AKMAP
Freshwater Projects

2008 Cook Inlet Lakes Survey

Nutrient Criteria Development

Upcoming Projects

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AKMAP
2008 Cook Inlet Lakes Survey

A part of the U.S. EPA National Lakes Assessment Program

Survey Design

- Cook Inlet Ecoregion 115 selected
- Lakes must be: a permanent body of water, at least 1m deep, greater than 1000 m^2 of open water
- Not included: lakes with a saline or glacial influence; lakes used for mine tailings, sewage disposal, aquaculture, or other disposal (working lakes)
- Stratified random design, target of 50 lakes

Sampled Lakes:

- 11 Road Accessible
- 39 Floatplane Accessible
- 8 "Urban" Lakes
- 42 Remote
- Very small to very large (800 ft to 32,000 ft in distance)
- Shallow to Deep (1m to over 60m)
- Sea level to 3800 ft in elevation
- Stained and Clear
- Open and Closed Basins

Discarded Lakes:

- Not road accessible & too small for floatplane
- Too high in elevation
- Surrounding topography
- Bad weather

Indicators Sampled

- **Trophic**: temperature, DO, pH, TP, TN, alkalinity, DOC, TOC, TSS, turbidity, color, conductivity, metals, chl-a, secchi disk
- **Ecological:** phytoplankton, zooplankton, benthic macroinvertebrate, diatom, mercury, physical habitat survey, fish pollutants (metals, mercury, and organics), sediment metals and dating
- Recreational: enterococcus

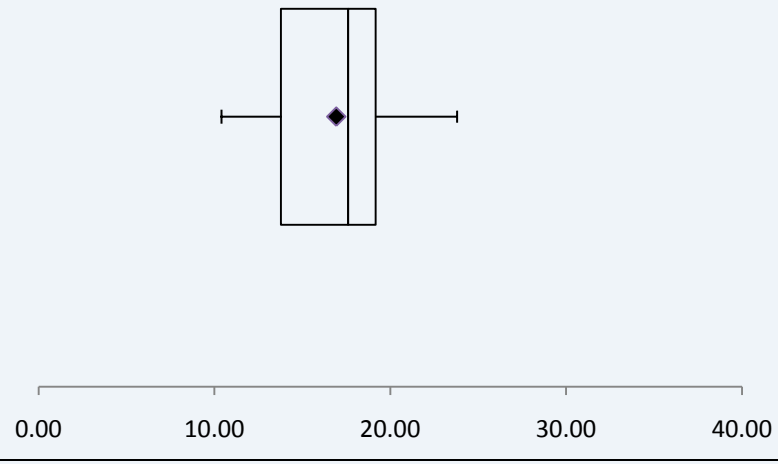
Partners / Roles

- **EH Fish Monitoring Program-** 77 fish collected throughout project. All fish will be analyzed for metals and mercury at no cost to DOW. As their funding allows they will include organics
- **Volunteers**- reduced costs for field support and assisted in field collections: DIAS, DOW, UAA
- **UAA ENRI-** field support, GIS analysis, identification and analysis of biological collections, report writing
- **RMW**- lab space

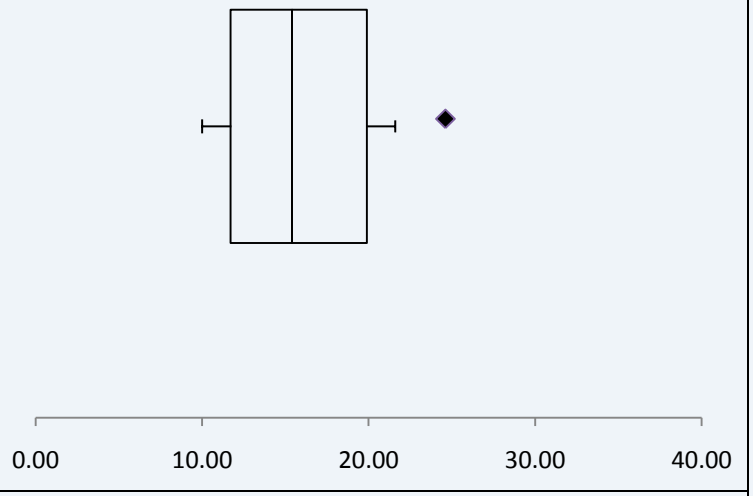
Results / Data

- Biological analysis completed by June 2009: phytoplankton, zooplankton, benthic macroinvertebrate, diatom
- All data provided to EPA, uploaded to SWIM database, translated to WQX, accessible through Storet
- Alaska will not be included in national report
- In house analysis and report by Dec 2009
- Searchable database on website?

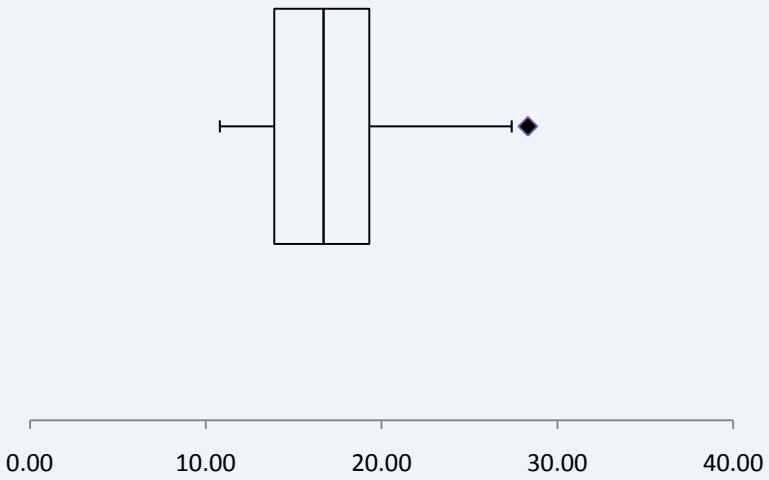
2008 AKMAP Cook Inlet Lakes Survey
Total Phosphorus ug/L, Urban Lakes



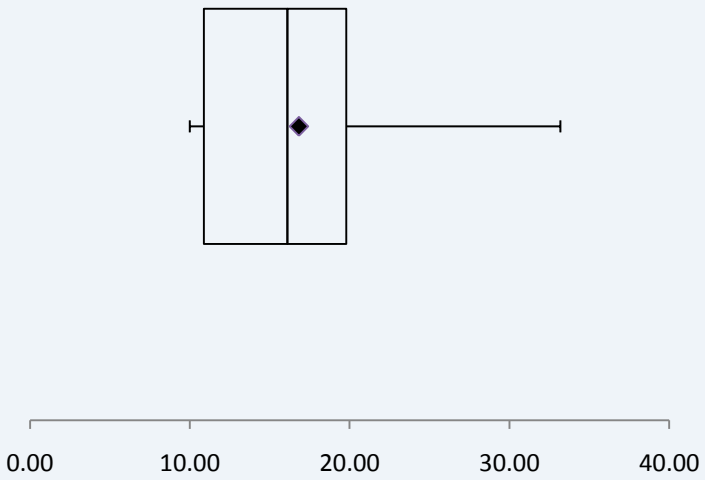
2008 AKMAP Cook Inlet Lakes Survey,
Total Phosphorus ug/L, Remote Lakes

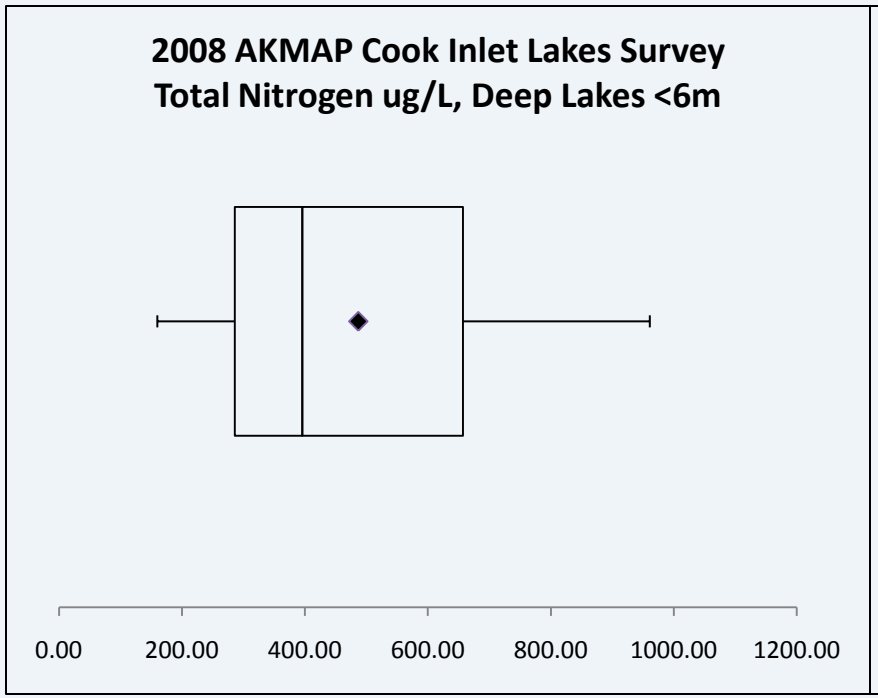


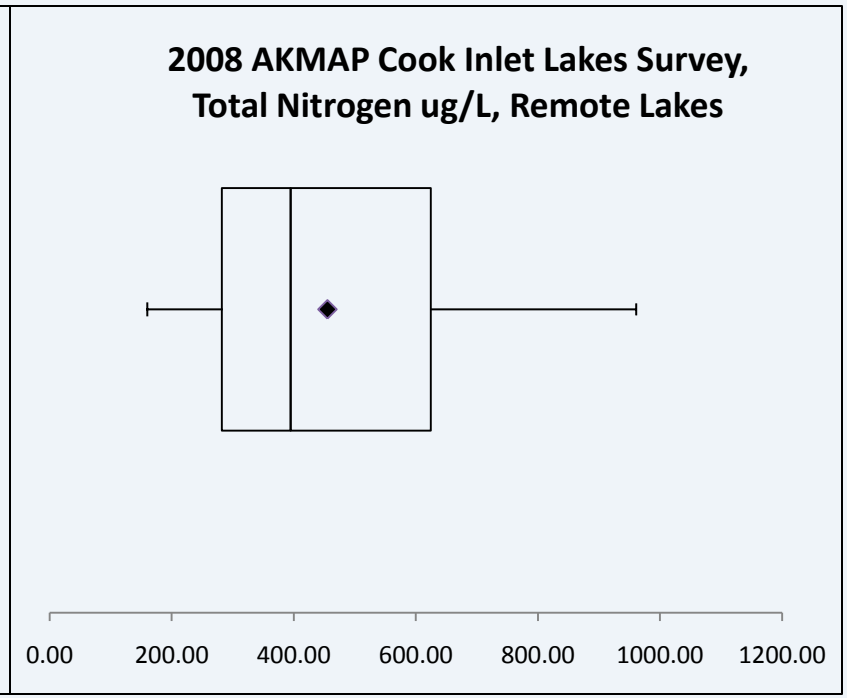
2008 AKMAP Cook Inlet Lakes Survey
Total Phosphorus ug/L, Shallow Lakes >6m



2008 AKMAP Cook Inlet Lakes Survey
Total Phosphorus ug/L, Deep Lakes <6m

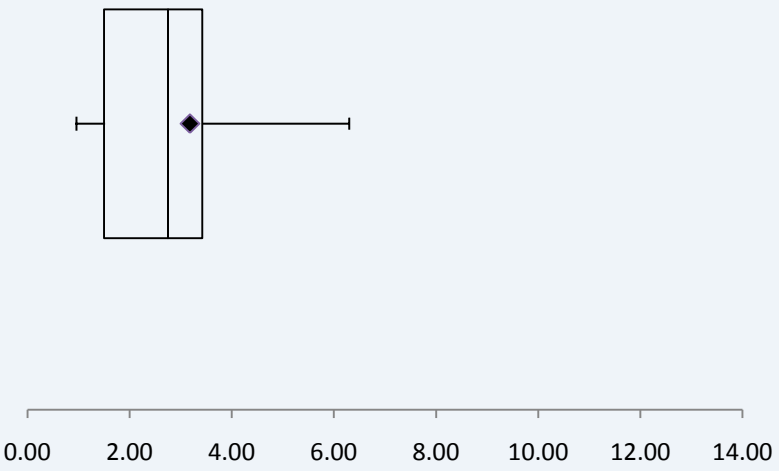




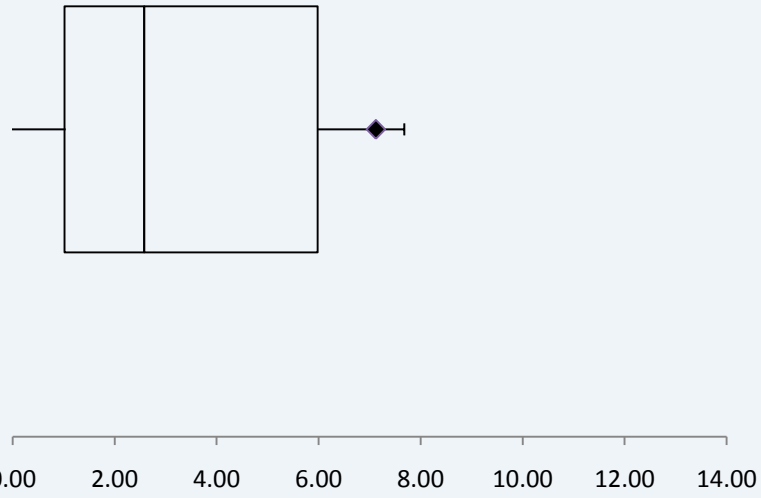


Nitrogen was only detected in 10 lakes. It was not detected in any urban lakes and found in only one shallow lake.

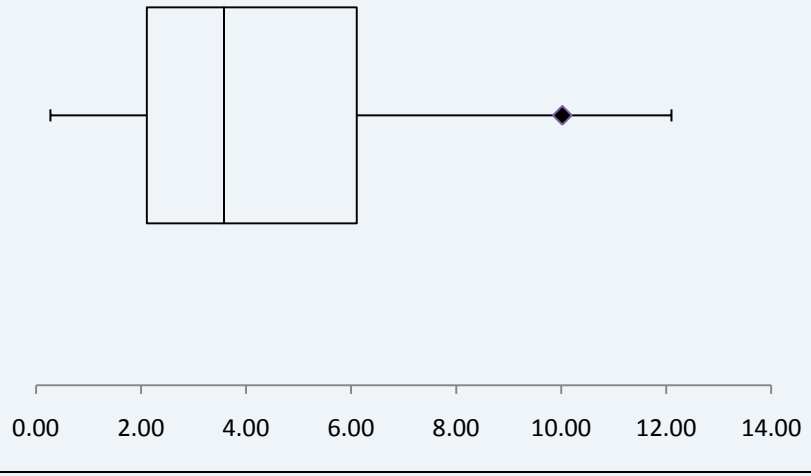
2008 AKMAP Cook Inlet Lakes Survey
Chlorophyll *a* mg/M3 , Urban Lakes



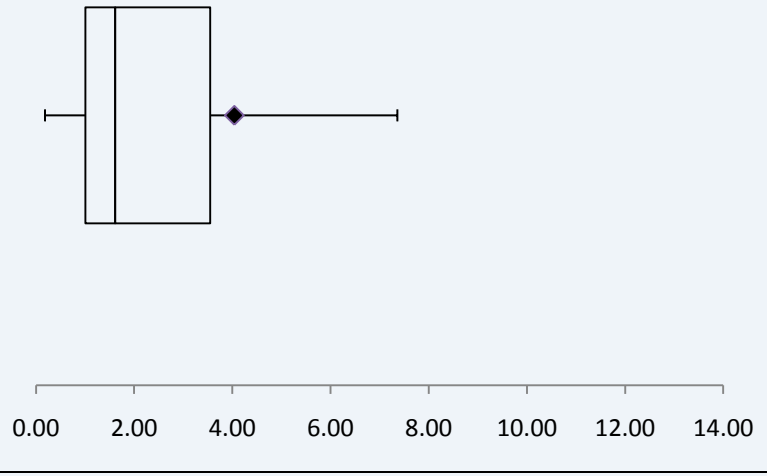
2008 AKMAP Cook Inlet Lakes Survey,
Chlorophyll *a* mg/M3, Remote Lakes



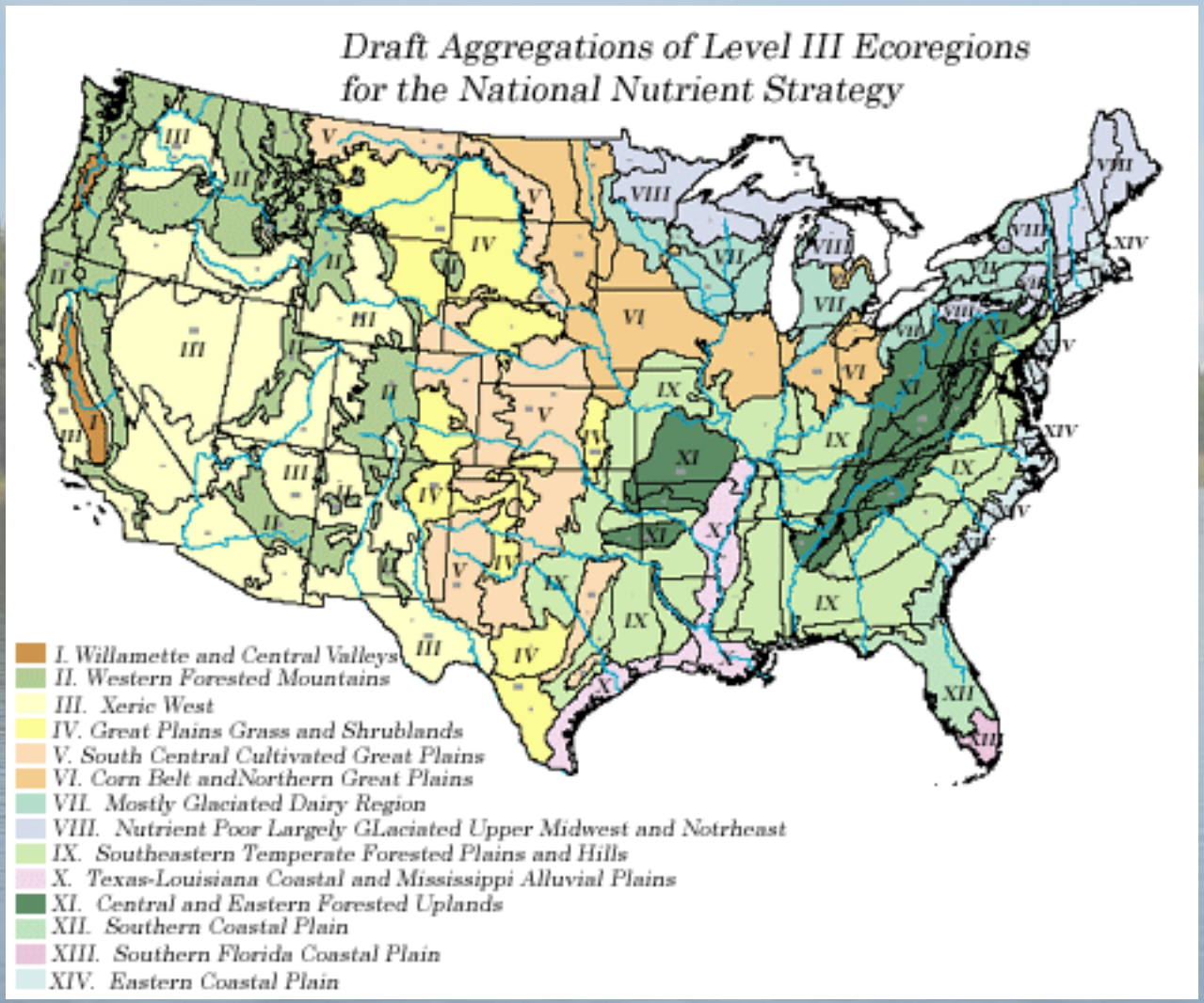
2008 AKMAP Cook Inlet Lakes Survey
Chlorophyll *a* mg/M3, Shallow Lakes >6m



2008 AKMAP Cook Inlet Lakes Survey
Chlorophyll *a* mg/M3, Deep Lakes <6m



EPA Recommended Nutrient Criteria



Region II- Western Forested Mountains

TP ug/L	**8.75**
TN mg/L	**0.10**
Chl *a* ug/L	**1.90**

Quick Comparison

			Total N / Nitrite-N	Total Phosphorus	Chlorophyll *a*
			ug/L	ug/L	ug/L
AKMAP Cook Inlet Lakes Survey	Urban	mean	-	17.60	2.750
	Remote	mean	395.00	15.40	2.580
	Deep	mean	396.00	16.10	1.610
	Shallow	mean	-	16.70	3.580
Other Regions	EPA, Aggregate Ecoregion II, Western Forested Mountains	Lakes	100	8.75	1.9
	B.C.	Lakes (aquatic life)		5-15	
	Washington (Coastal Lowlands, Pugent lowlands, Northern rockies)	oligotrphic		>20	
		lower meso		>10	
	Minnesota (northern forests)			>30	
	California	all fresh waters	10,000	100	
	Oregon	stratified waters			10
	EPA 1986 Goldbook	lakes and reservoirs		25	
Studies					

Nutrient Criteria Development

Nutrient Criteria Development; Guidance from EPA

In the mid-1990s, it was decided that new criteria should be developed in State Water Quality Standards for sediments, pathogens, and nutrients

In 1998, a National Nutrient Strategy was published, with the recommendation that states/tribes develop ecoregional nutrient criteria development plans for

- **Lakes and Reservoirs**
- **Rivers and Streams**
- **Estuaries**
- **Wetlands**

ADEC Nutrient Criteria Development

- Submitted plan in June 2004, approved September 2005, funding awarded June 2006
- RTAG formed: USGS, Mat Su Borough, UAF, WQAM, NPS
- UAF is a key partner to ADEC in this project.
- **List of Physical and Chemical Parameters to Be Sampled**
  - The physical parameters evaluated include:
  - Shoreline Characteristics
  - Qualitative Macrophyte Survey
  - Lake/Catchment site activities
  - Disturbances Observed
  - Surface Conditions
  - Hydrologic Lake Type
  - Anadromous or Stocked Fish populations

ADEC Nutrient Criteria Development

- The chemical parameters sampled include :
  - Temperature
  - pH
  - conductivity
  - total nitrogen
  - nitrate plus nitrite
  - total phosphorus
  - orthophosphate
  - Secchi disc depths
  - Dissolved oxygen
  - Chlorophyll a
- Final list of lakes selected:
  - Open basin
  - Reliable historic data
  - Selected based on funding and accessibility

2007 Lakes Sampled

	Lat	Lon	*USGS Data*	*ADF&G Data*	ADEC Data	*Volunteer Data*	*303 (d) Impaired Waterbody*	AKMAP Lake
Big	61.52923	149.93700	X	X	X		X	
Byers	62.73953	150.11482		X				
Homestead	61.51595	149.85535						
Horseshoe	61.57470	149.91785	X	X				
James	61.63729	150.08946						
Jim	61.56297	148.94710				X		
Johnson	61.56759	149.23633						
Lake Louise	62.28861	146.52020				X		
Lake Lucille	61.57750	149.46178		X	X	X	X	
Lalen	61.60104	149.69048				X		
Loonsong	61.46799	149.94843						
Mud	61.59772	149.34750		X				
Nancy	61.68750	150.00726	X	X				
Red Shirt	61.62325	150.17119	X	X				
Shell	61.95455	151.54263		X				
Threemile	61.49754	149.75626						
Vera	61.71444	150.13974						X
Wasilla	61.58176	149.41806		X	X			
West Papoose	61.53682	150.09546						X
Wolverine	61.66526	148.96277				X		
Zero	61.64794	149.80600						
21			**4**	**9**	**3**	**5**	**2**	**2**

Nutrient Criteria Development

- 27 lakes in Mat-Su sampled in summer 2007
- UAF currently working preliminary report
- Reviewing historic monitoring efforts and AKMAP 2008 Cook Inlet Lakes Survey
- UAF preliminary report due Dec 2008
- RTAG final report with DEC recommendation due June 2009
- Final report will include DEC position on nutrient criteria recommendation

Upcoming Projects

- 2009 Rivers

  focused on the Yukon River

  partner with YRITWC, USGS, ENRI, F&G, EH, BLM
- 2011 Wetlands

  focused on the National Petroleum Reserve

  partner with NSB, FWS, BLM, UAF ???