

Protocol Development Summary

Protocol: Point Source Human Effects

Parks Where Protocol will be Implemented: Cape Krusenstern National Monument (CAKR), Gates of the Arctic National Park and Preserve (GAAR), Noatak National Preserve (NOAT)

Justification/Issues being addressed:

ARCN is roadless and sparsely inhabited thus human effects in ARCN and surrounding areas are largely traceable to point sources. Non-point source effects such as air contaminants are monitored by other vital signs. Human-caused pollution and landscape impacts have the potential to dramatically affect ecosystem integrity. The time scale of the effect may be immediate, as in an oil spill washing ashore; or gradual, as in the case of dust palliative leaching into stream systems. Some point sources of pollution are industrial sources, community development impacts, and regional infrastructure impacts. One of the major industrial sources of pollution is the Teck Cominco Red Dog Mine. Impacts of the mine to surrounding park ecosystems include ore spills, haul road dust, dust palliatives, fuel spills, power plant and combustion engine emissions, and heavy metal accumulation (Hasselbach et al. 2005). Additional mining and oil exploration and development has been proposed just north of NOAT. Current community development impacts include road construction, gravel quarries, noise from aircraft, and trash and sewage disposal into rivers and streams. Infrastructure impacts include beach erosion due to beach stabilization methods (e.g., Shishmaref) and all-terrain vehicle (ATV) traffic. Point-source, human-caused pollution and landscape alteration may affect vegetation composition and distribution; primary productivity; groundwater and surface water quality; faunal composition, distribution, behavior, and health; noise level; and visibility. Point-source human effects associated with Subsistence/Harvest and Visitor Use are monitored by protocols for those specific vital signs. The Point-Source Human Effects vital sign is also linked to Air Contaminants, Wet and Dry Deposition of Pollutants; Coastal Erosion; Invasive/Exotic Species and Diseases; Lakes, Streams, and Lagoons Communities and Ecosystems; Terrestrial Vegetation and Soils; Bird Assemblages; Fish Assemblages; and various mammal vital signs.

Specific Monitoring Questions and Monitoring Objectives to be Addressed by the Protocol

Monitoring Questions:

- What is the water quality in streams and lakes near Red Dog Mine, the port site, and the haul road, and is the water quality changing over time?
- What is the water quality downstream from villages?
- What is the water quality in lakes used for float plane landings and what are baseline levels in case of fuel spills?
- What are the levels of contaminants in flora and fauna along the Red Dog haul road? Are levels changing over time?

Monitoring Objectives:

1. Determine current contaminant loads in flora and fauna near the Red Dog Haul Road and monitor changes in contaminant loads.

2. Monitor water quality in streams, lakes, and lagoons downstream or near Red Dog Mine, the port site, and the haul road, as well as near-shore waters at the port site.
3. Monitor water quality for heavy metals and other pollutants in lakes and streams downstream from villages within ARCN parks.
4. Monitor beach debris and ATV tracks in the coastal zone and lagoons of CAKR.
5. Compile data from other agencies and organizations monitoring point-source impacts, and track development plans so that pre-development baseline data can be collected where new monitoring sites may be needed.

Basic Approach:

The main focus of the monitoring protocol for the Point Source Human Effects vital sign will be impacts from the Red Dog Mine Haul Road and port in CAKR. Current park projects (Hasselbach et al. 2005) and ARCN's monitoring protocol for the Terrestrial Vegetation and Wet/Dry Deposition vital signs include long-term monitoring of vegetation and soils along the Red Dog Haul Road. The Small Mammals and Caribou protocols may include assessment of animal tissue for presence and bioaccumulation of contaminants associated with the Red Dog Mine. Water quality will be sampled for heavy metals at select sites along the Haul Road and near the port site for the Red Dog Mine in conjunction with sampling for the Streams, Lakes, and Lagoons protocols. Additionally water quality measurements will be made downstream from villages and camps within ARCN parks where sites coincide with monitoring for the Streams, Lakes, and Lagoons vital signs. Beach debris and ATV tracks may be monitored in conjunction with ground surveys for the Coastal Erosion monitoring protocol. Additionally ARCN staff will track economic development meetings, planning, and activities within and around the ARCN parks to include new sites for monitoring. A database will be created of current and potential development sites that may warrant water quality, vegetation, and other sampling. The database will also include information about other point-source monitoring programs conducted by other agencies and organizations in the region. We will collaborate with other agencies including the Alaska Department of Environmental Conservation, Fish and Game; US Fish and Wildlife Service; Environmental Protection Agency; local village and tribal organizations; and Native corporations that currently monitor or are responsible for monitoring point-source impacts.

Principal Investigators and NPS Lead:

NPS contact for this protocol is Jim Lawler, ARCN Coordinator. Principal Investigators include Peter Neitlich, Western Arctic Parklands Ecologist; Greta Burkart, ARCN Aquatic Ecologist; and Kumi Rattenbury, ARCN Ecologist.

Development Schedule, Budget, and Expected Interim Products:

Most aspects of the protocol for the Point Source Human Effects vital sign will be developed in conjunction with, or as portions of, other protocols.

Protocol development: FY 2008 and FY 2009

Implement and test: FY 2010

Peer review and finalize: FY 2011

Literature Cited

Hasselbach, L., J.M. Ver Hoef, J. Ford, P. Neitlich, E. Crecelius, S. Berryman, B. Wolk, and T. Bohle. 2005. Spatial patterns of cadmium and lead deposition on and adjacent to National Park Service lands in the vicinity of Red Dog Mine, Alaska. *The Science of the Total Environment*. 348:211-230.