



Mojave Desert Network Inventory and Monitoring **Communications Plan**



Developed by:

NPS Office of Education and Outreach and
Colorado State University

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Introduction

Project background

The Mojave Desert Inventory and Monitoring Network (MOJN) is a group of 7 NPS units located in the Great Basin-Mojave Desert ecoregion of Arizona, California, and Nevada. The Network is led by a Board of Directors comprised of the Superintendents of all 7 parks and 4 external advisors and was established to coordinate matters of cooperation and collaboration among them. The MOJN includes three large, natural-area parks, a national preserve, a national monument, a national recreation area, and one smaller historical site.

PARK	CODE	Size (hectares)
Death Valley National Park	DEVA	1,374,420
Great Basin National Park	GRBA	31,194
Joshua Tree National Park	JOTR	321,327
Lake Mead National Recreation Area	LAKE	521,346
Mojave National Preserve	MOJA	619,923
Parashant National Monument	PARA	424,242
Manzanar National Historical Site	MANZ	329
Total		3,292,732

The I&M program was established as an integral part of management in the national parks by the National Parks Omnibus Management Act of 1998, in which the Secretary of the Interior is mandated to develop a system of “inventory and monitoring of National Park System resources to establish baseline information and to provide information on the long-term trends in the condition of National Park System resources”. Under this program the nation’s national parks were divided into 32 networks for I&M purposes, of which MOJN is one. The legislation emphasizes the importance of not only the scientific research component of the I&M program, but the communication of that research and its applications to a wide range of internal and external audiences.

Therefore, the I&M program serves a diverse constituency:

Internal Audiences

1. NPS staff across divisions including park superintendents, resource managers, and interpreters
2. NPS leadership
3. Federal agencies
4. Inter-agency management groups (e.g. Desert Manager’s Group)

External Audiences

1. Visitors
2. Web visitors
3. NPS partners including universities
4. Concessionaires
5. Agencies administering adjacent federal lands (DOD, BLM, USFS)

6. Other state & federal agencies. E.g. USGS, BOR, USFWS, EPA
7. Adjacent networks (SCPN, NCPN, SODN, CHDN)
8. Friends groups, etc.

The Mojave Desert Network I&M program is led by a full-time coordinator based at Lake Mead National Recreation Area. The actual monitoring will be conducted by a combination of park staff, network staff, contractors, and volunteers, following formal peer-reviewed protocols. From 2004-2005, the MOJN I&M program organized a series of workshops, attended by park resource managers and outside advisors, to identify 20 vital signs as the focus of their I&M efforts. These vital signs range from surface water chemistry to fire and fuel dynamics and soil erosion, and are selected to give reflect ecosystem condition. As of September 2009, several of the 12 basic inventories had been completed at several of the parks in the network (http://science.nature.nps.gov/im/units/mojn/inventory/inventory_12basic.cfm) and the I&M team is currently working to finalize monitoring protocols for Streams and Lakes, Groundwater and Springs, Integrated Upland, Invasive Species, and Riparian Vegetation. Over the long-term, the ongoing work of the I&M program will provide managers and the public with an objective measure of ecosystem health in the national parks.

Once the monitoring protocols are in place, the program will begin to accumulate data about significant trends in park resources. It is essential for the welfare of the program and the parks that this data be effectively communicated to superintendents and resource managers in the network, so that they can implement I&M findings in their management actions. For this reason, it is important to establish a network of communication between I&M staff, resource managers, and other target audiences that can benefit from the I&M findings; this project will work to gather feedback from both entities and create a Science Communication Plan tailored to serve their specific needs.

In addition to internal communication, the MOJN has a responsibility to share its findings with a wider external audience. The majority of the parks in the MOJN have a Resource Education (Interpretation) specialist who is responsible for conveying park information to the public. Park interpretation follows a long tradition of informing the public and enriching visitor experience. It also performs the vital service of enhancing park protection by expanding visitor awareness of environmental issues by emphasizing the parks' vulnerabilities. Currently, a gap exists between the scientific staff who do the monitoring, the natural resource managers who implement the results, and the interpreters whose task it is to connect visitors to the park's resources. This Science Communication Plan attempts to bridge the gap between all of these stakeholders

This project is a joint effort with the MOJN I&M Network, Colorado State University, and the Natural Resource Program Center's Office of Education and Outreach (OEO).

Setting

All MOJN sites are located at least in part within the American Semi-desert and Desert Ecoregion. From north to south across the MOJN area, there are three contiguous, arid to semiarid, desert ecosystems (Great Basin, Mojave, and Sonoran) which exhibit a southward gradient of increasing temperature and decreasing average elevation. Because of its intermediate climatic and elevation gradient, the Mojave Desert is considered to be the transitional zone between the Great Basin and

Sonoran Deserts. Three of the MOJN sites (GRBA, MANZ and portions of PARA) are located northward, within a 'high (elevation) or cold (climate) desert' environment, while the rest of the sites are located southward, in a hot desert environment. Since dry desert environments are characterized by a scarcity of water, biological diversity across the network is concentrated primarily in riparian habitats and montane islands (MOJN Draft Phase III report).

Despite this harsh environment, the MOJN sites provide habitat for an impressive diversity of plants and animals, including several threatened and endangered species such as the Devils Hole pupfish, (*Cyprinodon diabolis*), the desert tortoise (*Gopherus agassizii*), and the southwestern willow flycatcher (*Empidonax traillii extimus*). There are also a significant number of species of special interest due to their limited ranges, such as the Joshua tree (*Yucca brevifolia*) and the California fan palm (*Washingtonia filifera*). As a result of millions of years of this diversity and a dry, hot climate, the MOJN sites also boast a unique fossil record.

As well as sharing similar ecological systems, the MOJN sites also share the associated anthropogenic influences including invasions of exotic species, altered fire regimes, degraded air and water quality, damage to fragile soil systems, and increasing pressure on park boundaries caused by development of adjoining lands.

Problem Statement

The MOJN is in need of strategies to convey information about research and monitoring activities and results to a wide range of audiences including resource managers, interpreters, park partner organizations, and the public. Prior to this project, no plan existed to disseminate this information to these audiences.

In the short-term, the MOJN needs to establish a communication plan to inform resource managers of

- Purposes and objectives of the I&M program
- Status of protocol development for monitoring of vital signs
- Status of MOJN I&M program development and quarterly/annual activities

In the long-term, the MOJN also needs strategies to convey information to a wider audience about:

- Purposes and objectives of the I&M program
- Inventory and monitoring and other research activities
- Findings on status and trends of vital signs
- Critical information for adaptive management decisions
- Successes in providing critical information for adaptive management decisions
- Benefits that accrue to the parks and the public from the I&M program and research in parks

The gap between good scientific information and the need for a simple, clear message for the resource management and non-scientific community must be filled through careful communication planning (Illustrated in Figure 1 below). Science communication can help parks to navigate the *Information Iceberg*, by providing managers with valuable information about the health of park resources, serving as an integral resource management tool, and raising awareness in audiences about the role of science in park management.

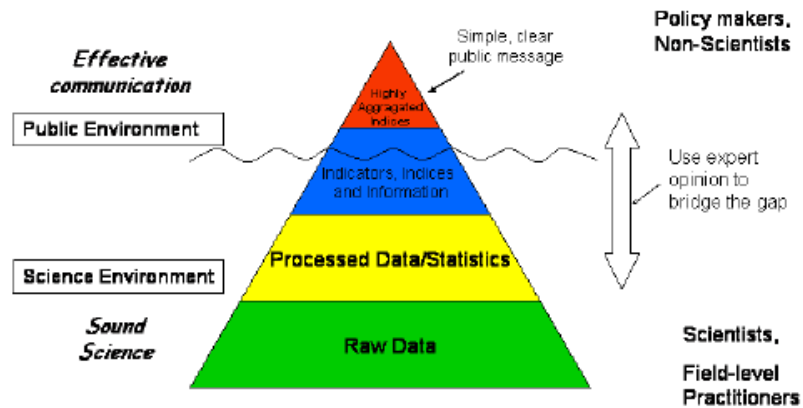


Figure 1: The Information Iceberg, linking the gap between good scientific information and the need for a simple, clear public message.

This project recognizes the need to develop clear and concise messages, methods of communication, and products that communicate the research efforts and information gathered by the MOJN to 1) an internal audience with emphasis on superintendents and resource managers and 2) a broader, external audience with various levels of interest and expertise. This project is an effort to establish a communication structure within the MOJN while the actual monitoring work is still in its infancy, so that communication and implementation of future findings will be accomplished effectively and seamlessly.

Approach

This project outlines a science communication plan and recommendations for products for the MOJN based on resource and audience analysis. The development of product recommendations was guided by the NPS Interpretive Development Program's interpretive competencies (the national standards for interpretation set in ten benchmark areas of interpretive work).

All interpretive product and service recommendations adhere to the guidelines of the NPS Director's Order 6 (guidelines for NPS Interpretation). Additionally, all products and programs developed conform to the format specified by the Natural Resource Preservation Program (NRPP). This funding source requires that requests for more than \$100,000 *must include* a separate Interpretive Component as part of the project statement in the PMIS justification data field. Our methods are based on these official formats/instructions and generate products and capacities to create new communications projects which support the service standards.

Interpretive Equation

The initial task in this communications project was to develop an understanding of the I&M program, the MOJN, and its audiences. The second task focused on raising awareness of MOJN's inventory and monitoring efforts through the development of interpretive themes and products.

The NPS has developed a philosophical equation to guide interpreters in the facilitation of interpretive opportunities. This equation is:

$$(Kr + Ka) \times AT = IO$$

The equation states that knowledge of the resource (Kr) combined with knowledge of the audience (Ka) in addition to the application of an appropriate technique (AT), leads to interpretive opportunities (IO), i.e. the opportunity for visitors to form an emotional and intellectual connection to the resource. This idea served as a guide for the development of example products for this communication plan.

Evaluating Communication in the Mojave Inventory and Monitoring Network

Evaluation of existing communications methods is an essential step in creating a tailored communication plan. Once it is understood what works and what does not, messages, techniques, and products can be adjusted accordingly. In the course of this project, the OEO team worked through two phases of evaluation: the first was scoping, familiarization with the network, and interviews, and the second was organizing a Communications Planning Workshop to present results and gather feedback.

Scoping and Interviews

During the initial phase of the project, the OEO team familiarized themselves with the network, parks, resources, and relevant audiences. This was achieved by reading the Mojave Desert Inventory and Monitoring Network Draft Phase III Report, exhaustively searching MOJN park websites for existing communications materials, and participating in conference calls with the MOJN Acting Network Coordinator. Additionally, the OEO team designed a questionnaire addressing pertinent communications issues in MOJN, and conducted 23 interviews with diverse staff in 6 of the 7 network parks (MANZ chose not to participate). The questionnaire is included in Appendix A, and a summary of the responses to key questions is presented below.

Knowledge of I&M Program

Core team

100% of core team is aware of program

Some respondents expressed that although they know of program, they are not aware of specific monitoring activities or results

Technical committee

100% of technical committee is aware of program

Some respondents expressed that they have not felt very involved; just receive emails, etc.

Other respondents emphasized the importance of communicating the results of I&M work to park and public

Other staff

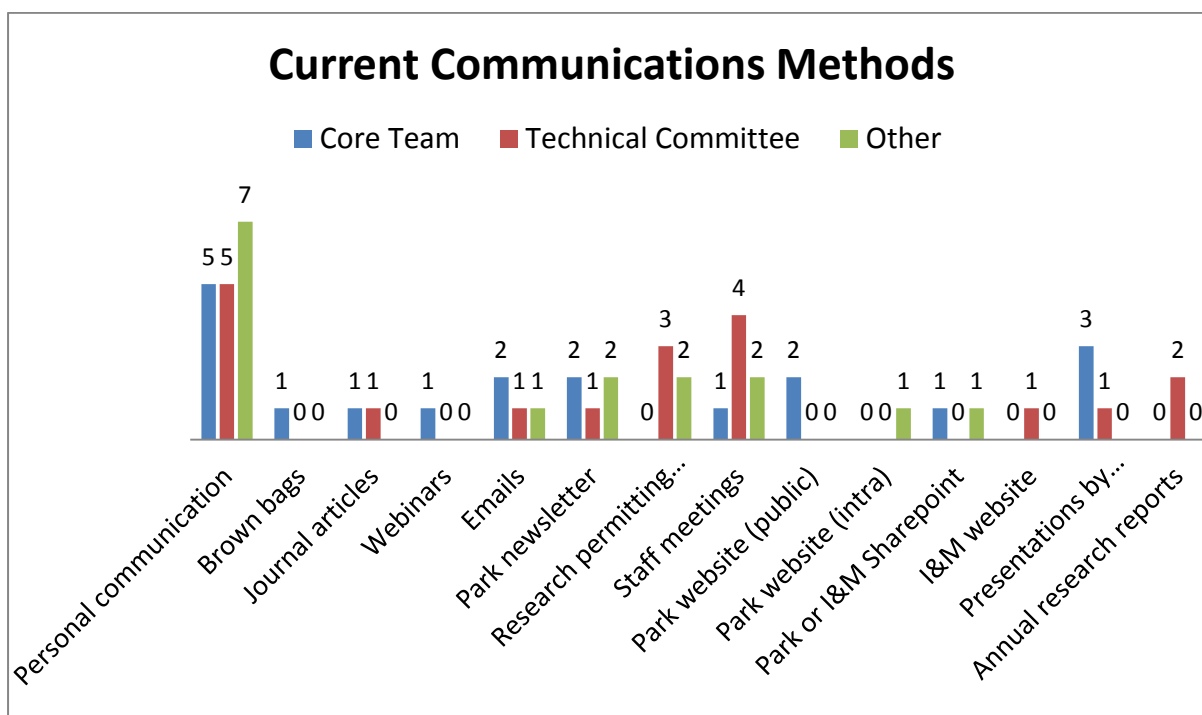
Superintendents interviewed were well aware of the program, goals, status

All other staff had heard of the program and know why it's important but

1. do not understand process of data collection/compilation
2. have not seen any useful results from the data mining process

Current methods of communication

The graph below shows current methods of communication used by park staff interviewed. Please note that the "Presentations" category includes orientations for seasonal staff and presentations by researchers inside and outside the park, and the "Research permitting process" category refers to the general response that "I find out about research when I approve permits, then don't hear about it again unless I seek it out"



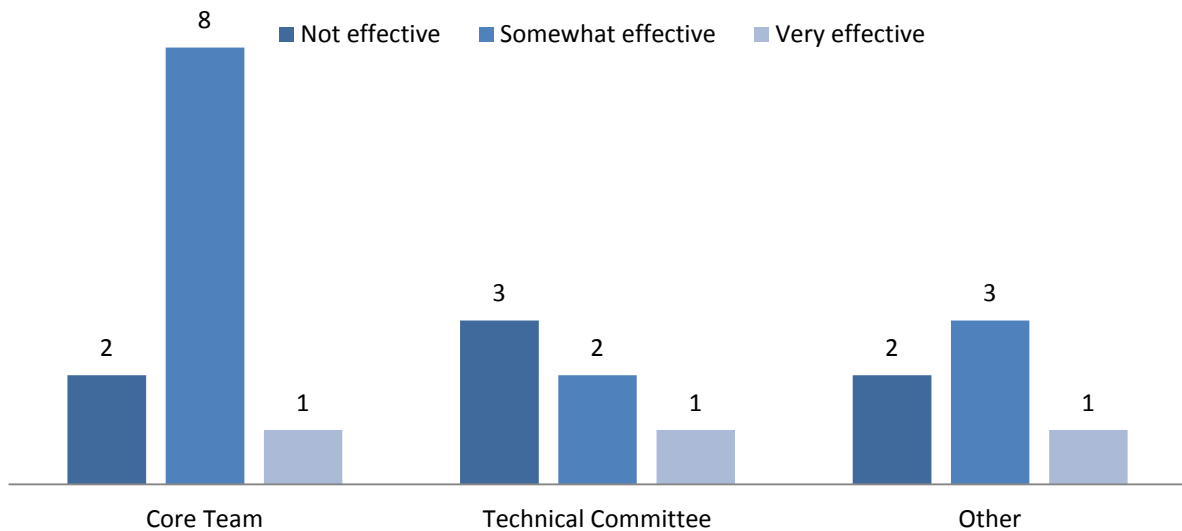
Effectiveness of current methods

Respondents were asked how well the current communications methods worked for them personally and for their park in general.

Key problems identified

1. External researchers: final report requirements vary. Some parks require a final report, but have difficulty enforcing this. Other parks don't even require this.
2. I&M email updates are sent only to Program Managers. They must communicate this information to other staff, but often don't have time/initiative.
3. Personal communication works well in small parks with limited staff-not so well in large parks or parks with more than one office

How effective are current communications methods?

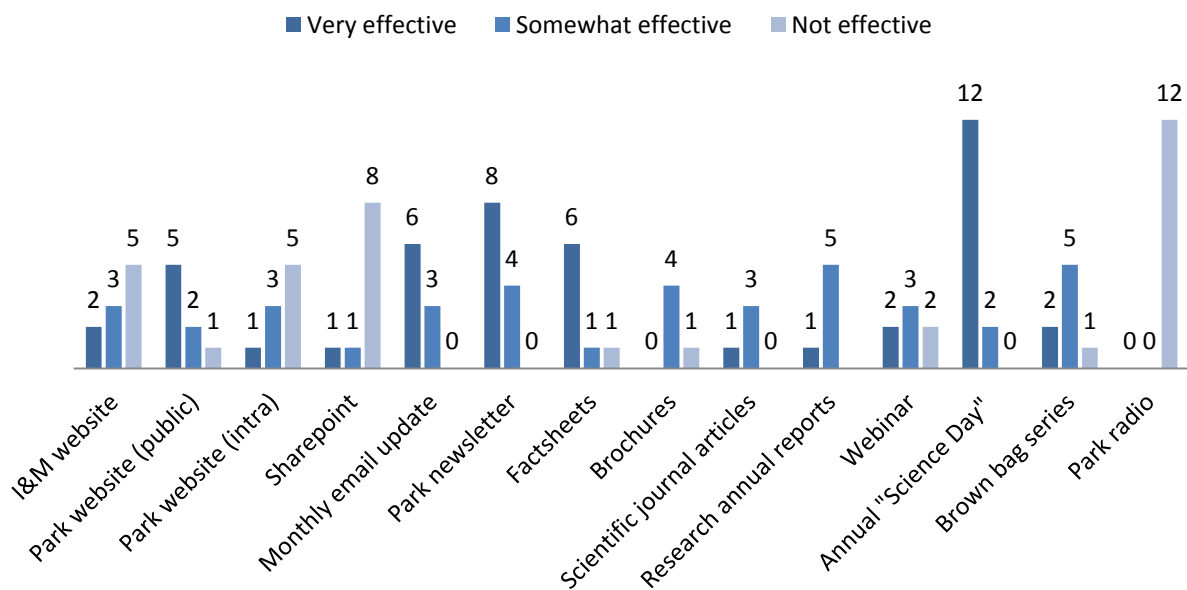


Preferred communications methods

Respondents were asked what communications methods they would prefer or think would be effective in keeping relevant staff updated and aware of I&M work in the parks.

Not all respondents commented on all methods, so the total responses for each method vary.

Preferred Method of Communication



Selected quotes from respondents:

"No matter how great a website is, there is simply no time to search for information!"

"An annual or bi-annual science meeting is great and should be organized by I&M folks. However, they should invite park researchers to present as well, not only I&M researchers"

"Parashant employees have no access to Sharepoint and so any information posted here, while valuable in and of itself, is basically useless for Parashant"

Principle perceived benefits of I&M

Respondents were asked about what they perceived to be the principle benefits that I&M research provides for their work and for the improved functioning of their park. Some representative responses are excerpted below.

"I&M research results give us up to date information to provide to the public"

"GRBA has a ton of data and we would really like help from I&M data managers to organize this data, but we feel that to date we have not received this help"

"The data collection and cleaning (data management) is hugely beneficial. Often NPS data is not managed in a way that is useable or retrievable, and so what the I&M is doing for data centralization is an incredible legacy to the National Park Service"

"I&M information can be communicated with the public to gain wider support for important issues on a network, not just a park, level"

"The I&M program takes information from the parks and does not give anything in return. It is frustrating for parks to assist I&M data miners with their work and subsequently feel like there is no reciprocal assistance"

"Knowledge of long-term trends"

"The I&M program is useful because it provides some inventory information they had not had—however, this is focused on network-wide issues. We have our own inventory work that is more PARA-specific and this has been more useful—they've even discovered several new species"

Communications Planning Workshop

At the end of the initial scoping phase, a communications planning workshop was organized to bring together representatives from each MOJN park and work to jointly identify communications issues and potential solutions for MOJN. The workshop, held at Lake Mead National Recreation Area (LAKE) in Boulder City, Nevada, was attended by representatives from four of the seven parks in MOJN, the MOJN Acting Network Coordinator, and the I&M Program Manager for MOJN. All parks were invited to attend.

During the workshop participants worked to identify overarching resource issues in the MOJN, possible slogans and other resource-specific messages, relevant audiences, and potential techniques to effectively reach these audiences. After the workshop, proceedings were sent to all members of the communication plan core team, so that representatives from absent parks had the opportunity to review and contribute to workshop conclusions.

In the months since the workshop, monthly conference calls were organized with as many of the Core Team members as possible and all other interested participants. The purpose of these calls was to continually report on progress and review ideas and products.

Communications goals

During the communications workshop, participants worked together to develop a list of priority communications goals for the network. These goals were combined with goals described by interviewees to create the following list of goals:

Short-Term:

1. Increase internal awareness/understanding of I&M in the network
2. Improve the format and accessibility of I&M information for different levels of park staff

Long- Term:

3. Create a Science Communicator position for the network
4. Create a central “one-stop-shop” website for I&M information in the network
5. Reinstitute and improve “Science Day” at a network level

Although the final two goals are actually techniques, they have broad, overarching impacts on a wide range of internal and external audiences, and can communicate a variety of messages. In addition, workshop participants and interviewees alike agreed that these should be established as goals for the network.

Recommendations

Overall recommendations to MOJN (focus on internal audience, focus on creating content, ?)

Communications Strategies

Based on the existing communications in the MOJN, the status of vital signs monitoring in the MOJN, and prioritized audiences, appropriate techniques were identified and developed to effectively communicate MOJN messages and information in the short- and long-term. Communications products and strategies developed by the team are listed below and described in product matrices in Appendix C:

- Website recommendations
- Staffing recommendations
- MOJN Logo
- MOJN Slogan

- Poster
- Top Ten Resource Questions Factsheet for each park (6 factsheets)
- I&M in Parks Factsheet templates (6 templates)
- Vital Signs Factsheet (1 factsheet)
- MOJN email newsletter template

A list of potential products which were not developed by our team are also described in product matrices in Appendix C. These lower-priority products include:

- MOJN Videos
- Vital Signs Case Study Folios
- MOJN Brochure
- “Science Day” symposium

Each product in the appendices states the intended audience. These matrices list products by: 1) interpretive intent and critical resource issues related to this individual service, 2) media and methods, 3) set-up and cost, 4) vendor information, and 5) evaluation.

There are a wide range of other creative products that may be potentially useful in conveying MOJN messages in the future, using the MOJN logo and slogan developed through this project. These potential future products are not in the matrices, but are listed below as a reference:

Products using MOJN Logo and Slogan:

- T-shirt
- Water bottle
- Bumper sticker
- Coffee mug
- Hankerchief
- First-aid pack
- Compass/Thermometer
- Swiss Army knife
- Screensavers
- Buttons
- Flashlight
- Baseball hat
- Post-it notes

Products requiring more investment to develop

- Park Staff field day: Raise awareness of MOJN and monitoring occurring in parks by inviting park staff to shadow and/or assist I&M staff.
- Touch screen kiosk-located at visitor’s center, focused on I&M
- Audio driving tour-What is I&M doing in this landscape?
- Elementary and high school curriculum modules focused on I&M
- Radio spots on local radio

References

Connect the Dots Briefing Statement for NRAG, March 7, 2008

Integration of Resource Management. Accessed December 15, 2009 at <http://science.nature.nps.gov/im/datamgmt/IRMA.cfm>

Mojave Desert Inventory and Monitoring Network Draft Phase III Report. Natural Resource report
NPS/MOJN/NRR. 2007. Accessed September 10, 2009, at:
<http://www1.nrintra.nps.gov/im/monitor/phase123.cfm>

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Appendix A: Park Staff Interviews

The following interview was administered to 23 park staff across the network. Interviews were conducted by telephone and results were compiled into a single document.

Name:

Park:

Interview Date:

1. What do you know about the MOJN I&M Program?
2. As part of the MOJN Core Team/Technical Committee, what goals would you like to achieve?
For non-core team/technical committee interviewees: What I&M goals are most important to your park?
3. By what methods do you become informed about current scientific research work in the park (I&M and non-I&M)?
 - Would you rate this method as effective or not?
 - Why or why not?
 - What method would be more effective? Rate the following on a scale of 1-5 (1=very effective, 5=not effective)
 - ☐ I&M website
 - ☐ Park website
 - ☐ Park intranet sites
 - ☐ Monthly e-mail update
 - ☐ Internal newsletter
 - ☐ Factsheets
 - ☐ Brochures
 - ☐ Scientific journal articles
 - ☐ Research project specific annual reports
 - ☐ Powerpoint presentation online
 - ☐ Annual "Science Day" meeting
 - ☐ Brown bag series (presentations by researchers)
 - ☐ Park radio announcements
 - ☐ Other (Please list)
4. Who should be the target internal and external audiences for communicating science about major resources issues?
5. What should the science communication goals of MOJN be?

6. What are some of the major resource issues your park is facing?
7. How does your park or division implement 'adaptive management' with respect to incorporating new information into management practices and policies?
8. Are there any associations/partners that support your park? (like the Yellowstone Association, etc) Could they help with designing/producing/maintaining interpretive products?
9. Can you recommend other people to interview in your park? We are looking for the following:
 - Superintendents
 - Interpretation & Communication specialist
 - Natural Resource specialist (resident ecologist, etc.)
 - Cultural resource specialist
 - Administrative staff
 - Maintenance
 - Law enforcement
 - NPS and Non-NPS researchers
 - Seasonal staff

Appendix B: Communications Basics: Logo, Slogan, Website Recommendations, Staffing Recommendations

The communications products and recommendations in this section are arranged in order of priority. Each is color-coded in red (high-priority), orange (medium-priority) or blue (low-priority). Design elements and templates are on the CD accompanying this report.

High Priority

Medium Priority

Low Priority

Mojave Desert Inventory and Monitoring Logo

The purpose of a logo is to establish the graphic identity of MOJN with a logo that represents the most important elements of the MOJN. The logo is intended for use on products for NPS staff and I&M program partners. In order to create this logo, our team worked with a graphic designer and the MOJN Core Team to identify key elements for inclusion. The team agreed that the Joshua tree and the bighorn sheep were iconic species present in multiple MOJN parks, and also emphasized the unique basin-and-mountain landscape found throughout the MOJN. Accordingly, these elements were incorporated into the final MOJN logo.

The MOJN logo can be used on MOJN products to show a relationship between the network and monitoring in individual park units. It must be used with an appropriate relationship to the NPS graphic identity; i.e., it must be used with the NPS graphic identity and subordinate to it to show that the MOJN is part of the National Park Service. In addition, the MOJN logo is generally not appropriate for public communication products as it is not important for visitors to the parks or park websites to be aware of the I&M program and the NPS's organizational structure. Rather it is important for them to know that science is being used to understand park resources and make decisions that will protect these resources.



Mojave Desert Inventory and Monitoring Slogan

The seven park units in the MOJN represent a wide range of ecosystems. The purpose of the slogan is to capture the 'essence' of the network parks. The slogan will be applied to the products developed by the MOJN as part of its graphic identity. Participants at the LAME workshop brainstormed words and concepts that link inventory and monitoring to the resources and unique characteristics of the network parks. Ideas included: biodiversity in the desert, biotic-abiotic relationships, I&M facilitates public access to important biological information, I&M explains/justifies management actions to the public, adaptations in a land of extremes, consensus on resource condition and trends. The slogan the Core Team decided best represented I&M in the Mojave Desert is:

"Understanding and protecting life on the edge."

Staffing Recommendations

The MOJN Inventory and Monitoring Network needs a science communicator to take the lead on facilitating internal communication between I&M and MOJN park staff and external communication with the public, and on generating and updating effective communications materials. This science communicator must understand the importance of I&M research in the network, and how this research relates to and supports other research efforts in the parks and in the region. The science communicator should also be familiar with interpretation, as the profession has been a vital part of the National Park System since its inception and interpreters are the face of the National Park Service.

After researching various possibilities with the help of staff from MOJN and staff from other networks who do have full- or part-time science communicators, we propose the following options for meeting this communications need, ***listed in order of preference***:

1. Share a science communicator with CHDN.

This would be a FTE with time split equally between the networks; the position could be based at either network. The supervisor would be Penny Latham, rather than an I&M person from either MOJN or CHDN.

Advantages:

- A full-time science communicator would dramatically improve internal and external communication for MOJN and CHDN.
- To date, both networks have no staff person formally assigned to communications; this position would fill that gap and avoid additional pressures on the already overburdened I&M staff.
- MOJN and CHDN are a good biogeographic match; the science communicator would be working with similar ecosystems in both networks.

Disadvantages:

- The science communicator could only be on-site at one network and would have to travel frequently to the other network.
- This is a new position and would require new funding commitments from both networks.

2. Assign some communications duties to the new administrative assistant who will be shared between MOJN and SIEN.

Advantages:

- This position is already in the budget, and the hiring process is almost complete.

Disadvantages:

- This is already a full-time position which does not include science communication.

- An administrative assistant is not trained in science communication.
- This person will be based in SIEN, therefore cannot provide on-site communications services to MOJN.

3. Direct some funding to Alice Wondrak-Biel to purchase some of her time. Alice is a technical writer shared between NCPN and SODN.

Advantages:

- Alice has significant experience in coordinating communications efforts for I&M networks.
- The SODN shares similar ecosystems with MOJN, so many of their communications materials may need only slight changes to apply to MOJN.

Disadvantages:

- Alice is a technical writer, not a science communicator. Her duties do not include organizing events such as “Science Day” or developing new and creative communications techniques.
- Alice’s time is already fully occupied with NCPN and SODN; it may not be possible for her to take on additional work for MOJN

4. Create a CESU agreement with a local university to hire a cooperator (graduate student) who could fulfill some of the duties of the science communicator position.

Advantages:

- This person would be based out of Lake Mead and solely focused on MOJN.
- This type of position is far less expensive than an FTE.
- Students bring fresh ideas and new perspectives to internal NPS projects.

Disadvantages:

- Significant paperwork is required to set up a cooperative agreement with a CESU, and a direct supervisor needs to be trained in the CESU processes and protocols.
- A cooperator may need additional time to become familiar with the needs of the National Park Service and Inventory and Monitoring Program.
- Science communication should be a serious, long-term priority for MOJN. This temporary position should only be used to fill the gap until MOJN can commit to a permanent science communicator position.

Website Recommendations

The web is a convenient method for posting information about the MOJN. As with other methods of communication, it is important to identify the audience you are trying to reach so that content is developed appropriately.

The Mojave Network maintains content on three websites: the public internet site, the intranet site, and the sharepoint site. (Todd: pros and cons of using nps sites). The MOJN faces a challenge when posting content on the intranet or sharepoint site because staff at Parashant do not have access to the NPS network.

Other networks have partnered with their Research Learning Centers to create a .org site. These sites are more accessible to cooperators and partners because they use a shared content management system (Drupal). The regional coordinator has explored the possibility of partnering with the Learning

Center of the American Southwest (<http://dev.southwestlearning.org/getinvolved/about>) to incorporate MOJN content. The FY10 estimate for the partnership would be approximately \$5,000. However, the MOJN decided not to pursue this partnership at this time because the MOJN lacked content for the site. Other considerations that need to be taken into account if this avenue is pursued are: (Todd: Pros and cons of .org sites)

Recommendation

For the immediate future, MOJN should direct their efforts at creating content for the existing public internet. The Heartland Network's website (<http://science.nature.nps.gov/im/units/htln/index.cfm>) is a good example of the use of the existing I&M internet page for delivering content. The target audience(s) for the MOJN internet would be park staff (resource managers, interpreters, superintendents), so content should be written for these audiences. Technical information can be added to this site for partners and for those who would like to drill down further, but introductory information is needed. Content can be developed in the format of resource briefs, newsletters, and case study folios, as identified in Appendix C of this report. Technical reports would also be appropriate. Additional products could follow the format used on the .org sites. Key to product development and distribution is the appropriate peer review process.

Notes: Meeting regarding MOJN web site possibilities

Margaret Beer, Todd Edgar, Sara Melena, Kate Cleary

The purpose of this meeting was to discuss the different approaches available for a MOJN website.

- *MB: Main advantages of a .org site:*
 - *End users love it!*
 - *More accessible to cooperators (shared content management systems → with strict peer review process)*
 - *Allows information to be seen in a larger context*
- *How much staff time is required for a site like the virtual RLC site?*
 - *People to ask: Rob Bennetts (Southern Plains Network)*
Andy Hubbard (SODN)
- *Internal site: MB does not want this to change its current format...i.e. we can't "jazz this up" too much to look more like the .org site*
- *TE: There **must** be a firewall between the .org and nps.gov (if there is not, as in GYSLC, that's wrong!)*
- *MB: Advice to MOJN is to focus on generating content at this point, post it on internal, existing MOJN site, and then further down the road they can think about doing a .org site.*

- With the .org, MOJN should try to join with a group which makes biogeographical sense to them: SODN, or Learning Center of the American Southwest

Appendix C: Communications Products

The communications products presented in this section are arranged in order of priority. Each is color-coded in red (high-priority), yellow (medium-priority) or blue (low-priority).

High Priority

Medium Priority

Low Priority

Table of Contents

Product	Audience	Purpose	Page Number
MOJN Poster	Internal: Superintendents, Chief of RM, Interpreters/Educators, Law enforcement/Maintenance staff/Entrance Station rangers. External: none	Raise awareness through a uniform visual identity which communicates the MOJN slogan: <i>Understanding life on the edge.</i>	
Vital Signs Factsheet	Internal: Superintendents, Chief of RM, Interpreters/Educators, Law enforcement/Maintenance staff/Entrance Station rangers. External: Concessionaires, Other agencies, Partners	Raise awareness of I&M work in MOJN. Educate and inform audiences about I&M vital signs, why they are important, and how I&M determines the status and trends of each vital sign.	
I&M in MOJN Parks Factsheet	Internal: Superintendents, Chief of RM, Interpreters/Educators, Law enforcement/Maintenance staff/Entrance Station rangers. External: Concessionaires, Other agencies, Partners	Raise awareness of I&M work in MOJN. Educate and inform audiences about activities and projects of I&M in each of the MOJN parks.	
"Top Ten" Factsheet	Internal: Interpreters/Educators, Law enforcement/Maintenance staff/Entrance Station rangers. External: Concessionaires	Provide answers to the top ten most commonly asked resource questions in each park. Relate this information to I&M work in the parks; raise awareness of how I&M work helps to answer important resource questions.	
MOJN Email Newsletter	Internal: Superintendents, Chief of RM, Interpreters/Educators External: Other agencies, Partners	Raise awareness of MOJN activities and accomplishments, keeping cooperators informed of progress, and inviting participation in MOJN projects.	

MOJN brochure	Internal: Interpreters/Educators, Law enforcement/Maintenance staff/Entrance Station rangers. External: Other agencies, Partners, University Collaborators	Raise awareness through a uniform visual identity (photos/logo), and providing basic, essential information about I&M, MOJN, MOJN Vital Signs, and key contact people in the network.
Videos	Internal: Seasonal employees External: Other agencies, Partners, Park and web visitors	Raise awareness about MOJN, the I&M Program, and the benefits of using scientific data to inform management decisions that protect the integrity of the parks.
Vital Signs Case Study Folios	Internal: Superintendents, Chief of RM, Interpreters/Educators External: Other agencies, Partners, Park visitors. Legislature	Raise awareness of MOJN Vital Signs. Inform and educate audiences on what a vital sign is, why each vital sign is important to monitor, and what is the status of each vital sign in MOJN parks.
MOJN Folder with Logo and Slogan	Internal: Superintendents, Chief of RM, Interpreters/Educators, Law enforcement/Maintenance staff/Entrance Station rangers. External: Other agencies, partners	Raise awareness of MOJN through a uniform visual identity (photos/logo/slogan)
“Science Day” symposium	Internal: Superintendents, Chief of RM, Interpreters/Educators, Law enforcement/Maintenance staff/Entrance Station rangers. External: Concessionaires, Researchers from other agencies, Partners, Park visitors, Invited general public	Raise awareness about the MOJN, the I&M Program, and the benefits of using scientific data to inform management decisions that protect the integrity of the parks. Share scientific data, create personal connections between NPS program areas, other agencies conducting I&M work in MOJN, and the public.

Interpretive Service or Product: Poster	
Target Audience:	Internal: Superintendents, Chief of RM, Interpreters/Educators, Law enforcement/ Maintenance staff/Entrance Station rangers. External: none
Interpretive intent and critical resource issues related to this individual service	
<i>Interpretive intent</i>	Raise awareness through a uniform visual identity (photos/logo) which communicates the MOJN slogan: <i>Understanding life on the edge.</i>
<i>Critical Resource issues</i>	N/A
<i>Human Dimensions Component</i>	N/A
<i>Message Description</i>	Conveying identity and building credibility of MOJN professionalism A 16"x 20" poster which communicates the MOJN anchor concept. Design will include the MOJN logo and the NPS arrowhead. Design will be created by professional graphic designer through OEO
Media and Methods	
<i>Service Duration</i>	N/A
<i>Logistics</i>	Hanging posters in each of the network parks. Posters should be displayed in common areas for all staff to view.
<i>Staff Time Commitment</i>	Minimal.
Set-up and Cost	
<i>Graphic Design</i>	Design file provided in Adobe Acrobat and InDesign software.
<i>Artwork</i>	N/A
<i>Materials</i>	Paper (provided by printer, weight and gloss TBD).
<i>Installation</i>	N/A
<i>Set-up</i>	N/A
<i>Cost/unit</i>	TBD
<i># of units</i>	350 (50 per park for all seven parks)
<i>Shipping</i>	TBD
Vendor Contact Information	
<i>Company</i>	Government Printing Office, San Diego Regional Office
<i>Website</i>	www.gpo.gov
<i>Contact Person</i>	TBD
<i>Email</i>	infosandiego@gpo.gov

<i>Phone</i>	619-209-6178
Evaluation	
	Solicit comments and suggestions from NPS staff.

DRAFT

Mojave Desert

Inventory & Monitoring Network

National Park Service
U.S. Department of the Interior
Mojave Desert
Inventory & Monitoring Network



Understanding and protecting life on the edge



Mojave • Lake Mead • Great Basin • Joshua Tree • Death Valley • Manzanar • Parashant

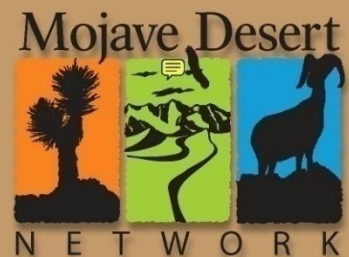


vital signs:

surveys of the status and distribution of in the national parks a subset of physical, chemical, and biological elements and processes of park ecosystems that represent the overall health of park resources.

examples of vital signs:

- Air & Climate
- Geology & Soils
- Groundwater & Springs
- Surface Water Quality
- Invasive/exotic plants
- Vegetation Change
- Reptile Communities
- Riparian Birds
- Small Mammal Communities
- Fire & Fuel Dynamics
- Landscape Dynamics



<http://science.nature.nps.gov/im/units/mojn/>

Interpretive Service or Product: Vital Signs Factsheet

Target Audience: Internal—Superintendents, RM, Interpreters/Educators, Law Enforcement/Maintenance/Entrance Station Rangers,
External—Other agencies, partner organizations, concessionaires

Interpretive intent and critical resource issues related to this individual service

<i>Interpretive intent</i>	Raise awareness of I&M work in MOJN. Educate and inform audiences about I&M vital signs, why they are important, and how I&M determines the status and trends of each vital sign.
<i>Critical Resource issues</i>	N/A
<i>Human Dimensions Component</i>	N/A
<i>Message</i>	Educating and informing audiences about the “big picture” importance of I&M in MOJN. Relating specific natural resources to the whole ecosystem of the MOJN, and explaining the importance of monitoring each of these resources. Communicating I&M activities and results to relevant audiences.
<i>Description</i>	One side of an 8 x 11” sheet containing information on the importance of each vital sign, the status and trends, management implications, list of parks where the vital sign is monitored, and contact information for a key MOJN staff person. Includes photographs, and graphs and charts where available/appropriate. Layout will include the MOJN logo and the NPS arrowhead. Factsheets will be provided for the following vital signs: • Groundwater and Springs • Surface Water Quality • Invasive and Exotic Plants These are the vital signs in the MOJN which currently have established contact people, finished or almost-finished protocols, and some inventory information. Templates will be provided for the remaining vital signs, and can be filled in later as information becomes available: • Geology and Soils • Air and Climate • Vegetation change-Integrated Upland and Integrated Riparian • Reptile communities • Riparian Birds • Small mammal communities • At-risk populations • Fire • Landscape Dynamics

Media and Methods

<i>Service Duration</i>	N/A
<i>Logistics</i>	Factsheets should be: • Available in park offices for use in internal trainings/orientations and interactions with external audiences • Included in informational binders for law enforcement/maintenance/entrance station rangers.

<i>Staff Time Commitment</i>	Minimal. Some staff time required for future printing and distribution of the factsheets, and for updating the factsheets if necessary.
Set-up and Cost	
<i>Graphic Design</i>	Design file provided in Adobe Acrobat and InDesign. It will be burned onto a CD to be included with the communications plan NPS Graphic Identity applied.
<i>Artwork</i>	N/A
<i>Materials</i>	Paper
<i>Installation</i>	N/A
<i>Set-up</i>	N/A
<i>Cost/unit</i>	TBD
<i># of units</i>	Whatever quantity each park decides to print; printing more than 100 copies is not cost-effective on a park printer and should be contracted out to a GPO
<i>Shipping</i>	TBD
Vendor Contact Information	
<i>Notes</i>	We recommend printing a single large batch at first, then printing in each park on an as-needed basis. Printing less than 100 is cheaper in-house; more than 100 is cheaper to print through the appropriate Government Printing Office. End users visiting the MOJN website will print the factsheets on their own printers.
<i>Company</i>	Government Printing Office, San Diego Regional Office
<i>Website</i>	www.gpo.gov
Evaluation	
	• Solicit comments and suggestions from NPS staff • Dissemination measured by how many factsheets distributed in a year. This should be monitored separately for internal and external audiences, to determine where the greatest demand lies.

Interpretive Service or Product: I&M in Parks Factsheet

Target Audience: Internal—Superintendents, RM, Interpreters/Educators, Law Enforcement/Maintenance/Entrance Station Rangers
External—Other agencies, partner organizations, concessionaires

Interpretive intent and critical resource issues related to this individual service

<i>Interpretive intent</i>	Raise awareness of I&M work in MOJN. Educate and inform audiences about activities and projects of I&M in each of the MOJN parks.
<i>Critical Resource issues</i>	N/A
<i>Human Dimensions Component</i>	N/A
<i>Message</i>	Educating and informing audiences about the goals of I&M in each park. Communicating I&M activities and results to relevant audiences who may be interested in I&M in a single park, rather than across the larger MOJN.
<i>Description</i>	One side of an 8 x 11" sheet containing information about I&M activities and projects in each of the parks. Includes photographs, and graphs and charts where available/appropriate. Layout will include the MOJN logo and the NPS arrowhead. Factsheets will be provided for the following parks: • LAKE • JOTR • MOJA • DEVA • GRBA • PARA • A template will be provided for MANZ Factsheet content includes a one-paragraph introduction on what the MOJN is and the purpose of I&M, then a list of each vital sign monitored in that park, with a brief description of a) inventory and monitoring results, where available and/or b) why this vital sign is important to this park. These sections can be filled in with more results and updates as they become available.

Media and Methods

<i>Service Duration</i>	N/A
<i>Logistics</i>	Factsheets should be: • Available at visitors center desks • Available in park offices for use in internal trainings/orientations and interactions with external audiences • Included in informational binders for law enforcement/maintenance/entrance station rangers.
<i>Staff Time Commitment</i>	Minimal. Some staff time required for future printing and distribution of the factsheets, and for updating the factsheets when necessary.

Set-up and Cost	
<i>Graphic Design</i>	Design file provided in Adobe Acrobat and InDesign. It will be burned onto a CD to be included with the communications plan. NPS Graphic Identity applied.
<i>Artwork</i>	N/A
<i>Materials</i>	Paper
<i>Installation</i>	N/A
<i>Set-up</i>	N/A
<i>Cost/unit</i>	TBD
<i># of units</i>	Whatever quantity each park decides to print
<i>Shipping</i>	TBD
Vendor Contact Information	
<i>Notes</i>	We recommend printing a single large batch at first, then printing in each park on an as-needed basis. Printing less than 100 is cheaper in-house; more than 100 is cheaper to print through the appropriate Government Printing Office. End users visiting the MOJN website will print the factsheets on their own printers.
<i>Company</i>	Government Printing Office, San Diego Regional Office
<i>Website</i>	www.gpo.gov
Evaluation	
	• Solicit comments and suggestions from NPS staff • Impact measured by how many factsheets distributed in a year. This should be monitored separately for internal and external audiences, to determine where the greatest demand lies.

Interpretive Service or Product: Top Ten Resource Questions Factsheet

Target Audience: Internal—RM, Interpreters/Educators, Law Enforcement/Maintenance/Entrance Station Rangers
External—Concessionaires

Interpretive intent and critical resource issues related to this individual service

<i>Interpretive intent</i>	Provide answers to the top ten most commonly asked resource questions in each park. Relate this information to I&M work in the parks; raise awareness of how I&M work helps to answer important resource questions. This gives staff that interface with the public an opportunity to share how the park is using science to protect park resources.
<i>Critical Resource issues</i>	N/A
<i>Human Dimensions Component</i>	N/A
<i>Message</i>	Educating and informing audiences about the “big picture” importance of I&M in MOJN. Relating specific natural resources to the whole ecosystem of the MOJN, and explaining the importance of monitoring each of these resources. Communicating I&M activities and results to relevant audiences.
<i>Description</i>	Both sides of an 8 ½ x 11” sheet containing information on the top ten most commonly asked questions about natural resources. These questions will be determined through talking to park staff. Since the resources and the questions differ by park, a separate factsheet will be created for each park: • LAKE • JOTR • MOJA • DEVA • GRBA • PARA Includes photographs, and graphs and charts where available/appropriate. Layout will include the MOJN logo and the NPS arrowhead.

Media and Methods

<i>Service Duration</i>	N/A
<i>Logistics</i>	Factsheets should be: • Available at visitors centers desks and entrance stations • Included in informational binders for law enforcement/maintenance/entrance station rangers.
<i>Staff Time Commitment</i>	Minimal. Some staff time required for future printing and distribution of the factsheets, and for updating the factsheets if necessary.

Set-up and Cost

<i>Graphic Design</i>	Design file provided in Adobe Acrobat. It will be burned onto a CD to be included with the communications plan NPS Graphic Identity applied.
<i>Artwork</i>	N/A

<i>Materials</i>	Paper
<i>Installation</i>	N/A
<i>Set-up</i>	N/A
<i>Cost/unit</i>	TBD
<i># of units</i>	The quantity each park decides to print
<i>Shipping</i>	TBD
Vendor Contact Information	
<i>Notes</i>	We recommend printing a single large batch at first, then printing in each park on an as-needed basis. Printing less than 100 is cheaper in-house; more than 100 is cheaper to print through the appropriate Government Printing Office. End users visiting the MOJN website will print the factsheets on their own printers.
<i>Company</i>	Government Printing Office, San Diego Regional Office
<i>Website</i>	www.gpo.gov
Evaluation	
	• Solicit comments and suggestions from NPS staff • Dissemination measured by how many factsheets distributed in a year. This should be monitored separately for internal and external audiences, to determine where the greatest demand lies.

Death Valley National Park

National Park Service
U.S. Department of the Interior

Mojave Desert
Inventory and Monitoring Network



Top Ten Resource Questions

2010

The Mojave Desert Inventory and Monitoring Network consists of seven geographically and ecologically similar park units: Death Valley National Park, Great Basin National Park, Joshua Tree National Park, Lake Mead National Recreation Area, Mojave National Preserve, Parashant National Monument, and Manzanar National Historical Site. In each unit, the Inventory and Monitoring (I&M) team collects information on status and distribution of natural resources “vital signs”, and tracks these vital signs over time to detect any changes. Information gathered by I&M researchers helps each park understand and better protect their incredible natural resources.

Let's learn how I&M helps answer some of the most commonly asked natural resource questions in Death Valley National Park.



Shining Milkvetch (*Astragalus lentiginosus* var. *micans*) is one of many wildflowers blooming in Death Valley National Park.

Air and Climate

Why is Death Valley so dry and hot?

Death Valley is a desert because of a “rain shadow effect”. The valley lies to the east of several mountain ranges. Stormclouds moving in from the Pacific cool as they rise up each mountain, and as they cool their moisture condenses and falls as rain or snow. By the time they arrive in Death Valley, there is rarely any moisture left.

It's hot because the valley floor surrounded by high mountains acts like an oven: air heats in the valley, then rises, but can't rise above the mountain ridges. As it cools, it sinks back down to the valley floor and is heated again. The park monitors weather, long-term climate trends, and air quality at the Furnace Creek air quality station.

Geology and Soils

How do the rocks at the Racetrack move?

The Racetrack is a “playa”, or dry lakebed, in a remote valley between the Cottonwood and Last Chance mountain ranges. Scientists are still studying the precise mechanism that sends the rocks on their wandering paths. Some hypothesize that during rainstorms, the parched playa surface, which is mostly clay, becomes wet and slippery, reducing the friction between the rocks and the sediment. High winds, funneled by the surrounding mountains, propel the rocks on their journey. Others think that thin ice “rafts” under or around the rocks, frozen by cold night temperatures in the Racetrack valley, minutely hoist the rocks from the ground, and convey them according to wind direction.

The I&M program helps us learn more about phenomenon like the racetrack by monitoring geology and soils in the park.

What are petroglyphs and how is the park protecting them?

Petroglyphs are pictographs created not by painting, but by pecking images into rock faces. To protect petroglyphs, the park does not direct visitors to the glyphs—we hope you discover them on your own as part of your adventures in the park. If you are lucky enough to discover a petroglyph, please do not touch it, as this will cause damage over time.

I&M does not directly monitor petroglyphs, since they are a cultural, not a natural resource. However, I&M monitoring of geology and soils indirectly relates to petroglyphs, since it helps us learn about processes such as erosion, deposition, and disturbance, which may affect preservation of petroglyphs.

Why are some of the rocks colored green, yellow, and blue?

Death Valley rocks are frequently rich in minerals that turn brilliant colors when exposed to air or water for long periods of time. Oxides of iron produce “rusts” in shades of yellow, orange, red, or green. Manganese oxides produce pink and purple hues. These and many additional colors may result from chemical alteration of other minerals as well. You can observe this rocky rainbow in geologic formations along Artists Drive. The I&M program helps us learn more about these natural works of art by monitoring geology and soils in the park.

<http://science.nature.gov/units/mojn>

Water

Where does the water in Death Valley come from?

Death Valley receives less than 2 inches of rainfall every year, a fraction of what most deserts receive. However, the park is home to 629 natural springs and 4 streams, including a small section of the Amargosa River. These water sources provide essential moisture to the plants and animals which have adapted to this extreme environment. I&M coordinates with park researchers to monitor the quality and quantity of groundwater and surface water, as well as the important wetland habitat created by groundwater around springs and seeps.

Why is there salt on the ground?

Death Valley has a huge drainage system. Rain falling on distant peaks creates floods that rush ever lower. Along the way, minerals dissolve from rocks and join the flood. Here, at the lowest elevation, floods come to rest and form temporary lakes. As the water evaporates, minerals concentrate until only the salts remain. After thousands of years, enough salts have washed in to produce layer upon layer of salt crust. The I&M program in Death Valley helps us learn more about this phenomenon through monitoring soil and surface water dynamics.

Wildlife

What animals can I see during the day?

Many animals that live in Death Valley are nocturnal, that is, they only come out at night to avoid the intense heat of the daytime desert. However, some animals, including coyotes, road runners, snakes, and bighorn sheep, can be seen during the day if you look carefully. The park is also home to the only naturally occurring population of the Devil's Hole Pupfish (*Cyprinodon diabolis*). This tiny iridescent blue fish is federally listed as an endangered species-its total population is only between 125-150 fish! The Pupfish is monitored by park researchers, and is part of the "at-risk populations" vital sign in the I&M program.

What is the chuckwalla? The zebra-tailed lizard?

The chuckwalla (*Sauromalus obesus*) is a giant lizard which can grow as long as 16 inches and weigh up to 2 pounds! When frightened, the chuckwalla gulps air, flattens its body, and wedges itself into tight hiding places in rock crevices. The zebra-tailed lizard (*Callisaurus draconoides*) is much smaller, with an average size of 3 inches. Its claim to fame is its amazing tail, which is striped black and white, just like a zebra's! Look for this lizard as it runs across the desert on its hind legs with its flashy tail extended over its back. Both of these lizards are harmless to humans. I&M coordinates with park staff to monitor the health of reptile populations in the park.

Vegetation

Where and when can I see wildflowers in the park?

The majority of wildflowers in Death Valley bloom in the springtime, but the wildflower season is irregular and dependent on winter rainfall. If there is a wet winter, you may be lucky enough to see the desert fill with a sea of gold, white, pink, and purple blossoms. Where to look for wildflowers depends on the time of year: from February to April flowers bloom at lower elevations, from April to May blossoms fill canyons and valleys between 3,000-5,000 feet elevation, and from May to mid July blooms can be found in pine forests and on slopes between 5,000-11,000 feet in elevation.

What is happening with the tamarisk plant?

Tamarisk is a non-native plant species which was introduced to the U.S. in the 1800s. It grows primarily near water sources, where it pushes out native plants. Two types of tamarisk threaten Death Valley's precious, native wetlands; saltcedar (*Tamarix ramosissima*) which are deciduous shrubs, and athel (*Tamarix aphylla*), an evergreen tree species. I&M in Death Valley will monitor tamarisk populations as part of its Invasive/Exotic Plants program. Currently, the park coordinates with Nevada Conservation Corps to organize tamarisk removal projects.



Alluvial flats



I&M staff monitoring vegetation communities in Death Valley



Death Valley pupfish

Great Basin National Park

National Park Service
U.S. Department of the Interior

Mojave Desert
Inventory and Monitoring Network



Top Ten Resource Questions

2010

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Let's learn how I&M helps answer some of the most commonly asked natural resource questions in Great Basin National Park.



Spelunkers explore a cave in Great Basin National Park

Air and Climate

From where in the park can I see the best night skies?

Great Basin is known for its stunning night skies. On a clear, moonless night, visitors can see thousands of stars, five of our solar system's eight planets, star clusters, meteors, man-made satellites, and even the Milky Way. Almost any location in the park away from outdoor lighting is a good location for night sky viewing, but one particularly impressive spot is the Wheeler Peak/Bristlecone Trail parking lot at the end of the Wheeler Peak Scenic Drive.

I&M will coordinate with park scientists to monitor air quality in Great Basin, and managers will use this information to help preserve the park's amazing night skies.

How many miles of visibility do we have in the park?

Great Basin typically has excellent visibility: on a good day visitors at high vantage points can see up to 150 miles! This places the park within the top few sites in the nation for good visibility, right up with Denali National Park in Alaska and the Bridger National Forest in Wyoming. However, despite the park's remoteness, urban air pollution still has a negative affect on air quality. Northeasterly winds from the Salt Lake City area blow a brownish-yellow haze into the Snake Valley, and any increased development on the western side of the park will have similar effects.

Scientists at Great Basin have been monitoring visibility since 1982, and the I&M program will coordinate with these researchers to collect data on this and other aspects of air quality, including wet and dry deposition and ozone levels.

Geology and Soils

How many caves are in Great Basin?

Great Basin National Park contains 43 known caves, and since only 5% of the karst area has been surveyed, there are probably many more. The caves are divided into four distinct groups: the Lehman Hill Caves, Baker Creek Caves, Snake Creek Caves, and Alpine Caves. Many of the caves within these groups may have formed together either hydrologically and/or structurally.

Caves harbor a diverse range of unique plant and animal life, from the Pseudoscorpion (*Microcreagriss grandis*) to the Cave cricket (*Ceuthophilus inyo*). A field guide to cave life is available on the park's website. I&M will support park staff in protecting these fragile cave systems through the Geology and Soils monitoring program.

Water

Is Las Vegas draining water from the park?

To date, Las Vegas does not receive water from Great Basin. But this doesn't mean Great Basin's water isn't threatened: in 2002, so many permits for groundwater were filed near Great Basin that the park solicited a study on the potential effects of groundwater development around the park. The study results, published in 2006, indicate that 9 miles of stream habitat, 18 wetland areas, 25 perennial springs, 156 acres of riparian habitat, and 23 cave systems could be negatively affected by nearby groundwater development.

I&M has two programs to monitor water resources: one focuses on groundwater and springs, and the other on surface water quality.

<http://science.nature.gov/units/mojn>

Wildlife

What species of fish are found in the lakes?

Four native species of fish occur in the park: Bonneville cutthroat trout (*Oncorhynchus clarki utah*), Mottled sculpin (*Cottus bairdii*), Redside shiner (*Richardsonius balteatus*), and Speckled dace (*Rhinichthys osculus*). Stocking for recreational fishing up to 1986 introduced four non-native fish species: the Lahontan cutthroat (*Oncorhynchus clarki henshawi*), Rainbow (*Oncorhynchus mykiss*), Brook (*Salvelinus fontinalis*) and Brown trout (*Salmo trutta*).

In 1999, the park restored the Bonneville cutthroat trout to five of the six streams where they once lived. In 2005, due to the success of this program, the park also reintroduced Mottled sculpin, Redside shiner, and Speckled dace into lower Strawberry and South Fork Big Wash Creeks. I&M does not directly monitor fish populations in the park, but its programs to monitor invasive plant species and water quality will help provide information about the status of important fish habitat.

Are there bears in the park?

No, neither Black bears (*Ursus americanus*) nor Grizzly bears (*Ursus arctos*) occur in Great Basin. Biologists think that although the higher altitudes in the park provide good bear habitat, bears may have been prevented from reaching this habitat by the long, dry, hot valleys surrounding the park, which are difficult for bears to cross.

I&M will assist park biologists in monitoring some wildlife species; the I&M program also maintains an online database (<http://science.nature.nps.gov/im/apps/npspp>) of all species present in national parks. So if you want to keep checking on whether or not bears have arrived, check there!

What wildlife species have been reintroduced to the park?

Besides fish, the only animals which have been reintroduced to the park are Bighorn sheep (*Ovis canadensis*). These hardy animals were extirpated from the area through hunting in the early 1900's, but were then reintroduced by the Nevada Division of Wildlife before Great Basin became a national park in 1986. I&M will help monitor Bighorn sheep populations in the park as part of its program to monitor at-risk populations.

Vegetation

Why are many of the trees dying?

Many of the White fir and Pinyon pine trees in the park have been affected by the Fir engraver beetle (*Scolytus ventralis*). This species is native to the area, and normally attacks only dying or sickly trees. However, prolonged drought conditions in the western U.S. have weakened many trees and left them susceptible to beetle infection. As the beetles find more susceptible trees, their numbers explode and cause a beetle outbreak which can overwhelm even healthy trees.

I&M's program to monitor vegetation change will help park managers to learn more about the extent and potential effects of the beetle outbreak in Great Basin.

Why are NPS crews cutting down trees in the park?

Pinyon/Juniper thinning on sagebrush encroachment.

Could you provide a little bit more information here (I can't find it on website)? How fast does pinyon/juniper encroach on sagebrush? How many acres have been converted to pinyon juniper? Is climate change or some other factor causing this?

Why are NPS crews spraying herbicides along the edges of park roads?

The crews spraying herbicide are working to control the expansion of invasive plant species. Like most protected areas in the world, Great Basin has been colonized by invasive and exotic plant species which occupy critical habitat and alter the internal balance of the fragile ecosystems in the park. According to a recent inventory, there are over 25 non-native plant species occurring in the park, including cheatgrass (*Bromus tectorum*), spotted knapweed (*Centaurea maculosa*), and bull thistle (*Cirsium vulgare*). Only the species which cause the most damage to the park's ecosystems are actively targeted for control by pulling or spraying.

I&M will coordinate with park resource managers to help provide information on the occurrence and spread of these



Bighorn sheep (*Ovis canadensis*) are the only animal which has been re-introduced to the park



Sunset view from near the Upper Lehman Cave entrance



Park staff electroshock Baker Lake as part of their fish monitoring program

<http://science.nature.nps.gov/units/mojn>

Joshua Tree National Park

National Park Service
U.S. Department of the Interior

Mojave Desert
Inventory and Monitoring Network



Top Ten Resource Questions

2010

The Mojave Desert Inventory and Monitoring Network (MOJIN) consists of seven geographically and ecologically similar park units: Death Valley National Park, Great Basin National Park, Joshua Tree National Park, Lake Mead National Recreation Area, Mojave National Preserve, Parashant National Monument, and Manzanar National Historical Site. In each unit, the Inventory and Monitoring (I&M) team collects information on status and distribution of natural resources "vital signs", and tracks these vital signs over time to detect any changes. Information gathered by I&M researchers helps each park understand and better protect their incredible natural resources.

Let's learn how I&M helps answer some of the most commonly asked natural resource questions in Joshua Tree National Park.



Arch Rock, one of thousands of unique rock formations in Joshua Tree

Air and Climate

How is the air quality in the park?

On a clear day visitors to the park can see the Mexican border from the mile-high vantage point of Keys View. More often, visitors can barely discern the tip of 10,000-foot-high Mount San Jacinto, about 50 miles away. The haze that obscures these magnificent views is the result of smog from surrounding urban areas, especially Los Angeles.

Two monitoring stations in the park keep track of changes in air quality, and Joshua Tree is also working with the University of California to determine the long-term effects of air pollution on native plants and animals. I&M will assist the park in monitoring ozone levels, wet and dry deposition, and visibility.

Geology and Soils

How are the fantastic rock formations created?

The towering rock piles in Joshua Tree began more than 100 million years ago, when molten lava oozed up and cooled just below the Earth's surface. Different lava flows hardened with different orientations, creating a matrix of volcanic and non-volcanic rock. Over millions of years, water percolated through this matrix and weathered away the softer rock, leaving huge eroded boulders piled in the impressive formations we see today.

I&M has a program designed to monitor geology and soils; this program will help to keep managers informed of environmental changes which may affect these unique formations.

Water

Where does water come from at Joshua Tree?

Joshua Tree lies at the junction of the Colorado and Mojave Deserts, which means it receives very little rainfall each year. What rain it does receive pours down in dramatic thunderstorms, often creating flash floods. Four small reservoirs in the park collect this water, making it more regularly available to wildlife and humans. In addition, recent surveys have identified 86 natural springs and seeps in Joshua Tree-but 86 springs and seeps in almost 800,000 acres is not a lot! Luckily, Joshua Tree's diverse animals and plants are well adapted to the arid environment.

I&M coordinates with park researchers to monitor the quality and quantity of groundwater and surface water, as well as the important wetland habitat around springs and seeps.

Wildlife

Are there mountain lions found in the park?

The California mountain lion (*Felis concolor californica*) does occur in the park, although sightings of this big cat are extremely rare. Its habitat is restricted to mountainous areas in the western portion of the park. Besides mountain lions, Joshua Tree is home to another wild cat, the Desert bobcat (*Lynx rufus baileyi*). This smaller cat (pictured on reverse) inhabits rocky canyons, and is much more common than the mountain lion.

<http://science.nature.gov/units/mojn>

How many bighorn sheep live in Joshua Tree?

The Desert bighorn (*Ovis canadensis nelsoni*) ranges throughout the dry, desert mountains of eastern California, much of Nevada, northwestern Arizona, and southern Utah (range map). The total population of this sheep is about 13,000, of which about 250 live in Joshua Tree. The park's sheep are split into three distinct herds, the smallest of which is found in the Wonderland of the Rocks, and is the most often seen by visitors.

I&M will help park biologists to monitor the health of Desert bighorn populations through its Biological Integrity program.

Are desert tortoises found here?

Yes, the desert tortoise (*Gopherus agassizii*), a federally listed threatened species, is found in the park. Desert tortoises can grow to up to 14 inches long and live more than 100 years!

As development of desert lands accelerate, lands inside Joshua Tree become increasingly important as habitat for this native tortoise. I&M helps monitor tortoise populations through its Biological Integrity program to monitor reptile communities.

What other reptiles are found in the park?

Besides the Desert tortoise, the reptiles of Joshua Tree include 18 lizard species and 25 snake species. Seven of these snakes are venomous, however, no snake wants to bite a human, and will not attack unless provoked. The diverse snakes and lizards in the park are perfectly adapted to life in the desert; they save energy by warming themselves with the sun, get all of their water from the food they eat, and conserve moisture by not producing urine.

I&M, in cooperation with park biologists, will monitor reptile communities in the preserve as part of the Biological Integrity program.

What are the best places to birdwatch?

Besides its long list of native species such as the Greater roadrunner (*Geococcyx californianus*), the Cactus wren (*Campylorhynchus brunneicapillus*), and the Prairie falcon (*Falco mexicanus*), Joshua Tree provides important habitat for migratory birds who spend the winter in its warm climate. In all, more than 250 species of birds have been recorded in the park!

Good places to search for birdlife are wet places: along fan palm oases, near the reservoirs, and around springs. I&M's Biological Integrity program assists park biologists in monitoring these important riparian bird communities.

Vegetation

Are there invasive/exotic plant species in the park?

Like most protected areas in the world, Joshua Tree National Park has been colonized by exotic plant species which occupy critical habitat and alter the internal balance of the fragile ecosystems in the preserve. Some of the most damaging invasive species include tamarisk, whose deep roots suck dry precious water sources, and cheatgrass and red brome grass, which cover previously bare ground and provide unprecedented fuel supplies for wildland fires.

I&M has a special program to monitor the appearance and spread of invasive plants, and to help provide the park with the information they need to control these invasives and preserve habitat for native plants.

Landscape Dynamics

Are there many natural fires in the park?

Fires are an important part of the natural ecosystems in Joshua Tree. Most fires in the park are still caused by lightning rather than humans. However, in recent years fires have become more frequent and more intense, partially as a result of the excess fuel supplied by invasive grass species. These intense fires can cause severe damage to slow-growing junipers and Joshua trees, and the fragile ecosystem may take decades to recover.

Biologists in Joshua Tree are investigating the long-term effects of the new fire regime on desert ecosystems. I&M will support this work through its Fire and Fuel Dynamics monitoring protocol.



A primrose blooms in the desert sand.



Joshua trees (*Yucca brevifolia*) frame the distant mountains



A bobcat (*Lynx rufus baileyi*) peers out of its daytime resting spot

Lake Mead National Recreation Area

National Park Service
U.S. Department of the Interior
Mojave Desert
Inventory and Monitoring Network



Top Ten Resource Questions

2010

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Let's learn how I&M helps answer some of the most commonly asked natural resource questions in Lake Mead National Recreation Area.



View of Lake Mead in the spring from Boulder Basin

Air and Climate

Is there a common air quality question?

Otherwise, is there a common or interesting question about:

* fire regimes in LAKE? OR

* Wilderness areas in LAKE?

Geology and Soils

What types of rocks and minerals are found here?

As most people are aware, Lake Mead is not a natural lake, but a reservoir formed by Hoover Dam. The canyon filled by the lake has a rich geologic history, shared by the mountains and canyons which still rise above the water. Around the lake, you can see rich red Aztec sandstones, pale yellow Miocene-age sedimentary rock, and dark hogbacks of Bitter Ridge Limestone. Downstream of the Hoover Dam, the Black Canyon cuts through metamorphic rocks like schist and gneiss, while further downstream, in the Willow Beach Marina area, granitic aplite dikes cut through the older schist and gneiss.

Although many of the rocks and minerals found around the lake are very beautiful, Lake Mead is a protected area, and collecting is prohibited. I&M helps Lake Mead protect aspects of this valuable geologic history through their program to monitor biological soil crusts, soil chemistry, soil erosion, and surface disturbance.

Water

Why is the water level in the lake so low?

The Lake Mead reservoir holds water for Nevada, Arizona, California and northern Mexico. About 96 percent of the water in Lake Mead is from melted snow that fell in Colorado, Utah, New Mexico and Wyoming. Each year, Lake Mead receives a minimum amount of Colorado River water from these states. But each year, water is released from Lake Mead to the downstream states, and on average, the amount of water flowing out exceeds the amount flowing in.

As a result of this high demand and of a decade of low rainfall in the upstream states, the water level in Lake Mead is lower than it has been in over 40 years. I&M helps Lake Mead resource management staff to monitor water levels.

How is the water quality in the lake?

The water quality in the lake depends on several factors, including the amount of fresh inflow from the Colorado River upstream, the level of native algal blooms, and the presence of the "Swimmer's Itch" parasite. Algal blooms are not harmful to swimmers, but may make the water less attractive for them! Swimmer's Itch is a waterfowl parasite which can also burrow into human skin. However, the parasite is incompatible with humans and dies within hours after infection. Check with park rangers for updates on which swimming areas may be infested.

I&M has a program specifically dedicated to monitoring surface water dynamics and chemistry.

<http://science.nature.gov/units/mojn>

Wildlife

What species of fish are found in the lake?

The majority of the fish species found in lakes Mead and Mohave are not native to the Colorado River, but have been introduced intentionally for recreational fishing purposes. These species include Largemouth bass (*Micropterus salmoides*), striped bass (*Morone saxatilis*), channel catfish (*Ictalurus punctatus*), crappie (*Pomoxis annularis*), and bluegill (*Lepomis macrochirus*).

Several protected species of native fish are also found in the Colorado River System. Two of these, the razorback sucker (*Xyrauchen texanus*) and bonytail chub (*Gila elegans*), may be found in the lakes.

Where can I see Bighorn Sheep, Bald Eagles, and other park wildlife?

Lake Mead is home to a wide variety of wildlife. More than 240 bird species, 43 reptile species, 82 mammal species, and 29 fish species are found here! Many mammal species are nocturnal, so it is hard to spot them during the day. Keep a sharp eye on rocky hillsides and you may be lucky enough to see a group of Desert bighorns (*Ovis canadensis*), a sunning lizard or snake, or a soaring Bald eagle (*Haliaeetus leucocephalus*). I&M will help Lake Mead biologists to monitor the health of wildlife populations through its Biological Integrity program.

What snakes are in found at Lake Mead?

The lake and its surrounding desert ecosystem is home to a wide variety of reptiles. 5 species of turtles, 20 species of lizards, and 18 species of snakes inhabit this area. Of these 18 snakes, only four are poisonous: The Western diamondback rattlesnake (*Crotalus atrox*), the Sidewinder (*Crotalus cerastes*), the Speckled rattlesnake (*Crotalus mitchelli*), and the Mojave rattlesnake (*Crotalus scutulatus*). Remember that no snake wants to bite a human, and will not attack unless provoked.

I&M, in cooperation with preserve biologists, has a special program to monitor reptile communities in the preserve.

What is Lake Mead doing about the invasive quagga mussel?

Quagga mussels (*Dreissena bugensis*) are an invasive freshwater mussel which has spread west throughout the entire United States. The mussels disrupt the natural food chain in the lake, and even change the composition of a land adjacent to the lake by filling them with thousands of sharp shells. Lake Mead is working to control the mussels through a public education campaign (since the mussels are transported by humans), and by enforcing clean boat rules. No effective biological control of the mussel is yet known, and mechanical removal is not economically feasible.

I&M has a special program focused on monitoring invasive species, and will help Lake Mead biologists to monitor and control the spread and effects of the quagga mussel.

Vegetation

When and where do wildflowers bloom around Lake Mead?

Despite receiving less than 6 inches of rainfall a year, the desert around Lake Mead is filled with flowering plants, which are supremely adapted to this dry climate. Wildflowers include the Arizona lupine (*Lupinus arizonicus*), ocotillo (*Fouquieria splendens*), and the desert sunflower (*Geraea canescens*).

The majority of wildflowers around the lake bloom in the springtime, but the wildflower season is irregular and dependent on winter rainfall. If there is a wet winter, you may be lucky enough to see the desert fill with a sea of gold, white, pink, and purple blossoms. I&M helps to protect these gorgeous landscapes by monitoring vegetation change in desert communities.

What is the "orange stuff" on some of the plants?

I can't find this online-could you fill me in?



Volunteers helping on the razorback sucker monitoring program



Invasive quagga mussels (*Dreissena bugensis*) cover a boat's propeller



Flowering ocotillo (*Fouquieria splendens*) adds a splash of brilliant red to the desert.

<http://science.nature.gov/journals/mojn>

Mojave National Preserve

National Park Service
U.S. Department of the Interior
Mojave Desert
Inventory and Monitoring Network



Top Ten Resource Questions

2010

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Let's learn how I&M helps answer some of the most commonly asked natural resource questions in Mojave National Preserve.



Rock formations at Hole-in-the-Wall in Mojave National Preserve

Air and Climate

From where in the preserve can I see the best night skies?

The eastern half of the park, far from freeways and development, has many locations that offer great night sky viewing. The Hole-in-the-Wall area is especially dark, and the family and group campgrounds make it more convenient to stargaze late into the evening. Although Las Vegas is over 75 miles away from Hole-in-the-Wall, a faint glow can still be seen beyond the mountains. I&M will coordinate with park scientists to monitor air quality, including light pollution, and managers will use this information to help preserve the park's amazing night skies.

Water

Where does the water come from in the preserve?

To date, 263 springs and seeps, and one perennial stream, have been mapped in the Mojave. This may seem like a lot, but the Preserve covers more than 1,619,920 acres! Only 263 springs and seeps and one perennial stream in an area this large means that the Mojave is a very dry place.

I&M has a specific program to inventory and monitor groundwater and springs in the preserve. The Mojave also enlists the help of citizen scientist volunteers to help with their annual "Springs Survey". In addition, I&M helps gather information about potential effects of climate change by monitoring vegetation plots at springs around the preserve.

Geology and Soils

How do the cinder cones and lava tubes form?

Cinder cones form when lava erupts as a relatively calm liquid fountain, rather than the explosive eruptions that create formations like Hole-in-the-Wall (pictured above). As lava is spewed through the air, it solidifies instantly, often preserving bubbles created by escaping gasses. If an eruption of this type continues long enough, fragments accumulate to form a cinder cone. Lava tubes are created when active lava flow develops a continuous, hard crust, which thickens and forms a roof above the still-flowing lava stream. Once the lava stops flowing, the hollow crust is left behind, forming a lava tube.

I&M has a program designed to monitor geology and soils; this program will help to keep managers informed of any changes which might threaten the preserve's unique cinder cone and lava tube formations.

What are petroglyphs and how are they protected?

Petroglyphs are created by chiseling into or carving rock faces. To protect petroglyphs, we do not direct visitors to the glyphs—we hope you discover them on your own as part of your adventures the preserve. If you are lucky enough to discover a petroglyph, please do not touch it, as this will cause damage over time.

I&M does not directly monitor petroglyphs, since they are a cultural, not a natural resource. However, I&M monitoring of geology and soils helps us learn about processes such as erosion, deposition, and disturbance, which may affect preservation of petroglyphs.

How were the rock formations at Hole-in-the-Wall created?

About 18.5 million years ago, a powerful volcanic eruption blasted outward from the nearby Woods Mountains. Propelled by rapidly expanding gasses, a cloud of ash and rock fragments spread out at near super-sonic speeds across the land. Some of the rocks thrown out by the blast are 60 feet across - the largest ever documented!

Hot, suffocating ash buried every living thing within 600 km² of the blast, and solidified into rock. Today, the fossilized remains of birds, mammals, and plants lie entombed beneath the colorful cliffs of Hole-in-the-Wall. I&M's geology and soils monitoring program helps provide information about the preserve's unique geological resources.

Wildlife

Where are the mule deer, and how are they monitored?

The hardy mule deer (*Odocoileus hemionus*) is a common species in the preserve, and there is a hunting season for them each fall. In cooperation with the California Department of Fish and Game, the preserve has collared several deer in order to monitor the health, range, and water use of deer populations.

The I&M program does not directly monitor populations of these deer in the Mojave, since they are not a threatened or endangered species. However, the I&M programs to monitor vegetation change and invasive plants help to provide Mojave biologists with the information they need to protect mule deer habitat.

What snakes are in the preserve?

Of all the reptiles found in the preserve, snakes are the most numerous. Thirty-two species of snakes occupy habitats ranging from rocky slopes, to sandy valleys, to riparian areas. Three of these species are venomous, including the Mojave green rattler (*Crotalus scutulatus*), a beautiful greenish-brown rattlesnake found in dry habitats with sparse vegetation. I&M, in cooperation with preserve biologists, has a special program to monitor reptile communities.

Vegetation

What are those colored spots on the rocks?

Lichens, thought to be among the oldest living organisms on earth, are actually a "symbiosis", or cooperative, between two or three separate organisms. Each lichen is made up of a fungus, which like humans, gets its energy from other organisms, and a partner algae or cyanobacteria (or both!) which produce food for themselves and the fungus through photosynthesis.

Recent studies have identified 40 different species of lichen in the Mojave, a surprising level of diversity in the desert! I&M helps preserve biologists to protect these unique lichen communities by monitoring vegetation change.

Are there invasive/exotic plant species in the preserve?

Like most protected areas in the world, Mojave National Preserve has been colonized by exotic plant species which occupy critical habitat and alter the internal balance of the fragile ecosystems in the preserve. According to a recent plant species inventory, there are 86 exotic plant species occurring in the Mojave, including two species of the infamous tamarisk, *Tamarix aphylla* and *Tamarix ramosissima*, and more than 20 invasive grass species.

I&M has a special program to monitor the appearance and spread of invasive plants, and to provide the parks with the information they need to control these invasives and preserve habitat for native plants.

Landscape Dynamics

When was the Hackberry Fire, and how did it affect the preserve?

The Hackberry Complex Fire began on June 22, 2005, ignited by a dry lightning storm that rolled through the preserve. Seven separate fires across the landscape burned together to become the Hackberry Fire, the Narrow and Wild Horse Fires, and the Brandt and Ranch Fires. A total of 70,736 acres were burned in these fires.

While fires are a natural part of landscape dynamics in the Mojave, this fire was probably exacerbated by an over-abundance of fuel provided by non-native grasses. I&M has programs to monitor both fire and fuel dynamics and invasive plants such as brome grasses which increase the intensity of natural fires.



Joshua trees (*Yucca brevifolia*) in the preserve



A desert tortoise (*Gopherus agassizii*) in the preserve



Flowering cholla cup cactus (*Echinocereus triglochidiatus*)

Grand Canyon-Parashant National Monument

National Park Service
U.S. Department of the Interior

Mojave Desert
Inventory and Monitoring Network



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2010

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Let's learn how I&M helps answer some of the most commonly asked natural resource questions at Grand Canyon-Parashant National Monument.



Whitestem-paperflowers (*Psilotrophe cooperi*) brighten the desert landscape in Parashant National Monument.

Geology and Soils

What are petroglyphs and how are they protected?

Petroglyphs are pictograms created by chiseling into or carving rock faces. To protect petroglyphs, we do not direct visitors to the glyphs—we hope you discover them on your own as part of your adventures on the Parashant. If you are lucky enough to discover a petroglyph, please do not touch it, as this will cause damage over time.

I&M does not directly monitor petroglyphs, since they are a cultural, not a natural resource. However, I&M monitoring of geology and soils indirectly relates to petroglyphs, since it helps us learn about processes such as erosion, deposition, and disturbance, which may affect preservation of petroglyphs.

Water

Where are the springs in the Monument?

To date, 206 springs and seeps have been mapped on the Parashant. This may sound like a lot, but the total area of the Parashant is more than 1,000,000 acres! Only 206 springs and seeps in an area this large means that the Monument's environment is generally very dry.

The largest springs on the Parashant are the Pakoon, Tassi, and Nixon. I&M research on ground and surface water dynamics helps the Monument's staff to locate, monitor, and protect their valuable water resources.

How many miles of the Colorado run through the Parashant?

The Colorado River does not actually pass through the Monument. The river runs through the adjacent Grand Canyon National Park, and can be seen from a few locations on the Parashant, especially the Whitmore Canyon Overlook.

I&M in MOJIN has a specific program for monitoring groundwater dynamics, surface water dynamics, and water quality. The Parashant has no permanent streams or lakes, but it does have 206 springs and seeps. The I&M program provides valuable information to park staff about the status of these important water sources.

Wildlife

What animals live in the Parashant?

The Parashant's diverse wildlife include healthy populations of mule deer, pronghorn antelope, non-native Kaibab squirrels, and wild turkey. There are numerous threatened or endangered species as well, including the Mexican spotted owl, California condor, desert tortoise, and the Southwestern willow flycatcher. Some species that are not yet listed as threatened or endangered but are probably declining are the spotted bat, the western mastiff bat, Townsend's big eared bat, and the goshawk.

I&M at the Parashant will monitor reptile, bird, and small mammal communities, and will determine whether these species are in decline. This information helps staff to plan for protection of threatened species and communities.

<http://science.nature.gov/units/para>

What is the Parashant doing about feral pigs?

As their name suggests, feral pigs are not part of the native fauna at the Parashant. Feral pig populations are established when domestic pigs escape, find their way onto the Monument, and reproduce. These animals cause extensive damage to native plant and animal populations. There is a year-round open hunting season on feral pigs; a complete information packet is available at the Visitor's Center.

I&M at the Parashant does not directly monitor feral pig populations, but it does monitor at-risk native species which may be affected by feral pigs.

What are the names of the two new insects identified at the Monument?

In 2009, a biologist working at the Monument made an exciting discovery. While exploring a remote cave he identified two species of insects previously unknown to science. The two new bugs were named after the biologist, Kyle Volyes: *Troglosphaeropsocus volesti* and *Pratherodesmus volesti*.

There are still many more mysteries waiting to be found in the huge expanses of the Parashant. The I&M inventory and monitoring work may help reveal these mysteries, and will assist Monument biologists in their protection.

Vegetation

What plants are found on the Parashant?

The intersection of the Mojave Desert, Great Basin and Colorado Plateau provinces on the Parashant creates a unique, remarkable environment for plants and animals alike. Low, unpredictable rainfall encourages forests of Giant Mojave Yucca on the Shivwits Plateau, while ponderosa pine forests flourish in the slightly wetter Mt. Trumbull area. A multitude of desert wildflowers, like the whitestem-paperflower pictured above, bloom after spring rains, while areas around springs and seeps provide moisture for water-loving plants.

Occasionally, after a rare heavy rain, plants show up which haven't been seen in a decade or more. Botanists have been surveying the Parashant for 130 years, but there are still new species being identified in the Monument! I&M will monitor vegetation change in the Monument's ecosystems, especially changes in at-risk vegetation communities.

Where are the best places to view wildflowers?

In the early spring, spectacular wildflowers fill the warming Mojave Desert, and as the summer heat increases, blooms spread to the higher elevation canyons and mountain ranges. Favorite viewing areas include Whitney Pass Road to Tassi Ranch, Snap Canyon, Poverty Mountain and Mt. Trumbull. I&M helps preserve wildflowers through monitoring vegetation change on the Monument.

Are there invasive plant species on the Parashant?

The remoteness of the Monument has not protected it from invasives. Like almost all protected areas in the world, the Parashant has been colonized by non-native plant species which fill up critical habitat and alter the internal balance of the fragile ecosystems in the Monument.

To date, 13 species of non-native plants have been identified in the Parashant, including Prickly Sowthistle (*Sonchus asper* ssp. *asper*), Dandelions (*Taraxacum officinale*) and Knotweed (*Polygonum aviculare*). I&M has a special program to monitor the appearance and spread of invasive plants, and to provide the parks with the information they need to control these invasives and preserve habitat for native plants.

Landscape Dynamics

Is there ranching today on the Parashant?

Ranching has been part of the Parashant region since the 1850s. Before the Taylor Grazing Act was passing in 1934, ranchers ran in excess of 100,000 head of cattle on public lands in the region. The Taylor Grazing Act was intended to stop overgrazing and to stabilize the livestock industry dependent upon the public range.

Today there are 117 cattle permit holders on the public lands administered by the Bureau of Land Management and National Park Service. Where there were once more than 100,000 head of cattle before 1934, permits are now issued for 15,000 cows and no sheep. I&M on the Parashant monitors changes caused by land use such as ranching, and provides Monument staff with data on how these land uses may be affecting ecosystems.



Landscape in Parashant



Claretcup cactus (*Echinocereus triglochidiatus*) blooms add a splash of red to desert landscapes



The endangered Desert tortoise (*Gopherus agassizii*) is found in Parashant.

Interpretive Service or Product: Email Newsletter	
<i>Target Audience</i>	Internal: Superintendents, Chief of RM, Interpreters/Educators. External: Other agencies, Partners
Interpretive intent and critical resource issues related to this individual service	
<i>Interpretive intent</i>	Raise awareness of MOJN activities and accomplishments, keeping park staff and cooperators informed of progress, and inviting participation in MOJN projects.
<i>Critical Resource issues</i>	N/A
<i>Human Dimensions Component</i>	N/A
<i>Message</i>	MOJN is active, productive, and committed to sharing information with internal and external stakeholders.
<i>Description</i>	Newsletter is biannual. Issues should coincide with the start of end of a field season. 2-4 page newsletter with MOJN logo and slogan which includes: • Banner using same theme as poster and folder to convey identity • Space for 1 main article, 2-3 news tidbits, and a “final thoughts” section • Calendar of upcoming MOJN events • Link to MOJN website • Contact information for key contact person • Images of the natural resources within MOJN parks and MOJN staff inventorying and monitoring vital signs.
Media and Methods	
<i>Service Duration</i>	N/A
<i>Logistics</i>	Generating content for newsletter on a bi-annual basis, compiling email distribution list and sending newsletter biannually.
<i>Staff Time Commitment</i>	Moderate.
Set-up and Cost	
<i>Graphic Design</i>	Design file provided in Adobe Acrobat, on a disc included with report.
<i>Artwork</i>	Photographs contributed by MOJN; graphic design by OEO.
<i>Materials</i>	N/A: This is primarily an email newsletter, which can be printed in small batches at MOJN discretion. For printing batches of more than 100, it is more cost-effective to use the GPO.
<i>Installation</i>	N/A
<i>Set-up</i>	N/A
<i>Cost/unit</i>	TBD
<i># of units</i>	TBD
<i>Shipping</i>	TBD

Vendor Contact Information	
<i>Company</i>	Government Printing Office, San Diego Regional Office
<i>Website</i>	www.gpo.gov
<i>Contact Person</i>	TBD
<i>Email</i>	infosanddiego@gpo.gov
<i>Phone</i>	TBD
Evaluation	
	Comments and suggestions from NPS staff.

Insert Draft design

Interpretive Service or Product: Overview Brochure	
Target Audience: Internal: Interpreters/Educators, Law enforcement/Maintenance staff/Entrance Station rangers. External: Partners, other agencies, university collaborators	
Interpretive intent and critical resource issues related to this individual service	
<i>Interpretive intent</i>	Raise awareness through a uniform visual identity (photos/logo), and providing basic, essential information about I&M, MOJN, MOJN Vital Signs, and key contact people in the network.
<i>Critical Resource issues</i>	N/A
<i>Human Dimensions Component</i>	N/A
<i>Message Description</i>	Conveying identity and building credibility of MOJN professionalism. A trifold brochure which includes: • MOJN logo and slogan on the front panel • Brief description of what I&M is and does • Brief description of park units in MOJN • Brief description of 5 categories of MOJN Vital Signs, with “level 3” vital signs listed under the appropriate category. Example: ○ Air and Climate ▪ Ozone ▪ Wet and Dry Deposition ▪ Visibility and Particulate Matter ▪ Basic Meteorology • Key contact people in the network • Links for MOJN websites • Images of the natural resources within MOJN parks • Images of MOJN staff inventorying and monitoring vital signs.
Media and Methods	
<i>Logistics</i>	Printing. Distributing brochures to park staff, including them in new employee training, and delivering them to external audiences as necessary.
<i>Staff Time Commitment</i>	Initial development of the brochure content and image collection will take the most time. Once the content is developed, an annual review should be the only additional staff commitment.
Set-up and Cost	
<i>Graphic Design</i>	Existing MOJN logo and slogan should be incorporated into design. Graphic design can be done in-house if possible, or OEO can assist.
<i>Artwork</i>	
<i>Materials</i>	Paper (provided by printer). TBD.
<i>Installation</i>	N/A

<i>Set-up</i>	N/A
<i>Cost/unit</i>	TBD
<i># of units</i>	TBD
<i>Shipping</i>	TBD
Vendor Contact Information	
<i>Company</i>	Government Printing Office, San Diego Regional Office
<i>Website</i>	www.gpo.gov
<i>Contact Person</i>	TBD
<i>Email</i>	infosanddiego@gpo.gov
<i>Phone</i>	TBD
Evaluation	
	Solicit comments and suggestions from MOJN Core Team and other relevant NPS staff.

Interpretive Service or Product: Movies	
Target Audience: Internal: Seasonal employees External: Other agencies, Partners, Park and web visitors	
Interpretive intent and critical resource issues related to this individual service	
<i>Interpretive intent</i>	Raise awareness about MOJN, the I&M Program, and the benefits of using scientific data to inform management decisions that protect the integrity of the parks.
<i>Critical Resource issues</i>	The five categories of vital signs monitored by MOJN: Air and Climate, Geology and Soils, Water, Biological Integrity, and Landscape Patterns and Processes.
<i>Human Dimensions Component</i>	The first steps toward developing stewardship are to pique curiosity and raise awareness. The set of 3-minute films is intended to stimulate interest in MOJN and issues related to the network through compelling stories and visual images.
<i>Message</i>	The seven parks within the Mojave Network protect significant natural resources. MOJN coordinates with researchers from various agencies and universities as well as park biologists to gather credible scientific information and to monitor resource vital signs. MOJN strives to make this information available to park personnel so they are able to make sound management decisions.
<i>Description</i>	The complete product would include six films, one focusing on each of the following categories: 1. MOJN Overview: What is I&M? What is MOJN? Who are the faces of MOJN? 2. Air and Climate monitoring in MOJN: Explains importance of this vital sign, and briefly describes monitoring protocols. 3. Geology and Soils monitoring in MOJN: Explains importance of this vital sign, and briefly describes monitoring protocols. 4. Water monitoring in MOJN: Explains importance of this vital sign, and briefly describes monitoring protocols. 5. Biological Integrity monitoring in MOJN: Explains importance of this vital sign, and briefly describes monitoring protocols. 6. Landscape Pattern and Process monitoring in MOJN: Explains importance of this vital sign, and briefly describes monitoring protocols. The films can be downloaded from the MOJN webpage, used in new employee trainings, included in DVD media packages, and shown at park Visitor Centers.
Media and Methods	
<i>Service Duration</i>	Estimated duration of one video: 3 minutes
<i>Logistics</i>	DVD player and TV, or LCD projector computer.
<i>Staff Time Commitment</i>	Minimal.
Set-up and Cost	
<i>Graphic Design</i>	N/A
<i>Artwork</i>	N/A
<i>Materials</i>	High resolution digital images. Production music.
<i>Installation</i>	Closed captioning. Loading movie onto MOJN website.
<i>Set-up</i>	Concept development. Copy-writing. Collecting visual images, interviews, and b roll. Recording narration. Editing.
<i>Cost/unit</i>	Production & editing: approximately \$1000/finished minute Travel
<i># of units</i>	
<i>Shipping</i>	

Vendor Contact Information		
Company	Production Local CESU	DVD Replication Government Printing Office, San Diego Regional Office
Website		www.gpo.gov
Contact Person		TBD
Email		infosanddiego@gpo.gov
Phone		TBD
Evaluation		
	Feedback and comments from MOJN Core Team, Interpreters and Educators on MOJN staff, and trainers showing videos to new staff. Number of downloads from MOJN website.	

Interpretive Service or Product: Vital Signs Case Study Folios	
Target Audience: Internal: Superintendents, Chief of RM, Interpreters/Educators External: Other agencies, Partners, Park visitors, Legislature	
Interpretive intent and critical resource issues related to this individual service	
<i>Interpretive intent</i>	Raise awareness about how monitoring information has been used to understand complex resource issues, make management decisions, or preserve park resources and visitor experience. Case study folios can also be developed to identify some of the tough choices managers must make when addressing resource issues.
<i>Critical Resource issues</i>	Determined by park and network priorities.
<i>Human Dimensions Component</i>	Dependent on issue.
<i>Message</i>	MOJN Vital Signs are essential indicators of ecosystem health, and MOJN I&M program is dedicated to providing information on the status and trends of these signs.
<i>Description</i>	Each case study should include a description of: • the issue, a discussion of how inventory and monitoring information has been used to understand • the issue or inform management decisions • how the issue has been successfully addressed • the relation of the issue to the surrounding ecosystem, extending the benefits of park science • outside the boundaries of the park. • management decisions made as a result of monitoring information The case study should include appropriate pictures and graphs and should be written using non-scientific jargon. Case studies should be written so that they do not become dated or in opposition to a changed management recommendation. For example, case studies describing use of prescribed fire should be sure to state that the use of prescribed fire is on of a variety of management actions that may be taken to address a resource concern. For an example of a Vital Signs Folio, see Great Smoky Mountains National Park Air Quality Folio at: http://www.nps.gov/grsm/naturescience/air-quality.htm
Media and Methods	
<i>Service Duration</i>	N/A
<i>Logistics</i>	Initial content must be generated by staff communications person, then periodically modified and re-distributed. Proper peer review is necessary. Folio will be distributed by email to appropriate audiences, and printed out by individuals for use at conferences and meetings.
<i>Staff Time Commitment</i>	Moderate.
Set-up and Cost	
<i>Graphic Design</i>	
<i>Artwork</i>	Photographs contributed by MOJN; graphic design by OEO.

<i>Materials</i>	Paper (provided by printer).
<i>Installation</i>	N/A
<i>Set-up</i>	N/A
<i>Cost/unit</i>	TBD
<i># of units</i>	TBD
<i>Shipping</i>	TBD
Vendor Contact Information	
<i>Company</i>	Government Printing Office, San Diego Regional Office
<i>Website</i>	www.gpo.gov
<i>Contact Person</i>	TBD
<i>Email</i>	infosanddiego@gpo.gov
<i>Phone</i>	TBD
Evaluation	
	Comments and suggestions from NPS staff.

Insert AHSLC example

<http://www.nps.gov/grsm/naturescience/upload/air%20quality.pdf>

Interpretive Service or Product: Folder	
Target Audience: Internal: Superintendents, Chief of RM, Interpreters/Educators, Law enforcement/Maintenance staff/Entrance Station rangers. External: Other agencies, Partners	
Interpretive intent and critical resource issues related to this individual service	
<i>Interpretive intent</i>	Raise awareness of MOJN activities and accomplishments, keeping park staff and cooperators informed of progress, and inviting participation in MOJN projects.
<i>Critical Resource issues</i>	N/A
<i>Human Dimensions Component</i>	N/A
<i>Message</i>	MOJN is active, productive, and committed to sharing information with internal and external stakeholders.
<i>Description</i>	Newsletter is biannual. Issues should coincide with the start of end of a field season. 2-4 page newsletter with MOJN logo and slogan which includes: • Banner using same theme as poster and folder to convey identity • Space for 1 main article, 2-3 news tidbits, and a “final thoughts” section • Calendar of upcoming MOJN events • Link to MOJN website • Contact information for key contact person • Images of the natural resources within MOJN parks and MOJN staff inventorying and monitoring vital signs.
Media and Methods	
<i>Service Duration</i>	N/A
<i>Logistics</i>	Generating content for newsletter on a bi-annual basis, compiling email distribution list and sending newsletter biannually.
<i>Staff Time Commitment</i>	Moderate.
Set-up and Cost	
<i>Graphic Design</i>	Design file provided in Adobe Acrobat, on a disc included with report.
<i>Artwork</i>	Photographs contributed by MOJN; graphic design by OEO.
<i>Materials</i>	N/A: This is primarily an email newsletter, which can be printed in small batches at MOJN discretion. For printing batches of more than 100, it is more cost-effective to use the GPO.
<i>Installation</i>	N/A
<i>Set-up</i>	N/A
<i>Cost/unit</i>	TBD
<i># of units</i>	TBD

<i>Shipping</i>	TBD
Vendor Contact Information	
<i>Company</i>	Government Printing Office, San Diego Regional Office
<i>Website</i>	www.gpo.gov
<i>Contact Person</i>	TBD
<i>Email</i>	infosanddiego@gpo.gov
<i>Phone</i>	TBD
Evaluation	
	Comments and suggestions from NPS staff.

Interpretive Service or Product: Science Day Symposium

Target Audience: **Internal:** Superintendents, Chief of RM, Interpreters/Educators, Law enforcement/Maintenance staff/Entrance Station rangers.

External: Concessionaires, Researchers from other agencies, Partners, Park visitors, Invited general public

Interpretive intent and critical resource issues related to this individual service

<i>Interpretive intent</i>	Raise awareness about the MOJN, the I&M Program, and the benefits of using scientific data to inform management decisions that protect the integrity of the parks. Share scientific data, create personal connections between NPS program areas, other agencies conducting I&M work in MOJN, and the public.
<i>Critical Resource issues</i>	N/A
<i>Human Dimensions Component</i>	Science Day brings together researchers, resource managers, administrators, partner agencies/universities, and the public. It provides an unparalleled opportunity for participants to engage with each other, make connections, and learn more about all facets of MOJN projects.
<i>Message</i>	The seven parks within the Mojave Network protect significant natural resources. MOJN coordinates with researchers from various agencies and universities as well as park biologists to gather credible scientific information and to monitor resource vital signs. Through Science Day and other communications initiatives, MOJN strives to make this information available to park personnel so they are able to make sound management decisions.
<i>Description</i>	

Media and Methods

<i>Logistics</i>	Logistics for an event of this magnitude are significant and according to other organizers, would require ½ of an FTE for 6 months. The appropriate staff person is a communications person, which the MOJN currently does not have.
<i>Staff Time Commitment</i>	Significant.

Set-up and Cost

<i>Graphic Design</i>	N/A
<i>Artwork</i>	N/A
<i>Materials</i>	Some conference-related materials would need to be produced. The essentials are: • Email announcement with MOJN logo & slogan • Poster announcement with MOJN logo & slogan. This could be a modified version of the MOJN poster produced for this report. • Agenda: this can be a simple word document with the MOJN logo and slogan, and the events of the day listed in order of occurrence. • Evaluation form: an evaluation form should be passed out to participants in order to collect suggestions/feedback on the event. • Other: This is a great opportunity to distribute other MOJN “gimmicky” materials such as MOJN pens, buttons, post-it notes, if these have been produced (see list of Recommended Products in report for more suggestions)
<i>Installation</i>	Key staff person would need to coordinate production and distribution of these basic materials.
<i>Set-up</i>	
<i>Cost/unit</i>	N/A
<i># of units</i>	N/A
<i>Shipping</i>	N/A

Vendor Contact Information

<i>Company</i>	N/A
<i>Website</i>	N/A
<i>Contact Person</i>	N/A
<i>Email</i>	N/A
<i>Phone</i>	N/A
Evaluation	
	Evaluation forms from participants will help to provide feedback. This form should be: • distributed and collected at the event • emailed to NPS participants after the event

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Appendix D: List of Supporting Organizations in MOJN

The following table shows a list of the organizations which provide financial and/or technical support to the parks in the MOJN. They may be potential sources or cooperators of funds, design assistance, or distribution centers for future MOJN communications materials.

This information was gathered from the MOJN staff interview process and park website research.

Park	Organization	Website
JOTR	JOTR National Park Association	www.joshuatree.org
JOTR	National Park Conservation Association	www.npca.org
JOTR	The Desert Institute	www.desertinstitute.homestead.com
DEVA	Death Valley Natural History Association	www.dvnha.org
DEVA	Death Valley Fund	www.deathvalleyfund.org
GRBA	Great Basin National Park Foundation	www.greatbasinfoundation.org
MOJA	Mojave Desert Land Trust	www.mojavedesertlandtrust.org
MOJA	Mojave National Preserve Conservancy	www.preservethemojave.org
MANZ	Manzanar History Association	On MANZ website
All MOJN	SNAP (an NPS and BLM cooperative project)	www.snap.gov
All MOJN	Western National Parks Association	www.wnpa.org