National Park Service
U.S. Department of the Interior

Natural Resource Stewardship and Science

Alaska Inventory and Monitoring Program Science Communication Plan

Natural Resource Report NPS/AKRO/NRR—2011/460

ON THE COVER
Inventory and Monitoring staff conducts long-term vegetation monitoring study in Kenai Fjords National Park
Photograph by: NPS

Alaska Inventory and Monitoring Program Science Communication Plan

Natural Resource Report NPS/AKRO/NRR—2011/460

Celeste Brooke Carney
National Park Service
240 West Fifth Avenue
Anchorage, AK 99501

Claudette Moore
National Park Service
P.O. Box 7
King Salmon, AK 99613

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Executive Summary

This communication plan is meant to serve as a guiding document for the Alaska Inventory and Monitoring Program (I&M) including the four networks and the regional office. The purpose of this document is to provide the philosophy, strategy, and tools for a fundamental objective of the Alaska I&M Program - namely, to provide park managers and the public with compelling, understandable syntheses on the status, trends, and interpretations of park natural resources. This plan, including both its development and implementation, represents an explicit effort to link new, self-identified needs with existing Network monitoring plans and Service-wide efforts, including the Climate Change Response Strategy and Call to Action. This is the first strategic effort to establish a structure for communicating science conducted by the I&M Program within Alaska. Prior to beginning the development process, we outlined steps to complete the plan, which began with a review of existing and past efforts and gathering input from stakeholders. Based on the information gathered, we developed priorities and goals, defined audiences and core messages, determined the best communication products and methods, and finally, methods for evaluating our efforts. This document is purposefully organized in the same order, with each section building on the one before it.

Defining our audiences, which include three broad groups: the internal team, direct audiences, and indirect audiences, is a major component of this document. The description of audiences reflects the priority placed on understanding and connecting with each of them. In particular, we emphasize the effort to define relationships with our communication partners, including interpretive staff and the two Research Learning Centers. The goal of defining these relationships is to take a step towards strengthening the relationships with partners.

Communication products and methods are organized by audience group and described in detail. Products and methods emphasize the use of required reports and other documents to efficiently and broadly apply and repurpose existing information. Products and methods include communication tools for the internal I&M team, summary products and overviews for direct audiences, and a variety of interpreted products and information for indirect audiences. All communication products and efforts focus on delivering information to various audiences in order to assist in the overall effort by NPS to manage and interpret park resources based on scientific information. Finally, plans to evaluate communication effort are outlined. Evaluation is a vital component in the overall success of this plan.

Acknowledgments

This communication plan would not have been possible without the guidance, input, and support of the informal yet highly valuable development team. This well-rounded and diverse group has played a major role in creating a final product focused on maximizing partnerships and sharing resources. The program managers of all four Alaska Networks (Jim Lawler (ARCN), Maggie MacCluskie (CAKN), Brendan Moynahan (SEAN), Michael Shephard (SWAN), and the regional coordinator, Sara Wesser, provided the vision for this plan as well as guidance and review throughout its development. Stacia Backensto and Kumi Rattenbury of the Arctic Network, Laura Weaver of the Central Alaska Network, Chris Sergeant of the Southeast Alaska Network, Parker Martyn and Beth Koltun of the Alaska Regional Inventory Program, and Ted Gostomski of the Great Lakes Network all provided guidance and feedback. Jim Pfeiffenberger (OASLC) and Ingrid Nixon (MSLC, DENA) extended support and partnership from both of Alaska's Research Learning Centers. John Morris and Rebecca Talbott provided perspective and input from the Alaska Interpretation and Education Division. John Quinley and Judy Kesler of the Alaska Communications Office provided support and feedback as well. The input and support provided by the following NPS staff is also greatly appreciated: Morgan Warthin, Regional Fire Communication and Education Specialist for Alaska; Bob Winfree, Alaska Region Science Advisor; Louis Dalle-Malle, North and West Alaska CESU; and Joanne Welch, AAPLIC. Finally, many NPS employees generously shared their time and sincere thoughts in the survey upon which this plan is based.

List of Acronyms

AAPLIC	Anchorage Alaska Public Lands Information Center
AKRO	Alaska Regional Office
ALC	Alaska Leadership Council
ARCN	Arctic Network
CAKN	Central Alaska Network
CCRS	Climate Change Response Strategy
CESU	Cooperative Ecosystem Studies Unit
DENA	Denali National Park and Preserve
DOI	Department of Interior
EAG	Education Advisory Group
FAPLIC	Fairbanks Alaska Public Lands Information Center
GLKN	Great Lakes Network
GRSM	Great Smoky Mountains National Park
I&E	Interpretation and Education
I&M	Inventory and Monitoring
MSLC	Murie Science and Learning Center
NPS	National Park Service
OASLC	Ocean Alaska Science and Learning Center
RLC	Research Learning Center
SEAN	Southeast Alaska Network
SWAN	Southwest Alaska Network
WASO	Washington Office (of the National Park Service)

Introduction

The National Park Service (NPS) manages approximately 54 million acres in Alaska, or 60% of the total area managed by NPS. Sixteen park units containing significant natural resources and large tracts of relatively undisturbed wild lands comprise the Alaska Region. Within the Alaska Region, there are four Inventory and Monitoring (I&M) Networks and a regional team that work to improve park management through greater reliance on scientific information. Figure 1 provides a basic illustration of Alaska I&M Networks and the parks within each network.

- ***Arctic Network (ARCN):*** Bering Land Bridge National Preserve, Cape Krusenstern National Monument, Gates of the Arctic National Park and Preserve, Kobuk Valley National Preserve, Noatak National Preserve

- ***Central Alaska Network (CAKN):*** Denali National Park and Preserve, Wrangell-St. Elias National Park and Preserve, Yukon-Charley Rivers National Preserve

- ***Southeast Alaska Network (SEAN):*** Glacier Bay National Park and Preserve, Klondike Gold Rush National Historical Park, Sitka National Historical Park

- ***Southwest Alaska Network (SWAN):*** Alagnak Wild River, Aniachak National Monument and Preserve, Katmai National Park and Preserve, Kenai Fjords National Park, Lake Clark National Park and Preserve

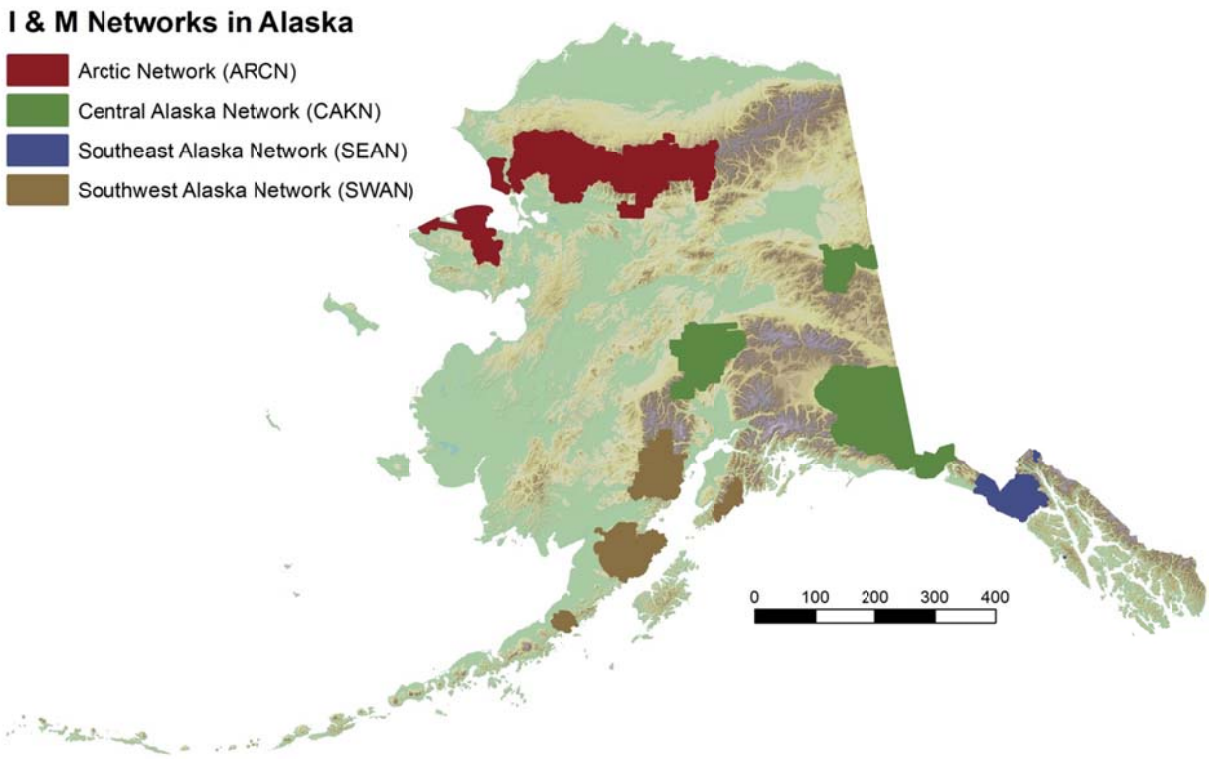

Figure 1. Alaska I&M networks

In order to most effectively increase understanding and inform management of Alaska park resources, the I&M Program must address unique characteristics and conditions, rich cultural history, and vulnerability to the effects of climate change as well as logistical and staffing challenges. In some cases, the long-term monitoring efforts conducted by I&M staff are the only records for a given resource.

The purpose of this document is to provide the philosophy, strategy, and tools for a fundamental objective of the Alaska I&M Program - namely, to provide park managers and the public with compelling, understandable syntheses on the status, trends, and interpretations of park natural resources.

The Inventory and Monitoring Program

I&M was established in 1992 and was expanded in 2000 as part of the NPS Natural Resource Challenge, a nationwide effort to revitalize and expand the natural resource programs in NPS units (NPS 1999). The goal of the Natural Resource Challenge was to provide funding to programs that aim to:

- protect native species and their habitats,
- provide leadership for a healthy environment, and
- connect parks to protected areas and parks to people.

The purpose of the I&M Program is to provide consistent information about natural resources within national parks, including species diversity, distribution, and abundance; and to determine the current condition of park resources and how they change over time. The primary objective of the I&M Program is to collect, organize, and make available natural resource data and to contribute to the Service's institutional knowledge by facilitating the transformation of data into information through analysis, synthesis, and modeling. Thirty-two I&M networks, organized by ecoregion, represent 270 park units with significant natural resources. Each network supports a group of professional staff that conducts the day-to-day activities of the program and collaborates with the staff of network parks and other program partners to implement an integrated long-term program focused on monitoring a select group of natural indicators. Network staff provide important data and expertise to park planners and serve as scientific advisors for resource assessments, resource stewardship strategies, and performance reporting.

Inventory

Twelve baseline inventories have been identified by the National I&M Program as the minimum set of information needed to effectively manage and protect natural resources within national parks. Collection of baseline information for each inventory has been completed or is in one of several phases of completion for each park unit within the program including those in Alaska. See Appendix A for a table outlining the progress of inventories in Alaska's national parks. Because of the unique logistical challenges that exist in Alaska, including vast areas of roadless wilderness and severe weather, a regional effort exists to assist networks with the timely completion of several baseline inventories. The twelve baseline inventories are to be repeated in set intervals to document the condition of park resources over time.

Monitoring

Parks within individual I&M Networks share ecological and geological attributes. Networks share expertise across parks and work with other partners to evaluate the condition of park resources by monitoring a small number of select indicators, or vital signs. Vital signs are selected through extensive and thorough planning and development processes. In addition, each vital sign monitoring effort adheres to strict guidelines for developing and following monitoring protocols. Protocols are peer reviewed and include monitoring objectives, rigorous sampling design, and analysis and reporting procedures. A summary of the vital signs monitored in Alaska is provided in Appendix B.

A Need for Enhanced Communication

Successful scientific monitoring of natural resources includes two key components – collecting and managing high quality data and delivering the information to a broad audience. Two of the I&M Program's primary objectives reflect the need for sharing information gathered through inventory and monitoring efforts (NPS 2009).

- Integrate natural resource inventory and monitoring information into National Park Service planning, management, and decision making.
- Share National Park Service accomplishments and information with other natural resource organizations and form partnerships for attaining common goals and objectives.

To date, networks in Alaska have met these objectives through a variety of mandatory and optional/additional communication products and efforts. Now, the Alaska I&M Program has identified the need for an enhanced and strategic communication effort. The need for a strategic communication effort is based on the increasing amount of information being generated by the programs and the emphasis on understanding and responding to climate change based on scientific information. In addition, the National Park Service adopted the Climate Change Response Strategy (CCRS) in September of 2010 which emphasizes four key components – science, adaptation, mitigation, and communication (NPS 2010). The I&M Program is uniquely positioned to offer expertise in two of the four areas of emphasis.

This plan, including both its development and implementation, represents an explicit effort to link new, self-identified needs with existing Network monitoring plans and Service-wide efforts, including the CCRS and Call to Action. This is the first strategic effort to establish a structure for communicating science conducted by the I&M Program within Alaska. An illustration of information—from raw data to simple, clear messages—is shown in Figure 2. This illustration and the method of thinking it represents are used throughout the NPS I&M Program and serves as a guide for this communication effort (NPS 2009).

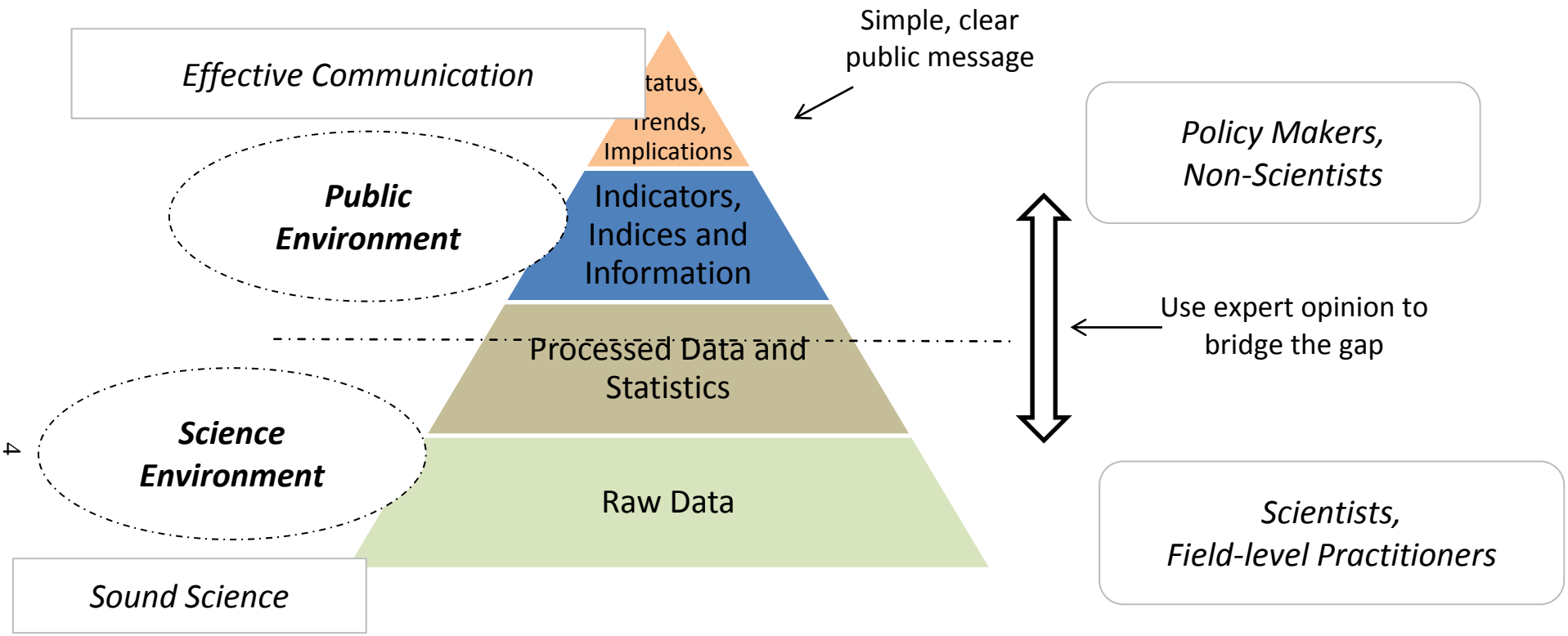

Figure 2. The Information Iceberg links the gap between good scientific information and the need for a simple, clear public message.

Plan Development

As one of the first steps in developing this communication plan, we completed a thorough review of science communication literature and existing communication plans developed by other I&M Networks, NPS programs, and other communication plans (Gostomski 2011, 2009, HaySmith and Nash 2009, Jocius and Garrett 2009, National Park Service 2011, 2010a, 2010b, 2010c, 2009a, 2009b, 2009c, 2007, 2005, 2001, O'Herron 2009, Whatley 2011). Next, we held several scoping sessions among I&M staff to develop a framework of current communication needs and establish goals for this plan. We completed an inventory of past and existing communication efforts by each Alaska Network and the regional program (Appendix C). We circulated a short survey on science communication experiences, needs, and opinions to Alaska NPS employees. See Appendix F for survey and responses. To supplement the information gathered from the survey, we conducted several unstructured discussions with NPS stakeholders. To provide ongoing input throughout the development process, we organized an informal science communication advisory group.

Objectives, audiences, partners, and key messages were developed based on the information gathered in the first several steps. We then held another series of planning meetings to discuss the most effective products, methods of delivery, implementation schedule and methods of evaluating products and the overall communication effort on a regular schedule. The results of each of these steps are summarized and presented in this document.

Prior to beginning the planning process, we outlined the following steps, and they served as guidelines to facilitate the development of each component of this plan. This document is purposefully organized in the same order, with each section building on the one before it.

1. Complete thorough review of existing communication plans and related literature.
2. Conduct scoping sessions with Alaska I&M Networks to frame needs and goals.
3. Establish baseline understanding of past and current communication efforts among the four Alaska I&M Networks by conducting a statewide inventory.
4. Gather input from potential audiences and partners through surveys and unstructured interviews.
5. Develop ***priorities and goals*** based on results and trends from steps 1 through 4.
6. Identify the direct and indirect ***audiences*** of the I&M program based on information gathered in previous steps.
7. Identify the ***core messages*** of Alaska I&M program that best meet the priorities and goals appropriate for audiences identified.
8. Determine the most effective ***methods of communicating*** core messages to each audience.
9. Establish protocols for ***evaluating*** and updating communication products and efforts.

Purpose and Goals

Purpose of this Plan

This plan is meant to guide communication efforts by the Alaska I&M Program. It is intended to serve as a supporting document for the regional program and each of the four networks and to provide guidance to regional and network staff for summarizing, organizing, and distributing information about network activities and findings. Its purpose is to identify areas of communication needs that can directly benefit from having an explicit plan, guidance on content, timing, delivery methods used, and means of evaluating communication efforts by the I&M Program.

Goals

A series of planning meetings and discussions involving Alaska I&M staff and other NPS employees were held to formulate the goals and objectives of this plan. The overarching goal of the plan as a whole, however, is to provide park managers and the public with compelling, understandable syntheses of otherwise inaccessible and disparate information gathered by the I& M Program.

Goal 1:

Contribute to informed decision making on park management issues by providing timely, accessible, and relevant information on the status and trends of park natural resources to park managers.

Objective 1.1:
Ensure information is packaged in ways that are relevant and useful to the intended audiences.

Objective 1.2:
Ensure information is delivered on a regular, consistent schedule and is appropriately timed with management needs, seasons, and other timing considerations.

Goal 2:

Maximize the efficiency of sharing information across multiple programs, agencies, partners, and audiences.

Objective 2.1:
Strengthen and maintain relationships with direct audiences and partners in order to effectively communicate activities, findings and related implications.

Objective 2.2:
Utilize multiple forms of delivery, including new and emerging technologies, to strengthen communication efforts.

Goal 3:
Provide guidance on creating a regional "brand" for the I&M Program that easily identifies the program as a regional expert on natural resource science. (Note: Branding is for internal purposes only. Any external products follow the graphic identity guidelines of the NPS.)

Objective 2.1:
Develop communication products and methods that tell regional stories and connect the work of the various networks.

Objective 2.2:
Provide information and visual themes that are consistent across all Networks yet maintain the unique individual identity of the work conducted and products produced within each Network and office.

Priorities

There are many goals and objectives of the I & M communication plan; however, time and other resource constraints exist that limit the capability to meet all goals. The priorities stated below prioritize the most important/relevant considerations and effective means of delivery. Priority will be given to products and strategies that align closest with the goals and objectives identified in this plan. Products currently produced by the four networks and the regional program should be reviewed for alignment with these priorities. Emphasis and priority will be placed on those products and approaches that build on existing strengths and meet the following criteria:

- *Maximize use of required reporting information:* Make use of required reporting documents, including annual reports, monitoring plans, protocols, technical reports, and resource briefs to develop other communication products meant to communicate the same core information, but tailored to specific audiences.

- *Ensure accessibility:* Ensure existing and newly developed products and information are easily accessible to audiences, including multiple web links, reminders to audiences of new information and location of information, etc.

- *Ensure timeliness:* Make sure information provided is delivered in a timely manner.

- *Ensure relevance and applicability to audiences:* Answer the "so what" for the audience receiving the information and give significant thought to how the information will be used.

- *Consider the audience when developing products and text:* Use appropriate language, length, and format for the intended audience.

Audience and Partners

An important component of developing this plan was to clearly define: (1) the team of staff members that will use this plan; (2) the audiences of our communication products and (3) our communication partners. We further defined these three groups as: the internal team, the direct audience and the indirect audience (Figure 3). We chose the terms direct and indirect rather than primary and secondary to highlight our intent to regard each audience equally. Although our aim is to meet the communication needs of all identified audiences, due to limited resources, our main focus will be on our direct audience. As we strengthen our relationships with our communication partners, they will be more successful at serving our indirect audience. The internal team is defined here to give the users of this plan clear direction on sharing information within the I&M program.

Internal Team	Inventory & Monitoring staff: intra-network, inter-network
Direct Audiences	Park managers, park natural resources staff, communication partners, regional leadership, broader science community, partner agencies and organizations
Indirect Audiences	Local, state, and national leadership; park visitors; general public

Figure 3. A conceptual model of the communication flow of the Alaska I&M Networks

The flow of information will involve a great deal of interplay between the I & M program and our audiences. Figure 4 illustrates an ideal interplay of information and feedback.

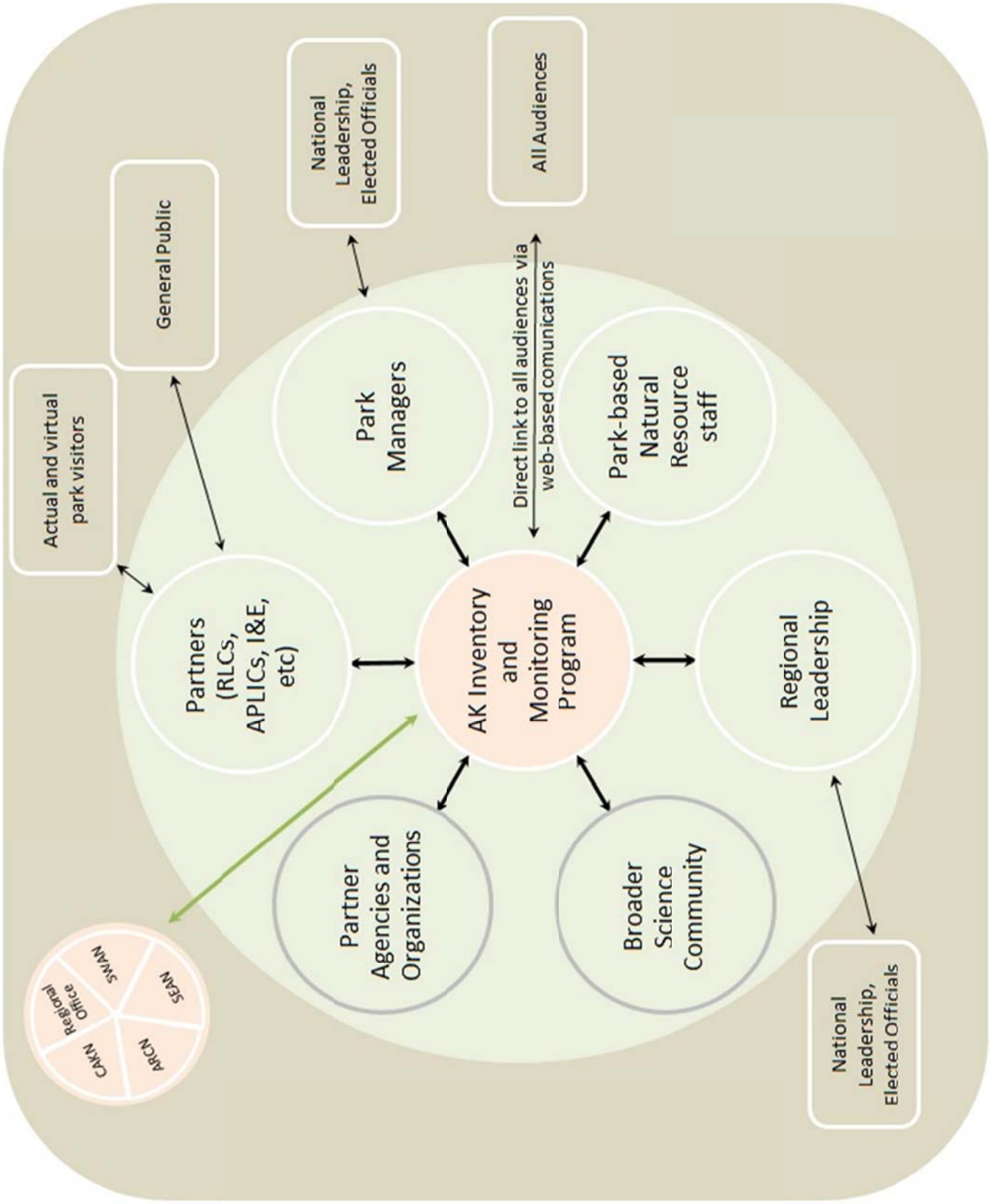

Figure 4. Alaska I&M Program Communication Flow and Audiences

Audience Descriptions

The following sections list and define each audience by categories and suggest the types of communication tools for audiences within the category.

Internal Team

This core group is the primary user of this communication plan. Because this plan covers multiple Networks and staff are geographically dispersed, we have chosen to offer information specific to communication within the I&M program. The specific internal groups of users, or teams, are defined here.

Intra-network

This refers to I&M staff within one Network. In many cases, the staff of one Network is located in different parks and offices.

Inter-network

This refers to I&M staff working within the I&M program but in different Networks and offices. Geographic isolation and limited overlap in day-to-day activities are challenges to communicating with each other.

Direct Audience

This broader group is the primary receiver of information developed and delivered under guidance from this plan. The direct audience includes groups internal to NPS as well as external to it. Again, geographic isolation is a challenge to communicating with this group. Additionally, there is limited to no overlap in day-to-day activities, differing areas of expertise and experience, and differing interests and priorities.

Park Managers

Park managers are the priority audience for the I&M program's communication efforts. Delivering useful information to this group is integral in the overall goal of the I&M program to improve management of park resources through a greater reliance on scientific information.

Park Natural Resource Staff

Natural resource staff typically work closely with I&M staff, and communicating directly with this group insures a more effective work flow for each group.

Regional Leadership

The Alaska Leadership Council (ALC) provides guidance and direction for all parks and programs within the region. In order to understand the I&M program's activities and information and to do their job as effectively as possible, regular and consistent communication is needed. This group also communicates on the I&M program's behalf to audiences at the national and international level.

Broader Science Community

As a science-based program, it is essential to communicate directly with the broader science community, including academic institutions and non-profit research centers. Not only is sharing information an integral part of what the I&M program does, in many cases, researchers from other organizations collaborate with I&M to conduct many of the monitoring projects.

Communication Partners

Partners include NPS programs, such as Interpretation and Education teams, Research Learning Centers, and others, with missions and purposes that overlap with or compliment I&M projects. The I&M program works with partners to develop messages that are then delivered to the indirect audiences as defined in the following section. A goal of this communication plan is to more clearly define partner relationships and expectations as a first step in strengthening existing partnerships. This will in turn lead to a more effective communication with I&M's indirect audiences.

Interdisciplinary Working Groups

Participation in a variety of relevant interdisciplinary working groups, both inside NPS and otherwise, is an important part of engaging with and maintaining relationships with partner groups. Selective and meaningful participation in such groups leads to efficient sharing of ideas and resources as well as to a higher level of overall communication success. Such groups may include the Education Advisory Group (EAG), social media teams, webmasters groups, multi-agency teams, such as the Kenai climate change communication group, and others. For example, the Arctic Network is part of the Western Arctic Caribou Herd Working Group and contributes summaries of relevant activities and findings that are then disseminated via meeting and the "Caribou Trails," a newsletter published by the group.

Research Learning Centers

The concept of Research Learning Centers was developed as part of the Natural Resource Challenge and their purpose, which is to facilitate research and educational opportunities based on scientific research conducted within national parks, clearly defines their role as a partner connecting the I&M program with multiple indirect audiences. Research Learning Centers exist in many different forms and stages of development throughout the NPS, but their core mission remains the same. They are places where science and education come together to preserve and protect areas of national significance. They have been designed as public-private partnerships that involve a wide range of people and organizations including researchers, universities, educators, and community groups. Alaska has two such centers and each is geographically located to assist with two of the four I&M networks. While the broader mission of Research Learning Centers goes well beyond communicating the work of the associated I&M Network(s), the two programs are intended to work together to deliver information obtained by I&M.

Murie Science and Learning Center

The Murie Science and Learning Center (MSLC) is located in Denali National Park. The Center has significant facilities associated with it, including a visitor center, office space for educators and vising researchers, and a large dining hall. It

is funded primarily through the efforts of Denali National Park and by programs provided by the non-profit partner of the Center, Alaska Geographic. To date, MSLC's education efforts are centered in Denali National Park for practical reasons associated with its organization and physical location. Plans are currently underway to develop communication products and programs that will convey information on monitoring efforts conducted in all parks of the Arctic and Central Alaska Networks.

Ocean Alaska Science and Learning Center

The Ocean Alaska Science Center (OASLC) is located within Kenai Fjords National Park. The OASLC is a virtual science center, and there is no dedicated facility. Instead, the Center utilizes facilities within Kenai Fjords National Park and the Alaska SeaLife Center, its non-profit partner. Research and educational programs are coordinated through staff offices, web-based interactions, and community and park programs. The Ocean Alaska Science Center serves the Southwest and Southeast Alaska Networks.

Interpretation and Education Team

The interpretation and education team is the voice of the NPS. They are the individuals that most often interact with park visitors and other groups interested in parks, park resources, and the activities to protect and manage park resources. In Alaska, there are several sub-groups within this team of partners.

National Parks in Alaska

Park interpretive staff represents the parks to the public and tells the story of the park in which he/she works. They are also often the educators working with teachers and students to provide education on natural resources and park-based science among other topics. Establishing methods to interact with and provide useful information to this group is a goal of this plan. Initially, the means to accomplishing this goal will be through working with the regional Education Advisory Group, which consists of the Chiefs of Interpretation and Education Specialists from each park in Alaska.

Alaska Regional Office

The regional interpretation and education team is small in staff size but has a scope that reaches across the parks and into communities and schools. This portion of the interpretation and education team offers support to the parks as well as strategic planning for regional education efforts. Developing a strong relationship with this partner has multiple benefits, including advice for providing interpreters and parks with useful and appropriate information and partnering on the development of region-wide communication products for broad external audiences.

Alaska Public Lands Information Centers

Alaska has several Public Lands Information Centers located throughout the state, which are managed in partnership with other federal agencies and non-profit

partners. They are centrally located and offer visitors to Alaska, who may never set foot in a park, an educational opportunity to learn about the natural resources within the parks as well as the ongoing efforts to protect and manage park resources. Interacting with the Public Lands Information Centers can lead to exhibits and information based on the most up-to-date and accurate information on long-term monitoring efforts and results.

Partner Agencies and Organizations

The nature of I&M's work requires and is enhanced by multiple partnerships with other natural resource-focused government organizations and academic institutions and the researchers employed by them. Cooperative Ecosystem Studies Units (CESU) are a network of cooperative units established to provide research, technical assistance, and education to resource and environmental managers. These units are named to signify their broad role as providers of assistance to federal land management, environmental, and research agencies and their potential partners. Alaska I&M Networks work with several CESUs across the country. CESUs foster collaborative research in national parks by facilitating cooperative agreements for non-NPS researchers to contribute to long-term monitoring goals. CESUs provide the main mechanism through which the I&M Program works with other government agencies and academic and research institutions.

Indirect Audience

This audience includes groups and individuals that we consider when sharing information but that are most often reached directly by our partners, who have a combination of connections, opportunities, and expertise in proper delivery methods for reaching these specific audiences. The indirect audience consists of groups that are both internal to NPS as well as external to it.

Local, State, and National Leadership

This audience, which includes NPS WASO and DOI staff, elected officials at the local, state, and national levels, and others, is directly reached through park management and the regional directorate, both of which are direct audiences of Alaska I&M.

Park Visitors

This audience refers to actual and virtual park visitors (see Appendix D for a table describing virtual and actual visitation to parks), who are most often directly reached by Interpretation and Education staff as well as Visitor Services staff. The Alaska I&M program largely depends on interaction with appropriate partners to meet the needs of this audience.

General Public

This audience includes members of the general population that may not visit parks but are interested and/or affected by the work of I&M in national parks. This group may include community members in Alaska, the U.S., and international locations as well as residents and visitors to areas outside of parks or those interested in work conducted within park boundaries. This group also includes Alaskan and Beringian native populations that may be interested and/or affected by the work of I&M in national parks.

Core Messages

Core messages for the Alaska Region I&M Program are basic statements that clearly convey the themes that should be considered in the development of all communication products and carried throughout all content. While these statements may not be written verbatim in all products, content of effective science communication products will relate back to one or more of these core messages.

Core Messages

Message 1

The I&M Program is a regional expert and resource on scientific information; a primary goal of the program is to contribute to the institutional knowledge of the National Park Service on the status and trends of park natural resources.

Message 2

The purpose of the I&M Program is to provide consistent information about natural resources within national parks, including species diversity, distribution, and abundance; and to determine the current condition of our park resources and how they change over time.

Message 3

The I&M Program contributes to the mission of the National Park Service *to promote and regulate the use of the...national parks...which purpose is to conserve the scenery and the natural and historic objects and the wild life therein and to provide for the enjoyment of the same in such manner and by such means as will leave them unimpaired for the enjoyment of future generations* (U.S. Congress, 1916).

Message 4

The research conducted by the I&M Program is rooted in sound scientific practices. The I&M Program conducts a rigorous planning and evaluation process to determine the most important monitoring efforts to conduct and the most effective and highest quality methods for conducting the chosen monitoring efforts.

Message 5

The information provided on the activities of the I&M Program has multiple applications and is useful by a wide range of audiences.

Communication Methods and Products

This communication plan serves several Networks, parks, and audiences across a vast geographic region. Methods of communication are focused on maximizing partnerships and existing communication programs (including interpretation and education programs). Although products are largely focused on direct and internal audiences, some products are intended for indirect and external audiences. Other methods include packaging and sharing information with communication partners with the goal of incorporating I&M messages into interpretation, education, and communication products for indirect audiences. The following pages summarize communication methods and products. Communication products and programs are organized by audiences—internal team, direct audience, indirect audience—in tables 1, 2, and 3. The tables provide a brief overview of products and programs and the priority assigned to each. Table 4 describes implementation schedules for various products and efforts. Table 5 shows the relative proportion of responsibility for each product or effort. Detailed descriptions, examples and templates of the products and efforts described in this section are provided in Appendix D.

Internal team: communication products and efforts by audience group and priority level

Table 1. Brief overview of communication products and efforts by the internal team

Product or Effort	Brief Description	Priority Level	Reason for Priority
Alaska I&M Communication Team	Sub-set of internal team who collaborates and supports each other on communication efforts	High	Critical for successful implementation of this plan; does not require additional resources
Alaska I&M Email Group	Contact group used to facilitate exchange of information within internal team	High	Critical for successful implementation of this plan; does not require additional resources
Alaska I&M Sharepoint Site	Method of organizing and increasing accessibility to I&M documents	Undecided	Valuable tool, but one of many options
Alaska I&M Annual Meeting	Forum for sharing successes, challenges, and new information	Undecided	Valuable and important, but may be one part of already scheduled events, etc.

Direct Audiences: communication products and efforts by audience group and priority level

Table 2. Brief overview of communication products and efforts geared to the direct audiences

Products and Efforts	Brief Description	Priority Level	Reason for Priority
Annual Report	Summary of tasks accomplished for the Network including updates on inventories, monitoring efforts, staff changes, and budgets	Mandatory	Required by NPS I&M as part of the reporting associated with the Natural Resource Challenge
Project-specific Annual Report	Summary of tasks accomplished over the past year, trends in a vital sign or set of vital signs, outline staffing and budget	Mandatory	Required by NPS I&M as part of the reporting associated with the Natural Resource Challenge
Technical Paper	Disseminate results of scientific studies for the advancement of science and the achievement of the NPS mission	Mandatory	Required by NPS I&M as part of the reporting associated with the Natural Resource Challenge
Resource Brief	Brief overview and update of a particular monitoring effort, inventory, or other specific project	Mandatory	Required by NPS I&M as part of the reporting associated with the Natural Resource Challenge
Network Newsletter	Update on network accomplishments, priorities, upcoming plans, notable events, project contacts (web and print)	High	Based on feedback from employee survey, requires few additional resources
Alaska I&M E-bulletin	Simple email made up of topics and links to update on I&M activities, trends, and news around the state	High	Based on feedback from employee survey, requires few additional resources
ALC Updates	"Glossy" update for ALC gatherings; updates on select accomplishments, plans, etc.	High	Based on feedback from employee survey, specific priority audience, requires few additional resources
Regional Summaries	"Glossy" summaries of regional efforts on a specific topic; intended to provide introduction and overview to informed but non-technical audiences	High	Based on feedback from employee survey and goals of I&M program managers

Products and Efforts	Brief Description	Priority Level	Reason for Priority
Park Summary Reports	Summary of status and trends determined by I&M activities, see examples (Yellowstone 2009)	Undecided	Potentially valuable but needs additional planning from a wide group of stakeholders; some monitoring programs are too young to provide necessary information
Articles in scientific journals and other related publications	Peer-reviewed, published summaries communicating work of I&M staff for the advancement of science and the achievement of the NPS mission	High	Effort is highly valued, ongoing, and distributed widely among staff; requires no additional resources
Oral presentations	In-person summary of a particular I&M activity or update, provides opportunity for direct interaction with audiences; includes webinars	High	Effort is highly valued, ongoing, and distributed widely among staff; requires no additional resources
Training (i.e. seasonal staff)	Inform NPS employees of I&M activities, importance of science in parks, ways to communicate science messages	High	Important for effective communication by partners with many indirect audiences; requires minimal additional resources

Indirect audiences: communication products and efforts by audience group and priority level

Table 3. Brief overview of communication products and efforts geared to the indirect audiences

Products and efforts	Brief Description	Priority Level	Reason for Priority
Website Content, Links, Downloads	I&M Network or program websites, clearninghouse of information related to all efforts by I&M program, location of several web-based datasets, archive of reports	High	Primary method of sharing information with broad audiences, efficient method of sharing and storing information, requires little additional resources
Multi-media	Variety of communication tools, including audio and visual recordings, interactive web or mobile based tools, etc.	Medium	Partners will have the lead on the development of such products in most cases; maximize resources available through partners; requires substantial resources
Press Releases, non-technical articles, program highlights	Written pieces intended for a public, media-based set of audiences	High	Important component of public understanding on science in parks, requires substantial effort but is not intended to have a high frequency
Interpretive Programs, Exhibits, Publications	Guided walks, interpreter-led programs, exhibits, brochures	Medium	High value and importance, however partners have lead role in development of these types of products
Park Websites	Websites for each NPS unit, an important communication tool for parks (See Appendix D)	Medium	High importance, partners have lead role, I&M to support with content and links to content
Alaska regional website	A recently re-designed site with information about national parks in Alaska, region-wide programs, etc	Medium	Valuable tool, issues with accessibility, priority for web presence is with park and program-based sites

Products and efforts	Brief Description	Priority Level	Reason for Priority
NPS website	National website for NPS, central communication tool for NPS, link to park and program sites	Low	Valuable tool; I&M does not have direct involvement with site maintenance or content, coordinated outside the scope of the I&M program
Social Media contributions	Subscription-based websites and interactions, used to highlight I&M activities and accomplishments, direct audience to websites; includes facebook, Twitter, You Tube, Flcker, etc	High	High value for communicating with indirect audiences, requires little additional support, incrreases accessibility to other communication products and efforts, enhances existing partnerships

Implementation Schedule

Table 4. Overview of implementation schedule for communication products

Product	Frequency	Due Date	Notes
Alaska I&M Communication Team	ongoing	11-Oct	Ongoing effort, review annually
Alaska I&M Email Group	ongoing	11-Oct	Ongoing effort, review annually
Alaska I&M Sharepoint Site	ongoing	11-Oct	Ongoing effort, review annually
Alaska I&M Annual Meeting	biannual	Fall and Spring	fall meeting after field season is completed, spring meeting just before it starts
Annual Report	annual	fall	determined by NPS
Project-specific Annual Report	annual	fall	determined by NPS
Technical Papers, journal publications	varies, ongoing	varies	dependent on project
Resource Brief	update annually	winter	complete after annual reports each year or as staff resources allow
Network Newsletter	Twice annually	December, May	Templates to be determined by networks, include calendar, announcements, and updates
Alaska I&M E-bulletins	monthly	Begin in Oct 2011	Encourage submissions from staff on an ongoing basis
ALC Updates	biannual	May, October	pre and post field season highlights, coordinate with ALC meetings
Regional Summaries	annual	varies	develop as often as vital sign monitoring and staff resources allow
Park Summary Reports	annual	fall/winter	timed just after the annual reports are completed, determine feasibility, pilot test
Oral presentations	varies	varies	actively seek out opportunities at conferences, meetings, and webinars
Training	varies	varies, spring	depends on content, some training will be timed with hire of seasonal interpretive staff
Website Content, Links, Downloads, Park websites	ongoing	minimum quarterly	every communication product and update to a program should be immediately reflected on the website

Product	Frequency	Due Date	Notes
Multi-media	varies	varies	depends on projects, funding, staff resources
Press Releases, non-technical articles, program highlights	Varies, ongoing	depends on target media outlet	Actively seek out opportunities to highlight I&M work in non-technical articles and established communication outlets
Interpretive Programs, Exhibits, Publications	varies	varies	actively seek out opportunities to collaborate with NPS partners to incorporate scientific information
Social Media contributions	daily	daily	provide updates, links to websites, reminders of timely events

Roles of Inventory and Monitoring Staff in Implementing Communication Plan

Table 5. Roles and responsibilities for implementing communication plan

Communication Product or Effort	Staff Support Provided by the Regional Communication Office (%)	Staff Support Provided by Networks (%)
Alaska I&M communication team	50%	50%
	The Communication Team consists of the regional science communication specialist and representatives from each of the four networks. The Team works together to plan, produce, and distribute communication products and programs as well as to maintain a flow of information across the four networks.	
Alaska I&M Email Group	75%	25%
	Regional office maintains email group; compiles email announcements and updates; distributes emails	Network staff contributes to email content
Alaska I&M Sharepoint Site	75%	25%
	Regional office sets up site, loads content, maintains site	Networks upload and use as needed
Alaska I&M annual meeting	50%	50%
	Regional office sets up conference, plans, facilitates	Networks set up their side of conference, plan, participate
Annual Report	10%	90%
	Regional office provides minimal support for this mandatory report but is available to assist as needed	Networks complete this task as required by NPS
Project-specific Annual Report	10%	90%
	Regional office provides minimal support for this mandatory report but is available to assist as needed	Networks complete this task as required by NPS
Technical Papers, scientific journal publication	25%	75%
	Regoinal office provides support on reports, journal articles, plans, and proposals 1) that have regional applicability, or 2) as needed by Networks	Networks complete papers, articles, and report as needed depending on projects and needs
Resource Brief	50%	50%
	Regional support will vary by Network but will provide assistance in designing, writing, and distributing as needed	Networks determine needs and abilities to complete task based on individual staff skills, interest, and availability
Spring and Fall Updates	90%	10%
	Regional office designs, writes, distributes updates; networks provide input on content and review document	
Newsletters and E-Bulletins	50%	50%
	Regional office compiles and sends e-bulltein, assists Networks with newsletters as needed, assists with newsletter distribution	Networks provide content for e-bulletins, produce and distribute newsletters

Communication Product or Effort	Staff Support Provided by the Regional Communication Office (%)	Staff Support Provided by Networks (%)
Regional Summaries and ALC Updates	90%	10%
	Regional office designs, summarizes regionally applicable subjects, and writes regional briefs, distributes. Networks contribute, review, assist with distribution.	
Park Summary Reports	75%	25%
	Regional office, designs, writes, and assists with distribution	Networks provide input on content; review; distribute
Oral presentations and Training programs	25%	75%
	Regional office presents to non-technical audiences, assists networks as needed	Networks present project findings at meetings, conferences, training programs, etc. to both technical and non-technical audiences
Website Content, Links, Downloads, Park websites	50%	50%
	Regional office maintains content and pages on AKRO site, provides content to Networks as needed, assists parks with web content as needed, provides content to nps.gov as needed	Networks maintain content, pages and database on network sites, work with regional office and parks on related websites as needed
Multi-media	50%	50%
	Varies depending on project and media used. May develop content, facilitate production, distribute, etc.	
Press Releases, non-technical articles, program highlights	75%	25%
	Regional office writes and distributes; works with Networks on story topics, timing, distribution, etc.	Networks write, distribute, review as staff resources allow
Interpretive Programs, Exhibits, Publications	50%	50%
	Regional office partners with I&E as projects come together, assists networks in development of materials and programs to be used by I&E; involvement and activity level varies based on project	Networks work with I&E to communicate about ongoing monitoring efforts, etc. Projects vary widely depending on content and audience.
Social Media posts and contributions	90%	10%
	Regional office provies majority of social media content and tracking statistics of user feedback, Networks provide updates and content in the form of updates from the field, on project progress, or on other interesting highlights	

Evaluation of Communication Strategies

Evaluation is an important part of developing and reviewing communication efforts to ensure time and resources are used efficiently and that communication efforts and products produce the desired results. It is a continuous process during the life of a communication program. Two types of evaluation are common in communication planning – formative and summative. Formative evaluation occurs during the development of a program or product, and is explained for this plan below. Summative evaluation should occur at the end of a project to assess its success at meeting objectives.

Formative Evaluation

Formative evaluation was used during the development of this plan to determine the most appropriate messages, audiences, product formats, and timing of efforts. The plan development team conducted several scoping sessions and planning meetings throughout the development of the plan to determine goals and to adjust approaches based on feedback from surveys and informal discussions.

Summative evaluation

Summative evaluation will be used at regular intervals to assess the effectiveness of individual communication products as well as to assess the communication effort as a whole. Adjustments to individual products, or methods of delivery will be made accordingly. Expanding or shifting of resources will also be considered as determined by ongoing evaluations. Summative evaluation will be conducted differently for each communication approach and product (see Appendix E for detailed descriptions of communication products), and will include the methods listed below.

- Targeted annual surveys to audiences
- Web summary statistics (includes number of visits, source of visits, length of visits, number of interactions)
- An open-ended review and discussion of products and approaches during annual meetings
- Targeted input from I&M staff to gather feedback on communication approaches and products
- A log of communication contacts made, basic counts of impressions (accompanied by an explanation of audience quality and quantity as they relate to communication tool used)
- Subjective evaluation of select audience representatives (includes interviews)
- An annual communications report summarizing efforts, responses, suggested changes, and future plans
- As resources allow, an in-depth evaluation effort possibility conducted by an outside entity at some point in the future (2-5 years after this plan is implemented) would benefit the program.
- Record of collaborations with partners, including research learning centers, interpretation and education programs, and cooperative ecosystem system units using 2010 as a baseline year for comparison.

Evaluation Schedule

Table 6. Summary of evaluation methods and schedule for implementation

Evaluation Measure	Due Date
Annual Survey of Audiences	September 2012
Web Analytics	Quarterly, summarized in annual report
Open-ended review and discussion	November 2012 (when will I&M folks likely get together in 2012?)
Internal survey to gain input from I&M staff	September 2012
Log of impressions, contacts	Ongoing, summarized in annual report
Annual report	September 2012
In-depth evaluation	2015
Collaboration record	Ongoing, summarized annually, September 2012

Conclusions and Recommendations

Communicating about science is a major part of the overall effort to better understand the world around us. Without communicating scientific findings to a broad and diverse set of audiences, the value of the work remains undervalued and often times misunderstood. This communication plan serves as a road map for effectively communicating about scientific studies conducted within the National Park Service in Alaska. This plan is meant to be a living document and is meant to provide guidance for natural resource staff, including those within the I&M program, as well as all partners and audiences defined in this plan (park managers, interpretation and education staff, research learning centers). It should be regularly evaluated and updated to reflect the current needs of its users and audiences. Also, this plan can only be effective if supported by its users and implemented to the fullest extent possible. While the I&M program has a specific focus and scope, it is the hope of its developers that this plan and the broader communication effort will facilitate and encourage integration of communication efforts, program resources, and staff collaboration within the Alaska region of NPS.

The scope of this plan is limited to the Alaska I&M program for practical reasons. However, good communication does not exist in a bubble, and there are additional communication needs within NPS, including the need for a broader science communication plan for the Alaska region, a general communication strategy for the Alaska region, and a science communication plan for NPS. Natural resource programs service-wide are positioned to utilize the communication expertise that exists within the NPS interpretation and education programs as well as the various communication offices to reach science communication goals. The development of region and/or service-wide communication strategies will maximize the efficient exchange of information within NPS as well as to external audiences.

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Appendix A: Alaska Inventories

Inventory	Arctic Network					Central Alaska Network			Southeast Alaska Network			Southwest Alaska Network				
	BELA	CAKR	KOVA	GAAR	NOAT	DENA	YUCH	WRST	GLBA	KLGO	SITK	LACL	KATM	KEFJ	ANIA	ALAG
Natural Resource Bibliography	2001	2001	2001	2001	2001	2001	2001	2001	2001	2007	2007	2001	2001	2001	2007	2007
Base Cartography Data	2010	2010	2010	2010	2010	2010	2007	2010	2007	2004	2007	2010	2010	2007	2007	2010
Air Quality Data	2006	2006	2006	2006	2006	2006	2006	2006	2006	2006	2006	2006	2006	2006	2006	2006
Air Quality Related Values Data	2010	2010	2010	2010	2010	2010	2010	2010	2010	2010	2010	2010	2010	2010	2010	2010
Climate Inventory	2007	2007	2007	2007	2007	2007	2007	2007	2007	2007	2007	2007	2007	2007	2007	2007
Geologic Resources Inventory	In Progress	In Progress	In Progress	In Progress	In Progress	2010	In Progress	In Progress	In Progress	In Progress	In Progress	In Progress	map 2010, report in	map 2010, report in	map 2009, report in	map 2010, report in

Inventory	Arctic Network					Central Alaska Network			Southeast Alaska Network			Southwest Alaska Network				
	BELA	CAKR	KOVA	GAAR	NOAT	DENA	YUCH	WRST	GLBA	KLGO	SITK	LACL	KATM	KEFJ	ANIA	ALAG
Soil Resources Inventory	2009	2009	2009	2009	2009	2005	In Progress	2010	Planned	In Progress	Planned	In Progress	Planned	Planned	Planned	Planned
Water Body Location and Classification	2008	2008	2008	2008	2008	2008	2008	2008	2008	2008	2008	2008	2008	2008	2008	2008
Baseline Water Quality Data	2008	2008	2008	2008	2008	2007	2007	2008	2007	2007	2007	2007	2007	2008	2008	2007
Vegetation Inventory	2007	2007	2004	2004	2004	2004	2007	2008	2008	In Progress	In Progress	2004	2004	2008	In Progress	In Progress
Species Lists	2008	2008	2008	2008	2008	2008	2008	2008	2008	2008	2008	2007	2007	2007	2007	2007
Species Occurrence and Distribution	2007	2007	2007	2007	2007	2007	2007	2007	2007	2007	2007	2007	2007	2007	2007	2007

Appendix B: Vital Signs Monitored in Alaska

		Arctic Network	Central Alaska Network	Southeast Alaska Network	Southwest Alaska Network
Air & Climate	Air Quality	**Air Contaminants***	Air Quality°	**Air Contaminants***	**Visibility & Particulate Matter***
	Weather and Climate	**Weather & Climate***	**Weather & Climate***	Visibility & Particulate Matters†	**Weather & Climate***
		Snowpack*	**Snowpack***	**Weather & Climate***	
Geology & Soils	Geomorphology	**Coastal Erosion***	**Glacial Extent***	**Glacial Extent***	**Glacial Extent***
		Sea Ice°			**Geomorphic Coastal Change***
	Subsurface Geologic Processes	**Permafrost***	Disturbance: Volcanoes & Tectonics†		Volcanic and Earthquake Activity°
	Soil Quality		**Permafrost***		
Water	Hydrology	Surface Water Dynamics†	**Disturbance: Stream Flooding***	**Oceanography***	**Surface Hydrology***
			River/Stream Flow*	**Stream Flow***	
	Water Quality	**Lagoon Communities & Ecosystems***	**Water Quality***	**Freshwater Quality***	**Marine Water Chemistry***
		Lake Communities & Ecosystems*		**Freshwater Contaminants***	**Freshwater Chemistry***
		Stream Communities & ecosystems*		**Marine Contaminants***	
Biological Integrity	Invasive Species	Invasive/Exotic Species†	Disturbance: Exotic Species†	Invasive/Exotic Plants°	Invasive/Exotic Species°
				Invasive/Exotic Animals†	
	Infestations and Disease		Insect Damage†	Pests and Diseases†	Insect Outbreaks°
	Focal Species or Communities			Western Toads†	**Kelp & Seagrasses***
				Freshwater Benthic Macroinvertebrates†	
				Intertidal Communities*	**Marine Intertidal Invertebrates***
		Fish Assemblages†	**Freshwater Fish***	Forage Fishes†	**Resident Lake Fish***
				Salmon†	Salmon°

		Arctic Network	Central Alaska Network	Southeast Alaska Network	Southwest Alaska Network
Biological Integrity		**Land Birds***	**Passerines***	**Kittlitz's Murrelets***	**Black Oystercatcher***
		Yellow-billed Loons*	**Bald Eagles***	Bald Eagles†	
			Golden Eagles*	Breeding Land Bird Assemblages†	**Bald Eagles***
			Peregrine Falcons*		**Marine Birds***
			Ptarmigan†		
		Small Mammal Assemblages†	**Small Mammals***		
		Caribou°	**Caribou***	Ungulates°	Caribou°
		Moose°	**Moose***		**Moose***
		Dall's Sheep*	**Dall's Sheep***	Humpback Whales°	
		Muskox*	**Wolves***	Harbor Seals†	**Wolves***
		Brown Bears*	Brown Bears†	Stellar's Sea Lions†	**Brown Bears***
			Snowshoe Hare*	**Marine Predators***	Harbor Seal°
			Arctic ground Squirrel†	Killer Whales†	**Sea Otter***
		Terrestrial Vegetation*	Vegetation Structure and Composition†	Wetland Communities†	**Vegetation Composition & Structure***
			Subarctic Steppe†		**Sensitive Vegetation Communities***
Human Use	Point Source Human Effects	Point Source Human Effects†	Human Populations†		
	Consumptive Use	Subsisttence/Harvest°	Consumptive Use°	Consumptive Use°	Consumptive Use°
	Visitor and Recreation Use		Visitor Use†	Human Use & Mode of Access°	Visitor Use°
			Trails†		
(ecosystem patterns &	Fire and Fuel Dynamics	Fire Extent & Severity°	Disturbance: Fire Occurrence and Extent°		**Landcover***
	Landscape Dynamics	**Landscape Patterns and Dynamics***	**Landcover, Use & Patterns***	**Landform & Landcover***	**Land Use & Processes***
	Sound		Soundscape°	Underwater Sound°	

		Arctic Network	Central Alaska Network	Southeast Alaska Network	Southwest Alaska Network
				Airborne Sound†	
	Energy Flow		Plant Phenology°		

Activity level given for each vital sign reflects the highest level of activity within the network. It does not imply this level of activity for each park within the Region.

* Vital signs for which the network is developing protocols and implementing monitoring efforts with funding from the vital signs or water quality monitoring program.

° Vital signs that are currently being monitored long-term by a network park, another NPS program, or by another federal or state agency. The network will collaborate with these other monitoring efforts where appropriate but will not use vital signs or water quality monitoring program funds.

† Vital signs for which monitoring will likely be done in the future but which cannot currently be implemented due to limited staff or funding.

Appendix C: Inventory of Existing Communication Efforts

Inventory of Existing Efforts: Communication Categories and Products

Network/Office	Print materials	Oral presentations and programs	Web-based materials	Social media	Other
ARCN	• Resource briefs • Network Newsletter • Annual reports • Technical reports • Articles in AK Park Science • posters at professional meetings/conferences	• Conference presentations • Outreach programs in partnership with park Interp staff	• Website (text, interactive tabs for vital signs, data, maps, images, reports to download, links to more information, links to parks) • search tool on website • 3 podcasts (in English and Japanese)		• 4 kiosks (with CAKN) • Focus on relationships with interpretive staff at parks, Denali Science Center, FAPLIC
CAKN	• Resource briefs • Annual reports • Technical reports • Articles in AK Park Science • posters at professional meetings/conferences	• Conference presentations • Relationships with Interpretive staff = programs on I&M projects	• Website (intro text, documents to download, news, images, maps, links to parks) • 2 podcasts with FAPLIC		• 4 kiosks (with ARCN)
SWAN	• Resource briefs • Annual reports • Technical reports • Articles in AK Park Science • posters at professional meetings/conferences • Field season highlights • Network newsletter • Network brochure	• Conference presentations	• Website: (intro text, maps, images, links to parks, etc) • recent reports highlighted • history component • podcasts (through Ocean Alaska Science and Learning Center)		
SEAN	• Resource briefs • Annual reports • Technical reports • Articles in Alaska Park Science • posters at professional meetings/conferences	• Conference presentations	• Website (intro text, maps, interactive tabs for vital signs, documents to download, links to parks) • FAQ		
Regional	• Resource briefs • Vital signs overview • Technical reports • Articles in AK Park Science • Posters at professional meetings/conferences	• Conference presentations	• Website (intro text, print documents to download, links to other sources of information, links to networks)	Facebook & Twitter posts	

Network/Office

Inventory of Existing Efforts: Communication Products, Audiences, and Purposes

Communication product	Primary audience	Secondary audience	Purpose served
Resource Briefs	NPS employees	General public	Provide update on progress and subject of study
Network Newsletters	NPS employees	General public	Provide updates on status and trends, plans for upcoming months, other information important to program
Annual reports	NPS mgmt	NPS employees	Provide detailed account of work conducted to managers; used to maintain accountability and to supplement other planning and reporting documents and programs
AK Park Science articles	Researchers/scientists	NPS employees	Provide summary and conclusions of various monitoring or inventorying efforts in a semi-technical format
Posters at professional meetings/conferences	Researchers/scientists	NPS employees	Share research with colleagues to advance broader realm of scientific research and its implications
Technical reports	Researchers/scientists	NPS employees	Share research with colleagues to advance broader realm of scientific research and its implications
Published journal papers	Researchers/scientists	NPS employees	Share research with colleagues to advance broader realm of scientific research and its implications
Network brochure	General public	NPS employees	Provide an overview of the purpose and activities of the I&M program
AK Vital Signs Overview	Gov agency mgrs		Provide a quick glance at the types of monitoring efforts ongoing in AK parks
Conference presentations	Researchers/scientists		Share research with colleagues to advance broader realm of scientific research and its implications
Interactions with Interp staff/ in-person programs	Interpretation staff	General public	Serve as resource of scientific information to be incorporated into interpretive programs, displays, etc
Website content	General public	Researchers/scientists	Provide introduction,

Communication product	Primary audience	Secondary audience	Purpose served
			overview, updates and methods of accessing more detailed information to broad set of audiences
Podcasts	General public	NPS employees	Explain purpose and focus of work to public audiences; educate public about park resources and activities conducted to ensure protection for future
Social media posts	General public		Create sense of excitement about park resources and work being conducted in parks, connect the public with park and program websites, educate
Kiosks (interactive exhibits)	General public		Inform public on resources and work being conducted to protect them

Appendix D: Virtual and Actual Visitors to Alaska National Parks

	Real 2008	Virtual 2008	Real 2009	Virtual 2009	Real 2010	Virtual 2010	Difference Virtual 2008-9	Difference Virtual 2009-10
ALAG	0	25,442	0	25,276	0	22,941	-0.65%	-9.24%
ALEU	0	36,385	0	34,149	0	38,860	-6.15%	13.80%
ANIA	10	59,240	14	53,872	62	61,607	-9.06%	14.36%
BELA	1,019	93,519	1,054	87,293	2,642	87,094	-6.66%	-0.23%
CAKR	1,575	13,486	1,810	14,577	2,521	15,850	8.09%	8.73%
DENA	432,309	2,875,166	335,757	2,847,020	378,855	3,281,075	-0.98%	15.25%
GAAR	11,397	230,351	10,090	318,032	10,840	274,299	38.06%	-13.75%
GLBA	418,911	593,831	371,912	630,149	444,530	598,253	6.12%	-5.06%
INUP	0	14,206	0	15,017	0	14,118	5.71%	-5.99%
KATM	7,970	286,302	43,035	311,918	55,172	352,666	8.95%	13.06%
KEFJ	272,190	368,064	218,358	354,354	297,596	441,442	-3.72%	24.58%
KLGO	935,940	240,641	880,512	260,584	797,716	244,987	8.29%	-5.99%
KOVA	1,565	35,640	1,879	56,348	3,164	53,002	58.10%	-5.94%
LACL	6,802	215,116	9,711	240,260	9,931	218,091	11.69%	-9.23%
NOAT	2,147	25,087	2,474	27,793	3,257	34,372	10.79%	23.67%
SITK	241,407	88,210	246,866	99,423	189,176	102,546	12.71%	3.14%
WRST	65,693	427,664	59,965	413,506	73,170	418,344	-3.31%	1.17%
YUCH	4,942	57,491	6,432	67,011	6,211	67,666	16.56%	0.98%
TOTALS	2,403,877	5,685,841	2,189,869	5,856,582	2,274,843	6,327,213	154.53%	63.32%

Table compiled by Judy Kesler and Rebecca Talbot for use at the May 2011 ALC meeting.

Appendix E: Communication Products and Examples

Alaska I&M Communication Team

Priority
High

Purpose

Facilitate sharing of information among internal team, establish framework for support and collaborative development and maintenance of communication efforts to direct and indirect audiences, encourage participation in cross-program working groups, such as the EAG, webmasters, etc; Critical for successful implementation of this plan; does not require additional resources

Audience

Internal team: Alaska I&M staff in all networks and regional office

Description

Sub-set of internal team who collaborates and supports each other on communication efforts; An informal committee of 5-10 I&M staff with at least one representative from each Network and the regional office as well as a representative from each RLC within Alaska; Develop communication plan for upcoming months and/or years, share with appropriate partners

Delivery Methods

The primary means of communication will be via email with some teleconferences and the occasional in-person gatherings; may utilize Sharepoint site or other tool for sharing products

Required Resources

No additional staff or funding needed; will require by-in and active participation by members: designated staff chairs committee, facilitates initial and ongoing communication, rotating responsibilities

Expected Responses and Outcomes

I&M staff with communication responsibilities will be more effective and efficient by having a support system in place. The team should meet or interact regularly. Potential task includes developing master communications calendar with key dates and designated times to focus on particular subject noted.

Evaluation Methods

Informal discussion among I&M staff held annually: strengths and weaknesses, what works or doesn't, determine value of group, etc.

Alaska I&M Email Group

Priority
High

Purpose

Facilitate regular, frequent, informal communication among I&M staff in all Alaska networks. Enhance possibilities for collaboration. Increase efficiency of each project and network.

Audience

Internal team: Alaska I&M staff in all networks and regional office

Description

A group of email addresses, updated regularly, containing all I&M staff within the Alaska Region

Delivery Methods

Maintain an excel spreadsheet of current I&M employees, contact information, and project responsibilities; deliver regular emails to group

Required Resources

Designated staff person creates and maintains email list. Time commitment: 3 hours, then 30 minutes for updates as needed

Expected Responses and Outcomes

I&M staff will communicate on a more regular basis, be better informed of monitoring efforts other than the ones in which they are involved, collaborate with others more easily.

Evaluation Methods

Informal survey or discussion among I&M staff. Tally examples of outcomes.

Alaska I&M Sharepoint Site

Priority
Medium

Purpose

Increase efficiency of sharing files, posting questions, cataloging presentations and posters to staff within Alaska as well as with staff outside of the Alaska Region

Audience

Internal team: Alaska I&M staff in all networks and regional office; secondary audience: I&M staff outside Alaska

Description

A web-based interface which will be incorporated into the existing NPS I&M Sharepoint Site and organized into files containing resource briefs, annual reports, powerpoint presentations, posters, photos, and other products

Delivery Methods

URL, shared among staff, permissions granted to all, requires access through DOI computer

Required Resources

Alaska I&M communication team completes initial uploading of documents, then shared by all I&M staff

Expected Responses and Outcomes

I&M staff will be able to easily locate documents and other files quickly and easily; the site will facilitate sharing of more information, especially communication-focused drafts and documents

Evaluation Methods

Informal survey or discussion among I&M staff. Tally examples of outcomes.

Alaska I&M Annual Meeting

Priority
Medium

Purpose

Provide a face to face opportunity for I&M staff across Alaska to collectively provide updates, ask questions, share successes and present new findings to program peers

Audience

Internal team: Alaska I&M staff in all networks and regional office

Description

A meeting linking groups of I&M staff in different locations via video conferencing or an in-person gathering; Forum for sharing successes, challenges, and new information

Delivery Methods

Planning via email and phone, event via video -conference or in-person meeting space

Required Resources

Designated staff organize meeting, inform others, all Alaska I&M staff participate

Expected Responses and Outcomes

I&M staff will be more informed, complete projects more efficiently as a result of information sharing and collaboration

Evaluation Methods

Informal discussion or survey among staff prior to and following the meeting

Network Annual Report

Priority
Mandatory

Purpose

Provide a summary of tasks accomplished over the past year including updates on inventories, monitoring efforts, staffing, budgets, and a “connect the dots summary” chart; lso provides content for other communication products

Audience

Park managers, regional leadership, national leadership

Description

A detailed document outlining the activities of a particular network over the past year

Delivery Methods

Print and distribute, electronic submittal, available on external and internal websites

Required Resources

Network managers contribute significant time to writing and compiling information within the reports

Expected Responses and Outcomes

Audiences have greater understanding of I&M activities within their park, use information in decision making and planning

Evaluation Methods

Mandatory requirement, evaluation not as useful; could potentially explore ways to shift format to be more user-friendly

Project-specific Annual Report

Priority
Mandatory

Purpose

Provide a summary of tasks accomplished over the past year; summarize trends in one vital sign or a set of vital signs, outline staffing and budget; provide content for other communication products

Audience

Park managers, regional leadership, national leadership

Description

A detailed document by principal investigators outlining the activities associated with a particular vital sign or inventory over the past year

Delivery Methods

Print and distribute, electronic submittal, available on internal websites and drives

Required Resources

Project leads contribute significant time to writing and compiling information within the reports

Expected Responses and Outcomes

Audiences have greater understanding of I&M activities within their park, use information in decision making and planning

Evaluation Methods

Mandatory requirement, evaluation not as useful; could potentially explore ways to shift format to be more user-friendly; evaluate based on effectiveness of communicating status and trends

Technical Reports

Priority
Mandatory

Purpose

To disseminate results of scientific studies in the physical, biological, and social sciences for both the advancement of science and the achievement of the National Park Service mission. The series provides contributors with a forum for displaying comprehensive data that are often deleted from journals because of page limitations. Provides content for other communication products.

Audience

Park managers, regional leadership, national leadership, natural resource staff, broader scientific community

Description

Peer reviewed document containing information on background, methods, and results used to answer a particular scientific question or communicate a significant scientific advancement

Delivery Methods

Print and distribute, electronic submittal, available on internal websites and drives

Required Resources

Project leads contribute significant time to writing and compiling information within the reports

Expected Responses and Outcomes

Audiences have greater understanding of I&M activities within their park, use information in decision making and planning

Evaluation Methods

Mandatory requirement, evaluation not as useful; could potentially survey internal audiences for general understanding of subject, tally number of associated presentations, posters and journal publications

Resource Brief

Priority
Mandatory

Purpose

Provide a brief overview and update of a particular monitoring effort, inventory, or other specific project

Audience

Park managers, regional leadership, national leadership, park visitors

Description

One to two page document with a newsletter-style layout that includes content (several short paragraphs or statements) on the purpose or importance of the subject, information on the production or methods used for the subject, and updates on status, trends, and implications on the subject; includes pictures and graphics to help explain the subject. The following pages show examples of resource briefs.

Delivery Methods

Print and display, website download (link from region, network, park pages), load into IRMA, package with other related resource briefs for additional distribution

Required Resources

Principal investigators provide guidance, designated network or regional staff (part of Alaska I&M communication team) writes and locates graphics, use existing template.

Expected Responses and Outcomes

Park managers will incorporate information into decisions and planning, NPS employees use information to enhance their own programs or projects (ie. natural resource staff share methods and recourse, law enforcement staff have greater awareness of ongoing research activities within parks, interpreters incorporate into programs or products)

Evaluation Methods

Mandatory requirement, evaluation not as useful; could potentially explore ways to shift format to be more user-friendly; evaluate based on effectiveness of communicating status and trends

Arctic Network

Bering Land Bridge N Pres. • Cape Krusenstern NM
Gates of the Arctic NP & Pres. • Kobuk Valley NP • Noatak N Pres.

Brown Bears Resource Brief

June 2011, no. 18

Long-term Monitoring

How will we monitor brown bears in the Arctic Network?

We conduct aerial direct-count surveys of brown bears to estimate population abundance and the probability of occupancy (presence/absence from an area). We will track population trends over time, and use occupancy estimates to evaluate the long-term spatial distribution of brown bears. We have completed 5 aerial surveys since 2005 in 4 survey areas across ARCN. During each 7-10 day survey, 4-6 pilot-observer teams systematically search 20-40% of the total sample units to locate bear groups by flying contours in mountainous terrain or evenly spaced transects on flat terrain. For each group located the observer photographs individuals and records the group composition and location. Some survey units are re-sampled by a second team. Since bears are not uniquely marked, photographs are necessary to determine whether each bear group was seen by only one or both teams. We do not see 100% of the bears present during a survey, but re-sampling units enables us to estimate the number of undetected bears in an area. To compare among survey areas of different sizes, the abundance estimates are converted to bear density estimates.

Management Applications

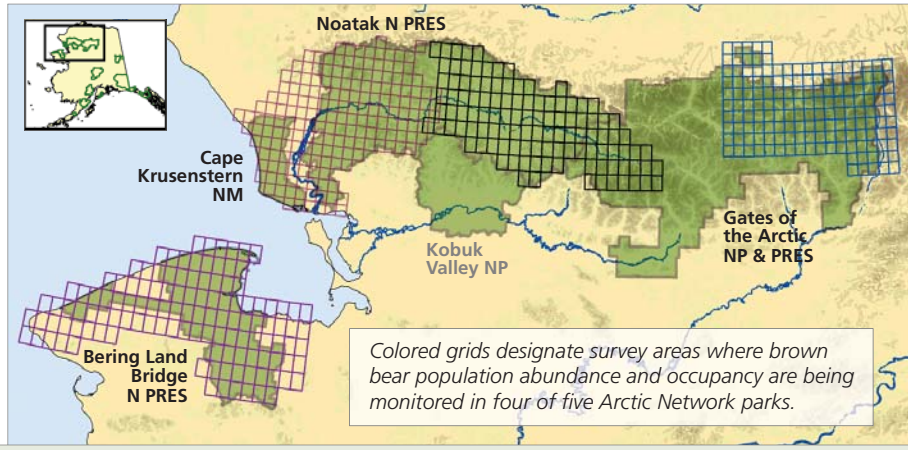
How can monitoring protect brown bears in the Arctic Network?

Brown bear abundance and density estimates are key parameters in managing brown bear populations and their harvest. Additionally, occupancy estimates provide statistical information about trends in brown bear distribution. These surveys will provide estimates of bear abundance, density, and trends in bear distribution, all of which are necessary to understand and manage the effects of human activities and developments that directly affect brown bear survival in ARCN and northwest Alaska.

Preliminary Objectives

What do we want to know about brown bears in the Arctic Network?

- Long-term trends in bear abundance and density within 4 survey areas.
- Trends in bear occupancy in each survey area.
- Estimated, total annual human-caused mortality within each park unit.
- Acceptable harvest rates to maintain healthy populations.
- Probability of population decline as a function of total annual mortality.



Colored grids designate survey areas where brown bear population abundance and occupancy are being monitored in four of five Arctic Network parks.

Importance

Why are brown bears important in the Arctic Network?

Brown bears occupy 43 countries, but are most abundant in Russia, Alaska, and Canada. Alaska accounts for more than 50% of the remaining North American brown bears and has the second largest population worldwide. The management of bears and protection of bear habitat is specifically mandated within the enabling legislation for 10 of 16 Alaska NPS units and brown bears are wilderness and national park icons. Brown bears utilize a broad range of habitats and require large areas free from human threats. They have been viewed as an "umbrella species" that confers protection to other co-occurring species with smaller habitat requirements. Human activities pose a threat to the long-term viability of brown bear populations worldwide because of habitat loss and fragmentation, and human-caused mortality. Baseline abundance and distribution data are lacking for brown bear populations in the Arctic Network (ARCN), yet brown bears are found in every habitat type in these parks. ARCN park units may ultimately provide a refuge for brown bears in northwest Alaska because there are increasing demands for oil, gas, coal, and minerals on adjacent public and private lands.

Contact: Brad Shults, Wildlife Biologist/Pilot, Brad_Shults@nps.gov (907) 455-0674

RESOURCE BRIEF 4

PEREGRINE NUMBERS HAVE GROWN, BUT ENVIRONMENTAL THREATS REMAIN

PEREGRINE MONITORING IN THE CENTRAL ALASKA NETWORK: YUKON-CHARLEY RIVERS

2007 MARKED THE 32ND CONSECUTIVE YEAR OF AMERICAN PEREGRINE FALCON MONITORING ALONG THE UPPER YUKON RIVER CORRIDOR.

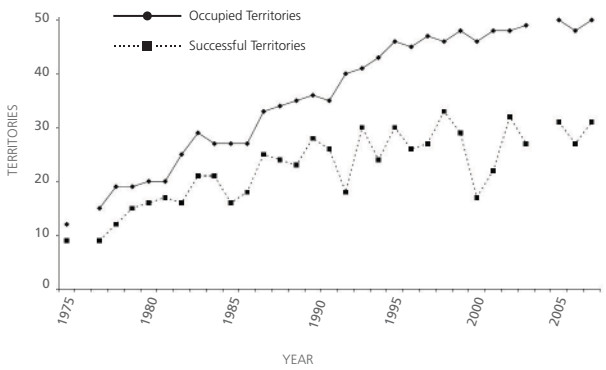
In late May 2007, biologists travelled the Yukon River between the communities of Eagle and Circle, Alaska, and counted the number of occupied Peregrine Falcon territories. A second survey was conducted in July to determine nest success and productivity. Both surveys indicate continued positive growth in the Yukon-Charley Rivers Peregrine Falcon population.

The number of occupied territories within the study area has shown a steady increase since the species neared extinction in the early 1970s because of nest failure caused by DDT contamination. In 2007, 50 occupied territories were observed, which is nearly a 5-fold increase since 1975.

Reproductive success has improved during the past 3 decades as well. The number of nestlings, though variable among years, has increased from 17 in 1975, to 82 in 2007. However, recent evidence suggests that American Peregrine Falcons are still threatened by environmental contaminants.

Analyses of Peregrine eggs from the upper Yukon River suggest that mercury levels are increasing. Mercury is a persistent compound which bioaccumulates at high trophic levels and causes toxic effects (similar to DDT). The amount of mercury being found in Yukon area eggs is currently at levels that may affect reproduction. High levels of mercury are made biologically available through industrial processes such as mining and waste incineration, and will likely increase with global industrialization. Additionally, DDT and other pesticides are still being used on Peregrine wintering grounds, which may cause continued risk to the population.

Number of Peregrine Falcon Occupied & Successful Territories 1975 - 2007



What do we want to understand about Peregrines?

1. Determine annual levels of nesting territory occupancy, nesting success, and overall population productivity.
2. Determine variation in nesting territory occupancy, nesting success, and productivity during the last decade.
3. Describe historic levels of environmental contaminants and eggshell thickness. Determine levels of organochlorine pesticides, mercury, and eggshell thickness every five years.
4. Measure changes in habitat on the breeding range.

Addled egg (above) from an upper Yukon aerie.

Graph (left) shows the steady increase in both occupied and successful (offspring were produced) territories from 1975 to 2007.

Why Are Peregrine Falcons Important?

Peregrines are a top predator that react not only to changes in the environment, but are highly sensitive to contaminants and habitat alteration.

Yukon-Charley Rivers National Preserve (YUCH) was created by the Alaska National Interest Lands Conservation Act in 1980 in part because of its population of nesting Peregrine Falcons (Falco peregrinus anatum), making them a high priority focal species for monitoring. Focal raptor species are also monitored in the other network parks (Golden Eagles in Denali and Bald Eagles in Wrangell-St. Elias).

Besides Yukon-Charley Rivers enabling legislation, it makes ecological sense to monitor this species because Peregrines are a top trophic level predator that respond quickly to changes in the environment. They are also highly sensitive to environmental contaminants and habitat alteration. Moreover, the Peregrine population of the Upper Yukon River corridor is one of the densest in North America. They have been surveyed each year since 1975 and have a legacy as being one of the longest and most thoroughly studied populations of Peregrine Falcons in the world.

Central Alaska Network Web site:
http://science.nature.nps.gov/im/units/cakn

Address & Phone Number:
4175 Geist Road Fairbanks, Alaska 99709 (907) 457-5752

Resource Brief
Southeast Alaska Network

National Park Service
U.S. Department of the Interior

Inventory & Monitoring Program

Freshwater Quality

Glacier Bay National Park
Klondike Gold Rush National Historical Park
Sitka National Historical Park

Importance

Rivers are a major feature of the southeast Alaska landscape. As rivers flow from mountains to sea, they are influenced by multiple environmental forces. Glaciers cause rivers to run cooler. Geology shapes the chemical composition and physical appearance of water. Climate influences patterns in glacial melting and sedimentation. The unique characteristics of individual rivers lead adult salmon from the ocean to their birth place and support a diverse community of organisms adapted to thrive in each river's seasonal changes.

Freshwater quality is critical to understanding and tracking the health of aquatic and terrestrial ecosystems. Park managers in the Southeast Alaska Network (SEAN) are concerned with potential threats to water quality from climate change, visitor impacts, and atmospheric contaminants. Current and historical water quality data for SEAN parks are limited. The main objective of this monitoring program is to collect continuous data on core water quality parameters in order to describe seasonal and annual variation and long-term trends. This data will also inform management decisions, assist researchers, and help determine compliance of freshwater with state and federal regulations.

Contacts:

Project leader:
Chris Sergeant,
christopher_sergeant@nps.gov

Data management:
Bill Johnson, bill_johnson@nps.gov

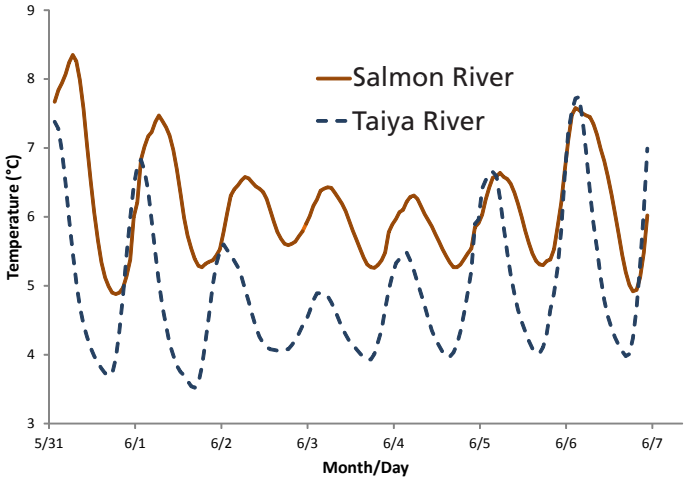
Coordinator:
Brendan Moynahan,
brendan_moynahan@nps.gov

Photo: Chris Sergeant/NPS

This image of the Indian River, located in Sitka, shows a black plastic tube (left, foreground), which holds the data logger and sensors that record water temperature, dissolved oxygen, pH, and conductivity. The logger sits at the bottom of the tube, which is perforated to allow continuous flow across the sensors at all water levels.

Program Design and Status

Freshwater quality monitoring is a well-developed field. This SEAN program was informed by published protocols and by a SEAN-specific inventory of existing water quality data. One data collection site has been established in each park unit: the Indian River at Sitka, the Taiya River outside Skagway, and the Salmon River near Gustavus. At each site, four core parameters are measured hourly from May to October: temperature, pH, specific conductance, and dissolved oxygen. Hourly turbidity data is collected at the glacially influenced Taiya River. Monitoring sites were fully operational as of summer 2011, and the monitoring protocol will be finalized in late 2011. Data from this monitoring program will be integrated with results from related programs, including streamflow, freshwater benthic macro-invertebrates and algae, freshwater contaminants, and climate monitoring. Example data is shown in the figure (right). Over the period of one week, the Taiya River was, on average, 19% colder and had a 48% greater range between daily high and low temperatures. These differences in temperature regimes have distinctly different effects on the organisms experiencing them.



Water temperature monitoring in two parks demonstrates that a glacially-influenced river (Taiya River - Klondike Gold Rush, dotted line) is cooler and exhibits greater daily temperature fluctuations than a non-glacially influenced river (Salmon River - Glacier Bay, solid line).

Reports and Data Access:
http://science.nature.nps.gov/im/units/sean/FQ_main.aspx

Updated September 2011

Air Quality and Contaminants

Resource Brief

Importance

Air quality in SWAN park units is considered pristine by national standards, but airborne pollutants associated with increasing global and regional industrialization, and increased particulate loads associated with wildfire and volcanic activity have the potential to affect ecological processes in the Network. Increased nitrogen deposition associated with human activity may result in soil acidification, changes in plant communities, and increased emissions of greenhouse gases. Particulate sampling conducted in King Salmon (1987-1992) found that elements associated with anthropogenic sources were proportionately greater than in other parks surveyed in Alaska. In addition, current-use and historic-use pesticides as well as some heavy metals (e.g., mercury) were found in low concentrations in most Alaskan parks in the Western Airborne Contaminants Assessment Project. These contaminants are stored in lake sediments, vegetation, fish tissue and snowpack.

NPS

NADP site in Denali NPP includes a wet deposition collector and electronic rain gage. A similar system will be installed in King Salmon in spring 2009.

Long-term Monitoring

Pollutants associated with regional and global industrialization are known to travel great distances and are deposited through wet and dry deposition to terrestrial and aquatic environments. SWAN scientists are in the early stages of incorporating air quality and contaminants monitoring into existing Vital Signs monitoring. Due to the complexity associated with air quality monitoring, SWAN will also partner with state and federal agencies currently monitoring air quality and contaminant concentrations within the vicinity of SWAN park units.

Status

The US Fish and Wildlife Service (USFWS) currently administers two IMPROVE (dry deposition) sites in the Tuxedni and Simeonof Wilderness Areas, which measure a range of particulates, including nitrate, sulfate, and carbon. These sites are located at the northern and southern boundaries of the SWAN and will be an important source for understanding deposition trends in SWAN park units.

Stair step moss (*Hylocomium splendens*) was collected in several SWAN park units in 2008 to estimate baseline concentrations of metals, sulfur and nitrogen. This moss is used to assess airborne contaminants because annual growth increments are easily observed, it is widely distributed, and, like all mosses, it lacks a vascular system; thus, deriving most of its nutrients from wet and dry deposition sources. The results will be used to design a more complete study to assess how contaminants move through and accumulate in the terrestrial environment.

SWAN will establish a wet deposition collection site in King Salmon as part of the National Atmospheric Deposition Program (NADP) in spring 2009. A seven-day composite sample will be collected and analyzed for a suite of chemical parameters including sulfate, nitrate, ammonium, phosphate, and pH. NADP is a long-term program that has been monitoring wet deposition for over 20 years. Collection sites are located throughout the U.S.; many are located in national parks.

Other projects include contaminants analysis in fish and mussel tissue and lake sediment analysis.

Hylocomium splendens is a common moss found throughout the Network.

http://www.flickr.com/photos/maximillian_millipede/2320124870

Contacts
Michael Shephard, NPS-SWAN, michael_shephard@nps.gov
Claudette Moore, NPS-SWAN, claudette_moore@nps.gov
Jeff Shearer, NPS-SWAN, jeff_shearer@nps.gov

Network Newsletter

Priority
High

Purpose

To highlight and provide quick updates of interesting and/or priority activities as well as new developments within a particular network, used to inform I&M staff of activities in other networks. Provide content for other communication efforts and products.

Audience

I&M staff, park managers, NPS employees, partners

Description

A brief document containing updates on network accomplishments, priorities, upcoming plans, notable events, project contacts

Delivery Methods

Print and distribute, electronic submittal, available on internal websites and drives

Required Resources

One staff person per network to be designated as newsletter developer; all staff contribute; assistance from regional office as needed

Expected Responses and Outcomes

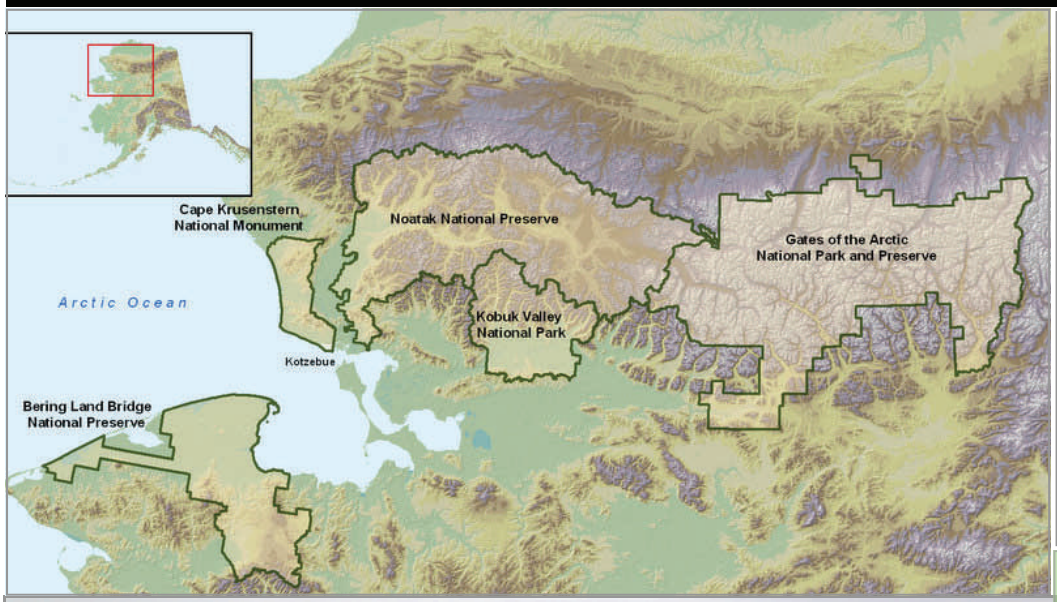
Audiences have greater understanding of I&M activities within their park, use information in decision making and planning

Evaluation Methods

As part of an annual survey on I&M communication efforts, survey internal audiences for general understanding of subjects, tally number of individuals reached

Arctic Network Newsletter

Alaska Region Inventory & Monitoring Program
National Park Service



In this issue

Counting Dall's sheep pg 2

Climate stations pg 3

Kotzebue students win science fair pg 3

Dalton Highway podcast tour pg 3

Muskoxen perish in storm pg 4

2011 Spring and Summer Monitoring and Field Activities

June

24-Jul 1 Dall's Sheep Foraging Study, Gates of the Arctic National Park and Preserve (GAAR, *K. Rattenbury*)
20-28 Yellow-billed Loon Survey, Bering Land Bridge National Preserve (BELA) and Cape Krusenstern National Monument (CAKR, *M. Flamme*)
28-30 Terrestrial Vegetation Node Study, Noatak National Park and Preserve (NOAT, *D. Swanson*)

July

2-7 Dall's Sheep Survey, Itkillik Preserve, GAAR, (*K. Rattenbury*)
1-31 Terrestrial Vegetation Node Study, NOAT (*D. Swanson*)
5-14 Dall's Sheep Survey, NOAT (*K. Rattenbury*)
7-21 Shallow Lakes Monitoring, Kobuk Valley National Park (*A. Larsen*)
27-28 Ungulate Grazing Exclosures, BELA (*P. Neitlich, M. Holt*)

August

1-10 Terrestrial Vegetation Node Study, NOAT (*D. Swanson*)
17-21 Muskox Group Composition Survey, BELA and CAKR (*J. Lawler*)
25-31 Yellow-billed Loon Productivity Survey, BELA and CAKR (*M. Flamme*)

September

1-2 Yellow-billed Loon Productivity Survey, BELA and CAKR (*M. Flamme*)

Barren-ground shrew (*Sorex cinereus*) in a pitfall trap

Science for the stewardship of Arctic Parklands

Small creatures in a large landscape

Shrews are potentially the most diverse and abundant small mammals within ARCN and comprise an important component of arctic communities. Last summer, six species of shrews were found in ARCN parklands by University of New Mexico researcher Andrew Hope and his crew. Two closely related varieties- the masked shrew, a forest species, and the barren-ground shrew, a tundra species, come into contact where the boreal forest and tundra overlap (imagine a line extending from the Seward Peninsula eastward through the Brooks Range). Hope is investigating hybridization between masked and barren-ground shrews in ARCN to understand how both species respond to shifts in ecotones (ecological transitions) as a result of climate change. Dynamic change within parklands such as northward expansion of boreal forest species can be evidenced through changes in the small mammal communities. Past and present surveys will assist with future management.

Masked shrew (*Sorex ugyunak*)

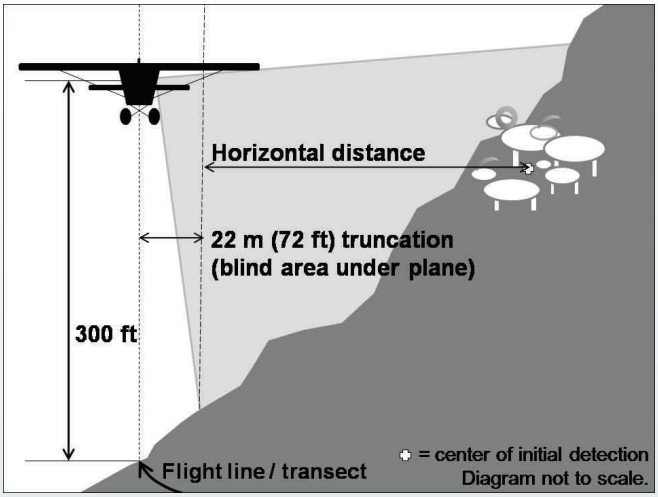
For more information, please contact: ahope@unm.edu

ESTIMATING DALL'S SHEEP ABUNDANCE IN ALASKA'S PARKLANDS

The NPS is using a combination of distance sampling and hierarchical modeling to estimate Dall's sheep abundance in GAAR, NOAT, KOVA, DENA, WRST and LACL. Distance sampling has been used for wildlife and vegetation surveys since the mid 1970s. It is an efficient and cost-effective method that produces unbiased estimates of abundance and accounts for detection probability (the unknown number of animals not detected during a survey).

IN THE FIELD

For wildlife that live in mountainous terrain, distance sampling is conducted by flying transects that follow elevational contours. Pilot-observer teams work together to search for sheep uphill from the line (pictured right). When a group of sheep is detected, the pilot flies over and records the group's location with GPS. The observer records information about group composition, behavior, and weather on a laptop.



CALCULATING DENSITY ESTIMATES

The horizontal distances between detected groups and their respective transects (pictured right) are used to estimate density per transect, which is then extrapolated for a park-wide estimate using hierarchical modeling. The model allows us to include elevation, group size, sheep distribution, and other factors that may influence detection and abundance.

Dall's sheep can consume between 50-120 species of vegetation, primarily forbs, grasses, and sedges during summer. Mineral licks are important for them to compensate for mineral deficiencies. ARCN will collect and analyze Dall's sheep fecal material from the Itkillik Preserve, GAAR to investigate summer diet composition and quality.

RECENT ESTIMATES

Recent surveys show that Dall's sheep numbers in Alaska's northernmost parks are recovering from a large-scale decline observed in the 1990s. These parks are home to 12-13% of the world's Dall's sheep. In Gates of the Arctic National Park and Preserve (GAAR) we estimated 8,412[a] sheep in 2009 and 10,072[b] sheep in 2010. Within the Itkillik Preserve of GAAR we estimated 1,898[c] and 1,854[d] sheep in 2009 and 2010, respectively. In the western Baird Mountains of NOAT survey teams* counted 823 sheep in 2009, with an estimate of 936[e] sheep after correcting for detection.

95% Confidence Interval: [a] 6,517-11,090 in 2009, [b] 8,081-12,520 in 2010, [c] 1,412-2,578, [d] 1,342-2,488, [e] 890-1,000,

*ARCN, WEAR, ADF&G

SURVEY FEASIBILITY

The 2009 and 2010 surveys showed that these methods are logistically feasible, cost 70-80% less than aerial minimum count surveys and produced precise abundance estimates. We found that distance sampling and hierarchical modeling can increase the statistical rigor and spatial extent of Dall's sheep surveys throughout Alaska, while reducing overall survey costs and improving harvest management.

For more information, please contact kumi_rattenbury@nps.gov or joshua_schmidt@nps.gov
http://science.nature.nps.gov/im/units/arcn/documents/documents/RB_ARCN_DSheep_2010-10-15.pdf

About the Arctic Network Inventory and Monitoring Program (ARCN)

Our mission is to collect scientifically sound information through natural resource monitoring to contribute to park management and facilitate park preservation for future generations. We work in Bering Land Bridge National Preserve (BELA), Cape Krusenstern National Monument (CAKR), Gates of the Arctic National Park and Preserve (GAAR), Kobuk Valley National Park (KOVA), and Noatak National Preserve (NOAT).

More Acronyms

WEAR: Western Arctic Parklands (BELA, CAKR, KOVA, NOAT)
YUGA: Yukon-Charley Rivers/Gates of the Arctic
DENA: Denali National Park and Preserve
CAKN: Central Alaska Network
WRST: Wrangell St. Elias National Park
ADF&G: Alaska Department of Fish and Game
USFWS: US Fish and Wildlife Service
USGS: US Geological Survey
LACL: Lake Clark National Park and Preserve

Education, Outreach, and Information Exchange

Kotzebue– High school freshmen China Kanter and Ember Ek received 4 awards for their high school science project about the drainage of KOVA lakes. They won first place in the earth and planetary science category at their high school science fair, an award from the American Indian Science and Engineering Society (AISES), an award from the Centers for Ocean Sciences Education Excellence, and the National Park Service Northwest Alaska Natural History award. Their study, conducted with help from Amy Larsen (CAKN aquatic ecologist), integrated lake science with traditional knowledge about Silver Dollar Lake in KOVA.

Dalton Highway Podcast Tour– In collaboration with the Bureau of Land Management and the U.S. Fish and Wildlife Service, GAAR staff Michael Letzring (pictured here) and Tracie Pendergrast are finalizing 20 podcasts filmed last summer about public lands along the Dalton Highway corridor (Fairbanks to Deadhorse). These 3-5 minute videos will be completed by August and will inform visitors about natural and cultural resources, field science activities, and recreational opportunities found along the road corridor. A new map-based, interactive website called *Dalton Highway Discoveries: Journey into Alaska's Arctic* is being designed in cooperation with Alaska Geographic to feature the podcasts. This virtual tour of the Dalton Highway will be completed in early 2012 and made available on the Fairbanks Alaska Public Lands Information Center website (www.alaskacenters.gov/fairbanks.cfm). To see a podcast about ARCN visit http://science.nature.nps.gov/im/units/arcn/.

ARCN presents–In March, ARCN scientists attended the George Wright Society Meeting in the vibrant city of New Orleans, LA. Kumi Rattenbury and Scott Miller presented work on Dall's sheep and Database Management respectively, while Jim Lawler chaired a session of presentations focused on climate change in Arctic Parklands.

Science and Monitoring Plans Reviewed

Climate Monitoring –The Environmental Assessment for establishing long-term remote climate stations in GAAR, NOAT, KOVA, CAKR, and BELA is complete and supports ARCN plans to erect 9 climate stations (pictured here) as early as summer 2011 in these parklands. The weather observations from these stations, transmitted hourly, will be posted to the Western Regional Climate Center's (WRCC) website (*www.wrcc.dri.edu/NPS.html*) in near real-time. After 5 years of data have been collected and analyzed, the stations' utility in future climate monitoring efforts will be reassessed.

3rd Year Review-This past winter, ARCN completed and passed the 3-year start-up review of its Inventory and Monitoring (I&M) Program. The program received positive feedback from the I&M national review team on the monitoring efforts underway for 17 vital signs.

For more information about ARCN's Climate Monitoring Program and Inventory and Monitoring Plan visit (*http://science.nature.nps.gov/im/stunits/arcn/*).

Staff Updates

Tara Whitesell (*Biotechnician*) is almost fully recovered from having hip replacement surgery last winter and will be back in the field this summer! She also graduated this spring from University of Alaska, Fairbanks (UAF) with a Bachelor's degree in Biological Science.

Kristin DeGroot (*Biotechnican, pictured below with a female and male lesser scaup*) finished her Master's thesis: Body condition and reproductive strategies of female lesser scaup in the boreal forest of Alaska. She graduated from UAF this spring.

Kate Schaefer (*Asst. Data Manager*) left ARCN and returned to UAF to work on a Master's degree in Geography.

Ken Hill, our physical scientist charged with deploying climate stations, left ARCN this spring to work for the Greenland Survey– a long term ecological monitoring program in Nuuk, Greenland. As their main field scientist, he will maintain the program's network of climate and hydrology and soil sensors.

Arctic Network Coordinator

Jim Lawler	907-455-0624

Arctic Network Staff

Dave Swanson	907-455-0665
Doris Lenahan	907-455-0668
Kumi Rattenbury	907-455-0673
Pam Sousanes	907-683-9573
Scott Miller	907-455-0664
Tara Whitesell	907-455-0663
Stacia Backensto	907-455-0669
Kristin DeGroot	907-455-0675

Technical Committee

Amy Larsen, YUGA aquatic ecologist, 907-455-0622
Brad Shults, WEAR wildlife biologist & pilot, 907-455-0674
Jennifer Barnes, Alaska Region fire ecologist, 907-455-0652
Ken Adkisson, WEAR subsistence coordinator, 907-443-6104
Peter Neitlich, WEAR plant ecologist, and acting Chief of Natural Resources, 509-996-3917
Tom Liebscher, YUGA Chief of Resources, 907-455-0620

Additional NPS Collaborators

Kyle Joly, YUGA Wildlife Biologist
Marci Johnson, WEAR Biologist
Melanie Flamme, YUGA Wildlife Biologist
Josh Schmidt, CAKN Data Manager
Laura Weaver, CAKN Visual Information Specialist
Maggie MacCluskie, CAKN Coordinator
Zac Richter, GAAR Interpretive Ranger

MUSKOXEN PERISH IN STORM SURGE AND ICING EVENT

At least 33 muskoxen were killed in late February 2011 during a storm surge that brought strong winds and extreme tidal surges along the icy shores of the northern Seward Peninsula. The carcasses were discovered in March during a routine radio-tracking flight. Four of the animals were among those collared for a study of muskox population dynamics and ecology led by Layne Adams (USGS) and Joel Berger (Wildlife Conservation Society, University of Montana). Prior to the storm, photos taken by NPS staff of the muskox group suggest there may have been as many as 55 killed, leaving many buried deep beneath the ice.

Monitoring Muskoxen

Last March, NPS and ADF&G biologists conducted fixed-wing aerial surveys for muskoxen using a distance sampling method (similar to the Dall's sheep surveys) for both the Seward Peninsula and Cape Thompson populations including BELA, CAKR, and areas extending up the Noatak River drainage and onto the North Slope. ARCN conducted a herd sex and age composition survey in BELA and CAKR by helicopter in April. Population estimates and group composition figures will be available this summer and provide valuable information for managing muskoxen in northwestern Alaska. For more information, please contact marci_johnson@nps.gov.

Arctic Network
National Park Service
4175 Geist Road
Fairbanks, Alaska 99709
http://science.nature.nps.gov/im/units/arcn/

Alaska I&M E-bulletin

Priority
High

Purpose

To highlight and provide quick updates of interesting and/or priority activities as well as new developments within a particular network, used to inform I&M staff of activities in other networks. Provide content for other communication efforts and products.

Audience

I&M staff, park managers, NPS employees, partners

Description

A short email containing headlines and links to more information on I&M activities, updates, and findings; see example from GLKN on the following page

Delivery Methods

E-mail distribution to Alaska NPS employees

Required Resources

Designated staff person to serve as coordinator for monthly e-bulletins; requires buy in from staff throughout region but very little extra time or other resources

Expected Responses and Outcomes

Audiences have greater understanding of I&M activities within their park, use information in decision making and planning

Evaluation Methods

As part of an annual survey on I&M communication efforts, survey internal audiences for general understanding of subjects, tally number of individuals reached

Theodore Gostomski/GLKN/NPS
05/23/2011 06:55 AM

To Abby Rambo/APIS/NPS@NPS, egan0059@umn.edu, Becky Haass/SACN/NPS@NPS, Bob Daum/INDU/NPS@NPS, Brandon Seitz/GRPO/NPS@NPS, Bruce

cc

bcc

Subject News for Parks (5/23): Invasives in MN, wolves off the list?, the second national park, new Dark Sky Park, rain boosts lakes, the return of the reef cisco

Carp-stopping dam plan killed in Minnesota House committee

A move by the Minnesota House Ways and Means Committee to eliminated funding for a carp-stopping dam at Coon Rapids on the Mississippi River has drawn sharp criticism from the Minnesota Department of Natural Resources. Source: Duluth News Tribune (5/19)

http://www.duluthnewstribune.com/event/article/id/199502/

Carp-stopping dam plan killed in Minnesota House committee.doc

Most speakers in Ashland tell feds to take grey wolf off endangered species list
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A public hearing in Ashland, Wis., to take grey wolves off the endangered species list in the western Great Lakes region drew people from Wisconsin, Minnesota, and Michigan. Source: BusinessNorth.com (5/19)

http://www.businessnorth.com/kuws.asp?RID=3930

Minnesota House OKs invasive species plan

An upgraded invasive species action plan was added Thursday to a bill that cleared the Minnesota House over objections that the overall package would weaken environmental protections. Source: St. Paul Pioneer Press (5/12)

http://www.twincities.com/politics/ci_18053871?nclick_check=1

Early signs good for Minnesota's loons

Wildlife experts and enthusiasts say there are encouraging early signs that Minnesota's loons and other migratory birds fared well while wintering in the Gulf of Mexico after last summer's massive oil spill, although they say it's too early to be sure. Source: Duluth News Tribune (5/12)

Story is already off-line.

Pruning the parks: Mackinac National Park

Though few people seem to know or care, Michigan's long-ago abolished

ALC Update

Priority
High

Purpose

To highlight and provide quick updates of interesting and/or priority activities in all Alaska networks as well as a to provide information about plans for upcoming activities; highlight priorities of networks to regional leadership

Audience

Alaska Leadership Council (regional directorate and superintendents)

Description

A brief document containing updates on network accomplishments, priorities, upcoming plans, notable events, project contacts; see example on the following page

Delivery Methods

Prepared prior to ALC meetings, distributed at meeting

Required Resources

One designated staff develops document, coordinates input from network representatives

Expected Responses and Outcomes

Target audience has a quick reference of I&M highlights across the state, can interact with I&M representatives at meetings

Evaluation Methods

As part of an annual survey on I&M communication efforts, survey target audience with satisfaction of delivered information and format

Inventory and Monitoring Program
2011 Spring Update

National Park Service
U.S. Department of the Interior

Inventory and Monitoring Program
Alaska Region

The Inventory and Monitoring Program provides consistent information about natural resources within national parks, including species diversity, distribution, and abundance; and determines the current condition of park resources and how they change over time.

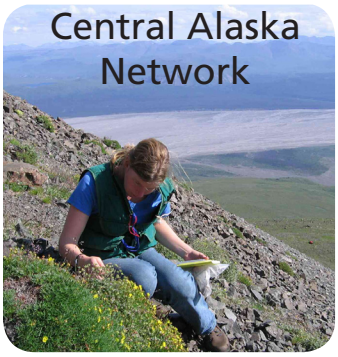
BELA KOVA NOAT CAKR GAAR

Landscape patterns report released: Historical data analyzed; in more heavily vegetated areas, 10-20% increase in greenness over past 20 years

Permafrost monitoring: Mapping shows areas of active thermokarst in NOAT and GAAR; 3D models are being developed for these target areas to better track and understand effects of melting ground ice on the landscape

GIS tool for caribou: ArcGIS extension tool developed; displays lines representing speed and distance traveled by individuals

DENA WRST YUCH



Dall's sheep monitoring: New, cost-efficient methodology developed by Central and Arctic Networks, implemented in WRST after successful implementation in GAAR

Vegetation monitoring: Completed tenth season of network-wide project; 300 permanent sampling plots installed in 2010, 1600 installed over the course of the project; Totals: measured 50,319 trees and an additional 4,350 seedlings, collected and identified 20,000 plant specimens, collected 1600 soil samples

Wolves: Structured decision making model developed for YUCH population; used to support decision by superintendent to close sport trapping season

GLBA SITK KLGO

Oceanography: Completed evaluation and re-processing of GLBA data; represents longest-running, most intact dataset from SE Alaska waters; now available online

Lichen inventory: KLGO inventory complete; 766 species identified in small 13,000 acre area; 75 species new to science discovered

Kittlitz's murrelets: Second year of monitoring complete; technical paper on methodological advances accepted for publishing in peer-reviewed scientific journal, Marine Ornithology

LACL KATM KEFJ ANIA ALAG

Vegetation monitoring: Established 37 permanent monitoring plots in LACL; these plots will be monitored annually, used to track changes related to climate change

Sea otters: Completed third survey along the Kenai Peninsula; estimated 1322 individuals; three year density average shows slightly lower density than Prince William Sound, partially a result of limited habitat along the Kenai due to steep terrain

Climate Change Response: Enhance Existing Monitoring Efforts

Glaciers:
- Develop detailed profiles of representative glaciers
- Determine volume change on glaciers in parks
- Produce illustrated guide to glaciers in Alaska's national parks

Permafrost:
- Map location and condition using landscape inventory products and modeling tool
- Monitor core ground temperatures

Seasonal changes:
- Track greenness, ice formation and break up with satellite imagery
- Support data from satellite imagery and track smaller-scale changes with time lapse cameras

Weather:
- Improve and expand historical data with new monitoring stations
- Maximize weather station use by co-locating with other monitoring efforts

Provide decision support:
- Strategic region-wide communication effort
- Structured decision making

2011 Field Season: Highlighted Plans

Arctic: Continue long-term monitoring of two populations of Muskox in BELA and CAKR (initial data shows differences in teeth wear in two populations); determine species composition in study areas

Arctic: collaborative effort to study chemistry and 'plumbing' of Serpentine hot springs will continue; represents first comprehensive study of the hot springs. Initial results of water quality testing in 2010 resulted in decommissioning of cold water intake pipeline to the springs.

Central: Complete synthesis and analysis of vegetation monitoring data, for which the tenth field season was completed in 2010. Determine trends in vegetation of all three network parks.

Central: Actively engage in monitoring 14 of the vital signs identified by the network -- the highest amount of activity since the start of the program in 2005

Southeast: As result of evaluating proposed methods of monitoring and characteristics of the unique area, develop methods for inventorying intertidal zone species in SITK

Southeast: Install additional remote weather stations in KLGO and GLBA

Southwest: Host Southwest Alaska Science Symposium in Anchorage: Crossing Boundaries in a Changing Environment, November 2-4, 2011

Southwest: Conduct fish contaminant sampling in KATM and LACL to establish baseline levels for resident lake fish; analyze for heavy metals and persistent organic pollutants

Regional Inventory program: Conduct field work for landcover and soil inventories in KLGO; Finalize landcover survey for ANIA, Conduct field work for soils inventory in LACL; acquire DEMs for all of KATM and part of DENA base cartography inventories

Communication Efforts Support Inventory & Monitoring Program

Develop formal communication plan to include audiences served, internal communication needs, and proposed methods of evaluating communication efforts among other things

Produce additional communication products to support park staff based on employee feedback

Strengthen interdisciplinary communication and collaboration efforts by actively engaging with Science & Learning Centers and the Interpretation & Education team

Increase accessibility of I&M information to internal and external audiences through organization of web-based communication tools

Natural Resources Information Portal (NRInfo)

NR Info is the beginning of a one-stop online shop for information on park natural resources including reports, GIS datasets, and species lists. It is currently in development and, when complete, will serve as both a repository and resource for park staff. This NPS-wide effort is being led in Alaska by a team effort involving the I&M, GIS, and NR teams at the regional office, park staff, and in collaboration with the Alaska Resource Library Information System. NRInfo is accessible from any government computer by typing in "nrinfo" into your web browser. Once complete, a large portion of it will be available through a public website.

Inventory and Monitoring Program Goal: improve park management through greater reliance on scientific information

Arctic Network
Jim Lawler, Program Manager
455-0624
jim_lawler@nps.gov

Southeast Alaska Network
Brendan Moynahan, Program Manager
364-2621
brendan_moynahan@nps.gov

Alaska I&M Program
Sara Wesser, Regional Coordinator
644-3699
sara_wesser@nps.gov

Central Alaska Network
Maggie MacCluskie, Program Manager
455-0660
maggie_maccluskie@nps.gov

Southwest Alaska
Michael Shephard, Program manager
644-3681
michael_shephard@nps.gov

Regional Inventories
Parker Martyn, Program Manager
644-3697
parker_martyn@nps.gov

Contact Brooke Carney for additional information on I&M communication efforts: celeste_carney@nps.gov 907-644-3695

Regional Summaries

Priority
High

Purpose

To give a summary update on a particular vital sign or other focus area being monitored by several networks across the region; to address the topic from a regional perspective.

Audience

I&M staff, park managers, NPS employees, partners

Description

Two to four page document with short paragraphs describing the importance, methods, trends, and implications of findings relevant to all audiences; see example on the following pages

Delivery Methods

Print and distribute, electronic submittal, available on internal websites and drives, post and promote on external websites

Required Resources

One designated staff person writes, formats, distributes; input from all I&M staff in region

Expected Responses and Outcomes

Audiences have a better understanding of a particular topic and how it relates to parks throughout the region, contributes to I&M's reputation as expert scientific resource

Evaluation Methods

As part of an annual survey on I&M communication efforts, survey internal audiences for general understanding of subjects, tally number of individuals reached

Resource Brief
Alaska

National Park Service
U.S. Department of the Interior

Inventory and Monitoring Program
Alaska Region

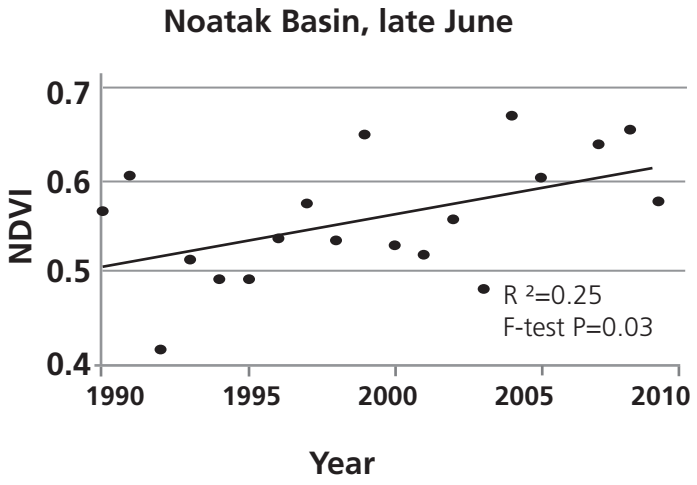
Arctic Network Central Alaska Network Southeast Alaska Network Southwest Alaska Network

Seasonal Processes and Climate Change

Background

Seasonal processes, as defined by the Alaska Inventory & Monitoring Networks, include a number of physical and biological events that occur seasonally, such as the breakup of ice on lakes or the emergence of new leaves on plants in spring. Documenting seasonal processes can help determine the effects of large scale changes in a particular area or species. To date, relatively little is known about the various seasonal processes of many species in Alaska because of the vastness and inaccessibility of much of the state. Inventory and Monitoring Networks within the Alaska region have previously identified seasonal processes as a vital sign and several networks have already begun conducting monitoring activities. *As part of the National Park Service's Climate Change Response Strategy, efforts to enhance existing monitoring programs are underway.* This multi-faceted approach integrates data collected from satellite imagery, remote cameras installed at weather stations and field observations to monitor seasonal variation in lake ice, snow cover and growing season length in Alaska's national parks.

> Increased warming is expected to result in greater variation in the seasonality of vegetation, snowpack and lake ice dynamics across Alaska.



Many sites in the Arctic, including the Noatak Basin region, above, showed a significant increase in NDVI, a measure of greenness, over the period 1990-2009. The increase in NDVI reflects an increase in plant biomass that is likely due to warming (Swanson 2010).

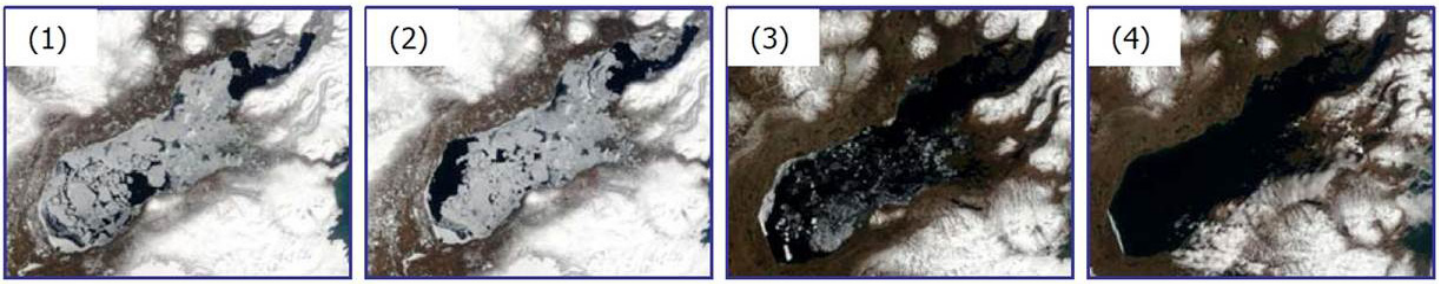
Photo: Chuck Lindsay/NPS

A National Park Service researcher installs a remote camera on an existing weather station in Katmai National Park.

Enhanced Monitoring

Satellite imagery data from Moderate Resolution Imaging Spectroradiometer (MODIS) and Advanced Very High Resolution Radiometer (AVHRR) are collected one to two times daily over Alaska and are currently being archived at, and distributed by, the University of Alaska – Geographic Information Network of Alaska (GINA). The high temporal resolution of MODIS and AVHRR data make them well-suited for regional-scale monitoring of seasonal processes. To date, MODIS and AVHRR data from the Southwest Alaska and Arctic Networks have been summarized over the periods of record for snow, vegetation (NDVI) and lake ice (2001-2008, Reed et al. 2009; 1989-2009, Swanson 2010). Enhancements to monitoring include summarizing data for the remaining two networks. Finer-scale data are being collected at a subset of sites using remote cameras installed at weather stations. The cameras are capturing daily images that will be used to monitor snowpack development, snow melt and the start and end of the growing season. Plans are in place to install additional remote cameras at weather stations throughout the region.

Finally, field observations are being used in the Central Alaska Network to describe the seasonal events of selected tree species. NPS is working with several partners to expand a species list developed by the National Phenology Network (NPN) to include Alaskan species. Field data collected in the parks will be uploaded to NPN.



Photos: Chuck Lindsay/NPS

The two sets of images show examples of data that will be analyzed to better understand seasonal processes. (a) Satellite images (MODIS) from April 15 to May 10, 2005 show ice break up on Lake Iliamna south of Lake Clark National Park. (b) Images taken by a remote camera station in Lake Clark National Park provide detail on the variation of snow cover in one winter season, which is not easily detected by satellite imagery.

Putting it All Together

Increased warming is expected to result in greater variation in the seasonality of vegetation, snowpack and lake ice dynamics across Alaska (Reed et al. 2009), which in turn may affect a broad suite of ecological processes (e.g., river discharge, wildlife foraging and movement, etc.).

The networks are using multiple approaches to enhance monitoring of seasonal processes. (1) Satellite imagery (MODIS, AVHRR) is available online through web coverage (WCS) and web mapping services (WMS) hosted by GINA, and methods for calculating seasonal metrics are being automated to the extent possible. (2) Protocols and deliverables for time-lapse data collected by remote cameras are in development using established methods outlined by the PhenoCam Network, a collaborator with NPN. (3) Methods for field data collection have been reviewed for compatibility with NPN, and data uploads to NPN will commence in the near future. (4) Expansion of the National Phenology Network's species lists to more adequately address Alaskan ecosystems is planned for 2011 and will involve collaboration with U.S. Fish and Wildlife and the Alaska Natural Heritage Program.

As a result of the expanded monitoring effort in Alaska's national parks, technical reports and interpretive materials stemming from network monitoring efforts are being developed and will be distributed to park managers, interpretative staff, the scientific community and the general public. Data summaries are expected to be updated every 1-5 years.

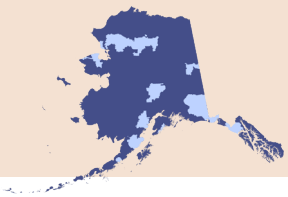
Tracking Nature's Calendar in Alaska's Parks

Satellite imagery data collected using established protocols will be combined with new data from remote cameras and ongoing collaboration with the National Phenology Network to provide a more comprehensive understanding of seasonal processes in Alaska's national parks. Satellite imagery data focuses on broad scale snow, lake ice and vegetation cover, whereas time-lapse photos and on-site observations focus on small scale events. This expanded monitoring effort will be ongoing, and should result in improved characterization of both interannual variability and long-term trends in seasonal processes.

Reed, B., Budde, M., Spencer, P & Miller, A. (2009). Integration of MODIS-derived metrics to assess interannual variability in snowpack, lake ice, and NDVI in southwest Alaska. Remote Sensing of Environment, 113, 1443–1452. doi:10.1016/j.rse.2008.07.020

Swanson, D. (2010). Satellite Greenness Data Summary for the Arctic Inventory and Monitoring Network, 1990-2009. Natural Resource Data Series, NPS/ARCN/NRDS, 2010/124.

Project contact: Amy Miller
(907) 644-3683
Amy_Miller@nps.gov
http://science.nature.nps.gov/im/units/akro/



Park Summary Reports

Priority
Medium

Purpose

To provide a detailed, park-specific report on the status and trends of vital signs, implications, and recommendations for management decisions

Audience

NPS staff, public

Description

Several formats and designs are being considered as part of a broader effort by I&M to better inform parks and park visitors about the status and trends of natural resources within a particular park; see examples from DENA and YELL

Delivery Methods

Print and online distribution, internal and public websites

Required Resources

Significant time and energy will be put into these reports, team effort by designated network and regional staff

Expected Responses and Outcomes

Audiences have a better understanding of the status and trends in a particular park, greater appreciation for the role science plays in informing management decisions

Evaluation Methods

Pilot test summary report with interested park, develop specific survey to evaluate various aspects of report

Legend for symbols used in the tables.

Management Control

- Park has high degree of control over resource condition or opportunity
- Park has moderate degree of control over resource condition or opportunity
- Park has low degree of control over resource condition or opportunity

Trend of Resource Condition or Opportunity

- Condition is improving
- Condition is unchanged
- Condition is deteriorating

Management Concern (because of condition, trend, or confidence)

- Significant concern
- Caution
- No current management concern (this may be because of resources devoted to this resource)

Confidence (in data for current or reference condition, trend, or ability to gauge management concern)

- High confidence
- Medium confidence
- Low confidence

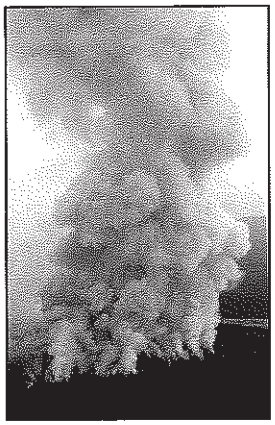
Table 1. Scores for the fundamental (coral shading) and other important (olive-green shading) park resources and values as identified in the Resource Stewardship Strategy. See explanation of symbols at left.

Park Resources and Values	Status in 2010
(1) Wildlife populations, habitat, ecosystems: The natural abundance, behavior, diversity, and ecological integrity of native animals as part of their ecosystems will be maintained. The aquatic habitat of the park and preserve will be protected to maintain natural, self sustaining aquatic populations. These lands will be managed to ensure that natural processes prevail. Human activity will not result in a decrease of wildlife viewing opportunities along the park road. The community of life is untrammeled by human activity. Wildlife populations should be natural and healthy.	⇔
(2) Wilderness resource values and wilderness recreational opportunities: Opportunities are available for solitude, privacy, isolation, and freedom from reminders of society. The imprint of human-kind's work is substantially unnoticeable (signs of human activity are limited). There are opportunities for a natural sound environment.	⇔
(3) Scenic and geologic values: Scenic and geologic values are preserved.	⇩
(4) Visitor enjoyment and inspiration from observing wildlife in its natural habitat and other natural features: Crowding issues and visual impairment from development are limited. Basic needs of the visitor are ensured. Visitors enjoy their experiences and are inspired through understanding wildlife and habitats.	⇔
(5) Historic, archaeological, and ethnographic resources: Historic and archeological sites, and the resulting identified cultural landscapes, are appropriately protected. Historic objects and ethnographic resources are appropriately preserved. The National Park Service will ensure the preservation of resources associated with native peoples whose cultural memory, traditions, and lives are closely associated with the park and its general vicinity.	⇔
(6) Paleontological resources: Paleontological resources remain unimpaired.	⇧
(7) Air quality: Denali achieves the highest attainable air quality levels and visibility standards consistent with the applicable Clean Air Act designations and the mandates specified by ANILCA and the NPS Organic Act; Denali is designated as a Class I airshed.	⇔
(8) Subsistence Resources and Opportunities: Opportunities exist for subsistence trapping, hunting, fishing, and uses of firewood and cabin logs.	⇔
(9) Scientific research, education, and interpretation about natural ecosystems and geologic features and processes: Denali serves as a living laboratory for research. Park science is shared through education and interpretation to enhance visitor experience and build relationships with park resources and values.	⇧

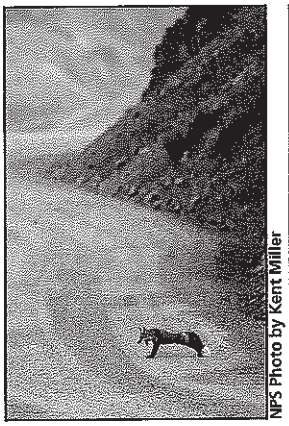
NPS Photo by Kent Miller

Seeing the behaviors of a wild bear in Denali is an unforgettable experience.

Reseachers gather data about water quality.



Wildland fire is a natural process.

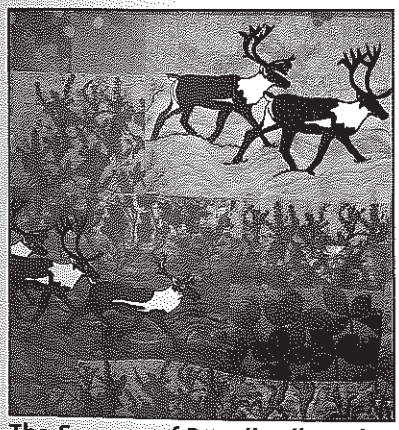


NPS Photo by Kent Miller

A red fox stretches on the Denali Park Road.

NPS Photo by Ken Conger

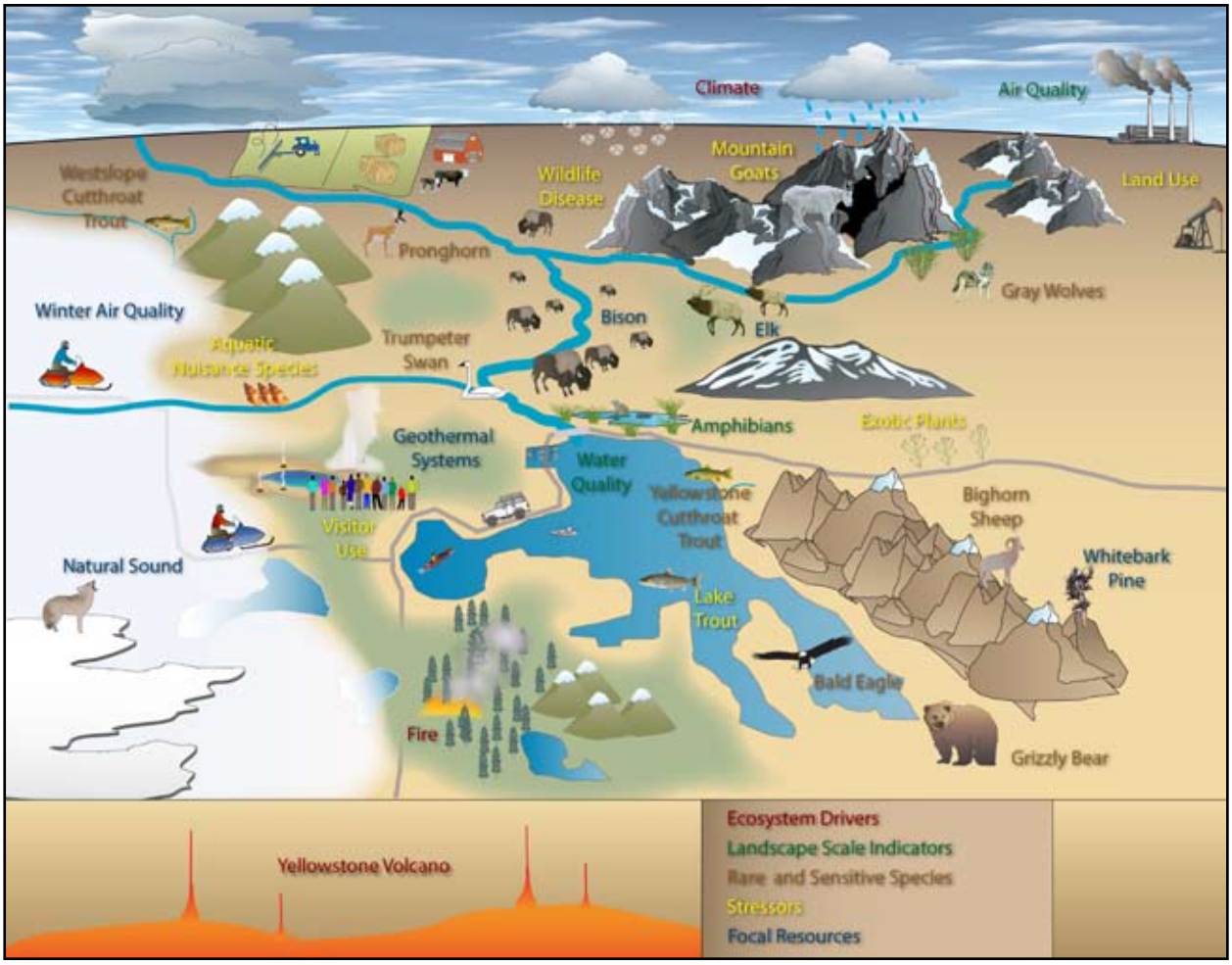
Wolves are viewed by thousands of visitors.



The *Seasons of Denali* quilt at the Eielson Visitor Center portrays the rich "fabric" of Denali's wildlife and intact ecosystems.

Table 2. Scores for the six desired conditions for *one* of the fundamental resources and values as identified in the Resource Stewardship Strategy—*Wildlife populations, habitat, ecosystems.* See explanation of symbols on page 2.

Desired Conditions	Status in 2010
(1) Wildlife populations, habitat, ecosystems: The natural abundance, behavior, diversity, and ecological integrity of native animals as part of their ecosystems will be maintained.	
The aquatic habitat of the park and preserve will be protected to maintain natural, self sustaining aquatic populations.	
These lands will be managed to ensure that natural processes prevail.	
Human activity will not result in a decrease of wildlife viewing opportunities along the park road.	
The community of life is untrammeled by human activity.	
Wildlife populations should be natural and healthy.	



This conceptual diagram of Yellowstone's natural resource vital signs begins to tell the stories of how these resources interact on the landscape.

Yellowstone's vital signs fall into five categories according to the role they play in the larger Greater Yellowstone Ecosystem (GYE).

Ecosystem Drivers: As the major forces that create and modify our parks, ecosystem drivers operate at regional, continental, or even global scales. Changes caused by these forces are likely to have cascading effects on virtually all park resources.

Landscape-scale Indicators: Landscape-scale indicators are monitored because changes they exhibit tell us something about the ecosystem or the landscape beyond their individual status or trends.

Rare and Sensitive Species: Rare and sensitive species are monitored not only because they are of high concern to both management and the public, but also because preserving native flora and fauna is core to the park's mission.

Stressors: Like ecosystem drivers, stressors are agents of change. Stressors, such as exotic species, tend to reduce biodiversity and ecological integrity, and destabilize ecosystems.

Focal Resources: These are resources that are of particular interest to management either because of concerns for that resource or because of how they might influence other resources.

The table on the following page summarizes information on selected vital signs, including the criteria used to assess them, their current condition, and a reference condition that can be used to evaluate the current condition. Several types of reference conditions are used depending on the information available (sources are listed on page 4); they are not necessarily desired future conditions.

They may be based on:

- recovery plans for endangered or recently recovered species (e.g., grizzly bears), a Record of Decision resulting from an Environmental Impact Statement (e.g., bison), or federal and state standards (e.g., water quality);
- recommendations derived from scientific literature and empirical data (e.g., Yellowstone cutthroat trout); or
- a comparison of the current condition to that of prior years (e.g., fire).

In other cases, park managers have not yet been determined a reference condition for the vital sign (e.g., mountain goats).

Each reference condition serves to inform park managers about whether a resource has changed since previous years or is approaching a threshold which indicates that more management time, energy, and effort may need to be directed toward that resource.

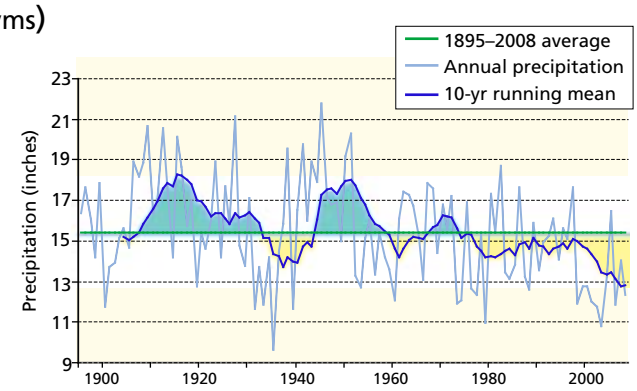
ECOSYSTEM DRIVERS

Climate (monitored by GRYN, see pg. ii for acronyms)

Within Reference Condition

Yellowstone began 2008 in a moderate drought. Although precipitation was at or above the 30-year average (1971–2000) during winter and spring, and the snowpack was near average, precipitation was at or below average during summer and early fall. Parts of Yellowstone received less than 25% of average precipitation in July. Residual moisture from late May storms combined with average to relatively cool spring temperatures and a long-lasting snowpack prevented a severe drought late in the growing season. Annual runoff at the Yellowstone River gauges was 115–120% of average, and the timing of peak runoff was near average.

Most of the year was relatively cool in Yellowstone, with maximum daily temperatures near or slightly below average. However, July and August maximums were 2–4°F warmer than average. Data collected at the park's northeast entrance indicate that the growing season (daily temperature minimums >32°F) has lengthened from an average of 88 days (1985–1996) to 115 days (1997–2008); it was 107 days in 2008. The onset of the 2008–09 winter did not occur until the latter half of December.

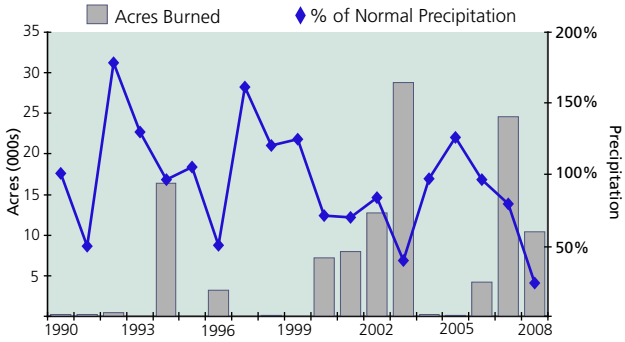


Upper Yellowstone River Basin precipitation, 1985–2008 (data from the Western Regional Climate Center, WY Climate Division 1).

Fire (YNP)

Within Reference Condition

Since 1988, fire activity has fluctuated from less than one acre per year to nearly 29,000 acres in 2003. Fires caused by human activity have been responsible for less than 2% of the burned acreage since 1990. In 2008, a total of 10,363 acres burned in Yellowstone. There were eight known wildland fire starts, of which seven were considered human-caused, including one downed power line. Three of these fires were fully suppressed and one partially suppressed, and four were managed under Appropriate Management Response and allowed to burn themselves out. A total of 165 acres were treated for hazard fuels; 30 acres through burning piles and the rest through mechanical removal.



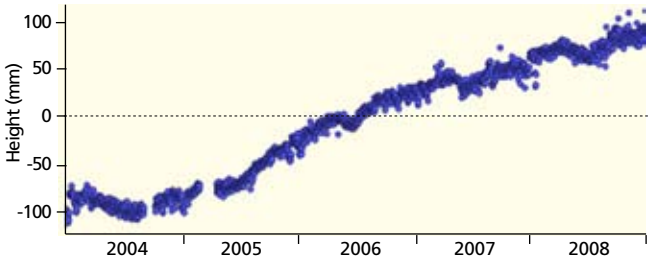
Acres burned in Yellowstone compared to summer precipitation as a percentage of the 1970–2000 average.

Yellowstone Volcano (YVO)

Within Reference Condition

The Yellowstone Volcano Observatory detected 2,317 earthquakes in the park in 2008, compared to a range of 872–3,172 per year during 1995–2007. Most earthquakes in the park are less than magnitude 3. (Earthquakes with magnitudes less than 3.4 are generally not felt by people.) From late December to early January, the northern portion of Yellowstone Lake experienced a swarm of almost 900 earthquakes with magnitudes up to 3.9. This swarm is well above typical activity in the park but not unprecedented in the last 40 years of monitoring. Earthquake swarms typically occur within the Yellowstone caldera. During a 1985 swarm on the northwest rim of the caldera that lasted for three months, more than 3,000 events were recorded with magnitudes up to 4.9.

Data from Global Positioning System (GPS) ground stations and the European Space Agency's Envisat satellite indicate that parts of the Yellowstone caldera rose as much as 7 cm per year from 2004 to 2006. The largest uplift has been recorded at the White Lake GPS station, inside the caldera's eastern rim, where the total uplift from 2004 to October 2007 was about 17 cm. Given the area's geologic history, YVO scientists think that the current period of uplift will likely cease and be followed by another cycle of subsidence. Norris Geyser Basin, which uplifted 12 cm from 1996 to 2004, has subsided 6 cm since 2004.



Vertical uplift at the White Lake GPS station, 2004–08.

I&M Website Content

Priority
High

Purpose

Provide central location for network or program specific information: summaries, photos, data, reports, communication products, etc.

Audience

All - internal team, direct audiences, indirect audiences

Description

I&M Network websites serve as central communication tool for technical and non-technical audiences and partners, houses summary information on vital signs, inventories and other activities, online data, archived reports, interactive tools

Delivery Methods

Public websites; information housed on Natural Stewardship and Science server, Ft. Collins, CO

Required Resources

Data manager for each network serves as web coordinator as designated by the national I&M program

Expected Responses and Outcomes

Audiences have a better understanding of the role of I&M networks, the projects they work on, status of programs, trends detected; audiences are able to navigate through sites easily

Evaluation Methods

As part of an annual survey on I&M communication efforts, survey target audience with satisfaction of delivered information and format

Multi-Media

Priority
High

Purpose

Convey messages by means other than traditional written or spoken products to enhance overall communication effort

Audience

All - internal team, direct audiences, indirect audiences

Description

Audio, video, or interactive communication tool, such as podcasts, vodcasts, interactive web tools, etc

Delivery Methods

Varies widely depending on product

Required Resources

Varies widely depending on product

Expected Responses and Outcomes

Audiences have a better understanding of the projects and efforts to monitor natural resources by I&M

Evaluation Methods

As part of an annual survey on I&M communication efforts, survey target audience with satisfaction of delivered information and format

Non-Technical Articles

Priority
High

Purpose

To communicate an interesting find or newly updated status and/or trend of a particular vital sign, to communicate about a new project, or to otherwise highlight a particular aspect of an I&M effort.

Audience

Varies

Description

Press releases, feature stories, program highlights, and other written communication intended for a non-technical audience

Delivery Methods

Varies; used established media outlets, newsletters, etc.

Required Resources

Communication team shares writing and distribution tasks as needed and appropriate

Expected Responses and Outcomes

Audiences are more informed of park resources; contributes to the broader NPS mission of educating public

Evaluation Methods

Tally number of news outlets using story, readership of outlet, tally of times the article is accessed (using web analytics) or other appropriate method

Interpretive Programs, Products

Priority
Medium

Purpose

Provide scientific information to partners tasked with interpretation and education duties; contribute to public education products, programs, and exhibits

Audience

Partners, park visitors, general public

Description

Varies greatly but may include summarizing information, brainstorming sessions, editing programs or publications for accuracy

Delivery Methods

Varies widely depending on final product

Required Resources

Communication Team coordinates, all I&M staff contributes - highly dependent on particular project. Participation in Education Advisory Group (EAG) and other related working groups highly encouraged.

Expected Responses and Outcomes

Audiences are more informed of park resources; contributes to the broader NPS mission of educating public; contributes to I&M's reputations as an expert scientific resource

Evaluation Methods

Varies widely, to be determined by partner in charge of final product and results shared with I&M staff

Websites: Parks, Alaska Region, NPS

Priority
Medium
Low

Purpose

Educate users on mission of the NPS and associated activities, including content on all aspects of the NPS; serves as virtual gateway to national parks and related programs

Audience

Broad audiences, general public, park visitors

Description

High priority Service wide, but outside of the realm of responsibility for I&M; National Park Service website, Alaska Regional website, parks' websites

Delivery Methods

Web-based, ongoing; includes audio/visual components and social media components

Required Resources

Significant and widespread; primary responsibility lies with internal partners with input from I&M staff

Expected Responses and Outcomes

Increased understanding of importance of scientific monitoring in parks and increased appreciation for science conducted in parks via more "nature and science" based content on all sites

Evaluation Methods

To be determined, will vary for each of the sites described, work with partners to determine how to evaluate

Social Media

Priority
High

Purpose

Engage various audiences in news and events, highlight program and work, direct to more in-depth information on websites

Audience

Park visitors, general public, subscriber-based in most cases

Description

Largely depends on social media outlet, and includes Twitter (conversation based: share headlines and links to stories, pictures, videos, etc), Facebook (posting of pictures, news feeds, etc), YouTube (host and share video files), Flickr (host and share image files), iTunes (share audio and video files hosted by outside source).

Delivery Methods

Online and ongoing, exact methods depend on specific outlet

Required Resources

All staff provide content, communication team summarizes and shares. Participation in social media streams highly encouraged.

Expected Responses and Outcomes

More informed audiences, more traffic to websites, contributes to overall awareness and understanding of NPS as expert and resource of scientific information

Evaluation Methods

Review web analytics

Appendix F: NPS Employee Survey

As part of the science communication planning effort for the Alaska I&M Program, a survey was developed to gain input from National Park Service employees throughout the Alaska Region. The survey questions were based on background research by two I&M staff members. The survey was introduced to regional staff in an AK Today announcement and circulated via email. The goal of the survey was to gain a better understanding of the following:

- Awareness of and familiarity with the I&M program
- General preferences for receiving internal information
- Types and evaluation of I&M communication pieces received
- Opinions on delivery methods, formats and subject matter of communication products received
- Open-ended thoughts on I&M communication efforts

Summary

An email containing an introductory paragraph and the survey link was delivered to approximately 700 employees (number of employees based on a May 2011 employee roster). The survey was open for ten days and 242 responses were collected for a response rate of 35%. The response rate is average for online surveys according to Smart Survey Design, a guide produced by Survey Monkey.

Of participants who have received information from I&M, most have received information via resource briefs and/or oral presentations at meetings or conferences. The evaluation of information received was fairly high. Based on five parameters and on a scale of 1 to 5, the average score was 3.87. However, two areas ranked lower than the rest (3.65) and show room for improvement – timeliness and accessibility.

When asked what types of information is preferred, the majority chose updates (quick briefings on current findings) and trends (are things changing, and if so, in what direction based on long-term datasets). Answers to a question on topics that are of interest spread across a broad spectrum from wildlife to soils and are fairly aligned with the vital signs chosen by each network.

Trends that emerged in open-ended comments throughout the survey include the need for timely information, information that is applicable to park management or programs outside of I&M (answer "so what?"), information that "cuts to the chase" and elicits the appropriate reaction, and the need for fluid internal communication and a strategic approach to communication on a regional scale. Clear (and recurring) explanation on why I&M does not announce results with full confidence on a frequent basis seems like it might be useful as well. A reminder (or introduction) to the scientific process may be helpful to folks with a non-science background. The challenge will be doing this in a way that is captivating and that resonates with the audience. A basic understanding of the scientific process and I&M's approach may greatly assist interpretive staff and other internal users in applying I&M data to their jobs and/or programs. I&M can give suggestions on prefacing the use of data with the idea that we are basing current activities on best practices and our understanding to date, but that drawing conclusions without statistical significance is just plain bad science. For example, determining trends takes time and this is why, but here is what we understand to be true at this time and this is a way you can use the information without drawing unsupported conclusions.

Answers are summarized for each question listed below.

<u>Employment type</u>: 77% of participants are permanent employees

Location: 27% of participants work in the regional office, 16% work at Denali, remaining 57% work at remaining locations with YUCH, GLBA, WRST, KEFJ having an average of 20 responses, or 8-9% each
Program or office: 40 responses (16%) came from natural resources staff; cultural resources, education and interpretation, law enforcement and maintenance provided about 27 responses each; 18 responses came from I&M staff; 14 responses came from park administration; and 10 responses were provided by the directorate.
General preferences on receiving internal information: group or selective recipient email ranked the highest (144 responses, 60%) followed by AK2Day (120 responses, 49.6%) and mass email (98 responses, 41%)
Familiarity with the I&M Program: 42% are somewhat familiar with I&M, 25% are actively involved with I&M, 18% of the participants are not familiar with the I&M program, and 14% are not familiar with I&M
Receipt of communication products from I&M program: 45% yes, 19% yes, but sought it out on their own, and 36% no. After answering this question, participants were sent to two different pages based on their yes or no answers.
Information received from I&M: If participants answered yes to question 6 (directly or own their own), they were asked to list what they have received.

Answer Options	Response Percent	Response Count
Resource Briefs (print or electronic form)	62.2%	92
Project specific annual reports	55.4%	82
Project specific technical papers	41.2%	61
Network newsletter (print or electronic form)	49.3%	73
Network email	40.5%	60
Email or other prompt to visit internet links provided	48.6%	72
Inside NPS announcements or updates	31.1%	46
Oral presentations at meetings or conferences	58.1%	86
Regional I&M program website	36.5%	54
Arctic Network website	30.4%	45
Central Alaska Network website	36.5%	54
Southeast Alaska Network website	22.3%	33
Southwest Alaska Network website	31.1%	46
Other (please specify)		10
answered question		148
skipped question		94

Comments:

Video program in our Information Center
Also like brown bag sessions!
cannot recall
collection related
informal interpersonal communications
National I&M websites

National I&M Program Website
can't remember, it has been a while
exchange of project information with project heads
Meetings and casual conversations with I&M folks

Rank information received: Survey participants who have received information from the I&M program were asked to collectively rank the information they have received on a scale of 1 to 5, 5 being the highest and 1 being the lowest. Open-ended responses are also included below.

Useful as it relates to your job and/or programs:	4.05
Informative:	4.25
Timely:	3.65
Accessible:	3.64
Appropriate amount of technical information:	3.78

Comments:

Everyone is working on important work - and we can't know everything about everyone's projects. That's why I like routine updates or form of announcement if there's a crisis.

don't really read the information as it doesn't pertain to my job, unless it's announcing meeting that the directorate would attend

The main issue I have as a manager is that briefing statements would be nice - something that cuts to the chase and lets me know whether or not I need to go visit the site, be on the web conference, etc. Time is really precious and this would help me filter what information I need most.

The charts are useful for explaining trends and the field pictures are great for demonstrating the technical applications of their research.

What's often missing is "how" the information may be used in a proactive manner, our how it can be made applicable to other parks/programs.

too little, too late, thus not helpful

Sometimes from contractors who may not have the best data to share

Do not always receive all project specific reports for archiving in park unit collections.

As a new program, it has potential to provide very useful, informative products, but to my knowledge, has not yet done so.

I've worked as an educator for several NPS partner organizations, and used I &M publications/information; my current position in NPS admin requires me to be a trained monkey, so I'm answering for previous jobs :-)

I want easily accessible, easily digestible status and trend info. Trends take a while to report on, so they probably won't be timely until they are routine.

Highly variable according to project - some go out of their way to deliver updates, others never provide them. The people in Anaktuvuk Pass (AKP) see the projects operate out of the village, and then they want to know what the results were. As the only onsite NPS staff, I am held accountable for trying to obtain that info, and it affects public perceptions when I am unable to do so.

No information received, thoughts on what would be useful: Participants who said they have not received information from I&M were asked to choose communication products that might be useful to them. Choices were pretty spread out across options and don’t tell us much. (The top

two choices were quarterly newsletters and I don't know.) Two interesting comments were included, though, and they are listed below.

Comments

region today via e-mail as I see it 90% of the time
response from researchers for information that can be put into our
Denali fact sheets

Opinions on types of communication and subject of communication: The last section of the survey asked opinions of all participants on types of communication products and areas of interest. Answers to these three questions, with attention given to the open-ended comments provide valuable information about the methods of communication to include in the I&M communication plan.

What types of information from the I&M Program would be useful to you? (choose all that apply)

Answer Options	Response Percent	Response Count
Updates – quick briefing of current findings	82.5%	189
Summary averages - annual/seasonal/monthly/daily	52.4%	120
Current status - based data to date	41.0%	94
Trends - are things changing and if so in what direction, based on long-term datasets	70.3%	161
Data – links to processed I&M data sets	32.3%	74
Lists – species lists	37.1%	85
Bibliography – list of published reports and articles related to I&M	33.2%	76
Other (please specify)		15
answered question		229
skipped question		13

Comments

less process, more results
Depends on the issue - overall updates that include trends, summaries pertinent to what it is you think I need to know.
photos of researchers at work, IARs completed with useful information
original reports and all associated data for projects within a particular park
FYI emails to all park staff when I&M staff plan on being in park
Information on products such as models used for analyses
projects goals, methods and locations, shp.files
custom maps, but not in shapefile format
project specific reports

If graduate students are working with I&M as their thesis or dissertation, a copy of that thesis or dissertation when completed would be interesting to me.

What subject areas interest you and/or relate to your job? (choose all that apply)

Answer Options	Response Percent	Response Count
Vegetation	70.3%	161
Wildlife	81.2%	186
Geology	59.4%	136
Climate	78.2%	179
Water resources	63.8%	146
Coastal resources	58.5%	134
Mapping resources	65.1%	149
Other (please specify)		17
answered question		229
skipped question		13

Comments

ecological trends
ALL
fisheries
Fish
none.
Anything to help us better understand what the physical protection needs of our areas are.
visitor use social science/human impacts
Anything concerning facility management
glacier research
anything that might affect cultural resources
Weather info (snow levels in particular) is useful, as is river levels.
Park assets- so that the relationship of natural resources and the built environment may be analyzed.
The things I am supposed to be protecting. Endangered species, ARPA, paleo sites etc.
Cultural resources
Visitor impacts
None
Soils

Please provide any additional comments related to the communication of scientific information to NPS employees.

The most useful and informative means of receiving information about research going on in Denali is the speaker series through the Murie Science and Learning Center. I think having the researchers there explaining data or data to be collected is engaging and helpful.
Just be careful if considering email announcements - for most of us, managing our inbox is a constant challenge.
will be getting info at seasonal orientation next week in Nome/BELA

Am interested in KLGO-specific information
As I work mostly on documents for general public audiences I can make most use of information that is legible...by the non-ecologist reader. Statistically obtuse research that has no clearly understandable results doesn't help me or the general reader.
SEAN did a spectacular job on oceanographic dataset availability, I just have not had occasion to use it yet.
From the public affairs perspective, timeliness and context are major concerns. Finding out about work or results a year after they happen makes it harder to engage the public. And, to be engaged, we need to answer the "so what?" question -- why are the results we have important.
collaboration with park-based communication efforts would be ideal. sometimes we have different audiences then networks do, and having information to share is important; sometimes I have great difficulty in getting information about CAKN findings and updates to share in our Denali publications
It feels like I get most of the I&M stuff through RM staff who know I have an interest. It would be nice if your briefings were more widely publicized.
I would really like to see the I&M program work more closely with curatorial staff in each park. Anything that is collected within the boundaries of a national park is federal property and is tracked via the museum program regardless of where the collections reside. In addition, if no collecting occurred, the report and/or associated information is also tracked through the museum collection. I think with increased communications the two programs can work successfully together to accomplish everyone's goal.
All disciplines relate to all of our jobs, otherwise someone wouldn't be getting paid to do it for the organization. Insight and issues from the Admin, Cultural, Maintenance, Law Enforcement, Interp, Concessions, etc perspectives are essential supplements to a purely scientific / natural history outlook ...especially when trying to "manage" based on science it's important to be disciplinarily multilingual to make sure it's an enticing start to a dialog rather than a dogmatic monolog?
I ask that the networks work closely with park interpretive staff to development visitor friendly products and to better inform intepretive staff.
I am usually too busy to take the time to appreciate the effort put into this sort of a project, but I also realize the necessity of the data.
Need info to inform park planning.
Perhaps coordinating with region wide Interpretation programs to ensure that interpreters are receiving up-to-date annual training.
Chuck has been an incredible asset to KEFJ.
Need assistance in making the scientific information collected and analyzed connect to physical protection programs and what can further be done on the ground by other park programs to put the science to work.
I'd like to be more involved with the I&M program. I am involved in Fire Weather and Fire Danger forecasting.
Our mission statement is all about I&M. It's a very important resource to keep us updated!
Keep it coming....
Having staff dedicated to the communication of I&M generated scientific information would be very beneficial and would only add additional value to an already valuable

dataset!!!
Nice concept
Information provided is not specific enough on your findings
I am involved in many I&M field operations because I review them for compliance with cultural resources laws and regulations.
Science informatin needs to be used by management, and evidence (examples) of such use needs to feed back to I&M program, managers and public.
Use AKRO entry screens and AK2Day to advertise new I&M meeting schedules and recent report releases .
I&M should provide a spreadsheet of specimens/samples/collections made every year and final reports when available to the appropriate curatorial division for archiving.
Would like to see a better means of insuring that collections information & project reports make their way to museum collections for archiving.
It'd be good if research results emphasized how the data could be used for park/resource management. This might help make the data accessible and useful to managers and the public.
Currently, I do not have a clear idea of what information is available through I&M, I look forward to learning more.
Thank you for sharing I&M info.
Sell non-I&M employees on the importance of the information... the "so what?" but I'm sure this is already being done.
I am often impressed by the quality of accessible yet in-depth information offered by IM puiblications--keep it up!
I feel like there are too many places to look for information. It feels competitive rather than complementary (parks, networks, region, RLC, etc). There's not a common approach agreed on by all, but lots of individual efforts. The networks are visibily distinct from the RLCs which may makes sense to nps folks, but not to visitors and partner science folks (in my opinion).
Where does I&M fit in the larger picture of NPS communicating scientific information. We need the larger dialog to answer that.
Please see comments on page 2.
Each network has a well developed website. It would be good to receive periodic notices via email with a brief summary of "what's new!"
We need more internal communication between networks below the level of the network coordinator. Inter-network discipline specific working groups that would meet regulaly would be great. External communication seem better in comparison.
Call me to discuss - Dave Schirokauer 983-9228
A lay person's synopsis would make the material more easily transferable to the public. What the data might mean to the public would help as well.
I am a museum curator and although I am technically listed under Cultural Resources, I manage a natural science collection and perform reference functions for researchers. I've only been here a few months so I haven't had much opportunity to interact with I&M in this region. An orientation to available resources that I could use to help researchers would be fantastic.

Appendix G: Useful Resources for the Internal Team

Maibach, Edward. Global Warming's Six Americas 2009: An Audience Segmentation Analysis.

Baron, Nancy 2010. Escape from the Ivory Tower: a guide to making your science matter. Island Press.

Bubela, T et al 2009. Science Communication Reconsidered. *Nature Biotechnology* 27, 514 – 518. doi:10.1038/nbt0609-514

Burns, TW, O'Connor, DJ, Stocklmayer SM 2003. Science communication: A contemporary definition. Public Understanding of Science 12:183–202.

Christensen, LL 2007. The Hands-On Guide for Science Communicators: A Step-by-Step Approach to Public Outreach (Springer, New York).

Dickinson, D 2004. Science and Technology Communication for Development. PLoS Biol. 2004 January; 2(1): e11.

Ford, Matt 2009. Successful science communication: A case study. Online article for Nobel Intent.

Mayer, RE 2008. Applying the science of learning: Evidence-based principles for the design of multimedia instruction. Am Psychol 63:760–769.

Meredith, Dennis 2009. Explaining Research: How to Reach Key Audiences to Advance Your Work. Oxford University Press.

Mooney, Chris and Kirshenbaum, Sheril 2009. Unscientific America. Basic Books.

Nisbet, MC, Scheufele, DA 2009. What's next for science communication? Promising directions and lingering distractions. Am J Bot 96:1767–1778.

Olson, Randy 2009. Don't Be Such a Scientist: talking substance in an age of style. Island Press.

Palmer, JW 2002. Web site usability, design, and performance metrics. Inf Syst Res 13:151–167.

Pieke, Robert 2009. The Honest broker: Making Sense of Science in Policy and Politics. Cambridge University Press.

Rogers, CL 2000. Making the audience a key participant in the science communication process. Sci Eng Ethics 6:553–557.

The Department of the Interior protects and manages the nation's natural resources and cultural heritage; provides scientific and other information about those resources; and honors its special responsibilities to American Indians, Alaska Natives, and affiliated Island Communities.

NPS 965/111439, October 2011

National Park Service
U.S. Department of the Interior

Natural Resource Program Center
1201 Oakridge Drive, Suite 150
Fort Collins, CO 80525

www.nature.nps.gov