


Society for Wilderness Stewardship

White Paper on Stewardship Issues

**THE USE OF NEW TECHNOLOGY IN WILDERNESS:
EMERGING ISSUES AND NEED FOR POLICY AND MANAGEMENT**



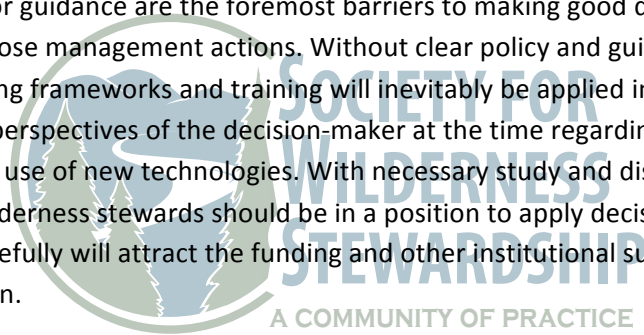
This is one of a series of white papers developed by the Society for Wilderness Stewardship that focus on important issues wilderness stewards struggle with. Each paper will explore the nature of the issue, how it is being dealt with and reasons why wilderness stewards struggle with making decisions and/or implementing effective stewardship. Each paper concludes with recommendations regarding how the issue could be dealt with more effectively, appropriately and professionally.

Authorship: Tom Carlson, retired, Arthur Carhart National Wilderness Training Center, Missoula, MT; John Shultis, Associate Professor, Ecosystem Science and Management Program, University of Northern British Columbia, Prince George, Canada; and Joe Van Horn, retired, Wilderness Program Coordinator Denali National Park and Preserve, Hotchkiss, CO.

Executive Summary

The use of new technologies in wilderness topic includes many forms including the common cell phone, GPS mapping, internet information sharing, personal locator beacons, and many more. The effects of the use of these technologies is not yet well studied and understood in terms of both biophysical impacts and the visitor experience. Interviews with wilderness managers indicate increasing use of many forms of new technologies in wilderness but the scarcity of empirical study and specific agency policy, combined with insufficient resources, has led, in general, to a lack of management action and some inconsistent decisions to address known impacts.

Why is there inconsistency and unresolved divergent opinion on the use of new technologies in wilderness? Does it reflect only inadequate policy and guidance, poor decision-making tools/processes, insufficient training, uncertainty about the likely effectiveness of interventions, lack of funding or other types of institutional support or is it just because many of these devices and uses are relatively new? While all of these may contribute to some degree to the current situation, our fundamental conclusion is that both a lack of empirical research on the impacts of increasing use of new technologies and inadequate policy and/or guidance are the foremost barriers to making good decisions about whether, where and when to impose management actions. Without clear policy and guidance, based on good research, decision-making frameworks and training will inevitably be applied in inconsistent ways, reflecting the personal perspectives of the decision-maker at the time regarding their perceptions of the impacts associated with use of new technologies. With necessary study and discussion leading to clear policy and guidance, wilderness stewards should be in a position to apply decision-making tools to make good decisions that hopefully will attract the funding and other institutional support to allow for effective implementation.



The Issue

The use of new technology in and outside of wilderness has the potential to change how wilderness is perceived and visited as well as how it is managed. The impacts may be positive or negative and could affect the opportunities for a wilderness experience, the biophysical resources of wilderness, and, for some, the very meaning of wilderness. Changes in any of these variables will also influence the future management of wilderness. Appendix A provides a description of the various types of new technologies, their uses, and potential management questions.

How does technology affect wilderness and wilderness visitors? The traditional perception of wilderness has been one of discovery and the challenge of a wild and natural environment. In modern times this perception has necessitated acquiring skills of self-reliance to be able to successfully travel and camp in wilderness using nothing more than a map, compass, and good decision making. There has always been a degree of inherent risk in wilderness given the knowledge that natural hazards exist and the chances of swift rescue are diminished by the remoteness of the areas. Off-trail travel was typically limited to those who either had the necessary skills or simply chose to give it a try unaware of the possible consequences. Information about opportunities and experiences in wilderness was shared by word of mouth on a limited basis or through guide books. Areas in need of special protection (i.e. archaeological sites) were not typically identified to reduce risk of vandalism.

The use of personal electronic equipment (i.e. cellphones, GPS units, personal locator beacons, etc.) in wilderness areas is not prohibited by the Wilderness Act of 1964 or subsequent legislation. But the widespread use of some newer technologies along with the increased use of on-line information sharing platforms (i.e. social media, trip maps, blogs, websites, electronic guides, etc.) has, for some, prompted a change in both the perception and use of wilderness and created real and potential impacts for wilderness and wilderness managers. These changes in visitor experience and behavior may include an over reliance by some visitors on technology in remote areas for travel route location and decision-making and a perception that risk is decreased because emergency rescue can be more easily summoned. Changes may also occur because of information transfer that occurs outside of the wilderness. For example, visitors who map a new off-trail travel route can easily share that route via the internet and social media, which leads to others using the same previously unused route. If the shared information leads to a significant increase in use and impacts to a fragile ecosystem or inadvertently causes others to discover and damage archaeological resources, there may be a degradation of both the social and biophysical resources of wilderness.

In addition, some visitors may have a perception of wilderness, not as an area of natural conditions and processes to be respected and discovered, but rather as an area that they can master or dominate through the use of technology. This may lead to a perception of less contrast between wilderness and other lands and potentially a changed value for wilderness in society. But there may also be positive impacts from the use of technology if it encourages people to visit wilderness because of their familiarity and use of new technologies outside of wilderness. The increased comfort and safety provided by many recent technological advances (e.g., lightweight materials, improved communication

devices) may also lead to additional or longer visits to wilderness areas, including those areas previously perceived to be 'out of reach' before the wide spread availability of new recreational equipment. The technological advances in new equipment may also allow older users to continue using wilderness areas (e.g., walking poles, lightweight materials). The ability to use new technology may also help address the recent declines in use of many protected area systems. Increasing visits to wilderness may lead to a greater understanding and appreciation and ultimately public and political support for wilderness areas in the public lands.

Another potential impact of new technologies is the notion of gathering and providing detailed mapping and other information about wilderness visitor opportunities through commercial businesses. While this is in some ways similar to long available maps and guidebooks, the magnitude and types of information that can be made readily available to anyone is new. The Wilderness Act prohibits commercial enterprise but in the past map makers and authors have needed nothing more than a notebook and a camera and visitors had to purchase a hard copy map or text. Will the use of a more sophisticated camera and data recorders, similar to what is used to map streets and neighborhoods (e.g., Google earth) in wilderness and the ease of obtaining information on-line affect visitor experiences?

And there is the potential for big picture and landscape scale impacts to wilderness. Proposals for power lines, pipelines, water developments, monitoring installations, etc., perceived by some to be necessary for society or security purposes, have been and will continue to be proposed for location in wilderness areas. Large scale societal changes, including the use of new technologies, may contribute to the need for new developments in wilderness but new technologies may also help make them more feasible.

Underlying the discussion of the use of new technologies in wilderness is the lack of empirical study of the issues noted above. To this point, very little empirical data on how technology may influence users' perceptions of risk or the wilderness experience has been undertaken (but see Martin and Pope, 2012; Shultis, 2015). The vast majority of published work in this area "is almost entirely anecdotal, primarily deterministic, and has not proven successful at engaging managers or administrators to meaningfully debate the issue" (Shultis, 2012, p. 116). That is, the potential negative impacts of technology on the wilderness experience are normally highlighted, and the research tends to focus on specific types of technology (e.g., communication tools such as cell phones and personal locator beacons or navigation tools such as GPS units) while ignoring others (e.g., lightweight synthetic materials); wilderness user perspectives are normally equated with the authors' perspectives (e.g., Borrie, 2000; Borroe, 2004; Borrie and Friemund, 1997; Dawson, 2007; Dickson, 2004; Douglas and Borrie, 2015; Ewert and Hollenhorst, 1997; Ewert and Shultis, 1999; Roggenbuck, 2000; Van Horne, 2007; Watson, 2000). Other empirical studies are in progress and work has been done to help identify potential effects and responses (e.g., education, regulation, etc.) to move the discussion forward, but in general no agency policy or guidelines are readily available to help managers prepare or take action when needed. Nor has the previously published work managed to generate a meaningful debate about the potential impact of technology in wilderness settings. Shultis (2012, p. 117) suggests "The unwillingness of Western society to question the use of new technology or consider its impacts, the commodification of leisure

experiences in our consumer society, and the public desire for safety, comfort and ease also provide challenging roadblocks to such a public debate”.

Finally, the lack of adequate federal agency wilderness management policy to help wilderness managers address issues of new technology (see Current Policy section below) has led to lack of action or, in some cases inconsistent management approaches as well as uncertainty among wilderness managers over how to address existing and emerging examples of this issue. The consequences of inadequate policy may include unnecessary biophysical resource impacts and confusion or misunderstood opportunities for wilderness visitors.

Current Practice

Recently an informal request for examples of new technology use in wilderness was distributed through the four federal agencies with management responsibilities for wilderness resulting in 19 responses (see Table 1 below).

Table 1 – Attributes of those who responded to information request.

Contact	Agency/Location	Position	Years in current position (approx.)	Interview period
1	BLM/AZ	Wilderness manager	13	2014
2	FS/MN	Wilderness manager	23	2014
3	FS/TN	Wilderness manager	22	2014
4	FS/OR	Wilderness manager	14	2014
5	FS/CO	Regional manager	26	2014
6	FS/OR	Trail supervisor	27	2015
7	NPS/AK	Wilderness manager	3	2014
8	NPS/AK	Wilderness coordinator	5	2014
9	NPS/CA	Wilderness coordinator	10	2014
10	NPS/AZ	Wilderness planner	10	2014
11	NPS/AZ	Wilderness ranger	10	2014
12	NPS/MT	Wilderness coordinator	10	2014
13	NPS/CO	Wilderness coordinator	5	2014
14	NPS/WA	Wilderness coordinator	5	2014
15	NPS/WY	Wilderness coordinator	5	2014
16-19	BLM, FWS, FS. NPS/national	Training specialists	41 combined	2014 and 2015

Where new technology is or has been an issue, some managers are addressing impacts on a case by case basis, using a combination of monitoring, information, education, and law enforcement techniques, but most respondents indicated a need for more emphasis including better definitions of the various types of new technology, discussion of the appropriate uses of new technology in wilderness, new or clearer agency policy to help evaluate impacts and formulate management strategies, and additional resources to prioritize actions such as visitor information and education.

Examples:

1) Unmanned Aerial Systems (UAS):

While recently banned from use in all national parks, the BLM, FS, and FWS have yet to take action that officially prohibits the use of UAS (also known as drones) over wilderness. Some managers noted reports of UAS operated by visitors using cell phones and subsequent posting of video on the internet and social media. Concerns include attracting unskilled visitors into more challenging and remote terrain as well as marketing of certain routes leading to spikes in use levels and concentration of use caused by other visitors following the video obtained by use of a UAS.

2) Personal Locator Beacons (PLBs):

Managers are experiencing more false alarms from PLBs due to the increasing use of the technology. While many are due to an inadvertent triggering of the device, there have also been situations where an alarm was sounded for a relatively minor problem or in a moment of panic that does not require an emergency search and rescue response. The feeling from managers is that users probably would have dealt with many of these problems on their own in the past rather than creating the need for an agency response. It is difficult to evaluate the seriousness of an alarm from a PLB, so a response is generally dispatched. Frequently this involves helicopter use which presents both a safety risk for responders and a disturbance to wilderness.

Managers are also encountering situation where users with a PLB fail to check in with a designated contact person in a timely manner. Sometimes these have proven to be legitimate emergencies, but frequently it is a result of forgetfulness or inability of the device to make a contact. Coverage for PLBs can be limited in some areas. Interestingly, in areas where this is true, such as Alaska, managers felt that users still only viewed PLBs as an option rather than a certainty. They still expected that they would have to solve their own problems, or had other notification systems in place in case of emergency.

Newer generations of PLBs may allow for limited two way communication and better coverage. This could reduce some of these problems. Fewer problems are encountered with satellite phones because the two way communication allows an assessment of the situation for an appropriate response.

3) Cell Phones

Managers stated that many of the same concerns identified for PLB use apply to cell phone use. Calls are frequently received for nonemergency situations. However, in many cases the ability to communicate directly with the user does provide a chance for the manager to limit the response to an appropriate level, or better yet encourage the user to deal with it on their own.

The larger concern is that all these devices seem to be changing the wilderness user's attitude away from self-reliance toward a reliance on others if a problem develops. Many managers wondered if a new generation of users will develop the necessary skills to deal with wilderness problems on their own if the technology were to fail. They are also concerned that users are taking more risks or extending themselves beyond their limits on the assumption that they can contact someone to bail them out.

These concerns are based on conversations with users and appraisals of changing experience levels in users made by experienced field staff. The use of cell phones for non-emergency purposes has also been shown to create recreation conflict among visitors. For example, while a call to a person who is picking up a visitor at a trailhead might be seen as appropriate, a call to a friend to catch up on the latest gossip might be seen as inappropriate use of this technology.

4) Availability of electronic trip information

The sharing of extremely detailed trip information that includes GPS data and digital imagery, sometimes captured by UAS flights, is now widespread via the internet. Managers report several emerging issues related to this rapid increase in site specific information.

a) Use Increases

Managers have noted significant and sudden increases in use that can be directly related to information published on the internet about a specific location or route and they are particularly concerned about use changes and impacts in areas without designated trail systems. Examples of impacts include increases in informal trail development and a proliferation of campsites in these areas. For most areas the information is still only qualitative at this point because of the recent nature of the change, lack of adequate monitoring techniques, and lack of staff to conduct the detailed monitoring often required to document this kind of change. Also, because use levels typically were low in these areas, they were often not viewed as a priority for monitoring in the past and, in many cases, baseline information does not exist for quantitative evaluations. However, we also found several examples of sufficient monitoring leading to recognition of the issue. In these cases management action taken through visitor information and education and proactive contacts with user organizations, web managers, bloggers and others led to some changes in the availability and use of the information by visitors, and a reduction of impacts.

b) Impacts to biophysical and archaeological resources in wilderness

Along with the use increase described above, there is both anecdotal and inventoried evidence that off-trail use may be increasing in sensitive ecosystems (e.g. sub-alpine areas) and for accessing remote and unprotected archaeological sites due to visitors following detailed route information found on the internet. While in many areas, off-trail travel is not illegal, multiple trips on the same previously rarely used route can cause significant new impacts and result in visitor created trails and increased access to fragile archaeological sites increases the potential for degradation. No large scale inventory or analysis of these cumulative impacts has been compiled but there are examples of managers attempting to raise the awareness of the issue and address it in a similar manner to the increase in visitor use noted above.

c) Changing user base for off trail areas

All the managers interviewed felt that users, particularly those attempting off trail hikes, are less experienced than in the past. Users are now relying on very detailed digital information provided by others to make up for lack of skills or knowledge gained by past experiences. While many of the trip reports on the internet are honest attempts to share helpful information with others, there are also

plenty of “ego trips” out there that are promoted as the “best” or only hike in an area. Other users are naturally attracted to these accounts and believe it is the only hike they should do. Managers report difficulty in convincing users that a hike which was appropriate for someone else might not be the best hike for others.

In the past, the required skill level for off trail hiking provided a limiting effect of sorts on both the number of users and the level of trouble a user might get themselves into on a hike. Without a digital “breadcrumb” trail to follow, managers believe that many users were hesitant to get themselves too far away from the relative safety of more regularly traveled trail systems. Now it is quite easy for an inexperienced hiker to get many miles into a remote cross-country area with the false sense of security provided by technology. Weather, steep terrain, and wildlife all create hazards that cannot be mitigated by technology alone. So far, most of the problems reported by managers are related to less satisfaction by users because they couldn’t complete a hike or the hike turned into a physical challenge far greater than they were seeking. No statistics have been compiled to see if search and rescue efforts have increased. However, there was a feeling from some managers that requests for assistance for relatively minor problems, ones that users typically resolved by themselves in the past, were increasing.

d) Impacts on use management systems.

Some use management systems such as trailhead quotas are very vulnerable to sudden changes in the popularity of an area. When demand suddenly exceeds supply, there is often an incentive for either illegal use or at a minimum finding ways to “scam” a system. In the past, managers had a chance to react to these pressures and make corrections because it took time for word to filter out about a desirable destination or how to “beat” the system to get there. Now information spreads almost instantly via the internet. Systems that are based on an assumption of dispersed use along a trail corridor or in a zone are vulnerable when use becomes focused on a few locations. Managers are seeing changes in camping patterns because of information available on the internet. If use management systems cannot function correctly, resource values are at risk.

e) The information never goes away.

In the past when an article or guidebook was written that pinpointed an area and increased use, the information and the impact was often temporary. Managers are now concerned that the impacts may be more permanent because the information is digital and does not disappear as in the past.

f) Apps and maps

The internet has drawn a great deal of attention to prominent trails such as the Pacific Crest Trail, John Muir Trail, and the Appalachian Trail. There are now “apps” available for all these and other trails with GPS enabled maps and detailed information about the best camping spots, water locations, trail conditions, etc. Several managers have encountered hikers who are using these apps to the exclusion of any other information even including what they see around them. In effect, if it isn’t on the app it isn’t there. Managers have noticed that many users are no longer carrying traditional tools such as map and compass, instead relying only on their smart phone. Comments such as “we’ll wait until the app comes

out to do that part of the trail” have been heard. The rapid increase in use of these tools means that previous assumptions and models for use dispersion along these heavily used trail corridors are not working as well.

5) Changes in user attitudes

Longtime managers who have had extensive contact with the public in wilderness situations feel that there are several significant changes in how users are interacting with wilderness.

a) Desire to stay connected to electronic devices

Users are routinely taking more electronic equipment with them into the backcountry to the point that solar chargers are frequently carried. Music players and video players are regularly used to take up idle time in camp. There seems to be a very strong desire to constantly “document” the trip and then share with others as soon as any point of connectivity is reached. Hikers can be found gathered at “Hotspots” for connectivity, the locations of which are noted in apps or shared on the internet. Digital cameras mean that hundreds of photos can be taken and linked to GPS points and video footage of a hike or climb is commonplace. An interesting example of the degree that electronic equipment has become linked with the outdoor experience can be seen in the 2014 Fall REI catalog (Let’s Camp). Photos on virtually every page show users in camping situations using electronic equipment.

Many managers wondered whether this reluctance to “unplug” has changed how visitors perceive wilderness and what they expect wilderness to provide for society. Are the more contemplative values of wilderness that are linked to its pristine and primitive aspects being missed because users never really leave modern society behind on their trips?

b) Users expect extremely detailed information

Staff that regularly contact visitors report that there is a greater expectation and desire for very detailed trip planning information. Many users want someone to provide a detailed trip plan for them, rather than use traditional tools and take the time to plan it for themselves. They want a trip that has been determined to be the “best” by someone else rather than help planning a trip that might be the best for them. Part of this seems to come from a desire to make maximum use of time available for a trip, but there also seems to be less interest in taking time to do the work of researching a trip. There is definitely a reluctance to just go out and try something that isn’t rated by someone else and described in detail so that it is a predictable experience. The information and experience that management agencies are now expected to provide is more like what a commercial operator would have provided in the past. Rather than just providing basic information that allows the user to discover the resource on their own, the user wants a total package from start to finish.

c) Greater expectation of help in emergency

Many incidents and conversations have led managers to believe that users now have a greater expectation than in the past that someone will take care of them if they get into trouble. They are also more willing to transfer that responsibility onto someone else. The availability of electronic

communication devices seems to be the main source of this change. Users now have devices that they expect to work, even if sometimes they don't. Another factor that was mentioned by some managers was the presence of staff with better communication equipment. Users now know that staff regularly carry satellite phones and better radios, and that they are available to help them. Managers have experienced situations where users expect staff to take care of a weak member of their party while they continue on the trip, rather than changing their plans to accommodate that person.

6) Commercial use of technology

Several managers mention that they were approached by film groups and even Google to do filming for virtual hikes or river trips that could then be sold or used in some way for profit by a commercial venture. For the most part, those requests have been denied. But in one example, a non-permitted company traveled with and filmed the trip of another permitted commercial venture and in this way got the footage they wanted, unknown to the agency. In another area, GPS mapping of user trails (non-system trails) has occurred leading to on-line sharing of the narrative and images and a published book of unofficial trails. Managers have taken action in some cases to try and rehabilitate and close some of these areas because of impacts to rare plants or heritage sites with some success.

7) Large scale national initiatives

The primary impact from national initiatives still seems to be in the border areas where national security issues have driven technology and other conflicting uses into wilderness areas. Managers in other areas did not report unusual increases in pressure for other large scale projects such as wireless networks, power lines, cell towers, water management systems, etc. in wilderness yet.

The conversion from analog to digital two way radio systems for agency staff use has created a perceived need for more radio repeater installations to compensate for the reduced coverage associated with the digital units. This conversion coupled with new agency requirements for staff to have better communication for safety in backcountry areas has created pressure for more repeater sites in wilderness. Alternatives include satellite phones and PLBs with two way communication. Several areas are in the process of determining just how many additional repeater sites are actually necessary given the availability of other technologies.

8) Webcams and virtual hikes

The use of webcams and posting of virtual hikes by agencies has definitely been a topic of internal discussion in several units. So far it appears that the use of these technologies by agencies has been limited to areas outside of wilderness.

9) Data loggers, radio collaring, imbedded transmitters

According to managers, scientific researchers are making more requests all the time for the use of this type of equipment. While advancement in this type of technology has made it less obvious in some cases, it does not seem to have reduced the overall number of installations. One manager noted that as the equipment becomes smaller, the requests for its use become more numerous.

10) Geocaching

Geocaching is not prohibited in many areas but managers have observed impacts from certain types of activities. Local policy and restrictions have been imposed by some managers to prohibit physical caches in wilderness and restrict virtual caches to locations near system trails to minimize impacts.

11) Light weight equipment

Managers feel that light weight equipment has allowed hikers to travel faster. This has changed use patterns, particularly along trails such as the Pacific Crest, where long distance hiking is popular. Use allocation models based on previous hiker behavior are not working as well as in the past.

Light weight pack rafts have created new hiking route options that incorporate floats of rivers as part of the trip. Some existing routes are seeing more use as well as new routes being established. Some conflicts with permit systems have developed where limits are in place for river floats. The pack rafting trips can intersect the typical float route at a different point than the limit system was established to manage.

Managers report that hammock use is causing impact in different locations than traditional tent camping. Users seek out a different type of campsite and create new locations for informal trails and campsites as a result. Some units now require hammocks to be hung within the confines of established campsite boundaries.

Managers could not link a greater need for rescue to the use of lightweight equipment, but they did feel that many trips were ended sooner than expected due to lightweight gear not providing adequate protection during extreme weather conditions that are common to many mountain wilderness areas.

12) Advanced trail construction technology

Some managers felt that there was a tendency for trail size to increase when they were reconstructed or created with newer technologies because it was easier to build them. They felt it was critical to have well established trail standards and good documentation on the location of where trails were not to be built so that planning rather than technology controlled trail maintenance and development.

Current Policy

Appendix B identifies the current policy of the four federal agencies that is applicable to new technologies. The BLM has addressed new technologies by requiring that “New activities and technologies will be evaluated as they are developed” and identifies specific concerns related to geocaches. The other agencies do not yet have specific policies to address new technologies though the NPS has recently prohibited all use of Unmanned Aircraft Systems (UAS) by visitors over national parks. The BLM, FWS, and FS have considered forming separate task forces to address the UAS issue for wilderness areas they manage but are not currently formulating policy for other new technologies. The FS has also identified the commercial use of video filmed by UAS as an additional issue that requires new policy and management strategies.

Conclusions

The current state of both knowledge and policy related to new technology use in wilderness seems to be less than adequate to address both the needs of managers and the desires of wilderness visitors. While examples of the use of new technologies are relatively common and likely increasing in frequency, decisions about whether to take action against use of new technologies have been inconsistent and have occurred in response to perceived or obvious real or potential impacts. Many managers take a reactive approach to these impacts as the basis for visitor education or regulation but others wonder if there is value or even necessity in the use of new technologies in wilderness that can enhance both understanding and support for wilderness. In addition, the four federal agencies are not using a coordinated approach (e.g. only the NPS currently bans UAS in wilderness) and clear and instructive agency policy, informed by research, is lacking.

To help move forward on the issue of new technologies in wilderness, it is important to remember that “Technology both enables and disables wilderness. For almost a century—from Model Ts to iPads—technology has simultaneously led to successful rallying cries to protect the wilderness (for example, the passing of the Wilderness Act) and concern that its use will diminish or even destroy the wilderness experience itself” (Shultis, 2012, p. 117). That is, technology is a double edged sword, having both positive and negative impacts simultaneously. It seems likely that the impacts of technology on the wilderness experience and resource are similarly complex as well as mutually constructive and destructive: our managerial response to technology should address both aspects of the use of technology in the wilderness.

Why is there inconsistency, paralysis and unresolved divergent opinion on the use of new technologies in wilderness? Does it reflect inadequate policy and guidance, poor decision-making tools/processes, insufficient training, uncertainty about the likely effectiveness of interventions, lack of funding or other types of institutional support or is it just because many of these devices and uses are relatively new? While all of these may contribute to some degree to the current situation, our fundamental conclusion is that both a lack of empirical research on the impacts of increasing use of new technologies and inadequate policy and/or guidance are the foremost barriers to making good decisions about whether, where and when to impose management actions. Without clear policy and guidance, based on good research, good decision-making frameworks and training will inevitably be applied in inconsistent ways, reflecting the personal perspectives of the decision-maker at the time regarding their perceptions of the impacts associated with use of new technologies. With necessary study and discussion leading to clear policy and guidance, wilderness stewards should be in a position to apply decision-making tools to make good decisions that hopefully will have the funding and other institutional support to allow for effective implementation.

Research Issues and Management Recommendations

As noted above, there is a current dearth of empirical studies on the potential impact of an increasing amount of existing and new technologies on the wilderness experience, on the wilderness biophysical attributes, and the social values of wilderness. The existing literature from wilderness researchers tends

to focus on highlighting the potential negative impacts of modern technology on risk taken by and risk perceptions of wilderness users. This literature seems to reflect the main concerns expressed by wilderness and other protected area managers. Most frequently, communication technology (e.g., cell phones and personal locator beacons) is identified as being problematic through the provision of anecdotes provided by managers and local/regional media outlets.

The status of the current literature suggests that research related to the potential impacts of technology on risk issues is highest on the priority list of wilderness agencies and managers. One empirical study found in a sample of Northern California wilderness users a “substantial subset of visitors (high risk takers in the pro-technology cluster; 23% of the sample) with a combination of traits that managers have expressed concern over—high risk takers who (1) believe that technology reduces many of the dangers people associate with being in the wilderness, (2) think that having technology makes people think their safety is not their personal responsibility, (3) believe that technology creates a genuine increase in safety for wilderness users, and (4) are willing to take more risks and then use that technology to bail themselves out of trouble” (Martin and Pope, 2012, p. 125).

Future research could assess the following basic and frequently asked questions facing wilderness managers. How does the use of modern technology increasingly embedded within recreational equipment influence the perception of risks and actual risk taking behavior in the wilderness? Does the use of advanced technology change the meaning of the wilderness experience and if so, how and why do these changes occur? How do users think managers should deal with the increased use of technology in wilderness areas (i.e., which managerial approaches would be supported or considered most appropriate)? In addition, it may be useful to assess managers’ perceptions of this issue: how important is it and what potential approaches are considered appropriate?

But the deeper questions about societal use of technology should not be ignored. For example, how do our social and cultural perceptions of the role of technology in society reflect or influence wilderness users’ perceptions of recreational technology? Why is concern expressed over certain types of technology and not others? Why is it so hard for Western culture to critically examine the cumulative impact of technology on our quality of life (e.g., the so-called ‘unintended consequences’ of technology)?

In addition, the positive impacts of existing and future technology should also be assessed. A recent qualitative study of primarily highly experienced wilderness recreationists in New Zealand found that users almost completely focused on the positive attributes of technology: the increased comfort and safety provided by new technologies allowed users to gain new skills, undertake more trips and visit new areas. They saw technology as a great enabler to access and staying safe within the wilderness (Shultis, 2015). Similarly, results from an unpublished Master’s thesis (Blackwell, 2015) studying the impact of technology on visitors to the Sequoia-Kings Canyon Wilderness in California suggested that the use of new technology allowed visitors to have less stress and worry while on their wilderness visit, giving them and their loved ones an added sense of security. Visitors suggested they would be more willing to take a solo trip if they had use of this technology and were able to enjoy the wilderness solitude when they carried the technology with them. Further, risk-takers said they would be just as likely to take the same

risks with or without the technology (e.g., cell phones, personal locator beacons). It is interesting that the very few empirical studies of wilderness visitors themselves almost completely reflect the positive impacts of technology on the wilderness experience, while the non-empirical literature (which do not assess actual visitor perceptions) almost completely focuses on the negative impacts of technology on the wilderness experience.

An Australian study in an urban, high use national park compared the use of new technology (GPS-based tours and an mp3-based audio tour) versus traditional forms of interpretation in parks (e.g., signs, brochures) and found that “both modern media achieved the highest satisfaction ratings for discovery and learning and were most efficient at facilitating factual learning”, but “Traditional media were more conducive to socialising and more relaxing and consistent with a nature-based experience” (Wolf, Stricker and Hagenloh, 2013, p. 59).

Using a range of methodological approaches to study the relationship between technology and wilderness use would best illuminate the complex factors that influence our use of technology and its impacts on our society and environments. Quantitative approaches most often use surveys to assess the self-reported attitudes and behaviors of wilderness users. Qualitative approaches typically use interviews to delve deeper into the experiential aspects of using technology in wilderness environments. More importantly, these two approaches use different ontological and epistemological positions. Typically, quantitative research uses a realist approach, while qualitative research uses a relativist approach: both ontological positions are needed to fully understand the impact that technology has in the wilderness.

In addition to the need for additional empirical studies on the impacts of new technologies in wilderness there is also a need to explore the development of more definitive policy to manage potential and existing impacts. As noted above, the four federal agencies have not yet formulated policy related to new technology (except for the NPS prohibition on the use of UAS in all parks) and managers are struggling to address impacts when they do occur. Basic questions center around whether use of some or all of the new technologies should be allowed or encouraged or whether they should be discouraged or limited by either regulation or information and education.

As previously discussed, there is reluctance on the part of society to discuss technological changes. However, the agencies do have an affirmative responsibility to make the public aware of uses which they think may impact resources or visitor experiences and take the lead in these discussions. Agency guidelines also require interaction with the public to develop or implement appropriate policy, education programs, or regulation. For example, the NPS has specific guidelines for providing opportunities for citizens to participate in the decisions and actions of the agency. Unfortunately, the best approach for communicating these concerns about the potential effects of technology are not completely clear. Further research on the most effective ways to engage in these discussions and explain their concerns could make the task of taking the lead easier for the agencies.

As noted above, there are indications that some of the new technologies discussed in this paper are beginning to alter use levels and patterns. This means that there is also the potential for eventual

regulatory action. Any regulatory action will require supportive data on changes in use level, patterns of use, and biophysical impacts. Our discussions with managers indicated that data of this type is not generally available. Agencies need to consider ways to gather this data for the areas where change is most likely to occur now because of the time required to acquire this information. Situations where it appears changes are already occurring have been previously discussed in this document. Areas that are managed for dispersed use such as trail-less zones or trail corridors where use is regulated by trailhead quotas seem to be priorities for immediate attention. Unique recreational opportunities for self-reliance, solitude, and naturalness that are key wilderness values can be quickly lost in these pristine areas once use escalates and impacts such as new informal trails or campsites occur. Concentrated use management systems that employ designated trails and campsites have some resilience to change as opposed to dispersed management systems which can be quickly altered. The authors understand the budgetary and staffing limitations that land managers face today, but feel that it is essential that baseline inventories for these dispersed use areas be made a priority. Once again, additional research on more effective methods for inventory techniques in dispersed management systems could ease the already difficult job that managers face. Extensive research has been done on measuring the condition of designated trails and campsites. Some of these techniques are transferable, but many are not. The worst outcome would be for agencies to devote their limited resources to poor data collection that would not be useful or defensible.

There is also a role for non-governmental organizations with regard to the issue of technology of in wilderness. One of the challenges for conducting baseline inventories is the amount of area that needs to be examined. The scale is likely well beyond even the abilities of even the best staffed wilderness operations. Cooperative volunteer efforts with agencies to conduct basic presence/absence surveys of impacts could significantly increase the ability to accomplish the needed work. A side benefit for the agency is that it also provides a way to engage user groups and make them aware of an important issue in a constructive way. This type of collaborative engagement to look at the resource together has been successfully used in other land management issues.

Ultimately, one of the biggest factors in the amount of impact technology has on wilderness will be how visitors choose to personally employ it. Some thoughtfulness and moderate restraint in how it is used, based on an increased awareness of potential negative effects, could go a long way to reducing impacts and perhaps the need for agencies to take restrictive actions which eventually just result in reduced opportunities. The Leave No Trace program has been a successful private and governmental cooperative effort to encourage ethical wilderness use behavior. It provides an existing and well understood forum for discussion of concerns that have many similarities to the issue of technology use in wilderness. The Leave No Trace organization also has access to financial resources that are not available to the agencies. Consequently, the authors encourage the agencies and the Leave No Trace organization to take up the topic of technology for possible inclusion in their associated education efforts.

Perhaps, the most important recommendation that can be made is for the agencies to acknowledge that the use of new technology can create changes, both negative and positive, in wilderness resources and visitor experience, and that it is an important issue just like any other that they currently face. Once it is

recognized as such, wilderness managers have a wealth professional experience and creative energy that can be focused on how best manage these activities for both the benefit of the resource and the users of wilderness.

References

Blackwell, J. L. 2015. Influences of hand-held information and communication technology on risk behavior and the experience of wilderness visitors. Unpublished Masters of Science in Natural Resources, Humboldt State University, Arcata, CA. Available at http://humboldt-dspace.calstate.edu/bitstream/handle/10211.3/142887/blackwell_jessica_l_Sp2015.pdf?sequence=1.

Borrie, W. T. 2000. Impacts of technology on the meaning of wilderness. Pp 87-88 in A. E. Watson, G. H. Aplet and J. C. Hendee, comps. Personal, societal, and ecological values of wilderness: Sixth World Wilderness Congress proceedings on research, management and allocation – Volume II. Proceedings RMRS-P-14. Odgen, UT: U.S. Department of Agriculture, Forest Service, Rocky Mountain Research Station.

Borrie, W. T. 2004. Why primitive experiences in wilderness? *International Journal of Wilderness* 10(3): 18-20.

Borrie, W. T. and W. A. Freimund. 1997. Wilderness in the 21st century: Are there technical solutions to our technical solutions? *International Journal of Wilderness* 3(4): 21-23.

Dawson, C. P. 2007. New opportunities for educating future wilderness and wildland managers in a changing technological world. *International Journal of Wilderness* 13(3): 36-39.

Dickson, T. J. 2004. If the outcome is predictable, is it an adventure? Being in, not barricaded from, the outdoors. *World Leisure* 4: 48-54.

Douglas, M. and W. Borrie. 2015. Unraveling the coil of the wild: Geospatial technology and wilderness. In S. Carver and S. Fritz, eds. *Mapping the wild: Concepts, techniques, and applications*. Dordrecht, NL: Springer. Available at http://static1.squarespace.com/static/52437f52e4b0fe7d0ab3f8d9/t/54de2b75e4b03b667222c892/1423846261662/Douglas_Borrie_01_20140429-1448_sanitized.pdf.

Ewert, A. W. and S. J. Hollenhorst. 1997. Adventure recreation and its implications for wilderness. *International Journal of Wilderness* 3(2): 21-26.

Ewert, A. E. and J. D. Shultis. 1999. Technology and backcountry recreation: Boon to recreation or bust for management? *Journal of Physical Education, Dance and Recreation* 70(8): 3- 8,11.

Martin, S. R. and K. Pope. 2012. The influence of hand-held information and communication technology on visitor perceptions of risk and risk-related behavior. Pp 119-126 in D. N. Cole, comp. *Wilderness visitor experiences: Progress in research and management*. Proceedings RMRS-P-66. Fort Collins, CO: U.S. Department of Agriculture, Forest Service, Rocky Mountain Research Station.

Roggenbuck, J. W. 2000. Meanings of the wilderness experiences in the 21st century. *International Journal of Wilderness* 6(2): 14-17.

Shultis, J. D. 2012. The impact of technology on the wilderness experience: A review of common themes and approaches in three bodies of literature. Pp. 110-118 in D. N. Cole, comp. *Wilderness visitor experiences: Progress in research and management*. Proceedings RMRS-P-66. Fort Collins, CO: U.S. Department of Agriculture, Forest Service, Rocky Mountain Research Station.

Shultis, J. D. 2015. "Completely empowering": A qualitative study of the impact of technology on the wilderness experience in New Zealand. Pp. 195-201 in A. Watson, S. Carver, Z. Křenová and B. McBride, comps. *Science and stewardship to protect and sustain wilderness values: Tenth world wilderness congress symposium*. Proceedings RMRS-P-74. Fort Collins, CO: USDA, Forest Service, Rocky Mountain Research Station.

Van Horn, J. 2007. GPS and the internet: Possible effects on the protection of remote areas and wilderness values. *International Journal of Wilderness* 13(3): 7-11.

Watson, A. E. 2000. Wilderness use in the year 2000: Societal changes that influence human relationships with nature. Pp. 53-60 in D. N. Cole, S. F. McCool, W. T. Borrie and J. O'Loughlin, comps. *Wilderness science in a time of change conference – Volume 4: Wilderness visitors, experiences, and visitor management*. Proceedings RMRS-P-15-VOL-4. Odgen, UT: U.S. Department of Agriculture, Forest Service, Rocky Mountain Research Station.

Wolf, I. D., H. K. Stricker and G. Hagenloh. 2013. Interpretive media that attract park visitors and enhance their experiences: A comparison of modern and traditional tools using GPS tracking and GIS technology. *Tourism Management Perspectives* 7: 59-72.

APPENDIX A:

NEW TECHNOLOGIES THAT MAY AFFECT WILDERNESS VALUES

Unmanned Aerial Systems (UAS): Commonly known as drones, these devices can be flown over wilderness areas carrying cameras and can be controlled by cellphones. The video images captured by UAS can be shared via the internet or social media for private or commercial use. Questions remain about whether UAS are aircraft subject to regulation by the Federal Aviation Administration (FAA), the effects of the commercial use of this technology, and what role the wilderness management agencies should play.

Personal Locator Beacons (PLBs): These devices are portable transmitters that allow users to communicate through the internet and summon rescue if needed. Use of PLBs may cause changes in visitor experience and behavior that may include an over reliance by some visitors on technology in remote areas and a perception that risk is minimized because emergency rescue can be summoned as needed. There are questions about whether this will lead to a feeling of less contrast between wilderness and other lands and potentially a changed value for wilderness in society? Or, will there also be positive impacts from the use of technology if it encourages some to become more aware of wilderness and visit because of their familiarity and use of new technologies outside of wilderness.

Cell Phones and Other Hand Held Devices: As cell networks expand, there is now coverage in many more wilderness areas, leading to both impact and safety issues related to the use and reliance on apps for navigation in place of a map and compass. There also ethical issues of people talking on phones while in quiet spaces or using video devices to watch movies, etc. while camped. Obviously, there are many personal choice issues, but at what point does the use of these devices create recreation conflicts? Leave No Trace and others have started to address this with guidance, but what role should managers take in getting an appropriate message out there?

GPS Mapping (i.e. Google Trekker) – also see Internet and Social Media Networking of Information, Digital Trip Planning Tools, and Geocaching below: This technology allows travel routes to be easily mapped and widely shared. As with PLBs these changes in visitor experience and behavior may include an over reliance by some visitors on technology in remote areas for travel route location and decision-making.

Internet and Social Media Networking of Information: Impacts to both the social and biophysical resources may occur because of information transfer that occurs outside of the wilderness. Visitors who map a new travel route (e.g. off-trail) can easily share that route via the internet and social media which leads to others using the same previously unused route. The practice becomes a management concern if the shared information leads to a significant increase in use and impacts to a fragile ecosystem or causes others to discover and damage archaeological resources.

Digital Trip Planning Tools. The advances in digital terrain models and satellite imagery means that wilderness hikes can be visualized and then planned via GPS at a very detailed level. Most of this information is all readily available to users to find on their own. Questions remain as to what obligation an agency has to provide this information and whether there advantages to the protection of wilderness if the agency does provide access to it at back-country offices or agency websites, especially if they provide LNT messaging along with it for example). Are there things that should be avoided such as more elaborate software programs that help users “find” a hike, or fly overs of a route (some of these might

use technology or data that a government agency might have at its disposal that would normally not be available in the public domain)? Does making this information available encourage the expansion of use into new areas that may not be adequately protected by regulation (use limits) because demand was so low in the past?

Commercial Use of Technologies: This category includes both the technology used for mapping travel routes and destination locations in wilderness but also the potential for identifying sensitive areas or protected sites (i.e. cultural resources). Is this a commercial enterprise prohibited by the Wilderness Act or a commercial service allowed if necessary?

Large Scale National Initiatives – see also Wireless Repeater Networks below: As use and demands for technology increase both inside and outside of wilderness there will be increasing challenges for rural connectivity, power grid expansion, national security networks, etc. which cause negative impacts to wilderness character. How should these initiatives be addressed and what is the role for wilderness stewards in meeting this challenge?

Wireless Repeater Networks: Line of sight repeaters than can provide both a backbone of internet connectivity for administrative sites in a management unit, or the possibility of wireless connectivity from remote locations provides the potential to support phone service to fixed locations or mobile units in remote areas, data transfer from remote sensing equipment such as data loggers/radio collars/webcams/etc., or video conferencing to individuals such as researcher in the back-country. This technology has been proposed as basis for innovative approaches to increasing scientific and educational uses of wilderness, as well as reducing physical impacts from overflights or foot traffic impacts. However, when is the use of this technology important and what is the perception of wilderness that this education would actually provide: is it really beneficial to preserving an enduring resource of wilderness?

Live Video Cameras: Suggestions include placing cameras on animal dens, nests, visibility monitoring, weather cameras for aircraft safety, etc. These could be either supported by wireless network as described above or satellite up links. There may be benefits as well as impacts from these activities. When and where are these cameras justified in wilderness?

Data Loggers: Visible or ones so small to be essentially invisible (or at least not seen by users). Examples include temperature sensors, trail counters, law enforcement surveillance equipment (e.g., due to border issues) supported by wireless networks, uplinks, or simple chip storage of data with new applications for this type of microchip technology is emerging. The benefits of these types of technology are frequently stated and a common attitude is if you can't see it, there is no impact. But questions remain about whether all of the impacts been adequately articulated, evaluated and discussed so that objective decision making can take place.

Radio Collaring/ Imbedded Loggers or Transmitters: Somewhat similar to data loggers discussed above, but more of a trammeling component to the impacts. Advances mean some equipment is no longer visible, so some say "no impact", however, what are other concerns that should be discussed. Many collars are now GPS and satellite uplinked and this is used as justification because more data per collar with no overflights to monitor. What are the issues that still remain with the use of this technology?

Geocaching: While this activity is not as new as others described above it does involve use of similar technology (i.e. GPS and internet) and has the potential to cause significant impacts in certain locations.

Two basic categories of this activity are commonly practiced. The first is a physical cache of some sort left in a hidden location for others to find given its' GPS map coordinates posted on the internet. Because this involves leaving personal equipment behind in wilderness most managers discourage and some aggressively regulate or prohibit this activity. The other form of geocaching is to leave a virtual cache, just the map coordinates, by posting this information on the internet for others to locate and report on. This activity does not require any of the Wilderness Act's Section 4c prohibited uses and is more frequently practiced in wilderness and allowed by managers. The most common issue with geocaching is the placement of the caches in locations that attract new or repeated use off-trail or in areas of sensitive vegetation (i.e. mountain alpine or sub-alpine or desert crusts) creating new trails and other impacts. On the positive side, geocaching has been credited for encouraging some to visit and experience wilderness while in pursuit of the GPS locations. What is the appropriate role for geocaching as an activity in wilderness and how can the impacts be addressed and limited?

Light Weight Equipment: Some users are interacting with the resource differently based on the gear they carried and it could indicate an emerging trend. For example, if you carry a lighter ground pad, do you select a softer campsite? At Denali National Park visitors were directed to follow Leave No Trace techniques and camp on gravel bars, but some people were observed using the soft tundra. If you carry a less sturdy tent or just a tarp, do you camp in the trees more? People used to go there for protection, then tents got better, and more camped in the open. Are they now moving back to the trees? There also may be a greater interest in open fires again, rather than carry stoves and the light weight pack rafts can alter use patterns with visitors starting to do hikes that involved a float out. In some places this can lessen impacts because of less foot traffic, but on the flip side visitors now camp in different places and used routes that formerly saw little use because of length/inaccessibility. Some users are using ultra-light gear to provide new challenges to the traditional wilderness experience; for example, some wilderness users carry only a day pack and travel at high speeds to cover as much ground in one day that might have taken two or more days to travel using traditional gear. What are the actual effects of the use of lightweight equipment? How can any degradation of biophysical resources or the experience of wilderness visitors be addressed?

Advanced Trail Construction Technology Geofabrics, geogrids and synthetics may offer managers many positives if trail repairs can be done that last longer, but are some of these materials allowing designated trails to occur in areas where they once would have not been considered feasible/economically practical? The typical and more accepted management response to trail impacts (formal or informal) is to concentrate, designate, and maintain. However, there are other management questions that should be asked so that designated trail system do not inadvertently expand into locations such as pristine cross-country zones and thereby limit spectrum of opportunities for an area. Advanced trail technologies make some trails easier to build, but this could lead to avoiding the decision making process of whether a trail should be created or not. Regulating use levels to the point of preventing unacceptable informal trail impact can be a politically hard decision, but may be essential to providing protection for experiences in certain types of the most pristine areas of wilderness.

APPENDIX B:

AGENCY POLICY AND GUIDANCE ON USE OF NEW TECHNOLOGY IN WILDERNESS: A COMPILATION

This appendix is a compilation of each U.S federal land management agency's policy and guidance regarding the use of new technology in wilderness as of December, 2015. It includes only the specific policy, if any, relevant to this issue.

Bureau of Land Management (BLM): BLM Manual 6340 – Management of Designated Wilderness Areas (Public)

6340 – Management of Designated Wilderness Areas (Public)

1.6 Policy

C. Managing Resources and Resource Uses in Wilderness

13. Recreational Use

e. New activities and technologies will be evaluated as they are developed. Neither the Wilderness Act nor this manual can anticipate all possible uses and technologies that may arise over time. When a new technology or activity is proposed for recreational use in a wilderness area, the BLM must first consider whether the technology or activity violates one of the prohibitions of Section 4(c), as defined in section 1.6.B and the Glossary. For example, geocaching with a physical cache is not permitted in wilderness since this activity violates Section 4(c) through its use of installations.

If a new activity or technology does not violate one of the Section 4(c) prohibitions, the BLM may allow it as long as it does not otherwise impair wilderness character. Geocaching with virtual caches, for example, does not violate any of the 4(c) prohibitions and may be allowed at the discretion of the manager. However, if this activity impacts an area's wilderness character—by drawing visitors to sensitive wilderness resources or impacting solitude, for example—the manager may prohibit this activity.

Fish and Wildlife Service (FWS): FWS Manual -Natural and Cultural Resources Management – Part 610, Wilderness Stewardship

Natural and Cultural Resources Management Part 610 Wilderness Stewardship

Note – There is no policy that specifically addresses use of technology other than UAS operation beyond the Wilderness Act Section 4(c) prohibited uses.

2.8 May the Service manage aircraft use in and over wilderness?

A. The Wilderness Act generally prohibits landing aircraft in refuge wilderness.

B. The Wilderness Act also generally prohibits landing aircraft in wilderness for refuge management activities (see [610 FW 1.16](#)) unless:

(1) We determine such use to be the minimum requirement for administering the area as wilderness, and the use is necessary to accomplish the purposes of the refuge, including Wilderness Act purposes;

(2) They are required to respond to an emergency involving the health and safety of a person or people, damage to property, or violations of civil and criminal law; or

(3) The uses are authorized in the enabling legislation. See [610 FW 5](#) for additional provisions applicable in Alaska.

C. The Wilderness Act and the Administration Act do not prohibit the use of aircraft over a wilderness area. The Federal Aviation Administration (FAA) is responsible for managing commercial and private air space. The FAA has established 2,000 feet (600 meters) above ground level as the minimum altitude advisory for refuges, including designated wilderness areas (see [FAA Advisory Circular 91-36c](#)). Other Federal laws (e.g., Airborne Hunting Act, Endangered Species Act, Bald Eagle Protection Act) may govern overflights above a refuge.

D. We may use aircraft over wilderness for refuge management activities, such as wildlife surveys, if we determine it is the minimum requirement for administering the area as wilderness and necessary to accomplish the purposes of the refuge, including Wilderness Act purposes, or if we are responding to an emergency involving the health and safety of people. We may conduct such flights at levels low enough to achieve refuge management objectives. However, we will conduct our aircraft operations in conformance with the FAA minimum altitude advisory whenever mission objectives and weather conditions allow. We conduct flights for administration of the wilderness in a manner consistent with safety concerns and public aircraft use recommendations and restrictions to the greatest extent possible. We must set a high standard and provide an example for the public to follow.

E. Other Federal, State, or tribal agencies may use airspace above refuge wilderness as necessary to fulfill their responsibilities consistent with applicable FAA and other laws, regulations and advisories (e.g., by the Department of Defense and the National Aeronautics and Space Administration). We will consult with other agencies using airspace above refuge wilderness to minimize adverse impacts on wilderness character.

F. Aerial sightseeing, wildlife viewing, and photography (collectively referred to as “flightseeing”) are activities that may conflict with refuge purpose(s), including Wilderness Act purposes, and result in unacceptable disturbance to wildlife and visitors. Although we lack jurisdiction over airspace, we discourage flightseeing and will work with the FAA to encourage all pilots to conduct overflights in conformance with the FAA minimum altitude advisory. We must enforce provisions of Federal laws that promote public safety or prohibit harassment of wildlife by aircraft. Wilderness administrators should monitor and document low-level aircraft activity.

Forest Service (FS): FS Manual 2300 - Recreation, Wilderness, and Related Resource Management, Chapter 2320 - Wilderness Management

Note – There is no policy that specifically addresses use of technology beyond the Wilderness Act Section 4(c) prohibited uses.

National Park Service (NPS): NPS Management Policies 2006; Director’s Order 41 – Wilderness Stewardship

Management Policies 2006

Chapter 6 – Wilderness Preservation and Management

Note – There is no policy that specifically addresses use of technology beyond the Wilderness Act Section 4(c) prohibited uses.

Chapter 8: - Use of the Parks

Provides guidance on determining new appropriate uses for all park areas but is not specific to wilderness.

Director’s Order #41 – Wilderness Stewardship

Note – There is no guidance that specifically addresses use of technology beyond the Wilderness Act Section 4(c) prohibited uses.



Policy Memorandum, June 20, 2014

NPS Director Jonathan B. Jarvis has directed superintendents nationwide to prohibit launching, landing, or operating unmanned aircraft on lands and waters administered by the National Park Service.

The policy memorandum directs park superintendents to take a number of steps to exclude unmanned aircraft from national parks. The steps include drafting a written justification for the action, ensuring compliance with applicable laws, and providing public notice of the action.

The policy memorandum is a temporary measure. The next step will be to propose a Service-wide regulation regarding unmanned aircraft. That process can take considerable time, depending on the complexity of the rule, and includes public notice of the proposed regulation and opportunity for public comment.

Applicable authority, definition and regulation language:

Authority: 36 CFR 1.5

Definition: The term "unmanned aircraft" means a device that is used or intended to be used for flight in the air without the possibility of direct human intervention from within or on the device, and the associated operational elements and components that are required for the pilot or system operator in

command to operate or control the device (such as cameras, sensors, communication links). This term includes all types of devices that meet this definition (e.g., model airplanes, quadcopters, drones) that are used for any purpose, including for recreation or commerce.

Closure Language: Launching, landing, or operating an unmanned aircraft from or on lands and waters administered by the National Park Service within the boundaries of [insert name of park] is prohibited except as approved in writing by the superintendent.

