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# U.S. Geological Survey Activities Related to American Indians and Alaska Natives

Fiscal Year 2000



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U.S. Department of the Interior  
U.S. Geological Survey

# U.S. Geological Survey Activities Related to American Indians and Alaska Natives

Fiscal Year 2000

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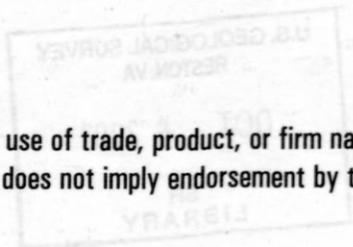
**U.S. Department of the Interior  
Gale Norton, Secretary**

**U.S. Geological Survey  
Charles G. Groat, Director**

U.S. Department of the Interior  
U.S. Geological Survey

U.S. Geological Survey Activities Related to American Indians and Alaska Natives

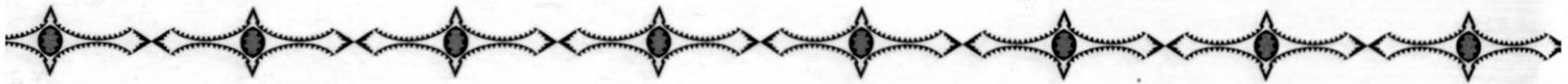
Fiscal Year 2000



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Introduction



# U.S. Geological Survey Activities Related to American Indians and Alaska Natives Fiscal Year 2000

## Introduction

The U.S. Geological Survey (USGS) is an impartial scientific organization that strives to produce scientific results that are relevant to the people of the United States and their land and resource managers. USGS does not improve the quality of its customers' lives; it provides the informational tools for American Indians, Alaska Natives, and other customers to understand and improve their own lives.

In cooperation with American Indian and Alaska Native governments, the USGS conducts research on water and mineral resources, animals and plants of environmental, economic, or subsistence importance, natural hazards, and geologic resources. Digital data on cartography, mineral resources, stream flows, biota, and other data sets are available to American Indian and Alaska Native institutions. The USGS recognizes the need to learn from and share knowledge with Native peoples. This report describes most of the activities that the USGS conducted with American Indian and Alaska Native governments, educational institutions, and individuals during Federal fiscal year 2000. Some of these USGS activities were conducted in concert with the Bureau of Indian Affairs. Others were conducted by Tribes and the USGS.

In the year 2000, the USGS began examining its activities related to American Indians and Native Alaskans to determine how it can better serve these customers within its mandates. More Tribal governments, educational institutions, and other Tribal organizations are using geographic information systems and other digital technologies in recent years. As Tribes become more interested and more adept at managing digital information, they are seeking such data from the USGS with greater frequency. The increasing use of such technologies allows Tribal governments additional means of managing lands and resources for the benefit of current and future generations. The USGS recognizes the need to make its information available to Tribal governments, and to work with those governments and other institutions to advance data management capabilities.

The USGS is responding to this need by increasing the transfer of scientific information to American Indian and Alaska Native governments and by training employees of these governments to conduct and improve scientific studies. The USGS is also encouraging American Indians and Alaska Natives to pursue careers in science, and seeking ways to hire Indian and Native students. By identifying, improving, and disseminating information about available hiring mechanisms, the USGS is working to make hiring such students easier, and therefore more likely, for USGS managers.

The U.S. Geological Survey is the Federal science bureau within the Department of the Interior (DOI). The USGS is non-regulatory and is not a significant manager of Federal or Trust lands or assets. However, there are two types of USGS activities that do involve American Indians, Alaska Natives, and their lands. The first type of activity is the course of formal studies, conducted through existing USGS programs, that involve collection of specific types of data as well as investigative and research projects. These projects have a duration of two or three years, although a few are parts of longer-term activities. Some are funded through cooperative agreements or reimbursable accounts, from monies provided to the USGS by individual Tribal governments or by the Bureau of Indian Affairs (BIA). The USGS provides matching funds for cooperative projects. These formal projects may also receive funding from the U.S. Environmental Protection Agency, the Indian Health Service (part of the Department of Health and Human Services), or other Federal agencies. The USGS routinely works with its sister bureaus in the Department of the Interior to provide the scientific information and expertise needed to meet the Department's science priorities. Within this context, the USGS and the Bureau of Indian Affairs are cooperating to use USGS knowledge for the benefit of American Indian and Native peoples and their lands.

The second type of USGS activity is less formal, based on initiatives designed and conducted by USGS employees. Frequently



Involving educational activities, these endeavors are prompted by employee interests, often as collateral issues, that result from an individual or group of USGS employees identifying and responding to an observed need. In these activities, USGS employees help us fulfill a mission of the USGS, to make science relevant, while helping their fellow citizens. USGS employees have also taken the initiative to assist American Indians and Alaska Natives through participation in several organizations that were created to foster knowledge of science among Native peoples and to help build support and communication networks. One such group is the American Indian Science and Engineering Society (AISES). This group sponsors an annual national meeting in which USGS employees participate. USGS employees join this organization on a voluntary basis, paying the costs themselves, yet bringing the benefits of this expanded network to the USGS, as many employees do with other professional organizations.



Hands-on salmon science with Alaska Native Interns.

Each part of the USGS has identified an American Indian/Alaska Native liaison. As USGS moves to a more regional organizational structure, it will establish contacts in the Western, Central, and Eastern Regions. Within the USGS, this report will help in developing outreach, educational, and program documents for use in future years. It is hoped that USGS employees, American Indians, and Alaska Natives will adapt these activities in new areas and will use the USGS contacts to expand the relevance of the USGS to more Americans.

This document was prepared by cooperatively:  
Steve Hammond, Water Resources Division American Indian/Alaska Native Liaison  
Sharon Crowley, Geologic Division American Indian/Alaska Native Liaison  
Bonnie Gallahan, National Mapping Division American Indian/Alaska Native Liaison  
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Hardy Pearce, Biological Resources Division American Indian/Alaska Native Liaison  
Susan Marcus, USGS American Indian/Alaska Native Liaison  
Sharon Cline designed and created the graphic layout of the report.

You are welcome to contact us with any questions that you may have. Information on how to contact us is provided at the end of this report.



Cooperation among Native American governments and the U.S. Geological Survey to use Tribal capabilities to more effectively manage Tribal resources and to improve the scientific and secondary education of future generations of Tribal leaders. Here are some highlights from Fiscal Year 2000.

#### Open Books Agreement

The President of Santa Fe Indian University and the Director of U.S. Geological Survey signed a historic agreement to work together to improve the education of Native students. Santa Fe Indian's Bachelor's of Science Degree is being supported by USGS technology and professional development provided through the USGS' ERDC Data Center. Both parties to the agreement intend this to be a mutually beneficial relationship that will help train Tribal students for data management careers. Contact: Eugene Nagler, 505-794-5225, [enagler@usgs.gov](mailto:enagler@usgs.gov)

# Highlights of Fiscal Year 2000

USGS' Major Water Resources Division started a workshop on Remedial Action Plans. Many Tribes had expressed interest in learning USGS' Remedial Action Plan (RAP) development and implementation. The workshop was held at the USGS Training Center in Denver, Colorado, in 1999. The workshop provided Tribal officials, including USGS staff, with a wealth of information regarding USGS' current work about the needs of Tribal water personnel. Based on the feedback provided by participants, the USGS agrees to improve the versions of the course. Contact: Robert Lamb, 202-852-3344, [rlamb@usgs.gov](mailto:rlamb@usgs.gov)

#### Public Health Concern

A cooperative effort between USGS and the U.S. Environmental Protection Agency (EPA) resulted in a series of communications regarding water quality and health concerns to the media. The Jamestown Shoshone Tribe and the USGS are working together to learn about the health consequences of arsenic. This created a significant Tribal role in the process. Contact: Michael H. ...

... To improve the health of the population in a health care planning, the Tribe and USGS invited experts to a water quality sampling site to determine the public health and contamination problems. Being effectively and appropriately handled. Contact: ...

#### Job Training for Future Resource Managers

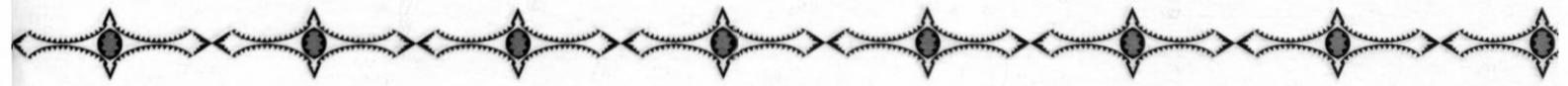
Professors of Life Sciences and Soil Science are working with USGS scientists on a curriculum project designed to improve the skills of Native students. This is the first of the USGS' major water tribe and the USGS' water tribe is a formal agreement between the two agencies. A curriculum is being developed for the USGS' water tribe students, integrating biological and earth science concepts with water and the cultural values of the tribe. Contact: ...

USGS' Major Water Resources Division started a workshop on Remedial Action Plans. Many Tribes had expressed interest in learning USGS' Remedial Action Plan (RAP) development and implementation. The workshop was held at the USGS Training Center in Denver, Colorado, in 1999. The workshop provided Tribal officials, including USGS staff, with a wealth of information regarding USGS' current work about the needs of Tribal water personnel. Based on the feedback provided by participants, the USGS agrees to improve the versions of the course. Contact: Robert Lamb, 202-852-3344, [rlamb@usgs.gov](mailto:rlamb@usgs.gov)

#### Water Quality Concerns

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# Highlights of Fiscal Year 2000

Cooperation among Native American governments and the U.S. Geological Survey builds Tribal capabilities to more effectively manage Tribal resources and to improve the elementary and secondary education of future generations of Tribal leaders. Here are some highlights from Federal Fiscal Year 2000.

## **Sinte Gleska Agreement**

The President of Sinte Gleska University and the Director of U.S. Geological Survey signed a historic agreement to work together to improve science education for Native students. Sinte Gleska's Baccalaureate of Science Degree is being supported by USGS technology and professional development available through the USGS' EROS Data Center. Both parties to the agreement intend this to be a mutually beneficial relationship that will help train Tribal students for data management careers. Kudos to: Eugene Napier, 605-594-6088, enapier@usgs.gov or James Rattling Leaf, 605-856-4262; jamesrl@sinte.edu

## **Tribal Hydrology Workshop**

Meeting Tribal needs while exhibiting a "Can do!" spirit, the USGS' Maine Water Resources District hosted a workshop on measuring stream flows. Maine Tribes had expressed interest in learning USGS hydrologic techniques, yet travel costs are an obstacle to Tribal participation in training at the USGS Training Center in Denver, Colorado, or in Water Resources Technician Training Courses, sponsored by the Bureau of Indian Affairs. Tribal officials worked with the USGS District staff to create a useful and successful workshop. USGS learned more about the needs of Tribal resource personnel. Based on the comments provided by participants, the USGS hopes to improve future versions of the course. Kudos to: Robert Lent, 207-622-8201, rmlent@usgs.gov

## **Public Health Concern**

A cooperative scientific project became a means of communicating economic and health concerns to the media. The Jamestown S'Klallam Tribe and the USGS are working together to learn about the bacterial contamination of shellfish that closed a shellfish fishery that is of significant economic importance to the

Tribe. To publicize the fact that the contamination is a manageable problem, the Tribe and USGS invited reporters to a suspended-sediment sampling site to reassure the public that the contamination problem is being effectively and appropriately handled. Kudos to: John M. Clemens, 253-428-3600, ext. 2635, jclemens@usgs.gov

## **Soil Science for Future Resource Managers**

Teachers of Ute Mountain Ute and Navajo students are working with USGS scientists on a curriculum project designed to improve the health of Native rangelands. Soils on the lands of the Ute Mountain Ute Tribe and the Navajo Nation have suffered significant damage from grazing animals. A curriculum is being created for Ute and Navajo grade-school students, integrating biological and earth sciences to explain soil crusts and the crucial roles they play in the ecosystems of the Four Corners region. The scientific information blends with Native conservation to help guide the future land stewards. This project intends to inspire students to bring their expertise to the community. Students are being encouraged to seek further formal education leading to careers in science. Kudos to: Jayne Belnap, 434-719-2333, jayne\_belnap@usgs.gov

## **Changing Climate at Hopi Buttes**

Arid climate and increasing population combine to pose unique problems in the Hopi Buttes region of Arizona. Native knowledge and oral traditions are being integrated into a USGS project on changing climate in the Hopi Buttes region. Information on past and modern geology and ecology of the region is being supported by the history of land use, supplied by members of the Navajo Nation and the Hopi Tribe. The project is being conducted collaboratively with Tribal participants. A workshop involving Navajo and Hopi governmental agencies, educational institutions, and the Bureau of Indian Affairs was held in fiscal year 2000. Kudos to: Margaret Hiza Redsteer, 303-236-0075, mhiza@usgs.gov



State Health Officers  
The President of the U.S. Geological Survey signed a historic agreement to work together to improve science education for Native students. The U.S. Geological Survey's Department of Science Degree is being supported by USGS technology and professional development activities through the USGS' PRISM Data Center. Both parties to the agreement intend this to be a mutually beneficial relationship that will help train tribal students for this management career. Kudos to Eugene Taylor 202-744-6002, eugene.taylor@usgs.gov for Iowa Native Lead 562-432-2362, jacob@iowanative.edu

Tribal Health Officers  
Meeting tribal needs while conducting a "real" spirit, the USGS' Native Water Resources Program hosted a workshop on measuring water flow. Tribal water and regional water is being USGS hydrologic response. The workshop was in partnership with the USGS Training Center in Denver, Colorado, or in Water-Resources Technology Training Center, sponsored by the Bureau of Indian Affairs. Tribal officials worked with the USGS District staff to create a tribal water workshop. USGS funding will support the needs of tribal water personnel. Based on the workshop provided by participants, the USGS hopes to improve future versions of the course. Kudos to Robert Lee 202-852-4301, robert.lee@usgs.gov

Public Health Officers  
A cooperative scientific project between a group of community, economic and health concerns in the media. The partnership between the USGS and the USGS are working together to learn about the bacterial organisms of shellfish that affect a shellfish industry that is of significant economic importance to the

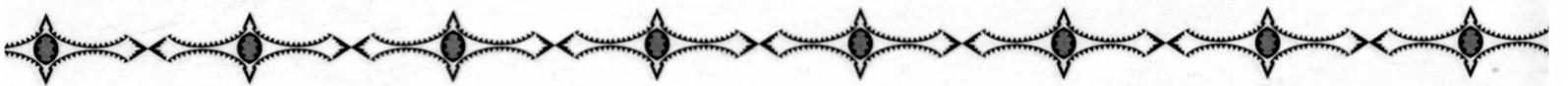
Sea Science for Future Resource Managers  
Leaders of the Mountain Ute and Navajo students are working with USGS scientists on a curriculum project designed to improve the health of Native students. Both of the lands of the Ute Mountain Ute Tribe and the Navajo Nation have suffered significant damage from grazing activities. A curriculum is being created for the Ute and Navajo grade school students, incorporating biological and earth science to explain soil erosion and the impact that their life in the ecosystems of the Four Corners region. The science education project with Native students is to help guide the future land stewards. The project involves in Native students to bring their expertise to the community. Students are being encouraged to seek further formal education leading to careers in science. Kudos to Joyce Taylor, 814-419-1333, joyce.taylor@usgs.gov

Coastal Science at Hot Spots  
Wild threats and increasing population densities in some regions in the high barrier region of Alaska. Native knowledge and oral traditions are being integrated into a USGS project on changing climate in the high barrier region. Information on sea and modern ecology and ecology of the region is being supported by the history of land use, as well as by members of the Navajo Nation and the Hopi Tribe. The project is being coordinated collaboratively with tribal partners. A workshop involving Navajo and Hopi governmental agencies, educational institutions, and the Bureau of Indian Affairs was held in Flagstaff, AZ. Kudos to Margaret Hiza Redford 503-236-0022, margaret.hiza@usgs.gov





# Educational Activities



## Educational Activities

**National Indian Education Association.** The National Indian Education Association's 30th Annual Convention was held at the Myriad Center in Oklahoma City, Oklahoma, October 17-20, 1999. The theme of the USGS exhibit was "Exploring a Changing Planet." This conference offered an opportunity to introduce USGS educational resources to the approximately 3,000 Native American educators and administrators from across the United States who attended the convention. It also provided the USGS with an opportunity to learn more about the issues facing Native educators and students. The USGS is pleased to support the NIEA goals of improving educational opportunities and resources for Native Americans throughout the United States by participating in this conference. Contact: Mark Barber, 605-594-6176, barber@usgs.gov or Carrie Jucht, 605-594-6083, cjucht@usgs.gov

**American Indian Science & Engineering Society.** The American Indian Science & Engineering Society celebrated its 21st Anniversary National Conference in Minneapolis, Minnesota in November 1999. The USGS sought to reach out to American Indian students regarding career opportunities in the natural sciences through an exhibit at the AISES career fair. In conjunction with the AISES conference, the USGS also participated in the organization's Government Relations Board to share knowledge about, and seek new opportunities for, Federal interactions with AISES. The USGS continued its participation in AISES conferences with a USGS exhibit at the AISES career fair at the AISES 22nd Annual Conference in November 2000 in Portland, Oregon. The exhibit was staffed by Native USGS employees, who also attended the year 2000 AISES Government Relations Board Meeting. Contact: Maria Montour 303-236-2787, mmontour@usgs.gov or Eugene Napier, 605-594-6088, enapier@usgs.gov

**Continuing Progress with EdNet.** The Bureau of Indian Affairs' Office of Indian Education (OIEP) is conducting a project called "Access Native America". The project has three parts: (1) school connectivity to the Internet; (2) education management; and most importantly, (3) school classroom applications. The U.S. Geological Survey continues to work with the BIA to link BIA-supported Indian schools through the EdNet program. There are 215 sites involved, including 185 schools from K-12; the remaining sites are located on college campuses. By March 2001, more than 180 elementary and secondary schools as well as several Tribal colleges had been connected to the Internet and the World Wide Web. The USGS is providing the technical wide-area network (WAN) expertise to connect each of these schools to the DOINET/Internet. The USGS is also assisting the

BIA in training teachers and other educators to use this vast system, which also includes e-mail communications. The schools use these digital resources to assist Indian students, reduce isolation, and expand information resources, particularly in remote locations. Many Indian schools are in remote locations where Net access encourages the students to take "virtual trips" to libraries and museums. Several schools have created their own Web pages. Indian students have improved communications with other American Indians. Contact: Tim Lee, 303-236-4955, tlee@usgs.gov

**Volunteers for Science.** In FY2000, the USGS Alabama Water Resources District worked with two volunteers for science as part of a BIA internship program. These two volunteers are members of the Poarch Creek Indians. They assisted the USGS in collecting of surface-water quality and quantity data as part of an ongoing study in the Mobile, Alabama area. The USGS provided training in field techniques and received valuable assistance in the field. We expect this relationship to continue in FY2001. Contact: Scott Gain, 615-837-4701, wsgain@usgs.gov

**Helping USGS Diversify by Coordinating with Haskell Indian Nations University.** The USGS, through the Kansas District Office, provides advice to Haskell Indian Nations University (HINU) on Natural Resources curriculum issues as a member of the Natural Resources Advisory Board. Representatives of the USGS visited HINU as part of a broad effort to encourage natural science education and increase personnel diversity within the USGS. The USGS recruitment team participated in HINU's career fair in November 1999 and visited the campus in April and September 2000. The Kansas District participated in the November 2000 career fair at HINU. One HINU student was hired for a Student Career Enhancement Position at USGS' EROS Data Center and several HINU students were hired for part-time positions during FY 2000 by the Lawrence, Kansas office of USGS. A USGS field office is maintained on the Haskell Indian Nations University Campus. Contact: Tom Trombley, 913-832-3551, trombley@usgs.gov, Maria Montour, 303-236-2787, mmontour@usgs.gov or Eugene Napier, 605-594-6088, enapier@usgs.gov

**Southwestern Indian Polytechnic Institute.** Southwestern Indian Polytechnic Institute (SIPI) and the USGS, through its support of the Federal Geographic Data Committee (FGDC), continue conducting quarterly satellite broadcasts for all participating Tribal Colleges and Universities from SIPI. The broadcasts, titled "GIS in Indian Country," have been a great success, providing new connections to Native communities, a means of including



field work in the curriculum, and an excellent model for school-to-career opportunities. These broadcasts are dedicated to promoting tribal self-sufficiency by improving management of geographic information and building intertribal communication networks. The USGS has presented sessions on how and why Native American educators are using GIS in the curriculum to teach math, science, history, and geography. Many educators on Tribal lands are finding that the use of GIS is a natural one, given the crucial sense of connectedness to the earth that is a part of the culture and education in most Tribal schools. Through GIS, students can work on projects using real-world data in innovative ways, solving real-world problems in a team environment, and simulating what occurs in the workplace. The USGS presented major types of USGS geospatial data and described several projects taking place using GIS in education, including a neighborhood analysis project, a natural hazards earthquake project, a regional geography project, a chemical spill analysis project, and a pollution land use project. Sponsors for these broadcasts include SIPI, Rural Geospatial Innovations (RGIS), the Federal Geographic Data Committee (FGDC), and the Intertribal GIS Council, Inc. Participating institutions access the broadcast via satellite from a signal sent by the Distance Learning Center of SIPI. Contact: Bonnie Gallahan, 703-648-6084, [bgallahan@usgs.gov](mailto:bgallahan@usgs.gov)

**Bird Diseases.** Patterns and trends in the occurrence of wildlife diseases are often indicators of environmental quality. The types, distribution, and frequency of diseases impacting bird populations are continually changing. USGS scientists are studying avian brain syndrome, a relatively new neurological pathogen that is infecting bald eagles and coots in the southeastern United States. Two field installations are cooperating in sponsoring the graduate work of a Washoe-Paiute student who is studying the problem. The student is working on a project using wild coots and game farm mallards to monitor the disease in North Carolina. This work will further efforts to identify the source and causes of avian brain syndrome. Contact: New York Cooperative Fish and Wildlife Research Unit, 607-255-2836, [ram26@cornell.edu](mailto:ram26@cornell.edu), or Tonie Rocke at the National Wildlife Health Center, 608-270-2451, [tonie\\_rocke@usgs.gov](mailto:tonie_rocke@usgs.gov)

**Wildlife Studies.** The USGS supported graduate research by a Native American on survey techniques for the northern goshawk. This advanced education opportunity was co-sponsored by the U. S. Fish and Wildlife Service and the University of Minnesota's Conservation Biology graduate program. Contact: Minnesota Cooperative Fish and Wildlife Research, 612-624-3421, [dea@usgs.gov](mailto:dea@usgs.gov)

**Promoting American Indian Science Education through South Dakota State University.** The USGS' South Dakota Cooperative Fish and Wildlife Research Unit continues to participate in a South

Dakota State University program titled "2+2+2" to help more American Indian students prepare for careers in the agricultural and biological sciences. The program is a team effort between high schools, Tribal colleges, and South Dakota State University. Options for study range from environmental management to food science to wildlife and fisheries. Each "two" of the "2+2+2" represents two years in high school, Tribal college, and the State University. The program's goal is to have all these 2's add up to a brighter future with increased opportunities for American Indians. Contact: South Dakota Cooperative Fish and Wildlife Unit, 605-688-6121, [berryc@usgs.gov](mailto:berryc@usgs.gov)

**Geographic Information System (GIS) Support and Training Program at Haskell Indian Nations University.** The purpose of this project is to develop and support a GIS Training program at Haskell Indian Nations University (HINU) as part of the University's new Baccalaureate program in Environmental Science. The USGS provides equipment and maintenance support for a GIS lab on the HINU Campus. As part of this support, USGS personnel teach an introductory class in GIS, give demonstrations and presentations to Natural Resources classes and assist with field trips. Students are provided with opportunities to work on BIA, Tribal, USGS, and other Federal agency GIS projects. A USGS factsheet on this program has been published and is also available online at: <http://ks.water.usgs.gov/Kansas/pubs/fact-sheets/fs.010-98.html> Contact: Tom Trombley, 913-832-3551, [trombley@usgs.gov](mailto:trombley@usgs.gov)

**Training for Montana Tribes.** The Montana Cooperative Fishery Research Unit cooperates with the U. S. Fish and Wildlife Service in Bozeman, Montana, to train Native Americans in aspects of wildlife ecology. USGS scientists serve as advisors for undergraduates in the Fish and Wildlife Management program at Montana State University as well as through the Federal Student Career Experience Program. As result of the mentoring program, a Native American graduate student from the Crow Tribe of Indians is currently completing research as part of an overall study on the ecology of bull trout in the Saint Mary River Drainage, Glacier National Park, and on the Blackfeet Nation. Contact: Montana Cooperative Fishery Research Unit, 406-994-4549, [bobwhite@montana.edu](mailto:bobwhite@montana.edu)

**Graduate Student Sponsorship.** The New Mexico Department of Game and Fish cooperates with the USGS' Cooperative Fish and Wildlife Research Unit in providing opportunities for graduate education. The Department provided research support for a Native American graduate student who completed field research on a sensitive bighorn sheep population. The USGS Unit facilitated the student's academic program and thesis preparation. This student also is an appointee in the Student Career Experience Program sponsored by the Bureau of Land Management and is working in cooperation with the Research



Unit. Contact: New Mexico Cooperative Fish and Wildlife Research Unit, 505-646-6053, bthompso@nmsu.edu

**Water Camp for Teachers.** The USGS, Idaho District, provided funding for scholarships for Native American teachers from Tribal schools to attend the Idaho Water Education Foundation "Water Camp for Teachers." Teachers from the Shoshone-Bannock Tribes, Shoshone-Paiute Tribes, Nez Perce Tribe, and Coeur d'Alene Tribe were offered the opportunity to participate in these workshops which were held at the College of Southern Idaho in Twin Falls, Idaho and Lewis & Clark State College in Lewiston, Idaho, in June. This is the first year the workshops were expanded to Northern Idaho to enable more Native American teachers to attend. Contact: Derrill J. Cowing, 208-387-1316, dcowing@usgs.gov

**Developing a Curriculum for Ute and Navajo Students.** Soil crusts are important features of arid and semiarid ecosystems throughout the Southwest. In addition to stabilizing surfaces and increasing water absorption, living organisms in soil crusts contribute nitrogen and organic matter to ecosystems, functions that are especially important in desert ecosystems. Like most of the public, many Native Americans are unaware of the relationship of soil crust to the ecosystem. In addition, soil crusts on lands of the Ute Mountain Ute Tribe and the Navajo Nation have suffered significant damage from grazing animals. U. S. Geological Survey scientists are developing a curriculum for grade school students in the Ute and Navajo Nations that integrates biological and earth sciences. The curriculum will focus on teaching students about biological soil crusts and the crucial roles they play in the ecosystems of the Four Corners region. Government scientists hope to pass along the knowledge that is being gained in USGS research on soil crusts to the next generation of land stewards. The curriculum being prepared for Indian students will engage students in the workings of basic scientific concepts. Through this study of biology and earth science as they relates to their local environment, students will be encouraged to pursue further education in these disciplines and to consider careers in resource management. This project aims to inspire students to bring their expertise to the community as resource managers, ranchers, and better-informed members of the community. Contact: Jayne Belnap, 434-719-2333, jayne\_belnap@usgs.gov

**Educational Outreach to Navajo Children.** The USGS Flagstaff Field Center provided several educational presentations on geology to schools and organizations serving primarily Navajo children. "What Good Are Rocks?", an explanation of how rocks and minerals are used in toothpaste, building materials, and other aspects of daily life, was presented to students from Kayenta Primary School and Tonalea Boarding School from the Navajo Nation, and to students at American Indian Christian School. Navajo secondary school students attending a summer Environmental

Education Outreach Program at Northern Arizona University (NAU) enjoyed a USGS presentation on the uses and types of remotely sensed data. The programs "Earthquakes, Volcanoes, and Plate Tectonics" and "Rocks, Minerals, and Fossils" were presented to classes from Little Singer Community School and Window Rock High School, respectively. Students from Leupp Elementary School, on the Navajo Nation, toured the astrogeology research facilities at the USGS Flagstaff Field Center. The USGS also provided educational materials, curriculum enhancements, and posters to the following organizations serving American Indian children: NAU liaison for tribal professionals; Window Rock High School, Grey Hills Academy, Kayenta Middle School, and Page Middle School on the Navajo Nation; summer enrichment classes, Tuba City High School, Navajo Nation; and the NAU Center for American Indian Economic Development Native American Youth Entrepreneur Camp. Contact: Sue Priest, 520-556-7148, spriest@usgs.gov

**Training in Fisheries, Wildlife, Range Biology and Landscape Studies.**

The USGS' Cooperative Fish and Wildlife Unit at the University of Arizona continues to support a natural resource training program for American Indians who are recommended by Tribal Councils, individual Tribal members, or partner agencies. Currently the program has two graduate students and two undergraduate students from the White Mountain Apache Tribe, and one undergraduate from the Micmac Tribe. The graduate research work includes an evaluation of natural resource management programs on Tribal lands and the development of a GIS focused on hydrological features of the White Mountain Apache Tribal lands. The undergraduate students are studying range, wildlife and fisheries management. One Navajo student from northeastern Arizona graduated with a Bachelor of Science Degree in range management this past year and began a career with his Tribal natural resource management department. Another Navajo student from New Mexico graduated with a Bachelor of Science Degree in fisheries and will be working with an environmental education program for youth this summer. Contact: Arizona Cooperative Fish and Wildlife Research Unit, 520-621-1959, cconway@usgs.gov

**Frontiers of Navajo K-12 Science and Mathematics Education**

**Workshop.** The Frontiers of Navajo K-12 Science and Mathematics Education Workshop was held at Diné College, Tsaile, Arizona, on August 3 and 4, 2000. Thirty kindergarten through sixth-grade teachers attended. The Workshop included four sessions: (1) Navajo bilingual education in life sciences, earth sciences, and space sciences; (2) astronomy; (3) water sciences and geology; and (4) atmospheric sciences. Workshop sponsors included: Department of Energy, Los Alamos National Laboratory; Seaborg Hall of Science; Arizona State University; Navajo Nation Rural Systemic Initiative Program; Diné College; University of New Mexico; Chinle Unified School District; and



USGS. The program design for the Workshop included "concept-based" lectures with "hands-on inquiry-based" demonstrations. The Seaborg Award for Excellence in Science and Mathematics Teaching was presented to a Navajo eighth-grade science teacher from Tse'Bit'ai Middle School, Shiprock, New Mexico. Contact: Paul Blanchard, 505-830-7947, pblanch@usgs.gov

**Hualapai Tribe Youth Camp.** The USGS, Arizona District, participated in the annual Youth Camp held during August 2000 and sponsored by the Hualapai Tribe. The Youth Camp is held every year for grades 7-12, on the Hualapai Indian Reservation. USGS employees spoke to the students about career opportunities with the USGS, USGS scientific activities, and tools used to collect hydrologic data. Contact: Robert J. Hart, 520-556-7137, bhart@usgs.gov

**Education and Career Opportunities with USGS.** USGS scientific and human resource personnel met with the President and Treasurer of the DQ University, an accredited tribal two-year college in Davis, California for initial discussions on possible USGS roles. Topics included student internships, career opportunities, curriculum review, library support, and teaching. Further talks are planned. Contact: Walter Swain, 916-278-3024, wcswain@usgs.gov

**Alaska Native Internship Program.** The USGS worked with other DOI bureaus in Alaska and the University of Alaska Anchorage to establish the "Internship for Native Student Training and Education Program" (INSTEP) for Alaska Natives. The program gives interns six college credits and 10 weeks of work experience in DOI bureaus. The USGS contracted for two interns during the summer of 2000. Contact: Gordon Nelson, 907-786-7100, glnelson@usgs.gov

**Marine Science Opportunities.** The USGS Glacier Bay Field Station promoted a member of the Sitka Tribe of Alaska, who had been a student employee of the USGS since 1998, into the Student Career Education Program. She is an intern in marine biology pursuing her final year of undergraduate education, which will be followed by a master's degree program in marine biology. This student has been assisting scientists who are performing oceanographic research and mapping the ocean floor. She has also been learning spatial analysis and the use of geographic information systems. Contact: USGS Alaska Biological Science Center, 907-786-3512, philip\_hooge@usgs.gov

**Eskimo Students Assist in Biological Research.** USGS scientists in Alaska are continuing to enhance communication between government researchers and Native Alaskans. To demonstrate the kind of research being conducted, USGS recruited 12 Yupik and Cup'ik students to assist in a waterfowl study on the Yukon-

Kuskokwim Delta in Alaska. The students captured geese and swans and fitted them with leg bands and neck collars; movements of these waterfowl are being monitored as part of a large study to determine annual survival rates, migration pathways, and important staging and winter habitats. The year 2000 marks the 15th consecutive year of involvement by Alaska Native students from the Native village of Chevak in this important project; more than 150 Eskimo youth have volunteered to participate in this program since 1986. Contact: USGS Alaska Biological Science Center, 907-786-3512, craig\_ely@usgs.gov

**Alaskan Natives Learn the Science of Ecosystems.** In September 2000 students from Native Alaskan villages on the Alaska Peninsula attended a science field camp at Becharof National Wildlife Refuge. There they were introduced to principles of ecosystem science and participated in a unique field experience. A USGS scientist instructed students in bear and caribou ecology, plant community mapping, animal tracking, and nature observation skills, and demonstrated lithic knapping (stone tool making), primitive fire-starting techniques, and the traditional uses of native plants. The Native community has strongly supported this outreach effort, which has stimulated considerable interest in the natural sciences among Alaskan Native students. Contact: USGS Alaska Biological Science Center, 907-786-3512, tom\_smith@usgs.gov

**USGS Participates in Environmental Education Programs for Alaska Natives.** In cooperation with the U.S. Fish and Wildlife Service (USFWS), Alaska Department of Fish and Game (ADFG), and the Tanana Chiefs Conference, USGS fishery biologists are conducting research on the freshwater ecology of Yukon River chum salmon stocks. The accessibility of the Chena River study site makes it ideal for educational programs and students interested in learning about field science in Alaska. In the summer of 2000, twelve students from the Earth Quest Wildlife and Wildlands Camp visited the site. The Earth Quest Camp is operated under a Challenge Cost Share Agreement among the USFWS, Tanana Chiefs Conference, Alaska Bird Observatory, Alaska Biological Research, Inc., Alaska Boreal Forest Council, ADFG, Alaska State Parks, Alaska Public Lands Information Center-Fairbanks, Northwest Arctic Borough School District, and the University of Alaska Fairbanks. The students, ages 16 to 18, came from rural areas throughout Alaska. During their visit to the study site, students were given hands-on training in fish identification, measurement, and tagging techniques, and were introduced to topics ranging from Pacific salmon life history and habitat requirements, to current concerns facing fisheries managers and subsistence fishers. The students also had an opportunity to meet federal scientists and find out how and why people become biologists. Contact: Jim Finn, 907-786-3450, jim\_finn@usgs.gov

**Native Alaskan Internship Program.** A USGS scientist began an internship program in the Bristol Bay region of Alaska during the summer of 2000 to recruit Native Alaskans into the field of fisheries science. That summer, two honor roll students from Nondalton, Alaska learned what it was like to be a fish biologist. The girls learned how to count migrating adult salmon, how to capture, anaesthetize and radiotag salmon, how to track them to their final spawning destinations, and how to collect, measure, and record data. Both students hope to work in the program next summer. The USGS biologist plans to recruit more teens into the program as a way of encouraging them to pursue a college degree consider a career in science. Contact: USGS Alaska Biological Science Center, 907-786-3512, carol\_woody@usgs.gov

**Education in Salmon Science.** Fisheries biology is one topic in the Bureau of Indian Affairs' Water Resources Technician Training Program for Native Americans. Native Alaskan students visited a study site on the Chena River where USGS scientists are conducting research on Yukon chum salmon. The students learned how to operate weirs on the river that count salmon, how to tag and measure fish, map spawning habitat, and collect environmental data. Native Alaskans from villages in western Alaska and the Yukon River drainage participated in the field work, which was also sponsored by the BIA, the Tanana Chiefs Conference, the EPA, the U.S. Fish and Wildlife Service, and the Army Corps of Engineers. Students represented the following numerous Native villages throughout Alaska. Contact: Jim Finn, 907-786-3450, jim\_finn@usgs.gov



Alaska native youths with geese, Yukon-Kuskokwin Y-K Delta, Alaska.





The first responsibility of a government is to provide for the safety and security of its citizens. This is done through the establishment of laws and the enforcement of these laws. The government also has the responsibility to provide for the welfare of its citizens. This is done through the establishment of social programs and the provision of public services. The government also has the responsibility to provide for the defense of its citizens. This is done through the establishment of a military and the provision of national security.

# Resource Activities

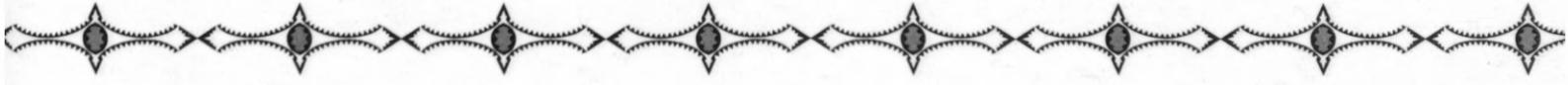


These are the main responsibilities of a government. They are the foundation of a well-ordered society. The government must be able to provide for the safety and security of its citizens, to provide for their welfare, and to provide for their defense. Without these responsibilities, a government would be unable to function effectively.

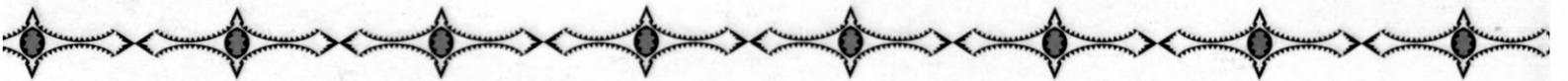
The second responsibility of a government is to provide for the economic well-being of its citizens. This is done through the establishment of a sound monetary policy and the provision of public services. The government also has the responsibility to provide for the education of its citizens. This is done through the establishment of a public school system and the provision of higher education.

The third responsibility of a government is to provide for the cultural and social well-being of its citizens. This is done through the establishment of a public library system and the provision of public services. The government also has the responsibility to provide for the health and safety of its citizens. This is done through the establishment of a public health system and the provision of medical services. The government also has the responsibility to provide for the environment. This is done through the establishment of a public works department and the provision of public services.

The fourth responsibility of a government is to provide for the international relations of its citizens. This is done through the establishment of a foreign affairs department and the provision of public services. The government also has the responsibility to provide for the defense of its citizens. This is done through the establishment of a military and the provision of national security. The government also has the responsibility to provide for the welfare of its citizens. This is done through the establishment of social programs and the provision of public services.



Resource Activities



## Resource Activities

**Golden Eagle Populations.** Native Americans legally harvest golden eagles for use in ceremonies. The Department of the Interior has the responsibility for determining the potential effects of this harvest on eagle populations. Wildlife biologists with the USGS are gathering data for use in developing a plan for monitoring population size. Objectives of the project include reviewing literature for information relevant to the current status of golden eagles in a chosen study area. USGS is soliciting information from Federal, State, Tribal, and non-government biologists for information about the biology of golden eagle populations and their opinions on the status of the species. USGS scientists will estimate the number of golden eagles in the study area using appropriate statistical methods. Contact: Mark Fuller, Forest and Rangeland Ecosystem Science Center, Snake River Field Station, 208-426-4115, mark\_fuller@usgs.gov



**Golden Eagle.**

Photographer: Tom Dunstan

**Tribal Fisheries Enhancement.** The USGS Great Lakes Science Center's Tunison Laboratory of Aquatic Science continued assistance to local tribes in restoring and enhancing their fisheries. Tunison staff stocked 150 catchable rainbow trout (reared at the Tunison facility) in waters of the Onondaga Nation. Tunison scientists continued assisting The St. Regis Mohawk Tribe by examining the feasibility of restoring Atlantic salmon in St. Lawrence River tributaries. Salmon restoration activities included stocking 20,000 salmon fry in tributaries of the St. Regis and Salmon rivers and assessing survival through the fall and estimating overwinter survival of salmon fry stocked in July 1999 in St. Regis River tributaries. In addition, the Environmental Division of The St. Regis Mohawk Tribe and Tunison

Laboratory are cooperating in a pilot project that focuses on the American Eel population in the St. Lawrence River. The project involves field collection of American eels, ecological assessments, and laboratory analysis of eel health and life history of this population. Contact: Great Lakes Science Center, 734-994-3331, nancy\_m\_milton@usgs.gov

**Determining the Effect of Water Temperature on Lake Trout Predation by Sea Lampreys.** The USGS Great Lakes Science Center and the Chippewa-Ottawa Resource Authority have undertaken a cooperative research effort to investigate the effects of water temperature on sea lamprey predation of lake trout in Lake Huron. Bioenergetics, the study of energy exchanges within and between living things and their environment, will be used by USGS scientists to predict the mortality of lake trout by lamprey attacks in relation to water temperature. A by-product of this research effort would be a measurement of the effectiveness of international efforts to control sea lampreys in Lake Huron. Lake trout have been tagged in an effort to determine daily and seasonal water temperature preferences. In cooperation with the Tribal Fisheries Management Authority, the first tagging phase began in 1998, and continued in the fall of 1999. A manuscript is in preparation that describes temperatures occupied by three strains of lake trout from fall 1998 through fall 2000. The Seneca Lake (New York) strain lake trout occupied significantly lower temperatures in summer 1999 than lake trout of Great Lakes origin. This supports earlier speculations that Seneca lake trout may be less vulnerable due to lower temperature and lower lamprey metabolism. The results of the study will benefit lake trout management and restoration programs in eight states, several Canadian provinces, and other Federal and Tribal agencies throughout the Great Lakes Basin. Contact: Great Lakes Science Center, 734-994-3331, nancy\_m\_milton@usgs.gov.

**Delineation of Contributing Area, Public Water Supply Wells, Keweenaw Bay Indian Community.** Keweenaw Bay Indian Community in the Upper Peninsula of Michigan uses two wells drilled into the Jacobsville Sandstone to supply a Tribal housing community with drinking water. The tribal wells are unusual in that most other known wells in the Jacobsville Sandstone produce less water that is of poorer quality. The USGS study delineates the 10-year contributing area for the public water supply wells and describes the hydrogeology of the study area, emphasizing the relation between surface water and ground water in shallow wells completed in glacial and lacustrine deposits and deeper wells completed in the Jacobsville Sandstone. The project has been completed. A report of the results was published in FY2000. Contact: Tom Weaver, 906-786-0714, tlweaver@usgs.gov.



**Water Resources Investigation of Tribal Lands, Nottawaseppi Huron Band of Potawatomi.** Little is known about surface- and ground-water resources of the Nottawaseppi Huron Band of Potawatomi's Indian Reservation. For their domestic water supplies, Tribal members living on Tribal lands depend upon fairly shallow wells completed in unconsolidated glacial and lacustrine deposits. Three tributaries of the St. Joseph River system also flow through the reservation, after first crossing primarily agricultural land. In FY 2000, a four-year cooperative agreement was implemented on a government-to-government basis between the Tribe and the USGS. The cooperative study will analyze and describe Tribal water resources. Results of the study will be used to establish baseline conditions. Contact: Tom Weaver, 906-786-0714, tlweaver@usgs.gov

**Water Resources of the Bad River Band of Lake Superior Chippewa Indians.** In a cooperative study, the Bad River Band of Lake Superior Tribe of Chippewa Indians and the USGS are characterizing the local and regional ground-water flow systems in the northern part of the Bad River Indian Reservation. Information gathered to characterize the hydrogeologic framework will provide the basis for site-specific investigations concerning long-term water-resource and water-quality trends. The hydrogeologic framework consists of the geologic setting (rock types and their physical and chemical properties) and the hydrologic setting (porosity, permeability, hydrologic flow). As part of this investigation, three boreholes have been drilled into the bedrock aquifer in the northern part of the Reservation. The hydrogeologic characteristics of selected intervals of rock and aquifer are being evaluated using geophysical logs, rock core analysis, and aquifer pumping tests. Characterizing the hydrogeologic framework will lay the foundation for future numerical modeling. Water quality will be evaluated at selected sites and depths. A report is being prepared. Contact: Charles Dunning, 608-821-3827, cdunning@usgs.gov

**Investigation of Ground-water Contamination at County Road A Site on Lands of the Bad River Band of Lake Superior Chippewa Indians.** The USGS is working with the Bad River Band of Lake Superior Chippewa Indians and the U.S. Environmental Protection Agency (EPA) to define the local ground-water flow system around a site on County Road A. The site, which was used for disposing paper mill sludge and has two open ponds, has been under investigation by the EPA for several years. The EPA hopes to use the information being provided by the USGS to determine whether contaminants associated with the sludge are moving off the site and into the ground water. It is critical to the investigation to identify the proper locations down-gradient of the contaminated sites for the placement of monitoring wells. These monitoring wells will be used for water-quality sampling and for additional water-level information. Water-level recorders, pond-stage recorders, and meteorological instruments will be

employed to estimate a water budget for the ponds in order to define the connection between the pond and the ground-water system. A report is being printed and will be available for distribution soon. Contact: Charles Dunning, 608-821-3827, cdunning@usgs.gov

**Historical Trends in Streamflow, Sedimentation Rates, and Sediment Trace-Element Concentrations Associated with the Wolf River, Keshena Falls to Balsam Row Dam.** The objectives of this project are to identify natural and historical concentrations of trace elements in streambed, floodplain, and backwater sediments of the Wolf River from Keshena Falls to Balsam Row Dam, mostly within the lands of the Menominee Indian Tribe of Wisconsin. This cooperative study between the Menominee Tribe and the USGS will also determine the range of historical (150+ years) variability of flooding and the sedimentation characteristics along the same reach of the Wolf River. Major factors affecting stream sedimentation and flooding characteristics-geologic/natural versus land-use effects- will be identified. The study may be expanded to the Wolf River upstream of Keshena Falls or to selected Wolf River tributaries. This study is expected to be completed in FY2001, with a report published at its conclusion. Contact: Faith Fitzpatrick, 608-821-3818, fafitzpa@usgs.gov

**Reintroduction of Lake Sturgeon.** Two dams block the natural migration of lake sturgeon in the Wolf River, Wisconsin, onto the Menominee Indian Reservation. In efforts to re-establish a lake sturgeon population, biologists with the Menominee Indian Tribe of Wisconsin, U.S. Fish and Wildlife Service, Wisconsin Department of Natural Resources, and USGS are studying the movements and habitats of radio-tagged adult and juvenile lake sturgeon released into waters on tribal land. Contact: Upper Midwest Environmental Sciences Center, 608-781-6221, brent\_knights@usgs.gov

**Studying Drinking Water for the Menominee Indian Tribe of Wisconsin.** Contributing areas for the two wells supplying the community of Zoar have been determined. This information will be used by the Menominee Tribal government for water-resource and well-head protection planning in the Community area. Additional studies are now underway to determine contributing areas for wells in three other Tribal communities: Middle Village, Onekewat, and Redwing. Also, a detailed hydrogeological study is underway for the town of Neopit that will characterize the aquifer and address concerns in regards to protecting the community's water supply. Contact: Charles Dunning, 608-821-3827, cdunning@usgs.gov

**Fish Passage Project.** The Menominee Indian Tribe of Wisconsin and the USGS cooperate to enhance fish passage along the Wolf River. USGS fishery biologists determined movement of lake sturgeon by analyzing radio telemetry tracking data. The Tribe



collected the data using USGS equipment, with technical assistance provided by USGS scientists. Results from the study will be used to determine the best location for a fish passage structure at Shawano Dam on the Wolf River. USGS biologists are also constructing and testing a prototype "spiral" fishladder for lake sturgeon passage at low head dams. Passage of lake sturgeon around dams that block access to spawning habitat is critical to species restoration. Contact: Leetown Science Center, Conte Anadromous Fish Research Center, 413-863-3807, boyd\_kynard@usgs.gov

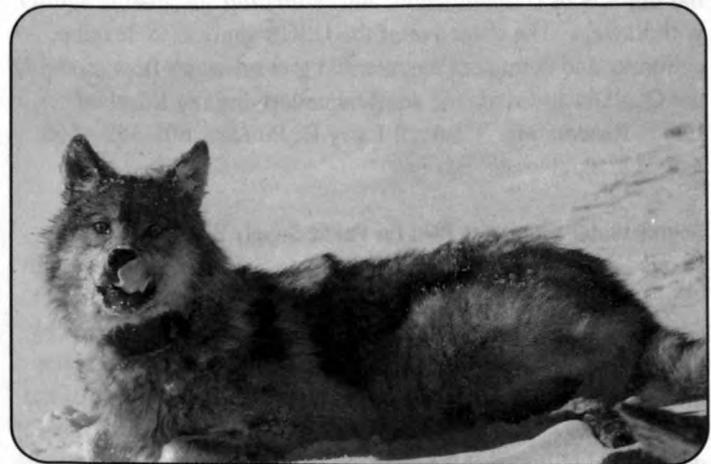
**Compilation and Analysis of Water-Resources Data Near the St. Croix Reservation and Vicinity.** The St. Croix Chippewa Tribe is concerned about the future health of several lake and stream watersheds adjacent to their lands. In a project completed in September 2000, the USGS provided the St. Croix Tribe with a summary and analysis of available water-resources data near their lands. This information will be used by the Tribe in developing management plans for specific lake and stream watersheds. Contact: David A. Saad, 608-821-3865, dasaad@usgs.gov

**Water Resource Assessments of the Lands of Three Minnesota Indian Communities.** The availability, quantity, and quality of both ground and surface waters of the lands of the Grand Portage Band of Lake Superior Chippewa, the Bois Forte Band of Chippewa, and the Prairie Island Dakota Sioux, are being assessed by the USGS. The assessments will provide information needed for the communities to make sound management decisions regarding overall water quality and quantity on their lands and to protection of their water resources. Studies are presently under way to determine the zone of contribution and the well-head protection areas for their community and municipal wells. Streamflow and lake levels are also being monitored as they relate to wild rice production. Contact: Don Hansen, 612-783-3250, dshansen@usgs.gov

**Water Resource Assessment of the Grand Portage Indian Reservation.** The objectives of this study are to determine the recharge areas to aquifers and lakes and determine the water quality of lakes and streams on the Grand Portage Reservation. The Grand Portage Band of Lake Superior Chippewa will use this information as a baseline to make decisions regarding drinking water availability on their lands. This is an ongoing program of the USGS Minnesota District Office. Contact: Don Hansen, 612-783-3250, dshansen@usgs.gov

**Cooperation on Long-Term Wolf Research.** The Bois Forte Band of Chippewa cooperates with USGS wildlife biologists who are conducting research on wolves in northeastern Minnesota. The "1854 Authority" a tribal organization that manages certain off-reservation hunting, fishing, and gathering rights of the Grand

Portage Band of the Lake Superior Chippewa and Bois Forte Band of Chippewa, purchased two radio collars that were donated to the project to further long-term wolf research goals. Contact: Northern Prairie Wildlife Research Center, 651-649-5231, David\_Mech@usgs.gov



**A grey wolf waking up after being radio collared.**  
Photographer: D. Mech

**Water Resource Assessment of Prairie Island Dakota Community.** This study will determine the water quantity and quality of the alluvial aquifer on the Prairie Island Tribal lands. The Tribe will use this information as baseline data to manage its water resources. This is an ongoing program with the USGS' Minnesota District. Contact: Don Hansen, 612-783-3250, dshansen@usgs.gov

**Protecting Water Quality of the Prairie Island Dakota Community Wells.** USGS hydrologists are determining the areas around each of two municipal wells that contribute water to those wells. The Prairie Island Community will use this information to determine appropriate land-use activities on the well protection area, in order to preserve the water quality. Contact: Don Hansen, 612-783-3250, dshansen@usgs.gov

**Surface and Ground-Water Resources of the Sisseton-Wahpeton Sioux Tribe.** The USGS is working with the Sisseton-Wahpeton Sioux Tribe on the Tribe's Lake Traverse Reservation to collect hydrologic data and to evaluate the surface- and ground-water resources of the Tribe's lands. A multi-year study was undertaken to determine the location, depth, quality, and quantity of water on the Lake Traverse Reservation. The effects of surface-and ground-water interactions, recharge, and discharge on the hydrologic system are also parts of the study. Data collection and field work have been completed. Contact: Ryan Thompson, 605-353-7176 ext. 225, rcthomps@usgs.gov



**Aquifer Studies for the Rosebud Sioux Tribe.** The Ogallala and Arikaree aquifers are important water resources for the Rosebud Sioux Tribe. The aquifers are used extensively for agricultural, municipal, and domestic water supplies. The Tribe needs a water resource tool to evaluate management and environmental issues such as planning for source water protection, describing potential impacts of contamination, and estimating sustainable aquifer withdrawals. The objective of the USGS study is to develop, calibrate, and document a numerical ground-water flow model of the Ogallala and Arikaree aquifers underlying the Rosebud Indian Reservation. Contact: Larry D. Putnam, 605-355-4560, ext. 212, lputnam@usgs.gov

**Source Water Protection Plan for Public-Supply Wells on Oglala Lakota Lands.** The USGS and the Oglala Sioux Tribe are continuing scientific cooperation to benefit Oglala Tribal members who reside on the Pine Ridge Reservation. Previous studies by USGS, conducted on behalf of the Tribe, have examined water quality of existing water supplies. The primary objective of the current study is to provide the Tribe with hydrologic analysis for delineation of well-head protection areas for public-supply wells. The Tribe will also receive information contained in the USGS Ground Water Site Inventory database, to help manage Tribal water resources. The database includes information about aquifer characteristics, water quality, well construction, and ground-water levels for public-supply wells. The USGS will also assist the Tribe in establishing a data management system to house their ground-water data. Contact: Allen J. Heakin, 605-355-4560, ext 216, ajheakin@usgs.gov

**The Arikaree Aquifer on Lands of the Oglala Sioux Tribe.** The USGS is completing an inventory of public and private wells in parts of the Pine Ridge Reservation. As part of this project, the USGS will update its Ground Water Site Inventory database with the newly acquired well information. The information in the database will be shared with the Oglala Sioux Tribe, for use in managing Tribal resources. The USGS will construct a potentiometric map of the Arikaree aquifer within the Reservation. This map will show the potentiometric surface, which can be defined as the standing water level in a bore hole. Contact: Allen J. Heakin, 605-355-4560, ext 216, ajheakin@usgs.gov

**Overview of Water Resources in and Near Lands of the Wichita and Affiliated Tribes.** The USGS is cooperating with the Wichita and Affiliated Tribes to describe surface and ground water, water use, availability, and water quality in northern Caddo County and northwestern Grady County, Oklahoma. The study area is about 900 square miles and extends from the Canadian River on the north to the Washita River on the south. Contact: Marvin M. Abbott, 405-810-4411, mabbott@usgs.gov

**Analysis of Surface-Water Resources of the Blackfeet Nation.** The surface-water resources of the Blackfeet Indian Reservation include pristine mountain streams, glacial lakes, and prairie wetlands. These resources are of considerable cultural and economic importance to the Blackfeet Nation. The high quality surface waters support diverse populations of fish and wildlife, are widely used for stock watering and irrigation, and supply drinking water for many residents. This USGS study is analyzing and describing the surface-water resources of the major river basins of the Blackfeet Indian Reservation. Contact: Mike Cannon, 406-457-5900, mcannon@usgs.gov

**Flood-Frequency Data For Gaged Sites and Methods For Estimating Flood-Frequency At Ungaged Sites in Montana.** Reliable flood-frequency information for streams is essential for design and operation of various water control structures such as dams, levees, and water-supply systems. In addition, reliable flood-frequency data are required for proper design of stream-crossing transportation structures, such as bridges and culverts, and for identification of flood-prone areas for land-use management and flood-insurance purposes. This study is a cooperative activity with the Confederated Salish and Kootenai Tribes. It is intended to update flood-frequency information for all gaged sites in Montana that have an unregulated-flow record of at least 10 years. It will also combine the updated flood-frequency information with geomorphic and climatic data compiled at each gaged site to develop regional regression equations and a region-of-influence computer model for the estimation of flood-frequency at ungaged sites. A third component of this project involves developing a Web-based program to apply the estimation methods at ungaged sites without the need for users to measure the required geomorphic and climatic data at the sites. Contact: Charles Parrett, 406-457-5900, cparrett@usgs.gov

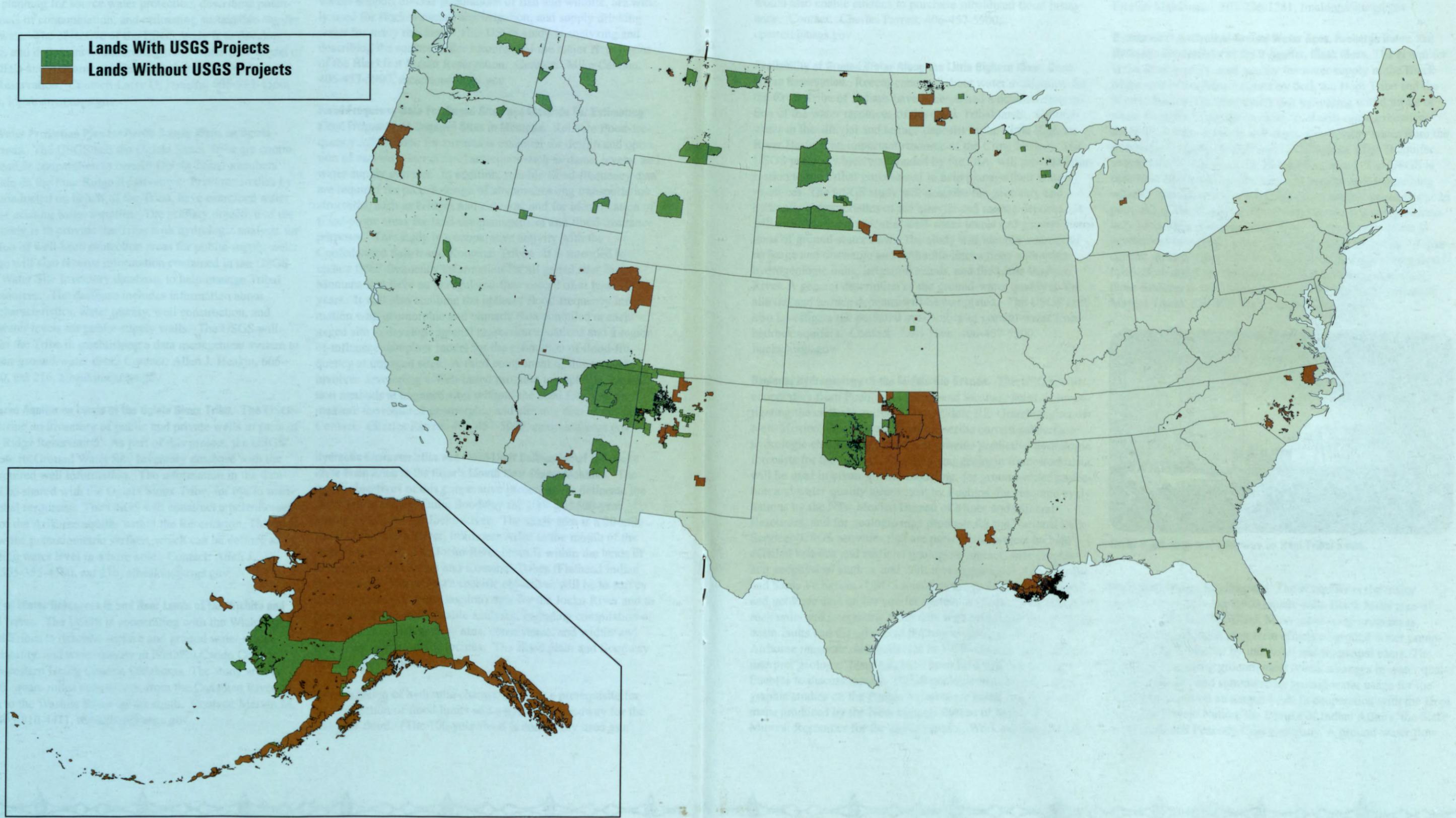
**Hydraulic Characteristics and Flood-Limit Delineation of the Jocko River From Arlee to the River's Mouth Near Dixon, Montana.** The major objectives of this cooperative project are to delineate the flood limits and hydraulic floodway for 100- and 500-year events for part of the Jocko River. The study area is a 20-mile reach of the Jocko River, from near Arlee to the mouth of the river near Dixon. The Jocko River basin is within the lands of the Confederated Salish and Kootenai Tribes (Flathead Indian Reservation). The project's specific objectives will be to survey channel-geometry (cross-section) data for the Jocko River and to perform water-surface profile analyses, including compilation of hydraulic data such as flow area, conveyance, and widths and mean flow depths and velocities. The flood plain and floodway will also be delineated.

Determination of hydraulic characteristics is a prerequisite for the delineation of flood limits and a hydraulic floodway for the 100-year flood. (The 100-year flood is commonly used as a





# American Indian and Alaska Native Lands Showing U.S. Geological Survey Projects Active During Fiscal Year 2000



Indian Land Boundaries from U.S. Department of Interior, Bureau of Indian Affairs



standard for flood-plain management and flood insurance purposes.) Adoption of flood-plain management regulations for the Jocko River would enable land-use and fishery managers for the Confederated Salish and Kootenai Tribes to better plan and guide future development to minimize riverine impacts. It would also enable citizens to purchase subsidized flood insurance. Contact: Charles Parrett, 406-457-5900, cparrett@usgs.gov

**Availability of Ground Water Along the Little Bighorn River, Crow Indian Reservation.** Recent concerns about water availability for the Crow Tribe of Indians have necessitated a detailed description of the water resources of the Crow Tribal lands. Ground-water in the alluvial and terrace deposits in the Little Bighorn River Basin is an important resource of the Crow Nation. The USGS project, which was funded by the BIA, will provide information to the Tribal government to help manage their water resources. The USGS study will describe the geometry and hydraulic characteristics of the alluvial and terrace deposits. It will also determine potential well-water levels and general directions of ground-water flow. The study will identify sources of recharge and discharge and hydraulic interactions with other hydrogeologic units, irrigation canals, and the Little Bighorn River. A general description of the ground-water quality in the alluvial and terrace deposits will be completed. The USGS will also investigate the potential availability of ground-water from bedrock aquifers. Contact: Lori Tuck, 406-457-5900, ltuck@usgs.gov

**Regional Hydrogeology of the Middle Rio Grande.** The USGS, with cooperators from Pueblos and State and local agencies, is investigating the critical aquifers of the Middle Rio Grande region of New Mexico. Project results will describe current subsurface hydrologic characteristics and will provide predictive hydrologic forecasts for the region. Mapping and geologic framework data will be used in urban-growth modeling, for ground-water protection and water-quality assessment by Pueblos, for resource evaluations by the New Mexico Bureau of Mines and Mineral Resources, and for geologic map products for the National Park Service. USGS activities that are parts of the project include detailed bedrock and surficial geologic mapping, stratigraphic and geophysical studies, and fault investigations in Albuquerque and Santa Fe basins. USGS scientists are gathering hydrologic and geologic data on the aquifer system in the Santa Fe Group of rock units and integrating these data with investigations of major basin faults and the effects of faulting on ground water. Airborne magnetic data collected in 1999 also are being used to interpret geology. Meetings have been held with most of the Pueblos to discuss results. USGS geologic mapping and stratigraphic studies on the Pueblo of Isleta are being compiled with maps produced by the New Mexico Bureau of Mines and Mineral Resources for the entire Pueblo. Work continues in the

northern Santa Fe region on geology and ground-water studies, conducted in part on the Pojoaque Pueblo, Pueblo of San Ildefonso, and Pueblo of Tesuque. Contacts: Jim Bartolino, 505-830-7936, jrbartol@usgs.gov; Jim Cole, 303-236-1417, jim-cole@usgs.gov; Tien Grauch, 303-236-1393, tien@usgs.gov; Florian Maldonado, 303-236-1281, fmalдона@usgs.gov

**Geochemical Analysis of Ground-Water Ages, Recharge Rates, and Hydraulic Conductivity of the D Aquifer, Black Mesa.** The N aquifer is the most heavily used aquifer for water supply in the Black Mesa area of northern Arizona by both the Hopi Tribe and the Navajo Nation. Concern exists that increasing withdrawals of water from the N aquifer to slurry coal will cause excessive declines in water level or will cause poor-quality water from the overlying D aquifer to infiltrate the N aquifer. (The D aquifer overlies the N aquifer in the Black Mesa area.) The USGS is characterizing water quality of the N aquifer and determining whether leakage is occurring from the D aquifer, possibly due to pumping of the N aquifer. The investigation is using geochemistry to identify a geochemical signature, if present, of the D aquifer and to date the age of the water in the D aquifer. A conceptual ground-water flow model of the area is also being developed. Both the Hopi Tribe and the Navajo Nation will apply these findings to their separate uses of the N aquifer. Contact: Margot Truini, 520-556-7352, mtruini@usgs.gov



**Orabi Wash gage and cableway on Hopi Tribal lands.**

**Black Mesa Monitoring Program.** The N aquifer is the major source of water for the 5,400-square-mile Black Mesa area of Northern Arizona. The Black Mesa monitoring program is designed to document long-term effects of ground-water pumping from the N aquifer by industrial and municipal users. The USGS is monitoring ground-water levels, changes in water quality and quantity, and summarizing ground-water usage for the Black Mesa area on an annual basis in cooperation with the Hopi Tribe, the Navajo Nation, the Bureau of Indian Affairs, the State of Arizona, and Peabody Coal Company. A ground-water flow



model is currently being evaluated for use in making predictions of ground-water change in the N aquifer as development continues on the Hopi and Navajo lands. Contact: Blakemore E. Thomas, 520-556-7255, bthomas@usgs.gov

**Navajo Surface Water Project.** The Navajo Surface Water project is designed to help personnel of the Navajo Nation's Water Resources Department compute streamflow records and operate their streamflow-gaging stations. The USGS is providing technical assistance to Navajo hydrologists and technicians by populating databases with hydrologic data to compute and store streamflow data. USGS scientists also are training Navajo personnel to compute records and to develop rating curves. Additionally, USGS staff are providing quality assurance for the project. The USGS currently operates two streamflow gages in cooperation with the Navajo Nation to provide near real-time hydrologic data and to provide training opportunities to Tribal personnel. Contact: Gregory G. Fisk, 520-556-7225, ggfisk@usgs.gov

**Availability and Quality of Surface-Water and Ground-Water Resources of the Yavapai-Prescott Indian Tribe.** The Yavapai-Prescott Indian Tribe's primary water-resource needs are related to water rights, water availability, and water quality. The study has four primary objectives. The first is to determine surface water inflows and outflows in Granite Creek within the Reservation boundary as well as peak flows in four Granite Creek tributaries. The second objective is to define the potential occurrence and concentration of suspect contaminants in water, sediment, and alluvial aquifer of Granite Creek that are associated with past and current industrial activities within and near the Reservation. The third objective is to identify the rate and direction of movement of potential contaminants entering or existing in the alluvial aquifer of Granite Creek. The final objective is to determine the potential for development of ground-water supplies on the Reservation. A report titled "Occurrence and quality of surface water and ground water within the Yavapai-Prescott Indian Reservation, Central Arizona, 1994-98" will be published in FY2001 describing the results of this study and addressing the four objectives. Currently, the USGS collects water-level measurements at 12 wells, measures stream discharge at 2 streamflow gages, and collects water-quality samples from springs, wells, and surface-water sites within the reservation boundary. This program was designed to assist the Yavapai-Prescott Indian Tribe in managing its water resources and to help improve the health of Tribal members by meeting EPA water-quality standards. Contacts: Gregory G. Fisk, 520-556-7225, ggfisk@usgs.gov or Margot Truini, 520-556-7352, mtruini@usgs.gov

**Hydrologic Investigation of Grande Wash, Fort McDowell Yavapai Nation.** The community of the Fort McDowell Yavapai Nation is concerned about the effects of runoff in Grande Wash from the

nearby Fountain Hills development. Other community concerns related to Grande Wash include potential effects from an abandoned landfill, which is located in the wash. Unnatural flow in the wash has been observed when the stream should be dry. The objectives of this investigation were to furnish the Fort McDowell Yavapai Nation with hydrologic data that contribute to the protection of life and property. Specifically, the investigation examined ground water near the landfills to determine whether the water is contaminated and if the landfills are sources of that contamination. The results include delineation of a 100-year flood-plain elevation within Grande Wash. The studies evaluated the effects of existing and planned land-use activities upstream from the Reservation on peak surface-water flows within the Grande Wash drainage. The source, quantity, and quality of streamflow in Grande Wash at the west boundary of the Fort McDowell Reservation were also determined. Results of the studies are being compiled, with one report published in FY2000 as "WRIR 00-4116 (Hydrology, Water Quality, and Stormwater-Sediment Chemistry of the Grande Wash Area, Fort McDowell Indian Reservation, Maricopa County, Arizona." The Tribe also is concerned about the Verde River, located on the northern boundary of the Tribal lands, and the effects that future development in the region may have on the quantity and quality of river water. The USGS is monitoring the quantity and quality of the river as it enters and exits the Reservation boundary to provide baseline data for the Tribe. Results of this study are expected to be published in FY2001. Contact: John P. Hoffmann, 520-670-6671 ext. 265, jphoffma@usgs.gov

**Preliminary Assessment of Hydrologic Conditions in the Southern Boundary Area of Tohono O'odham Nation.** The Tohono O'odham Nation needs hydrologic data and information to effectively manage its water resources. The Tohono O'odham water-resource issues are particularly sensitive because of the presence of the U.S.-Mexico border. The USGS and the Tohono O'odham Nation initiated a cooperative project to meet these needs. Its part, the USGS will estimate the quantity of surface water flowing in Vamori and San Simon Washes and will complete construction, testing, and calibration of load-cell scour sensors. USGS staff will also help identify additional Tohono O'odham data needs and develop a plan for intensive study along the southern border of the Tohono O'odham lands to determine the effects of future ground-water withdrawals and agricultural development on hydrologic conditions within the Reservation. Use of load-cell scour sensors in an automated slope-area installation is a new technique that will be broadly applicable in sand channels in the desert southwest. This technique will enable discharge measurements to be made at locations that cannot be reached by a streamgager during flows because of poor road access due to flooding. Contact: Michael C. Carpenter, 520-670-6671, ext. 275, mccarp@usgs.gov



**Salmonoid Genetics.** Biologists at the USGS Alaska Biological Science Center are researching the genetic population structure of Lahontan cutthroat trout, in collaboration with USFWS. The scientists are examining the genetics of Snake River steelhead for the State of Idaho. Results of this research will have significant implications for Tribes that comprise Nevada Indian Fish Commission and other Tribes in the interior of the Great Basin. Contact: USGS Alaska Biological Science Center, 907-786-3512, jennifer\_nielsen@usgs.gov

**Fallon Basalt Aquifer.** The Nevada Division of Water Resources, the U.S. Navy, the Bureau of Reclamation, and the Fallon Paiute Shoshone Tribe are cooperating with the USGS on a study to better define sources of water to, controls on, and the quality of water in the Fallon Basalt Aquifer. This aquifer is the sole source of drinking water for the Fallon Paiute Shoshone Tribe, the City of Fallon, and the Fallon Naval Air Station. The Fallon Tribe is contributing data to the project and is providing access to Tribal lands for this study. Phase II of the project involves developing a digital model of the aquifer and assessing the potential for in situ treatment of arsenic concentrations (which currently exceed drinking water standards) in the basalt. Contact: Terry Rees, 775-887-7635, tfrees@usgs.gov

**National Water Quality Assessment Benefits Nevada Tribes.** The National Water-Quality Assessment (NAWQA) Nevada Basin and Range Study Unit (NBRISU) covers the Carson and Truckee River basins in northwestern Nevada and Las Vegas Valley in southern Nevada. Information on ground-water quality in Las Vegas Valley is important to the Las Vegas Paiute Tribe, which is developing tourism as an economic base and depends upon the Las Vegas Valley alluvial aquifers for its water supply. Water quality data from the NBRISU in the upper Carson River Basin have provided the Washoe Tribe of Nevada and California with information about stream quality and biological conditions on their lands downstream from Leviathan Mine. These data were used, in part, as a basis for an NRDA action on behalf of the Tribe. Other water-quality data for streams and aquifers in the Truckee and Carson basins are of importance to the Washoe Tribe (Carson River and Lake Tahoe Basins) and the Pyramid Lake Paiute Tribe (lower Truckee River). Contact: Tom Lopes, 775-887-7688, tjlopes@usgs.gov

**Tribes and the Northwest Forest Plan.** Tribal governments in the Pacific Northwest identified significant resources on Tribal lands that may be impacted by the Federal Pacific Northwest Forest Plan. The Plan calls for major changes in the management of Pacific Northwest forests to ensure that species associated with old-growth trees and riparian areas have suitable habitat throughout their ranges. USGS biologists have developed a monitoring program that will determine the effects of the Forest Plan on these important resources on Tribal lands. Contact:

Michael Collopy, Forest and Rangeland Ecosystem Science Center, 541-750-7338, michael\_w\_collopy@usgs.gov

**Infectious Hematopoietic Necrosis Virus.** Using new molecular methods developed at the Western Fisheries Research Center, USGS researchers are assisting fisheries managers at the Northwest Indian Fisheries Commission and the Columbia River Inter-Tribal Fish Commission in identifying specific strains of infectious hematopoietic necrosis virus (IHNV) that are affecting fish in their hatcheries. The genetic diversity of IHNV isolates provided by tribal biologists is being analyzed to determine important features of the epidemiology of the virus in the Pacific Northwest. The results have been presented to fisheries managers and will be incorporated into hatchery management plans and used in salmon restoration activities proposed by Tribes in northern Washington State. Contact: Western Fisheries Research Center, 206-526-6282, frank\_shipley@usgs.gov

**Exotic Virus.** The Northwest Indian Fisheries Commission, in collaboration with the Washington Department of Fisheries and Wildlife and the U.S. Fish and Wildlife Service, is supporting research at the USGS' Western Fisheries Research Center on the effects of an exotic virus on Pacific salmon. The virus, infectious salmon anemia virus, causes significant mortality in Atlantic salmon reared in aquaculture in Europe and on the Atlantic coast of Canada. If introduced to the West Coast, the virus could have a devastating effect on wild and cultured Pacific salmon. The Western Fisheries Research Center houses a state-of-the-art Biosafety Laboratory in which this work can be safely carried out. Contact: Western Fisheries Research Center, 206-526-6282, frank\_shipley@usgs.gov

**Unknown Disease of Chinook Salmon.** The Northwest Indian Fisheries Commission, representing more than 20 Tribes in Washington State, requested assistance in responding to an unknown disease in a population of chinook salmon in its hatcheries. Working with tribal biologists and staff from the Washington Department of Fisheries, USGS researchers determined the nature of the disease and identified the viral infecting agent that was causing anemia and enlarged spleens in the salmon. Based upon the results, the Commission and the State of Washington modified the management practices for hatchery stocks to avoid the virus, and expressed their appreciation for the USGS' assistance. A manuscript is being prepared for submission to a peer-reviewed journal on which tribal biologists will be primary authors. Contact: Western Fisheries Research Center, 206-526-6282, frank\_shipley@usgs.gov

**Colonial Fish-Eating Birds Prey on Endangered Salmon.** The USGS cooperated with the Columbia River Inter-Tribal Fish Commission to determine the impact that predation by terns, cormorants, and gulls has on survival of young salmonids



(salmon and steelhead) in the lower Columbia River and estuary. Up to 15 percent of the smolts of some salmonids listed under the Endangered Species Act are consumed by Caspian terns, double-crested cormorants, and various gull species in the Columbia River estuary. USGS wildlife biologists measured the extent of loss to avian predation. They then significantly reduced losses of salmonid smolts to birds by relocating nesting colonies closer to the ocean, where more abundant alternative prey were available. The USGS hired two Inter-Tribal biologists to help with the project, including a member of the Confederated Tribes and Bands of the Yakama Nation as a seasonal technician. Contact: Oregon Cooperative Fish and Wildlife Research Unit, 541-737-1938, robyd@ucs.orst.edu

**Surface-Water Monitoring in the Nooksack River Basin.** The USGS is monitoring surface-water resources in the Nooksack River Basin in cooperation with the U.S. Bureau of Indian Affairs and the Lummi Nation. In 2000, the USGS operated four continuous-recording streamflow gaging stations and participated with several agencies in performing seepage runs for determining areas of ground-water recharge and discharge in segments of the Nooksack River. The USGS provided discharge-measurement training to seepage-run participants, including members of the Lummi Nation and the Nooksack Indian Tribe. Contact: Johnna Sheehy, 253-428-3600, ext. 2676, jlsheehy@usgs.gov

**Compilation and Assessment of Hydrologic Data of Areas Effecting the Lummi Indian Nation and the Nooksack Tribe of Indians.** The water resources of Water Resources Inventory Area 1 (WRIA 1), which includes the Nooksack River and several adjacent watersheds, need to be quantified to better manage that resource. Water in WRIA 1 is used for diverse and competing purposes that include timber harvesting, mining, industrial uses, recreation, agriculture, and fisheries. The USGS compiled and assessed all of the readily available data on both ground water and surface water in WRIA 1 and placed the information on a web page to allow ready access for subsequent studies and assessments. The work was completed under an agreement with a consortium of governments, including the Lummi Nation and the Nooksack Tribe. Contact: Marijke van Heeswijk, 253-428-3600, ext. 2625, heeswijk@usgs.gov

**Salmon Life History.** USGS fishery biologists are assisting the Skagit System Tribal Cooperative in studying the life history of Chinook salmon in the Skagit River, Washington. The study is funded by Seattle City Light and the USGS, and investigates the importance of intertidal estuarine habitats in the life cycle of Chinook salmon. The length of time spent in this ecosystem is determined, and the daily growth of juvenile Chinook salmon is measured, by studying the changes in ear stone (otolith) microstructure. USGS provides the Cooperative with laboratory space, use of specialized equipment, supervision, and technical

assistance in conducting the study. Contact: Western Fisheries Research Center, 206-526-6282, frank\_shipley@usgs.gov

**Sea Otters and Sea Urchins.** USGS scientists are conducting surveys of sea otter populations off the coast of Washington State. Results of annual otter counts are provided to the Makah Nation. Tribal members value sea urchins that are native to waters adjacent to Makah lands; the sea urchins are also a delicacy relished by sea otters. The Makah Nation is interested in the USGS' sea otter survey population numbers to ascertain potential conflicts with a possible commercial, Tribal sea urchin fishery. Contact: Western Environmental Research Center, 541-754-4388, ron\_jameson@usgs.gov

**Hydrologic Data Collected During the 1994 Lake Mills Drawdown, Elwha River, Lower Elwha Klallam Tribe.** In response to the loss of the salmon runs in the Elwha River Basin, the Elwha River Restoration Act became law in 1992, Enactment of this law initiated the process of assessing the feasibility of restoring the Elwha River ecosystem. A key part of the restoration is removing two dams on the Elwha River. To help evaluate the impacts of dam removal on streamflow and sediment transport, a draw-down experiment of Lake Mills was conducted in 1994. The USGS collected streamflow, sediment, and water-quality data as part of that experiment. These data and subsequent analyses were published in an interpretive report in 2000. The work was conducted in cooperation with the U.S. Bureau of Reclamation, the National Park Service, and the Lower Elwha Tribal Community of the Lower Elwha Reservation. Contact: Dave Kresch, 253-428-3600, ext. 2611, dlkresch@usgs.gov

**Support for a Ground-Water Model of the Swinomish Indian Reservation.** The Swinomish Indian Tribal Community (SITC) is interested in protecting the water resources of its reservation for the beneficial uses of the members of the Tribe. Concerns have arisen that pumping of ground water has resulted in depleted stream flows and has caused seawater intrusion into parts of the reservation. There is also concern that a landfill may be contaminating the ground-water system. The USGS recently completed a study to provide updated streamflow and ground-water-quality data to the SITC. The Tribe is interested in having a model of the ground-water system, but has not yet decided how that will be done and who will do the work. The USGS has agreed, through funding provided by U.S. Environmental Protection Agency, to provide technical assistance in this effort. Contact: Brian Drost, 253-428-3600, ext. 2642, bwdrost@usgs.gov

**Salmon River Watershed Analysis, including Channel and Floodplain Processes, Quinault Indian Nation.** The Quinault Indian Nation is collaborating with the USGS and several other agencies to conduct an analysis of the Salmon River watershed. The Salmon River watershed covers three square miles of forested land,



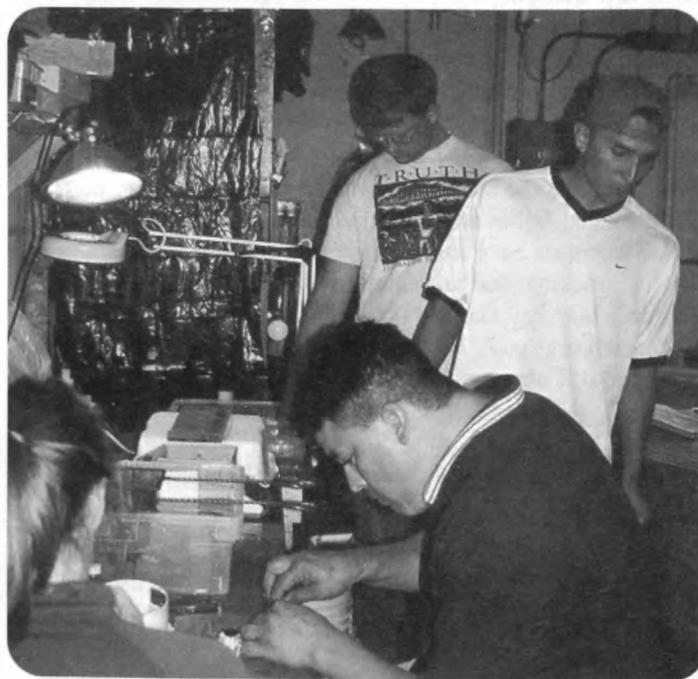
much of which has been affected by timber harvesting. The River has native runs of Chinook and Coho salmon, as well as steelhead trout. The Quinault Nation also operates a salmon hatchery on the River. The watershed analysis will serve as a tool to support decision-making processes in managing the river system and restoring salmon runs. Under two separate projects, the USGS is leading the efforts for two modules - hydrology and geomorphology - of the watershed analysis. As part of the hydrology module, USGS staff measured low-flow discharge at selected sites on the Salmon River and correlated them with nearby continuous-discharge records. These data were used in base-flow predictive models to estimate low-flow recurrence intervals for un-gaged streams in the basin. As part of the geomorphology module, USGS scientists investigated channel-migration processes, including interactions among channel migration, large woody debris, floodplains, and the surrounding forest. Historic channels and logjams were also mapped. The results of these studies will be published in the coming year in several reports. Contacts: Bill Bidlake, 253-428-3600, ext. 2641, [wbidlake@usgs.gov](mailto:wbidlake@usgs.gov) or Jim O'Connor, 503-251-3222, [occonnor@usgs.gov](mailto:occonnor@usgs.gov)

**Steelhead Restoration.** USGS fishery biologists continue cooperating with the Confederated Tribes and Bands of the Yakama Indian Nation in a long-term project to restore steelhead trout to streams in the Wind River basin of southwestern Washington. Federal scientists and Tribal representatives worked together on a Technical Advisory Committee to the Wind River Watershed Council. Contact: Western Fisheries Research Center, Columbia River Research Laboratory, 509-538-2299, [jim\\_seelye@usgs.gov](mailto:jim_seelye@usgs.gov)

**Ground-Water Resources of the Yakima River Valley, Confederated Tribes and Bands of the Yakama Nation.** Surface water in the Yakima River Basin is under adjudication. The amount of surface-water available for appropriation is not known, but there are increasing demands for water for municipal, fisheries, agricultural, industrial, and recreational uses. These demands must either be met by ground-water withdrawals and/or by changes in the way water resources are allocated and used. Ongoing management of water in the basin also may be affected by rules implemented under the Endangered Species Act for salmonid fish that have either been listed or are proposed for listing under that Act. In 2000, the USGS began a study of the ground-water system in the basin, in cooperation with the U.S. Bureau of Reclamation and the Washington State Department of Ecology, and working with the Confederated Tribes and Bands of the Yakama Nation. The study will describe the geologic framework and ground-water flow system in the Yakima River basin, as well as the interaction between ground water and surface water. A ground-water model will also be constructed as a tool to improve understanding of the system and estimate the

effects of selected management strategies. Initially, some 1,500 wells were visited to verify locations and measure water levels. Contact: John Vaccaro, 253-428-3600, ext. 2620, [jvaccaro@usgs.gov](mailto:jvaccaro@usgs.gov)

**Pacific Lamprey.** The USGS is assisting the Confederated Tribes of the Umatilla Indian Reservation (CTUIR), in their effort to reestablish Pacific lampreys in the Umatilla River. Currently, USGS biologists, in cooperation with the CTUIR, are conducting research on several aspects of the life history and habitat needs of lampreys in the Columbia River basin. USGS project staff are examining the timing, behavior, and overwintering and spawning habitat use by upstream migrating Pacific lampreys. USGS scientists are investigating the olfactory sensitivity of Pacific lampreys to pheromones released by other lampreys and lampreys' use of these pheromones as a migratory cue. The study participants are trying to define critical habitat needs of lamprey eggs and early larvae by conducting experiments to measure effects of temperature on these early life history stages. Results of the study will also refine identification and aging techniques for larval lampreys. All of these projects are intended to provide information that will help the CTUIR implement their Umatilla River restoration plan. Contact: Western Fisheries Research Center, Columbia River Research Laboratory, 509-538-2299, [jim\\_seelye@usgs.gov](mailto:jim_seelye@usgs.gov)



**Lamprey research with the Confederated Tribes of the Umatilla Indian Reservation.**



**Geomorphology of the Deschutes River, Oregon.** The results of this project will describe the overall geologic and geomorphic context of the Deschutes River system in a way that will help evaluate the effects of the Pelton-Round Butte hydroelectric complex on downstream channel morphology. Portland General Electric and the Confederated Tribes of the Warm Springs Reservation are currently applying jointly to the Federal Energy Regulatory Commission for relicensing of the hydroelectric complex. Contact: Jim O'Connor, 503-251-3222, [oconnor@usgs.gov](mailto:oconnor@usgs.gov)

**Studies of the Deschutes Basin, Oregon.** USGS scientists are cooperating with the Confederated Tribes of the Warm Springs Reservation to study aspects of the Deschutes River related to water and aquatic resources. The Deschutes River flows through the lands of the Confederated Tribes of the Warm Springs Reservation, who hold rights to considerable flow in the river and who have critical interests in streamflow, fisheries, and habitat quality. Legally-mandated minimum flows in the Deschutes River are required to protect aquatic wildlife and recreation. These requirements are often not met during dry months, and ground-water pumping has the potential to further reduce streamflow. A hydrologic study will characterize the regional ground-water flow system of the upper Deschutes Basin and will develop a methodology to quantitatively evaluate the effects of ground-water pumping on streamflow of the Deschutes River and its tributaries. Another study will determine the distribution of juvenile hatchery spring chinook salmon in the Deschutes River and their potential impact on the aquatic community. Juvenile spring chinook salmon are tagged with radio transmitters and then tracked throughout the lower Deschutes River as they migrate downstream from the Warm Springs National Fish Hatchery. Tracking the juvenile salmon will indicate where fish released during fall will overwinter and how they might impact wild salmon in the Deschutes River. Working together, the Confederated Tribes of the Warm Springs Reservation and USGS scientists have shared the responsibilities for trapping, tagging, tracking, and instream sampling during this study. Contact: Marshall Gannett (hydrologic study), 503-251-3233, [mgannett@usgs.gov](mailto:mgannett@usgs.gov); Western Fisheries Research Center (fisheries study), Columbia River Research Laboratory, 509-538-2299, [jim\\_seelye@usgs.gov](mailto:jim_seelye@usgs.gov)

**Anadromous Fishery Restoration.** USGS biologists and hydrologists participated in the Klamath River Fishery Restoration Program, a cooperative effort among the Yurok, Karuk, and Hoopa Valley Tribes, the U.S. Fish and Wildlife Service, and California Department of Fish and Game. USGS is extending and further developing a River System Impact Assessment Model that will provide a better understanding of water quality and quantity management problems that limit anadromous fish restoration in the Klamath River below Iron Gate Dam. Scientists will also collect data to fit the model and perform the

required analysis. Contact: Midcontinent Ecological Science Center, 970-226-9100, [lee\\_ischinger@usgs.gov](mailto:lee_ischinger@usgs.gov)

**Regional Ground-Water Hydrology of the Upper Klamath Basin, Oregon and California.** The objectives of this study are to quantitatively characterize the regional ground-water hydrology in the upper Klamath Basin, characterize the relation between ground-water and surface water, and evaluate the potential for additional ground-water development without adversely affecting streamflow. Changes in water management in the basin to accommodate aquatic wildlife have caused shortages of water available for agriculture and for wildlife refuges. Ground water has the potential to augment surface water supplies, but also has the potential to diminish streamflow in some areas. A number of Tribes have interests in the fisheries in both Upper Klamath Lake and the Klamath River including the Klamath, Yurok, and Karuk, and Hoopa Valley Tribes. Contact: Marshall Gannett, 503-251-3233, [mgannett@usgs.gov](mailto:mgannett@usgs.gov)

**Geochemical Landscape of Alaska Native Corporation Lands.** Geologists from the USGS have developed collaborative plans with Alaska Native Corporations to conduct projects with the goal of understanding the geochemical landscape (that is, the spatial variations in the distribution of chemical elements within media such as stream sediment and soil) of Native and adjacent lands. The study areas comprise the southwestern quadrant of Alaska, including the Aleutian Islands. Part of the project includes collecting one sample per 289 km<sup>2</sup> (20 km cell) and analyzing each sample for 43 chemical elements of both geological and environmental significance (examples: mercury, arsenic, and selenium). Geologists from the Calista Corporation and the Bristol Bay Native Corporation will participate in acquiring samples for analysis. The geochemical data will be used to create interpretive derivative maps involving watersheds, lithologies, geology, mineral deposits, and political boundaries. The products of the project are designed to assist the Native Corporations in managing their lands. Contact: Andrew E. Grosz, 703-648-6314, [agrosz@usgs.gov](mailto:agrosz@usgs.gov)

**Kuskokwim Mineral Belt Project.** The USGS' Kuskokwim Mineral Belt project is in its final year of a four-year investigation of the regional geology and assessment of the undiscovered mineral deposit potential of one of Alaska's most promising mineral frontiers. The study area lies in the heart of the 190,000 sq. km (approximately 73,000 sq.mi.) Kuskokwim Mineral Belt (KMB), an important precious metal-bearing region in southwestern Alaska. This study focuses on the historically productive central part of the mineral belt, a 15,000 sq. km (5,800 sq. mi.), nearly 25 percent of which is Native-patented or interim-conveyed land. Calista Corporation, the regional Alaska Native Corporation, will use the results of these studies to evaluate and manage the resources of their lands-a goal supported by the



Department of the Interior's policy to assist Alaska Native groups. Deposits of gold and silver are now known to be associated with specific igneous rock units in this part of Alaska. In addition to precious metals, the KMB has produced mercury from shallow, relatively low-temperature deposits. USGS and Calista geologists are cooperatively studying the Calista lands by performing joint field investigations and sharing geologic, geochemical, and mineral deposit information. New data on the geologic controls of mineralization, supplemented by regional geochemical and geophysical data, will help USGS scientists estimate the mineral value of this largely unexplored region and will allow the Corporation to make better-informed decisions to benefit its people. Contacts: Marti Miller, 907-786-7437, [mlmiller@usgs.gov](mailto:mlmiller@usgs.gov); Dwight C. Bradley, 907-786-7434, [dbradly@usgs.gov](mailto:dbradly@usgs.gov)

**Modeling the Effects of Egg-Harvesting at a Glaucous-Winged Gull Colony.** USGS biologists completed fieldwork at a gull colony in Glacier Bay National Park that is a traditional site for subsistence egg harvesting by the members of the Hoonah Indian Association. Data collected on the timing and success of egg laying will be used to develop a probability model that simulates the effects of egg predation on re-laying frequencies. The model will be used to test the effects of varying levels and intensities of egg predation on the hatching success of the gulls. Experimental data gathered will be used to determine physiological costs to adult gulls that re-lay eggs. Eggs that were collected as part of the experimental study were donated to the Hoonah Indian Association. Contact: USGS Alaska Biological Science Center, 907-786-3512, [john\\_piatt@usgs.gov](mailto:john_piatt@usgs.gov)

## Environmental Activities







# Environmental Activities



## Environmental Activities

**Contamination of the Penobscot River.** The Bureau of Indian Affairs has brought together agencies including the U.S. Geological Survey (USGS), the Environmental Protection Agency (EPA), and the University of Maine Water Research Institute (WRI) to collect information regarding the occurrence, distribution, and ecological and human health risks associated with dioxins, furans, and polychlorinated biphenyls (PCBs) in fish and sediment in the Penobscot River. The study area encompasses the main channel of the Penobscot River from the Milford Dam impoundment in Old Town to Grindstone, Maine. Concentrations of dioxins and furans in the riverbed sediment have been quantified to a limited degree through a sampling study conducted in this area in 1995 by the Penobscot Nation's Department of Natural Resources. In addition, the Maine Department of Environmental Protection (MDEP) presently maintains several fish sampling stations in the study area as part of their statewide dioxin program. The USGS will compile the data that the project generates on dioxin, furan, and PCB that will then be reviewed and interpreted by EPA. Contact: USGS District Chief, Robert Lent (water issues), 207-622-8201, [rmlent@usgs.gov](mailto:rmlent@usgs.gov); USGS Columbia Environmental Research Center (wildlife issues), 573-875-5399, [bill\\_mauck@usgs.gov](mailto:bill_mauck@usgs.gov)

**South Florida Ecosystem Program.** The concerns of the Seminole Tribe of Florida and Miccosukee Tribe of Indians of Florida are integral to the health and management of the Everglades. The Miccosukee and Seminole Tribes, with the USGS and other agencies, participate cooperatively on the South Florida Ecosystem Restoration Working Group. The working group identifies research needed for wise management of the area. The USGS conducts research to help other entities with their water-management decisions. Current USGS research in support of the working group focuses on: water flow and management issues; landscape ecology; wetland ecology; fire ecology; ornithology and ichthyology; coral reef ecology; and long-term monitoring.

As part of the Everglades Restoration Program, the U.S. Army Corps of Engineers and the South Florida Water Management District (SFWMD) propose modifying water deliveries to tribal lands, Big Cypress National Preserve (National Park Service), and other areas located in the interior of the Everglades. The proposed modified water deliveries are designed to provide net flood protection and water delivery benefits to agricultural lands, as well as partial restoration of historic ecological conditions within both Seminole and Miccosukee tribal lands. The effects that these proposed water delivery changes will have on tribal lands can be determined only if interior flows are accurately known.

The Everglades Construction Project, developed as a result of the Everglades Restoration Program, required diversion of the surface water from a specific basin into a storm treatment area. This diversion will cause changes in the portion of the water subject to tribal entitlement. The project utilizes the individual strengths of the three entities (the Seminole Tribe, the SFWMD, and the USGS) that coordinate its operation. The USGS collects and analyzes data on surface-water flows. Implementation and development of strategically located streamflow gaging sites will help define future surface-water flow requirements. Accurate flow calibrations are generated from data collected at these sites. Subsequent studies can be conducted by other agencies to compute nutrient and other contaminant loadings based on the calibration information. That information, in turn, can be used to manage the canal system. Providing continuous flow data at selected impact points for interior basins will also complement the existing eastern flow canal discharge network and allow more accurately timed surface-water releases.

The USGS operates and maintains two gages in cooperation with the Seminole Tribe and the SFWMD. Acoustic velocity meters systems (AVM) at the two sites are calibrated to the flow and used to compute discharge. The Seminoles are responsible for servicing, operating, and maintaining flow-weighted nutrient autosamplers at the same sites, activated by these AVM's. The samples are sent to the USGS for analysis. The SFWMD provides real-time data transmission support by servicing the radio frequency/cell phone telemetry infrastructure located at each of the two gaging sites. Furthermore, the SFWMD is responsible for combining the flow data with nutrient sample data to determine total nutrient loads. These combined data are disseminated in several annual "load" reports. The final discharge data are also published in the annual USGS Water Resources Data Report, v. 2a. One gage was operated in cooperation with the Miccosukee Tribe. At the end of FY 1999, that part of the project was modified so that the Miccosukee Tribe currently operates equipment within the structures built by the USGS. Contact: Mitch Murray, 305-717-5827, [mmurray@usgs.gov](mailto:mmurray@usgs.gov) (water issues), or Florida Caribbean Science Center, 352-378-8181, [russell\\_hall@usgs.gov](mailto:russell_hall@usgs.gov) (ecology issues)

**Study of Environmental Contaminants.** USGS scientists completed a final report summarizing four years of baseline water quality and toxicology monitoring and submitted it to the Sokoagon Chippewa Community, Mole Lake Reservation. Walleye and wild rice are the principal cultural and economic resources of the Mole Lake Band. USGS biologists exposed walleye fry and wild rice seedlings to various concentrations of heavy metals to



establish baseline toxicity thresholds for metals. An ancillary study concerned the use of bryophytes (mosses, liverworts, and hornworts) for monitoring heavy metals uptake and the effects of copper and sulphate on wild rice in the Swamp Creek Basin. The bryophyte study was completed for the Great Lakes Indian Fish & Wildlife Commission (GLIFWC). All tests were conducted using water and organisms collected and shipped from Mole Lake or organisms cultured in Mole Lake water. All work on this project has been completed. Contact: Mid-Continent Ecological Science Center, 970-226-9100, lee\_ischinger@usgs.gov

**Historical Ecosystem Reconstruction and Potential Identification of Effects of Past Ecosystem Perturbations in Lac Courte Oreilles.** This project is reconstructing the Musky Bay ecosystem history of, and an additional site within, lands of the Lac Courte Oreilles Band of Lake Superior Chipewau Indians, with special emphasis on the possible effects of cranberry farming and shoreline development using the sediment record. Studies are focusing on the nutrient history (input and burial rates) that reflect management practices and possible watershed degradation. The modeled nutrient history will be interpreted in concert with reconstructed algal (mainly diatom) communities preserved in the sediments. Another objective of the project is to search for possible cranberry farming signatures including sulfur, uranium, and potassium associated with fertilizers, and copper associated with pesticides. Biogenic silica profiles will provide complimentary data for algal community reconstructions. The sediment record likely preserves observable trends in nutrient biogeochemical cycling and ecosystem character over the last few hundred years, a time that includes a background period and the period of cranberry farming. Contact: Faith Fitzpatrick, 608-821-3818, fafitzpa@usgs.gov

**Water Quality Monitoring of Menominee Lands.** The Menominee Indian Tribe of Wisconsin is gathering information on current water quality and biotic conditions of the Wolf River within the Menominee Reservation, including the presence or absence of contaminants in water, sediments, and biota. The USGS is providing information as part of a project to develop a set of baseline data for the Menominees. This database was designed to determine the concentrations of specific trace elements in water-column samples and in samples of fish livers, caddisfly larvae, and fine streambed sediments at the sampled sites. A final USGS report describing the results from the baseline monitoring of water quality near the upstream and downstream boundaries of the Menominee lands will be published during fiscal year 2001. The USGS also began a new year-long study to collect similar data on water quality and biotic conditions at 10 additional sites on Wolf River tributaries. Contact: Garn Garn, 608-821-3838, hsgarn@usgs.gov

**Oneida Hydrologic Investigations.** The Oneida Tribe of Wisconsin is concerned about the effects of building development and agriculture on the drinking water quality of Tribal members. The USGS is assisting the Oneida Tribe by compiling and presenting information on water quality at two sites on Oneida lands. In FY2000, the USGS collected water quality samples from two streams. The headwaters of one stream are in an area of heavy row crop production. The other stream has a naturally producing cold-water source in its headwaters and is in an area of rapid development. Because of these factors, both of these sites are of a major interest to the Oneida government. Samples were analyzed for nutrients, pesticides, and suspended sediment concentration and will be used to perform trend analysis. This is intended to be a long-term study, providing information to help the Oneida manage their water resources. Contact: Kevin Richards, 608-281-3861, krichard@usgs.gov

**Water Quality of South Dakota Reservoirs.** USGS biologists are assisting in a study of the physical, chemical, and biological characteristics of Federal reservoirs in southwest South Dakota. The Oglala Sioux Tribe and the Cheyenne River Sioux Tribe are interested in results of these investigations since the results might influence the Bureau of Reclamation's management of the reservoirs. USGS is preparing a summary report on water quality in the reservoirs that analyzes all extant, available data. Contact: Columbia Environmental Research Center, 573-875-5399, bill\_mauck@usgs.gov

**Water Quality in Tar Creek and Spring River near Lands of Quapaw Tribe of Oklahoma.** The Picher Mining District of northeastern Ottawa County, Oklahoma was the site of mining for lead and zinc from about 1900 until 1970. Mining in the area has decreased substantially since the 1950's. By the 1980's, approximately 2,900 acres of land were overlain by large piles of gravel-sized tailings of limestone and chert with traces of metallic-sulfide minerals. Drainage from these piles, as well as from mine openings, has lead to substantial metals contamination of Tar Creek and the Spring River near Miami, Oklahoma. The USGS and other agencies conducted water-quality and bed-sediment sampling in the area from the 1980's to early 1990's. The Quapaw Tribe of Oklahoma would like to obtain current data about the occurrence and distribution of metals, pesticides, volatile organic compounds, and other substances in surface water draining their lands to determine the current condition of those waters. Contact: William J. Andrews, 405-810-4416, wandrews@usgs.gov

**Osage-Skiatook Petroleum Field Conference.** Two locations near Skiatook Reservoir on the Osage Reservation in northeast Oklahoma have been selected as Petroleum Environmental Research Project study sites. The USGS project will evaluate the effects of oil and gas production operations on soils and surface-

and ground-water quality in the area. Skiatook Reservoir serves as flood control, water supply, and recreation for the city of Tulsa and adjacent areas. A November 2000 field conference brought together scientists and managers from government, tribal, and university backgrounds to tour the project sites and discuss the present and future effects of oil and gas development. The USGS, the Osage Nation, BIA, EPA, DOE, the Army Corps of Engineers, University of Oklahoma, University of Tulsa, and Oklahoma State University participated in the conference. Contact: Jim Otton, 303-236-8020, jkotton@usgs.gov



**Members of the Osage Nation Environmental and Natural Resources Department, the Bureau of Indian Affairs, the U.S. Army Corps of Engineers, the Department of Energy, and the U.S. Environmental Protection Agency listen to US Geological Survey scientists describe the history of hydrocarbon development in Oklahoma.**

Photographer: Kathy D. Peter, USGS

**Surface-water Quality and the Effects of Oil Production, Osage Nation.** The USGS is continuing to cooperate with the Osage Nation to sample water-quality and measure stream discharge at 140 surface-water sites on the Osage Reservation. The study is also identifying the oil wells upgradient from the sampling sites using a digital elevation model. Water-quality data will be compared to oil-well information for upgradient wells. Contact: Marvin M. Abbott 405-810-4411, mmabbott@usgs.gov

**Monitoring of Water Quality in Iowa Tribal Lands, Central Oklahoma.** The Iowa Tribe of Oklahoma is concerned about the quality of ground and surface water on Tribal lands in central Oklahoma. Possible sources of contaminants to water in the area include agricultural activities, ground-water/surface-water interactions with the Cimarron River, oil drilling, dump sites, and naturally occurring trace metals. The USGS, in cooperation with the Iowa Tribe of Oklahoma, sampled several sites to investigate possible water-quality problems caused by these sources. Ten domestic wells and eight surface-water sites were sampled for physical parameters, nitrate, chloride, uranium, and major pesticides to

help identify the occurrence and distribution of pesticide contamination in waters underlying or draining Tribal lands. Contact: William J. Andrews, 405-810-4416, wandrews@usgs.gov

**Caddo Aquifer Vulnerability.** The Caddo Tribe of Oklahoma is concerned about the vulnerability of ground water in northern Caddo County and Canadian County, Oklahoma, to pesticide contamination. On behalf of the Tribe, the USGS is constructing an aquifer sensitivity map to outline areas where the aquifer is susceptible to pesticide contamination. The Tribe, with USGS assistance, is developing a geographic information system (GIS) that will include land use, pesticide use, and other data for parcels of land. USGS scientists will work with Tribal employees on ways to use the GIS resources to make ground-water vulnerability maps. Results will be made available in a report. Contact: Carol Becker, 405-810-4436, cjbecker@usgs.gov

**Groundwater contamination on and near the Fort Peck Indian Reservation.** USGS hydrologists monitored two ground-water contamination situations on the Fort Peck Indian Reservation, on behalf of the Fort Peck Assiniboine and Sioux Tribes. In one case, salinewater is contaminating non-saline ground water in Quaternary deposits in the East Poplar oil field. In the other case, nitrate is contaminating the Flaxville and underlying aquifers. The USGS investigated the extent, magnitude, and movement of these two contamination issues and reported the results, to date, in Water-Resources Investigations Reports. Saline-water contamination in the East Poplar oil field may be as much as 12.4 square miles, may affect 9-60 billion gallons of ground water, and discharges to the Poplar River. The probable source of saline-water contamination is brine that is a by-product of the production of crude oil in the East Poplar oil field. In the other case, concentrations of nitrate equaled or exceeded 10 milligrams per liter nitrate as nitrogen in 84 percent of the wells completed in the Flaxville aquifer and dryland farming and livestock are the dominant sources of nitrate. The USGS collected additional data in these two study areas to investigate saline-water plume migration and seasonal nitrate trends. Data collection is now complete and final reports are being prepared. Contact: Joanna Thamke, 406-457-5923, jothamke@usgs.gov

**Geohydrologic and Water-Quality Assessment of Pueblo of San Ildefonso Lands.** The Pueblo of San Ildefonso and the USGS are cooperating to evaluate the extent of environmental impacts on the geohydrologic system of the Pueblo of San Ildefonso and adjacent Federal lands managed by the Department of Energy (DOE) by using existing information derived from internal and external sources. The project is identifying the water-quality characteristics of water resources on Pueblo and adjacent DOE lands. It will also identify potential sources of pollution within the study area. The water-quality data from this study can be used by the Pueblo of San Ildefonso in developing its water-quality standards. A critical component of this project is train-



ing provided by USGS staff to Pueblo staff. The training will assist the Pueblo staff in developing their technical abilities to collect water data. At the conclusion of the study, the Pueblo will have increased independence in conducting the activities. Contact: Dale Rankin, 505-830-7965, [drrankin@usgs.gov](mailto:drrankin@usgs.gov)

**Geohydrologic and Water-Quality Assessment of Pueblo of Jemez Ancestral Lands.** This study is evaluating the extent of environmental impacts on the geohydrologic system of the Upper Jemez River watershed from internal and external sources. The project is identifying the water-quality characteristics of water resources within the Jemez River watershed and point and nonpoint sources of pollution within the study area. The water-quality data can be used by the Pueblo in deciding among appropriate economic development alternatives. As part of this project, USGS staff will work with Pueblo staff to enhance the Jemez employees' technical ability to collect water data, thereby increasing the Pueblo's self-sufficiency so that Jemez employees can conduct assessment activities independently. Contact: Dale Rankin, 505-830-7965, [drrankin@usgs.gov](mailto:drrankin@usgs.gov)



Collection of suspended sediment sample after storm event on the Pojoaque River at El Rancho, New Mexico; Naomi Archuleta, Pueblo of San Ildefonso (left), and Robert McBreen USGS (right).

**Aquifer Sensitivity on Navajo Nation Lands and Ground-Water Vulnerability to Pesticide Contamination on the Navajo Indian Irrigation Project.** The primary objective of this study is to determine the sensitivity of aquifers to agricultural activities and attendant pesticide application occurring on the overlying land surface. The assessment of aquifer sensitivity on Navajo Nation lands will be based on an evaluation of the physical setting of the aquifers, including the overlying topography and geology, depth to water from the land surface, precipitation, and characteristics of the overlying soils. Digital data sets and GIS coverage describing these conditions will be some of the products of this study. Additionally, the project will assess ground-water vulnerability on the Navajo Indian Irrigation Project, including an evaluation of agricultural practices. These practices include how much and when irrigation water is applied. The use of pesticide products, as well as the amount, timing, and method of application of these products, will also be considered. Potential sources of data for this study include the Navajo Nation and its contractors, the USGS and other Federal natural-resource agencies, and State natural-resource agencies in Arizona, New Mexico, and Utah. Contact: Paul Blanchard, 505-830-7947, [pblanch@usgs.gov](mailto:pblanch@usgs.gov)

**Aquifer Sensitivity on Navajo Nation Lands and Ground-Water Vulnerability to Pesticide Contamination on the Navajo Indian Irrigation Project.** The primary objectives of this study are to determine the sensitivity of aquifers to impacts from activities occurring on the overlying land surface, and to estimate the effects of irrigated agriculture and attendant pesticide use on ground water underlying the Navajo Indian Irrigation Project (NIIP). GIS coverages that describe recharge areas, areas of unconsolidated deposits, soil hydrologic group, topography, and precipitation have been developed. The aquifer sensitivity assessment will consist of combining these coverages and interpreting the resulting coverage. The assessment of ground-water vulnerability to pesticide contamination on the NIIP will consist of combining the results of the aquifer sensitivity assessment with pesticide leachability ratings for each pesticide used during 2000. Leachability ratings will be estimated on a field-by-field basis. Contact: Paul Blanchard, 505-830-7947, [pblanch@usgs.gov](mailto:pblanch@usgs.gov)

**Geoenvironmental effects of the Glen Canyon Dam.** The environment in Grand Canyon has been degraded by the Glen Canyon Dam. The USGS is collaborating with other researchers to provide the Bureau of Reclamation with information for policy decisions concerning the management of water flow at the Glen Canyon Dam. Under the post-dam flow regime, which limits floods and impounds sediment, sandbars have degraded, campsites and riparian habitat have been lost, and species have become endangered. Congress passed the Grand Canyon Protection Act, requiring the Bureau of Reclamation to alter discharge from the

dam to enhance the environment downstream in Grand Canyon National Park. Representatives of the Hualapai Tribe and Hopi Tribe are among more than two dozen stakeholders who regularly receive reports on the progress of this project from with USGS' Coastal and Marine team and the Grand Canyon Monitoring and Research Center. The USGS has provided marine survey technology including side-scan sonar, rotating sonar, seismic reflection profiling, and underwater video equipment. USGS scientists are interpreting sedimentary structures to provide explanations for sediment transport (particularly useful for determining sediment transport prior to the dam) and developing new approaches to sediment-transport modeling. Contact: David Rubin, 831-459-3156, drubin@usgs.gov

**Climate Change and Land-Use Impacts, Navajo Nation and Hopi Tribe.** Sand dunes on the Navajo Nation in Arizona are being examined as indicators of climate change, and the potential of sand dune movement is being determined. This project, begun in Federal fiscal year 2000, consists of mapping sand dune deposits and classifying them according to stability, based on the degree and type of vegetation holding them in place, and on regional meteorological information. The mobility of sand dunes is important for determining potential impacts of sand encroachment on grazing and farming resources, native plants, and infrastructure. Project activities in FY 2000 included organizing and holding a workshop on the new Hopi Buttes study. The workshop provided a forum for community outreach and development of the study's focus with collaborators from Navajo Nation Department of Archaeology, Diné College, Department of Water Resources of the Hopi Tribe, Department of Natural Resources of the Hopi Tribe, Northern Arizona University, and various scientific disciplines within the USGS. Workshop participants also included representatives of the Navajo Nation's Environmental Protection Agency, BIA's Division of Water and Land Resources, and the Hopi Tribe's Minerals Department. A USGS scientist was invited to speak at the Navajo Nation's Shiprock Chapter GIS Conference and to participate in the Navajo EPA's strategic planning session. These projects emphasize outreach with the Native community, including the coordination of training sessions in image processing and acquisition of Landsat 7 imagery on the Navajo and Hopi Reservations. Contact: Margaret Hiza Redsteer, 303-236-0075, mhiza@usgs.gov

**Wetlands on the Navajo Reservation.** USGS wetland scientists assisted in constructing a wetland environment on the Navajo Nation that will treat wastewater formerly impounded in a wastewater lagoon. The wetland will improve the quality of discharge water from Pinon, Arizona, and, at the same time, create excellent habitat for wildlife. This is a cooperative effort among the Navajo Nation, the Indian Health Service, Bureau of Reclamation, and the USGS. Researchers will analyze data obtained from monitoring the effectiveness of the wetland to

determine the success of the project. The results of analysis will provide information on how and when to build additional wetland treatment cells for further development in the Pinon area. Contact: Mid-Continent Ecological Science Center, 970-226-9342, joan\_thiebaud@usgs.gov

**Sedimentation and Erosion on Navajo Lands.** The USGS is identifying sources and mechanism of sediment production on lands of the Navajo Nation. Parts of the investigation will estimate rates of hillslope, valley, and channel erosion in tributary drainage basins and sediment yields from drainage basins within the Navajo Partitioned Lands. Results of the study will help the Navajo Nation's land-use managers and residents assess the stability of channels, and the relative erodibility of valleys and hillslopes. A report was produced at the conclusion of this project in FY2000. Contact: John Parker, 520-670-6671, ext. 271, jtparker@usgs.gov

**Alien Invaders.** Exotic plant species are invading lands in the Southwest, including Tribal lands. USGS scientists have developed a standardized methodology for compiling data collected in the field on infestations of invasive exotic plants. The Southwest Exotic Plant Mapping Program provides Tribes with the opportunity to contribute their field observations to a regional database. The regional database and maps made from the database can be used for inventorying, monitoring, and sharing data on exotic plant species. The Navajo Nation participated in this cooperative effort by contributing over 250 field observations to the regional database. Several sites on the Navajo Reservation have been used to implement the program. The effectiveness of methods to control the spread of exotic species on Navajo lands is being shared regionally by the Navajo Nation's contribution to the regional data and maps that are available on the program's web site. Contact: Colorado Plateau Field Station, 520-556-7466, ext. 235, kathryn\_a\_thomas@usgs.gov

**Sedimentation of White Sturgeon Spawning Habitat, Kootenai River, Idaho.** In 1999, the USGS, in cooperation with the Kootenai Tribe of Idaho, began examining sedimentation in Kootenai River white sturgeon spawning habitat. The Kootenai River, second largest tributary to the Columbia River, has undergone many changes due to construction of dikes and Libby Dam. The operation of this dam has altered the river ecosystem, resulting in the decline of many resident fish populations including the Kootenai River white sturgeon (listed as an Endangered Species in 1994). One limitation to white sturgeon spawning success may be the change from the natural fluctuations in flow and sedimentation in sturgeon spawning areas resulting from the operation of the dam. This study will characterize the type of sediments composing the Kootenai River substrate/subbottom habitat. It will also assess changes in Kootenai River bed habitat characteristics, including trends in the variability of bed elevation during pre-



and post-Libby Dam periods. Study tasks include a detailed survey of the substrate using marine seismic subbottom profiling systems and coring the upper 10 to 15 feet of substrate/sediments. These data are being integrated with data defining pre- and post-dam water-surface and riverbed elevations to develop a conceptual model describing the sedimentation history of the substrate habitat area. This integrated analysis will aid in characterizing how sedimentation processes in the river have changed over time and whether changes have affected the quality of the habitat area as it relates to spawning conditions. Contact: Gary Barton, 253-428-3600, ext. 2613, [gbarton@usgs.gov](mailto:gbarton@usgs.gov)

**Mining Contamination.** Parts of the South Fork of the Coeur d'Alene River in Idaho have been contaminated by historic mining activity. The USGS has participated in the Coeur d'Alene Natural Resource Damage Assessment to ascertain the extent of injury. Of particular importance is determining any injury to ecosystems on lands of the Coeur d'Alene Tribe. Scientists are studying contamination from metals and other mining wastes released from the mine and providing technical support for litigation. Contact: Columbia Environmental Research Center, 573-875-5399, [bill\\_mauck@usgs.gov](mailto:bill_mauck@usgs.gov)

**Western US Phosphate and the Shoshone-Bannock Tribes.** The eastern half of the Fort Hall Reservation, home of the Shoshone-Bannock Tribes and part of the Southeast Idaho Phosphate Resource Area in the Western Phosphate Field, is included in the study area of the USGS project "Geologic and Geoenvironmental Studies of the Western Phosphate Field." Although the project was initially focused on delineating additional resources, research efforts have been extended to include multidisciplinary, geoenvironmental studies of selenium. Selenium, an element released from phosphate waste piles, is known to have had a detrimental effect on local livestock. Study areas include the Gay Mine, one of the largest open-pit mines in southeastern Idaho, operated by J.R. Simplot and FMC on the Shoshone-Bannock lands from 1946 to 1993. The site consists of numerous mine pits, waste dumps, and mill shale piles spread over an area of nearly 25 square miles. USGS involvement in fiscal year 2000 consisted of initial contacts and meetings with the Bureau of Indian Affairs (BIA) and the Tribal Land Use Committee, visits to the Gay Mine site, and geologic mapping in support of resource estimates for the Chesterfield Quadrangle. Samples were also collected for chemical and petrographic analysis. In addition, both the BIA and the USGS have been participants in regular meetings of the Interagency Area-Wide Technical Group and the Selenium Working Group Advisory Committee. Contacts: James R. Hein, 650-329-5287, [jhein@usgs.gov](mailto:jhein@usgs.gov); Sam Hernandez, BIA, 208-238-2305, [samhernandez@bia.gov](mailto:samhernandez@bia.gov); Dan Christopherson, Shoshone-Bannock Tribes, 208-478-3808, [wildlife@cyberhighway.net](mailto:wildlife@cyberhighway.net); Curtis Farmer, Chairperson, Tribal Land Use Committee, Shoshone-Bannock Tribes, 208-478-3891

**Monitoring Movement of Pesticides on Shoshone-Bannock Tribal Lands.** The USGS, in cooperation with the Idaho Soil Conservation Commission (representing the Shoshone-Bannock Tribes), began a project in FY 1999 to examine the migration and persistence of two pesticides (1,3-Dichloropropene and Metam-Sodium) and their degradation products through soil at selected field locations on the Fort Hall Indian Reservation. The study used or adapted existing procedures to collect soil samples from multiple depths in selected fields; samples were collected before and after pesticide applications. Personnel from the Shoshone-Bannock Tribes, Idaho Soil Conservation Commission, National Resources Conservation Service, Idaho State Department of Agriculture, and USGS cooperated to complete objectives of the project. The project will be completed before March 2001, and a report on the study will be available through the USGS Idaho District web site, <http://idaho.usgs.gov/public/reports.html>. Contact: Deb Parlman, 208-387-1326, [parlman@usgs.gov](mailto:parlman@usgs.gov)

**Cui-ui in Pyramid Lake, Nevada.** The cui-ui is an endangered fish of the sucker family that is found only in Pyramid Lake, Nevada. The Pyramid Lake Paiute Tribe and other Northern Paiutes historically relied upon annual spawning runs of cui-ui for food. Since the Tribe controls use of Pyramid Lake and fully supports efforts to restore the cui-ui population, the Tribal Council has passed resolutions prohibiting harvest of cui-ui by non-Indians and Tribal members. The USGS is studying the population dynamics and reporting results to the Tribal Chairman. Adult cui-ui are netted at the south end of Pyramid Lake in the spring and are marked to determine the mortality rate. Fish are recaptured in the fall at selected stations around the lake to determine juvenile population size and estimate mortality over the summer. Contact: Western Fisheries Research Center, Reno Field Station, 702-784-5451, [gary\\_scoppettone@usgs.gov](mailto:gary_scoppettone@usgs.gov)

**Organochlorine Compounds and Mercury in Fish Tissue from Lake Roosevelt and the Upper Columbia River, Confederated Tribes of the Colville Reservation.** The presence of organochlorine compounds, such as PCBs, dioxins, and furans, and mercury in fish of Lake Roosevelt has been well documented. Consequently, there have been concerns about the effects of local fish consumption on human health. Health advisories regarding consumption of Lake Roosevelt fish have been issued by the Washington State Department of Health. However, changes in industrial discharges to the Columbia River have been made in recent years, and one report has described decreases in concentrations of dioxins and furans in fish tissue. The Confederated Tribes of the Colville Reservation depend on Lake Roosevelt for subsistence fishing and for the economic benefits provided by non-Indian recreational use of the Lake. For this study, the USGS collected and analyzed selected fish tissues for concentrations of PCBs, dioxins, furans, and mercury. The results were statistically com-

pared to work done several years before, showing that concentrations of these contaminants had either decreased or stayed the same over that time period. A report describing these results was published in early 2000. Contact: Mark Munn, 253-428-3600, ext. 2686, [mdmunn@usgs.gov](mailto:mdmunn@usgs.gov)

**Work Plan to Study the Presence and Transport of Contaminants in Sediment of Lake Roosevelt and the Upper Columbia River, Confederated Tribes of the Colville Reservation.** The presence of organochlorine compounds (such as PCBs, dioxins, and furans) and mercury in the sediment of Lake Roosevelt and the Upper Columbia River is well known. The U.S. Bureau of Reclamation supported a project in which the USGS worked with the Confederated Tribes of the Colville Reservation to create a description of work needed to identify the spatial distribution of these contaminants in the lake and river sediments. The product of this cooperative effort is a plan that also identifies the need for information about how sediment is transported through the system. Contact: Mark Munn, 253-428-3600, ext. 2686, [mdmunn@usgs.gov](mailto:mdmunn@usgs.gov)

**Yakima River Basin Stream Quality and Biological Communities.** The lands of the Confederated Tribes and Bands of the Yakama Indian Nation encompass more than 100,000 acres of intensively irrigated land within the Yakima River Basin. Agricultural runoff from the Yakama Nation has been assessed during this project, along with similar data from the rest of the basin's agricultural areas to determine the effect of different irrigation methods and agricultural practices on surface water quality. The National Water Quality Assessment (NAWQA) program has worked cooperatively with personnel from the Yakama Nation's Department of Natural Resources. Small- and intermediate-sized agricultural drainages within the Yakama Nation were added to the NAWQA sampling network. In addition, chemical suites from routinely sampled sites were augmented with NAWQA pesticide and trace element determinations to characterize agricultural return flow at the mouths of tributaries to the Yakima River. A ground-water sample was collected to measure emerging contaminants, including pharmaceuticals that may be entering the shallow groundwater from combined animal feeding operations. Sampling small- and medium-sized agricultural drainages was undertaken in October 2001, during minimal-flow conditions, for the purpose of measuring chemicals entering streams from shallow groundwater. Results will be compared with results of samples taken during other flow conditions. Contact: Greg Fuhrer, 503-251-3231, [gjfuhrer@usgs.gov](mailto:gjfuhrer@usgs.gov)

**Contaminated Chinook Salmon.** The Department of Energy's Hanford Laboratory in Washington State has become a nuclear waste disposal area. Tribes in the region, including the Confederated Tribes and Bands of the Yakama Indian Nation, the Confederated Tribes of the Umatilla Reservation, and the

Nez Perce Tribe of Idaho, are concerned that chromium leaking from the site might adversely affect chinook salmon. USGS biologists have simulated conditions of the Hanford Reach of the Columbia River in Washington in the laboratory to study impacts under various exposures. Research began on this project in FY1999 and is continuing. Contact: Columbia Environmental Research Center, 573-875-5399, [bill\\_mauck@usgs.gov](mailto:bill_mauck@usgs.gov)

**Suspended Sediment in the Lower Dungeness River.** The objective of this study is to characterize and quantify suspended sediment in the lower Dungeness River. The results will help Jamestown S'Klallam Tribal scientists in their study of elevated fecal coliform concentrations found in fine-grained sediments in Dungeness Bay. Daily suspended-sediment discharge and stream temperature are collected at two sites and particle size analysis is performed on selected samples. The results are published in the USGS Annual Data Report for Washington. Contact: Johnna Sheehy, 253-428-3600, ext. 2676, [jlshsheehy@usgs.gov](mailto:jlshsheehy@usgs.gov)

**Southwest Washington Coastal Erosion Study.** This cooperative project between the USGS and Washington State uses fundamental and applied studies to develop a regional perspective and understanding of coastal processes, sediment transport, and associated shoreline changes. The study is examining the effects of man-made influences (enhanced runoff, dredging operations, Columbia River dams) and natural processes (climate variability, subsidence caused by earthquakes, coastal dune development) on sediment budgets and on the long-term shoreline change trends of the southwest Washington coast. As part of this project, the USGS and the Army Corps of Engineers jointly funded a study of coastal erosion on lands of the Shoalwater Bay Indian Tribe. Contact: Guy Gelfenbaum, 650-329-5483, [ggelfenbaum@usgs.gov](mailto:ggelfenbaum@usgs.gov)

**Hydrogeologic Issues of the Shoalwater Bay Indian Tribe and Tokeland Peninsula.** The Shoalwater Bay Indian Tribe obtains water from an artesian aquifer (an aquifer that comes to the surface) underlying its lands and the Tokeland Peninsula that extends into Willapa Bay off Washington State. The Tribe is concerned about the effects of increasing population and commercial activities on the quantity and quality of water in the aquifer. Specific water-quality concerns include seawater intrusion, contamination from septic tanks, and contamination from pesticides applied in nearby forests. The USGS conducted a study describing the general hydrology and water chemistry of the aquifer, including concentrations of nitrate and selected pesticides. An interpretive report describing the findings was prepared. Contact: Gary Turney, 253-428-3600, ext. 2624, [glturney@usgs.gov](mailto:glturney@usgs.gov)



**Sediment Oxygen Demand in Upper Klamath and Agency Lakes, Oregon.** This study seeks to determine the magnitude and variability of sediment oxygen demand (SOD) in Upper Klamath and Agency Lakes. One aspect of the study will evaluate the change in SOD from before the development of summertime algal blooms to late summer, after or during the decline of the blooms. The study will also attempt to correlate SOD and other quantifiable sediment characteristics, in particular coarse/fine distribution, organic carbon content, and the residue lost on ignition. SOD is a critical component of the dissolved oxygen budget in the lakes, where low dissolved oxygen concentrations are detrimental to endangered sucker fish species of interest to The Klamath Tribes. Contact: Tamara Wood, 503-251-3255, tmwood@usgs.gov

**Restoring Salmon in the Trinity River Basin.** USGS staff are involved in efforts to restore salmonid fisheries in the Trinity River Basin, California. This project, involving Tribal interests of the Hoopa Valley, Yurok, and Karuk Tribe of northern California, is a major inter-agency, inter-jurisdictional effort to restore a fishery decimated by water exportation and other land-use practices. USGS hydrologists are leading the effort to complete the Trinity River Flow Evaluation, produce the summary report, and make recommendations to the Secretary of the Interior on actions needed to restore the fishery. Contact: Jon Nowlin, 775- 887-7600, jonowlin@usgs.gov

**Water Quality Sampling of the Taku River.** The Douglas Indian Association (DIA) initiated a grant from the Alaska Department of Environmental Conservation (ADEC) to fund a 5-year cooperative water-quality project. The purpose of the project is to collect baseline water-quality data for the Taku River, an important salmon fishery. The Taku River is subject to glacial "outbursts" that affect the River's water quality, though the watershed

is undeveloped. The USGS is conducting the water-quality sampling and the USEPA is analyzing the samples. The DIA has provided an intern to assist USGS researchers with the sampling for at least part of the project. Contact: Bruce Bigelow, 907-586-7287, bbigelow@usgs.gov

**Alaska Volcanoes and Alaska Natives.** Open communications between Alaska Natives and the USGS' Alaska Volcano Observatory (AVO) is crucial to help safeguard Alaskan communities. Numerous Alaska Native villages and corporations communicate with the AVO during periods of volcanic activity. Native officials transmit on-site observations to AVO, and AVO scientists distribute interpretive and hazards information to the Native communities. Many of these communities are on the AVO automatic weekly update fax and/or electronic mail lists that provide the status of activity of more than 40 active volcanoes in the Aleutian islands. All Native villages in the Aleutians, including Nelson Lagoon, Naknek, Unalaska, Akutan, False Pass, Atka, King Cove, are near active volcanoes. AVO also conducts geological field studies and services existing seismic-monitoring equipment to provide real-time warnings of volcanic activity and related hazards to aircraft and local communities. The USGS communications and research involved obtaining letters of non-objection for proposed volcano hazards work and accessing lands owned or selected by several Alaska Native corporations, including The Aleut Corporation, Akutan Corporation, Ounalashka Corporation, Ahtna Corporation, and Cook Inlet Region Incorporated. Contact: Thomas Murray, 907-786-7042, tlmurray@usgs.gov







## Technical Assistance

**Maine Tribal Workshop.** The Maine Tribal Workshop on Streamgaging and Measuring was hosted by the USGS Maine District on August 30-31, 2000 in Machias, Maine. Four Maine tribes were represented. Attendees included field technicians and one natural resources program director, with various levels of experience with streamflow measuring and streamgaging. Being the first workshop of its kind to be conducted by USGS personnel, valuable input was provided by all attendees regarding the merits of the workshop and how to improve the course including topics for future workshops. Participants reported greatest satisfaction with the field trip part of the workshop in which everyone had the opportunity to make a wading discharge measurement. The classroom sessions of the workshop consisted of hands-on familiarization with all of the wading measurement gear and presentations of information from USGS CD ROMS (Data Collection at USGS Streamgaging Stations, by Nolan and others, and Measurement of Stream Discharge by Wading, by Nolan and Shields). Copies of the presentations were provided to each Tribe. Attendees offered suggestions for future short-course topics, including use and access of USGS data on the Internet, more hands-on learning with both field and laboratory equipment, and water-quality sampling methods. Contact: Robert Lent, 207-622-8201, rmlent@usgs.gov

**Spirit Lake Tribe Capacity Building.** USGS personnel accompanied Spirit Lake Tribal staff in the field and provided quality-assurance regarding the collection, processing, and shipping of water-quality samples. USGS personnel have also helped the Tribal staff assemble and install wetland monitoring packages, and provided training on how to read and record water-level information, how to calibrate the equipment, and how to get data from field to office. USGS cooperation and technical assistance continue to be available to the Spirit Lake Tribe. Contact: Wayne R. Berkas, 701-250-7429, wrberkas@usgs.gov

**Mapping and Geographic Information System (GIS) Activities.** USGS biologists are providing GIS and remote sensing support to the Three Affiliated Tribes (Fort Berthold Reservation) and the Standing Rock Sioux Tribe related to the USGS' North Dakota Gap Analysis project. Data are being shared and USGS scientists are enhancing data for Tribal use. The work with the Three Affiliated Tribes involves constructing GIS databases for range inventories conducted by the Tribes in the summers of 1999 and 2000. The Tribes have provided access to range inventory worksheets in exchange for converting the information from paper records to electronic records in a GIS. These data will be useful to the vegetation and land cover mapping objective of the North Dakota Gap Analysis. The Tribes have also provided copies of

GIS data for their lands, including soils, land ownership, and range management units. The USGS has attached digital attributes to the soil maps.

The USGS is working with the Standing Rock Sioux Tribe and the U.S. Fish and Wildlife Service to complete digitizing National Wetlands Inventory data for the Standing Rock Reservation. The Tribe has also provided copies of GIS data for their lands, including soils, land ownership, and range management units. As with the Three Affiliated Tribes, government scientists have attached digital attributes to the soil maps. Contact: Northern Prairie Wildlife Research Center, 701-253-5524, larry\_strong@usgs.gov

**Training in Fire Management.** The USGS Cooperative Fish and Wildlife Unit at South Dakota State University participated in a workshop on habitat management organized by the Bureau of Indian Affairs for Tribes in the region. The workshop was held at Wall, South Dakota, in June 2000, and was attended by 60 Tribal land managers. Biologists from the Unit staff led sessions on the use of prescribed fire for natural resource management. Contact: South Dakota Cooperative Fish and Wildlife Research Unit, 605-688-6121, berryca@usgs.gov

**Surface-Water Quality on Lands of the Prairie Band of Potawatomi.** USGS scientists are training personnel from the Prairie Band of Potawatomi in water-quality sampling and quality assurance/quality control procedures. The USGS also provides periodic water-quality assessments at selected sites on the lands of the Prairie Band of Potawatomi to identify and monitor potential sources of contamination that could cause human-health concerns. As part of the training program, several Tribal staff members attended the water-quality sampling course at the USGS' National Training Center in Denver. Tribal staff accompany USGS personnel during water-quality sampling trips on the Reservation and help collect and process samples for analysis. As the Tribal staff become more experienced with sample collection and processing, and as they procure more equipment, their role in sample collection and processing will expand. Contact: Tom Trombley, 785-832-3551, trombley@usgs.gov

**Geographic Information Systems Support for the Prairie Band of Potawatomi.** The purpose of this project is to provide GIS support to the Prairie Band of Potawatomi. Students at Haskell Indian Nations University, using the facilities of the Haskell GIS lab, are creating and documenting geographic data layers for the Tribe under the supervision of a USGS hydrologist. Data are provided to the Tribe on compact disk or by other media.



Training in GIS concepts and the use of GIS software is provided to the Tribe, enabling them to analyze relevant data. Contact: Tom Trombley, 785-832-3551, [trombley@usgs.gov](mailto:trombley@usgs.gov)

**Mapping Exotic Plants in the Southwest.** In conjunction with land managers, biologists in the USGS are developing a database on exotic plants in the Southwest. The database will become an important tool for inventorying, monitoring, and sharing data on exotic plant species that are invading the area. USGS scientists are gathering data on the plants and compiling it according to Federal standards. The database can also be used to generate maps of locations of the plants. The goals of this effort include developing and maintaining the Southwest Exotics Plant Database, maintaining a distribution system that integrates educational, management, and scientific information to aid in control of the exotic plant species, and facilitating a collaborative partnership among Tribal, Federal, State, and private land managers. Contact: Kathryn Thomas, Forest and Rangeland Ecosystem Science Center, Colorado Plateau Field Station, 520-556-7466, ext. 235, [kathryn\\_a\\_thomas@usgs.gov](mailto:kathryn_a_thomas@usgs.gov)

**Bird Surveys on Tribal Lands in Northeast Arizona.** USGS biologists are providing the Kaibab Band of Paiute Indians with information on breeding bird populations on Tribal lands. Scientists will identify nest sites of specific species to enable the Tribe to improve management of protected-use areas. These surveys are an extension of work being done on National Park Service lands adjacent to Tribal lands in northeastern Arizona. Contact: Matthew Johnson, Forest and Rangeland Ecosystem Science Center, Flagstaff, AZ, 520-556-7466, ext. 236, [Matthew.Johnson@nau.edu](mailto:Matthew.Johnson@nau.edu)

**Stream-gaging Cooperation.** USGS employees helped White Mountain Apache Tribal staff to install and maintain stream-gaging equipment on White Mountain lands. Contact: Christopher Smith-Arizona 520-670-6671 x251, [cfsmith@usgs.gov](mailto:cfsmith@usgs.gov)

**Long-term Monitoring of Flycatchers.** The San Carlos Apache Tribe contacted USGS biologists about ways to monitor the population of southwestern willow flycatchers on Tribal lands as a long-term project. Biologists assisted the Tribe's Wildlife Management Department in locating, capturing, and banding flycatchers at potential breeding sites. During three trips to the Reservation in the summer of 2000, USGS researchers instructed Tribal biologists in bird capturing and banding techniques. Contact: Mark Sogge, Forest and Rangeland Ecosystem Science Center, Colorado Plateau Field Station, 520-556-7466, ext. 232, [mark\\_k\\_sogge@usgs.gov](mailto:mark_k_sogge@usgs.gov)

**Media Field Demonstration of Sediment Sampling on the Dungeness River, Northwestern Washington, Jamestown S'Klallam Tribe.** Bacterial contamination of shellfish in Dungeness Bay, north-

western Washington, resulted in closure of commercial shellfish harvesting in April 2000. The shellfish harvest is an important Tribal economic resource. In cooperation with the Jamestown S'Klallam Tribe's Water Resources Department, the USGS sampled water from the Dungeness River at three sites for analysis of suspended sediment. The collected data will help Tribal scientists with their contamination study. In May 2000, the Tribe and USGS invited news reporters to the Dungeness River for a demonstration of USGS sampling techniques to publicize the work being done on the bacteria problem. A Tribal natural resource planner for the Jamestown S'Klallam Tribe was present to answer reporters' questions, while a USGS hydrologist and a USGS hydrologic technician demonstrated sampling methods. Contact: John M. Clemens, 253-428-3600, ext. 2635, [jclemens@usgs.gov](mailto:jclemens@usgs.gov)

**Surface-Water Quality Training for the Karuk Tribe of California.** USGS scientists are training Karuk Tribal personnel in water-quality sampling, measurement, and quality assurance/quality control procedures. The training builds Tribal capability to manage water resources. Contact: Jim Bowers, 760-247-1401, [jcbowers@usgs.gov](mailto:jcbowers@usgs.gov)

**Streamgaging by the Hoopa Valley Tribe.** Hoopa Valley Tribal employees are operating four gaging stations in the Trinity River watershed under general direction and quality assurance review by USGS scientists. Tribal employees have attended USGS classes on sediment measurement in addition to on-the-job training during USGS field work. As part of the Trinity River Restoration Program, the Hoopa Valley Tribe is planning to expand its role in stream discharge measurements and sediment sampling. Contact: Jim Bowers, 760-247-1401, [jcbowers@usgs.gov](mailto:jcbowers@usgs.gov)

**GIS Assistance-Historical Ground-Water Information.** The USGS provided a bibliography and copies of individual ground-water reports to the Agua Caliente Band of Cahuilla Indians. The Tribal Government is developing a Geographic Information System (GIS) to evaluate its ground-water resources in the Palm Springs, California area. This includes extracting historical data from the USGS and other sources. In cooperation with the Water Resources Center Archives at the University of California, Berkeley, all identified references were made available to the Agua Caliente Band. Contact: Walter Swain, 916-278-3024, [wcswain@usgs.gov](mailto:wcswain@usgs.gov)

**Surface-Water Monitoring Stations.** The USGS operates the following surface-water monitoring stations, usually with cooperative funding from the Tribe, the Bureau of Indian Affairs (BIA), or a third party.





**Dan Guevara, Navajo Nation Hydrologist (using the instrument) and Greg Fisk, USGS, running an indirect high-flow measurement on Jeddito Wash, Arizona.**



## Surface-Water Monitoring Stations.

The USGS operates the following surface-water monitoring stations, usually with cooperative funding from the Tribe, the Bureau of Indian Affairs (BIA), or a third party.

Number of Stations	Cooperator	Contact	
2	Seminole Tribe of Florida & South Florida Water Management District (includes 2 continuous recorders with Tribal nutrient autosamplers)	Mitch Murray-Florida, 305-717-5827, mmurray@usgs.gov	
1	Bad River Band of Lake Superior Chippewa Indians	Barry Holmstrom-Wisconsin, 608-821-3831, bholmst@usgs.gov	
1	Menominee Indian Tribe of Wisconsin		
1	Oneida Tribe of Wisconsin		
1	Mohican Nation, Stockbridge-Munsee Band		
1	Lac du Flambeau Band of Lake Superior Chippewa Indians		
2	Three Affiliated Tribes	Wayne R. Berkas- North Dakota, 701-250-7429, wrberkas@usgs.gov	
4	Bureau of Indian Affairs	Ralph Teller-South Dakota, 605-355-4560 ext. 222, rwteller@usgs.gov	
3	Oglala Sioux Tribe		
1	Standing Rock Sioux Tribe		
1	Sisseton-Wahpeton Sioux Tribe		
2	Fort Peck Assiniboine and Sioux Tribes	Ronald R. Shields-Montana, 406-457-5900, rshields@usgs.gov	
9	Confederated Salish and Kootenai Tribes		
7	Blackfeet Nation		
4	Northern Cheyenne Tribe		
11	Bureau of Indian Affairs		
19	BIA with the Joint Business Council of the Northern Arapaho and Eastern Shoshone Tribes (Wind River Reservation)	Bob Swanson-Wyoming, 307-778-2931, rswanson@usgs.gov	
2	Southern Ute Indian Tribe	Bob Boulger-Colorado, 970-245-5257 ext. 21, rboulger@usgs.gov	
5	Bureau of Indian Affairs	Michael Roark-New Mexico, 505-830-7954, mroark@usgs.gov	
2	Pueblo of Zuni		
1	Nez Perce Tribe	Thomas S. Brennan-Idaho, 208-387-1366, tbrennan@usgs.gov	
4	Bureau of Indian Affairs		
1	Bureau of Indian Affairs & Peabody Coal Co. (Navajo Reservation)	Christopher Smith-Arizona 520-670-6671 ext. 251, cfsmith@usgs.gov	
3	Bureau of Indian Affairs & Peabody Coal Co. (Hopi Reservation)		
1	Arizona Department of Water Resources (Navajo Reservation)		
2	Hopi Tribe		
2	Havasupai Tribe		
3	Hualapai Tribe		
6	Yavapai-Prescott Indian Tribe (2 continuous records and 4 crest-stage gages)		
1	Tohono O'odham Nation		
2	Pueblo of Zuni		
5	Pyramid Lake Paiute Tribe		Kerry Garcia-Nevada, 775-887-7659, ktgarcia@usgs.gov
24	Walker River Paiute Tribe		
1	Paiute Tribe		
2	Shoshone-Paiute Tribes		
1	Summit Lake Paiute Tribe		
4	Confederated Tribes and Bands of the Yakama Nation	Robert Kimbrough-Washington, 253-428-3600 x 2608, rakimbro@usgs.gov	
2	Nisqually Indian Tribe		
1	Quinalt Indian Nation		
1	Makah Nation		
1	Quileute Tribe		
1	Coeur D'Alene Tribe		

Surface-Water Monitoring Stations—Continued

Number of Stations	Cooperator	Contact
1	Lower Elwha Tribal Community of the Lower Elwha Reservation	
1	Skokomish Tribe of Indians	
7	The Tulalip Tribes	
7	Bureau of Indian Affairs	
7	Confederated Tribes of the Umatilla Indian Reservation	
11	Confederated Tribes of the Warm Springs Reservation	Thomas A. Herrett-Oregon, 503-251-3239, herrett@usgs.gov
1	Nez Perce Tribe	
7	Hoopa Valley Tribe	Robert Mason-California, 916-278-3178, rrmason@usgs.gov
3	Karuk Tribe of California	
1	Tule River Tribe	
1	Haida Corporation	Bruce Bigelow-Alaska 907-586-7287, bbigelow@usgs.gov
1	Alaska Native Tribal Health	
1	City of Klawock	



Supai Village from the air, located in Havasu Canyon, Havasupai Reservation.



## Water-Quality Monitoring Stations

The USGS collects water quality at the following sites:

Number of Stations	Cooperator	Contact
2	Three Affiliated Tribes	Wayne R. Berkas-North Dakota, 701-250-7429, wrberkas@usgs.gov
4	Three Affiliated Tribes (lake sites)	
3	Spirit Lake Tribe (ground-water wells)	
10	Spirit Lake Tribe (wetlands)	
4	Yavapai-Prescott Indian Tribe	Christopher Smith-Arizona 520-670-6671x251, cfsmith@usgs.gov

## Ground-Water Monitoring Stations

The USGS operates the following ground-water monitoring stations:

Number of Stations	Cooperator	Contact
1	USGS (on Fort Belknap Reservation-Assiniboine and Gros Ventre Tribes)* *The station was destroyed near the end of FY 2000 by vandals and won't be replaced	Clarence L. Chambers-Montana, 406-457-5900, chambers@usgs.gov
1	Collection of Basic Records (CBR) program (observation well located on Kaibab Band of Paiute Indians' Reservation)	Contact: Christopher Smith-Arizona 520-670-6671, ext. 251, cfsmith@usgs.gov
4	Yavapai-Prescott Indian Tribe	
6	Bureau of Indian Affairs (Navajo Nation and Hopi Tribe)	
15	Pechanga Band and Morongo Band of Mission Indians (wells for monthly depth to water)	Robert Mason-California, 916-278-3178, rrmason@usgs.gov
3	Pechanga Band and Morongo Band of Mission Indians (continuous record wells)	
6	Pechanga Band and Morongo Band of Mission Indians (wells for annual water quality)	

## Sediment Monitoring Stations

The USGS operates the following sediment monitoring stations:

Number of Stations	Cooperator	Contact
3	Hopi Tribe	Christopher Smith-Arizona 520-670-6671, ext. 251, cfsmith@usgs.gov
1	Pueblo of Zuni	



...the keynote address to the conference of the International Council in Albuquerque, New Mexico, in 1977. The Council gave an overview of USGS data base activities. Other contacts: Dennis Galtsoff, 703-278-9374, dennis.galtsoff@usgs.gov

**Basic Research Initiatives in Aquatic Ecology** - The Federal Council on Data Cooperative (FCDC) provided support for Monitoring of Unimpaired Aquatic Ecosystems for Basic Research and Initiatives in Aquatic Ecology. It was a State, Federal, and local government initiative to address the need for scientific information to understand the quality of lotic environmental health and maintain a representative rural communities. FCDC is implementing this initiative. Technical assistance is provided to State, Federal, and local government.

# General Coordination and Policy Activities

**Professional Symposiums** - The USGS has sponsored several symposiums. The most recent was the 1994 Symposium on the Status of the Great Lakes Fishery. The symposium was held in the USGS Great Lakes Science Center, 141 21215th St., Ann Arbor, MI 48106.

**Regional Information for Aquatic Resources of the Great Lakes Basin** - The USGS Great Lakes Fishery Program, which was established in 1977, provides information on the status of the Great Lakes Basin. The USGS Great Lakes Science Center and American Indian groups, such as the Chippewa, Ojibwa, Seneca, and Oneida, are the primary sources of information. The program provides information on the status of the Great Lakes Basin and the impact of human activities on the Great Lakes Basin. The USGS Great Lakes Science Center, 141 21215th St., Ann Arbor, MI 48106.

**Participation in Great Lakes Fishery Council** - USGS Great Lakes Science Center has been participating in the Great Lakes Fishery Council since 1977. The Council is a voluntary organization of State, Federal, and local government agencies. The Council's mission is to coordinate and improve the management of the Great Lakes Basin. The USGS Great Lakes Science Center, 141 21215th St., Ann Arbor, MI 48106.

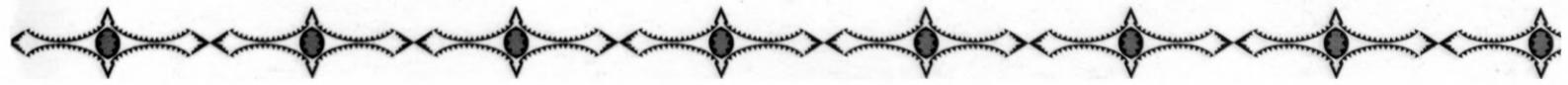
...the keynote address to the conference of the International Council in Albuquerque, New Mexico, in 1977. The Council gave an overview of USGS data base activities. Other contacts: Dennis Galtsoff, 703-278-9374, dennis.galtsoff@usgs.gov

**Workshop on Aquatic Ecology** - The USGS has sponsored several workshops. The most recent was the 1994 Workshop on Aquatic Ecology. The workshop was held in the USGS Great Lakes Science Center, 141 21215th St., Ann Arbor, MI 48106.

**USGS staff members** - The USGS staff members are responsible for the management of the Great Lakes Basin. The USGS Great Lakes Science Center and American Indian groups, such as the Chippewa, Ojibwa, Seneca, and Oneida, are the primary sources of information. The program provides information on the status of the Great Lakes Basin and the impact of human activities on the Great Lakes Basin. The USGS Great Lakes Science Center, 141 21215th St., Ann Arbor, MI 48106.

**Great Lakes Departmental Council** - The USGS has sponsored several meetings of the Great Lakes Departmental Council. The Council is a voluntary organization of State, Federal, and local government agencies. The Council's mission is to coordinate and improve the management of the Great Lakes Basin. The USGS Great Lakes Science Center, 141 21215th St., Ann Arbor, MI 48106.

**State Studies and the International Environmental Council** - The USGS has sponsored several studies of the Great Lakes Basin. The USGS Great Lakes Science Center and American Indian groups, such as the Chippewa, Ojibwa, Seneca, and Oneida, are the primary sources of information. The program provides information on the status of the Great Lakes Basin and the impact of human activities on the Great Lakes Basin. The USGS Great Lakes Science Center, 141 21215th St., Ann Arbor, MI 48106.



1. Department of Health Services  
2. Dept. of Health Services  
3. Dept. of Health Services

Department of Health Services  
1000 Broadway, Suite 4000, Seattle, WA 98101

### General Meeting Minutes

The following minutes were presented:

Date: \_\_\_\_\_  
Time: \_\_\_\_\_

# General Coordination and Policy Activities

1. The meeting was held on \_\_\_\_\_ at \_\_\_\_\_.

2. The meeting was held on \_\_\_\_\_ at \_\_\_\_\_.

### Business Meeting Minutes

The following minutes were presented:

Date: \_\_\_\_\_  
Time: \_\_\_\_\_

Department of Health Services  
1000 Broadway, Suite 4000, Seattle, WA 98101



## General Coordination and Policy Activities

**Intertribal GIS Council Presentation.** The USGS Director presented the keynote address to the conference of the Intertribal GIS Council, in Albuquerque, New Mexico in July 2000. The Director gave an overview of USGS data sets available to Tribes. Contact: Bonnie Gallahan, 703-648-6084, [bgallahan@usgs.gov](mailto:bgallahan@usgs.gov)

**Rural Geospatial Innovations in America (RGIS).** The Federal Geographic Data Committee (FGDC) recently approved a Memorandum of Understanding (MOU) with the Rural Geospatial Innovations in America (RGIS) to assist State, Tribal, regional, and local governments in implementing advanced geospatial information technologies to improve the quality of life, environmental health, and economic competitiveness of rural communities. Efforts in implementing the MOU include technical assistance in system development and management to Tribal colleges and universities, implement training programs, including K-12 education, short courses and university curricula, and advanced spatial analysis for decision-making processes. Contact: Bonnie Gallahan, 703-648-6084, [bgallahan@usgs.gov](mailto:bgallahan@usgs.gov)

**Distribution of Herpetological Information.** The USGS Northern Prairie Wildlife Research Center supported the Tribal Environmental Education Conference by securing publications from the North American Reporting Center for Amphibian Malformations. Center scientists updated the text for the meeting and provided 50 copies of an information sheet that was distributed at this conference. Contact: Northern Prairie Wildlife Research Center, 701-253-5538, [Betty\\_Euliss@usgs.gov](mailto:Betty_Euliss@usgs.gov)

**Biological Information for Committees of the Great Lakes Fishery Commission.** The Great Lakes Fishery Commission has established committees to coordinate fishery resource management in individual lakes. The USGS Great Lakes Science Center and American Indian groups, such as the Chippewa-Ottawa Resource Authority and the Great Lakes Indian Fish and Wildlife Commission, are represented on several of these committees. To assist fishery management agencies in assessing the success of fish restoration efforts, USGS and Tribal scientists report annually on the status of lake trout rehabilitation and important prey fishes in lakes Superior, Michigan, and Huron. Contact: Great Lakes Science Center, 734-994-3331, [nancy\\_m\\_milton@usgs.gov](mailto:nancy_m_milton@usgs.gov)

**Participation in Great Lakes Tribal Fishing Settlement.** USGS Great Lakes Science Center biologists participated in implementing the Consent Decree, mandated under the authority of U.S. District Court, concerning Indian fishing rights under the Treaty of 1836

(U.S. v Michigan, 1985). The 15-year agreement under the 1985 consent order expired in 2000 and a new 20-year agreement was negotiated and signed on August 8, 2000. USGS provided data and data interpretation from Center research surveys on lakes Superior, Michigan, and Huron. Specifically, USGS scientists served on the modeling subcommittee of the Technical Fisheries Review Committee in the re-negotiation process. Members included the USGS Great Lakes Science Center, U.S. Fish and Wildlife Service, Michigan Department of Natural Resources, the Chippewa-Ottawa Resource Authority, Little Traverse Bay Bands of Odawa Indians, Little River Band of Ottawa Indians, Grand Traverse Band of Chippewa and Ottawa Indians, and Michigan State University. Contact: Great Lakes Science Center, 734-994-3331, [nancy\\_m\\_milton@usgs.gov](mailto:nancy_m_milton@usgs.gov)

**Michigan Tribal Coordination.** USGS staff members attend quarterly meetings of the Michigan Tribal Environmental Group (MTEG). Individual Tribes, the Inter-Tribal Council of Michigan, U.S. Environmental Protection Agency's Region 5, USGS, US Department of Agriculture, State of Michigan, and other groups and agencies are represented in MTEG. MTEG meetings serve as a forum for discussing environmental issues pertinent to Michigan Tribes.

USGS staff members also attend quarterly meetings related to the Multi-Federal Agency Memorandum of Understanding (MOU), sponsored by the Midwest Region Office of the Bureau of Indian Affairs. Federal agencies participating in the MOU workgroup include BIA, USGS, Indian Health Service, Army Corps of Engineers, and EPA. The workgroup meets to cooperatively plan and coordinate agency Tribal activities in EPA's Region 5. Contact: Tom Weaver, 906-786-0714, [tlweaver@usgs.gov](mailto:tlweaver@usgs.gov)

**Inter-Tribal Environmental Conference.** USGS scientists presented results of their work in Osage County, Oklahoma, at the Inter-Tribal Environmental Council Conference in Oklahoma City. All of the Tribes in Oklahoma were represented at the conference, along with several bureaus of the Department of the Interior, and several sections of the U.S. Environmental Protection Agency. Contact: Marvin M. Abbott, 405-810-4411, [mmabbott@usgs.gov](mailto:mmabbott@usgs.gov)

**Data Sharing with the Intertribal Environmental Council.** A USGS hydrologist gave a presentation about aquifer/ground-water vulnerability maps and digital data sets describing the Rush Springs aquifer that are available from the USGS to the Intertribal Environmental Council in October 1999. The Intertribal Environmental Council is made up of representatives from seven



Oklahoma Tribes: Apache, Caddo, Comanche, Delaware, Fort Sill Apache, Kiowa, and Wichita. Contact: Carol Becker, 405-810-4436, [cjbecker@usgs.gov](mailto:cjbecker@usgs.gov)

**Oklahoma Tribal Pesticide Management Workshop.** USGS Water Resources personnel gave a presentation on "What makes an aquifer vulnerable" at the Pesticide Management Workshop hosted by the Delaware Tribe of Western Oklahoma. Digital data sets describing the major aquifers in Oklahoma were also discussed. The workshop was held in Anadarko, Oklahoma, during October 1999. Contact: William J. Andrews, 405-810-4416, [wandrews@usgs.gov](mailto:wandrews@usgs.gov)

**Governor's Tar Creek Task Force.** Heavy metals from the Picher Mining District contaminated the Tar Creek area. The contamination affects eight Tribes in northeastern Oklahoma. USGS staff supplied previously published reports, data, and technical advice to the Task Force. USGS personnel attended the annual Tar Creek Symposium, hosted by the Cherokee Volunteer Society in Miami, Oklahoma. Numerous technical talks, including some by USGS scientists, were presented on Tar Creek history, environmental, and medical research.

The Water-Quality Subcommittee of the Governor's Tar Creek Task Force also held a meeting including representatives of the Oklahoma Water Resources Board, Oklahoma Department of Environmental Quality, the Quapaw Tribe of Oklahoma and Miami Tribe of Oklahoma, Inter-Tribal Environmental Council, and several private firms. Copies of USGS and Oklahoma Geological Survey reports were delivered. All water-quality data for Ottawa County, Oklahoma were downloaded from the USGS' National Water Information System database and were made available at the meeting. USGS personnel also attended workgroup meetings throughout the year. Contact: William J. Andrews, 405-810-4416, [wandrews@usgs.gov](mailto:wandrews@usgs.gov)

**Sac and Fox Nation Contamination Issues.** Officials with the Sac and Fox Nation's Environmental Office met with USGS representatives to discuss deterioration of Euechee Creek in Payne County. The Euechee Creek watershed includes a large petroleum transfer station, the City of Cushing wastewater treatment plant, and pasture. Sac and Fox Tribal members use the creek. Contact: Kathy Peter, 405-810-4400, [kdpeter@usgs.gov](mailto:kdpeter@usgs.gov)

**Southwest Indian Polytechnic Institute (SIPI).** Southwestern Indian Polytechnic Institute (SIPI) and the USGS, through its support of the Federal Geographic Data Committee (FGDC), are conducting quarterly satellite broadcasts for all participating Tribal Colleges and Universities from SIPI. The broadcasts, titled "GIS in Indian Country" have been very successful in providing a good connection to the Native community, a means of including field work in the curriculum, and an excellent school-to-

career opportunity. The facilities at SIPI's Distance Learning Center continue to improve, allowing the camera to focus on maps, documents, computer displays, and the presenter. These broadcasts are dedicated to promoting Tribal self-sufficiency by improving management of geographic information and building intertribal communication networks. Contact: Bonnie Gallahan, 703-648-6084, [bgallahan@usgs.gov](mailto:bgallahan@usgs.gov)

**Federal-Tribal Southwest Water Resources Conference.** The USGS, Arizona District, participated in the Federal-Tribal Southwest Water Resources Conference during April 2000, which was sponsored by the Bureau of Reclamation's Native American Affairs Office. The theme of the conference was "Rules of the Road: Routes to Greater Tribal Participation in Water Resource Programs". The USGS provided an overview of cooperative Tribal water-resource programs in the District. The conference was held at Arizona State University's East Campus, in Mesa, Arizona. Contact: Robert J. Hart, 520-556-7137, [rbhart@usgs.gov](mailto:rbhart@usgs.gov)

**Alaska Native Cultural Awareness Class.** The USGS participated in the Federal Executive Association Training Subcommittee. During FY2000, the Subcommittee arranged a 16-hour well-received class titled "Alaska Native Cultural Awareness" for Federal employees in Alaska. The class covered history, laws, heritage, and values of Alaska Natives. Contact: Gordon Nelson, 907-786-7100, [glnelson@usgs.gov](mailto:glnelson@usgs.gov)



**Intertribal Environmental Council field trip, Oklahoma. The bull wheel in the foreground was used to operate multiple pumps from a central engine.**

Photographer: Kathy D. Peter, USGS

For more information on the variety of programs offered at Tribal Colleges and Universities, contact the National Indian Education Association at 1000 17th Street, NW, Washington, DC 20036. Contact: 202-462-6244, <http://niea.org>

**Learning to Lead Agencies Grant.** The EPA is awarding grants to support the training of geographic information system (GIS) specialists for tribal environmental protection agencies. Contact: 2046 R Street, SW, Washington, DC 20004. Contact: 202-566-0200

## Future Opportunities

**U.S. Environmental Protection Agency (EPA) Tribal College and University Program.** The EPA is awarding grants to support the training of geographic information system (GIS) specialists for tribal environmental protection agencies. Contact: 2046 R Street, SW, Washington, DC 20004. Contact: 202-566-0200

**Confederated Tribes of the Colville Reservation, Washington.** The Confederated Tribes of the Colville Reservation is seeking a GIS Specialist. The position involves the development and maintenance of GIS data and maps for the reservation. Contact: 2000 1st Street, Wainwright, WA 99572. Contact: 509-835-2200

**Western States GIS Forum (WSGF).** The Western States GIS Forum is a biennial conference and workshop for GIS professionals in the western United States. The forum provides an opportunity for GIS users to share their experiences and learn from each other. Contact: 2000 1st Street, Wainwright, WA 99572. Contact: 509-835-2200

**U.S. Forest Service (USFS) Tribal College and University Program.** The USFS is awarding grants to support the training of GIS specialists for tribal environmental protection agencies. Contact: 2000 1st Street, Wainwright, WA 99572. Contact: 509-835-2200

**Washington State's Tribal College and University Program.** The Washington State Department of Ecology is awarding grants to support the training of GIS specialists for tribal environmental protection agencies. Contact: 2000 1st Street, Wainwright, WA 99572. Contact: 509-835-2200

**U.S. Environmental Protection Agency (EPA) Tribal College and University Program.** The EPA is awarding grants to support the training of GIS specialists for tribal environmental protection agencies. Contact: 2046 R Street, SW, Washington, DC 20004. Contact: 202-566-0200

**U.S. Environmental Protection Agency (EPA) Tribal College and University Program.** The EPA is awarding grants to support the training of GIS specialists for tribal environmental protection agencies. Contact: 2046 R Street, SW, Washington, DC 20004. Contact: 202-566-0200

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## Future Opportunities

**Intertribal GIS Council (IGC).** The Intertribal GIS Council and the USGS, through its support of the Federal Geographic Data Committee (FGDC), will again be a co-sponsor and plan in the development of the 2001 IGC Annual Conference. The FGDC has co-sponsored this event for the last several years and plans to continue these efforts in the future. Upcoming activities with the IGC include: an updated directory of GIS courses and programs offered at Tribal Colleges and Universities; creating scholarship and student intern programs; and an updating of Tribal boundaries in coordination with the Environmental Protection Agency and the FGDC. Contact: Bonnie Gallahan, 703-648-6084, bgallahan@usgs.gov

**Updating Tribal Boundary Maps.** The EPA, the USGS (through its support of the Federal Geographic Data Committee) and the Intertribal GIS Council will explore opportunities to update tribal boundary maps through an existing MOU. Contact: Bonnie Gallahan, 703-648-6084, bgallahan@usgs.gov

**Coordination on Crime Mapping.** The Bureau of Indian Affairs (BIA), the National Native American Law Enforcement Association (NAALEA), and USGS, through its support of the Federal Geographic Data Committee (FGDC), are coordinating for the upcoming NAALEA Annual Conference and will include presentations on FGDC, crime mapping, and updates on the National Institute of Justice. Opportunities will be explored to institutionalize GIS and crime mapping into the BIA's Police Academy. Contact: Bonnie Gallahan, 703-648-6084, bgallahan@usgs.gov

**Coordination on GIS Training.** The National Oceanic and Atmospheric Administration, and the U.S. Fish and Wildlife Service, National Conservation Training Center, in cooperation with the Federal Geographic Data Committee will implement partnership concepts by developing workshops and professional training sessions to encourage Tribal geographic data coordination. Courses are being developed at both locations in metadata and GIS for tribal entities. Contact: Bonnie Gallahan, 703-648-6084, bgallahan@usgs.gov

**National States GIS Council (NSGIC).** In cooperation with the Federal Geographic Data Committee, the NSGIC will plan and develop regional workshops to help train Tribes and States on GIS and metadata. The training will include presenters or materials from NASA, the Inter-Tribal GIS Council, and other Tribal entities. Contact: Bonnie Gallahan, 703-648-6084, bgallahan@usgs.gov

**Hydrologic Issues--Michigan Tribes.** USGS staff met with Keweenaw Bay Indian Community environmental staff to discuss developing flow models for several basins within Tribal lands. USGS staff also met with representatives of the Lac Vieux Desert Band of Lake Superior Chippewa in 2000 to discuss water quality sampling and water budget analysis of the Lac Vieux Desert Basin. USGS and each Tribe hope to forge bi-lateral agreements in FY2001. Contact: Tom Weaver, 906-786-0714, tlweaver@usgs.gov

**Monitoring Wisconsin Lakes.** The St. Croix Chippewa Tribe and the USGS are discussing the possibility of adding two lakes of interest to the Tribe to the USGS' Lakes Monitoring Program. Information gathered through this program would help the Tribe make sound land and water management decisions. Contact: Dale Robertson, 608-821-3867, dzrobert@usgs.gov

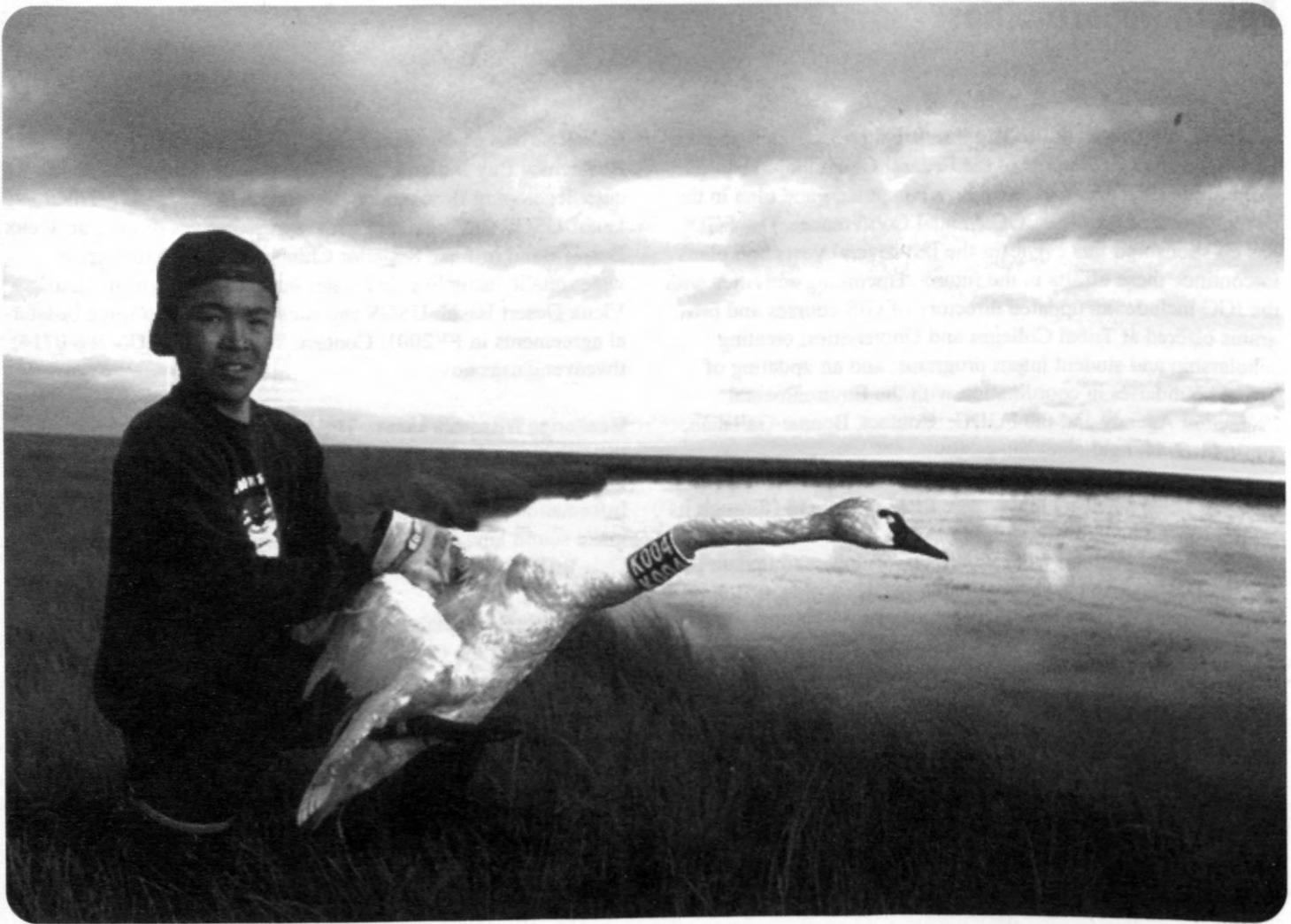
**Brine Research in Oklahoma.** USGS representatives met with representatives of the Osage Nation and the Bureau of Indian Affairs to present results of a USGS ground-water project on the Osage Nation and to discuss a proposed petroleum production research site. A suitable site has been found that would afford an excellent opportunity to study geochemical, hydrological, and biological processes of an old brine disposal site. Contact: William J. Andrews, 405-810-4416, wandrews@usgs.gov

**Coordination with the Iowa Tribe of Oklahoma.** USGS personnel met with Tribal staff of the Iowa Tribe of Oklahoma's Office of Environmental Services at Tribal Headquarters in Perkins, Oklahoma, to discuss upcoming projects involving water-quality sampling with the Tribe. Contact: William J. Andrews, 405-810-4416, wandrews@usgs.gov

**Geographic Information Systems Cooperation.** USGS hydrologists from the Oklahoma District met with a representative of the Cheyenne and Arapaho Tribes of Oklahoma to discuss a cooperative project involving geographic information systems. Contact: William J. Andrews, 405-810-4416, wandrews@usgs.gov

**Pesticides in the Yakama Basin.** In FY 2001, the USGS plans to research osprey diets and nest locations as part of studies arising from continuing concerns about pesticide residues in fish on the lands of the Confederated Tribes and Bands of the Yakama Indian Nation. Identification of these factors is intended to lead to measurement of organochlorine pesticides residues in resident fish and in eggs of fish-eating birds. Contact: Greg Fuhrer, 503-251-3231, gjfuhrer@usgs.gov





**Eskimo youth with banded swan; Yukon-Kuskokwim Delta, Alaska**



## USGS Contacts

The U.S. Geological Survey has an American Indian/Alaska Native Coordinating Team to establish policy and to coordinate USGS activities. Please contact any of the individuals listed below for more information or to discuss questions or concerns.

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