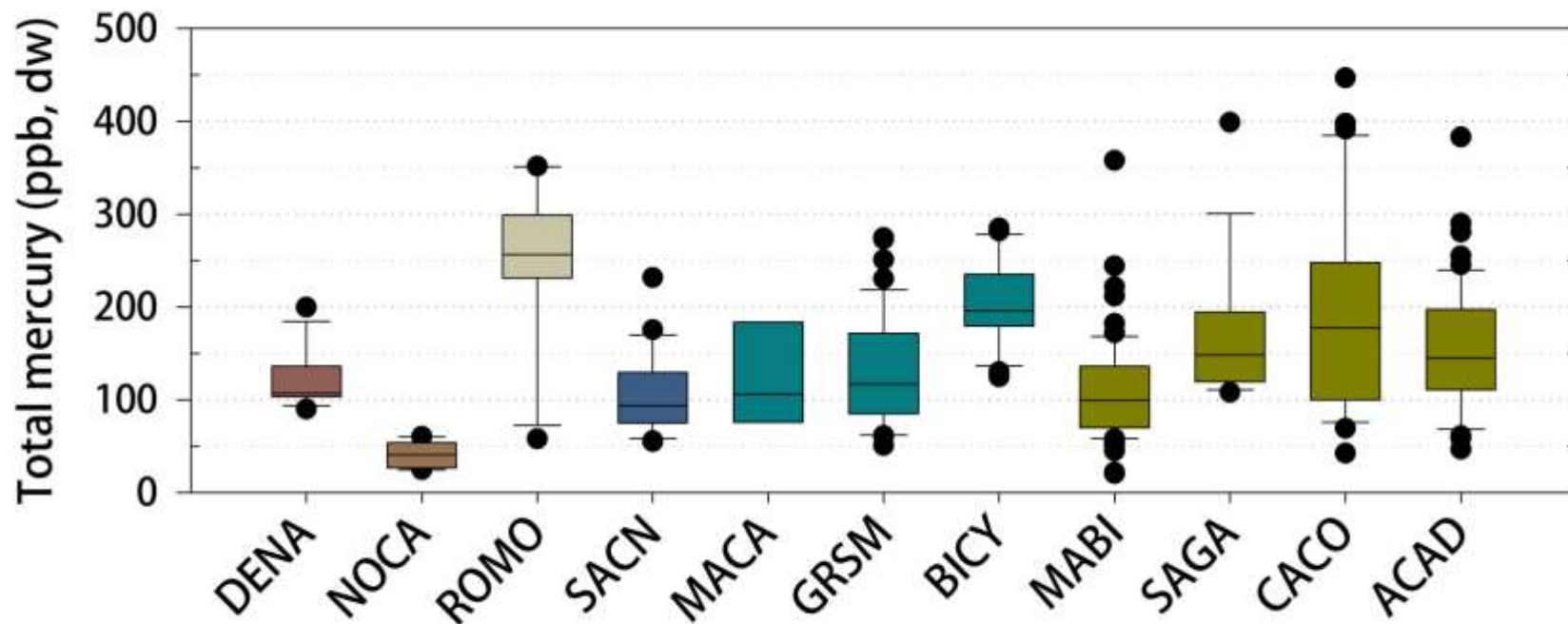


Methods



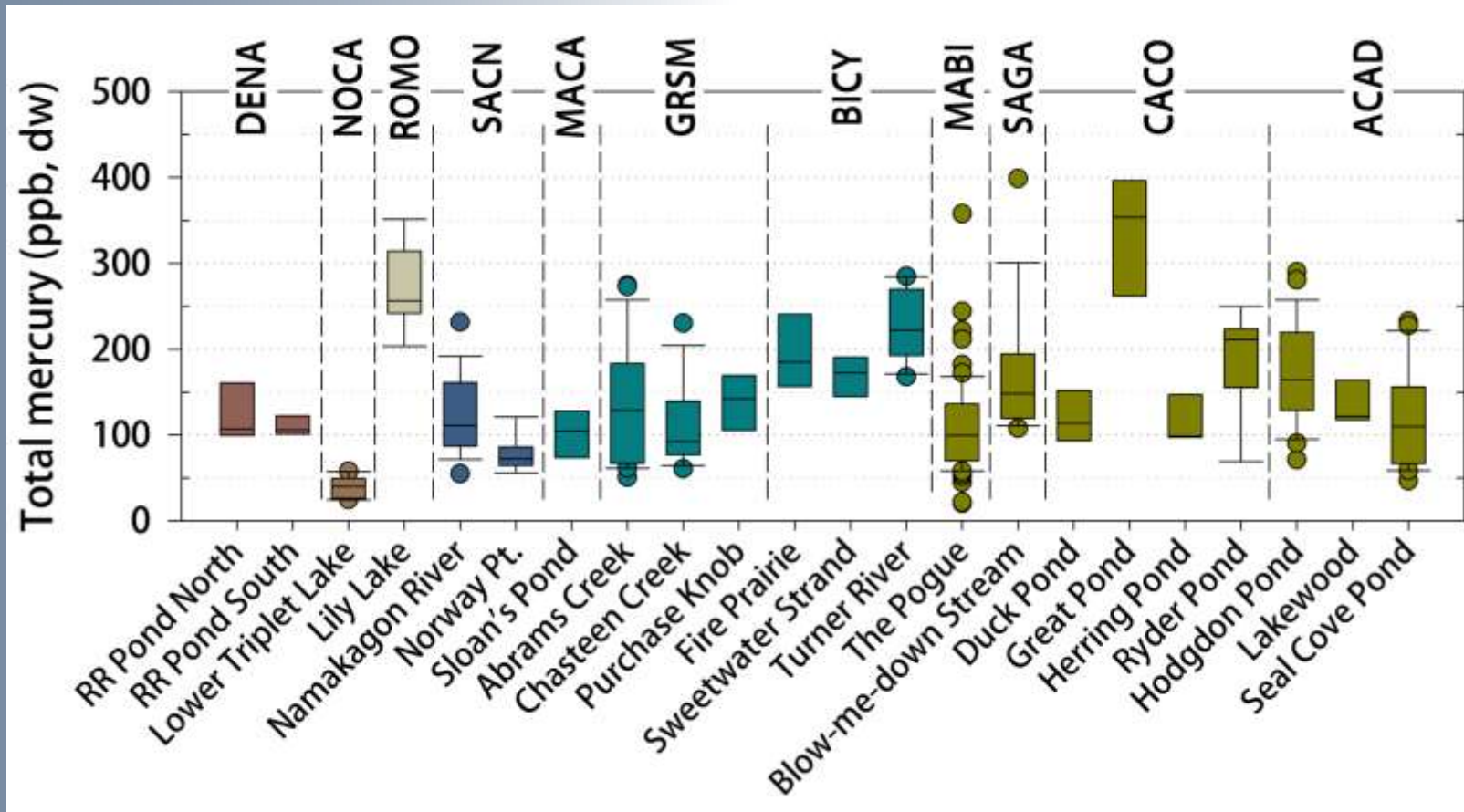
- **Distribute:**
 - Call for citizen scientists
 - Sampling protocol
- **Parks selected according to:**
 - Interest!
 - Potential mercury risk
 - Geographic location
 - Existing connection with citizen scientists, including Research Learning Centers
- **Sampling gear & shipping provided**
- **All participating parks:**
 - **Collect**
 - Dragonfly larvae
 - Water Samples
 - Identify larvae to family
 - Measure length
 - Send samples to UMaine for analysis
- **QA/QC in lab**

2012 Data: Park-by-Park



Median mercury (mean +/- SD) in larvae was 125 +/- 77 ppb, dw.

2012 Data: Site-by-Site



Median mercury highest at Lily Lake, Turner River, and Great Pond.

Findings

- Data reveal differences among parks, and even within a park, suggesting that these indicators are useful in describing fine-scale differences in Hg risk.
 - Differences within a park a result of environmental factors that affect uptake of Hg in the food web.
- Findings can inform managers about potential concerns regarding Hg in fish



Social Media: Video Podcast

Citizen Scientists use Dragonfly Larvae to Learn about Mercury



Social Media: Facebook

- ***Six-Legged Scouts in the National Parks***
 - “Like” us!

Wow, this week is busy with sorting all of the samples we received last week from Cape Cod, Golden Gate, and Cuyahoga Valley national parks! Your fantastic sampling efforts are keeping us busy!

Six-Legged Scouts in the National Parks 23 likes · 6 talking about this

Science Website
Citizen scientists collect dragonfly larvae from 25 National Parks to determine mercury levels and see if dragonfly larvae can indicate ecosystem health.

Next Steps

- Educational curriculum for use in the parks and interpretive programs
- Identification to species, and instar
 - Connection to *Biodiversity Discovery* activities
- Analysis of methylmercury in larvae
- Continued use of data in classrooms
 - 2013 data available in Spring 2014
- USGS/NPS Water Quality Partnership
 - *Linking freshwater mercury concentrations in parks to risk factors and bio-sentinels: a national-scale research and citizen science partnership*

Questions?



- Colleen Flanagan, NPS
(e) colleen_flanagan@nps.gov
(ph) 303-969-2806
- Dr. Sarah Nelson, UMaine
(e) sarah.j.nelson@maine.edu
(ph) 207-581-3454



- Project Webpage
http://www.nature.nps.gov/air/Studies/air_toxics/dragonfly/index.cfm