

RECREATION AND WILDLIFE:

MANAGEMENT RECOMMENDATIONS FOR BALANCING PUBLIC ACCESS AND SPECIES CONSERVATION ON PROTECTED LANDS

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SUMMARY

Most protected lands, including increasing numbers of properties owned or managed by land trusts, have a dual or multiple-use mandate to provide public access for outdoor recreation and other human activities, while also protecting wildlife species and habitats. Access for outdoor recreation plays an essential role in generating political support and revenue for land conservation and management, and it provides important human health and economic benefits for local communities. Globally, protected areas receive an estimated eight billion visits per year, and in the United States, outdoor recreation activity increased by 40% in the last decade. A growing body of research demonstrates that even quiet, non-consumptive recreation activities (e.g., hiking and wildlife viewing) can negatively affect the behavior, habitat use, reproduction, and survival of individual animals and persistence of wildlife populations. To successfully balance the public access and species conservation goals of protected lands, and to increase support for management decisions and compliance by recreationists, managers need science-based guidance for decisions regarding recreation access and permitted uses.

The Wildlife Conservation Society and Sonoma Land Trust hosted a meeting June 11-12, 2018 at Pepperwood Preserve in Sonoma County, CA with a goal to *collaboratively generate science-based recommendations for how to balance objectives for public access and wildlife conservation in protected lands*. The co-authors, three scientists and three managers with expertise on recreation and wildlife and one facilitator, spent two days deliberating the challenges and opportunities for achieving the dual mandate of many protected lands (Appendix I). We offer this summary of management recommendations as a tool for opening a conversation about balancing visitation and protection of natural resources.

We collaboratively decided to tailor our recommendations for land managers. These include individuals who make decisions about land management in federal, state, or local resource management agencies, land trusts, or as private landowners. Land managers are important because they regulate public access to protected lands and make stewardship decisions about wildlife habitats and working lands. Managers can establish thresholds for the location and timing of visitor use and set expectations for the balance of access and protection. Additionally, managers are often charged with the enforcement of rules and communication to user groups. Importantly, managers must prioritize how to invest their limited resources, to protect and enhance habitat, while providing safe and sustainable recreational opportunities.

In a pre-workshop survey, the co-authors identified three promising strategies for balancing public access and wildlife conservation: 1) zoning, 2) conservation planning, and 3) collaboration and inclusion. In this document, we share recommendations within those categories, and we conclude with a discussion of the need for more specific and locally-relevant scientific evidence to guide protected land planning and management decisions.

In the absence of strong data, we encourage managers to use adaptive management, a structured approach to decision-making that combines management guidelines with a monitoring design to

promote scientific understanding and improve subsequent decisions (Salafsky et al. 2001). Under adaptive management of recreation access, we recommend that the burden of proof should be to demonstrate that multiple uses are compatible with resource protection. Where wildlife habitat is an important conservation value, we encourage managers to use the precautionary principle, consider physical separation of uses, and direct the most impactful uses farthest away from the most sensitive areas. We further recommend that land managers monitor human access as well as wildlife and habitat responses to track success of management actions.

The strategies and recommendations in this document provide managers with initial guidance for identifying locally-relevant information needs and making decisions about public access and wildlife conservation on protected lands. We highlight important considerations for managers who are facing decisions about this issue, often in the absence of conclusive scientific evidence specific to their management area and conservation values. Given the relatively small body of research examining the specific impacts of recreation on wildlife, and the trade-offs associated with meeting demands for access and conservation, we encourage managers to partner with universities, conservation organizations, and other research institutions to undertake some of the research and monitoring steps recommended throughout this document.

Much work is yet to be accomplished to address the growing demands for access on protected lands. This document is a starting point designed to foster dialogue at management agencies about what steps could be taken to thoughtfully consider the trade-offs of visitation and conservation while taking steps to monitor impacts and strive for outcomes that balance multiple demands on protected lands. We hope this work will inspire managers to engage in adaptive management to generate and refine best practices for balancing public access and species conservation.

Promising Strategy #1: Zoning

Implement spatial and/or temporal zoning within protected areas to protect priority wildlife species, habitats, or processes.

Assessment of key resources

- Understand policies that could influence implementation of zoning decisions
- Choose target species (e.g., desert tortoise, mission blue butterfly), communities (e.g., boreal species, woodland birds), habitats (e.g., sage brush, oak woodlands), and processes (e.g., dispersal, reproduction)
- Identify key spatial or temporal extent or location of priority species, communities, habitats, and/or processes, including important habitat connectivity areas
- Establish a baseline for visitor use and develop a program for monitoring users
- Establish a baseline of wildlife habitat use and develop a program for monitoring species responses

Principles for zoning decisions

- Associate closures with specific resources in need of protection or special management (e.g., closing rock climbing routes for peregrine falcon nesting)
- Ensure consistency of closures and zoning decisions with the best available science
- Be conservative when information is insufficient or inconclusive and be cautious about opening new areas for access
- Determine appropriate uses prior to opening, as it is more difficult to remove uses once they have been added
- Create a process for increasing public understanding of and support for zoning decisions

Design and planning

- Identify what type of zoning is important for protecting targeted resources (Table 1)
- Consider multiple options for closing and restricting use, including rerouting and temporary closures
- Cluster public access infrastructure in areas of high human activity or existing infrastructure outside the protected area
- Designate closed areas that are sufficiently large or connected to other undeveloped lands to ensure species persistence, according to the habitat requirements of target species
- Minimize edge-to-core ratio of closed areas
- Take advantage of existing or natural barriers (e.g., streams, steep slopes) in design of closed areas
- Keep through trails out of sensitive habitats and minimize use of spur trails in sensitive habitats (e.g., riparian zones, wetlands, etc.)
- Define buffer zones for specific life stages (e.g., reproduction) and tolerable levels of disturbance
- Seek synergies with other possible reasons for closures (e.g., fire, rain, trail conditions, etc.)
- Clearly map zoning designations for visitors, emphasizing locations of open areas

Construction practices

- Keep traffic out of critical wildlife movement zones (e.g., corridor pinch-points)
- Limit parking and staging areas to entry points that people are already use (i.e., natural entry points) to minimize disturbance
- Monitor for construction activities that could introduce invasive species (e.g., seeds on equipment)
- Establish and adhere to guidelines for width of access points, trails, and service roads

Adaptive management and monitoring

- Engage public, key ambassadors, local universities and/or students in monitoring resources
- Use baseline data from assessments of key resources to examine impacts of public access and use
- Adjust zoning parameters as monitoring indicates
- Evaluate new types of recreation activities and events on a case-by-case basis (e.g., drones, e-bikes, endurance events, etc.)
- Support closures and zoning with monitoring for rapid response to unauthorized use
- Incorporate actions into management plan to sustain habitat quality (e.g., fire, grazing, harvest, etc.)
- Coordinate across multiple agencies and user groups to develop and implement action plans for managing invasive species
- Create a stewardship culture where community works together to honor rules
- Ensure sufficient funding and staff capacity to enforce area or temporal closures
- Collaborate with user groups to provide engaging and compatible recreation opportunities in areas less sensitive to human disturbance

Table 1: Possible zoning designations for managing open and closed areas*

❖ Close areas, e.g., entire protected area, specific locations, specific trails
❖ Limit hours
❖ Limit use during specific seasons
❖ Limit group size
❖ Limit the number of people per day
❖ Limit domestic animals
❖ Limit types of activities
❖ Limit mode of travel
❖ Limit lights
❖ Limit off-trail use

**Scientific evidence regarding the effectiveness of these zoning designations is mixed. We encourage managers to investigate specific zoning designations relevant to their area's target species and designated uses, and ideally to implement and monitor zoning via adaptive management*

Promising Strategy #2: Conservation Planning

Conduct and support ongoing landscape-level and cross-jurisdictional conservation planning and management of prioritized recreation and conservation areas

Collaborative process

- Start by ensuring buy-in of top directors in land management agencies and land trusts, then convene staff members
- Identify a lead organization or individual
- Establish fora for collaboration among managers
- Compile existing policies and plans from all relevant organizations and landowners to identify opportunities and constraints to collaboration
- Enter into a memorandum of understanding (MOU) with engaged organizations to establish shared goals for collaborative planning and management
- Explicitly incorporate private landowners into landscape-level conservation efforts where possible
- Convene periodic meetings of all parties

Human dimensions

- Collect data on user groups to understand behaviors as well as needs, attitudes, and perceptions toward recreation, conservation and management of protected lands
- Conduct social surveys of protected land visitors and surrounding communities to understand demographics, attitudes, preferences, etc.
- Survey user groups regarding their perceptions of conservation areas and valuation of nature experience relative to type and intensity of use
- Use information on human uses, development and infrastructure to plan for outdoor recreation opportunities in less sensitive or near already impacted areas
- Use information on human uses, development and infrastructure to locate access for outdoor recreation opportunities close to where people live and prepare to manage high use
- Use communication science to frame messaging about visitation to protected areas and potential impacts (e.g., focus on health benefits and the regenerative role of nature for humans, emphasizing these benefits are important to wildlife too)

Mapping and modeling

- Compile species, communities, habitat, and/or process data
- Identify which species, communities, habitats, and/or processes need landscape-level conservation approaches (i.e., may be all, or scale may vary by resource)
- Identify large-scale habitats, corridors, etc. in your region (i.e., what habitat types and/or species do we have and how are they connected)
- Model importance of potential conservation areas in broad-scale ecological processes (e.g., climate adaptation)
- Map recreation accessibility for visitors into individual protected areas
- Identify recreation networks and patterns that cross jurisdictions (e.g., trail networks that cross boundaries) and understand visitor use at landscape-level
- Evaluate how permitted uses vary across the landscape and within recreation networks
- Model population growth and land-use change to estimate future visitation patterns
- Assess connectivity/permeability across nodes to see if conservation areas are isolated and, if so, consider them for increased recreational use

- Map areas for transportation or ease of access (e.g., if they are highly accessible, prioritize recreation there)
- Prioritize some protected areas within the larger landscape of protected areas for different levels of visitation and different types of human activity

Resources:

- Seek incentives (e.g., grants or awards) to support landscape-level planning
- Create a shared fund to support collaborative planning and management
- Support agencies with strained budgets with design and management of resources
- Connect to existing large landscape collaborations

Promising Strategy #3: Collaboration and Inclusion

Establish and sustain a collaborative and inclusive culture to support the balance of recreation access and wildlife conservation through outreach and education

Acknowledge trade-offs

- Conduct social surveys to assess visitor tolerance for trade-offs between recreation and conservation priorities
- Acknowledge and communicate trade-offs and seek to optimize among competing priorities
- Engage protected land visitors and user groups in recreation planning, but make clear that regulatory oversight is with land managers
- Bring an open mind to understanding diverse user groups and protected area constituencies

Involving users

- Build a community of visitors and educate around resource management (e.g., via sign-ups, friendly faces, events)
- Invest in user group participation in access management and resource stewardship
- Include different types of users in planning and management decisions (e.g., leaders, docents/volunteers, organizations, and/or staff)
- Engage user groups in participatory monitoring of recreational use and wildlife resources
- Engage user groups in implementing management solutions
- Engage user groups in other stewardship activities supporting conservation goals
- Engage with local youth organizations for citizen science or other educational opportunities to reach “future recreationists”
- Use docent or other volunteer presence to monitor and deter users from restricted use or closed areas, while recognizing limitations of volunteers who lack authority for enforcement
- Use guided tours to provide limited but quality visits into restricted use or closed areas
- Establish relationships with user groups and recreation industry groups
- Recruit leaders among recreation users and industry groups to educate their members and develop solutions together
- Reach out through individuals in recreation user groups and/or activity types that have sway in those communities
- Test influence of stewardship community of practice, including scientist practitioners and public, on behavior and conservation outcomes

Equity and inclusion

- Be inclusive of and engage those not directly using protected areas currently (e.g., non-users) in land protection and options for increasing access to a broader constituency
- Define “nature experience” broadly, and create outdoor opportunities in urban areas
- Create an equitable user fee system across jurisdictions and among user types, accounting for visitors’ ability to pay

Communication

- Reach out to local universities or other educational organizations to assist with education, outreach, and interpretation (e.g., environmental education programs)
- Partner with scientists and researchers skilled in scientific communication to assist with education and outreach activities (e.g., seminar series and science publications)
- Promote citizen science to help communicate trends documented through monitoring
- Create a communications plan and engage public media

- Involve influential outdoor athletes in communicating messages about balancing recreation and conservation
- Develop outreach materials in advance of allowing greater access
- Coordinate with journalists to build media coverage
- Popularize and individualize your conservation target (e.g., mountain lions in Los Angeles)
- Use social media for sharing and promoting visitor guidelines (e.g., leave no trace)
- Share assessment information of baseline conditions and subsequent monitoring of wildlife or human use, while protecting sensitive resources to avoid collection or other disturbance

Education

- Provide facilitated experiences in nature observation (e.g., guided bird walks, nature photography)
- Provide educational hikes or property tours
- Make stewardship and science visible to recreational visitors (e.g. include images of scientists doing the work in outreach materials, provide interpretation materials that explain the on-going stewardship or data collection)
- Ensure education activities are self-sustaining

Conclusion: Need for More Specific Guidance

At the end of the meeting, we discussed the broad challenges regarding the lack of detailed and locally-relevant scientific evidence to support manager decisions to balance conservation of wildlife and maintaining public access. We agreed that providing more specific scientific guidance for designation of permitted uses and thresholds of visitation would assist managers making decisions about visitation to protected areas. Given the relatively small body of research examining the specific impacts of recreation on wildlife, and the trade-offs associated with meeting demands for access and conservation, we encourage managers to partner with universities, conservation organizations, and other research institutions to undertake the research and monitoring steps recommended throughout this document.

This guidance would include answers to questions such as: At what distance from the critical habitat area can Activity X be allowed? What is the ecological impact zone of Activity Y? We noted that resource assessment tools or other similar resources do exist in some contexts (e.g., noise thresholds for snowmobiles in Yellowstone National Park) and could be synthesized for best practices (Dertien et al. 2018).

In the absence of strong locally relevant data and specific guidance, we share two recommendations. First, we recommend using the precautionary principle, particularly in areas where wildlife habitat is an important conservation value. The strongest application of the precautionary principle is to keep an area closed to the public to ensure preservation goals can be met, while establishing baseline information about natural resources in the area. Second, once a decision is made to open an area, we recommend managers make decisions using adaptive management. Adaptive management is a structured approach to decision-making that combines management guidelines with a monitoring design to promote scientific understanding and improve subsequent decisions (Salafsky et al. 2001).

Under adaptive management of recreation access, we recommend that *the burden of proof should be to demonstrate that multiple uses are compatible with conservation objectives*. Managers can achieve this by establishing clear adaptive management guidelines to monitor the impacts, allowing visitors *in small numbers at certain limited times then assessing and evaluating impacts*, and finally adding additional activities, visitors, and trail distances iteratively. For example, a manager could consider a spatial approach to adaptive management where some areas are open to a few visitors for a single activity, visitor use and wildlife responses are monitored, and if impacts are minimal, then perhaps more visitors are allowed or an additional activity is added. Similarly, if visitors desire an expanded trail system, managers can begin by adding a short distance, and then monitor wildlife responses and assess whether to add additional distance.

Given the paucity of available scientific data on the effects of visitors and activities on wildlife, we encourage managers to develop testable hypotheses as part of the adaptive management process and continue to improve the guidance available to land managers, including specific recommendations for quantitative thresholds of acceptable impacts (Dertien et al. 2018). When evaluating, managers should seek to answer the following questions:

- Do the impacts have a biologically significant effect on the target resources for protection?
- Are the impacts acceptable (i.e., to managers, visitors, and conservationists)?
- Is access being managed in a way that keeps these impacts at their absolute minimum, given the competing mandates for allowing access?

As demand for public access increases, decision-makers need to consider how best to manage visitors and protect wildlife, habitats, and ecological processes. The strategies and recommendations contained in this document provide a starting point for managers to begin conversations about balancing public access and species conservation in protected areas as well as understand the types of information needed for

decision-making and the approaches that could help achieve that balance. We hope that this work will inspire managers to engage in adaptive management to understand how decisions about visitor access and use impact wildlife and contribute to the growing body of knowledge for best practices on balancing public access and species conservation.

Additional Resources

For further information on the effects of recreation on wildlife, we recommend starting with the following resources:

- Dertien, J.S., C.L. Larson and S.E. Reed. 2018. Adaptive management strategy for science-based stewardship of recreation to maintain wildlife habitat connectivity. Wildlife Conservation Society, Americas Program, Bronx, NY, USA. tinyurl.com/rec-mgt-report
- Hammitt, W.E., D.N. Cole and C.A. Monz. 2015. Wildland Recreation: Ecology and Management. Wiley Blackwell, Oxford, United Kingdom. 307 pp.
- Hennings, L. 2017. Hiking, mountain biking and equestrian use in natural areas: A recreation ecology literature review. Metro. 169p.
<https://www.oregonmetro.gov/sites/default/files/2017/09/28/Metro-Recreation-Ecology-Literature-Review.pdf>
- Larson C.L., Reed S.E., Merenlender A.M., and Crooks K.R. 2016. Effects of recreation on animals revealed as widespread through a global systematic review. PLoS ONE 11(12): e0167259.
- Shannon, G., C.L. Larson, S.E. Reed, K.R. Crooks and L.M. Angeloni. 2017. Ecological consequences of ecotourism for wildlife populations and communities. Pages 29-46 in Blumstein, D., B. Geffroy, D. Samia and E. Bessa (editors), Ecotourism's Promise and Peril. Springer, Cham, Switzerland.

Resources for adaptive management:

- Salafsky, N., R. Margoluis and K. Redford. 2001. Adaptive management: A tool for conservation practitioners. Biodiversity Support Program, Washington, DC.
<http://www.fosonline.org/wordpress/wp-content/uploads/2010/06/AdaptiveManagementTool.pdf>
- Stankey, George H.; Clark, Roger N.; Bormann, Bernard T. 2005. Adaptive management of natural resources: theory, concepts, and management institutions. Gen. Tech. Rep. PNW-GTR-654. Portland, OR: U.S. Department of Agriculture, Forest Service, Pacific Northwest Research Station. 73 p. https://www.fs.fed.us/pnw/pubs/pnw_gtr654.pdf
- Williams, B. K., R. C. Szaro, and C. D. Shapiro. 2009. Adaptive Management: The U.S. Department of the Interior Technical Guide. Adaptive Management Working Group, U.S. Department of the Interior, Washington, DC. <https://www2.usgs.gov/sdc/doc/DOI-%20Adaptive%20ManagementTechGuide.pdf>

Resources for management of recreation use:

- Anderson, D.H., D.W. Lime, and T. L. Wang. 1998. Maintaining the quality of park resources and visitor experiences: A handbook for managers. University of Minnesota Extension Service: Tourism Center. 135pp.
- Interagency visitor use management council, 2016. Visitor Use Management Framework A Guide to Providing Sustainable Outdoor Recreation, Edition One
https://visitorusemanagement.nps.gov/Content/documents/lowres_VUM%20Framework_Edition%201_IVUMC.pdf

Appendix I - About the Authors

Ashley D'Antonio, Ph.D. is an Assistant Professor in the Department of Forest Ecosystems and Society at Oregon State University. She is a recreation ecologist that uses interdisciplinary approaches to understand visitor movement and behaviors in parks and protected areas and the ecological consequences of those behaviors. Much of Dr. D'Antonio's work strives to make predictive models of visitor behavior and anticipate the responses of various ecosystem components to the pressures of recreation use. She has worked in various National Parks throughout the West, as well as Forest Service lands, and with non-profits managing urban-proximate natural areas.

Jutta Burger, Ph.D. is Science Program Director at the California Invasive Plant Council in Berkeley, CA. She has over 18 years of experience in conservation which include overseeing the resource management program for an urban-adjacent wildland reserve system in southern California at the Irvine Ranch Conservancy. As a land manager and applied scientist, Jutta has developed monitoring and management programs for invasive species, recreation and wildlife, has facilitated repair of habitats through landscape-scale restoration, and works to foster human connections to nature through volunteer stewardship and citizen science. Her role has included directing one of the longest running remote camera wildlife and recreation monitoring programs in the country to inform recreation management decisions.

Heidi Kretser, Ph.D., is a Conservation Social Scientist with the Wildlife Conservation Society's Americas Program and serves as Adjunct Associate Professor at the Cornell University Center for Conservation Social Science. For over 20 years, Dr. Kretser has worked to improve conservation of wildlife and wildlands by using tools and perspectives from the social sciences to incorporate the human dimensions of natural resource policy and management into conservation practice. She has worked on several projects supported by private foundations, state government and the National Science Foundation addressing the impacts of recreation on wildlife.

Bryan Largay is Conservation Director of the Land Trust of Santa Cruz County, where he oversees planning and management, preservation and restoration of sensitive habitats as well as provision of recreational access and conservation of working lands. During his 25 years in the conservation field, he has worked to conserve and restore habitat throughout the Monterey Bay region with an emphasis on wetlands and watersheds. Bryan holds an M.S. in hydrologic sciences.

Adina Merenlender, Ph.D., is a Cooperative Extension Specialist in the Department of Environmental Science, Policy and Management at UC Berkeley. She is a conservation biologist with over 100 scientific research articles on the forces that influence biodiversity loss. Her work in environmental problem solving includes the use of spatially-explicit decision-support systems for conservation planning. Adina started the UC California Naturalist program to foster a community of volunteer naturalists and citizen scientists trained and ready to take an active role in natural resource stewardship, conservation, and education. She is also the co-author of "Corridor Ecology" and "The California Naturalist Handbook" See more at <http://ucanr.org/sites/merenlender>

Tony Nelson is the Sonoma Valley Program Manager for Sonoma Land Trust, managing several preserves, directing a regional wildlife corridor conservation program, and developing and implementing targeted research and monitoring programs. He has B.S. and M.S. degrees in wildlife and fisheries ecology and has been working in conservation fee land and easement stewardship for 25 years.

Sarah Reed, Ph.D., is the Director of Applied Conservation Science for the Americas Program of the Wildlife Conservation Society and an Affiliate Faculty member in the Department of Fish, Wildlife and Conservation Biology at Colorado State University. She has 20 years of experience researching how land development and human activities affect wildlife and biodiversity, and working with communities and government agencies to apply conservation science to land-use policy and land management.