iSWOOP Implementation in National Parks:
Park Leader Perspectives

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Communicating science to visitors, especially a scientist's specific research, can be intimidating as well as hard for some interpreters to grasp. Having the interpreters work side-by-side with scientists has made a world of difference in the interpreters' comfort level. I feel that it has also made the interpreters more credible to the visitors. They are not just repeating something they read — they lived it!

I saw interpreters seeking out park scientists to add information to programs and discuss the importance of park science in their programs. It increased communication across divisions.

Introduction

Interpreters and Scientists Working on our Parks (iSWOOP) brings together educators, scientists and National Park Service (NPS) interpreters to incorporate park-based science into formal and informal interactions with the public. Based on a successful pilot at Carlsbad Caverns (Char, 2015), iSWOOP principal investigators (Martha Merson from TERC, and Nickolay Hristov and Louise Allen from Winston-Salem State University) conjectured that other parks would find valuable three key elements of its model:

> Direct contact between interpreters and scientists
>
> Guided experiences in the field by scientists for interpreters
>
> Support for integrating inquiry into interactions with visitors.

Park leaders committed to scheduling professional development for key staff. Their scheduling of interpreters' assignments influenced iSWOOP-informed interactions with visitors. Over time we found that interpreters' initiative and enthusiasm for implementing new content and approaches could be leveraged or dampened by supervisors' decisions (Char, 2019).

iSWOOP's model relies on contributions from scientists. iSWOOP requests that scientists:

- be present for one to three days on-site
- contribute visual material based on scientific data collected
- co-develop this material into visualizations appropriate to ranger-led interactions, and
- pitch in, as needed, with support for new interpretive programs.

A mix of parks was chosen to represent destination parks and parks close to diverse, urban populations. When iSWOOP2.0 was proposed in the fall of 2014, parks were experiencing an uptick in visitation. In 2015 Joshua Tree reported nearly two million recreational visits for the first time. Acadia estimated a record-setting 1.2 million visits. Since that time, two of the iSWOOP parks have greeted double or triple those numbers of annual recreational visitors. Increased visitation puts pressure on operations. Skeletally-staffed parks like Jean Lafitte National Historic Park and Preserve have struggled to release interpreters from basic visitor center desk functions. Leaders in divisions of interpretation have been conservative with their requests for support from their in-house resource managers (who usually are familiar with leaders of park-based scientific studies, but are similarly stretched).

During this time of unprecedented visitation iSWOOP implemented professional development in five parks. In the following synopsis of findings gathered through a questionnaire sent to park leaders, we

heard confirmation that iSWOOP has benefitted their staff and park. We also received insightful comments about how future implementation could look, making park staff more likely to be successful.

The questionnaire was conducted with an eye to prospective adopters of iSWOOP approaches. Therefore, we asked questions about the perceived benefits/value added, changes in interpreters' practice, advice for others implementing iSWOOP in their park units, which aspects of the model were difficult to implement (and therefore would benefit from external support) and leaders' plans vis a vis iSWOOP. Among the questions driving the questionnaire development:

- Did iSWOOP deliver on its promise to increase connections between scientists and interpreters?
- Were new skills and approaches evident among interpreters?
- In their view, in what ways did visitors benefit?
- Will you continue to use elements of iSWOOP? If so, which ones and how?
- What advice do you have to make adoption and implementation a smooth experience at future iSWOOP parks?

Although iSWOOP had a long runway at its partner parks, iSWOOP leaders assumed that once the model was tested and refined, it would take months not years to implement. The iSWOOP leaders conjectured that visitors would benefit and that the experience of facilitating inquiry, of leading a two-way conversation, would be rewarding and reinforce the use of new skills and approaches. Further, that a close fit with parks' interpretive mission would then float these kinds of interpretive opportunities to the top of the priority list for supervisors.

Below we report on supervisors' responses. They confirm that:

- They were attracted to iSWOOP because it fit the mission of their park, or offered new opportunities for interpreters.
- As leaders, they observed positive changes in park programming and visitor experiences that resulted from iSWOOP, such as the creation of new science-focused programs, more interactive methods for engaging visitors, and greater public interest in science.
- They witnessed supervisees demonstrate increased confidence in communicating park-based research, increased attention to science storytelling skills to make park-based science engaging and memorable, and increased confidence and skill with strategies that promote audience-centered interpretation.
- The supervisors' role is critical. Of eight targeted actions presented, leaders thought it was most important to set expectations for iSWOOP featured science to be incorporated into formal programs, to allow interpreters the time to experiment with and implement new techniques, and to make continuing training a priority.
- In selecting particular locations and programs for featuring iSWOOP science and interpretive techniques, a grass-roots approach, consulting with interpreters and looking for a close connection between the scientific research and the current park offerings and locations already popular with visitors is helpful.

To make implementing an iSWOOP approach easier for park leaders, supervisors suggested providing a clear overview of the iSWOOP program and how it aligns with park themes and objectives, and yields benefits to the park. Leaders reported that it was relatively easy to *choose a scientist*, *select programs and locations in which to feature iSWOOP*, and to *routinely feature the work of particular scientists*. Supervisors offered dozens of helpful suggestions for the iSWOOP team and peers who might implement iSWOOP approaches in the future. They made recommendations on managing selection of staff to participate, selection of science topics, the timelines for implementation and visual development, technology used in interactions with visitors, and turnover.

They also urged that leaders be clear from the outset on their commitment to the training and expectations for implementation in the park. Finally, they imagined arranging staff support and infrastructure across participating parks for guidance and information sharing.

Findings presented in greater detail below include:

Appeal of iSWOOP for park leaders

Increased skills and capacities for interpreters: Importance and iSWOOP impact

Observed changes in park programming and visitor experiences

Supervisory actions that enhance iSWOOP implementation

Ease of implementation of project elements

Enthusiasm for continuing iSWOOP approaches and scientific park-based research

Methods: The survey sample for the evaluation involved park leaders who supervised interpreters participating in iSWOOP professional development in 2016, 2017 and/or 2018 from five parks (Acadia, Indiana Dunes, Joshua Tree, Jean Lafitte, and Carlsbad Caverns).

The survey was designed to gather information on park leaders' views and observations of the impact of iSWOOP on their interpreters' professional skills and practice, and on their park, and feedback and advice on iSWOOP's program implementation and professional development. It consisted of thirteen evaluative items (three items featuring a matrix of rating scales, one "checklist" question, nine open-ended questions), plus five additional items gathering demographic information on respondents.

A core set of questions featured rating scales on leaders' views regarding: 1) the importance of and observed program impact upon various interpreter skills and capacities; 2) what supervisory actions were seen as critical to the success of iSWOOP implementation; and 3) the difficulty of implementing various elements of iSWOOP.

Quantitative data yielded from the matrix rating scale items were analyzed using frequency distributions, given the small sample size ($n = 10$). Prose responses to the open-ended questions were coded by a member of the evaluation team, using a grounded theory approach (Charmaz, 2006; Patton, 2002) using thematic categories that emerged from the comments and that were in alignment with the main features of the project, project goals and desired outcomes.

Sample: The leader survey was administered to park leaders in Spring 2019 to 12 supervisors and an interpretive coach at five parks. Responding to the survey were 10 park leaders (10 out of 13, or 77% response rate), representing the five national parks. Leaders as a whole were highly experienced, ranging from 5 to 34 years in working at the national parks (median = 22.5 years). Half the leaders (5) had spent all or close to all of these years with the NPS at their current park.

Eight of the ten leaders had supervisory roles with park staff reporting to them. (The remaining two either held positions as an education coordinator or as an interpretive coach.) Of these eight leaders with supervisory positions, the number of people reporting to them during peak season ranged from 7 to 16 staff (median = 12 staff), and between 4 to 12 staff during off-season (median = 7 staff).

All ten leaders held at least a bachelor's degree, with most related to the sciences (e.g., coastal ecology, geological sciences, natural resources and environmental sciences, forestry and interpretation). Six of the ten also held master's degrees or graduate certificates (e.g., masters of public administration, wildlife biology/natural resources, parks and recreation/environmental education).

FINDINGS

Appeal of iSWOOP for Park Leaders: When presented with a checklist of five options, the most common reason that leaders reported they were attracted to iSWOOP was that it fit the mission of their park (7 leaders), followed by offering new opportunities for interpreters (6 leaders.)

Of the six park leaders who chose "other", one leader said she was drawn to "being on the cutting edge of science communication and engagement, and the direct access to park researchers". Another leader reported being interested in "the additional tools that can be used when training new interpreters developing meaningful programs", such as the 3-D props, movie, and educational materials. The remaining four rangers choosing "other" indicated that their involvement was due to their park being selected as a pilot site for the project and being assigned to the project.

Figure 1: Attraction to iSWOOP

What attracted you to iSWOOP? Why are you taking the time to be part of it?
(Check all that apply)

Fit mission, e.g., incorporating current park-based science	7
New opportunities for interpreters	6
Promised cool visuals	2
Free stuff (PD, iPad)	1
Other, please describe:	6

(n = 10)

Increased Skills and Capacities for Interpreters: Importance and iSWOOP Impact: Leaders were presented with six targeted areas for park interpreters' increased skills and capacities, concerning science, park-based research, and interactive interpretive techniques. They were asked to rate each outcome for their views on importance, as well as for interpreters' professional growth resulting from iSWOOP.

The three areas leaders deemed as having highest importance concerned rangers increasing their confidence in communicating park-based research, their attention to science storytelling skills to make park-based science engaging and memorable, and their confidence and skill with strategies that promote audience-centered interpretation. Leaders regarded iSWOOP having a positive impact on interpreters' growth in these three areas at medium and high levels, with the highest level reported concerning the communication of park-based findings. Leaders also reported that iSWOOP had a high impact on interpreters gaining closer relationships with scientists.

Figure 2: Interpreters' Skills and Capacities: Importance and iSWOOP Impact

For each of the following aspects of iSWOOP, please rate your views on:

a) the importance of your co-workers/supervisees gaining these skills and capacities; and

b) the extent to which iSWOOP successfully enabled participating co-workers/supervisees to experience growth in these areas.

Importance			Co-workers/supervisees will gain:	iSWOOP Impact		
Low	**Med**	**High**		**Low**	**Med**	**High**
0	0	10	Increased confidence in communicating park-based research (e.g., obstacles scientists face, their questions, findings, and methods)	0	3	7
0	2	8	Increased attention to science storytelling skills to make park-based science engaging and memorable	0	5	5
1	1	8	Increased confidence and skill with strategies that promote audience-centered interpretation	1	5	4
0	3	7	Increased ability and skill to incorporate visualizations into interactions and to facilitate discussion about them	1	5	4
0	4	6	Closer relationships with scientists (within or outside NPS)	1	2	7
0	6	4	Increased confidence and skill with new technology/display devices	1	6	3

(n = 10) (3-pt. rating scale: Low, Medium, High)

Leaders reported having observed iSWOOP's impact on interpreters in the top four areas in a variety of ways.

Impact Area	Leader Comments on Observed Changes with Interpreters
Confidence in communicating park-based research	*Renewed excitement about incorporating science in our programs. We have become more aware of the research being done within our own park.*
	Interpreters feel more comfortable talking about park research (esp. highlighted researcher/project.) Staff have gained an almost intimate relationship with the research subject – Prothonotary warblers
	Better understanding of [our park's] migratory bat population. More up-to-date scientific information.
	I think it got interpreters thinking more about the process of science and not just the results of science.
Attention to science storytelling skills to make park-based science engaging and memorable	*It increased the enthusiasm of some of our interpretive staff to tell the stories of yucca moths, Joshua trees, and mycorrhizal fungal networks.*
	The staff really enjoys sharing the visual library with visitors while roving the cave and some use the iPads for their map talks in the visitor center.
	Incorporation of more science-oriented props into programs.
	Our division was able to offer more creative programs, with better props and audience-centered activities. We were able to have the audience think about and discuss more detailed information based on new research, and to introduce audiences to current park science.
Confidence and skill with strategies that promote audience-centered interpretation	*Helping us learn to listen to our visitors more.*
	It was the first introduction to ACE (audience-centered experiences) programming for our staff and since then they have all had more ACE specific training which has definitely enhanced our programming. Especially our formal Bat Flight programs because the interpreters can talk about their first-hand experience in the field with

	the biologists and what we have learned.
Gaining closer relationships with scientists	*[I've observed] Interpretive rangers getting to interact with a scientist researching within the park itself.*
	Brought some access to working scientists, for our staff.
	More trust/better relationship with resource management staff at the park.

One leader reported how interpreters' opportunity to engage in field work with the scientists during training had a great impact on both their comfort level with the science and their credibility with the public. Another leader stated, "At the most basic level, it has changed how our staff thinks about program development. They are now looking at how science can be incorporated into our programs. I hear staff saying they are figuring out "**how to iSWOOP their program**.""

Leaders reported observed positive changes in park programming and visitor experiences that had been positively resulted from iSWOOP, such as the creation of new science-focused programs, more interactive methods for engaging visitors, and greater public interest in science.

As three leaders described,

> *We have incorporated iSWOOP principles into three formal programs. We have also used it with tabling sessions at various outreach opportunities. This year, we are developing a [new] program on the Monarch butterfly. The impact on visitor experience has been the hardest to measure, but anecdotally, we've had comments from visitors on not having known about all the science going on in the park and expressing interest in learning more. As a result, we have created a monthly "Science Saturday" program where a different scientist comes out to the park and does a short talk at the visitor center before taking visitors out to a park research site.*

> *[There is] More incorporation of science/research into interpretive programs, therefore more visitors being exposed to science/research. More focus on getting visitors to ask their own questions than I have seen in the past.*

> *During the time we were working with the iSWOOP team, I had many visitors on programs enthusiastically participating in audience-centered activities. That was not only fun for the interpreter and audience, but it facilitated connections between the audience and the interpreter.*

Leaders were asked for ideas on how parks might expand to broaden the adult and family audiences engaging in science-oriented programming beyond those park visitors who typically self-select to attend ranger-led talks and walks on science topics. Suggestions included incorporating science-oriented elements into already existing programs in outreach, family events (such as a modified Junior Ranger walk, book and take-home activity), public programs (such as ones that deliberately blend art and science, or literature and science, or outdoor recreation and science), workshops, volunteer stewardship/citizen science programs, and special speaker programs, such as "Science Saturdays". Other suggested vehicles for reaching more of the public included temporary exhibits in the visitor center, articles in park newsletters and information on social media, and graphics and information in a stand-alone touch screen immersive display or phone app.

Supervisory Actions that Enhance iSWOOP Implementation: Leaders were asked to identify what supervisory actions they thought would best enhance iSWOOP implementation in parks. Of the eight targeted actions presented, leaders thought it was most important to *set expectations for iSWOOP featured science to be incorporated into formal programs*, to *allow interpreters the time to experiment with and implement new techniques*, and to *make continuing training a priority*.

Figure 3: Supervisory Actions to Enhance iSWOOP Implementation

	Not at all/ A little important	Somewhat important	Important/ Very important
Setting expectations for iSWOOP featured science to be incorporated into formal programs	0	2	8
Setting expectations for iSWOOP featured science to be incorporated into informal interactions with visitors	0	3	7
Scheduling specific times for programming that incorporates iSWOOP featured science (n = 9)	0	2	7
Allowing interpreters the time to experiment with and implement new techniques	0	1	9
Scheduling time for interpreters to observe peers' programs and collaborate with others	1	3	6
Making continuing training a priority	0	1	9
Carefully selecting some interpreters to take part in the training (n = 8)	1	3	4
Making it possible for all interpreters to take part in training	1	1	8
Other (please specify):	0	0	2

(n = 10, unless otherwise noted) (5-pt. rating scale: Not at all important, A little important, Somewhat important, Important, Very important)

As one leader expressed,

> I think that setting expectations that iSWOOP will be incorporated into formal and informal programs is very important … I do think that parks need to decide where they want it to be featured and some parks may only want to use it in one setting or another. I do not think it is critical that it is used in both formal and informal interpretation in every park.

> I do think that it is critical that it be scheduled. Because it is a new style of program, it takes extra time for interpreters to prepare. In a hectic schedule, if no one is assigned to be accountable for doing iSWOOP-style interpretation, it is likely that most interpreters will fall back on techniques that they have used successfully in the past instead of experimenting with new interpretive principles. Until iSWOOP becomes common, I think it is necessary to identify specific settings where it will be used, clearly communicate the expectation that interpreters will use it in that setting and hold them accountable for doing so.

> Leaders stressed how securing supervisors' steady support and commitment to the iSWOOP initiative was critical to its successful implementation.

> Establish a plan with branch chiefs or division supervisors to commit to the program through the implementation stage. Identify specific individuals that have approval from their supervisors to work with the iSWOOP team so that everyone is on board throughout the process. I felt like I had to periodically talk my supervisors into participating in a program that I was very enthusiastic about but that they did not fully understand.

From our experience at [our park] the most important thing is to have supervisory and managements support. As a supervisor I need to assure the staff has opportunities to use their iSWOOP skills by integrating those opportunities into the daily schedule. I also feel that it is important for the staff to know we are paying attention to the good work they do by adding an iSWOOP (ACE) component to their yearly evaluations.

It takes the Site Supervisor actually scheduling the interpreters TIME to – meet with the researcher and go out in the field; Rove or deliver a hands-on experience at the Visitor Center; plan how to incorporate the new knowledge into park events such as Spring in the Swamp; Swamp Science Fest, etc.

[iSWOOP's] not easy, but it is worth it! Non-specific park or NPS goals such as: inspiring people about STEM; educating the visiting public about how much research occurs in parks; offering opportunities to increase science literacy of the public, etc. are all so important and should be central goals of the NPS. But the fact that this job falls in the crack between Interpretation and Resource Management responsibilities means that it is currently nobody's "baby,"

Almost all the leaders (8 out of 10) also expressed the importance of striving to have all interpreters take part in the training. As two leaders expressed:

I think it's best if all interpreters can take the training. More people will ultimately be reached, and the interpreters will have more co-workers with which to collaborate. If only a subset of the interpreters will be able to attend the training for some reason, it would be important to select those interpreters who will have the most opportunity to reach people, and those interpreters who would likely go the extra mile in order to continue to develop, practice, and present i-SWOOP-style programs.

I believe that all interpreters would benefit from training. At [my park], it was frustrating because some interpreters did not want to step out of their comfort zone and use the materials and techniques as part of their programs. As soon as one or two people did not participate, then there was a general lack of participation in the division … I would like to see all interpreters be involved in the meetings and training, and I would encourage all staff to use at least some of the materials in their programs. We had many people who were nervous about using the techniques in the beginning that loved them in the end. There was a great deal of creativity involved, but also a focus on the importance of incorporating current park science into every program. It felt like a great thing for both the staff and the visitors when it was used.

At the same time, leaders in several parks said it simply wasn't feasible for all interpreters to take part in iSWOOP training, either due to their park's small number of staff, or the mandatory training on a wide variety of park issues that all interpreters need to take part of during the short training period leading up to the peak summer season.

It is never going to be possible for all interpreters to be trained. We work weird schedules and someone has to "run the shop" while others are being training or giving programming.

While I see how making it possible for all interpreters to participate in training could be appealing, I also recognize that in many parks there are a lot of training priorities and it may not be possible for everyone to do everything. At [our park], for example, we do 3+ weeks of training in which we introduce a full range of geology, ecology, history and prehistory content, formal program skills, roving skills, protocol for operating the visitor center, nature center, the museum, use of vehicles, first aid … as well as trying to get interpreters scheduled to observe programs that they will be giving, schedule time on the boats for those who will be giving cruises, etc. There are some things that everyone is trained on, but a lot of training is targeted to those who need

particular skills. If we tried to train everyone on everything, it would take months to get the staff up and running for the season. I think iSWOOP falls into the category of training that only needs to be assigned to those who will actually be using it.

If I did have to choose certain interpreters, I would select those who had experience giving interpretive programs that included facilitated dialogue techniques. These rangers were more comfortable getting creative with visitors and seemed to be more enthusiastic about the iSWOOP program.

Two leaders further raised the issue of how best to deal with turnover of park staff and staff continuity for both administrators and interpretive staff, either by establishing plans with supervisors at the outset, or including iSWOOP interns.

I think it is important to have general guidelines/plans established with supervisors (including the branch chief) before the process starts. We had that in place at [our park] but then most of the supervisors left and there were no higher-level staff members who were committed to iSWOOP. We tried to reestablish those guidelines and [iSWOOP staff member] did a good job of trying to check in and monitor our progress, but she was often met with resistance.

Staff continuity helps, which is easier to maintain at a small park like [ours]. NPS staffing levels are shrinking across the country; perhaps iSWOOP interns are the way to keep the fire flaming.

In a related survey item, leaders were asked what it took for an interpreter to move from having a positive professional development experience with iSWOOP to actually using the content and approaches with visitors (i.e., putting it into practice.). Leaders described a combination of essential elements involving both interpreters being invested in and committed to learning, exploring and incorporating iSWOOP approaches into their practice, and administrators providing the necessary support, guidance and sanctioned time to do so. As four leaders expressed,

[What's needed are] Opportunities within the schedule to offer programs which include the science/research topic highlighted, time to develop those programs, and an interpreter who is dedicated to the task.

I think it depends on the interpreter. In general, once they have been introduced to the approach, they need to work to understand the science, learn about how it was conducted and get background information on the scientist as well as do all the usual things that they do to develop a program. I think it is helpful to have interpreters who have a strong background in science or a desire to develop strong science communication skills, as well as being open to and motivated to experiment with new interpretive techniques. It is also helpful to have strong supervisory support including setting clear expectations, providing support for learning new skills, and clearing time in staff schedules to allow them to do the extra work involved in learning and preparing a new style of program.

Interpreters need to be comfortable with the material, and they need to be encouraged to use different techniques. Creativity was lacking in our division because there were very few higher-level rangers and supervisors who encouraged staff to incorporate the new material into their programs. I think it is important to have general guidelines/plans established with supervisors (including the branch chief) before the process starts.

I don't think there is much [interpreter] resistance to the idea of iSWOOP, I just think we need to provide enough training and support so the staff becomes comfortable with the concepts and skills necessary for iSWOOP programing. It does take some time. I don't believe most of our staff was

really comfortable really incorporating iSWOOP into programing until after the second year of the program.

Ease of Implementation of Project Elements: To implement iSWOOP in their parks, leaders are asked to embark on accomplishing a number of different steps and tasks. Leaders were later questioned about which project elements they had found easy or difficult to accomplish. Of the nine project elements presented, leaders reported that it was relatively easy to *choose a scientist*, *select programs and locations in which to feature iSWOOP*, and to *routinely feature the work of particular scientists*.

Figure 4: Ease of Implementation of Project Elements

iSWOOP expects to come up with implementation models that a wide range of parks can use in collaboration with park-based or park-relevant scientists. For each project element, how difficult was it to implement in your park?

	Easy/ Somewhat Easy	Neither easy nor difficult	Somewhat difficult/ Difficult
Choosing a scientist (n = 8)	7	1	0
Selecting a research topic/project on which iSWOOP will be based (n = 8)	5	2	1
Selecting/recruiting interpreters to be involved with iSWOOP (n = 8)	6	0	2
Offering intensive professional development (releasing interpreters from tasks for about 16 hours, allowing them to work directly with a scientist)	2	0	7
Selecting programs/locations in which to offer iSWOOP	7	1	1
Managing new technology/display devices (n = 8)	2	2	4
Routinely highlighting park-based science	5	2	2
Routinely featuring the work of particular scientists	7	1	1
Expanding the program (to new interpreters, scientists, or science topics)	3	2	4

(n = 9, unless otherwise noted) (5-pt. rating scale: Easy, Somewhat easy, Neither easy nor difficult, Somewhat difficult, Difficult)

While most leaders indicated it was relatively easy to choose a scientist, several stressed important criteria to keep in mind when selecting a scientist, including enthusiasm for sharing their research with the public, and accessibility:

> *The most important factor is choosing the scientist. They need to be very interested in the project and engaging. They need to be not only passionate about their research, but also in sharing it with the public through our interpreters. They also need to be readily available (being located near the park helps) to come out to the park to work with staff early in the process. We have been very fortunate to have quite a few scientists to choose from so we could get ones that fit this profile.*

When offering advice to other managers in their selection of a research project to showcase in iSWOOP, most leaders recommended a "grassroots-up" approach to make sure that the research featured connected with visitors' interests and possible reasons for coming to the park, and offered a logical foci of interpreters' programs, given the parks' overall interpretive plans and themes.

Talk to your staff. Ask their opinion on what topics visitors are interested in or what types of science research would enhance their programs. Allow the selection of the science to be a grassroots up process rather than a management down process. And keep it simple to start; start with one or two research projects and figure out how to make it work with those before adding more scientists and more studies to the mix.

Make sure that the research is relevant to our visitors. Here at [our park] we highlight the work of bat biologists because bats are one of our main resources and a huge reason why visitors come to this park. We have had other scientists do very important work in the park, but would not be a topic that would pique the interest of a majority of our visitors.

Be sure the topic is one that can logically be interpreted in a wide variety of locations throughout the park, and in a wide variety of seasons.

Make sure [the selected research projects] closely meet the long-range interpretive plan, themes, and goals.

As for advice in selecting particular locations and programs for featuring iSWOOP science and interpretive techniques, leaders recommended adopting a similar grass-roots up approach, and looking for a close connection between the scientific research and the current park offerings and locations already popular with visitors.

We choose popular locations with scientific significance. These sites also have ongoing research being conducted.

My advice would be to try a variety of settings (i.e. a hike, an evening program, a rove) and for immersive experiences (i.e. the roves, hikes…) to choose locations that are directly relevant to the research (i.e. can you do the program at the site where the research happened or in a very similar site?)

Match the topic's relevancy to the resources at the particular locations.

After we selected the scientists we would be working with us, we looked at the programs we were currently offering (or had offered in the past), and the locations we were giving those programs to see if we could use the iSWOOP materials there. We determined how the materials would fit in to an existing program, and then we took the scientists to those places to do the program and talk about how we could modify the programs. I would say "stay flexible". There are lots of ways to get creative and don't be afraid to try new things. Maybe start with small modifications to existing programs and expand from there, rather than change up entire programs.

[It is important to consider] the dynamics of our interpretive operation and what the visitors focus is in this park. Trying to force "surface" programs in the visitor center has never worked here and most likely will never be successful. Over time we found that incorporating iSWOOP into formal programs and rove s… was the most successful. Not only do the visitors enjoy it, but so do the interpreters. So, my advice is for the training team not to have preconceived expectations on how the programming needs to be done. Let the managers look at their own unique interp operations and find where it will work best.

Several leaders described how the integration of iSWOOP may evolve over time, and can gradually expand to a wider range of applications once rangers are more familiar with the iSWOOP approach.

Initially, we choose programs that were most easily tied to the chosen scientist's research. By the second year, staff was more comfortable with iSWOOP and incorporating it into other programs.

I just folded it into things we already do – roving, touch tables, front desk operations, special events.

The main area that park leaders indicated was difficult was arranging the offering of intensive professional development. Throughout the project, leaders indicated in communication with iSWOOP project staff the challenges in obtaining release time for multi-day interpretive training when juggling multiple work schedules of participating staff given the day-to-day demands and responsibilities of park interpreters on the "front line", and the compressed timeframe for training new seasonal interpreters during their orientation just prior to peak season.

One leader recommended various advantages of involving interpreters throughout the iSWOOP development process, to optimize the fit between iSWOOP and interpreters' practice and effective integration into programs.

Training interpreters by bringing them in at multiple stages in the process is very helpful. We met as a group to identify the scientists and also decide on research topics to present. When rangers are included from the beginning, they are much more invested in the process along the way, and they incorporate park science and iSWOOP materials into their programs more effectively.

<u>Enthusiasm for Continuing iSWOOP Approaches and Scientific Park-based Research</u>: All eight leaders with supervisory roles at the park stated that they foresee continuing to use iSWOOP methods/approaches/content into the future (i.e., beyond 2019). Leaders described how the scientific research and currently featured scientists will continue to be highlighted by interpreters in a wide variety of programs and formats — on hikes, public programs, junior ranger programs, open houses, programs in their education center. They also indicated their plans to expand to new scientists and scientific topics. Leaders reported that they intend to offer continued training of its interpreters (including working in the field with scientists), and several envisioned the featuring of scientific research now being their park's approach to doing business.

[We will be] continuing to keep the current research forefront in our interpretation of park resources.

[The scientist's] research will continue to be applicable on [our] hikes forever. The props provided to interpreters will be useful for both the public and school programs.

The interpreters will continue to utilize the iSWOOP visual library during roves and continue to incorporate the science behind what we know about our bats at the bat flight programs. We are also working with another research team … The staff has opportunities to work in the field with these researchers, seeing their work close up … and some will be participating in an upcoming [iSWOOP] webinar training.

We plan to add the iSWOOP principles to at least one major public program every year.

After this season, we plan to choose a new researcher to highlight. We will need to think long and hard about how we will do that, and in conjunction with our resource management staff. I consider it a way of doing business moving forward.

Regarding final thoughts on how to make implementing an iSWOOP approach easier for park leaders, leaders suggested providing a clear overview of the iSWOOP program and how it aligned with park themes and objectives, and yielded benefits to the park, and possibly staff support and infrastructure across participating parks for guidance and information sharing.

They also urged leaders to be clear from the outset their commitment to the training and expectations for implementing in the park, and also to support and build infrastructure across participating parks for guidance and information sharing.

> *Present a clear outline and method for the iSWOOP program. Explain how this approach helps accomplish the park's long-range interpretive plan. It must align with the park's themes and their objectives.*

> *Easier to sell to park management if there is an online course designed to teach rangers/leaders/supervisors about the overall program, its success stories, and the benefits of being involved. Such as an Eppley/proValens course.*

> *It is a good thing that the iSWOOP leaders stay in touch throughout the year - it is motivating and gives you timelines in which to have more to share.*

> *Commit to the training, know ahead of time how you want to present iSWOOP topics – daily programming, roving, etc. and don't force it or make it a burden on the staff.*

> *The vast majority of interpreters should be interested in the concept of iSWOOP or they wouldn't be interpreters in the first place. But, you need to provide a lot of support and training to overcome interpreters who may feel intimidated by science or new technology.*

Concluding Remarks

In summary, park leaders from across all five parks attested to the beneficial impact iSWOOP had on its staff, visitors, and park. Park leaders felt that iSWOOP had delivered on its promise to increase connections between scientists and interpreters. They witnessed their interpreters demonstrate increased confidence in communicating park-based research, increased attention to science storytelling skills to make park-based science engaging and memorable, and increased confidence and skill with strategies that promote audience-centered interpretation. As leaders, they observed positive changes in park programming and visitor experiences that resulted from iSWOOP, such as the creation of new science-focused programs, more interactive methods for engaging visitors, and greater public interest in science. Leaders' findings corroborate those found in other iSWOOP studies conducted with interpreters, visitors, and scientists (Char, 2019; Merson, Char, Hristov & Allen, 2017).

The park supervisors' role is critical. Interpreters and supervisors alike spoke to the importance of support. Interpreters' initiative and enthusiasm for implementing new content and approaches could be leveraged or dampened by supervisors' decisions (Char, 2019). Leaders stressed the importance of setting clear expectations for iSWOOP featured science to be incorporated into formal programs, to allow interpreters the time to experiment with and implement new techniques, and to make continuing training a priority.

Leaders stated that they foresee continuing to use iSWOOP methods, approaches, and content into the future. They envisioned continuing to highlight scientific research and scientists in a variety of programs and formats, and furthering the training of its interpreters in promoting park-based science in their work with the public.

The thoughtful comments supervisors made are a reminder that even if staff can't be completely faithful to the iSWOOP model by adopting all of its elements, those close to implementation will distill and implement elements of a new approach that make sense given their constraints and parameters.

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