

Looking to the Future: A Five Year Plan for Improving the Klamath Network Inventory and Monitoring Program



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Executive Summary

This plan describes the key ideas and recommendations of a self-evaluation process aimed at improving the Klamath Network Inventory and Monitoring Program. The impetus for the plan was the Three Year Program Review conducted by the National Inventory and Monitoring Program in July 2010. Although the review was favorable, this plan is intended to highlight areas where the Klamath Network I&M Program might focus on getting even better. The plan provides background and then discusses a number of areas of potential improvement for the program:

Section 1 – Background: This describes the Three Year Program Review process, the goals and objectives for the plan, and the scope and audience of the plan.

Section 2 – Human Resources: This section analyzes the staffing structure of the network and discusses options for solidifying, expanding, and potentially modifying the staffing structure of the I&M Program.

Priority Recommendations

- The Network Lead Biotech (Vegetation/Botany) should be upgraded from a GS-07 to a GS-09 to match the actual workload and duties.
- The Network Data Manager position should be classified as a GS-11/12. This is in recognition of the protocol management, managerial, IT, GIS duties associated with the position, in addition to data management tasks.
- The Aquatic Ecologist position should be converted from term to a permanent status.

Section 3 – Operations: This section describes the changes in the fundamental administrative and operational structures of the program that may be desirable over the next five years.

Priority Recommendations

- Re-visit and update Klamath Network Charter (2012)
- Explore feasibility of moving the network office to a better location on campus, such as the Science Building or Taylor Hall, to raise the NPS profile on campus and better connect with the resources and opportunities available there.
- Develop a Safety Handbook for the Network (2012).
- Meet with park staff to discuss ways to improve and streamline field operations each year (2012).
- Itemize the monies given to Redwood for administrative and IT support before beginning of fiscal year (FY 2011 and all subsequent years).
- Adjust reporting dates in task agreements to have annual reports for each task agreement due in August, so that portions of these updates may be pulled directly into the Annual Administrative Report each September, streamlining the report writing process.

Section 4 – Financial Projections: This section reviews the last five years of expenditures and projects income and costs forward for five years, with a discussion of potential accounting, cost saving , and fund raising ideas.

Priority Recommendations

- The KLMN I&M should focus on developing partnerships with the parks, other agencies, non-government organizations, and universities to look for opportunities to pool funding and staff.

- The KLMN I&M has provided REDW and Southern Oregon University with funding to support the administrative aspects of our program. A cost analysis of both partnerships should be completed and funds adjusted accordingly.
- Since the cost and activities associated with monitoring projects are standardized they should be easy to track over time. The KLMN should ensure they have a useful method for tracking costs related to these projects which will help ensure they will be able to fund the monitoring over time.

Section 5 – Protocol Feasibility: This section evaluates all KLMN I&M protocols and points out areas where potential refinements might be needed to ensure that implementation is successful and feasible over time.

Priority Recommendations

- Work to build a degree of redundancy into the program to ensure that work can be completed when the inevitable challenges arise.
- Revise protocol workloads as needed, during the first years of implementation to ensure they are feasible.
- Develop a Memorandum of Agreement between the ORCA and the KLMN to formalize the mistnetting joint-funding partnership.
- Develop a Memorandum of Agreement to articulate the shared goals and staffing commitments required for cave monitoring at LABE.
- Initiate discussions about the best prospect for future funding collaboration for Intertidal Monitoring.
- Consider methods for multiyear permitting processes to decrease the yearly permitting workload, and to better forecast the field efforts in each park over time.
- Explore means of executing invasive species monitoring with park-based crews.

Section 6 – Science Communication: This section describes the KLMN I&M Program’s plans and approaches for communicating inventory and monitoring science to the park managers and the public.

Priority Recommendations

- Assign KLMN Program Manager as Interim Science Communication Lead for the Program.
- Have a network meeting in FY 2012 to discuss the interim science communication approaches and to prioritize and schedule activities.
- Explore the feasibility of developing collaborative education projects in partnership with the parks, the Crater Lake Science and Learning Center, and other educational institutions.
- Begin the process for accessing professional science communication staff, either through shared positions with the park, through externally funded university positions, or through the eventual hiring of a Science Communication Specialist.

Section 7 – Technical Assistance: This section discusses goals and means for increasing the role of KLMN I&M Program in technical assistance for the parks.

Priority Recommendation

- The I&M program will work with the parks to develop a system for soliciting and providing technical assistance, respecting the core assignments of any affected staff, and the priorities of the parks and program.

Section 8 – Collaboration: This section describes ideas for improving the collaboration between the KLMN I&M Program and the parks for inventory, monitoring, research, and management support.

Priority Recommendations

The I&M Program will engage more closely with the Klamath Network parks through the following activities:

- Increased visits to parks to provide presentations of activities, assist with training, etc., to ensure that all staff are familiar with the staff, goals and activities of the program
- Find ways to get park-based staff involved in I&M activities by taking them into the field, allowing them to collaborate on report or publication writing, or other activities.
- I&M staff may provide assistance with sampling, data analysis, or reporting for park-based inventory, monitoring, and research efforts.
- I&M staff may become more involved in contributing to resource condition assessments, stewardship strategies, and general management plans.

Section 9 – Partnerships: This section discusses the roles that external partnerships with academic, nonprofit, and allied agencies will likely play in the development of the I&M Program’s ability to serve conservation goals in the parks and region.

Priority Recommendations

- Develop a roster of potential partners or peer reviewers for each of our vital signs and all the topic areas covered by our analysis and synthesis reports.
- Explore mechanisms for securing additional funding to support university-based staff well before 2014.
- Meet periodically with other land management agencies to discuss collaborative management initiative and funding possibilities.
- Meet with Crater Lake Science and Learning Center in 2012 to explore collaborative education and interpretation projects.

Section 10 – Data Management: This section describes potential improvements in the Data Management Program, as well as the data management implications of potential staffing structures in the future.

Priority Recommendations

- Evaluate the best way to utilize web pages and sharepoint sites to distribute data and information.
- Perform and develop trainings over the next 5 years to ensure all project staff understand their data management responsibilities.
- Determine how data should be managed for inventory and research projects that are: (1) fully funded by the KLMN or National I&M program, (2) partially (>50%) funded by the KLMN or National I&M program, (3) minimally funded by the KLMN or National I&M program, or (4) not funded by the KLMN, but the KLMN spends a significant amount of staff time on the project.
- Meet and work with the natural resource staff at each park to determine the best methods to make KLMN data and information available to them.
- Work with the natural resource staff at each park to help them meet their data management needs or desires.

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Section 1 – Background

In July 2010, the Klamath Network (KLMN I&M) underwent its three-year program startup review in Medford, Oregon. The Program Review, attended by delegates from all six parks in the Klamath Network, along with scientists from the Klamath Bird Observatory, Southern Oregon University, and USGS, provided an excellent opportunity to review the Network's progress and to share ideas for its improvement. The following quote from the KLMN I&M Program Review Report (Fancy et al. 2010) captures the general assessment of the Network's progress to date:

“There was a consensus among the review panel members and all of the superintendents, park resource managers, and other park staff and collaborators who attended the review or responded to the anonymous online survey that the network is off to an excellent start. The network and park staff have worked together to design and implement a program that is valued by all of the parks and meets the goals and standards of the I&M Program. The accomplishments and productivity of the small network staff to date has been impressive. Excellent progress has been made in establishing the infrastructure and procedures for effective data management, data analysis, reporting, and delivery of results to parks. The data management systems and procedures are top notch, and this is one of the strongest components of the network's efforts....”

Although the Review was generally positive, the panel recommended that the Klamath I&M team consider some changes in the upcoming years to better meet its workload and convey the key findings to the parks. Specifically, the attendees and review panel recommended that the Network increase the proportion of permanent employees, better engage the parks in collaborative monitoring of invasive species, consider placing some Network staff in parks, and conduct a series of “I&M road shows” in each of the parks to better connect with those park staff who rarely can attend centralized meetings.

The full report can be accessed at: http://www1.nrintra.nps.gov/im/monitor/startup_reviews.cfm (NPS Intranet website) or by contacting the Klamath Network office (541-552-8575).

This plan represents the key findings of an internal assessment following the report of the review panel. This plan is also the KLMN I&M Program's first attempt to explore the changes that may be required to meet the evolving demands of a maturing program. The last seven years have been devoted chiefly to the strategic planning process, including the three phases of the monitoring plan, the development of data management and strategic interpretive plans, and foundational documents, such as the development of an administrative handbook, and numerous monitoring protocols. This very heavy technical writing workload will be largely complete by FY 2012. The program will have also conducted nearly two dozen inventory, assessment, and research projects since 2004, most of which are gradually coming to conclusion. As of 2011, there are five vegetation mapping programs ongoing, as well as Natural Resource Condition Assessments and Resource Stewardship Strategies ongoing, all of which are expected to be completed in the next three years. Starting in 2011, the KLMN I&M staff will likely have increasing time to engage in data analysis and synthesis, science communication, and technical assistance to park staffs.

As the Network transitions from the research and development to the implementation phases of the program, work demands will shift from planning and conception to execution and management. While

the program requires strict adherence to monitoring SOPs and data management procedures, it is expected that a good number of the suggestions put forward over the last five years will need to be refined in light of implementation realities. At the same time, refinement of the workflow will be required to ensure that the program can continue to serve as an adaptive and responsive science program for the parks.

Content, Scope, and Audience

This plan is intended to outline ideas for improving the Klamath Network Inventory and Monitoring Program over the next five years. It is intended to complement and update specific staffing, administrative, and operational components of the program discussed in the program review. It is an addendum to existing planning documents, including the Klamath Network's Vital Signs Monitoring Plan, Data Management Plan, Administrative Handbook, and individual monitoring protocols. The focus is on the future, and targeted discussions and recommendations are presented in introspection and good faith, not as rigid prescriptions. The audience for the plan is the Klamath Network staff, the Klamath Network Board of Directors and all interested park staff, and the Regional and National Inventory and Monitoring Program Managers.

Section 2 – Human Resources

Background

At the Klamath Network Program Review, it was suggested that the network review its staffing structure, and specifically to consider adding to its permanent staff, to strengthen its ability to develop and implement the program. The current staffing strategy for the program was developed by the Klamath Network Program Manager and the Board of Directors to provide adequate personnel resources to develop and implement the monitoring program while retaining flexibility for future adjustments, as needed. Since 2004, a developing core staff has provided day-to-day management and oversight of the program, with supplemental staffing from the parks, universities, nonprofit partners, and other agencies.

Staffing Goals

The KLMN I&M Program's goals are to serve the parks of the Klamath Network through the development and execution of a rigorous inventory and vital signs monitoring efforts, which provide important information to serve park-based resource management and interpretive programs through data summaries, scientific reports and publications, and nontechnical communications. The Program also endeavors to provide top quality ecological science to the broader scientific community as a whole through presentations, peer reviewed publications, and timely and accurate data delivery. Ideally, executing the core vital signs and inventory duties and associated administrative and review tasks should require approximately 60% of staff time. These are the recurring and scheduled duties that can typically be forecast several years in advance. Another 20% of the staff time is likely to be consumed by unscheduled work assignments, such as new inventories, State of the Park Reports, unforeseen delays or complications, etc. The final 20% will likely be spent on a combination of technical assistance, scientific manuscript publication, assisting parks with legacy and current datasets, scientific meetings, collaborative meetings with park managers and interpreters, developing partnerships, and ensuring that I&M efforts contribute to the scientific literacy of our parks and to conservation science as a whole. Such efforts, by their very nature, must be adaptive and flexible.

Core Responsibilities

The Klamath Network Inventory and Monitoring Program conceives and directs a broad array of inventory, monitoring, and science communication activities with a small core staff and a variety of academic and nonprofit partners. Consequently, a team approach is required and all staff must provide interdisciplinary expertise and multitasking as needed. The Program Manager provides oversight and guidance for all the core network activities, yet this role may involve delegation to other technical or support staff or collaborative work with partners. The Network Program Manager and Network Board of Directors share responsibility for the successful execution of the program, and for ensuring that all staff are adequately trained to successfully complete assignments. The core responsibilities of the program are outlined in Table 1. For each core responsibility, we recognize a lead person, and alternate lead, and supporting staff. In some cases, the required technical knowledge is of sufficient depth and complexity that only one person can currently fill the responsibility (e.g., database development), for other responsibilities, such as technical writing or field logistical planning, all staff will contribute and fill in for team members, as needed. In all cases, we seek to develop the staff skills such that an alternate lead can stand in when a lead person is out of the office, or if a position becomes vacant. For instance, the

Table 1. Core responsibilities for the Klamath Network Inventory and Monitoring Program, with lead, alternate lead, and supporting roles designated for each staff member and academic and nonprofit partners.

	Administrative	Monitoring	Aquatic (Freshwater and Marine)	Terrestrial Vegetation	Terrestrial Wildlife (Landbirds)	Caves	Land Cover / Land Use	Inventory	Vegetation Mapping	Data Management	Geographic Information Systems	Technical Writing	Statistical / Data Analysis Support	Science Communication/Technical Assistance	Information Technology
FY 2011-13															
Program Manager	L		AL	L	AL	AL	L		S	S		S		L	S
Data Manager	AL		S	S	L	L	AL		S	L	AL	S		S	AL
Aquatic Ecologist			L							S	S	S	AL	S	S
Botanist				AL					AL	S	S	S		S	S
Program Assistant	L		S	S	S	S	S			AL		S		S	S
Field Crews			S	S	S	S				S	S			S	S
Park-based Staff						L				S				S	L
Academic	S						L		L	S	L	L	L	S	L
Nonprofit					L					S				S	

L = Lead Person, AL = Alternate Lead, S = Supporting

Program Manager is currently the alternate lead for the Aquatic Ecologist for aquatic monitoring. Preparing alternate leads for each of the administrative, technical, and science communication activities will be a major ongoing training goal for the team.

It is important to point out that not all these responsibilities are being met equally. With the current staffing structure, the program has strengths in the highest priority responsibilities, including the administrative, data management, and ecological elements of the program. The remaining areas are secondary priorities and pose collateral duties or must be acquired through partnerships. These responsibilities include GIS and spatial analyses, science communication, information technology, statistical analyses, and peer review.

It is also important to recognize that the primary responsibilities will change over time, both within and among years. Each fiscal year, the Fall season is typically consumed by data management activities, field effort reporting, annual work planning, and preparing for the annual Board of Directors meeting. Winters are largely devoted to report writing, submission, and field season planning, usually with a few focused meetings. Springs and summers are occupied by the operational demands of training and supervising field crews and executing monitoring. The core priorities will also change with the maturation of the program. With the inventory and program establishment phases largely complete by

2012, we expect that the I&M staff will have increasing time to engage in data analysis and synthesis, science communication, and technical assistance to park staffs.

Current Staffing Structure

Core Network Staff

As of FY 2011, five positions compose the “core staff” of the Klamath Network. These include four technical professionals, the Program Manager, Data Manager, Aquatic Ecologist, and Botanist, and a Program Assistant who supports them. The Program Manager and Data Manager positions are permanent; the Aquatic Ecologist, Botanist, and Program Assistant positions are term, with the possibility of conversion to permanent in the future. This team directs the execution of all the scientific activities of the network as well as administrative and managerial tasks. The technical professionals share responsibility for vital signs planning and, together with affiliated park staff and cooperators, implement the program. The technical staffing structure has been designed with the expertise required to design, execute, evaluate, and report findings about a vital signs monitoring program encompassing terrestrial, subterranean, freshwater, and marine ecosystems. In addition, the staff opportunistically executes a variety of inventory and scientific communications assignments in partnership with staff at Southern Oregon University and other academic and nonprofit partners, as funding and needs arise. Another duty is peer review of Natural Resource Technical Reports within the Pacific West Region (PWR). This workload is currently approximately 1 report per month, but will likely increase as more PWR networks execute their programs.

Supplemental Staffing

In addition to the Network's core staff, the program employs a number of seasonal employees each year to implement the fieldwork required by the program. The seasonal employees are supervised by the core staff or by designated program leads in each park, as suitable. In most cases, their primary responsibilities will be field data collection and data entry and validation, as appropriate. Figure 1 illustrates the expected staffing structure at full program implementation (FY 2009 and beyond). The roles, responsibilities, affiliations, durations, and duty stations of all supplemental staff will depend on the requirements described in the monitoring protocols. Interagency agreements, cooperative agreements, and contracts are used to obtain supplemental staffing.

Several core administrative and human resources responsibilities are provided by REDW, including human resources, budget tracking, vehicle, and procurement assistance to the Network. Currently, KLMN I&M Program provides approximately \$20,000 in support to the park. The Program also provides \$26,000 to Southern Oregon University (SOU) for office spaces, telephone and internet access, parking, library access, and hourly student workers.

In addition, partners will likely continue important roles in implementation of the program. During the three-phase monitoring plan and protocol development process, SOU provided the I&M Program with a Technical Writer/Ecologist and a GIS analyst, while USGS provided an Aquatic Ecologist. In each case, the individual(s) provided valuable ecological and technical knowledge in addition to their scheduled tasks which augmented the capacities of the core staff. Currently, SOU staff is supported through funding for the NPS vegetation mapping and Natural Resource Condition Assessment projects that are expected to last until at least 2013. In addition, the I&M Program will continue to collaborate with University of California, Santa Cruz for sampling of intertidal zones, and with the Klamath Bird Observatory for landbird community sampling. The Program also expects to continue working with University of Idaho for statistical assistance and possibly with University of Washington for editorial assistance.

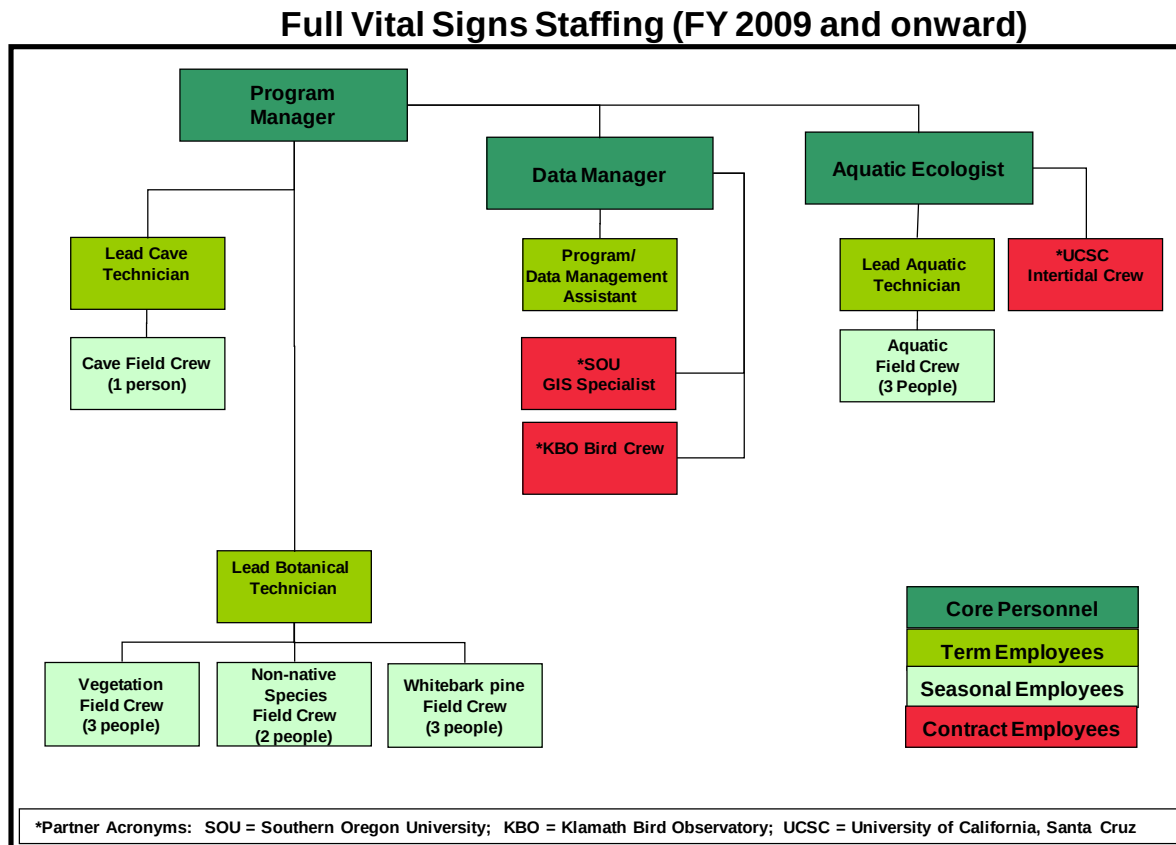


Figure 1. Staffing structure for the Klamath Network at full program implementation (FY 2009 and onward).

Roles and Responsibilities of Park-based Staff

Because the program integrity depends upon rigorous designs and implementation at all stages, all employees and partners will need to be aware of the standards and time required to accomplish monitoring objectives in a consistent way. The Network's core staff will lead development and refinement of protocols and standard operating procedures for all vital signs. Decisions to identify affiliated park-based positions such as project leaders and/or crew members should meet the following requirements: (1) capable staff at the park already exist or can be feasibly hired or assigned to conduct monitoring; (2) the park can provide work space to execute the assigned duties; (3) there are mechanisms in place to assure that the work can be completed following the guidelines in the monitoring protocol and data management plan and the schedule established in the annual work plan; and (4) the employee's supervisor has approved of the activity and ensured the KLMN Board of Directors that the park can allocate the employee adequate time and logistical support to fulfill the obligation to the I&M Program. Managing individual performance and seeing that park employees carry out their assigned duties according to established protocols is the responsibility of their park supervisor. In these instances, it is essential that the primary supervisor interact with the Network Contact (designated I&M lead on each protocol) to develop and evaluate employee performance, as established in the annual employee performance plan.

Communication is especially important to ensure that each employee or partner is aware of their responsibilities, associated standards, timelines, and deliverables. Communication and reiteration of such programmatic needs will be essential for executing the many scientific tasks of the I&M Program. At a minimum, all Project Leads should arrange pre-season and post-season meetings and/or calls with Park Contacts and other park-based staff. These meetings will discuss permits, lodging, equipment checkout, site access, and training pre-season, and report on data entry, equipment return, and field project post season, respectively.

Training and Professional Development

All staff charged with executing the I&M Program will be expected to possess or obtain adequate field, planning, data management, writing, and statistical skills necessary to complete their duties. Professional development may include personalized training or self-study programs, workshops, as needed to fulfill core responsibilities. Such personal study curricula will be reviewed and updated in annual individual development plans. Where possible, the Network will arrange workshops that allow for the efficient training of core and supplemental staff.

Staffing Analysis

To determine if the network was operating under a staff deficit, we compared the Klamath I&M Program's staffing strategy to the staffing structure of other networks, both similarly sized and larger. Because different networks have differing priorities and vital signs, direct comparisons are challenging. However, an examination of 14 other network staffing arrangements (using networks with publically available Administrative Annual Reports as a guide) gave a general conclusion that Klamath Network staffing is similar to other networks of comparable complexity and funding.

As a complement to our assessment of team responsibilities and overall staffing lists, we here analyze the differences in networks on a per position basis for the proposed long-term positions likely needed by the Klamath Network, commenting, as appropriate, where network size was associated with the likelihood of a position being staffed or graded at a particular level. In our staffing comparison, we included information in assessing pay scale and permanent versus term status (where available).

Data were compiled from a variety of sources, including: 1) Annual workplans listing salary and personnel allocations; 2) Staff listings available from network internet sites; and 3) salary information specifics available from http://php.app.com/fed_employees10/search.php

Position by position results

Program Manager

This is a mandatory, permanent position for the I&M network. Due the expanding complexity of the position since 2003, an accretion of duties study conducted by the PWR in FY 2010 resulted in this position being promoted from a GS-12 to a GS-13 position. This position is responsible for all inventory, monitoring, and data management activities of the network, including all supervisory and administrative tasks. This position has also acted as a *de facto* science coordinator of the network, working to broker science for the parks, bring academic, USGS, and nonprofit scientists together, and to increase the scientific capabilities of the network as a whole. This position is also responsible as the Project Lead on Vegetation, Invasives Species, and Whitebark Pine protocols. At this time, the position is comparable to other networks and appears appropriately graded. No changes are recommended during the planning

period. However, if a vacancy were to occur, it might be worth recommending that the position be flown as a GS-12/13 merit promotion position, with the GS-12 option operating under supervision from the Chair of the Board of Directors or the Regional I&M Program Manager. This option would allow application to the position by a large cohort of GS-11 professionals across the service with extensive experience in the NPS I&M Program.

It bears mentioning that this position is intended to serve in at least four core roles: (1) provide strategic and scientific leadership for the program; (2) oversee the administrative and operational details of the program; (3) evaluate, inspect, and review the quality and appropriateness of data, reports, and other media; and (4) ensure that the scientific efforts manifest themselves in data, reports, web media, and interpretive materials that meet park management and interpretation needs. It is unlikely that a candidate will be equally skilled in all the dimensions required, nor will it be feasible for the Program Manager to pursue all these activities simultaneously. The reality of the workload is such that the individual will need to delegate some of these duties to supporting staff, at least part of the time. More generally, the execution of these activities and the core responsibilities will need to be a team effort, to which the core staff each contribute in part.

As we move toward the future, it is likely that a larger share of the Program Manager's work will be in procuring resources and partnerships to ensure the long-term viability of the program. Fiscal trajectories are such that expenditures will exceed income a few years down the line (Section 4-Financial Projections). The best way to bring in resources will be to demonstrate excellence in scientific analysis, synthesis, reporting, and science communication over the coming years. To the degree that the Program Manager can delegate some subset of fiscal, administrative, or other duties, they may have more time available to provide strategic leadership, science communication, and continued program development.

Data Manager

The Data Manager is the second mandatory and permanent position for the I&M Network, this position provides guidance and leadership in all dimensions of data management including implementing the KLMN I&M data management plan. In recent years, this position has been centrally involved in designing and improving most of the network protocols, and is also responsible for overseeing the development and operation of the Landbird Community, Cave, and Land Cover/Land Use monitoring protocols. In addition, this position has been responsible for providing assistance with GIS applications and providing information technology (IT) support. Also importantly, this position (due to its direct involvement with all protocols and inventories) has included a degree of engagement and administration on most network projects, assisting the Program Manager as needed. Across the other networks of the Pacific West Region, these are GS-11 positions, however seven networks across the country (Southern Colorado Plateau, Central Alaska, Rocky Mountain, Cumberland-Piedmont, Greater Yellowstone, North Coast & Cascades, and Southeast Coast Networks) have these positions graded as GS-12; presumably in recognition of increased tasks above and beyond data management, including roles in supervision, GIS, ecology, and program management. The KLMN I&M is currently considering following the lead of these networks and upgrading the Data Manager position description to a GS-11/12 merit promotion position. This is in recognition of the wide variety of scientific and managerial duties the position conducts, including serving as the network's lead wildlife biologist, managing the land cover/land use and landbird protocols, information technology support, and assisting the Program Manager with a variety of administrative, budget-tracking, record-keeping, and strategic planning tasks. This strategic redefinition of the Data Manager position will be valuable in adding redundancy to the managerial, administration, and supervisory tasks, and for meeting the science needs of the network.

Aquatic Ecologist

Within the KLMN I&M, the Aquatic Ecologist is a GS-09/11 position responsible for the implementation of 3 protocols: 1) Wadeable Streams, 2) Mountain Lakes and Ponds, and 3) Intertidal Communities. It is currently filled at the GS-11 level in a term position.

Staffing strategies for nearly all I&M networks nationwide show that this is a vital component of NPS vital signs monitoring: 26 out of 32 networks employ an aquatic ecologist or equivalent. Because all I&M Networks receive monies from Water Resource Division, nearly all networks employ either a: (1) Aquatic Ecologist, (2) Hydrologist, (3) Fisheries Biologist, or (4) Marine Ecologist. For comparison purposes, we consider all these positions as functional equivalents to the KLMN Aquatic Ecologist. These differences in staffing, along with variability in vital signs, have dictated that networks employ a variety of methods in staffing for their aquatic ecology programs. For example, North Coast and Cascades Network utilizes a park staff aquatic ecologist on a part-time basis, and the Gulf Coast Network shares a position with Cumberland-Piedmont Network.

Although not all networks display the Perm/Term status of their staff, at least three were listed as permanent positions in staffing charts, and it is likely that many more are similarly classified. Additionally, five networks employed two staff members in the aquatic fields; for example the Heartlands Network has a GS-12 Lead Aquatic Ecologist, and a GS-11 Fisheries Biologist. Differences also reflect disparate funding levels for the networks. Across the networks reviewed, Aquatic Ecologist equivalents were rated as follows: 3 were GS-09, 12 were GS-11, 12 were GS-12, and 1 was a GS-13.

In sum, the current status of the Aquatic Ecologist is equivalent to most other networks in pay grade. There seems to currently be no consensus as to whether these should be term or permanent positions at this time. However, because this position is essential for the success of the network, with detailed and intense work demands associated with designated funding, it is recommended that this position be made permanent in the near future.

There is also a possibility of upgrading this position in the future. Currently, this position has the most favorable workload and skillset to support more detailed statistical analysis for the network as a whole, and with development, could serve as a quantitative ecologist for the Klamath Network. Moreover, as a Research-trained ecologist with terminal degree, this position would be ideally positioned to assist the Program Manager in preparing proposals for additional funding. If this position were to be elevated to the GS-12 level in the future, a corresponding shift in the work expectations would include a greater emphasis on quantitative analysis support for all network staff, technical assistance to the parks, scientific publication, and pursuit of additional inventory or research funding.

Botanist

Currently, the Botanist/ Lead Biotech (GS-07) is responsible for field testing, logistics, and implementation of three protocols: (1) Vegetation, (2) Invasives Species, and (3) Whitebark Pine (as a component of #1). This position has also been actively engaged in hiring and supervising field crews, and developing and field testing these protocols; however the Protocol Lead has been the Program Manager. Normal duties consist of pre-field planning and assistance with hiring, running the field crew, managing logistics, overseeing data entry and validation, and production of initial data reports. A key requirement of this job is a high level of botanical skill and a knowledge and facility with the KLMN vegetation databases.

In comparing this position with other networks, we included both Lead Biotechs and Botanists, who worked the majority of the year (no seasonals, although "Subject to Furlough" was included) to reflect the duties of the Klamath Network Lead Biotech position. Ten networks had comparable positions, and of these, two were GS-07, six were GS-09, and two were GS-11. Based on the critical role this position plays in the execution of three protocols and the comparison with other networks, we believe the current pay scale of GS-07 is undergraded and that the position should be upgraded to a GS-09 level. We recommend that this position become a term GS-07/09 position. The current arrangement assumes that the Program Manager functions as the lead vegetation ecologist, providing overall oversight for the terrestrial vegetation vital signs.

Because the current Program Manager has extensive knowledge of the vegetation in the region and facility with vegetation analysis, the current arrangement is cost effective, yet there is still some question as to how well the Program Manager will be able to fulfill the roles of the Project Lead while running the I&M Program. If a new Program Manager were hired with less botanical knowledge and experience, it may prove necessary to designate the Botanist as the Protocol Lead for the Vegetation, Invasive Species, and Whitebark Pine monitoring protocols. Such a designation would probably require regrading the position to a GS-9/11 Ecologist position. Given the uncertainty in future staffing, and in the sharing of duties for the terrestrial vegetation protocols, we believe this position should remain a term position through at least 2014.

Program Assistant/Administration Assistant

The KLMN has employed a full-time term GS-07 Biotech/Program Assistant to help with the administrative, scheduling, and procurement tasks associated with the program. The position is also responsible for assisting with data management tasks, editing KLMN I&M products, and leading/coordinating the KLMN I&M outreach efforts. The past incumbent provided general support for the Program Manager, Data Manager, and all Project Leads, while also assisting the KLMN Board of Directors the meeting scheduling, note taking, and other support tasks. The past incumbent also performed a critical role in document proofreading and editing through the final stages of monitoring plan and protocol development, including document layout and formatting. The workload has been prodigious (> 3000 pages of publication quality plans, technical reports, and protocols since 2007). Document preparation is likely to continue to be a substantial workload for the I&M program into the future.

Nationwide, 13 of the 32 networks employ a Program Assistant. Some are shared positions with parks, and some networks give monies directly to parks for personnel time. Pay scale information is not available for all (especially for shared positions), however for those available the breakdown was: one GS-04 (clerk – this network also employed a GS-07), five GS-06, three GS-07, and one GS-09. The general perception among the KLMN staff is that this position is very valuable in easing the administrative load across the network, thereby increasing the productivity of the entire science/technical staff. It is a cost-effective position.

Based on the additional duties (editing/outreach) of the Program Assistant, the GS-07 Pay scale is comparable to the other networks. Given the diverse services that this position has provided (general administration, scheduling, budget tracking, editing, data management assistance, science communication, and even fieldwork) the GS-07 Biological Technician classification seems appropriate. Over the coming years (FY 2012-2014), it is likely that the secondary position duties (besides general admin. and scheduling) will evolve away from copy editing and proofreading towards data management.

GIS Specialist

In the KLMN I&M, the GIS Specialist is funded through a collaborative agreement with SOU using monies provided through the NPS Vegetation Mapping Program, Natural Resource Condition Assessment (LBE, ORCA, LAVO), and with a GIS agreement funded using KLMN I&M base funds. In this capacity, the specialist has helped to develop and manage a GIS system to support KLMN projects and operations. This has included data organization and analysis, logistical support, data collection, and archiving. In addition, the incumbent has played a major role in supporting inventories, condition assessments, and other park specific projects. The incumbent is also taking the lead on the Land-use/Land Change Protocol.

Approximately one third of the networks list a GIS Specialist position; presumably these duties fall to another staff member for networks that do not have a GIS Specialist (e.g., a Data Manager, or other staff). Fourteen of the 32 networks had some sort of GIS specialist, be it a shared position with parks, or a university partner. Of these with pay scale information available, three were GS-07, 5 were GS-09, and five were GS-11. The GS-11 positions were typically shared with parks, or had the job title of "Spatial Analyst."

In the near term, the GIS Specialist will be providing GIS and spatial analysis expertise for the Natural Resource Condition Assessment Project for CRLA, LBE, and LAVO; and the Vegetation Mapping Projects for LBE, ORCA, and CRLA, respectively. These are both multiyear projects, and it is expected that adequate funding will be available to support this position until 2014. Beyond 2014, future needs and funding resources are less clear. Due to the use of an always-revisit sampling design, the Network anticipates that the vital signs GIS needs will decrease after full implementation (approximately 2012). Therefore, the position could continue as a shared position with SOU, where the network can access and use a GIS Specialist on a part-time basis, and the Specialist can round out their work schedule with associated teaching or research roles. Alternatively, the GIS needs could be met by sharing a position with a one of the KLMN parks, providing services to one or more parks of the network, while being available for network tasks as well. There is opportunity to make the GIS Specialist Position a split duty position within I&M, where the part-time GIS duties along with part-time Data Management/Science Communication/etc. constitute a full time position.

In sum, the status of this position is open to a variety of options, but our current arrangement should be viable until FY 2014, assuming Vegetation Mapping and Natural Resource Condition Assessment funding is forthcoming. If the network decides that a shared GIS position is a feasible option, the request process may need to be started several years before a position could be filled.

Technical Writer/Ecologist

Since 2003, the Network has provided funding for the services of a Technical Writer/Ecologist who has played a fundamental role in the planning and execution of the vital signs monitoring program. The incumbent assisted with vital signs scoping meeting, writing of all three of the phased vital signs reports, was lead author on three vital signs monitoring protocols, and now leads the vegetation mapping and classification efforts for three KLMN parks, while contributing to the Natural Resource Condition Assessment efforts for three parks. The incumbent in this position has contributed in innumerable ways to the development of the program, and has been central to the success of the program overall.

Funding levels through the Vegetation Mapping and Natural Resource Condition Assessment programs appear sufficient to fully fund this position through 2014. This position will continue to provide occasional review and input to the program, but the position will likely be discontinued after that time, unless additional monies are located.

Collaborators

The KLMN I&M executes its landbird monitoring through a cooperative agreement with the Klamath Bird Observatory. The Data Manager serves as the Network Contact and works closely with the Klamath Bird Observatory on landbird monitoring, analysis, and reporting. Intertidal monitoring is conducted through a Cooperative Ecosystem Studies Unit Task Agreement with University of California, Santa Cruz, which conducts sampling twice per year. The Aquatic Ecologist and the REDW Lead Fisheries Biologist are Co-Network Contacts for that agreement and are involved with all logistical, analysis, and reporting planning.

Potential New Positions

Science Communication/Editor/Interpretation

The Network does not currently employ a Science Communication specialist, yet there is widespread recognition that such a position would provide an important commitment to delivering science to the Klamath parks. Thirteen of the 32 networks retain some assistance with these tasks, and all are not directly comparable (shared, or part-time, for example). They are also filled at a wide variety of pay scales; for example, Northeast Coastal and Barriers Network employs a university student in the STEP program, whereas the Gulf Coast Network employs a GS-11 position. The KLMN I&M Program has utilized the Program Assistant as a writer/editor in addition to their core administration and data management tasks, so there is substantial overlap in these positions and functions in the network at present.

It is possible that a person hired into this position could also serve as a publication specialist for the network, conducting final reviews of document formatting and general review of finalized documents. This will likely be a serious need in the future. Currently, the PWR I&M assigns each Program Manager as a key official for reviewing reports for other networks. This role is time-consuming and might be best fulfilled by someone with fewer supervisory and managerial tasks and strong training in document proofreading and production. A trained individual available to lead the scientific communication and manuscript production roles would bring an increased level of professionalism to the report preparation and production processes in the network. Currently, the PWR obtains some editorial support through a cooperative agreement with University of Washington, but the long-term availability of such support is not known at this time.

This position could be filled by a GS-09 or GS-11 staff position. It could also be accomplished in a more *ad hoc* way through university agreements, shared positions with network parks, and/or as ancillary tasks to other positions. A big question is whether the more creative communication tasks and the more detail-oriented, editorial tasks will be easily obtainable in the same position. In any case, science communication and editorial support are both needs that are likely to increase in the future and would warrant additional staffing, if resources were available. In summary, the value and need for such a science communication position seems clear, but there is currently not adequate funding for a new fulltime position. With additional funding, it would be a top priority.

Quantitative Ecologist

The Quantitative Ecologist position was established by several I&M Networks to serve as a lead analyst and biometrician for vital signs data. All Quantitative Ecologists hired so far have been PhD level scientists with very strong quantitative analysis skills hired at the GS-12 level. The Klamath Network does not currently employ a Quantitative Ecologist, and presently only six of the 32 networks employ a Quantitative Ecologist. The networks that currently employ Quantitative Ecologists appear to be those with larger program budgets than the KLMN. Within the KLMN I&M, these duties are currently assigned to the protocol leads, with additional statistical assistance through university agreements as needed.

There are no current plans to hire a Quantitative Ecologist at the current network funding levels. As data from the varied vital signs begin to accumulate, this need for detailed analysis will undoubtedly grow in value in the future. If Project Leads eventually begin performing analysis, reporting, and publication duties comparable to a Quantitative Ecologist, an accretion of duties may suggest altering pay scales to match those of existing Quantitative Ecologists (which all are at the GS-12). Alternatively, a separate Quantitative Ecologist position might be flown in the future to support the team. This does not appear to be an immediate priority, and no funding is currently available.

An alternative way to meet statistical needs would be to continue to acquire statistical support through university cooperative agreements. The current arrangement with University of Idaho has been successful for the modest level of statistical analysis needed thus far, with the added benefit that our network can benefit from the expertise gained through similar analyses in other networks. This approach is the immediate plan, but this decision may need to be revisited if our analytical workload greatly increases or if funding shortfalls preclude paying for such expertise. The USGS Biological Resources Division has also hired several statisticians in our region that may be another resource for collaborative analysis.

Priority Recommendations

Current network funding levels do not allow for hiring of new positions at this time (FY 2011), however we have identified both immediate and future areas of action, and these will likely involve revisions to the performance plans of several staff members.

Immediate

1. The Network Lead Biotech (Vegetation/Botany) should be upgraded from a GS-07 to a GS-09 to match the actual workload and duties. This is in keeping with other networks.
2. The Network Data Manager position should be classified as a GS-11/12. This is in recognition of the protocol management, managerial, IT, GIS duties associated with the position, in addition to data management tasks. Other networks have set the lead in this area (upgrading positions to GS-12), and it appears commensurate with the position workload and complexity.
3. The Aquatic Ecologist position should be converted from a term to a permanent status. The Vital Signs headed by this position are funded by monies committed by the Water Resources Division, so the long-term need for this position is great.
4. Evaluate the need for an Assistant Data Manager position.

Long Term

5. In 2014, we should revisit the staffing plan to evaluate its effectiveness. We will have completed three years under the current arrangement and will be closer to knowing whether additional funding will be available for university-based support positions (Technical Writer/ Ecologist, GIS Specialist), and whether we should explore NPS positions or other arrangements as alternatives.
6. Staffing of the GIS specialist needs to be considered. Whether or not this is through a university, or a shared position within the network (e.g., GIS/Science Communication), or a shared position with a park, it is clear that a long-term supplier of GIS services will be needed on a part-time basis.
7. If the Aquatic Ecologist position fulfills duties typically associated with the Quantitative Ecologist, the position may be reclassified as a GS-11/12.
8. Revisit and evaluate the funding prospects and need for a Science Communication specialist position if additional funding comes available

Section 3 – Operations

Background

The Klamath Network's administrative and operational structure, outlined in the Network's Vital Signs Monitoring Plan (Sarr et al. 2007), has provided broad guidelines for the program's operations in last three years, and has been largely successful. This document was supplemented by the Data Management Plan (Mohren 2007) and the strategies summarized in the Klamath Network Administrative Handbook (Perry et al. 2011). In addition, each protocol has guidance on the material requirements and procedures for managing the planning, data collection, analysis, and reporting process. Nonetheless, the program's administrative functions and operations continue to be refined as the nature of the work flow changes from largely strategic and scientific planning to field operations and data management, analysis and reporting. While those documents provide detailed guidance which is too lengthy to include here, this section provides an overview of the network's current structure followed by recommendations for the future.

Klamath Network Charter and Advisory Groups

The Klamath Network's [charter](#), established in 2003, intends to describe the planning, management, and evaluation process of the monitoring program, in accordance with the NPS Natural Resource Challenge. The governance structure and schedule of participation for three advisory groups (Board of Directors, Technical Advisory Committee, and Scientific Advisory Committee) are outlined in the charter. The Board of Directors provides overall direction for the network and is composed of all six Park Superintendents, the Deputy Regional Director for the Pacific West Region, two rotating Natural Resource Chiefs, the Regional Inventory and Monitoring Coordinator, and the Klamath Network Program Manager. The Technical Advisory Committee meets annually to discuss the technical aspects of the Network's inventory and monitoring implementation and integration and is composed of all six Park Natural Resource Chiefs, the Network Program Manager, and the Network Data Manager. The Scientific Advisory Committee meets on an *ad hoc* basis to provide scientific reviews and advice to the program and consists of the Technical Advisory Committee members and other affiliated scientists. Since the original charter was drafted, the parks have organized themselves and have a revised network-wide charter that has a much broader scope than the original vital signs activities. The relationship between the two documents has yet to be defined.

Physical and Administrative Structure

The KLMN I&M Office is based at SOU and funded through an administrative agreement through the Pacific Northwest Cooperative Ecosystem Studies Unit. This arrangement provides a centralized location with internet access, data storage and backup, limited IT support, parking for network vehicles, and easy collaboration with university faculty and students. This centralized office houses all the permanent and term staff, vehicles, and other equipment of the program. In addition, the university provides conference rooms at either no or low cost, and has proven a convenient and desired place to gather and host network meetings. This arrangement has been working quite well, although there may be a need for additional space if staff or equipment needs expand in the future.

Through a Memorandum of Understanding with REDW, the KLMN I&M receives base administrative support from the host park. This support is currently supported through a yearly budget allocation (\$15-20k), which allows partial support hiring and other human resources functions, budget management and

contracting, information technology support, and property management and inventory. The Program Assistant works closely with the REDW staff on many of these functions and provides local administrative support in the KLMN office.

Anticipated Changes

In the coming years, the nature of the I&M workload will be changing from planning to implementation, analysis, and reporting, and there are likely to be other changes over time, such as increased space needs, tighter budgets, an increase in inventory and research activities, and staff turnover. Consequently, our operational approaches will need to be refined and improved. Because increased resources (office space, vehicles) usually require considerable time to arrive, specifying focal areas for improvement may help highlight the most likely priorities.

Charter and Guidance-The Klamath Network I&M Program has been in existence for ten years. Most of the organizational structures and guidance have not been revisited for some time, and there has been considerable turnover in I&M staff as well as in many of the park-based natural resource and interpretive staff. It seems a good time to revisit how the I&M Program functions within the larger goals of the parks and in concert with other network/multi-park natural resource program, like fire, air quality, and other NPS programs. Although I&M is a WASO funded program, the emergence of network-wide collaboration and governance provides a broader context for the program than existed in 2003.

Office Space-The program has been located in Central Hall at SOU since 2004, and now it has a two bedroom house that functions as a field operations center, housing the botany and aquatic program leads and field equipment and serves as a staging area for field crews. The SOU GIS Specialist and Vegetation Mapping Ecologist have a campus-based office or work from home, respectively. If we are successful in locating sufficient funding to fill additional positions, it may be desirable to look into additional office space on campus or elsewhere in the Ashland area. Alternatively, new staff may be housed at one or more of the parks. Given the lead times often required to find office space for staff, the options should be explored in advance of any major program expansions. A somewhat lower priority need may be to move the location of the main office, if facilities come available. The KLMN offices in Central Hall are adequate but not ideal for enhanced collaboration with SOU professors and students. By moving the office to the Science Building on campus or perhaps Taylor Hall, where Environmental Studies is housed, would likely raise the NPS profile on campus and allow staff to better connect with the resources and opportunities available there.

Field Operations-The current process for securing research permits, onsite lodging, camping, showers, and other needs (i.e., specimen cold-storage, disinfection facilities) is currently haphazard and cumbersome. This creates considerable inefficiency in preparing for and completing fieldwork in the parks of the Network as well as concerns about data quality. It would probably be very timely to develop a network wide approach to long-term permitting, camping, and housing reservations to minimize yearly obstacles and to ensure that I&M field crews are able to do their jobs more efficiently.

An example of an approach for easing field operations logistics is the Northern Colorado Plateaus Network's (NCPN) permit procedure: Instead of applying for a single permit at every park of the network, NCPN permit procedures are completed once for the entire network, allowing work to progress at every park within the network. This simplifies and standardizes the paperwork, and gives stability and predictability to the long-term monitoring.

Safety Plan-Although the KLMN vital signs monitoring protocols have safety guidance in the form of Job Hazard Analyses, general guidance has never been prepared for the program. REDW has a developing safety plan that may provide a good template for an I&M safety plan. Working with the Safety Officer at REDW and combining the current disparate sources of information, it would be desirable for the I&M Program to either adopt or modify the REDW plan before the FY 2012 field season.

Administrative Handbook- In order to establish a structured system for the administrative tasks and functions that the Klamath Network carries out in the office and in collaboration with REDW and SOU, the network prepared an administrative handbook (Perry et al. 2011). The handbook references and provides hyperlinks to appropriate authorities for NPS policies, and relates details and standardized processes and points of contact for the range of KLMN administrative duties. The document's sections include basic how-to sections (e.g. vehicle management, scheduling, meeting logistics, travel, procurement, SOU logistics) and basic background information (e.g., important timelines, budget and project tracking, data management). The document is intended to provide a staff reference and as a basis for standardizing administrative procedures. Consequently, the document will need to be updated and revised as new processes are implemented and current processes are updated.

Monitoring with Assistance Agreements- For the landbird and intertidal vital signs programs, and the vegetation mapping projects, the I&M Program works with nonprofit and university partners on multiyear projects. In all cases, the partners usually need to make considerable investments and plans to conduct field work at specified times of the year (usually by May or June). In the past, these agreements have been updated after fiscal year funding arrives, but there is a risk that if funding is delayed, contracting becomes overwhelmed, or other unforeseen delays occur, monies will not arrive in time to support critical fieldwork. In future years, such agreements should be prepared and submitted to contracting by March 1, to ensure that adequate time is allowed for processing before the field season.

Annual Effort Reporting- The I&M Program prepares an annual administrative report at the end of each fiscal year. In addition, the team prepares a monthly effort and activity report for the regional coordinator. Currently all annual reports for work conducted under task agreements are due in November of each year following the field season, but this is too late to contribute to the annual administrative reporting cycle. It might be valuable to have change reporting dates in the future, so that annual reports for each task agreement come due in August. This would allow that portions of these reports to be added directly into the Annual Administrative Report each September, streamlining the report writing process.

Priority Recommendations

Over the planning period, we recommend the following improvements in the operations of the network:

1. Re-visit and update Klamath Network Charter (2012)
2. Explore feasibility of moving the network office to a better location on campus, such as the Science Building or Taylor Hall, to raise the NPS profile on campus and better connect with the resources and opportunities available there.
3. Develop a Safety Handbook for the Network (2012).
4. Meet with park staff to discuss ways to improve and streamline field operations each year (2012).

5. Itemize the monies given to Redwood for administrative and IT support before beginning of fiscal year (FY 2011 and all subsequent years).
6. Adjust reporting dates in task agreements to have annual reports for each task agreement due in August, so that portions of these updates may be pulled directly into the Annual Administrative Report each September, streamlining the report writing process.

Section 4 – Financial Projections

Background

Over the past five years of program development, budget has been a major consideration in the decision making process. Budgets have played a critical role in determining the staffing structure, the number of vital signs selected for monitoring, sampling design and field effort for each inventory and monitoring project, and a variety of other activities the network staff participate in such as outreach, partnership development, and research. This section describes how the budget associated with the staffing structure, administration, monitoring, inventory, and research projects, and outreach efforts have been allocated in the past and will be allocated in the future. Table 2 provides a summary of the funding that has been made available to the KLMN over the last five years. Over that period, vital signs monitoring, water quality, vegetation mapping, and park matching funding have been the chief income categories.

Over the last three years, the activities of the Klamath Network have been shifting from monitoring and administrative planning, protocol development, and pilot study implementation to the execution of vital signs monitoring projects. Also, past inventory and research projects conducted with vital signs funds are being finalized and the funding used to support these projects is being shifted to exclusively support the vital signs monitoring implementation.

Core Staffing

Each inventory and monitoring network is required to have 2 permanent positions, a Program Manager and a Data Manager. Beyond these 2 positions it is at the networks discretion as to what other staff will be needed to implement the variety of administrative, scientific, and outreach tasks associated with the network. Section 2 of this document describes the current and proposed staffing structure of the network, however this section reviews the budget associated with staffing structure.

Staffing Plan FY 2007-2011

Table 3 provides a summary of costs associated with the staffing structure over the past five years. There have been five core staff positions including the Program Manager, Data Manager, Aquatic Ecologist, Botanist, and Program Assistant.

Table 2. Annual budgets for the Klamath Network.

Source	2007	2008	2009	2010	2011
Vital Signs Monitoring	\$801,400	\$802,300	\$837,700	\$844,900	\$850,000
Water Quality Monitoring	\$74,200	\$73,000	\$73,000	\$73,000	\$73,000
Vegetation Mapping	\$255,600	\$256,300	\$235,200	\$275,000	\$327,000
Parks	\$5,000	\$5,000	\$30,000	\$5,000	\$5,000
Total	\$1,136,200	\$1,136,600	\$1,175,900	\$1,197,900	\$1,255,000

Table 3. Staffing structure and related costs of the Klamath Network for FY2007-2011.

Core Staff	2007	2008	2009	2010	2011
Program Manager (GS-13)	\$93,819	\$78,412	\$102,551	\$107,804	\$115,837
Data Manager (GS-11)	\$77,172	\$83,968	\$85,236	\$84,837	\$85,575
Aquatic Ecologist (GS-9/11)	\$0	\$8,055	\$58,864	\$78,015	\$83,233
Botanist (GS-7)	\$18,657	\$0	\$38,158	\$44,301	\$53,773
Program Assistant (GS-7)	\$25,219	\$52,581	\$51,083	\$55,045	\$42,671

Staffing Plan FY 2011-2015

As described in Section 2 (Human Resources), the Klamath Network does not recommend changing the makeup of its core staff, however it is recommended in that section that the Botanist position be changed from a GS-7 to a GS-9 position and the Data Manager position be changed from a GS-11 position to a GS-12 position. This equated to approximately \$16-21K more per year for these 2 positions over the next five years. Table 4 provides the estimated cost of these positions based on the current step/grade of the staff but includes the proposed GS-9 level for the Botanist and the GS-12 level for the Data Manager.

Table 4. Estimated staffing structure of the Klamath Network for FY2011-2015 based on current benefit percentages, 2011 General Schedule locality pay table, and the proposed promotions of the Botanist and Data Manager.

Core Staff	2011	2012	2013	2014	2015
Program Manager (GS-13)	\$115,837	\$119,152	\$122,875	\$122,875	\$126,598
Data Manager (GS-12)	\$85,575	\$93,520	\$96,538	\$99,554	\$99,554
Aquatic Ecologist (GS-11)	\$83,233	\$85,917	\$88,603	\$88,603	\$91,287
Botanist (GS-09)	\$53,773	\$63,651	\$65,772	\$67,895	\$70,016
Program Assistant (GS-07)	\$42,671	\$38,790	\$40,084	\$41,377	\$42,671

Supplemental Staffing

In addition to the core staffing positions, four additional support positions, the GIS Specialist, Technical Writer, Statistician, and a USGS Scientist have been utilized over the last five years to contribute to the develop of the monitoring and data management plans, creations of the vital signs monitoring protocols, implementation of the pilot studies, and the execution of the vegetation mapping inventories. Table 5 shows the fiscal breakdown for these positions over the last five years.

The KLMN does not have enough funding from their base budget to support any of these positions over the long term. However, vegetation mapping inventory and resource condition assessment funds have been obtained to support the GIS Specialist until 2014 at which time additional funds will need to be secured if this position is to be maintained (see Section 2 – Human Resources). The Statistician, Technical Writer, and USGS assistance positions will be valuable on a case-by-case basis but additional funding will need to be secured to fund this need.

Table 5. Supplemental staffing and associated costs of the Klamath Network during the last five years.

	2007	2008	2009	2010	2011
*GIS Specialist	\$81,060	\$83,004	\$87,167	\$87,372	\$87,372
*Tech. Writer/Ecologist.	\$94,372	\$99,339	\$104,088	\$107,088	\$107,088
Statistician	\$20,000	\$5,000	\$0	\$0	\$10,000
USGS Assistance	\$60,000	\$25,000	\$0	\$0	\$0

*=Salary split between vital signs, vegetation mapping, and natural resource condition assessment funding.

Administrative Support

The main way the Klamath Network funds the administrative and operational support for the program is by providing funding to SOU, which supports a variety of services such as IT Support, General Services (phone, cleaning, etc), Library use, student hires, and housing. In addition to SOU, the KLMN also provides REDW with funding to support tasks such as budget management, purchasing, timekeeping, hiring, and vehicle support. However, a cost analysis of these efforts has never been completed so it is

not clear if the network is under or overfunding these efforts. In addition, tasks completed as part of our partnership with REDW have shifted back and forth between the park and the network staff. Table shows the distribution of funding to support our administrative needs for FY2007-2015. The KLMN also has a Program Assistant position that is described above, however it should be recognized that the Program Assistant position is responsible for assisting with multiple aspects of the program in addition to administration.

We plan on continuing to support the Network's administrative relationship with both organizations for the foreseeable future. It is expected that these costs will go up slightly over the next five years, however a more detailed analysis will need to be completed to determine the exact rate of increase.

Table 6. Administrative funding used to support the Klamath Network.

	2007	2008	2009	2010	2011	2012	2013	2014	2015
Southern Oregon University	\$24,000	\$25,000	\$26,000	\$26,000	\$26,000	\$26,780	\$27,583	\$28,411	\$29,263
Redwood National Park	\$19,841	\$20,000	\$20,000	\$20,000	\$20,000	\$20,600	\$21,218	\$21,855	\$22,510

Inventories/Research

While in the monitoring planning phase, the I&M Program was able to use funds that will be needed in the future to implement the monitoring projects to support some inventories that provided valuable information to the parks. In addition to monitoring funds, the network received funds from the vegetation mapping program to complete vegetation maps for 5 of 6 parks (WHIS is already completed). The SOU GIS Specialist also received funds from WHIS to complete the Whiskeytown cultural resources mapbook. Table 7 shows inventory and research projects and associated budgets that we have implemented over the last five years.

As mentioned, many of these projects have been completed or have a completion date in the near future. Table 8 shows the phasing out of the remaining inventory and research projects we have in place. As can be seen from the table, with the exception of the vegetation mapping inventory and the forest dynamics modeling projects, all inventory projects the KLMN is currently implementing will be completed by 2012. In the future, network base funding that can contribute to inventory projects will

Table 7. Inventory and research projects the Klamath Network has funded over the last five years. The "X" indicates the year the project was completed.

	2007	2008	2009	2010	2011
Data Mining Inventory	\$100,487	\$7,480	X		
Aspen Research	\$20,302	\$2,602			X
Wetland Assessment: LAVO	\$17,990				
Vegetation Mapping: REDW	\$18,300	\$30,300	\$43,475	\$100,000	\$52,000
Vegetation Mapping: CRLA, LABE, ORCA	\$86,800	\$60,000	\$134,853	\$135,734	\$275,020
Vegetation Mapping: LAVO	\$148,300	\$222,999	\$106,872	\$50,050	
Little Bald Hills Assessment		\$51,950	\$42,063		\$369
Climate Assessment		\$61,401			
Whiskeytown Cultural Mapbook			\$25,000	X	
Forest Dynamics Monitoring (USGS)				\$7,500	\$12,500
Landbird Distribution Modeling					\$16,000

Table 8. Inventory and research projects the Klamath Network will be completing from FY2011-2015. The “X” indicates the year the project is expected to be completed.

	2011	2012	2013	2014	2015
Aspen Research	X				
Vegetation Mapping REDW	0	X			
Vegetation Mapping: CRLA, LABE, ORCA	\$275,020	\$275,000	TBD	X	
Vegetation Mapping: LAVO	\$52,000	X			
Little Bald Hills Assessment	\$369	X			
Climate Assessment	\$0	X			
Forest Dynamics Monitoring	\$12,500				
Landbird Distribution Modeling	\$16,000	X			

be very limited so the network will need to find additional funds if we plan on continuing our inventory efforts. Some possibilities are to apply for funds from the WASO inventory program to continue the completion of the 12 basic inventories, work with other agencies, organizations, and universities to apply for grants, and team up with the parks to combine year end funding.

Monitoring

With the exception of personnel, the majority of the Klamath Networks base funds will be directed towards our monitoring projects. As can be seen from Table 9 below, over the last five years the network has been working to develop monitoring protocols, conducting pilot studies, and beginning to implement some of our vital sign monitoring projects. Over the next 5 years, we will have completed all the protocols and pilot studies and all monitoring projects will be implemented. The allocation to vital signs monitoring will increase over the next five years. The average amount spent on monitoring from FY07-FY11 was \$189,593 while the average amount we plan on spending from FY2011-2015 is \$310,000; this is over a 60% increase in the amount of funding that will be going towards monitoring projects.

Table 9. Budget numbers for FY2007-2010 are from the KLMN annual reports, FY2012-2015 budget numbers are from KLMN monitoring protocols. Items with an * assume a 3% increase from the previously sampled year for cost of living.

	2007	2008	2009	2010	2011	2012	2013	2014	2015
ISED Monitoring	0	0	13,098	0	52,164	0	51,832	0	52,550
ISED Pilot Study/Protocol Dev.	30,999	0	0	0	0	0	0	0	0
Whitebark Pine Monitoring	0	0	0	0	0	17,000	17,000	0	17,510*
Whitebark Pilot Study/Protocol Dev.	0	0	4,540	0	0	0	0	0	0
Vegetation Monitoring	0	0	0	1,065	53,197	78,745	43,613*	54,793*	81,107*
Vegetation Pilot Study/Protocol Dev.	0	17,763	0	0	0	0	0	0	0
Landbird Monitoring	0	42,743	42,743	76,386	43,574	44,144	87,646	43,574	44,144
Landbird Pilot Study/Protocol Dev.	30,000	0	0	0	0	0	0	0	0
Intertidal Monitoring	24,000	25,000	25,000	30,000	25,000	25,750*	26,523*	27,318*	28,137*
Stream Monitoring	0	0	0	0	91,481	94,225	0	99,964	102,963
Stream Pilot Study/Protocol Dev.	23,202	19,558	0	0	0	0	0	0	0
Lake Monitoring	0	0	0	0	0	0	70,880	0	0
Lake Pilot Study/Protocol Dev.	0	6,177		64,865	0	0	0	0	0
Caves Monitoring	0	0				37,334	0	71,434	0
Caves Pilot Study/Protocol Dev.	0	58,000	18,000	62,908	0	0	0	0	0
Land Cover / Land Use Monitoring	0	0	0	0	26,500	0	0	0	0
Land Cover / Land Use Protocol Dev.	0	0	0	0	40,000	0	0	0	0
TOTAL	108,201	169,241	103,381	235,224	331,916	297,198	297,494	297,083	326,411

Putting it all together

As discussed above, the Klamath Network considered budget limitations in all major decisions about monitoring, inventories, research, staffing, and administration which appear in this plan. Table 10 shows the estimated fiscal allocations for the Klamath Network over the next 20 years. The most important consideration over the longer term is that costs inflate at a higher rate than income. It is inevitable that shortfalls will eventually appear. FY 2015 and 2016 are the first years with negative balances (-\$13,651, and - \$671, respectively), however these minor shortfalls can likely be balanced through furlough of positions, reductions in network travel and training, or with funding that was allocated to other areas but not used (e.g., if the network does not spend all the dollars allocated for computers, vehicles, etc. they can be used to make up the budget shortfall). Starting in 2018, the Klamath Network will have a significant budget shortfall (-\$61,565) and careful examination of the budget should be done a few years prior to these years to ensure the program is still solvent. It is expected that cost savings can occur when positions turn over, additional project dollars are obtained through grants, inventory funding from WASO, or increases in base funding. The program is very ambitious at present, and cutting of staff positions would likely undermine the ability to complete the program. So, it seems critical to prepare for the upcoming shortfall well in advance of 2018, and to pursue means for augmenting program income through agency initiatives or through competitive funding requests.

Priority Recommendations

1. As monitoring reaches full implementation and inflationary cost increases consume excess funds, the available funding to support inventories, research, and outreach will be limited. The KLMN should focus on developing partnerships with the parks, other agencies, non-government organizations, and universities to look for opportunities to pool funding and staff to support needed projects in these categories.
2. The Klamath Network has provided REDW and SOU with funding to support the administrative aspects of our program. A cost analysis of both partnerships should be completed and funds adjusted accordingly. In addition, a MOU should be developed with REDW that clearly states the tasks that will be completed by the park and by the network and define the amount of funding needed to cover these costs.
3. After core staff salaries, vital signs monitoring is the second most expensive aspect of the KLMN program. Since the cost and activities associated with monitoring projects are standardized they should be easy to track over time. The KLMN should ensure they have a useful method for tracking the costs related to these projects which will help ensure they will be able to fund the monitoring over time.

Table 10. Project FY2011-2020 budget for the Klamath Network.

	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
PERSONNEL										
Program Manager (GS-13)	\$84,850	\$87,278	\$90,005	\$90,005	\$92,732	\$92,732	\$95,459	\$95,459	\$98,187	\$98,187
Program Manager (w/benefits)	\$115,837	\$119,152	\$122,875	\$122,875	\$126,598	\$126,598	\$130,321	\$130,321	\$134,045	\$134,045
Data Manager (GS-12)	\$65,061	\$71,102	\$73,396	\$75,689	\$75,689	\$77,983	\$77,983	\$80,276	\$80,276	\$82,570
Data Manager (w/benefits)	\$85,575	\$93,520	\$96,538	\$99,554	\$99,554	\$102,571	\$102,571	\$105,587	\$105,587	\$108,604
Aquatic Ecologist (GS-11)	\$59,321	\$61,234	\$63,148	\$63,148	\$65,061	\$65,061	\$66,974	\$66,974	\$68,888	\$68,888
Aquatic Ecologist (w/benefits)	\$83,233	\$85,917	\$88,603	\$88,603	\$91,287	\$91,287	\$93,971	\$93,971	\$96,657	\$96,657
Botanist (GS-09)	\$40,084	\$47,448	\$49,029	\$50,611	\$52,192	\$52,192	\$53,773	\$53,773	\$55,354	\$55,354
Botanist (w/benefits)	\$53,773	\$63,651	\$65,772	\$67,895	\$70,016	\$70,016	\$72,136	\$72,136	\$74,257	\$74,257
Program Assistant (GS-07)	\$42,671	\$38,790	\$40,084	\$41,377	\$42,671	\$42,671	\$43,964	\$43,964	\$45,258	\$45,258
Program Assistant (w/benefits)	\$57,691	\$52,444	\$54,194	\$55,942	\$57,691	\$57,691	\$59,439	\$59,439	\$61,189	\$61,189
Total Personnel	\$396,109	\$414,685	\$427,982	\$434,868	\$445,145	\$448,163	\$458,439	\$461,455	\$471,735	\$474,752

FIXED COST	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
Vehicles	\$16,582	\$17,079	\$17,592	\$18,120	\$18,663	\$19,223	\$19,800	\$20,394	\$21,006	\$21,636
Office Supplies	\$6,859	\$7,064	\$7,276	\$7,495	\$7,719	\$7,951	\$8,190	\$8,435	\$8,688	\$8,949
IT Assessment	\$1,936	\$1,994	\$2,054	\$2,116	\$2,179	\$2,245	\$2,312	\$2,382	\$2,453	\$2,527
Computers and Software	\$11,150	\$11,484	\$11,829	\$12,184	\$12,549	\$12,926	\$13,313	\$13,713	\$14,124	\$14,548
Network Travel	\$32,373	\$33,344	\$34,344	\$35,375	\$36,436	\$37,529	\$38,655	\$39,815	\$41,009	\$42,239
Training and Conferences	\$8,240	\$8,487	\$8,742	\$9,004	\$9,274	\$9,552	\$9,839	\$10,134	\$10,438	\$10,751
Awards	\$5,000	\$5,000	\$5,000	\$5,000	\$5,000	\$5,000	\$5,000	\$5,000	\$5,000	\$5,000
Total Fixed Cost	\$82,140	\$84,453	\$86,837	\$89,293	\$91,821	\$94,426	\$97,108	\$99,873	\$102,718	\$105,650

ADMINISTRATION	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
Southern Oregon University	\$26,000	\$26,780	\$27,583	\$28,411	\$29,263	\$30,141	\$31,045	\$31,977	\$32,936	\$33,924
Redwood National Park	\$20,000	\$20,600	\$21,218	\$21,855	\$22,510	\$23,185	\$23,881	\$24,597	\$25,335	\$26,095
Total Admin Cost	\$46,000	\$47,380	\$48,801	\$50,266	\$51,773	\$53,326	\$54,926	\$56,574	\$58,271	\$60,019

Table 10. (Continued).

MONITORING	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
EDIS Monitoring	\$52,164	\$0	\$51,832	\$0	\$52,550	\$0	\$55,703	\$0	\$59,045	\$0
Whitebark Pine Monitoring	\$0	\$17,000	\$17,000	\$0	\$17,510	\$18,035	\$0	\$19,134	\$19,708	\$0
Vegetation Monitoring	\$53,197	\$78,746	\$43,613	\$54,793	\$81,108	\$44,921	\$56,437	\$83,542	\$46,269	\$58,130
Vegetation Monumenting	\$77,000	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
Landbird Monitoring	\$43,574	\$44,144	\$87,646	\$43,574	\$44,144	\$87,646	\$44,881	\$45,468	\$90,275	\$46,227
Intertidal Monitoring	\$25,000	\$25,750	26,523*	\$27,318	\$28,137	\$28,981	\$29,851	\$30,746	\$31,668	\$32,618
Stream Monitoring	\$91,481	\$94,225	\$0	\$99,964	\$102,963	\$0	\$109,234	\$112,510	\$0	\$119,364
Lake Monitoring	\$0	\$0	\$70,880	\$0	\$0	\$77,453	\$0	\$0	\$84,635	\$0
Caves Monitoring		\$37,334	\$0	\$71,434	\$0	\$75,720	\$0	\$80,263	\$0	\$90,184
Land Cover / Land Use Monitoring	\$26,500	\$0	\$0	\$0	\$26,500	\$0	\$0	\$0	\$0	\$29,680
Total Monitoring Cost	\$368,916	\$297,199	\$270,971	\$297,083	\$352,912	\$332,756	\$296,106	\$371,663	\$331,600	\$376,203

	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
TOTAL Cost	\$893,165	\$843,717	\$834,591	\$871,510	\$941,651	\$928,671	\$906,579	\$989,565	\$964,324	\$1,016,624
Estimated Budget	\$928,000	\$928,000	\$928,000	\$928,000	\$928,000	\$928,000	\$928,000	\$928,000	\$928,000	\$928,000
Surplus/Deficit	\$34,835	\$84,283	\$93,409	\$56,490	-\$13,651	-\$671	\$21,421	-\$61,565	-\$36,324	-\$88,624

Section 5 – Protocol Feasibility

Since 2004, the I&M Program has been developing overall plans and protocols for vital signs monitoring in the network parks, drafting monitoring and data management plans, and protocols for each vital sign singly, or where appropriate integrating more than one. In every case, the intent has been to create a program that can be implemented within the funding allocated and within the capabilities of the program staff, parks, and partners. At this point in time, several of the vital signs have been implemented, lessons are being learned, and we have an opportunity to outline possible concerns and potential challenges that bear further consideration in the years ahead. This section evaluates the feasibility of each vital sign monitoring approach, and points out possible challenges.

Overall Programmatic Capabilities

Although a great deal of thought, discussion, and planning has underpinned all elements of the I&M Program, several overarching concerns seem worthy of mention. Foremost, the program is ambitious, with a great deal of productivity expected from a small staff over time. This could become problematic if any staff positions were to go vacant or perhaps require a leave of absence, or if work increased in scope and complexity. As mentioned in Section 1 - Background, a degree of redundancy may need to be built into the program to ensure that work can be completed when the inevitable challenges arise. It is also important that we accurately forecast the workflow and make adjustments as needed to ensure it is sustainable.

Vital Signs Monitoring

Landbird Monitoring

This protocol was first implemented in 2008, with the protocol approved in 2010. Prior to implementation, several inventory efforts and a mist netting monitoring station at ORCA acted as pilot projects and demonstrated initial feasibility of the methods. However, the Landbird Monumenting Report (Stephens et al. 2010) described several logistical challenges that will need to be addressed to feasibly implement the protocol, and which may be relevant to other vital signs field efforts. In that effort, weather posed several challenges, as access to higher elevation sites was limited by a deep lingering snowpack, or snowmelt flooding conditions that made streams uncrossable at CRLA and LAVO. At REDW, rugged terrain and dense vegetation slowed movement from monitoring point to monitoring point such that at one of the 25 routes the crew could access only four listening stations as compared to the 6-8 stations on other routes. This will need to be reviewed to see if this route can be expanded or if it needs to be removed and a new site added.

The protocol also depends upon a long-term cost match by ORCA. As part of the protocol, a mist net site is funded by ORCA and KLMN, each contributing ~\$5,000. If one of the entities could not continue to contribute funding this aspect of the monitoring project may need to be dropped. A Memorandum of Understanding between the park and the KLMN should be in place to formalize this partnership. Another potential issue would be the location of monitoring sites at LAVO. Sites were monumented using small 1 inch brass tags at the request of the park staff. These tags will be difficult to find and may cause an increase in the amount of time it takes to complete a site. If sites cannot be completed in the required time frame, some points along the routes may need to be dropped. A final issue is this protocol relies heavily on Klamath Bird Observatory (KBO) to implement. If KLMN budgets stay fairly flat, with funding allowing only cost of living increases for federal FTEs, this protocol will need to be

revisited. If federal funding does not keep pace with future cost of living expectations by KBO, the program may need to be simplified, augmented, or executed internally. One option would be to have KBO complete the field work and then have NPS staff complete the annual report and Analysis & Synthesis reports. Finding additional funding to support this program will be a joint goal of NPS and KBO.

Caves Monitoring

A pilot study was completed in 2010, and the protocol is under revision. The sample design employs 31 sites at LABE considered conservative, and doable. Issues/concerns on feasibility are provided by Shawn Thomas, LABE Biological Technician. His abbreviated response:

"The main thing I've thought of is the possibility of LABE losing my position (or having only summer funding for it), having no winter SCAs, and then relying more or less solely on the permanent Physical Scientist (Shane's position) to conduct the bat, ice, and climate monitoring in the winter. Implementing these SOPs could be done by one person, but they really rely on at least 2 individuals for safety reasons. Our division has been fortunate recently to have multiple paid employees and SCAs/volunteers during the winter, but that is of course not a guarantee in the future. Because implementing these protocols is viewed as a high priority, I would hope that our division would find some creative way to make it happen in the absence of staff - that might mean recruiting a temporary volunteer position or reaching out to the Klamath Network in hopes of some staff support or to put us in touch with an SOU student who might be able to come down over their winter break to help out.

The Climate SOP may not occur exactly as stated in regard to the timing. The SOP calls for HOBOS to be downloaded 3 times/per year, in April-May, July-August, and Nov-Jan. Every other year when we have funding for the seasonal to implement all the summer monitoring, it should be easy to download all the loggers in April-May and again in July-August. The third time that year will be dependent on LABE staff, though, which comes back to the issue in the above paragraph. On the years in between when we do not have any Network funding and some of the protocols are not implemented, I think it will be difficult to expect LABE staff to make it to 31 caves 3 times/year. On the plus side, I think that the HOBOS will be fine if they aren't downloaded 3 times/year. They are designed to hold enough data and have enough battery life to go much longer than 4 months. It's really just an issue of getting there 3 times/year to make sure they're working correctly and to avoid prolonged data loss in the event of a logger failure. So while I anticipate that we won't be able to always meet the schedule in the SOP, I feel that it is unlikely that the monitoring effort will suffer as a result."

Clearly, based on this comment, the roles and responsibilities, and commitments need to be finalized, with commitments from the I&M Program and LABE formalized in a Memorandum of Agreement to ensure that the partnership and vital signs monitoring is a high priority for park staff in all years.

Intertidal Monitoring

A pilot study was completed in 2004-2005. Vital sign monitoring began in 2006, and a protocol was approved in 2008. This protocol is implemented in collaboration with the Multi-Agency Rocky Intertidal Network (MARINE) program, through a Task Agreement under the California Cooperative Ecosystem Studies Unit Cooperative Agreement with University of California Santa Cruz. As this protocol was adapted from a preexisting one, few problems with feasibility have been encountered so far. However, since it is part of a preexisting protocol we may be vulnerable to losing our time series of intertidal data

should the group decide to change its protocol methodology, or run out of soft money. While some NPS labor is used in sampling at REDW, this would not be enough to offset significant cuts to the MARINE program. One of the benefits of this project is that the data we collected is being collected in a similar manner all along the Pacific Coast. This will allow the KLMN to have their data analyzed and put into context of the other efforts at little to no cost to the network. As one example, Dr. Peter Raimondi is planning on conducting an analysis of all sites that are part of the MARINE program starting in 2011 to look for trends in the data.

As with the Landbird Protocol, the Intertidal Protocol is implemented by an academic partner and therefore will receive no cost of living increases for federal FTEs, which is currently the only form of increased program income. Therefore we will have to discuss the cost of living, collaborative funding, and cost sharing strategies to address potential future shortfalls.

Invasive Species Early Detection

A pilot study was completed in 2007, implemented in 2009, and approved in 2010. Anticipated problems with feasibility for the protocol include inaccurate GIS layers (in particular at REDW), due to decommissioned roads or poor GPS coverage making it difficult for crews to locate survey segments. As demonstrated in 2009, a two person crew should be able to implement and complete the protocol in one season. However, if a person were to be injured or need to leave midseason, the work would be difficult to complete. It may be valuable to have additional crew members trained in the protocol who can assist, if needed.

In addition, in 2009 there was some concern by the park about the value of sampling in areas that had been treated, resulting in artificially low detection rates. Clearly, better communication is needed with park invasive species management programs. While it is not necessary to sample only in untreated areas of the parks, it is important that park managers and the invasive species field lead coordinate to collect the most meaningful data in a park. Since invasive species early detection is a major management goal in all the park of the network, it is possible that park-based crews may be the best way to implement this protocol in the future, under the guidance of the I&M Program and using our protocol.

Lake Monitoring

A pilot study was completed in 2008. A protocol has been completed, peer-reviewed, approved, and is in the process of being published. Implementation will occur in 2013. Detailed field study using the protocol to prepare an Index of Ecological Integrity (IEI) confirmed (along with the pilot study) that methodologies and sample size are doable. Feasibility issues include some lakes at CRLA that will not be deep enough to sample, or which dry up completely in some years. Given the high elevation of the study sites, deep, late-lying snow packs could be an issue in early summer to midsummer. This protocol is very equipment-intensive. There is a likelihood that repair and replacement costs of equipment will be substantial over time. Moreover, wear and tear on equipment is high, due to sterilization practices, which affect longevity of gear, and gear may need to be replaced more often than the budget allows. Because it requires hiking with heavy packs, as well as detailed and complex sampling methodologies, implementation of this protocol would be greatly hampered with the loss of a crew member due to sickness, injury, or if the crew member leaves for alternative employment.

Stream Monitoring

A pilot study was completed in 2009. A protocol has been submitted and is in revision. Implementation planned for summer 2011. As with the lakes protocol, this is an ambitious, complex, “high maintenance” protocol. Many of the same issues are of concern. Wear and tear on equipment due to sterilization practices affects longevity of gear, and gear may need to be replaced more often than originally anticipated. Wet, unstable, algae covered rocks in the stream pose a particularly challenging environment where slips and falls could increase the possibility of an injury. This protocol could be implemented with the temporary loss of one crew member. There could be issues with the acquisition of non-NPS permits. A NOAA permit is needed for salmonids at REDW and a USFWS permit for Bull Trout at CRLA. We could be denied a permit outright. But another more current problem is the permits ask for names and information about the permit holders, who have not been hired when the permits are applied for. Thus far Dr. Dinger has acquired the permits under his name, but that implies he is doing the collections, which is not frequently the case. We may need to be proactive and contact permit coordinators well in advance of future field seasons to negotiate memoranda of agreement to ensure that permitting agencies are aware of and approve our field sampling and training methods. This could streamline the process.

For both lakes and streams, critical data are contained in the chemical and biological samples sent to the contract laboratories for analysis. Usually, the sample processing requires several months for completion, which consumes much of the winter “reporting” season. If the contract laboratories are delinquent with returning samples, this could cause reporting due dates to be missed.

Vegetation Monitoring

A pilot study was completed in 2008, the protocol was accepted in 2011, and the protocol will be implemented in 2011. Problems with feasibility are: (1) difficult travel in steep wooded terrain, such as second growth forest at REDW, could prevent the crew from monumenting the full number of planned plots, and (2) difficulty with placing rebar due to rocks or large standing or down trees, could add considerable time to the plot monumenting process. These issues could translate into two years to complete monumenting. Rugged terrain and vegetation could also slow field sampling efforts in REDW, especially in riparian locations. Because of these park-specific challenges, solid park-specific estimates of sampling times will probably not be available until the end of the third year of sampling (2013). It seems clear that the pilot study estimates developed at CRLA will not be directly transferrable to REDW. Additionally, in a meeting in May 2011, staff at REDW expressed an interest in getting larger numbers of trees sampled in plots that fall in old growth forest. This will likely involve expanding the original plot in old growth forests (from 20m x 50 m to 40 m x 50 m or 60 m x 50 m) to gain higher numbers of large trees. Initial efforts to implement such an expanded plot appear infeasible, as it will nearly double sampling time. The Project Lead and Botanist should have a better sense of how feasible expanded old-growth sampling is by late summer 2011.

At this time, it appears that LAVO and or WHIS may discourage placement of permanent markers, making plot relocation difficult, and potentially time-consuming. Finally, this protocol would be difficult to implement with the loss of a crew member.

Whitebark Pine Monitoring

A pilot study was completed in 2009. The protocol is in review, with implementation planned for 2012. The pilot study confirmed methodologies are doable in the allotted time and resources. Major feasibility concerns are : (1) the I&M Program is not permitted to use monumenting markers at LAVO, and there could also be access difficulties due to deep lingering snow pack some years and (2) the relationship between the whitebark pine and the vegetation protocol is somewhat fuzzy. The vegetation protocol already intensifies sampling in high elevation environments, but not all such environments have whitebark pine. Until a map of whitebark pine coverage in CRLA and LAVO is available, this uncertainty will continue to be a concern. Internal reporting will be conducted in concert with the vegetation protocol, but the time required for coordinating and collaborating with the other NPS I&M networks needs to be scheduled.

General – All Vital Signs

Park personnel who approve of protocol objectives and sampling approaches could be replaced by personnel who do not (potentially removing sampling sites, or restricting access); obtaining a long term permit could prevent this from becoming a problem although some parks require annual permits as a way to track the work going on in the park. Park housing and camping accommodations could be eliminated. Closures of roads or trails used to access sites are an additional concern. If personnel leave or become injured, the crews may not be able to survey all sites in a year, unless a contingency plan is prepared to aid emergency hiring for new crew members, or KLMN office personnel are able to perform field work.

Priority Recommendations

1. Work to build a degree of redundancy into the program to ensure that work can be completed when the inevitable challenges arise.
2. Revise protocol workloads as needed, during the first years of implementation to ensure they are feasible.
3. Develop a Memorandum of Agreement between the ORCA and the KLMN to formalize the mist netting joint-funding partnership.
4. Develop a Memorandum of Agreement to articulate the shared goals and staffing commitments required for cave monitoring at LABE.
5. Initiate discussions about the best prospect for future funding collaboration for Intertidal Monitoring.
6. Consider methods of developing multiyear permitting processes to decrease the yearly permitting workload, and to better forecast the field efforts in each park over time.
7. Explore means of executing invasive species monitoring with park-based crews.

Section 6 – Science Communication

Background

A major recommendation of the Klamath Program Review was to increase the quality and quantity of information for park resource managers. The Klamath Network had already highlighted a need to convey information about its inventory and monitoring activities, research results and trends, and the implications of these studies on park resource conservation and management. The KLMN I&M is in need of a strategic approach to meeting its science communication needs in the future. Such a strategy will provide context and guidance for in-house efforts of I&M staff and facilitate partnerships with resource and interpretation staff in the parks, as well as other educational partners, such as local schools, regional universities, and nonprofit organizations. At present, the Program has a diverse array of inventory, monitoring, and research activities underway, but no framework for ensuring that our efforts are tailored to meet the diversity of park information needs and audiences. This section is intended to provide such a framework.

As of this time, the following objectives have been identified by the network as desirable for science communication:

Science Communication Objectives

1. Provide timely and rigorous information about status and trends in park resources as determined by inventory and monitoring efforts.
2. Develop a portfolio of technical and nontechnical information that reaches the full array of interested park staff, the scientific community, and the public.
3. Foster collaboration and communication between scientists, resource managers, and interpreters in the Klamath Network on I&M related subjects.

Our Interim Approach

The Klamath Network currently does not have a staff member permanently dedicated to science communication or outreach. Current and near-term communication efforts will need to leverage the time of existing staff, in collaboration with park-based interpreters and park managers. Additional monies for science communication are not expected in the next three years. Therefore, the KLMN I&M will need to pursue a suite of complementary activities and media to serve the parks, perhaps with matching funds from outside sources. In the interim, the Program Manager will likely need to lead the development of the Network's interpretive efforts, drawing on other I&M, park-based staffs, and partners as appropriate. In an initial scoping meeting of the Klamath Network staff in spring 2010, the following focal activities were identified:

Inter- and Intra-net Pages – The Klamath Network Internet and Intranet pages are the primary tools for the timely dissemination of science information. The Internet and Intranet sites provide overviews of all the Program's major inventory, monitoring, and outreach activities and copies of completed reports, outreach materials, and project data. In addition, the Intranet site contains draft documents and sensitive information of primary interest to park managers or interpreters. Both sites are updated continuously by Network staff. Internet pages include the standard pages for each of the categories of inventory and monitoring, following a standard NPS template. This will continue.

Reference Services / NRInfo – Reference Services, formally known as NPSpecies and NatureBib, is one of the tools being used by the Network to distribute products and information. Reference Services is a new application, implemented in 2009, and is part of the NRInfo Portal. All products related to inventories, monitoring, and research are posted here as a package that includes all products related to the project (e.g., reports, GIS layers, database products, scanned datasheets, etc.).

Resource Briefs– These are short summaries that provide overviews or key findings from each of our inventory and monitoring program elements. Generally, they are 1-2 page summaries written in an accessible style to park managers and interpreters, providing key findings and where to access further details. These will be prepared at least quarterly for disseminating key findings and insights from vital signs monitoring.

Reports and Technical Bulletins – These will be the primary scientific reporting tools of the Klamath I&M Program. Reports will range in scope and complexity from annual effort reports and simple data summaries to much more complex analysis and synthesis reports of multiyear monitoring data. Each monitoring protocol outlines the timeline and content for reports associated with that vital sign. All analysis and synthesis reports will be subjected to peer review and published in the appropriate report format in the NPS Natural Resource Report Series.

Journal Articles – In cases where KLMN findings have clear interest to the broader scientific community, publication will be pursued in standard ecological or agency-related journals, including *Ecology*, *Park Science*, *Natural Areas Journal*, *George Wright Forum* or other appropriate outlets. This will also be the preferred publication vehicle when there is a need for methods or findings receive blind, rigorous peer review.

Newsletters and Biodiversity Notes – The Program will continue to prepared bi-annual issues of the *Klamath Kaleidoscope* for general updates on the program and invited articles from staff or university primary investigators and students. The monthly highlight on flora and fauna in the Klamath Region, the *Featured Creature*, will continue to be prepared and sent out to all KLMN park staff and partners.

Meeting and Trip Reports – These reports will share insights and findings from Network, regional, or national meetings or other events that are of broad interest to the parks.

Articles in Park Newspapers – I&M staff will work with park contacts to identify and share topics of interest to park visitors in the yearly park newspapers. Generally, topics will be identified in the fall and winter and presented for publication in the appropriate timelines in each newspaper.

Brown Bag Presentations–Starting in fall 2010, I&M staff began preparing 30-45 minute lunch presentations designed to be delivered as lunch or evening programs or at park management meetings. An initial goal will be to provide one presentation per month at one park in the Network. The hope is that this effort will build stronger relationships between I&M's office-based staff and the parks' staff, and will give the park staff an opportunity to ask questions about and guide their I&M program.

Workshops and Symposia– Now that the protocols are nearing completion, it is expected that I&M staff will have more time to collaboratively conceive and facilitate focused workshops for park and Network-based staffs in topics such as data management, GIS analyses, electronic data collection,

univariate and multivariate data analysis, development of citizen science programs, etc. In addition, as data accumulate and projects near completion, we expect to periodically convene scientific symposia to share and discuss results. It is likely that many of these symposia will be jointly organized with allied agencies, university partners, and nonprofit conservation organizations.

Board of Directors and Technical Committee Meetings– I&M staff will continue to provide periodic summaries for Superintendents and Natural Resource Chiefs at the yearly Board of Directors and Technical Committee meetings. In future years, we would expect to also include the park Interpretive Chiefs.

Collaborative Education Projects– The Heartlands Network has had some success working with local teachers and education students to develop lesson plans that encompass vital signs activities, park interpretive themes, and teaching objectives of local educators. The Klamath Network may be able to engage similar efforts, perhaps in partnership with the Crater Lake Science and Learning Center.

These activities represent a diverse portfolio aimed at a variety of audiences, and they will be implemented across a varied schedule, from monthly to quarterly to yearly or occasional activities. The Program Manager will work with park resource chiefs and interpreters to refine and schedule this list.

Priority Recommendations

1. Assign KLMN Program Manager as Interim Science Communication Lead for the Program.
2. Have a network meeting to discuss the interim science communication approaches and to prioritize and schedule activities.
3. Explore the feasibility of developing collaborative education projects in partnership with the parks, the Crater Lake Science and Learning Center, and other educational institutions.
4. Begin process for accessing professional science communication staff, either through shared positions with the park, through externally funded university positions, or through the eventual hiring of a Science Communication Specialist.

Section 7 – Technical Assistance

Background

As a cadre of scientifically trained specialists with detailed knowledge of the parks and region, I&M scientists have a unique and important role to fill in helping the parks identify, articulate, and address their scientific needs. Specific knowledge and expertise include GIS, database development, statistical analyses, etc. or a knowledge base (e.g., aquatic ecology, survey design, landscape ecology, etc.) that allow team members to assist a park in managing park resources.

During the development of the vital signs monitoring plan and specific protocols, I&M staff time has been limited by the pressing needs for monitoring plan and protocol development. Occasionally, the I&M staff has been able to take a lead and help produce substantive products for the park (e.g., Hazard Tree Database for WHIS). More generally, assistance has been “catch as catch can” and limited in scope (e.g., loaning of equipment and training of staff for fish toxicity studies).

Technical assistance, defined here as help to network parks on non-Vital sign scientific and management related projects, has been an oft-mentioned goal of both the network and park staff. During the Three Year Review, the I&M staff estimated that approximately 1% of their time had been spent providing technical assistance to the parks. The network goal for the upcoming years is to increase the time spent on technical assistance to between 5 and 10%.

Vision

The I&M Program, as a scientific team dedicated to serving science and resource management in the parks of the Klamath Network, will be a resource called upon to assist the parks with a variety of management support, inventory, monitoring, and research needs. Technical assistance will help build collaborative relationships, increase park engagement, insert more science into resource management decisions, and leverage existing funds.

Priority Recommendations

The I&M program will work with the parks to develop a system for soliciting and providing technical assistance, respecting the core assignments of any affected staff, and the priorities of the parks and program. In particular, the KLMN Technical Committee will be the core group responsible for weighing the priority of technical assistance requests. All technical assistance requests will be evaluated by the following suite of requirements and will be pursued through technical assistance requests. Requirements for formal technical assistance requests of considerable scope and complexity are provided below. Ideally these requests would be identified for discussion by the technical committee well in advance of the work.

Technical Assistance Feasibility Criteria/Requirements

The feasibility of I&M staff directly assisting parks will be evaluated by the following:

1. The I&M staff member(s) has desired/needed capabilities (skills or knowledge).
2. The staff member has time available to make a commitment to the project. Time to work on projects can be arranged through one or more of the following:

- a. Sharing current commitments with other network staff (e.g., staff member offering technical assistance temporarily delegates core tasks to other network members with time available.)
 - b. Project is worked on in “spare” time in between current workload and projects.
 - c. In rare cases where deadlines are immediate and non-negotiable, the parks involved may pay overtime, if I&M staff member is willing to put in extra time.
 - d. If the Board of Directors determines there is a significant enough need to have I&M staff commit to a project.
3. Park is clearly committed to seeing the work achieved.
 - a. There is a park contact to whom the I&M staff collaborates with in a project.
 - b. The park contact is actively engaged.
4. The end product is a clear objective, and the mechanism for integrating it into park management or how the product contributes to the scientific understanding of the park is clearly defined.
5. On complex projects, expected to require a substantial amount of network time (defined by the Program Manager), park funding of staff time (or a portion) is provided by the parks involved.
6. The project has data management clearly outlined (e.g., determining park responsibility, or I&M responsibility). If data management is a network responsibility, the project will conform to the guidelines of the KLMN Data Management Plan (Mohren 2007).

Once a project requiring a long-term assistance is identified by the park/network staff, a Technical Assistance Request should be collaboratively written between the I&M Program and the park detailing the requirements of the project, with a project statement, timelines/deadlines, available resources needed, and budgetary requirements and funding sources of the project specified (e.g., Is travel necessary to accomplish the project? Does the project require the use of a contractor [e.g., extra water samples analyzed]?).

The Technical Assistance Request (in an Appendix) should then be reviewed by the network Program Manager for final approval and scheduling, and the Data Manager should be consulted for project data needs prior to commencing work.

Section 8 – Collaboration in Inventory and Monitoring

Background

In the early phases of development of the Klamath Network Inventory and Monitoring Program, planning meetings included representatives from all the parks, usually resource managers. Since that time, as the program demands increased and core staff were hired, the I&M Program increasingly functioned as a distinct program, with a Program Manager supervising a core staff and working closely with university, nonprofit, and interagency partners. Since 2004, with the onset of the vital signs monitoring process, the core staff has worked under tight deadlines with very high productivity demands. This workload, most of which involved office-based research and writing assignments by core staff, limited time spent in the parks. Although the team has been largely successful in achieving programmatic goals, there has been a recurring concern voiced that the park staff at times feel disconnected from I&M activities. This section explores several ideas to increase program visibility, and foster engagement in I&M or park-led inventory and monitoring efforts. We hope these efforts will increase the parks' awareness of and ownership in collaborative inventory and monitoring activities.

Collaboration Goals

Increasing Visibility- A primary means of increasing visibility of the program is to schedule face-time with park staff. The brownbag lunch talks outlined in the science communication section should provide one means for I&M staff to become more familiar with park staff and to discuss the intent, approaches, and key findings of inventory and monitoring. Another means may be to provide presentations or demonstrations at seasonal technician or interpreter trainings around the network.

Increasing Engagement- Much of the inventory and monitoring activity undertaken by the I&M Program has involved core staff and I&M funded positions. It will be desirable to get the parks involved in inventory and monitoring efforts as feasible, so that the view changes from “the I&M Program” to “our I&M Program.” This could be achieved by hiring park-based staff to assist with sampling, to provide funding and protocols so that park-based staff can complete monitoring by themselves, or by collaborative analysis and writing. Perhaps the most promising near term areas for increasing engagement will be in land cover and land use monitoring and invasive species early detection. Citizen science efforts, such as the National Phenological Network, may also be a way to collaborate with and better engage park natural resource and interpretive staff.

Park-led Efforts –The parks have been conducting monitoring of selected resources for many years. In the formative stages of the I&M Program, it was decided that many of the existing park-based monitoring programs either were too narrow in focus or inappropriate in sample design to be included in the WASO funded I&M efforts. Nonetheless, considerable park-based monitoring exists, which could be brought into a larger scope of monitoring efforts. As a few examples of ongoing park-based monitoring efforts, the parks monitor elk at REDW, bufflehead ducks at LAVO, bats and invasive plant species at LABE. The I&M Program has already provided nominal support for synthesis of historic bat data at LABE, and if time is available, may be able to assist with analysis of park-based dataset in future years.

Park Condition Assessments- A major category of activities in which the I&M staff might become more engaged is in the park condition assessments. Natural Resource Condition Assessments and Resource

Stewardship Strategies are underway in several parks of the network. I&M staff were instrumental in encouraging Drs. Dennis Odion and Greg Jones and Lorin Groshong of SOU and Dr. Paul Adamus of Oregon State University to undertake in the Natural Resource Condition Assessments process for CRLA, LABE, and LAVO. In addition, several I&M staff have been actively engaged in the Resource Stewardship Strategy development for LABE (Figure 2). It is unclear how these efforts will interface with the State of the Parks Reports, but Dr. Daniel Sarr has been involved in several discussions with park-based staff aimed at streamlining and improving the condition assessment process. In 2010, he created the following diagram to illustrate how various science collection, analysis, and synthesis project might interface to support the resource stewardship strategy.

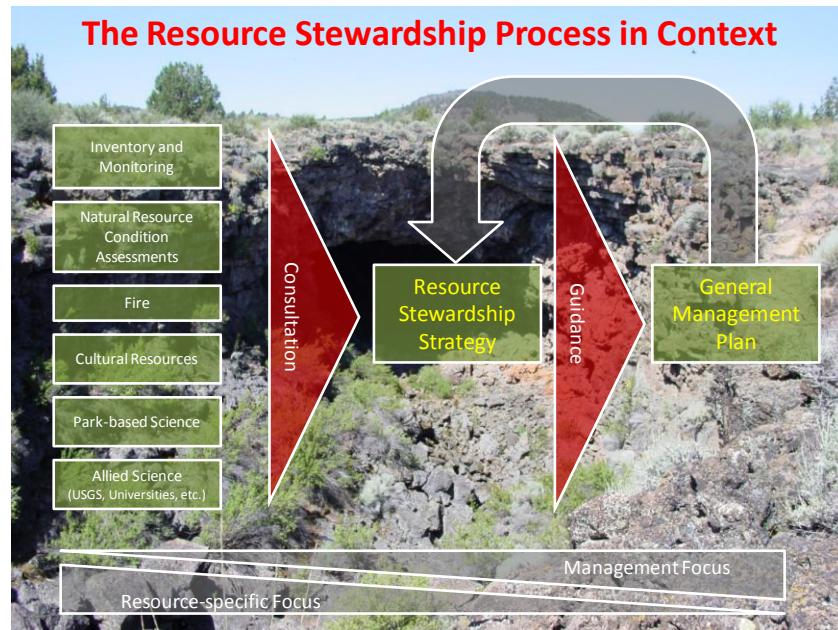


Figure 2. Diagram showing the idealized process for integrating science summary efforts into the Resource Stewardship Strategy process.

Priority Recommendations

The I&M Program will engage more closely with the Klamath Network parks through the following activities:

1. Increased visits to parks to provide presentations of activities, assist with training, etc., to ensure that all staff are familiar with the staff, goals and activities of the program
2. Find ways to get park-based staff involved in I&M activities by taking them into the field, allowing them to collaborate on report or publication writing, or other activities.
3. I&M staff may provide assistance with sampling, data analysis, or reporting for park-based inventory, monitoring, and research efforts.
4. I&M staff may become more involved in contributing to resource condition assessments, stewardship strategies, and general management plans.

Section 9 – Partnerships

Background

The KLMN I&M Program conducts a wide array of activities in a range of park ecosystems, but even such an ambitious effort covers only a fraction of the science needs of the network parks. However, as a science program with strong working collaborations with regional universities and nonprofit organizations, the I&M Program can potentially serve as a nexus between the parks and our other partners. The I&M Program currently enjoys partnerships with over a dozen science and education partners in allied federal agencies, universities, nonprofit, and for-profit organizations across the country. We expect many of these partnerships to continue over the next five years, and we will seek to build new ones.

It is important to note at the outset that partnerships take considerable time, with sometimes uncertain benefits. There is tremendous talent in the Klamath Region that could be engaged in mutually beneficial projects where appropriate, but with the recognition that the I&M Program is now fully engaged with executing the vital signs program and will need to make wise, cost-effective decisions about when and with whom to partner. These decisions will need to recognize whether specific, precise, and timely outcomes or more creative, synthetic, and novel outcomes are the primary goals for the partnerships. Obviously, the immediate partnerships will likely be in collaborative monitoring, but it will also be important, over time, to create conditions whereby systematic monitoring efforts can foster innovative science and education outcomes. It will also be important to strike a balance between actively engaging in regional and national scale partnerships and staying accessible and engaged with staff in each park.

Generally, outside partnerships are of three types: science partnerships, management partnerships, and interpretation and science communication partnerships. All partnerships require familiarity, a degree of ease and comfort in working together, and relatively frequent communication.

Types of Partnerships

Science Partnerships – The Klamath I&M Program aims to conduct integrated vital signs monitoring for the parks of the network. In the initial phases of the program, a major goal has been to select monitoring vital signs and protocols that can be implemented by typical NPS science staff within the monitoring and water quality funding allocations of the program. For the majority of the vital signs, I&M staff will be able to conduct the operations and fundamental analysis and reporting, with perhaps modest assistance and review from park-based staff. There is little doubt, however, that the vital signs data will allow considerably more complex analyses and syntheses through partnerships with other scientific organizations with overlapping goals. In the next five years the I&M Program will continue to be primarily concerned with implementing and field-testing the vital signs protocols and learning to manage our monitoring, data management, and reporting work flow. Over time, as data and insights begin accumulating, it is likely that more innovative science will become a substantive part of the program. Partners will be essential in both phases.

To date, the I&M program has developed two categories of vital signs, NPS-led and partner-led. The NPS-led vital signs (invasive species, whitebark pine, vegetation, caves, aquatic communities and water quality) have scheduled annual analysis and synthesis reports, which are designed to be feasible for

assigned network staff. More complex reports, research proposals, and complex analyses for journal articles will likely be facilitated by access to additional data analysis staff. Presently, there are several means of doing this. First, the Program currently commits modest funding in a Task Agreement with University of Idaho to gain statistical support. The overhead and hourly rates are high, however, and NPS typically provides 100% of the funding. This will likely be a less feasible approach over time, as costs increase and nonscheduled vital signs funding dwindles. A potential option for the future will be to work with one or more of the newly hired statisticians with the USGS Science Centers. Presently, there are statisticians at the Forest and Rangeland Ecosystem Science Center, the Northern Rocky Mountain Science Center, and the Western Ecological Research Center. These individuals may be able to assist the Program to undertake relatively complex analyses, and potentially provide trainings for I&M staff. Funding may be available at times through USGS Analysis and Synthesis funding sources.

NPS-led vital signs analysis and synthesis may also benefit from the assistance of research ecologists within USGS or academic institutions. It is possible that preparation of analysis and synthesis reports will be of interest to research ecologists in the region. A worthwhile exercise would be to develop a roster of potential partners or peer reviewers for each vital sign and all the topic areas covered by each analysis and synthesis report. It is probably not realistic to expect *pro-bono* work from regional scientists, but it may be possible to attract partners with co-authorship on articles or through jointly developed research funding proposals.

The Program will also need to become more familiar with and stay abreast of the other monitoring efforts in the parks and region. Currently, NPS Fire Effects Monitoring Program, the USFS Forest Inventory and Analysis, USGS Amphibian and Reptile Monitoring Initiative, and other ongoing programs actively collect environmental data in our region. To minimize duplication of effort, I&M staff will need to find ways to share information with these partners on a periodic basis.

Southern Oregon University has provided essential research, technical writing, and GIS support for the I&M Program since 2003. Much of this was funded directly and fully with I&M funding. Over the next three years, I&M vital Signs, vegetation mapping, and Natural Resource Condition Assessment funding will fully fund two SOU positions. However, it is uncertain whether the university will be able to bring matching funding to this longstanding relationship. Mechanisms for bringing in additional funding in to support university-based staff would almost certainly help the I&M Program, and should be explored well before 2014.

Several of the KLMN vital signs are partner-led (landbirds, intertidal, landcover/land use). Presently, the I&M Program provides all funding required for implementation and reporting through assistance agreements, usually with considerable support in the logistical, analysis, and reporting tasks by I&M staff. These partnerships should be ideal for leveraging additional funding and expertise for synthetic products. It will be important to convey that the partnership has an entrepreneurial element, where the non-NPS partner is expected to make efforts to leverage the NPS funding for additional scientific products, as opportunities arise. Major goals in the near-term will be to work closely with each partner to discuss the feasibility of the reporting strategies as well as collaborative research and reporting needs they foresee.

Two of the Klamath vital signs (climate, air quality) depend strongly upon data collected by other parties and are unfunded by the I&M Program. In the near term, the KLMN role will be to coordinate and

collate data from such efforts. Ideally, I&M staff will be able to use climatic analysis and air quality reports prepared by the partners to meet much of program reporting needs.

Management Partnerships – As described in the previous section, the I&M Program’s primary responsibility is to provide information to, and work closely with, the Klamath Network parks. However, there may be advantages to engaging in partnerships with larger scale management entities. The US Fish and Wildlife Service has established Landscape Conservation Cooperatives (LCCs) to collate and guide management efforts across large regions of the country. The LCCs may be a source of funding and expertise to help address changes associated with climate change, fire management, and other large scale processes. The Partners-In-Flight for landbird conservation is another potentially fruitful partnership. It is unclear at this time how much effort should be placed in such partnerships, but it is important to recognize that the conservation of most of the species and habitats in the Klamath parks will involve becoming conversant in the policies and practices of surrounding landowners. As a recent DOI science meeting (Odion et al. 2010), it was recognized that each of the agencies in the region has particular strength, and it might be appropriate to place each in a leadership role. For instance, NPS is a clear regional leader in environmental education, but US Fish and Wildlife Service leads in species and habitat conservation, and the USDA Forest Service leads in forest and wilderness management and associated research.

Interpretation and Science Communication Partnerships – The KLMN I&M Program has been working with park interpretive programs and SOU since 2005 on its Strategic Interpretive Plan (Herlihy et al. 2005). This has been a very beneficial partnership, that has built strong relationships and buy-in from the parks. The plan will be completed by the end of FY 2011. That effort largely emphasized developing materials from the inventories that had already been completed or were underway by FY 2005.

For the next five years, a major goal will be to maintain the momentum gained from earlier efforts, but in a tougher fiscal environment. One initial idea is to co-develop annual themes (focal inventories, etc.) with the Crater Lake Science and Learning Center (SLC). We propose an initial meeting in early FY 2012 to convene scientists and interpreters from the SLC, the I&M Program, and the Fire Program to identify a set of priority themes that could be compiled into a five year science and learning plan.

Priority Recommendations

1. Develop a roster of potential partners or peer reviewers for each of our vital signs and all the topic areas covered by our analysis and synthesis reports.
2. Explore mechanisms for bringing in additional funding in to support university-based staff well before 2014.
3. Meet periodically with other land management agencies to discuss collaborative management initiative and funding possibilities.
4. Meet with Crater Lake Science and Learning Center and NPS Fire Program in 2012 to explore collaborative education and interpretation projects

Section 10 – Data Management

Section Overview

This section addresses the data management concerns brought forth during the KLMN's Three Year Review (Fancy et al. 2010), progress that will be made in implementing the KLMN Data Management Plan (Mohren 2007), and some general ideas developed by the core staff of the Klamath Network.

Background and Responses to the Three Year Program Review

The KLMN received a favorable review on its progress towards implementing its Data Management Plan. One concern the review panel expressed was that there was no additional support, beyond the Data Manager position, to help implement the data management plan. While this is a valid concern, it is important to point out that the KLMN has developed a data management program that relies on the core staff to implement the majority of the data management workload, with each staff member, not just the Data Manager, carrying responsibility for fulfilling data management functions related to his/her position. The program has long viewed data management as a multifaceted undertaking that requires more than on full time equivalent employee. The KLMN set a goal early to integrate data management into the work habits of all its employees, emphasizing data management as a component of all processes and not just a stand-alone realm. Engaging all personnel in data management ensures a broader base of institutional knowledge within the Network and facilitates smoother transitions in personnel turnover and new project administration.

Although a general staffing analysis is provided in Section 1, this section discusses the implication of three alternative structures on the data management dimensions of the program. The staffing structures are described below:

1. Current Staffing Structure

If the I&M Program maintains its current structure, the future data management implementation structure will be similar to the current one. The focus of our program will continue be to:

- Ensure the staff of the KLMN is implementing the Data Management Plan and data management aspects of the vital signs monitoring protocols through appropriate training and guidance.
- Continuously review and update data management methods to ensure the Network is managing the data in the most efficient, logical, and user-friendly manner for the Network.
- Ensure data for all projects are managed in suitable databases, available for analysis in an appropriate timeframe, of a suitable quality to meet the needs of the project, and made available to Network and park staff.
- Manage GIS data so that they are well organized, available to Network staff, documented, and ensure the most up-to-date data are used for analysis and logistical planning.
- Manage images in a standardized way, make metadata available, and make both accessible to all Network staff.
- Continue implementation of national programs and databases such as NRInfo and its associated databases.

2. No GIS Specialist

The original plan for filling the GIS position at SOU was to fill a shared position, where the employee would work part time for KLMN and part time for SOU, with funding from both sources. The SOU end of this relationship still needs to be developed, as university funding has been very limited. If matching funding does not develop, then the KLMN will need to look for other methods to complete the GIS work. In general, the following will occur if a GIS Specialist is not available.

- The GIS structure is designed in such a manner that once it is completely in place, and staff is trained on how to utilize it, it can be managed by the Data Manager.
- Advanced GIS analysis would need to be completed by the network staff or if too complex, such work would need to be completed via contracts, agreements, or by partnering with DOI GIS staff from other offices, as feasible and appropriate.
- GIS-heavy projects such as vegetation mapping and condition assessments would need to be completed via contract, agreements, or by partnering with DOI GIS staff from other offices.
- Ensuring the analysis portions of the Land Cover/Land Use protocol could be implemented by one of the staff (currently the Data Manager) would be critical.
- Project Leads and crew leaders who are responsible for using GIS to prepare for the field season and for complete analysis and summaries for the various reports they developed would need to have appropriate training.

3. Addition of an Assistant Data Manager

The KLMN is considering making data management one of the core tasks of the Program Assistant. If this occurred, it is recommended that an assessment of his/her skill set should be examined, along with the current Data Manager's skills, to determine which data management tasks (as described above) he/she could take over. If the Program Assistant were available, we could:

- Improve the KLMN data delivery system to examine ways to integrating the vital signs database with KLMN web pages to develop dynamic data summaries for the parks.
- Improve the KLMN data delivery system by examining how to better integrate I&M data directly into each park's data management system.
- Work closer with the parks in the Klamath Network to provide data management leadership at a broad scale, moving beyond project-by-project help and examining how to help them better manage their data.
- Work with the parks to ensure their data are organized and made available to the Klamath Network. This would focus on data that can be directly influential to the KLMN such as weed treatment data, water quality data, vegetation treatment data, etc.
- Complete more network-wide training on a variety of topics including GIS, MS Access, NRInfo, etc.
- Complete an overall upgrade of the KLMN data management methods including adding advanced features to the data storage and collection methods, the implementation of advanced database systems such as SQL, and the implementation of an enterprise data management system for GIS delivery.

Park Staff Concerns

In addition to the suggestions by the review committee, parks staff also had an opportunity to provide comments on our progress in implementing the data management plan. Overall, the reviews were good. However, one Resource Chief did not think we were meeting his/her expectations and one Resource Chief and four park staff remained neutral. After reviewing the comments to the survey, a few things have become clear:

- Some park staff are not aware of the suite of data and information that the Network has made available to them via our web pages.
- The web pages may not be the best way to ensure our data are being made available in a useful manner to the parks.
- The I&M Program needs to examine better ways to ensure our data and information are known and accessible.

We believe these are valid concerns and will continue to implement a flexible data management system that can adapt to the needs of network and park staff, as well as meet national guidance and policy.

Over the next 5 years, the KLMN will do the following to address these concerns:

- Have a meeting at each park with the natural resource staff to determine the best way to make our data and information available to them.
- The I&M Program will continue to manage an Internet and Intranet web site, where it will make available all finalized KLMN reports, raw data, and GIS data as directed by WASO. The I&M Program will send quarterly updates that describe what has been added to these web pages. This has been done on an as needed basis in the past, but a standardized timeline will ensure park staff are aware of what we have available.
- The I&M Program will examine better ways to provide annual summary data, which are currently presented in annual reports.

Priority Recommendations

Overall, the data management architecture and approaches received favorable internal and outside review. However, there is always room for improving the system to meet the challenges of the next five years. Several recommendations are provided below:

1. The web sites for the KLMN are the main location for data and information distribution and this will not change unless better options become available. Evaluating the best way to utilize these web pages and sharepoint sites will be necessary.
2. Training will be a big part of the next 5 years to ensure all project staff understand their data management responsibilities. In addition, the Data Manager would like to begin implementing a variety of general training sessions on data management topics such as GIS and MS Access.
3. Determine how data should be managed for inventory and research projects that are (1) fully funded by the KLMN or I&M program, (2) partially (>50%) funded by the KLMN or I&M program, (3) minimally funded by the KLMN or I&M program, or (4) not funded by the KLMN, but the

KLMN spends a significant amount of staff time to the project. Currently, this distinction does not exist and data management efforts have varied on a project-by-project basis.

4. Work with the natural resources staff and each park to figure out the best method to make KLMN data and information available to them. It will not be very efficient to manage I&M project data in six different ways, but some degree of customization seems appropriate to ensure data are integrated into the resource management and interpretation programs of each park.
5. Look for other ways to present data summaries and analysis to the park staff. While the I&M Program has made substantial efforts to get park staff involved in the development of its protocols, much of this time was used to discuss objectives, sampling designs, and determining what to report on. However, very little time was allocated to methods and approaches for data delivery. A major collaborative project will be to develop and refine a data delivery system that meets each park's needs.

Section 11 – References

- Fancy, S., P. Latham, L. Thomas, and P. Campbell. 2010. 3-Year Start-up Review of the Klamath I&M Network July 28-30, 2010, Medford, Oregon: Report and Recommendations from the Review Panel. Unpublished Report on File at Klamath Network Office and (http://www1.nrintra.nps.gov/im/monitor/startup_reviews.cfm).
- Herlihy, M., D. Sarr, R. Brandt, K. Haner, T. Harris, M. McCabe, R. Nolan, and S. Thede. 2005. A Strategic Interpretive Plan for the Klamath Network Inventory and Monitoring Program. Unpublished Document on File, Klamath Network, Ashland, Oregon. 15pp.
- Mohren, S.R. 2007. Data management plan, Klamath Inventory and Monitoring Network. Natural Resource Report NPS/KLMN/NRR—2007/012. National Park Service, Fort Collins, CO.
- Odion, D., D.A. Sarr, E.E. Perry, and E.C. Dinger. 2010. Science, Research, and Climate Change for US Department of Interior Lands in the Klamath Region - Results of a Scoping Meeting. Unpublished Report on File. Klamath Network, National Park Service.
- Perry, E., D.A. Sarr, S.Mohren, and S. Smith. 2011. Klamath Network Administrative Handbook. Klamath Network Internal Report.
- Sarr, D.A., D.C. Odion, S.R. Mohren, E.E. Perry, R.L. Hoffman, L.K. Bridy, and A.A. Merton. 2007. Klamath Network vital signs monitoring plan. Natural Resource Report NPS/KLMN/NRR—2007/016. National Park Service, Fort Collins, CO.

Klamath Inventory and Monitoring Program
Technical Assistance Request Form

Project Title:

Park:

Park Contact:

Project Duration:

Project Summary (2-4 sentence summary):

Project Outcomes:

I&M Staff member Requested:

Cost Center for Salary and Travel (if necessary):

I&M Program Manager Signature: _____ **Date:** _____

I&M Staff member Signature: _____ **Date:** _____

Park Contact Signature: _____ **Date:** _____

Attach Project Statement of Work Below:

