Greater Yellowstone Area
Clean Air Partnership
(GYA-CAP)
GYA-CAP background

• Started by Mark Story, hydrologist and air quality specialist on the Gallatin NF (R1) in 1997.

• Mark served as the single chair from 1997 - 2012.

• The committee meets annually—historically as in-person meetings.

• Tight travel budgets have caused a shift in meeting style—sometimes in person, sometimes virtual.
Members

Yellowstone NP
Grand Teton NP
Shoshone NF
Bridger-Teton NF
Caribou-Targhee NF
Gallatin-Custer NF
Beaverhead-Deerlodge NF
National Elk Refuge
Red Rock Lakes Refuge

BLM (ID, WY, MT)
Montana DEQ
Idaho DEQ
Wyoming DEQ
USGS
MSU and UM
CSU
UWY
GYA-CAP Purpose

- Coordinate and communicate air quality information between partners such as:
  - Deposition, visibility, regional haze, and other concerns
- Assess air quality in the GYA
  - Through monitoring, modeling, and analysis (comply with Clean Air Act, Wilderness Act, Organic Act-NPS, and Forest Management Act-USFS)
- Support air quality management strategies
  - Example: developing critical load and target load numbers for pollutants to help FLMs make planning decisions
Air Quality concerns in the GYA

- Urban & Industrial emissions (N, S, Hg...)
- Oil and gas Development
- Prescribed and Wildfire Smoke
- Feedlot and Fertilizer emissions
- GHG’s and contribution to climate change
- Ozone and PM non-attainment
- Nitrogen Deposition
Current Focus

- Pattern of increasing Nitrogen deposition
  - Increase in N in samples of
    - Air (IMPROVE)
    - Precipitation (NADP)
    - Lake water and snowpack
    - Sediment
    - lichens

- Develop critical loads for sensitive ecosystem components to help inform management decisions.

- **Critical loads** level (load) of deposition that causes change to some part of an ecosystem

- **Target loads** are goals that can be established by FLMs, states or other stakeholders to designate how much or how fast we want ecosystem recovery to occur or what amount of change is acceptable
Greater Yellowstone Ecosystem: Continuum of Impacts to Ecological Health with Increasing Nitrogen

- **Alpine Plant Critical Load**: 3-4.0 kg/ha/yr
- **Terrestrial Ecosystem Health (lichen) Critical Load**: 3.0 kg/ha/yr
- **Current N deposition in GYE high elevation areas**: 2.5-3.5 kg/ha/yr avg.
- **Aquatic Ecosystem Health (diatom) Critical Load**: 1.5 kg/ha/yr (wet dep OR 2.0 total wet + dry)
- **Natural background N deposition**: ~0.5 kg/ha/yr

- **Changes in water chemistry**
- **Increase in “weedy” lichen species**
- **Change in macroinvertebrate diversity**
- **Effects on aquatic animals (episodic acidification)**
- **Forest decline (acidification effects on trees)**
- **Increase in “nitrogen loving” aquatic diatom species**
- **Surface water N saturation (NO3 at lake outlet)**
- **Change in alpine plant diversity**
- **Lethal effects on fish, other aquatic animals (chronic acidification)**
Glidepath, management too
Example from Rocky Mountain National Park
GYA-CAP Products

- **2009** Air Quality Data Analysis R1 (Lake samples, NADP, and IMPROVE)
- **2010** Air Quality Data Analysis Report B-T (Lake and precip samples, NADP, and IMPROVE)
- **2011** Air Pollution Critical Load Development Workshop
- **2014** Air Pollution Critical Load Development - Atmospheric Deposition Loading Maps (Still pending)
- **2014** Continued Air Pollution Critical Load Development - Macroinvertebrate Analysis (findings pending)
Challenges

Group

- Limited Federal Air Quality specialist/personnel in the GYA
- Different missions and operating goals of the different agencies—few number of folks pulled in a variety of directions
- Only meet annually

Work

- National AQ models tend not to work well in the GYA
- AQ monitoring can be expensive—need to expand on the use of bioindicators
- Lack of regulatory direction on GHG’s
Future Direction

- Continue to work on defining critical loads for nitrogen deposition in the GYA.
- Working with State agencies (MT, ID, WY) to develop the critical load concept and gain support for emission reduction.
- Climate change (GHG’s), Mercury deposition, Ozone monitoring and mitigation.
- Better communicate our work and findings to Management.

Needs

- Assessment of best monitoring for time and money.
- Analyze zooplankton data
- Add monitoring to areas lacking in the GYA (Shoshone NF).
- Look at source attribution (partnership between UWY and FS to continue isotope analysis on lichen samples, work with NPS to continue source apportionment studies).
- Update 2009/2010 reports—make a GYA-wide report?
- Partnerships? Open for suggestion.
Lake sampling