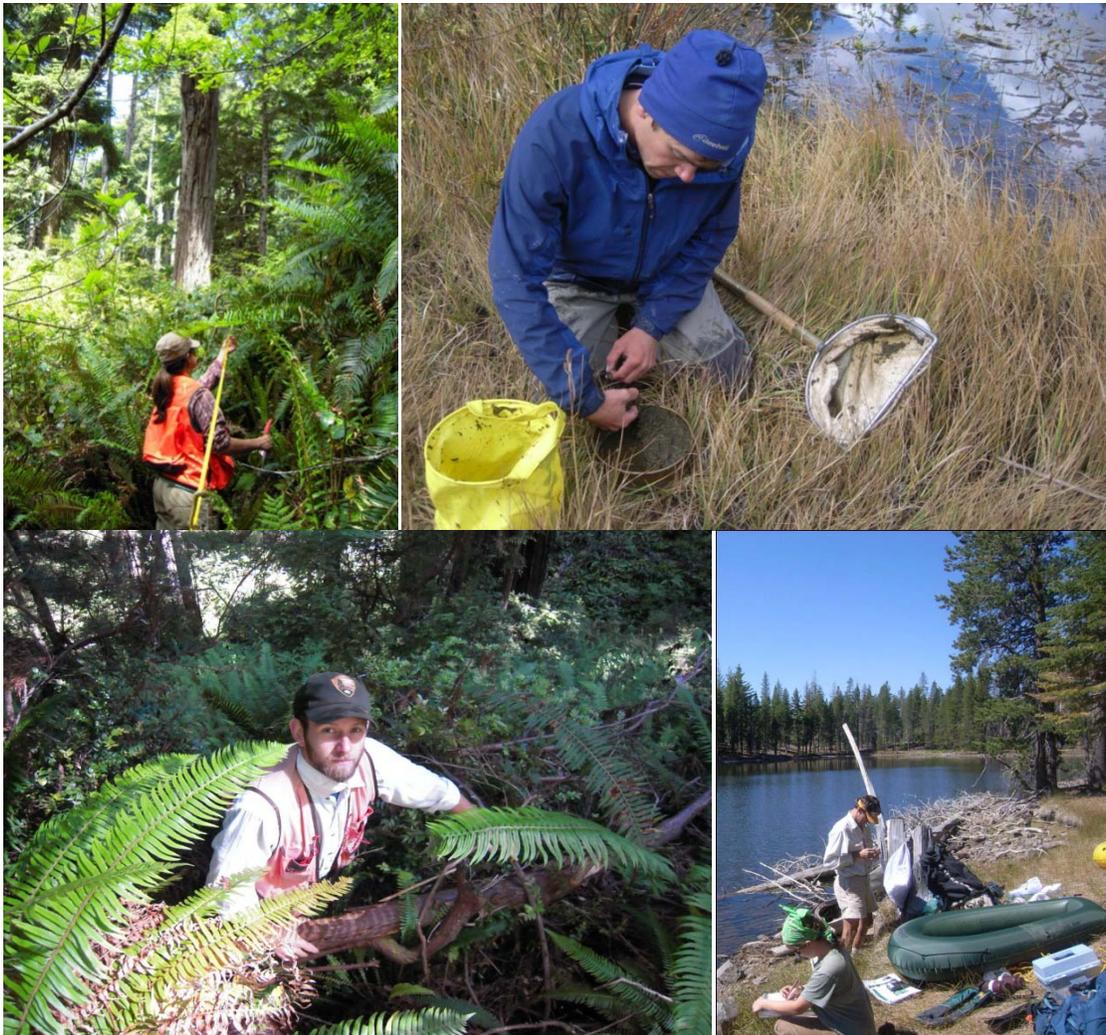




Science Communication Plan for the Klamath Network Inventory and Monitoring Program

Internal Report for Klamath Network, Version 1.0



ON THE COVER

Field crews conducting vegetation and aquatic monitoring in parks of the Klamath Network.

Science Communication Plan for the Klamath Network Inventory and Monitoring Program

Internal Report for Klamath Network, Version 1.0

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Executive Summary

In response to a need for more information about the condition of resources in national parks, the Natural Resource Challenge established a National Park Service-wide Inventory and Monitoring Program to expand existing resource inventories and develop efficient ways to monitor the vital signs of natural systems (NPS 1999). Through the Challenge, 270 parks in the national park system were organized into 32 inventory and monitoring networks of parks. The Klamath Network (KLMN) Inventory and Monitoring (I&M) Program includes Crater Lake National Park, Oregon Cave National Monument, Lassen Volcanic National Park, Lava Beds National Monument, Redwood National and State Parks, and Whiskeytown National Recreation Area.

A key component of this program is communication of inventory and monitoring results to a variety of audiences, with the primary target audience being park staff who need natural resources information to manage resources, plan future activities, and share information with the public. While the KLMN I&M Program staff have already been communicating with park staff and other audiences in a variety of ways, this plan is intended to help focus limited resources on communication activities and products that best meet the network's goals and objectives. Development of the plan was informed by input from park staff at a science communication workshop in December 2011, a survey of park staff, and comments and suggestions from park and I&M staff on drafts of the plan.

We outline the Klamath Network's communication goals and objectives. Following are the goals that we developed with park staff input:

1. Park staff members are better informed about the status and long-term trends in vital signs from the Klamath Network Inventory and Monitoring (I&M) Program; they can access current information at the level of detail they need.
2. The Klamath Network I&M Program builds upon existing collaborative relationships with parks and the greater scientific community to better integrate I&M information into park management, planning, interpretation and research.
3. The Klamath Network and park staff members work together to inform a diversity of public audiences about natural resource inventory and monitoring approaches, results and applications to resource management needs. Where possible, linkages are made to larger strategic NPS initiatives.
4. The varied audiences for Klamath Network I&M information understand the importance of monitoring natural resources and why particular vital signs were selected to monitor. The Klamath Network I&M Program is a trusted source for current, relevant scientific information.

We describe the specific communication approaches KLMN I&M Program staff will use to share information. These address the goals and objectives of this plan and can be categorized into technical products that meet scientific peer-review standards, products and activities to connect inventory and monitoring information to park management needs, and products that make information accessible to a variety of public audiences.

The technical products include: Monitoring protocols, analysis and synthesis reports, peer-reviewed journal articles, tabular and spatial data products, and presentations at scientific meetings.

While the technical products may be useful to resource managers in KLMN parks, additional products are needed to make I&M information more broadly accessible to park staff. Most of this plan focuses on reaching park audiences with the following products and activities:

- Annual reports and analysis & synthesis reports
- Resource briefs on projects and overall program
- Newsletters
- Annual administrative reports and work plans
- Web pages
- Linkages to data, maps, and other documents in on-line I&M database
- Featured Creatures
- Presentations in parks and posters to display periodically in parks
- Thematic symposia organized with parks
- Field days
- List-serve to send out program highlights and updates

We describe the following activities or products to reach general (non-technical) public audiences:

- Communicating and working with park interpreters – This is the primary means of reaching public audiences.
- Resource briefs
- Web pages and engaging media such as short videos on inventory & monitoring projects
- Occasional presentations at public venues and scientific conferences

We discuss the administration and implementation of the communication program, roles and responsibilities of KLMN I&M Program staff, and timelines for products. Finally, we identify some possible approaches for evaluating the effectiveness of communication efforts.

This plan is intended to be dynamic and responsive to changes in KLMN program capacity, lessons learned along the way, new technologies and communication opportunities, and park needs.

How to Use This Plan

This plan provides the context, framework, and specific approaches for science communication in the Klamath Network Inventory & Monitoring Program. The purpose and content of the individual chapters are briefly described below so that readers can evaluate which chapter or chapters will provide the information they need and focus on specific areas of the plan rather than reading it all. In addition, there are six appendices with more detailed information that are served on the KLMN website: <http://science.nature.nps.gov/im/units/klmn/index.cfm>.

Chapter 1: Background

This chapter provides brief overviews of the NPS Inventory & Monitoring (I&M) Program and the Klamath Network I&M Program. It answers the question of why a science communication plan is needed, and gives one specific example of a previous effective science communication collaboration between the KLMN I&M Program staff and PWR and park interpreters. (Length: 4 pages)

Chapter 2: Purpose, Goals, and Objectives

We provide a short purpose statement, four communication goals, and action-oriented objectives under each goal. The goals and objectives provide the framework for this plan. (Length: 3 pages)

Chapter 3: Elements of Effective Science Communication

This chapter reviews the different layers of scientific information that provide the foundation for science communication, defines primary and secondary audiences for I&M information at the Klamath Network, provides helpful themes that emerged from a national survey of I&M science communication efforts, and highlights the communication approaches found to be most effective in other I&M networks. (Length: 5 pages)

Chapter 4: Local Process: Park Staff and Plan Development

In this chapter, we describe how local park staff were engaged in the development of this plan. Their involvement included participation in a December 8, 2011 science communication scoping meeting, a science communication on-line survey, and reviews of draft chapters of this document. We provide highlights from the workshop and the survey and discuss some implications of park staff input for the KLMN I&M Program communication priorities and approaches. (Length: 5 pages)

Chapter 5: Communication Approaches

We describe the specific communication approaches that will be used to meet the Network's goals and objectives, and the goals are used as an organizing framework for the chapter. The approaches range from written and digital products that the Network has already been producing to new communication activities that are intended to provide more direct engagement with park staff, such as periodic symposia and field days. To the extent possible, the purpose, content, time frame, audience, and responsible parties are described for each approach. A separate section gives an overview of communication roles and responsibilities for each network staff member. A summary tabular version of this chapter is available as Appendix D. (Length: 26 pages)

Acknowledgments

We thank all of the Klamath Network I&M and park staff who participated in a science communication scoping meeting in December 2011, took an on-line survey, and/or provided review comments and feedback through the process of developing this plan. We especially thank Mac Brock, Sean Denniston, Karen Haner, and Terry Harris who provided consistent feedback through the development of this plan. Sean Mohren provided information related to data management and web page management and provided a helpful review of the entire plan. There is clearly a strong interest in sustaining and building upon the relationships and communication efforts already underway between the I&M Program and parks in the Klamath Network.

1. Background

The National Park Service (NPS) has developed an Inventory & Monitoring (I&M) program to provide baseline data through inventories of park natural resources and to design and implement long-term monitoring that will enable managers to develop scientifically sound information on the current status and long term trends in park resources (Fancy et al. 2009). As part of the National Park Service's effort to improve park management through greater reliance on scientific knowledge, the I&M Program collects, organizes, and presents natural resource data in ways that are appropriate for a variety of audiences (Fancy et al. 2009).

More than 270 NPS units are organized into 32 inventory and monitoring networks, grouped by ecoregion and natural resource similarities. The Klamath Network (KLMN) includes the following six NPS units located in southern Oregon and northern California: Crater Lake National Park (CRLA), Oregon Cave National Monument (ORCA), Lassen Volcanic National Park (LAVO), Lava Beds National Monument (LABE), Redwood National and State Parks (REDW), and Whiskeytown National Recreation Area (WHIS; Figure 1).

The Klamath Network conducted biological inventories from 2001-2006. Natural resource inventories are extensive point-in-time surveys to determine the location or condition of a resource, including the presence, class, distribution, and status of biological resources such as plants and animals, and abiotic resources such as air, water, soils, landforms, and climate. The primary purpose of natural resource inventories is to assess and document the current condition and knowledge of natural resources in the parks (NPS 2012a).

KLMN prepared a long-term monitoring plan (Sarr et al. 2007) that provided the framework for developing and implementing the monitoring program. Currently the Network is developing and implementing specific monitoring projects or protocols for resources of special concern to Klamath Network parks. Ultimately, KLMN will be monitoring 10 vital signs, or indicators of ecosystem condition (Table 1).

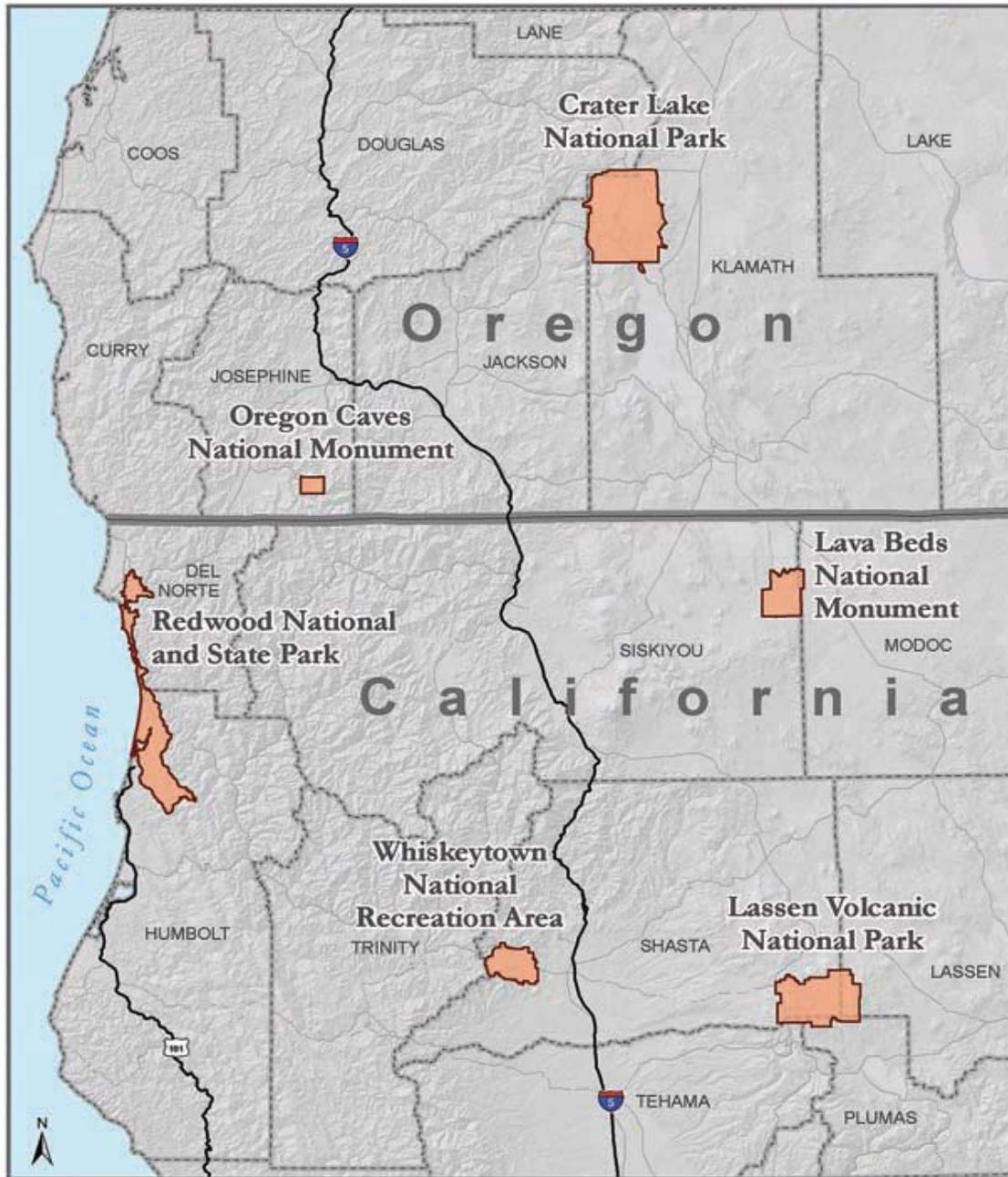
Table 1. List of vital signs in the Klamath Network and park units where they are monitored.

Vital Signs	Parks
Bird Communities	All
Cave Entrance Communities Cave Environmental Conditions	LABE, ORCA
Intertidal Communities	REDW
Land Cover	All
Non-native Species	All
Terrestrial Vegetation	All
Water Quality and Freshwater Aquatic Communities	Lakes - CRLA, LAVO Streams - CRLA, LAVO, ORCA, REDW, WHIS
Whitebark Pine	CRLA, LAVO

Overview Map

Klamath Network National Parks

National Park Service
U.S. Department of the Interior



Map Prepared by: Chris Zanger, NPS; Version 1.0,
Aug 14, 2007
Data Sources: Klamath Network, NPS
NAD 1983, UTM Zone 10

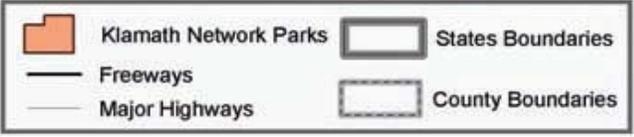


Figure 1. Distribution of Klamath Network NPS units in Oregon and California.

KLMN staff and their cooperators develop study plans (or monitoring protocols) to provide detailed instructions for all participants involved in monitoring vital signs, from field technicians to data analysts and project leaders. Each year, a rich array of information is collected about the KLMN vital signs. To make this information useful to park managers and other audiences requires a commitment to comprehensive data management, reporting, and communication with parks.

We developed this communication plan to help ensure that the inventory and monitoring data being collected will be summarized, synthesized, and reported to park staff and other audiences in a timely manner and in readily accessible, useful formats.

Why Do We Need a Science Communication Plan?

The purpose of this communication plan is to formalize KLMN's communication strategies and to ensure that the KLMN I&M staff are reaching key audiences with the results, reports, and compelling stories that inventory and monitoring data provide. The I&M Program vision is that long-term monitoring data be used for management decision-making (e.g., comparing estimates of current condition for key resources with desired conditions as part of developing management strategies), and for informing policy makers and the general public about natural resource status and trends (Fancy et al. 2009).

In other planning documents, the Klamath Network I&M staff have described important elements of information management and communication, including data management (Mohren 2007), an overall framework for analysis and reporting (Sarr et al. 2007), and more specific data analysis and reporting requirements for specific monitoring protocols (Ammann and Raimondi 2008, Dinger et al. 2009, Krejca et al. 2010, Odion et al. 2010, 2011; Stephens et al. 2010, Dinger et al. 2011, and others still in development). This plan provides a framework and context for all of the network's communication needs and activities. It will detail the specific approaches that enable KLMN to address the following:

- ***Integrate natural resource inventory and monitoring information into National Park Service planning, management, and decision making (I&M Program Goal 4).***

I&M Actions: Employ approaches targeted at specific park information needs and use existing park communication opportunities, when feasible. Where appropriate, participate in park planning meetings and provide I&M-information relevant to resource management needs.

- ***Share National Park Service accomplishments and information with other natural resource organizations and form partnerships for attaining common goals and objectives (I&M Program Goal 5).***

I&M Actions: Participate in local and regional meetings or conferences and seek opportunities to share information and collaborate with other agencies, universities, and non-governmental organizations.

- *Keep program relevant to park staff needs.*

I&M Actions: Do frequent and varied types of communication and periodic evaluation.

- *Clearly articulate KLMN communication plans.*

I&M Actions: Identify communication approaches, responsible parties, and time frames so that park staff members know the details of how I&M staff will communicate information to them and outside audiences.

While written products are critical to document and report on inventory and monitoring projects, a very important outcome of a dynamic science communication plan is strong working relationships between I&M and park-based staffs. These relationships must depend upon familiarity, good will, responsiveness, and trust over the long-term. In addition to articulating the details of specific communication products, this plan will also address approaches for building and sustaining working relationships with park staff.

An Example of Communication Collaboration Between I&M and Parks

One example of a project the Klamath Network has done that helped build relationships with park staff was the Strategic Interpretive Plan (NPS 2005, Figure 2). This effort brought together I&M and interpretive staff, defined common ground between interpretive themes and I&M information, and created products to facilitate information transfer from I&M projects to interpreters and other park staff. Southern Oregon University was also a partner in this effort, as students were involved in creating some of these products, which included: a set of web pages hosted by SOU that provided information and interpretation of I&M projects with biodiversity as the anchoring theme; a suite of intranet web pages describing climate change issues and concerns in the Klamath Network parks, a wetlands interpretive guide (Finstad 2011), and water quality podcast (in final review).

This strategic plan focused on inventory project information sharing, and now the I&M Program has numerous monitoring projects implemented. The long-term monitoring of KLMN park resources presents opportunities to provide information about change over time, as well as current status of park resources.

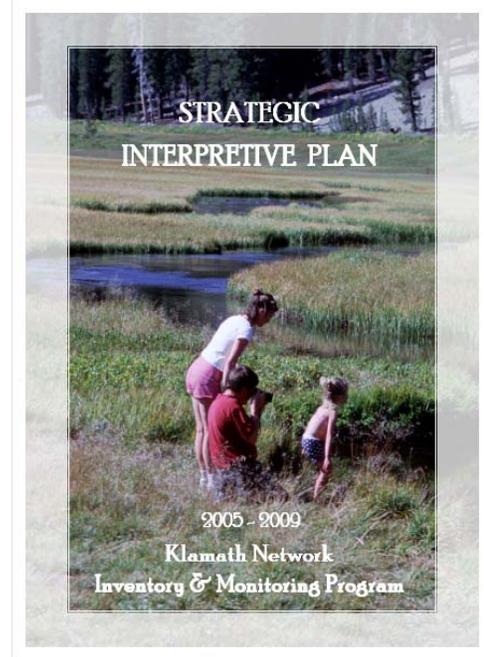


Figure 2. Strategic Interpretive Plan for Klamath Inventory and Monitoring Program (NPS 2005).

2. Purpose, Goals, and Objectives

Purpose Statement

Through implementing a communication plan, the Klamath Network Inventory and Monitoring (I&M) Program seeks to increase awareness about why inventories and monitoring of natural resources are important and to articulate effective strategies for sharing scientific findings from the Klamath Inventory & Monitoring Program with internal and external audiences.

Goals

The Klamath I&M Program communication goals are intended to be guide communication efforts for at least five years (2012-2016).

1. Park staff members are better informed about the status and long-term trends in vital signs from the Klamath Network Inventory and Monitoring (I&M) Program; they can access current information at the level of detail they need.
2. The Klamath Network I&M Program builds upon existing collaborative relationships with parks and the greater scientific community to better integrate I&M information into park management, planning, interpretation and research.
3. The Klamath Network and park staff members work together to inform a diversity of public audiences about natural resource inventory and monitoring approaches, results and applications to resource management needs. Where possible, linkages are made to larger strategic NPS initiatives.
4. The varied audiences for Klamath Network I&M information understand the importance of monitoring natural resources and why particular vital signs were selected to monitor. The Klamath Network I&M Program is a trusted source for current, relevant scientific information.

Objectives

We define objectives under each communication goal, and these are written to be specific, feasible, and results-oriented. Although I&M staff will strive to address as many objectives as possible each year, it will not usually be possible to address all objectives every year.

Goal 1: Park staff members are better informed about the status and long-term trends in vital signs from the Klamath Network Inventory and Monitoring (I&M) Program; they can access current information at the level of detail they need.

Objective 1: For each monitoring project, the project lead completes a **monitoring protocol** that documents the purpose, design, and methods; an **annual report** that summarizes the field season and provides basic data analyses; **periodic analysis and synthesis reports** that analyze trends and patterns in vital sign(s) monitored; and a **resource brief** to accompany each report.

Objective 2: The KLMN I&M Program publishes and distributes a **biannual newsletter** (*The Klamath Kaleidoscope*) in the spring and the fall. The newsletter briefly summarizes project results, highlights I&M products, and includes additional related articles and links to new reports as appropriate.

Objective 3: The KLMN I&M Program completes an **annual administrative report** to summarize accomplishments, public interest highlights, and expenses for the previous fiscal year. A **work plan** is developed to give an overview of goals and a general schedule of activities for the coming year. These serve as the basis for the annual December meeting of the Board and the Technical Committee.

Objective 4: The KLMN I&M Program maintains **internet and intranet sites** to provide a program overview, give current information on individual projects, provide staff contact information, and share reports, data, briefs, newsletters, and other summary products.

Objective 5: KLMN I&M staff inputs project products to the NPS **Integrated Resource Management Applications (IRMA)**, and the KLMN website links directly to documents and data in IRMA. Sensitive data and journal copyright issues require some information to be either omitted from IRMA, or have restricted delivery (such as park-staff only).

Goal 2: The Klamath Network I&M Program builds upon existing collaborative relationships with parks and the greater scientific community to better integrate I&M information into park management, planning, interpretation and research.

Objective 1: The KLMN I&M Program staff periodically give presentations at network parks. These may be informal talks on monitoring projects or presentations at specific park meetings or trainings.

Objective 2: The KLMN I&M and park staff work together to plan and carry out annual theme-based symposia between 2013 - 2016 that focus on topics of broad interest among I&M and park staff members.

Objective 3: The KLMN I&M Program organizes periodic field days where park staff are invited to accompany I&M staff on a monitoring project, and/or park staff discuss resource management projects. These days could rotate among the network parks each time a field day is organized.

Objective 4: I&M Program staff regularly inform parks and other audiences about new products and program updates through a variety of digital communication methods.

Goal 3: The varied audiences for Klamath Network I&M information understand the importance of monitoring natural resources and why particular vital signs were selected to monitor.

Objective 1: The KLMN I&M staff will develop program-level resource briefs that explain the following overview and background information about the program –

- The I&M Program purpose and organizational structure (include national but emphasize KLMN program) – answers question ‘why is monitoring important?’
- How the vital signs were chosen
- Where the network is in the process of protocol development and implementation

Objective 2: The KLMN I&M staff will develop an overview PowerPoint program and/or poster that can be used at various meetings or park events to provide background about the program.

Goal 4: The Klamath I&M and Park staff members work together to inform a diversity of public audiences about natural resource inventory and monitoring approaches, results and applications to resource management needs.

Objective 1: KLMN I&M staff will work with park interpreters to share information with public audiences, i.e., attend interpretive training sessions when feasible, provide updates and briefs for seasonal interpretive trainings when requested, and provide new information through emails, websites, or personal contacts as it becomes available.

Objective 2: KLMN I&M staff will occasionally participate in local public lecture forums (Examples: Southern Oregon University, Rotary, etc.) .

Objective 3: KLMN I&M staff will periodically publish articles in peer-reviewed journals and do presentations at scientific and interpretive conferences as appropriate and feasible to share monitoring results with the larger scientific community.

Objective 4: KLMN I&M staff will investigate creating a list-serve of local park staff, interested staff in the larger NPS community, and outside scientists and partners as an effective way to distribute KLMN products and information to an up-to-date list of interested parties. A list-serve could occasionally also serve as a forum for I&M or other related discussions.

Objectives 1, 2, 4, and 5 under Goal 1 also describe products that serve public audiences as well as park audiences.

3. Elements of Effective Science Communication

"Put it before them briefly so they will read it, clearly so they will appreciate it, picturesquely so they will remember it and, above all, accurately so they will be guided by its light."
- Joseph Pulitzer

This was sound advice from journalist Joseph Pulitzer regarding communication of news to a variety of public audiences. It could also be applied to scientists who must communicate technical information to diverse audiences. Whether communicating to other scientists, park managers, or public audiences, the above principles apply, but the level of detail, types of graphics, and particular emphases may vary. In this chapter, we define primary and secondary audiences and review effective science communication approaches. In discussing effective science communication, we focus primarily on the kinds of information and communication approaches most relevant to the Inventory & Monitoring program's goals and audiences. We will review:

- The information pyramid - showing the different levels of scientific information behind the range of products I&M staff develop
- Other I&M network communication approaches – individual networks, and a review of multiple networks' approaches and strategies (Drake 2011)

Defining the different levels of information I&M works with, reviewing effective communication approaches from other networks, and working with local park staff helped us identify the communication approaches that KLMN I&M staff will pursue with the limited resources that are available at this time.

The Information Pyramid

Field technicians and scientists collect raw data on plants, animals, water, and other natural resources. This large quantity of data must be managed properly, summarized and analyzed graphically and statistically, reported on in peer-reviewed technical reports and other publications, and translated for the needs of various audiences who need less technical information about park resources. An information pyramid can be used to represent these different levels of scientific information and to show that information at the upper levels of the pyramid is based on a strong foundation of data, statistical analyses, and information syntheses (Figure 3).

Each layer of the information pyramid has different types of audiences associated with it. A research scientist may be interested in the raw data and details of the statistical analyses, while a park manager or decision-maker may only need the summary graphics and synthesized information in a brief report. At the top of the pyramid, there may be a wide variety of public audiences, but in general, public audiences prefer a concise, clearly illustrated story that tells them why the information is important and what the key findings are.

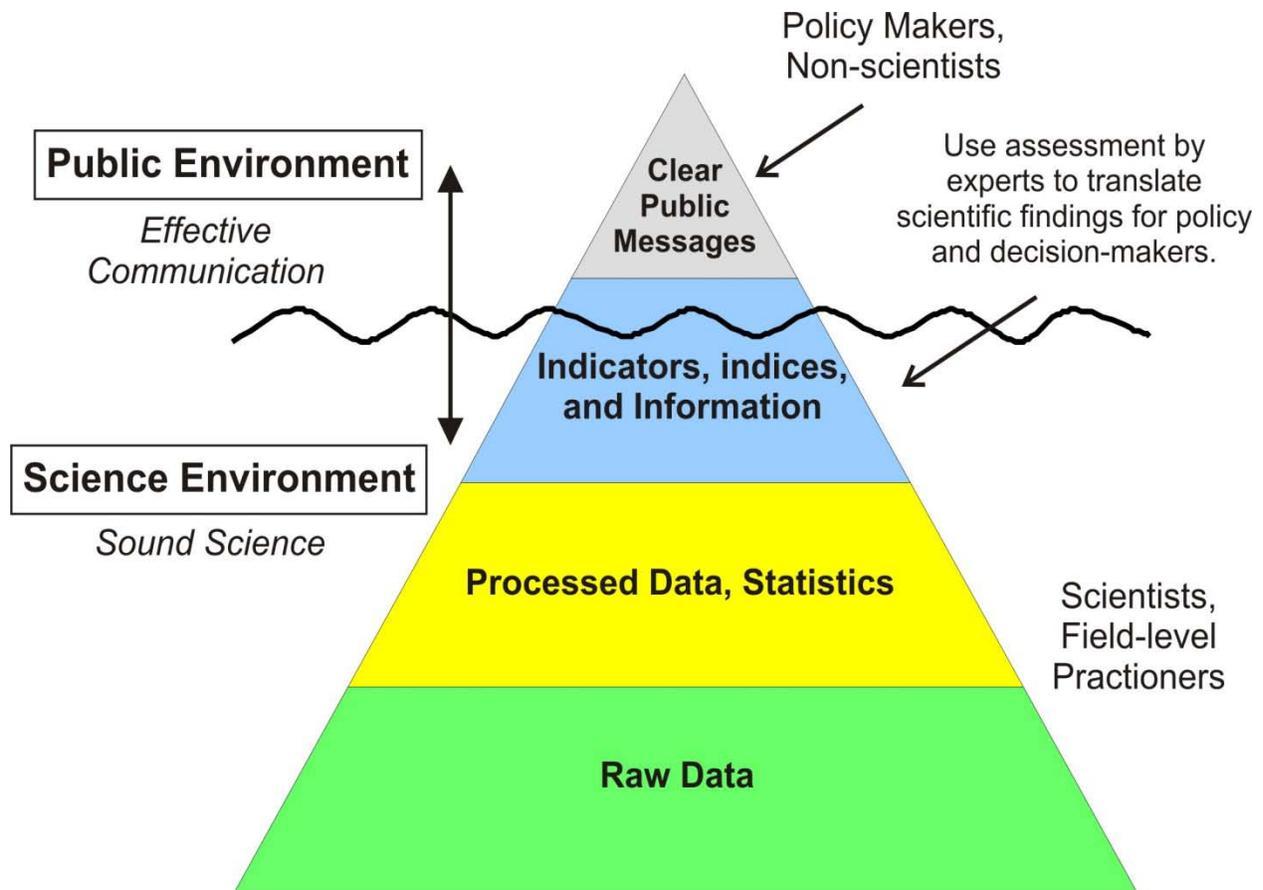


Figure 3. The information pyramid, adapted from Fancy et al. (2009). Raw data are data collected in the field and entered into a database. Processed data and statistics are analyses of raw data. Indicators, indices, and information are syntheses and summaries of data. Wavy line distinguishes the boundary between scientific and public audiences.

Audiences

Defining the audience is a critical step in developing a communication program. We have audiences that are both internal and external to the National Park Service. They have varying degrees of scientific knowledge and a wide range of interests in natural resource information. One person may just want to know what the weather will be for an upcoming visit to a park, while another may want monitoring data to use in an academic research project. Each communication product or tool will be developed with a specific audience or audiences in mind.

According to the Chief of the NPS I&M Division, the primary audience and users of the information produced through I&M programs are managers, planners, natural resource specialists, interpreters, and scientists at the local park level (Fancy et al. 2009). This primary audience of NPS staff must be able to use I&M information to make decisions, plan for the future, and inform the public. Monitoring results can also be provided to the general public in partnership with other NPS programs and park interpreters (Fancy et al. 2009). Secondary audiences include the general public, outside scientists, and various outside agencies and groups. In Table 2, we show the primary and secondary audiences as identified by KLMN I&M and park

staff. For the Klamath Network, the US Forest Service and Bureau of Land Management are the two agencies managing the largest areas of land adjacent to KLMN parks, and local county governments are sometimes partners in resource management issues such as weed control. At Redwood, park lands are managed by NPS and the state of California. While there is not complete agreement about primary vs. secondary audiences among park staff in the network, we have edited this table to show what KLMN I&M and numerous others in the network parks feel are the primary audiences: park staff and the cooperating associations that do educational work cooperatively with parks. While the secondary audiences are also important, it is the park staff who will be the main target for KLMN communication products and activities.

Table 2. Primary and secondary audiences for I&M information.

Primary Audiences
Superintendents
Resource managers
Park interpreters
Park staff from other divisions – may vary by park
NPS cooperating associations
Secondary Audiences
Scientists – partners, peers in scientific community
Other federal and state agencies
Educators and student groups
General public
Local residents and governments
Other NPS I&M networks

Learning from Other I&M Network Science Communication Efforts

To make this plan more effective and build on the knowledge gained through communication efforts at other networks and parks, we reviewed a recently completed survey and summary of communication efforts for the NPS Inventory and Monitoring Program conducted by Erin Drake through the NPS Office of Outreach and Education (Drake 2011). Drake conducted interviews with most of the 32 I&M networks about their approaches to science communication. She identified five themes relevant to science communication plans that emerged from the feedback she received. Since these themes developed from a systematic evaluation of I&M efforts nationwide, they provide a useful framework to inform the KLMN plan. Following is a summary of these themes (Drake 2011, NPS 2012b):

1. The science communication plan should foster and institutionalize the strengthening of interpersonal relationships and information exchange between network and park staff.
2. The science communication plan should provide a platform for consistent messaging between network and park staff regarding network information.

3. The role of who communicates inventory and monitoring information to non-technical audiences (NPS staff, visitors, local stakeholders) needs to be clearly identified between the Network I&M Program and network parks.
4. Determine the role of the local or regional Research Learning Center (RLC) in dispensing network information for networks where centers are present.
5. Physical communication “products” for non-technical audiences should be limited and serve to support the Network’s key messages through agreed-upon communication mediums.

In Appendix A, we give more detail on how these themes relate to the Klamath I&M Program’s communication plan.

We also reviewed the science communication plans, strategies, or analyses developed by other I&M networks (NPS 2007, Gostomski 2009, Haysmith and Nash 2009, Jocius and Garrett 2009, O’Herron 2009, Nortrup 2010, NPS 2009b, NPS 2010a, Mutch and Chung-MacCoubrey 2012, NPS 2012b). All networks developed long-term monitoring plans that provided the framework and timelines for the technical reports produced for each monitoring project. These technical reports include the monitoring protocol, annual reports, and periodic trend reports. While these reports are critical products, they typically only reach an audience of resource managers and scientists. To communicate with broader internal and external audiences, additional products and tools are needed. Among many other networks, these additional products and approaches may include:

- Websites – typically served through the NPS Inventory & Monitoring Program (<http://science.nature.nps.gov/im/index.cfm>) and are used to provide program overviews, staff contact information, and project-specific overviews and products. As noted above, some networks are also using .org websites to integrate I&M information with natural resources information from parks, outside researchers, and various park partners.
- Resource briefs that provide one- to two-page overviews of inventory or monitoring projects
- Periodic newsletters that give program updates (typically biannual to quarterly)
- Brochures that give overviews of network I&M programs
- Road shows or science days/symposia that provide opportunities to interact with parks and other partners to share information on specific projects, or on common themes that may be addressed by I&M as well as parks or other programs. Some networks conduct these road shows or science days annually. For others, in-person presentations may be done more opportunistically when network staff are in specific parks.
- Some networks are adding “new media” to their web presence. Additional tools for getting out I&M information and stories include: podcasts, vidcasts, blogs, Facebook, Twitter, RSS feeds, and photo

In her surveys of network science communication approaches, Drake (2011) reported that the three most favored communication products were:

- Resource briefs
- Newsletters

- Accessible websites with simple “new media” enhancements (podcasts, vidcasts, blogs, digital photo albums)

These results overlap with some of the results of a communication evaluation survey that the Great Lakes Network (GLKN) conducted with their parks’ staff. Gostomski (2011) found that E-mail updates and the biannual newsletter were the most popular forms of communication at GLKN, and resource briefs were the most widely used communication product. On-site presentations by network staff also ranked high.

Summary

By clearly defining the audiences for I&M information and pursuing communication principles and methods that are demonstrated to be effective in many I&M networks, the KLMN I&M Program can refine and strengthen its already well-established communication efforts. Park staff account for most of the primary audience for KLMN I&M information, thus the majority of communication products and activities should target local park managers and interpreters. The KLMN I&M Program has already been producing the communication products found to be most effective and popular through surveys of other networks or specific evaluations of communication programs: resource briefs, newsletters, and accessible websites.

Products oriented toward technical audiences provide park resource managers with scientific data and analyses to inform resource management planning and decision-making, and engage the I&M Program with the larger scientific community. Peer-reviewed publications and participation in local meetings and regional or national symposia are important avenues for sharing I&M results and findings with these audiences, and also enable I&M staff to critically evaluate their monitoring and analysis approaches.

From national (Drake 2011) and other individual network’s surveys related to I&M communication efforts, it’s clear that personal relationships among I&M and park staffs are critical to successful communication programs. These relationships are strengthened by “face-time” in the form of local meetings or presentations, informal conversations, and other means of in-person engagement around natural resource-related themes or activities. While digital communication is a critical means of distributing information to a variety of audiences, communication via phone and in-person activities strengthens and personalizes local relationships between I&M and parks. The KLMN I&M Program is located remotely from parks and in-person communication can be hampered by travel restrictions and budgets. Taking advantage of time I&M staff are in parks for field work, using larger NPS meetings like the George Wright Society meeting to have KLMN-specific meetings, and planning periodic theme-based symposia will help the KLMN create more opportunities for direct interaction between I&M and parks.

In the next chapter, we present feedback from KLMN park staff and summarize how they participated in this plan’s development.

4. Local Process: Park Staff and Plan Development

There is genuine interest among the Klamath I&M and park staffs to work collaboratively in sharing information related to scientific findings, resource management needs and issues, and outreach and education. This interest has been evident in a recent science communication plan scoping session, in a recent communication products survey, and in reviews of the plan during its development. We briefly summarize the meeting highlights related to this plan, the survey results, and implications for communication priorities and approaches.

Science Communication Plan Scoping Meeting

The Klamath Network had a science communication plan scoping meeting on December 8, 2011 that around 20 Park and I&M staff members attended. The attendees at this meeting helped us to:

- Develop draft communication goals and define audiences.
- Identify capacities and resources for science communication.
- Identify existing communication opportunities and challenges.
- Identify communication products or activities that address information needs.

For more detail about this meeting, please see the notes in Appendix B. We will concentrate below on some of the major discussion points that most directly inform this plan.

Some of the discussion at this meeting indicated enthusiasm for a broader science communication strategy at the Klamath Network, which would include I&M and park staff and programs). However, because capacity is limited (no new staff will be hired), the communication efforts of the I&M staff will need to be focused primarily on I&M products and activities that provide the most opportunities for I&M and park staff to communicate directly with each other. Student interns were brought up as a potential resource for accomplishing some science communication work each year.

It was evident that not all park staff have enough background information about the I&M program, as they may be new or were not involved in the meetings and workshops where vital signs were selected. Creating some briefs or presentation materials that provide a basic understanding of what the I&M Program is, why and how vital signs were selected, and what the current program status is would be helpful to provide context and a shared understanding of the program.

While a number of regional and local education and outreach opportunities were identified in a brainstorming session, there were too many for I&M staff to address directly. More communication among I&M, Resource Management and Interpretation staff is needed to help identify the most important messages and avenues to communicate with the public. Effective transfer of I&M information to interpreters enhances their ability to share some of the highlights and findings with the public.

This meeting also helped identify some of the most important challenges to communication in the Klamath Network. These included the following:

- Limited capacity: staff, time, resources

- Diversity of audiences
- Physically dispersed staff (among parks and I&M network)
- Multiple communication and other priorities to address within parks – would help if it's possible to combine I&M communication opportunities to help address other interpretive priorities
- Keeping mailing lists up to date – effectively distributing information

Participants identified some potential tools and strategies for mitigating these challenges – from more use of web-based or electronic communication tools such as list-serves, social media, and wiki pages to in-person sessions such as talks at parks, symposia, and field days. The next chapter will focus on communication approaches that the network will focus on, balancing the need for a variety of communication methods with the limited time and staff available to do the work.

I&M Communication Survey

We conducted a survey of park staff in the winter of 2011-2012 to evaluate the current I&M communication products and activities. Detailed results of the survey are in Appendix C. Thirty-two people completed the survey among the six KLMN parks. Almost 60% of respondents were in Resources Management and 22% in Interpretation. The remainder of respondents were park superintendents and staff spread among other divisions.

The survey showed that most of the current KLMN communication products are read by a majority of staff who responded (Figure 4). The web pages, resource briefs, newsletter, and Featured Creature are the most widely read products, but the technical reports and journal publications also get substantial interest. One suggestion was for better fact-checking on the Featured Creature briefs to ensure they are accurate.

Additional comments about these products were generally quite positive. The main issue brought up was a distribution or notification problem. Some people are only aware of some of the products. Others may be aware and interested in most of the products but don't receive them or don't get frequent enough updates on new products being produced. Suggested solutions for this issue included more frequent updates about new products via email and more linkages among park and I&M websites.

In the question evaluating how likely park staff are to attend various types of communication activities (some on-going, others proposed as future possible activities), the three that received the highest percentage of positive response (very likely or likely to attend or participate in) were: I&M presentations in parks (90%), informal communications (84%), and field days in parks (73%) (Figure 5). These responses indicate the importance of personal contact and direct communication with park staff. The science symposia idea was the next most popular with 62% of respondents responding positively.

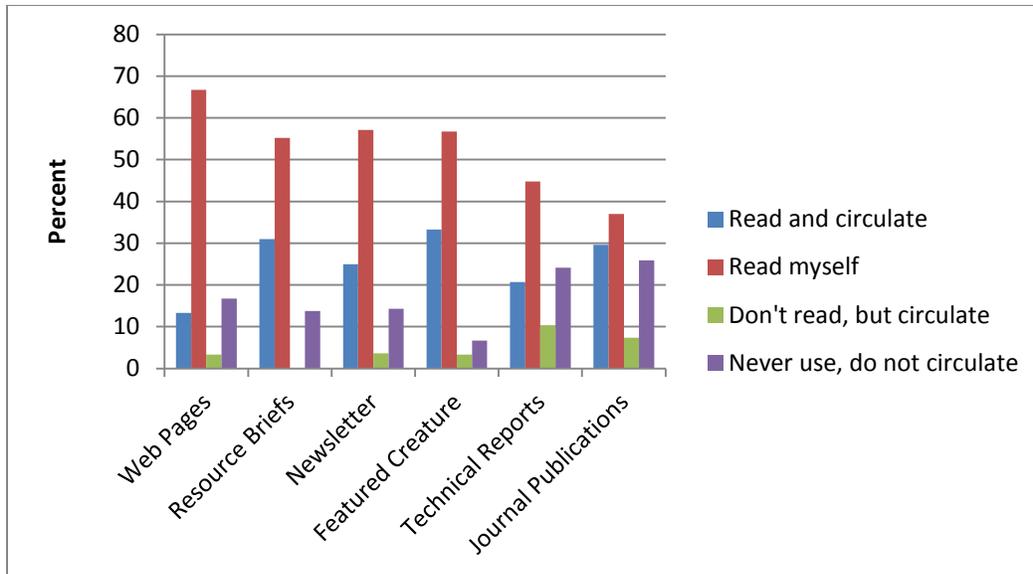


Figure 4. Percent of survey respondents (N=30 for this question) who fall into the different categories of usage for current KLMN communication products.

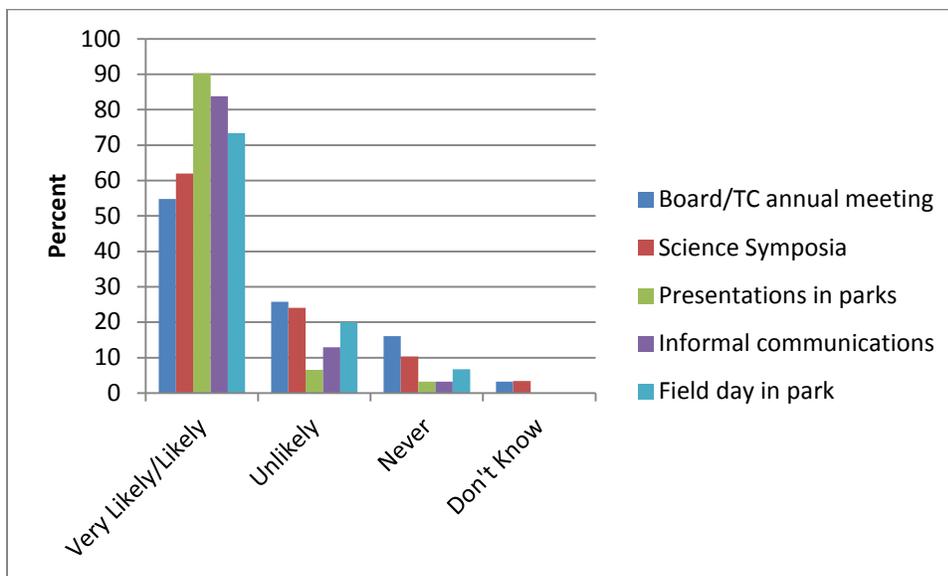


Figure 5. Percent of KLMN park survey respondents in categories of likelihood for attending the indicated communication activities.

To engage outside audiences, the following suggestions were provided:

- Local newspaper articles
- Simple, concise descriptions of projects or resources such as what is provided in resource briefs, newsletters, and Featured Creature; articles on I&M projects for park public newsletters
- Identify issues most important for interpreters to communicate to the public

- I&M assistance with park web pages to help highlight project results
- Symposia or conference attendance and subsequent development of interpretive programs
- Exhibits for park visitor centers on I&M projects
- More time for interpreters to engage with I&M in field projects – to improve understanding and ability to interpret I&M activities

Finally, we asked what the most important impediments are to communication between the KLMN I&M Program and park staff. Respondents selected the following types of impediments (which are generally consistent with responses provided at the I&M communication plan workshop described in the section above):

- Lack of time (79%)
- Physical separation of I&M and park staffs (66%)
- Separate organizational structures between I&M and parks (45%)
- Information not relevant to my work at this time (24%)
- Information distribution issues (21%)
- Other (24%)

Under “Other”, respondents mentioned that I&M work may not be of interest until it is happening in the respondent’s particular park, each park has its separate management issues and priorities and employees only have time to read products relevant to the issue of the moment, and I&M staff may be better able to evaluate this question than park staff.

Implications for Communication Priorities and Approaches

A majority of survey respondents reported that they read most or all of the written products from the KLMN I&M Program. Additional respondents expressed interest in these products, but were not aware of them or how to get them. Featured Creatures may not always be directly related to I&M projects, but are very popular and should be continued if time allows as they educate park staff in the natural resources of the parks by providing interesting details about organisms and their habits and life histories. They provide a means of “discovery” from one’s computer!

For written products to be most effective and reach more staff:

- Provide more frequent notifications to park staff when web pages are updated and new written products are available.
- Keep products on as regular a time schedule as possible so that park staff can be informed in a timely way about the monitoring or inventories that occurred in the previous field season.

- If possible, seek review from local subject-matter experts for Featured Creatures to ensure accuracy and provide local observations or specific information from parks where these creatures occur.

In general, the KLMN I&M Program is already producing the written products that both national and local surveys have determined to be the most popular. More effort on marketing them and making sure all projects have current resource briefs will help them gain wider distribution and readership.

From responses to the question related to engaging park staff in communication activities, it is clear that in-person, less formal communication activities are highly valued. KLMN I&M staff can consider how to take advantage of time they are in parks to fit in some of these kinds of activities:

- Presentations about I&M projects
- Field days to highlight I&M and/or park projects
- Informal communications with individuals or small groups

In addition, the science symposia received positive response from more than 60% of respondents, and talking further with park staff to find out what kinds of themes or topics would interest them and getting park staff involved in planning periodic symposia can help increase interest and participation.

To improve engagement with outside audiences, some of the same ideas were expressed as those to engage internal audiences – symposia, briefs and newsletters, better web page connectivity among park and I&M pages, and field days that interpreters can participate in. Focusing on these kinds of activities (or products) but with a special emphasis on interpreter involvement will facilitate communication of I&M information to interpreters and subsequently public audiences.

The primary barriers to communication include lack of time, physical separation of I&M and park staffs, and lack of awareness of I&M information and its relevance to the parks. While it's difficult to overcome the time shortage issue, if products are easily accessible, timely, concise, and attractive, people will be more likely to take the time to read them. Breaking down the physical barriers through more informal and in-person communication takes time but every effort should be made to take advantage of trips to parks or regional meetings to add on some additional time to do a presentation, organize a field day or communicate informally with park staff.

In the next chapter, we focus on communication approaches to address the specific goals and objectives developed with park staff at the December meeting. The park staff input highlights the need for both good-quality, well-distributed written products as well as time for in-person interaction and engagement.

5. Communication Approaches

This chapter provides descriptions addressing the why, what, how, when, who of communication products and activities, and is organized under the goals identified in chapter 2. It is modeled after portions of the Upper Columbia Basin, Great Lakes, and Sierra Nevada Networks' overviews of their communication methods or types (Jocius and Garrett 2009, Gostomski 2009, Mutch and Chung-MacCoubrey 2012). Each product description includes: 1) purpose and content; 2) guidance and timeline for production; 3) distribution, where appropriate; 4) audience and review process; and 5) responsible parties – KLMN I&M staff who are responsible for each product. A summary table of these communication approaches is provided in Appendix C.

Goal 1: Park staff members are better informed about the status and long-term trends in vital signs from the Klamath Network Inventory and Monitoring (I&M) Program; they can access current information at the level of detail they need.

The following communication approaches and products address the specific objectives that fall under Goal 1.

Monitoring Protocols

Purpose:

- Describe why and how we are monitoring the selected vital signs.

Content:

- Provide background and justification for the selection of vital sign(s) for long-term monitoring.
- Provide specific monitoring objectives and a detailed sample design that addresses the objectives.
- Provide analytical tools for interpreting and presenting monitoring data.
- Include step-by-step Standard Operating Procedures (SOPs) and narratives which describe more fully the methods required to implement the protocol.
- Address one to several vital signs.

Guidance and Timeline for Production:

- All protocols follow Oakley et al. (2003), Sarr et al. 2007, and Mohren (2007) for content guidance and the NPS Natural Resource Publications Natural Resource Report (NRR) template (Figure 6).
- Protocols and SOPs should be well-written and easy to follow for KLMN staff, field technicians, cooperators (where appropriate), and park resource managers.
- A customized Microsoft Access relational database is developed for each protocol and is designed to store and manipulate the data associated with the protocol.



Figure 6. Landbird monitoring protocol.

- All project data are certified for accuracy and completeness prior to development of final reports.
- All protocols and SOPs are peer-reviewed and published. Protocols are completed according to schedules outlined in the annual work plans. We expect to have all protocols that are being implemented completed by 2013.

Distribution:

- Hard copies of protocols and SOPs are distributed to the PWR I&M Program Manager, and any interested park staff. At least two copies are kept at the KLMN I&M Program office.
- Final protocols and SOPs are posted to the NPS Protocol Database and to IRMA, and the KLMN website links to the documents in IRMA.

Audience and Review Process:

- Primarily internal audience, but some protocols are conducted with cooperators, and protocols are shared with other agencies and organizations if requested. Protocols are reviewed internally by the protocol work group members and are submitted to the PWR I&M Program Manager for external peer review.

Responsible Parties:

- Protocols are written by KLMN I&M staff and outside cooperators. The Network Program Manager, Aquatic Ecologist, Data Manager, and Botanist are the primary staff involved with protocol development.

Annual Reports

Purpose:

- To document monitoring or inventory efforts, provide summary data, and communicate the major findings of the previous field season without detailed interpretation or discussion. These are concise reports of the previous one to two years of field work. The frequency of these reports is typically annual, or after the season of data collection, and is specified in each protocol. Annual reports may also be done as progress reports for multi-year inventory projects.

Content:

- Document the annual inventory or monitoring effort and activities, including any changes to the protocols, sampling limitations due to weather or other issues, and any unusual observations or results. Describe the current status of inventory or monitoring results (using basic summary statistics) and provide brief discussion.
- Provide maps of current or recent years' sampling sites and data to display results spatially.
- Evaluate data quality and identify any data quality concerns and/or deviations for protocols that may affect data quality and interpretability. Make recommendations for improvements in field operations, data management, or other protocol activities, if needed.

Guidance and Timeline for Production:

- Annual reports are produced for any project for each year in which data collection has occurred.
- Most annual reports will follow the NPS Natural Resource Data Summary (NRDS) report format provided by the Natural Resource Program Center's national publication series.
- Some annual reports may use the NPS Natural Resource Technical Report (NRTR) format if more detailed reporting is desirable for a particular year.
- Annual reports should be clearly written and provide useful summary information to park managers and KLMN staff about the monitoring project for that year.
- All project data are certified for accuracy and completeness prior to development of annual reports.
- Annual reports will be completed as soon as possible after the completion of a sampling season. This will vary among projects, as some require laboratory analyses (water chemistry) or taxonomic support that may delay data finalization for some months after the field season.

Distribution:

- If published, reports will be uploaded to IRMA as part of the publication process, links will be provided from the KLMN website, and publication of the reports will be announced to park staff.
- If not published, Project Leads will provide a finalized gray report to the Data Manager who will upload it to IRMA and make it available via the KLMN websites.
- Hard copies will be provided to park staff when requested.
- Project Leads will send digital copies to the Resource Chiefs and any additional park staff that they feel may want the report.

Audience and Review Process:

- The primary target audience is park staff as well as other I&M staff, but reports will be available to internal and external audiences. They will be reviewed internally (I&M and possibly park staff) before being submitted for publication.

Responsible Parties:

- The project leads are the primary authors. This is usually network staff, but may also include cooperators. An administrative support position or interns may assist with editing and formatting when needed.

Analysis and Synthesis Reports (Monitoring) or Final Technical Reports (Other Projects)

Purpose:

- Analysis and Synthesis Monitoring Reports: To analyze, synthesize, and interpret monitoring data after completing a full rotation through all sample panels or when a minimum of three years of data are available. These reports are intended to incorporate trend analyses, but in the initial sampling years they will emphasize more complex elements of status (typologies of ecological communities, structural analyses of vegetation, etc.).

- Final Project Reports: These are done for inventory, pilot, or other short-term projects. They provide data summaries and interpretations, identify additional information gaps, and highlight potential management applications for the data and information.

Content:

- Do trend analyses and more in-depth analysis of vital sign status.
- Do statistical summaries and analyses of inventory project results.
- Evaluate results in relationship to environmental variables, climate data, and known stressors, where feasible or relevant.
- Discuss results within the context of long-term park management goals.
- Where appropriate, include regional-level comparisons or analyses.

Guidance and Timeline for Production:

- Produced approximately every three to six years or at least every 10 years. Frequency is determined by the specific protocol or project.
- Do a final technical report at the conclusion of an inventory project.
- These reports will follow the NPS Natural Resource Technical Report (NRTR) template, or scientific journal format, as appropriate.
- All project data are certified for accuracy and completeness prior to development of analysis and synthesis reports.
- These reports will be completed as soon as possible after a panel rotation has been completed, or the desired number of years of data has been collected as specified in the protocol document. This time frame will vary among protocols due to post-season laboratory analyses or taxonomic support needs. Where possible, analysis and synthesis reports should be drafted by March and submitted for publication by early May of the fiscal year following the complete field sampling rotation.

Distribution:

- If not protected by copyright, published reports or articles are uploaded to IRMA, linked to from the KLMN website, and distributed electronically to all stakeholders. Otherwise, links may be provided to the journal, but necessarily the specific article.

Audience and Review Process:

- Both internal and external audiences: The target audience will be the parks, other I&M Networks and the Regional and National I&M programs, and the broader scientific community.

Responsible Parties:

- The protocol leads are the primary authors. This is usually I&M staff but may include cooperators. An administrative support position or interns may assist with editing and formatting when needed.

Resource Briefs

Purpose: To provide a condensed summary of the important findings for each inventory or monitoring project, taken from final reports, annual reports or the periodic synthesis reports.

Content:

- Provide a distillation of project-specific results for a more general audience.
- Describe how monitoring data informs resource management.
- Provide photos, key graphics, and data summary or analysis tables.

Guidance and Timeline for Production:

- The format for briefs has common elements among monitoring projects (fonts, graphics, key sections) and is generally limited to one to two pages (Figure 7).
- Most inventory or monitoring resource briefs include:
 - Project name
 - The importance of the resource inventoried or vital sign(s) monitored
 - Brief overview of what we are doing
 - Status and/or trends (include graphic or table)
 - Discussion (includes any management applications)
 - Parks where inventory done or vital sign(s) monitored and a summary of what was accomplished
 - Contact information
- Resource briefs are a widely circulated KLMN communication product. As such, they must be professional, attractive to readers, and written clearly for a less technical audience.
- Resource briefs will be produced in conjunction with annual or synthesis reports and are completed within a month after the draft report is produced for each protocol. Occasionally, as time allows, park-specific briefs will be produced on certain projects or sets of projects, but typically resource briefs will have a network-level focus.
- For briefs that are printed, use color printing on semi-gloss paper for a professional appearance.

Distribution:

- All resource briefs will be served on KLMN's website.
- New briefs will be announced via list-serve, emailed to the 6 park wide email lists, and links provided for retrieving them.
- Hardcopies will be printed for limited distribution to park staff at trainings and update meetings. Other hardcopies will be provided if requested, although we do not plan on



Figure 7. Example KLMN resource brief.

distributing these at visitor centers, which have reduced the numbers of brochures and handouts in more recent years.

- Resource briefs will be handed out at presentations, meetings, and alongside posters at conferences.

Audience and Review Process:

- Primarily non-technical NPS audiences, such as Park Superintendents, Interpreters, and other non-resource management staff. However, resource managers may use these as quick summaries for their programs and to help communicate inventory & monitoring results to other park staff.
- Resource briefs can be made available to public audiences, but are primarily a starting point from which NPS staff can develop interpretive materials for public audiences.

Responsible Parties:

- Project leads are responsible for preparing briefs on their projects at an appropriate interval and distributing them to the parks. The Data Manager is responsible for making certain they are available on the web. The Program Manager reviews all content before distribution. An administrative support position or interns may assist with brief development, formatting, and editing.

Newsletters (bi-annual)

Purpose: To provide a means of regular communication between the I&M Program staff and Parks. See example in Figure 8.

Content:

- Communicate KLMN's purpose and accomplishments to park staff and partners.
- Provide information about the status of KLMN's monitoring projects, pre- and post-field season.
- Emphasize the value of inventory and monitoring information to our understanding of the parks, and its importance in our ability to manage park resources and communicate about their condition to the public.
- Present invited articles on topics of regional importance.

Guidance and Timeline for Production:

- Distributed biannually – Summer/Fall edition will be distributed by late fall, and the Winter/Spring edition will come out prior to the field season.
- The newsletter will focus on short articles about monitoring programs and preliminary findings. It will be graphic- and photo-rich.

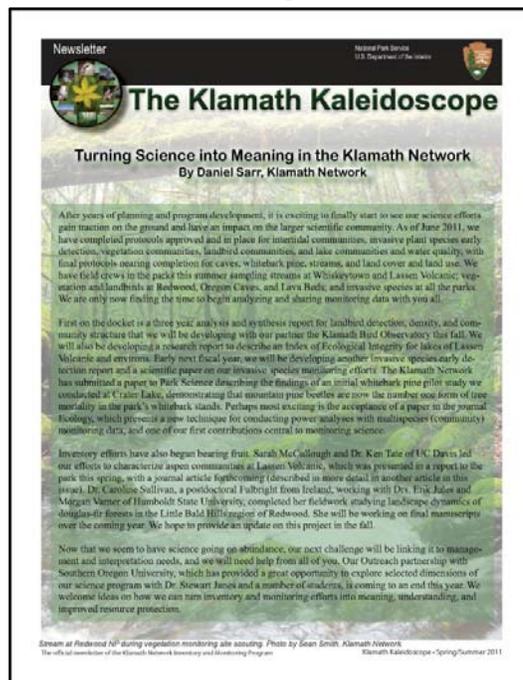


Figure 8. Klamath Network I&M newsletter.

- Park staff, researchers, and cooperators may be invited to contribute articles, in relationship to monitoring projects that are featured.

Distribution:

- Emails will be sent out to all park employees that include brief highlights from the newsletter and a link to the newsletter on KLMN’s website. An additional mailing list will be developed to include outside cooperators.
- Make some available at fall Board/TC meeting, science symposia, or other events in parks, when appropriate.

Audience and Review Process:

- Primary audience is park staff, visitors to KLMN’s website, and cooperators. A mailing list will be maintained, and anyone can request being included on it.
- Format and content will be evaluated periodically with park staff to determine usefulness, interpretability, and relevance of the information presented.

Responsible Parties:

- Organized, compiled, and distributed by the I&M Program Manager with help from interns or an administrative support position. Contributions are from KLMN I&M staff and others invited to write articles, such as Park staff, USGS scientists, outside cooperators, and academic scientists, such as those from Southern Oregon University.

Annual Administrative Report

Purpose:

- The Annual Administrative Report (AAR) details the accomplishments of the previous fiscal year and accounts for I&M Network expenditures (Figure 9).

Content:

- Program activities and accomplishments for inventories, monitoring, and water quality monitoring
- Public interest highlights
- List of personnel, personnel changes, and Board of Directors/Technical Committee membership
- Budget: Summary and breakdown of expenditures for the year
- List of reports, publications, and presentations

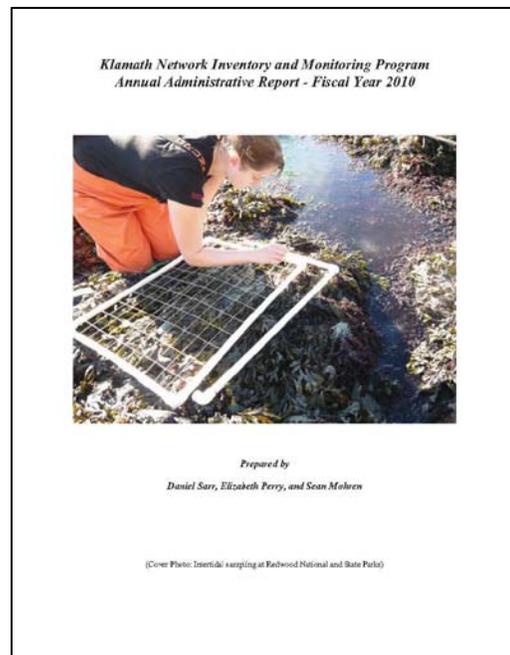


Figure 9. KLMN Annual Administrative Report example.

Guidance and Timeline for Production:

- Produce report annually at the end of the fiscal year in September.
- Report is submitted as draft to the KLMN Board and Technical Committee in September, to the Regional I&M Program Manager on October 7, and in final form to the Washington I&M Program Manager by November 1.
- Format of the report is determined by servicewide I&M program managers.

Distribution:

- In addition to distribution to the Technical Committee, Board of Directors, Pacific West Regional and National I&M Program Managers, the report is available on KLMN's intranet site.

Audience and Review Process:

- Internal audience – reviewed and approved by the PWR I&M Program Manager and the NPS I&M Program Manager.

Responsible Parties:

- The KLMN I&M Program Manager is typically the primary author, with contributions from other KLMN I&M staff. Occasionally, other I&M staff take the lead on compiling this report to get a broader perspective of the program.

Annual Work Plan

Purpose

- Provide an overview of planned work for the upcoming year.

Content:

- Summary of activities planned for monitoring projects
- Schedule of field work and other key events, such as symposia, network meetings, etc.
- Known personnel actions, if any.
- Estimated budget expenditures

Guidance and Timeline for Production:

- The work plan is presented to the KLMN Board and Technical Committee at the annual early December meeting and is submitted as a draft to the Regional I&M Program Manager by January 6, and is finalized for the Washington I&M Program Manager by January 31.
- Format of the work plan has been determined by servicewide and PWR I&M program managers.

Distribution:

- In addition to distribution to the Technical Committee, Board of Directors, Pacific West Regional and National I&M Program Managers, the work plan is available on KLMN's intranet site. The schedule from the work plan should be more widely distributed to

inform park staff about when I&M fieldwork is going on their parks and what other activities are planned that they might participate in. The current template has a one to two page activity calendar that provides a quick reference to the location and duration of I&M activities in each park each year and can easily be extracted and shared more broadly via a list-serve or other means.

Audience and Review Process:

- Internal audience – reviewed and approved by KLMN Board of Directors, Technical Committee, PWR I&M Program Manager, and NPS I&M Program Manager.

Responsible Parties:

- The KLMN I&M Program Manager is the primary author, with contributions from other KLMN I&M staff.

Internet/Intranet Pages

The I&M network's public website (<http://science.nature.nps.gov/im/units/klmn/>) is the primary means of communicating information about activities, products, and findings. The program has attempted to find a balance between using the website to inform the more technical audience of park staff and partners to individuals in the public. An intranet site (<http://10.147.158.160/im/units/klmn/>) is used to share administrative, draft, or internal documents, and this site is available to NPS audiences only.

Purpose: To provide park staff and the public access to KLMN I&M products, such as reports and resource briefs, to describe the mission and goals of the I&M program, and provide current information about inventory and monitoring projects.

Key Themes/Content:

- Provide one central location where anyone interested can answer the what, why, where, who, and how questions about the KLMN I&M program.
- Provide a central location where web page visitors can learn about specific projects and find products associated with those projects.
- Facilitate information sharing and collaboration among I&M and the parks, and provide linkages to related subjects on park Nature & Science web pages.
- Communicate the importance of inventory and monitoring to the understanding of park resources and natural processes and to effective management of parks.

Guidelines and Timelines for Web Page content and maintenance:

- Web pages are kept current and relevant.
- New products are posted as soon as possible after they are peer-reviewed and finalized, and the website serves as the main repository for serving finalized reports (by linking to IRMA) and other program summaries.
- Contact information is easy to find for all long-term KLMN staff.
- The website follows NPS I&M webpage formatting standards.

- Dreamweaver is the primary software program used to modify the content of the website, and Robocopy is used to upload new or revised web pages to the national server.
- Sensitive data or reports are protected from unauthorized access.
- The Data Manager reviews the website quarterly to ensure all hyperlinks are working. Content is reviewed by the specialist when it is initially developed and once a year after that. The Program Manager and Program Assistant are responsible for reviewing non-project pages such as about us sections, main page, etc.
- Park staff periodically evaluate (~every 2-3 years) the website for interpretability, usefulness, and relevance; to identify linkages they can make with park pages; and to suggest other improvements. This may be done through a questionnaire, conference call, or as part of a larger meeting.

Distribution:

- When park staff are notified about new products such as annual reports and resource briefs, send the url link to the document to reduce email size and send staff directly to the website.
- Include the URL on all printed and digital material distributed by the I&M network (reports, resource briefs, newsletter, brochure, etc.).
- Include the website url as part of Email “signatures”, where I&M staff automatically provide their name contact information as a standard way of ending email messages.
- Quarterly web page updates (a 1-page document with lists of new reports, resource briefs, and other web changes) will be sent out by the Data Manager to the 6 all park email lists.

Audience:

- The internet pages are aimed at a somewhat more technical or scientific audience, but are available to all internal and external audiences. The intranet serves only internal NPS audiences.

Responsible Parties:

- The Data Manager is the primary person responsible for maintaining and updating web page content. KLMN project leads provide or edit material pertaining to their particular projects, and the KLMN Program Manager and Program Assistant reviews page content, where needed.

NPS Integrated Resource Management Applications (IRMA)

The following overview is excerpted from the NPS Resource Brief on the Natural Resource Information Portal, available at: <http://science.nature.nps.gov/im/datamgmt/IRMA.cfm>.

The National Park Service - Natural Resource Program Center (NRPC) has developed the Natural Resource data and Information Portal, or IRMA, the beginning of a web-based “one-stop shop” for natural resource data and information, including reports and other documents, data sets, maps, images, links, and more.

IRMA allows users to easily search, view, download, and print information from multiple sources and systems, all from a consistent user interface. The architecture supporting IRMA also promotes data sharing with other data systems, federal and state agencies, and cooperators.

The full functionality and content of IRMA is currently available to all NPS staff at <http://irma.nps.gov>. A subset of records is also available to partners and the general public via the same url; the number of publically-available records will increase as the initial quality assurance steps are completed and sensitive data have been protected.

As of October 2010, all NPS staff can search, view, and download information from IRMA, as well as create, edit, and upload reference-related data.

Key features currently available on IRMA include:

- Search for documents and data
- Get a species list for a park
- Add a reference record and upload the associated file
- Find information on air, climate, geology, water, and more - Clicking on other portal tabs will take the user to multiple data sources and websites, including maps, webcams, inventories, and tools.
- Link directly to documents in IRMA from the Klamath Network I&M Program website. Queries can also be created and saved on specific topics.

Audience:

- Primarily NPS staff initially; over time IRMA will become a major source of information for cooperators, scientists doing research in parks, and various other public audiences.

Responsible Parties:

The Data Manager is ultimately responsible for ensuring that KLMN products are uploaded to IRMA and providing guidance to KLMN staff. Other staff provide support to get project-specific products uploaded. Project Leads will be responsible for the protocols they manage. The Data Manager will serve the products available in IRMA through KLMN's website.

Goal 2: The Klamath Network I&M Program builds upon existing collaborative relationships with parks and the greater scientific community to better integrate I&M information into park management, planning, interpretation and research.

Presentations at Parks

Purpose:

- To communicate in-person with park staff about I&M Program accomplishments, give project-specific updates, participate in training or other pertinent meetings, and provide opportunities for discussion and questions about the program.

Key Content:

- Communicate KLMN I&M Program's purpose and accomplishments to park staff.

- Provide information about the resources being monitored, such as natural history, status and trends in resources, interesting observations or highlights from the field.
- Provide linkages between Inventory & Monitoring data and products and specific park information needs for management decisions, long-term planning, and education and outreach activities.
- Offer park staff the opportunity to ask questions, discuss natural resource related issues with I&M Program staff, and provide suggestions about other communication opportunities.
- Create and maintain a positive rapport with park staff and demonstrate that the program provides an important service to each of the KLMN parks.

Guidelines and Time Frame for Presentations:

- Take advantage of existing lecture series, meetings, or trainings in parks to schedule talks about the I&M Program, when feasible for I&M staff to travel to parks. Examples include seasonal trainings, all-hands park meetings, etc.
- If travel must be restricted due to a low travel ceiling, I&M presentations will need to be timed to coincide with travel that includes field work or other business in KLMN parks. Most years, we expect that one staff member would present information on one project in the parks (birds one year, lakes another year, etc.), or we would present projects based on local park needs and interests.
- Develop and maintain an up-to-date presentation about the I&M program that will include a brief overview and summaries of existing monitoring projects. Occasionally, more in-depth project-specific talks will be given, to be developed and presented by the project lead.

Audience:

- Park natural resource and interpretive staff, local USGS scientists, and collaborators

Responsible Parties:

- Program Manager and other I&M staff

Symposia

Purpose: To convene park Resources Management, Interpretation, I&M staff, local USGS scientists, and others doing research in the parks to share current information around central themes of broad interest among KLMN park and I&M staff.

Key Content:

- May include presentations, panel discussions, small group problem-solving discussions, etc.
- Potential themes may include a combination of science and education/outreach-oriented topics. Examples include climate change, biodiversity, communicating science, invasive species, fire and other disturbances, restoration, pollutants, and reaching new audiences.

Guidelines and Time Frame:

- Symposia would occur in the spring (April or May) each year that scheduling is feasible. While ideally they would occur annually, time and travel constraints will likely limit these to every 2-3 years.

Audience:

- All attendees (but primarily park staff)

Responsible Parties:

- A symposium committee is formed each year to plan the content of the meeting, based on the theme selected during the December Technical Committee and Board of Directors meeting.
- This committee would consist of the I&M Program Manager and a subset of Resource Management and Interpretive Division Chiefs or SLC staff who are interested in organizing the meeting.
- Various park and I&M staff and other scientists (or educators for more interpretive-based themes) would be invited to give presentations.

Field Days

Purpose: Field days provide an opportunity for I&M staff to share on-the-ground monitoring activities with park staff and for park staff to highlight one or two resource management projects they are doing. It's an opportunity for park and I&M staff to get together in a less formal setting and share information about park resources on-site in a park.

Key Content:

- I&M staff demonstrate monitoring methods for a specific protocol, and highlight some things that have been learned about the vital signs being monitored (Figure 10). Handouts or small posters on-site may help provide some visual information about project status and results.
- Park staff may highlight a related (or unrelated) project so that I&M and staff from other KLMN parks learn something about resource management priorities and products in the park.
- Identify information that could be useful to interpreters in doing programs about the resources featured.



Figure 10. Aaron Maxwell, field crew leader, collecting macroinvertebrates from a lake in Lassen Volcanic National Park.

Guidelines and Time Frame:

- Field days will not likely be possible every year. The time frame is dependent on the projects being featured and availability of I&M and park staff to participate. It would occur during the primary field season from May through September. Field days could

also be arranged outside of field season (such as October) as long as conditions are such that field work can be demonstrated or discussed on-site in a park.

Audience:

- All attendees – Park and I&M staff.

Responsible Parties:

- Project lead (and field crew) for a specific protocol would be the primary one showing how the monitoring is done and discussing what is being learned.
- I&M Program Manager works with park staff to coordinate field day.
- Park staff project leads demonstrate a park project, if possible, and how it applies to park management needs.

Digital Linkages among I&M and Parks

Purpose: Enable web visitors to discover I&M information via park websites through links to I&M web pages from park Nature & Science pages, and via the social media some parks are using to connect with the public in new ways.

Key Content:

- Nature & Science web pages in the parks link to the KLMN I&M home page, and where specific pages exist for plants, animals, caves, or other resources related to the vital signs that KLMN I&M is monitoring, create links to specific vital signs pages that describe the monitoring being done.
- From I&M web pages, link to park web pages (especially the Nature & Science pages), and park webmasters and other staff can determine the most appropriate place(s) to link to I&M pages from the parks' websites.

Guidelines and Time Frame:

- Park and I&M staff keep informed about each other's website updates. The Data Manager sends out quarterly updates to park staff summarizing additions or changes to I&M web pages.

Audience:

- External and internal. These linkages are primarily to connect a larger public audience to I&M, but could also serve to connect more internal (NPS, Natural History Associations) to I&M information.

Responsible Parties:

- Data Manager, park webmasters, park resource managers, and I&M Program Manager.

Goal 3: The varied audiences for Klamath Network I&M information understand the importance of monitoring natural resources and why particular vital signs were selected to monitor.

Programmatic Resource Briefs

Purpose:

These briefs provide background and overview information about the KLMN I&M Program that allow both primary and secondary audiences to understand the purpose of the program, why monitoring is important, how the program works in relation to the parks and its regional and national organizational structure, and what the current status is of monitoring development and implementation.

Key Content:

The following three types of briefs are proposed at this time:

1. Program purpose and organizational structure – What is the Klamath Network I&M Program?
 - Brief background on national program establishment, goals, and structure (32 networks, relationship to Natural Resource Challenge and NP Omnibus legislation, emphasis on carefully developed monitoring protocols and information management and communication)
 - Why are inventory and monitoring important for park management?
 - How is the local program staffed, what is its relationship to parks, PWR/WASO, and Southern Oregon University (staffing, supervision, Board of Directors, Technical Committee, office location, etc.)
2. To monitor or not to monitor: How were vital signs chosen?
 - What is a vital sign – define.
 - What was the process of identifying, prioritizing, and selecting vital signs?
 - What were the criteria used to evaluate potential vital signs?
 - Who was involved in the process?
 - How many potential vital signs were identified and what were the final ones selected?
 - Briefly describe the importance of each vital sign.
3. Taking the pulse of the parks: Current status of Klamath Network vital signs monitoring
 - Provide an overview of status for each protocol and vital signs associated with the protocol.
 - This may most easily be done in a table listing the protocol, the associated vital signs, the status of the protocol (under development, approved, implemented), year monitoring started or is planned to start, what parks are being monitored for each protocol, and links to more information on the KLMN website.
 - Examples of interesting highlights or results to date

Guidelines and Time Frame:

- Format – Use same heading format as the project-specific briefs have (see example under Goal 1).
- Sections and content will vary for each of these three briefs.
- Use at least 2-3 images or other graphics to make more appealing to readers and to illustrate concepts or methods described in the text.
- Briefs 1 and 2 can be developed at any time, and would likely remain the same unless the vital signs being monitored changes over time. Brief 3 would need to be updated as the program progresses (possibly annually or every few years).
- Consider sharing via a program overview section of I&M web page.

Audience:

- Park staff who are new or are not directly involved in working with the I&M staff, partners, cooperating associations, and various public audiences.

Responsible Parties:

- Primarily I&M Program Manager, with contributions from the other network staff.

Program Overviews (Poster, Presentation)

Purpose:

- To provide a program overview that can be posted in park office buildings, presented at park or public meetings by various I&M staff, or used to summarize specific projects that are underway in parks.

Content:

- Communicate KLMN I&M Program's purpose and accomplishments to park staff, or other cooperators or partners attending meetings and activities in parks.
- Emphasize the importance of inventory and monitoring information to an understanding of the status and trends of park resources.
- Highlight specific projects for certain events or meetings (for example, bird monitoring during, for example, Winter Wings or Godwit Days meetings).

Guidelines for Overview Posters and Presentations:

- Posters follow a standard template using the NPS graphic identity standards and KLMN-specific information (contact information, website, etc.).
- Posters and other presentations are appealing to view – are photo and graphic-rich, use large enough fonts to read easily, and contain succinct, clearly written text.
- An overview presentation gives basic background information about the program such as the content described in the previous section on programmatic resource briefs. This content can be stand-alone or used as an introduction for a project-specific presentation. Some content could be omitted depending upon the audience.
- Posters can be displayed in the I&M office, where other park staff either work or meet, in rooms where presentations are given in parks, and for certain public events in parks where displays are appropriate.

- Project-specific posters will only be developed as needed for specific events but can then be periodically displayed in the I&M office building and in parks where the specific monitoring projects occur.

Audience:

- Primarily park staff, but the public could also be a target audience for certain events that occur in the parks or in the local communities.

Responsible Parties:

- Program Manager, Program Administrative Assistant, and student interns for program overviews, and other I&M staff for project-specific presentations or posters.

Goal 4: The Klamath I&M and Park staff members work together to inform a diversity of public audiences about natural resource inventory and monitoring approaches, results and applications to resource management needs. Where possible, linkages are made to larger strategic NPS initiatives.

While most of primary audiences defined for KLMN I&M information are internal, the KLMN I&M staff recognize the importance of sharing inventory and monitoring information with the public. The KLMN website and IRMA, and the reports, resource briefs, data, and other information these sources provide are available to a wide diversity of public audiences. KLMN I&M staff will occasionally give talks to local public audiences and to scientists and land managers at professional meetings about monitoring projects, their scientific findings, and their relevance to park management needs. In addition to technical reports, KLMN I&M staff will also periodically publish monitoring results in scientific journals, which are a primary means of reaching the broader scientific community.

For the most part, however, the program's success in communicating effectively with the general public will depend on its effectiveness in communicating and working with park interpreters.

High- quality interpretation will be the shared responsibility of all levels of NPS staff, from the Washington and regional directorates, through park superintendents and chief interpreters, to field interpreters and non- interpretive staff. It will be achieved through interpretive and educational services, media, ongoing research, planning, technical excellence in implementation, a well- trained staff, broad public input, and continual reevaluation. (Chapter 7, Management Policies Guidebook, NPS 2006b).

The I&M Program shares this responsibility, and will work closely with local staff to provide the kind of information needed to facilitate interpreting I&M information to public audiences.

Most of the KLMN parks have long-range interpretive plans or comparable documents that define interpretive themes (Edquist Davis Exhibits and NPS 2010; Interpretive Solutions, Inc. and NPS 2010; Oregon Caves National Monument 1999; Whiskeytown-Shasta-Trinity NRA 2008). These themes describe ideas, concepts, or messages about the parks and provide opportunities for visitors and audiences to make personal connections to the meanings and significance of the parks. Interpretive themes link tangible park resources (such as a wildlife) to less tangible concepts (such as trophic dynamics). Among the numerous cultural and natural

resource themes articulated in the KLMN parks' plans, several of them relate to the kind of information that Inventory and Monitoring projects provide. The most relevant themes are summarized in Appendix E. When park interpreters are seeking material for addressing these themes, I&M information may offer some current stories to share that can complement other natural resources information from park projects and outside research efforts. The Klamath Network has previously applied the approach of addressing interpretive themes with I&M information through the Strategic Interpretive Plan discussed in chapter 3 (NPS 2005).

Resource Briefs

See description provided above under Goal 1. Resource briefs are useful for both primary and secondary audiences. They may be most effective in providing current natural resource information for park interpreters to share directly public audiences in interpretative programs.

Working with Interpreters

Purpose:

- To share inventory and monitoring program information and highlights, to learn what kinds of information and communication approaches are useful for park interpreters, and to share ideas about how best to communicate I&M information to a diversity of public audiences.

Opportunities:

- Through periodic meetings and trainings, I&M and Interpretation learn about each other's programs and communication needs, and share ideas about interpretive opportunities.
- Discuss possibilities for collaborative projects related to I&M information and educational opportunities. Consider a focus on an interpretive theme or a Call-to-Action item that is applicable to Interpretation and I&M.

Guidelines and Timeframes for Communicating:

- I&M staff attend interpretive meetings as time and travel funds allow to share new information, answer questions.
- I&M staff participate in seasonal training (if requested) to provide general programmatic or topic-specific information that can be used in interpretive programs. Be sure interpreters have access to up-to-date information like current resource briefs or reports.
- I&M seeks feedback and guidance on resource brief content and formats that may be most useful for public audiences.
- I&M and park staff identify a Call-to-Action item to focus on together at a yearly winter meeting.

Responsible Parties:

- Program Manager, other I&M staff as appropriate, and park interpreters.

Featured Creatures

Purpose:

- To raise awareness of and generate interest in the plants and animals found in Klamath Network parks.

Key Themes/Content:

- Provide engaging natural history information about selected plant and animal species.
- Content includes a description of the organism and its habitat, where it can be found in KLMN parks, its reproduction, its behavior and diet (animals), its distribution, and any additional fun facts about the organism.

Guidance and Timeline for Production:

- Featured Creatures are limited to one page, and follow a format as shown in Figure 11.
- They are developed and distributed monthly.
- Compelling images are included of the organism.

Distribution:

- Featured Creatures are emailed out as a pdf document to park staff and a mailing list of other PWR networks and cooperators.
- All Featured Creatures are also served from the KLMN I&M website.

Audience and Review Process:

- Primary audience is park staff, visitors to KLMN's website, cooperators, and other I&M networks. A mailing list will be maintained, and anyone can request being included on it.

- Content is reviewed by the I&M Program Manager.

Responsible Parties:

- Organized and distributed by the I&M Program Manager. Featured Creatures are written by KLMN I&M staff as well as Park staff, cooperators, and interns from Southern Oregon University.

National Park Service U.S. Department of the Interior



Klamath Network Featured Creature

December 2008

Northern Alligator Lizard (*Elgaria coerulea*)

FIELD NOTES

General Description:
Northern alligator lizards are medium-sized and slender, have short limbs, a long tail, big bony scales, powerful jaws, and a large head. Head shape varies between sexes, with the male's being broader and more triangular. Adults' snout to vent length reaches 3-6 inches, with tails up to double this length making the lizard's total size 10-12 inches. The eyes are darkly pigmented. These lizards are typically solid brown, olive, or grey, or mottled with these colors and darker ones in spots and stripes. Young are more plainly colored than adults. Fourteen rows of scales line the center of the back. All the dorsal scales are at least slightly keeled, while the ventral scales are smooth. A different type of scale lines the sides of the body, these scales are normally folded to gether, but have the ability to expand to hold eggs, young, or food, and collapse again when not needed.

Diet:
Small invertebrates compose the bulk of the *Elgaria coerulea*'s food supply, including tasty snails, ticks, spiders, slugs, and worms. This lizard may also dine upon other small lizards, mammals, birds, and bird eggs. The northern alligator lizard, in a manner similar to its larger namesake - the alligator, often rolls around after clutching large prey in their jaws, allowing the lizard to tear off pieces to be eaten.

Behavior:
When threatened, one of its main defensive tactics is to break off its tail, distracting the enemy with this writhing appendage while the lizard scurries to safety. The tail will eventually grow back, although never as perfectly as the original. They are also good swimmers and may jump into the water to avoid predators.



© Wilgoeina



© California Herps



Jens V. Vindum © California Academy of Sciences

Reproduction:
Females mature sexually at about 3 years. Mating occurs in April-June, depending on elevation. After a 7-10 week gestation, these viviparous lizards give birth to live young between June and September. Litter sizes may be 2-15, although the normal is 4.

Habitat:
These secretive diurnal lizards hide under brush and rock and hibernate in the cold months. They prefer woodlands, grasslands, and forests. Although they are most common in relatively wet, cool environments, they are found near sunny clearings as well. Preferring cooler temperatures than other lizards, the northern alligator lizard may be found at elevations up to 10,500'. Don't disturb these lizards where you find them though; when agitated, their strong bite can break human fingers!

Where to see it in the Klamath Parks:
Crater Lake, Lava Beds, Lassen Volcanic, Oregon Caves, Redwood, and Whiskeytown are all home to *E. coerulea*.

Distribution:
The northern alligator lizard and its subspecies are found throughout the Klamath region, extending north into southern British Columbia, south well into the Sierras and coastal California, and east into portions of Idaho and Montana.

More Information:
California Herps:
<http://www.californiaherps.com/lizards/elsa/e.coerulea.html>

Nussbaum, R. A., E. D. Brodie Jr., and R. M. Storm. 1983. Amphibians and reptiles of the Pacific Northwest. University of Idaho Press, Moscow.

Figure 11. Sample Featured Creature.

Public Presentations

Purpose:

- To give a program overview or a topic-specific talk to local public audiences, typically as a result of an invitation from a specific park or other regional partner.

Key Themes/Content:

- Depends on group and their particular interests.

Guidelines and Timelines for Presentations:

- Usually done by invitation, and if staff are available to present.

Audience:

- Variable public audiences. Examples to date have included Southern Oregon University classes and presentation as at the Siskiyou Ecology Conference, Rotary, and community lecture series.

Responsible Parties:

- Depends on topic and venue. The Program Manager, Aquatic Ecologist, Data Manager, and Botanist may give public presentations.

Conferences

Purpose: To share information with and learn from the broader scientific community, as well as land managers and members of various conservation organizations.

Content:

- Present advances in understanding of natural resources and processes in KLMN parks.
- Present successful methods for balancing spatial and temporal monitoring objectives at the landscape-scale in national parks.
- Provide project-specific examples of how inventory and monitoring data inform management decisions about park resources or processes.
- Discuss the efficiencies and scientific advantages of monitoring common resources across multiple parks and networks.
- Provide information on research opportunities associated with the long-term datasets that the I&M program is collecting, maintaining, and analyzing.

Guidelines and Timelines for Presentations:

- These are typically formal oral or poster presentations given as part of a larger thematic or general scientific conference, thus they need to be professional and targeted to strict time limits established by the conference organizers.
- Conference attendance will likely be limited by travel budget restrictions and other program needs (field crew supervision, other time commitments of staff). While attending at least one scientific conference each year is desirable for all professional staff, KLMN's limited travel budget and demands on staff time will constrain staff participation in this activity.

Audience:

- Scientific community and others at regional and national conferences. Potential conferences include those sponsored by the Ecological Society of America, the Society for Conservation Biology, the American Geophysical Union, The Wildlife Society, Natural Areas Association, and the George Wright Society. Local or regional symposia may offer less costly opportunities to participate in scientific meetings.

Peer-reviewed Publications

Purpose:

- To reach the scientific community in a way that internal NPS reports cannot
- To share particularly noteworthy results with a broader scientific audience
- To encourage collaborative investigations that complement or add value to the monitoring program and provide additional useful information to parks
- Obtain more in-depth, outside peer review of inventory and monitoring analyses and syntheses
- Encourage partnerships for the establishment of threshold conditions

Content:

- Communicate advances in knowledge gained from monitoring.
- Present innovative monitoring techniques or approaches.
- Describe the importance of inventory and monitoring data in understanding long-term changes in resource condition and the resulting management implications
- Highlight scientific and management benefits of a network-scale approach to monitoring natural resources and processes.

Guidance and Timeline for Production:

- Specific style or format will depend on target publications. Each publication must be reviewed by the Network Program Manager prior to submission. If warranted, the Program Manager will facilitate review by parks or regional or national personnel.

Distribution:

- Provide links to article if possible from KLMN website and if possible get permission to post publication on website.
- Obtain a limited number of re-prints to distribute to park and outside audiences.

Audience and Review Process:

- Primary audiences are park staff and the scientific community beyond the National Park Service.

Responsible Parties:

- Program Manager and individual protocol leads (Aquatic Ecologist, Data Manager, Botanist, Klamath Bird Observatory staff).

Internet Pages

These are already described under Goal 1. The internet pages are intended for both primary (internal) and secondary (or external) audiences. These pages are the primary means of distributing the KLMN I&M Program's products to a wide range of audiences.

List-serve

Development of a list-serve is optional, and at this time, the KLMN I&M Program will only pursue it if it does not require a large time commitment and if it provides notable benefits beyond the current mailing list that is used for distribution of information.

Purpose:

- To facilitate distribution of KLMN I&M products and information to an up-to-date list of interested parties.
- To occasionally serve as a forum for I&M or other related discussions.

Content:

- Primarily used to share newsletters, links to new information on the KLMN I&M website such as resource briefs and reports, featured creatures, meeting announcements or minutes, monitoring schedules in parks, and other pertinent news related to the I&M program.

Guidelines and Time Frame:

- To be determined once KLMN I&M staff can investigate the development and management of a list-serve.

Audience:

- Includes park staff, cooperators, outside scientists, and others interested in receiving I&M newsletters and other periodic updates on new I&M products and news and in participating in occasional discussions.

Responsible Parties:

- Maintained by Data Manager.
- Used primarily by Program Manager as well as other I&M staff who need to share information and updates with a current list of interested parties.

Integrated Resource Management Applications

This is described under Goal 1.

Roles and Responsibilities

Communication about the KLMN Inventory & Monitoring Program will be a responsibility shared by all KLMN I&M staff. The KLMN I&M Program cannot afford to fund a dedicated science communication position at the present time; thus all staff will need to collaborate to fulfill the science communication goals. The Program Manager will coordinate I&M Program communication activities with the Data Manager, Aquatic Ecologist, Botanist, Program Assistant, and interns. Periodically, park staff may play a role in organizing meetings, events, or

communication activities that provide an opportunity to communicate I&M information, and will be on-going participants in a number of I&M-coordinated meetings and events.

Following is a brief narrative summary of each position's role and responsibilities related to communication needs. At the end is a 5-year timeline and an estimated annual timeline of communication products and activities (Tables 3 and 4).

Program Manager: Provides leadership and oversight, managing the budget and defining and prioritizing communication activities. Establishes the annual work plan, timeline, and priorities for communication activities for each year. Provides content guidance and review to KLMN staff for science communication products. Coordinates interns who work on science communication projects. Usually serves as the lead in developing KLMN's annual administrative report and work plan and in communicating with the Board of Directors and Technical Committee. Gives presentations about or represents the KLMN I&M Program or specific projects for local meetings and trainings as well as regional or national meetings. Defines and modifies as needed the science communication roles and responsibilities of other KLMN I&M staff. With other designated staff, prepares communication products (reports, publications, briefs, presentations) for any inventory or monitoring project(s) that he/she leads, in particular the vegetation, whitebark pine, invasive species early detection, and cave monitoring subprograms. Has the lead role in coordinating the biannual newsletter and the Featured Creature and provides content and review for KLMN web pages as needed. Leads or assists with coordination of symposia or network meetings that provide I&M information to KLMN park staff and other scientists.

Data Manager: Serves as the lead person communicating data management information, news, or training to KLMN and park staff and cooperators. Oversees the network file directory structure that helps KLMN I&M staff organize and share information. Provides training and updates to parks about information management and sharing tools or programs, such as the national I&M program's Integrated Resources Management Applications (IRMA). Ensures that I&M reports and data are uploaded to IRMA regularly. Plays the lead role in managing and updating the KLMN internet and intranet sites; helps the I&M staff make decisions about content and format for these sites and stays up-to-date with current national and local guidance. Periodically represents the KLMN I&M Program at local park meetings and trainings. Gives presentations about KLMN I&M Program or projects at local, regional, or national meetings, when feasible. Serves as an internal reviewer for some reports and other communication products, provides data management support for reporting needs, and contributes content related to data management and other inventory and monitoring projects to the newsletter, resource briefs, and the web page. Prepares communication products (reports, publications, briefs, presentations) for any inventory or monitoring project(s) that he/she leads, in particular the landbird and landcover / land use subprograms are assigned at this time.

Aquatic Ecologist: The Aquatic Ecologist is responsible for communication activities related to monitoring projects for which he/she is the Project Lead. At this time they are the streams, lakes, and intertidal subprograms. The Aquatic Ecologist may also support the Program Manager in developing or reviewing other reports and communication products. The most important responsibilities include writing annual reports and periodic analysis and synthesis reports, and developing content (text and images) for resource briefs associated with these reports. Other activities associated with the protocols include occasional newsletter articles, helping to develop

or update web page content, and giving presentations at local, regional, or national meetings or trainings. Will periodically represent the KLMN I&M Program at local park meetings or trainings, and occasionally at regional or national meetings. May occasionally give talks to public audiences about inventory or monitoring projects and the KLMN I&M Program.

Botanist: The Botanist shares responsibility for communication activities related to inventory or monitoring projects for which he/she is the Field Lead with the Project Lead (Program Manager). These currently include the terrestrial vegetation, and non-native species monitoring subprojects. The most important responsibilities include writing annual reports and periodic trend reports, and developing content (text and images) for resource briefs associated with these reports. Other activities associated with the protocols include occasional newsletter articles, helping to develop or update web page content, and giving presentations at local, regional, or national meetings or trainings. May periodically represent the KLMN I&M Program at local park meetings or trainings, and occasionally at regional or national meetings. May occasionally give talks to public audiences about inventory and monitoring projects and the KLMN I&M Program.

GIS Assistant: Provides GIS support to project leads to develop maps and other spatial analyses and products associated with inventory and monitoring projects, to be used in annual or trend reports. Develops maps and figures for web pages, newsletters, and resource briefs, if needed. Provides support to the Data Manager in sharing data management tools and information with KLMN and Park staff members.

Program Assistant: Provides support to Program Manager in editing and formatting resource briefs, newsletter, and other communication products. Assists with the organization of meetings or symposia. Takes notes at staff, Board, and Technical Committee meetings. Reviews resource briefs, web text, poster, or other products for readability and understanding for interpretive needs and public audiences. Provides support in editing and formatting of reports and other documents. As time permits, works with other KLMN staff to develop posters and PowerPoint presentations for general program use.

Interns: Student interns from Southern Oregon University (and perhaps other institutions) will be hired each year to assist with varied duties, including development of science communication products. The Program Manager will oversee the interns, and depending on their skill levels, they will assist with all or some of the following needs: resource briefs, newsletters, Featured Creatures, special projects such as a poster for an event or monitoring project, symposia or meeting support, program videos, taking good photos of KLMN I&M field work, web design, and other activities.

Five-Year Schedule and Annual Timeline

The five-year schedule and annual timeline are estimated from the Communication Approaches chapter. These schedules are subject to change depending on competing workloads and lessons learned from implementation of this plan that inform scheduling and priorities. The five-year schedule shows the more substantial communication products and activities that are not typically done on an annual basis (Table 3). Because these activities require more time, data, or funds, they are done when feasible based on need, I&M and park staff schedules, or protocol time frames.

Table 3. Five-year schedule (estimated).

Year	Communication Products and Activities
2012	Science communication scoping workshop Science Communication Plan Present Program Efforts at Ecological Society of America Lassen Lakes Aquatic Integrity Report Analysis and synthesis report for Landbird Monitoring
2013	Spring science symposia (theme-based) Programmatic resource briefs Programmatic overview poster Establish a list-serve to exchange information with KLMN parks. Analysis and synthesis report for Stream Monitoring Vegetation Classification and Map for Oregon Caves NM Vegetation Classification and Map for Lassen Volcanic NP Vegetation Classification and Map for Lava Beds NM
2014	Field day(s) in a KLMN park Attend regional or national professional meetings (TBA) – give KLMN I&M presentation(s). Analysis and Synthesis Report for Vegetation Monitoring Invasive Species Report Analysis and Synthesis Report for Landbird Monitoring (2)
2015	Spring science symposia (theme-based) Analysis and synthesis report for Landcover / Land Use Analysis and Synthesis Report for Climate
2016	Spring science symposia (theme-based) - relate to NPS Centennial Field day(s) in a KLMN park Analysis and synthesis report for Lakes Evaluate science communication effectiveness and revise plan if needed.

The estimated annual schedule (Table 4) includes the more routine communication activities that happen one or more times each year. This is a “typical” schedule, but will vary somewhat from year to year depending on other factors such as variation in the field season due to weather, staffing availability, and competing and sometimes unpredictable needs for I&M staff time.

Table 4. Estimated science communications annual timeline. Web updates or revisions are done as needed throughout the year and are not included below.

Month	Communication Products and Activities
October	Annual Administrative Report to Steering Committee Updates sent out via list-serve (web page changes, new resource briefs, etc.) Field day in a park (some years) Featured Creature
November	1 -- Annual Administrative Report to WASO 15 – Summer/Fall newsletter completed 30 – Periodic (every 3-5 years depending on protocol) trend and synthesis reports Featured Creature
December	1 – Annual Work Plan to Steering Committee First or Second week – Board of Directors and Science Communication planning meeting 15 – Upload new data and other products to IRMA Featured Creature
January	Participate in park lecture series or make site visits to talk with specific staff (as needed) Email updates sent out 30 – Annual Work Plan to WASO Featured Creature
February	Participate in park lecture series or make site visits to talk with specific staff Email updates sent out Featured Creature
March	Participate in park lecture series or make site visits to talk with specific staff (as needed) Featured Creature
April	15 – Winter/Spring newsletter completed Periodic theme-based spring symposium Featured Creature
May	Featured Creature
June	Meetings or Trainings (dates variable) <ul style="list-style-type: none"> • Park Resources Management and Interpretive seasonal trainings, when feasible Email updates sent out to parks
July	Featured Creature
August	Featured Creature
September	Featured Creature Email updates sent out

After this plan is implemented for a few years, these schedules can be updated to reflect more accurately the timing of communication products and activities, if needed.

Evaluating Communication Activities and Products

Implementation of this plan will be an opportunity to evaluate if the communication activities proposed are sustainable with the existing staff. Toward the end of the 5-year period that this plan is intended to address, a simple survey of park staff should be conducted to evaluate the effectiveness of the communication efforts. One fairly easy way to do this is through Survey Monkey (<http://www.surveymonkey.com>). See the example survey conducted as part of this plan development (Appendix B). If nine or fewer questions are used, there is currently no cost for use of the on-line program. It summarizes responses for those conducting the survey, and is an easy way for participants to provide feedback. This kind of survey helps assess overall awareness of the program and its projects, as well as what products and activities best meet the primary internal audience needs. Another way of getting feedback would be to include communication as a topic of discussion during annual network meetings.

6. Future Directions for KLMN Communications

As stated earlier, this plan's intended time frame is five years. While many of the communication products are a core part of the program that may not change a lot over time (e.g., annual reports, analysis and synthesis reports, resource briefs, web pages, newsletter), the KLMN I&M Program will need to re-evaluate periodically the effectiveness of communication efforts and be adaptable to evolving communication approaches and park needs. New methods and products are important for maintaining high interest in KLMN I&M activities and meeting the needs of diverse audiences. This plan added the following activities that will be implemented and/or evaluated for feasibility and effectiveness:

- Conducting periodic thematic symposia with parks and other partners
- Having periodic field days where park and I&M staff can get together to share field projects, methods, and findings out in a park
- Providing interpretive training when feasible
- Investigate creating and maintaining a list-serve for sharing I&M information and providing a forum for questions and discussion

Other Ideas for Future Consideration

In Appendix F (Other Activities Considered), we summarize a number of possible citizen science opportunities that KLMN parks and I&M could discuss. These are nationally coordinated programs and include eBird, Great Backyard Bird Count, and Project BudBurst. I&M staff would not lead these efforts but may be able to provide information that would help support park staff who wanted to pursue citizen science projects.

In-person communication (formal presentations or informal conversations) was strongly emphasized as important in results of the survey we did of park staff. Since KLMN staff are duty-stationed at Ashland, they do not encounter park staff on a regular basis as part of their regular work week. Another way to increase contact and information sharing between park and I&M staff is to take advantage of field crews who do work in KLMN parks all summer. Field crew members could be trained as “ambassadors” for the I&M Program in parks. While they don't have the long-term perspective and background that the core I&M staff have, they could still provide a face for I&M in parks and help promote awareness and understanding of the KLMN projects in parks.

KLMN I&M staff recently worked with SOU staff on a few short program and project films, and once these are finalized and can be posted, KLMN can determine if it is worthwhile to invest additional time in visual media such as short films or photo sharing on Flickr. Showing people what fieldwork involves and introducing them to the people who do it can be more vivid and personal than the written, static descriptions present in newsletters or other written formats.

Finally, we live in a world where more interactive digital communication methods (Facebook, Twitter, blogs, etc.) are increasingly popular and an important way to engage diverse audiences. As other I&M networks and parks explore social media for sharing information, the KLMN I&M Program can evaluate whether it is a direction worth pursuing in future years, if staffing is sufficient to support these communication tools.

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