Western North America Mercury Synthesis

Newsletter 2 – February 5, 2013

Dear Western North American Mercury Synthesis (WNAMS) Participants and Interested Parties,

The WNAMS Organizers and Subgroup leaders will be sending out a quarterly newsletter to keep participants and interested parties informed of our progress on the Synthesis and of any major developments pertinent to the group. This newsletter highlights the working titles and lead-authors of the manuscripts developed at the first USGS Powell Center Meeting (Sept. 2012). Also described are ways to become more involved as a participant if you were unable to attend the USGS Powell Center meetings in Colorado. If there are items not covered in the Newsletter or on the Biodiversity Research Institute's (BRI) website, please contact one of the Synthesis Organizers or Madeline Turnquist for more information.

Thank you again for your contributions and time. Your efforts are great appreciated!

Sincerely,

Dr. Collin Eagles-Smith (USGS) and Dr. David Evers (BRI)

***Specific contact information appears at the end of the Newsletter.

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Information about Western North American Mercury Synthesis

After completing mercury synthesis efforts in the Northeast (2001-2005) and the Great Lakes (2008-2011) Regions, it is time to move westward. The Western North American Mercury Synthesis (WNAMS) effort is BRI's third major mercury synthesis. This effort will cover parts of three countries (U.S., Canada, and Mexico). Please see geographic map on BRI's WNAMS webpage to see the geographic scope of the WNAMS effort.

With support from the USGS Powell Center for Integration and Synthesis and the National Park Service, BRI and the USGS conducted working group meeting in Fort Collins, CO in Sept. 2012 with a limited number of people. The participants represented research expertise in three broad areas of mercury science--Sources (including atmospheric transport and deposition), Biogeochemistry, and Fish & Wildlife--and divided into these subgroups to develop topical approaches to the synthesis effort. Several days of meetings culminated in outlines for a series of manuscripts to be developed over the next 1-2 years (see below). Full details of the meeting can be found in the summary document (http://www.briloon.org/uploads/hgconnections/wmc/2012Powell_WG_Summary.pdf).

Subgroups and Subgroup leaders

(Note: Participants can be involved with more than one subgroup.)

Fish & Wildlife:	Collin Eagles-Smith (ceagles-smith@usgs.gov)
	David Evers (david.evers@briloon.org)
Biogeochemistry:	Mark Marvin-DiPasquale (mmarvin@usgs.gov)
	Jacob Fleck (jafleck@usgs.gov)
Sources:	Chris Eckley (Eckley.Chris@epamail.epa.gov)

Options for getting Involved in WNAMS

There are many ways you can become directly involved in the WNAMS project. Depending on your level of interest, please follow one or more of these steps.

There are many ways you can get directly involved in the WNAMS project. Depending on your level of involvement and area of interest, please follow one or more of these steps.

1) **I have my own paper I would like to develop and contribute to the WNAMS special issue(s).**
    a. Identify the respective subgroup(s) your work and manuscript would fall under and contact that particular subgroup's leader(s).
    b. Send the subgroup leader(s) your contract information, a potential working title of your manuscript, and a brief synopsis, abstract, or outline of your manuscript.

2) **I would like to contribute as a co-author and/or data provider for one or more of the current manuscripts.**
    a. Identify the respective subgroup(s) and manuscript(s) to which you wish to apply your expertise, and contact that particular subgroup's leader(s) concerning your interest.
    b. Contact the lead author for that particular manuscript and inform them of your interest in involvement. If you need contact information or assistance contacting working participants or lead authors from the group, please contact Madeline Turnquist.

3) **I want to be a lead author on a current manuscript that does not have a lead author assigned to it.**
    a. Identify the respective subgroup(s) your work and that manuscript fall under, and contact that particular subgroup's leader(s).
    b. Let the subgroup leader(s) know which manuscript you are interested in leading.

4) **At this point, I do not have a manuscript in mind, but I want to be more involved with a particular subgroup.**
    a. Contact the leader(s) of the respective subgroup you would like to join.

5) **I have mercury data that I would like to contribute.**
    a. Please send information about your data Madeline Turnquist at madeline.turnquist@briloon.org.
    b. There are various privacy and sharing options you can choose form when contributing data. Your data can be as public or private as you choose.

6) **I received this e-mail/flyer as a forward from a colleague, and I want to receive updates about WNAMS directly.**
    a. Send your contact information (name, affiliation, address, phone number, and e-mail address) to Madeline Turnquist at madeline.turnquist@briloon.org.

7) **I do NOT want to receive further communications from this group, please remove my name from the distribution list.**
    a. Please e-mail Madeline Turnquist at madeline.turnquist@briloon.org, and she will remove you from the distribution list.

Special Journal Issue

The group will be submitting the finished manuscripts to one or two journals for publication in a special issue highlighting the research. There is current discussion for an initial series of synthesis manuscripts to be submitted to *Science of the Total Environment* (*STOTEN*). In the past, a special issue of *Ecotoxicology* (2005 - Northeast special issue, 2011 - Great Lakes special issue) has been developed. More information on publication plans will be provided in future newsletters.

Western Mercury Websites

For more information about this project, please visit BRI's webpage (http://www.briloon.org/mercuryconnections/western). For those of you as working participants[1] and attendees of the USGS Powell Center meeting, we also have information on the access restricted MyUSGS site (https://my.usgs.gov/confluence/display/westernhg).

WNAMS Webinar

The WNAMS leadership team will be hosting a webinar for State and Federal representatives to discuss the WNAMS effort and how scientists and decision makers can get involved and the impacts the research might have to Western management. The date of the webinar is to be determined, but it will likely be held sometime in March 2013. A separate e-mail invitation will be distributed for the webinar. If you wish to attend the Webinar, please let Madeline Turnquist know, and she will add you to the list.

Continued Financial Support

Ongoing support is critical to keeping the WNAMS effort moving forward. If you or your agency is interested in supporting our effort, or if you have RFPs that we should be aware of, please contact James Wiener (University of Wisconsin-La Crosse; jwiener@uwlax.edu).

Timeline

The following is the current working timeline of the group.

October 2011 — A preliminary meeting to determine the scope of the project was held in Golden, Colorado in conjunction with the U.S. Geological Survey (USGS) and the National Park Service (thanks to a generous grant from National Park Service's Air Division office).

September 2012 — First USGS Powell Center Meeting by invitation only; Fort Collins, Colorado.

February/March 2013 — Initial series of mercury data sets to be compiled.

March 2013 — Webinar for State and Provincial representatives and contacts representing state environmental and health departments.

April 2013 — Data organization and standardization complete.

July / August 2013 — Presentation of the WNAMS at the 11th International Conference on Mercury as a Global Pollutant, Edinburgh, Scotland, U.K.

September 15-20, 2013 — Second USGS Powell Center Meeting (by invitation only); Fort Collins, Colorado. Data analysis and conference quality presentations for each target manuscript included in the first series of papers from the WNAMS effort.

[1] Working participants are those who attended the USGS Powell Center meeting in Sept. 2012, are highly involved in the workings of the work with access to the WNAMS MyUSGS page (password protected), and/or have been identified as contributing an outside manuscript separate from the list initially proposed at the Powell Center meeting.

March or April 2014 — A third USGS Powell Center Meeting. Draft manuscripts completed and initial integration of synthesis results.

September 2014 — Draft manuscripts distributed among WNAMS participants for integration.

November 2014 — First series of synthesis manuscripts submitted to scientific journal(s).

November 9-13, 2014 — Special session at SETAC North America (Vancouver, British Columbia).

July 2015 — Special session at 12th International Conference on Mercury as a Global Pollutant (South Korea).

Tentative Target Manuscripts: Titles and Lead Authors

***If contact information for lead authors is needed, please let Madeline know.

Overview paper – Mercury in western North America: Introduction to a regional synthesis assessing environmental contamination, bioaccumulation, and risks; ***James Wiener et al.***

Sources Subgroup

- Spatial and temporal trends of atmospheric mercury in western North America; ***Peter Weiss-Penzias et al.***
- Spatial and temporal patterns of wet and dry deposition in western North America; ***Kristi Morris et al.***
- Comparison of atmospheric mercury concentrations and deposition modeling results in western North America; ***Lead author to be determined*** **(Any volunteers!)**
- Spatial and temporal trends in mercury deposition in western North America using geologic archives (including sediment, ice, and peat cores); ***Paul Drevnick et al.***
- Mercury monitoring program in Western North America; ***David Schmeltz et al.***
- Surface-air mercury fluxes throughout the West; ***Mae Gustin et al.***
- Determining the relative importance of atmospheric versus abandoned mining inputs in affecting water, sediment and fish mercury concentrations; ***Charles Alpers et al.***
- Mercury mobilization from contemporary suction dredge gold mining; ***Charlie Alpers et al***
- Watershed yields of mercury across the West and the impacts of landscape and land-use activities; ***Chris Eckley et al.***

Biogeochemistry Subgroup

- Spatial trends in surface water, sediment, and soil mercury species across western North America; ***Jacob Fleck et al.***
- Factors affecting methylmercury concentrations and methylation efficiencies in wetlands across western North America; ***Jacob Fleck et al.***
- Controls on methylmercury production across geochemical gradients in western North America; ***Mark Marvin-DiPasquale et al.***
- Landscape controls on carbon and mercury export; ***George Aiken et al.***
- Western reservoirs: methylmercury hotspots, fact or fiction; ***David Krabbenhoft et al.***
- Patterns in mercury concentrations in invertebrates in the western United States, Canada, and Mexico; ***Robin Stewart et al.***
- Drivers on methylmercury at the base of the food web: effects of primary productivity and dissolved organic carbon; ***Allison Luengen et al.***

Fish and Wildlife Subgroup

- Spatial and temporal variability in mercury concentrations of fishes across western North America; ***Collin Eagles-Smith et al.***
- Assessing mercury concentrations in fishes across western North America in relation to health risks of fishes, wildlife, and humans; ***Jesse Lepak et al.***
- Spatial exposure and risk profiles for avian piscivores in western North America; ***David Evers et al.***
- Spatial distribution in methylmercury bioaccumulation across multiple avian guilds in western North America; ***Allyson Jackson et al.***
- Decadal variation in feathers and bird egg mercury concentrations for 11 avian species across western North America; ***Josh Ackerman et al.***
- Fish as bioindicators of mercury contamination in western North America: food web partitioning and species differences; ***Jesse Lepak et al.***
- Landscape scale determinants of fish mercury bioaccumulation across ecosystems of western North America; ***Collin Eagles-Smith et al.***
- Mercury and selenium interactions and effects at multiple levels of organization: biogeochemistry, bioaccumulation, and toxicity; ***Robin Stewart et al.***
- Impact, rate, and feasibility of management approaches to reduce mercury bioaccumulation in sport fish; ***Jesse Lepak et al.***
- Assessing the risk of mercury to wildlife on US Fish and Wildlife Service Refuges: identifying management options; ***Chris Cline, Phil Johnson et al.***

Abstract submitted for 11th International Conference on Mercury as a Global Pollutant (Edinburgh, Scotland, July/August 2013)

The group submitted an abstract to the ICMGP. Participants of the USGS Powell Center meeting were listed as co-authors. Below is the final abstract.

The western region of North America is an expansive area with a diverse array of habitat types and land uses, and a wide range of climates. In comparison to other regions of North America the west is characterized by a combination of an extensive legacy of gold, silver, and mercury (Hg) mining, diffuse regional Hg emissions, and trans-Pacific Hg deposition overlain upon a landscape of varied hydrology and topography that together support unique biological communities. The combination of different Hg sources, habitat types, geography, geology, and climatic regimes creates a complex mosaic of processes driving Hg cycling and bioaccumulation. These complexities confound our understanding of methylmercury (MeHg) bioaccumulation and risk across western landscapes, potentially impeding management actions to mitigate the threats of Hg to western North American ecosystems. Importantly, public land comprises greater than 60% of the total surface area in the west, and many aquatic habitats are highly managed because of the prevalence of dams and reservoirs throughout the region. These characteristics make land management efforts to reduce MeHg risk potentially more plausible than in other regions.

Several decades of research and monitoring of Hg and MeHg in western North America provide a foundation for a regional synthesis of the existing data to facilitate a more quantitative understanding of Hg cycling, bioaccumulation, and ecological risk at landscape and regional scales. This is important because effective resource conservation related to Hg contamination will require information derived from datasets integrated across broad abiotic and biological compartments to anticipate (1) the cycling of Hg through the landscape under specific and changing climatic conditions, (2) the bioaccumulation of MeHg within habitat-specific and regional food webs, and (3) spatiotemporal patterns in MeHg risk to key indicator species.

We are conducting a collaborative landscape-scale synthesis of published and unpublished data on Hg and MeHg distribution across western North America, to understand variability in Hg sources, distribution and transport, as well as MeHg production, bioaccumulation, and risk across this diverse region. To do this, we are first coupling remotely-sensed data of landscape structure and land use change, models of Hg deposition and climatological variation, with measurements of Hg and ancillary parameters in abiotic media and food webs. This will support an examination of how the linkages between abiotic and biological processes interact geographically to influence MeHg risk across the region. Thus, facilitating the development of regional-specific models for assessing how changes in land management might be implemented in western North America to reduce exposure and risk to both humans and wildlife.

CO-PI's and Contact Information

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Again if you have questions, concerns, or ideas that you would like to share, contact one of the Co-PI's, Subgroup Leaders, or Madeline Turnquist (madeline.turnquist@briloon.org; 207-839-7600, ext. 248) who is coordinating this effort through BRI.