

Western Airborne Contaminants Assessment Program: A workshop for Montana
MEETING NOTES
10 October 2008



On 23 April 2008, twenty-six participants representing nine federal, state, and tribal agencies (National Park Service; Environmental Protection Agency; USDA – Forest Service; FDA Center for Food Safety & Applied Nutrition; Confederated Salish & Kootenai Tribes; State of Montana Governor's Office, Departments of Environmental Health, Natural Resources and Conservation, Agriculture, and Fish Wildlife & Parks; Flathead Basin Commission; Ministry of the Environment, British Columbia; and Parks Canada) and two universities (Oregon State University and Baylor University) gathered to discuss recent findings from the Western Airborne Contaminants Assessment Project (WACAP).

WACAP was a six-year, multi-agency study initiated by the National Park Service in 2002 to evaluate the potential threats to park ecosystems and likely sources of such airborne contaminants as heavy metals and pesticides. The study provided a window into the contaminant situation at sampling sites at twenty western national parks from the Arctic to the Mexican border, including Snyder Lake and Oldman Lake watersheds in Glacier National Park (NP). Key findings from Glacier NP indicate that concentrations of the banned pesticides DDT, dieldrin and chlordane in fish exceeded fish-eating wildlife and/or human health consumption thresholds. Additionally, PAHs, combustion products formed by industrial (among other) processes, were especially elevated in the Snyder Lake watershed.

The one-day workshop gave attendees the opportunity to directly interact with several of the WACAP scientists, serving to facilitate communication between agencies, and thus to the public, and to provide an understanding of what we know, gaps in the knowledge, and the next steps for research and monitoring related to toxic air contaminants in Montana.

MAJOR CONCLUSIONS

1. We need to encourage more research & monitoring of waterbodies in Montana to understand the distribution of air contaminants. More research is needed for us to understand the effects on wildlife and human health of the incorporation of contaminants into the aquatic food chain. WACAP results cannot be extrapolated to include the status of aquatic resources at other lakes/streams, both at high and low elevation sites.
2. Communication between agencies will create a better understanding of public health and wildlife health concerns and risk awareness. We need a "shared message" that we can get out to the public.
3. Given shared airsheds and watersheds between Montana and neighboring states and provinces, any future assessments of toxic air contaminants and resources sensitive to air pollutants should be considered in the context of regional partnerships, such as the Crown Managers Partnership and the Western Regional Air Partnership (WRAP).

ACTION ITEMS

(See section IV, below)



I. Morning science presentations and slide notes can be found at the MT workshop webpage or by clicking the below links:

Overview of the WACAP Science and Issues for Montana:

[WACAP Focus on GLAC Results](#)

Dixon Landers, EPA

Contaminant behavior, deposition and pathways:

[Transport and Deposition of Contaminants to Glacier National Park](#)

Staci Simonich, Oregon State University

Human health thresholds of contaminants in fish:

[Contaminants in fish – Research results](#)

Luke Ackerman, FDA

Evidence of aluminum smelter impacts in Glacier NP:

[Polycyclic Aromatic Hydrocarbons in Glacier National Park](#)

Sascha Usenko, Baylor University

SUGGESTIONS FOR FUTURE RESEARCH FROM WACAP SCIENTISTS:

1. Future ecosystem investigations should consider the “holistic” approach used by WACAP (i.e., distribution through space and time, analysis of sediment cores and fish, in particular, and consideration of biological effects)
2. Future research should include food web analyses to determine trophic positions and better compare data from different fish species
3. Use random approach in study design to characterize mercury in fish and factors pertaining to methylation. N= ~30 is the minimal number of lakes that would need to be sampled in order to estimate the condition of the population with “reasonable” error estimates on distribution
4. In order to test the importance of selenium (Se) in reducing methylmercury concentrations in fish, Se (in fish) needs to be measured and the excess Se beyond that molar ratio in fish to be quantified. Excess Se and Hg is worth calculating.
5. Measure PCB congeners applicable to risk threshold; Dioxins, Furans (actual risk is likely higher than the estimate WACAP reports) (Worth noting here that Dioxins are very expensive to analyze and therefore WACAP did not quantify them.)
6. Consider measuring degradation products of PAHs in order to determine toxicity and risk threshold.
7. Determine consumption habits of fisherman – an influential piece of information inexpensive to obtain, and can be used to add context to consumption advisory.
8. Continue bio-monitoring and create a specimen bank to speed future problem solving, albeit with a large associated cost/benefit.
9. Quantify industrial pollutants from east side of Glacier and Alberta: influence from oil and gas flares? Relevant work currently undertaken will compile sediment core data from high elevation lakes in Banff Provincial Park on which many SOCs were measured. Pertinent results may be analyzed with respect to Glacier.
10. Consider the USGS dieldrin model (see section III, USGS), and utilize GIS expertise to compare WACAP dieldrin results with the model’s predictions



II. Questions and Answers with the Science Team

Q: (Dept. Ag) was chlorpyrifos (CHLOR) found in the ecosystem at Glacier? The distribution of CHLOR near Glacier seems surprising, as CHLOR is not used on wheat, and wheat is the number 1 industry in Montana. Chlorpyrifos is used heavily in CA; not used as much in MT because of shorter season.

A: (Simonich) CHLOR is found in GLAC; see maps of use of pesticides; also trajectory maps. In addition to snow, contaminants are deposited with rain (convective storms) and in dryfall. Passive air sampling devices (PASDs) were used to sample long-term; short-term sampling was not conducted.

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Q: (USDA-FS) Does lake water chemistry (e.g., ANC) affect levels of contaminants (heavy metals differ in solubility at different pHs)?

A: (Landers) the entire watershed affects processing.

A: (Ackerman) More productive lakes (still oligotrophic) have bigger fish, sometimes more contaminants

A: (Simonich) Fish metabolize PAHs, so we don't see PAHs in fish. Upon looking at the profiles of metals in sediment (WACAP report, p. 469), Cd in Snyder Lake higher than Cd in Oldman, but trends are similar.

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Q: (NPS-GLAC) Given that PAHs don't accumulate in fish, what is the message? Are there control technology for PAHs?

A: (Ackerman) although GLAC is highest in PAHs, PAH is not necessarily human/wildlife risk; however, metabolites may be a problem. The effect of PAHs in fish is unknown as WACAP did not look for degradation products (metabolites) of PAHs in fish.

A: (Usenko) The aluminum smelter at Columbia Falls is not powered by coal; emissions from Al plant are non-stack emissions – fugitive. The technology is old. Technology at plant (open pots with tar cover) would need to be replaced in order to reduce emissions.. While the Al smelter production is stable or decreasing, oil flares are increasing. (Manuscript on PAHs in Glacier is in preparation.)

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Q: What else causes intersex fish?

A: (Landers) Most endocrine-active compounds weren't measured by WACAP, but an upcoming publication by Schwindt will provide further insight. WACAP looked at historical collections of fish and found a lower incidence in those fish, as compared to frequency of intersex found in WACAP fish. WACAP is first study that found (and also the first study that looked for) intersex fish in remote areas. However, the sample size was very small.

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Q: (EPA) what is contamination at low elevations vs. high elevation WACAP lakes?

A: (Ackerman) can't translate results from high to low elevation; not predictive. Low elevation lakes have point, runoff sources of contamination. Biggest problem is dieldrin and ppDDE – these occur in high elevation lakes. Other lakes have other health risks – mercury, where wetlands facilitate Hg methylation, so fish in lakes with input from wetlands may be elevated in Hg

A: (Landers) WACAP found that contamination was typically greater at higher elevations.

Comparison with Canadian study (Jules Blais) also found increase with elevation (Blais reviewed design of WACAP). Extrapolation to other lakes can be difficult; probability studies can be used to answer the question.

(EPA) Pollution is also coming from diesel drill rigs (Pinedale, WY)



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Q: (Dept. Ag) *what were the detection limits vs. noise?*

A: (Ackerman) the lowest values measured were about 10X noise

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Q: (Dept. Fish Wildlife Health) *Do you think that mercury found in fish from GLAC was low because of fish used?*

A: When informing the public, such a finding should be caveated by noting that other fish in GLAC have high levels of Hg

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Q: (Dept. Nat. Res. Cons.) *What criteria were used to select lakes?*

A: (Landers) small watersheds, fish, no glaciers

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Q: *Was consideration given to risk thresholds for sensitive members of the population (i.e., pregnant women and children)?*

A: (Ackerman) The pregnant women/children advisory is important for Hg and some other contaminants (see EPA guide). WACAP did not include other categories (women/child) beyond recreational and subsistence fish consumption because they didn't want to make assumptions.

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Q: (Parks Canada) *Are there plans to expand to Canada national parks?*

A: (Landers) No, this is low on EPA's radar; but will be talking to OAQPS (with CShaver) in a couple of weeks. WACAP's success is result of holistic approach, having investigators in on entire project; collaboration can unite efforts across broader region; wildlife effects may be significant but are there better ways to sample (osprey eggs? No, migratory. What else? What about synergistic/cumulative effects with other contaminants?

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Q: (MoE, BC) *Are WACAP methods SOPs?*

A: (Landers) No, methods are still in the realm of research. If methods are not the same, it's hard to compare results across tests. WACAP results can be compared across WACAP parks, but results may differ from other researchers depending on methods. WACAP methods were similar to other approaches used in Europe and USA.

A: (Simonich) If only EPA methods had been used, fewer compounds would have been detected, or even analyzed for.

A: (Landers) WACAP database and metadata being compiled; aim for summer 2008 completion

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Q: (MT Fish Wildlife Parks) *are there issues with fire retardants from fire suppression.*

A: (Landers) WACAP did not sample this kind of fire retardant. Flame retardants release P, NH3

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Q: *If ppDDEs and dieldrin still persist in the environment, what will eventually happen?*

A: (Landers) Time may be the best ally for historic use pesticides

A: (Simonich) The half-life for degradation of these compounds is very long: 100-200 years, and they degrade slowly in cold environments. Sediment cores give indication that flux of some (e.g., ppDDE) is decreasing, but each year fields are re-plowed, the contaminants are reemitted.

(FS) Recent fires have been burning very hot, releasing organics. Historic use pesticides are released by fires, but not necessarily broken down, just transported.

(NPS) Fires also release previously deposited Hg

(EPA) No tillage practices can reduce reemission of pesticides.

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III. Other agency data and programs on toxic air contaminants; plans for follow up monitoring, research and assessment

- National Park Service

Porter

- Air Resources Division coordinated WACAP as a broad-level, scoping assessment; parks involved now can move forward with the results provided and follow up with detailed sampling and analyses

Potter

- At Glacier, mercury research has been conducted; additional testing for Hg in lake trout at 5 lakes summer 2008 (work with Trevor); maybe will add Se; need sampling coordination for possible intersex study with Schreck
- Need for baseline information on coal mines in Flathead and Elk Rivers, as there is concern regarding selenium from coal mines; should also do Hg work there
 - o Money from US will be used in Canada to assess environmental impact of coalbed methane
- Public outreach: articles for park newspaper, fisherman handout (site-specific warnings?)

Trammell

- Need for a consistent message on risks, to extrapolate to all parks. Referral to the NPS Office of Public Health WACAP handout (needs to be coordinated with other offices within/without NPS), and soon upcoming DOI-wide fish consumption guidance

- Environmental Protection Agency

Larson/DalSoglio

- Limited program in MT, with limited air quality sampling
- TMDL program recognizes air sources
- State has been doing nutrient work in lakes through a competitive EPA solicitation for regional projects
- EMAP lake survey could be vehicle for unifying effort to get info on federal, state, tribal, Canadian lands. (EPA) The Office of Water EMAP (Environmental Monitoring and Assessment Program) study, an assessment of land use impacts, is worth investigating. [[EMAP is a research program to develop the tools necessary to monitor and assess the status and trends of national ecological resources. EMAP's goal is to develop the scientific understanding for translating environmental monitoring data from multiple spatial and temporal scales into assessments of current ecological condition and forecasts of future risks to our natural resources.]]

- USDA – Forest Service

Sirucek

- FS has many lakes with similar characteristics as WACAP lakes, and are nearby, therefore likely at risk. Probably have same chemical markers in lakes in the Bob Marshall WA and Jewel Basin
- FS needs to work with NPS on message; many visitors coming from West stop first at FS visitor center to get info on fishing, so FS has good opportunity to communicate.
- Highlight lake studies (related to acid rain) that have been carried out by the USFS Air Resources Program every 5 years – could be used to focus cont efforts, add some analyses.

- Confederated Salish & Kootenai Tribes

Ashley

- For FY09 submitted plan to identify air quality related values (tribe is a Class I area - Crown of the continent)



- Tribe also member of WRAP (Western Regional Air Partnership)– toxic air contaminants could be “next” issue for WRAP
- Concerns as some tribal fishers have moved to higher elevation lakes to escape agricultural contaminants

- State of Montana Dept. of Environmental Health
Steltzer
 - Advisories on PCBs and Hg continue (following EPA formula?)

- State of Montana Dept. of Natural Resources and Conservation
Moy
 - Crown of the Continent looking at ecological health, could add contaminants work and also look at transboundary lakes
 - Other issues being investigated include coalbed methane effects on water quality, PAHs, Powder River Basin, etc.

- State of Montana Dept. of Agriculture
Bamber
 - State trains lots of people every year about pesticides – WACAP will help
 - Presently does not sample air, but maybe should reconsider
 - Monitor wells for groundwater quality; also surface water, using passive samplers for qualitative sample, test sediments for pyrethrin (looking for runoff contamination) and current-use pesticides; pyrethrins toxic to aquatic organisms at ppt levels in sediments
 - Test for 95 pesticides in aquatic organisms, developing benchmarks
 - Tests for polar compounds, WACAP did both polar and nonpolar

- State of Montana Dept. of Fish Wildlife & Parks
Selch
 - State presently has advisories for PCBs and Hg; may be adding dieldrin to analysis
 - Database developed of lakes not sampled, fished, at risk – could use more input
 - Concern regarding issues with fire retardants from fire suppression (see Q&A)

- Flathead Basin Commission
Miske
 - Looking at selenium (Se) and mercury (Hg) in fish, otters, herons

- Ministry of the Environment, British Columbia
Stroscher/Willis
 - Representatives present do monitoring from regulatory side; need additional input from Environment Canada
 - Need suggestions for monitoring to add to permits. Hg, Se issues with mining applications; have data, some speciation, from permittees
 - British Columbia has little agriculture; more industry, and therefore may need different markers for effects.
 - Se in southeast British Columbia is a significant issue, both from runoff and atmospheric sources

- Parks Canada
Dolan
 - Lake trout at Waterton Lakes tested for Hg
 - Have outreach materials on Hg advisories in high elevation lakes (Upper Waterton Lake has advisory) – most information is present on fishing permit

- (USGS – not present)



- Nationwide model developed for effects of dieldrin distribution: "Regression Model for explaining and predicting concentrations of Dieldrin in Whole fish from United States Streams" (Scientific Investigations report 2006-5020)

IV. Where do we go from here in Montana?

ACTION ITEMS:

NPS-ARD

1. With Confederated Salish-Kootenai Tribes, explore WRAP: from visibility to toxic air contaminants (Shaver/Ashley)
2. Contact Carl Schreck regarding intersex study (Flanagan/Porter)
3. Report to press on the "next steps" discussed during workshop (Flanagan)
4. Copy WACAP publications to NRBib and citations on the WACAP website. (Flanagan)
5. Keep MT workshop webpage active. (Flanagan)
6. Send hard copy of the final WACAP report to the participants. (Flanagan)

EPA

7. Work with EPA Superfund folks to deal with risk communication (Bamber)
8. Present to EPA Office of Pesticide Programs and the Environmental Fate and Effects Division (Bamber)
9. Look in to pollution prevention program (PAHs)- MT University extension might explore emissions of PAHs from Columbia Falls Al smelter (Bamber/Larson)
10. Develop proposal for EPA regional solicitation in fall: testing of waters (Larson/lake survey?)
11. Explore addition of SOCs to EMAP lake survey, and inclusion of additional water bodies (Bamber/Larson)

NPS; State of Montana; Tribes; USDA-FS; EPA (WORKGROUP: Selch, Steltzer, Ashley, Miske, DalSaglio, Sirucek, Larson, Bamber, Tonnessen, Potter, Downs, Trammell, Flanagan, Ackerman, Simonich)

12. Develop risk language with Simonich Lab (Downs, Potter, Tonnessen, Simonich, Ackerman, Trammell, Flanagan)
13. Distribute message to public, distributed through park and state. Two products:
 - At Glacier, article included in Watertown Glacier Newspaper. Finalize two-page fish consumption advisory and post on website, and provide hard copies for visitor centers and ranger stations. Define what WACAP says, what it doesn't. (Selch, Potter, Downs, Tonnessen, Dolan)
 - With State as unifying entity (except for tribes), bring in all partners and update information on the angler pamphlet "Montana Sport Fish Consumption Guidelines". Presently the brochure does not include Glacier lakes; need for clarification on sources: atmospheric vs. runoff (Selch, Ashley, Sirucek, Larson, Bamber, Miske, Tonnessen, Potter, Downs, Trammell)
14. Update MT on lakes sampled, needing to be sampled (Sirucek, Larson, DalSaglio, Potter, Downs, Selch, Tonnessen)
15. Larger EPA lakes project: EMAP OW Lake Survey - sample collection (by random design) thought to begin in 09-10, but on 5-year rotating schedule and next sampling year is 2012. Training session this fall? Time is now to gain strategic inertia. Survey presently includes only nutrients, Hg, and fish - but not SOCs; could request (with \$) addn'l work in NPs. EMAP lake survey national coordinator is Tony Olsen, olsen.tony@epamail.epa.gov; Tina Laidlaw is EPA POC Region 8 for lake survey (each EPA regional office has coordinator). Steve Paulson? (Flanagan, Trammell, Larson, Bamber)



16. Creel (angler) surveys to evaluate risk and to understand the harvest, an important tool for communication as far as how many fish can be consumed safely/low risk. (Trammell? Downs? Selch?)

MT Dept. Agriculture

17. Take WACAP issues to the next EPA Office of Pesticide meeting (Bamber)

Confederated Salish & Kootenai Tribes

18. Explore WRAP: from visibility to toxic air contaminants (Ashley, Shaver)
19. Investigate Lieberman/Warner CO2 bill as a potential source of \$\$ (Ashley)

Parks Canada

20. Communicate with Crown of the Continent manager group, using IJC as a template, via ecosystem steering committee call, annual forum next February (Dolan, Moy)

MoE, British Columbia

21. Investigate sources for Industrial Pollutant (2004) map showing PAHs (Alberta has many sources) (Stroscher/Willis)

V. Initial feedback regarding workshop and logistics

1. Need for a questionnaire regarding workshop format
2. Need introduction to chemistry and abbreviations, information on pesticides, what is the source of these chemicals
3. Include mid-management folks in future meetings
4. perhaps more time needed for detailed science presentations (Simonich, Ackerman, Usenko); and additional time for questions
5. The website was very useful (links worked), and the links to resources (executive summary, talking points, fact sheet) were helpful
6. Folks that should've attended but either weren't invited or weren't able to make it: Environment Canada, MT Dept of Environmental Quality, NPS Office of Public Health, Fish & Wildlife Service, US Geological Survey (Biological & Water Resources disciplines), Alberta, Tribes
7. In workshop preparation and planning, could use a communications director to put on website; have a call before workshop to coordinate and target main players
8. We hope to gain more feedback from completed evaluation forms.
9. It works better to make individual contacts with desired attendees than expect co-workers to do so.