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Online Recovery Plans for Threatened and Endangered Species

Jacob Malcom, Defenders of Wildlife

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Project Title

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Abstract/Executive Summary

Introduction and Objectives

The U.S. Endangered Species Act (ESA) requires that the U.S. Fish and Wildlife Service (FWS) and the National Marine Fisheries Service develop written plans for recovering threatened species and endangered species unless such planning would not aid the species' conservation. The content and development of recovery plans has evolved significantly over the years, but plans are still fundamentally paper-based and static. Although this format describes the challenges and needs for the species at a point in time, it has significant drawbacks: plans are rarely updated more than once every few decades; they are impossible to integrate with other sources of information; and they are difficult to navigate. The goal of this project was to create a web-based, data-integrated recovery plan for the eastern indigo snake (*Drymarchon couperi)* that would enable improved decision-making and more effective collaboration among the parties whose actions affect the conservation of the species, including the Department of Defense.

Technical Approach

Collaborating with the FWS, Defenders of Wildlife digitized the Species Status Assessment for the eastern indigo snake, tested various platforms for distribution, and developed draft software plugins to integrate real-time data. We demonstrated these resources to our partners at the FWS and DoD and discussed key challenges to be addressed.

Results

Although FWS was unable to provide data or data connections to dynamically linked elements, Defenders developed a partial online recovery plan for the eastern indigo snake, found at https://drcoco.esarecovery.org containing information from version 1 of the eastern indigo snake Species Status Assessment, in user-friendly format.

Benefits

In addition to the partial online recovery plan that we developed, through the challenges we faced in receiving integrated, real-time data to fully complete our objectives, Defenders has provided recommendations for agencies to help inform future projects related to the transition to web-based recovery plans and implementation tools, including: formal data- and information-sharing agreements; and prioritization of technology and innovation as well as collaborative processes that improve the efficiency of ESA implementation.

Introduction

The U.S. Endangered Species Act (ESA) requires that the U.S. Fish and Wildlife Service and the National Marine Fisheries Service (FWS and NMFS respectively; collectively, the Services) develop written plans for recovering threatened species and endangered species unless such planning would not aid the species' conservation. The content and development of recovery plans has evolved significantly over the years, but plans are still fundamentally paper-based and static. Although this format describes the challenges and needs for the species at a point in time, it has significant drawbacks: plans are rarely updated more than once every few decades; they are impossible to integrate with other sources of information; and they are difficult to navigate.

Defenders of Wildlife, with support from FWS, received a Department of Defense (DoD) Legacy award to establish a pilot program for developing dynamic, online ESA recovery plans, using the eastern indigo snake (*Drymarchon couperi)* as an example species.

Project Description

Background

Challenges with Current Recovery Plans

A 2018 review of ESA recovery plans (Malcom and Li 2018) showed that a quarter of listed species lack a recovery plan, and many existing recovery plans are outdated and sometimes decades old, with the median age of existing plans being over 21 years old. These dated plans may contain obsolete information, lack important new data on threats, miss changes to the species status, and miss our (collective) evolving understanding of what recovery means under the ESA. These issues make it difficult for conservationists to use these plans to move species toward their recovery goals. These "classic" plans have three main shortcomings:

- *Slow to update.* Scientists and conservationists rapidly learn new information about species, but recovery plans are rarely updated more than once every few decades. As a result, many recovery plans are vastly outdated. The ESA requires the Services to review a species' status once every five years, but those reviews do not trigger immediate updates to recovery plans. Even a five-year cycle may be too slow. For

example, the Indiana bat (*Myotis sodalist*) five-year review was drafted just as the severe threat of white-nose syndrome was emerging. Neither the review nor the recovery plan has been updated to reflect this impediment to recovery.

- *Difficult to integrate.* Recovery does not exist in a vacuum, but static recovery plans make it impossible to integrate information from online databases on ESA section 7 consultations, voluntary conservation agreements, species occurrences, and other sources relevant to recovery.

- *Limited engagement.* Teams that include experts both inside and outside of government write recovery plans; Draft plans are subject to public review and comment. However, after a plan is finalized there are few opportunities for public engagement on the document. Another problem is that many plans are over 100 pages long —with some being some over 1,000 pages—with no easy way to quickly navigate between sections beyond manually scrolling through a PDF document. This inconvenience reduces the likelihood of people reading a plan and engaging in recovery actions.

Benefits of dynamic online recovery plans

The goal of this project was to overcome the issues associated with static recovery plans and use modern internet technology to create a dynamic online recovery plan. This "living document" would be edited and published online, allowing for more interactive content that is easier to navigate. Other key benefits of these online recovery plans include:

- *Quick to update.* The online plan model facilitates quick updates and allows new science to be more regularly—and as necessary, rapidly—integrated into these recovery plans by FWS as it becomes available. As a result, an online plan is more likely to contain the best available science and be viewed as a credible source of information to guide management decisions. All updates will be automatically recorded, and the change log will be accessible to the public, ensuring complete transparency. The ability to integrate new information as it becomes available and is deemed relevant will help to reduce the existing workload for FWS biologists, as parts of the plan can be updated piecemeal without a full plan revision.

- *Easy to integrate.* As the internet's colloquial name, the Web, implies, it is designed to link disparate pieces of information—to create a web of knowledge. With the Services beginning to open more of their data to the public (*e.g.*, monitoring and permitting data), the Web offers the perfect platform to link information back to recovery plans. For green sea turtles alone, FWS has conducted 2,063 permit evaluations since 2008 (of which 261 might involve actions harming the species). This data should be immediately available to recovery partners.

- *Amenable to engagement.* The Web has become a major part of modern life largely because of its ability to engage the public. A dynamic recovery plan can encourage more discussion and information-sharing among stakeholders. For example, a species expert could read a dynamic recovery plan online and, in five minutes, submit a request to FWS to update information on the distribution of the species. Static plans cannot allow that level of engagement.

All of these characteristics would benefit the DoD by making recovery plans easier to implement, linkages to DoD operations clearer, and by improving tools for collaboration for recovery.

Objectives

The goal of this project was to create a web-based, data-integrated recovery plan for the eastern indigo snake that would enable improved decision-making and more effective collaboration among all of the parties whose actions affect the conservation of the species, including DoD. A dynamic plan would allow for updates to the plan to be added by FWS rapidly when science reveals new solutions to a problem or when a species' status changes; integrate real-time information about endangered species permitting that might impede recovery; and provide conservationists, landowners, federal agencies, and policy-makers with updated information to accelerate recovery.

Our dynamic online recovery plan for the eastern indigo snake aimed to include the following elements:

- Display information collected from across other online databases about the species, allowing users to better understand the many factors that affect recovery. For example, users would be able to explore the activities for which FWS has permitted incidental take for the species.

- Feature a discussion board that allows recovery partners and other members of the public to post questions and share ideas on recovery. For instance, if a conservation bank has identified an effective method for compensatory mitigation, they might describe the method on the discussion board. FWS staff or species experts would monitor the discussion and respond to questions if time allows but are under no obligation to do so.

- We would create secured log-in access for FWS staff to revise any part of the online plan and limited, secure log-in access for DoD staff to revise select parts of the plan (e.g., updates on recovery actions carried out by DoD). This approach allows approved recovery partners to contribute to the contents of an online recovery plan so that the responsibilities do not fall solely on FWS.

We established four objectives for this project:

1. Create a fully functional online recovery plan that incorporates features such as secure authentication log-in and the ability to easily revise any portions of the plan;
2. Ensure the online plan is easy to navigate, intuitive and aesthetically pleasing;
3. FWS would formally adopt the online plan as a compliment to or substitute for any traditional-format recovery plan they publish for the eastern indigo snake; and
4. Widely disseminate the online plan developed for the eastern indigo snake, with interest in adopting it as a model for other species recovery plans.

Methodology

To develop the online recovery plan, we met several times between 2017 and early 2020 with species recovery leads, including once in person; FWS participants included Michele Elmore,

Roy Hewitt, Matthew Dekar, Donald Imm, Drew Becker, and Michelle Eversen. In addition, we met or had calls with Alison Dalsimer, Ryan Orndorff, and others in the DoD Natural Resources program. In these meetings, we worked through the ideas and ranges of possibilities for the eastern indigo snake online recovery plan; developed lists of data and draft software plugins needed to create real-time data integrations; and dove into the security and deployment requirements. All development was done by Defenders of Wildlife. A partial online plan was published on a WordPress site created by Defenders with access granted to FWS to add and deploy content.

Materials

The materials used in this project were laptops and remote servers to transfer information provided by FWS to the online recovery plan prototype. Defenders tested various platforms for online plan distribution and developed draft software "plugins" to integrate real-time data. This site is built on WordPress.

Results and Discussions

Defenders was able to develop a partial online recovery plan for the eastern indigo snake, found at https://drcoco.esarecovery.org. It contains information from version 1 of the eastern indigo snake Species Status Assessment (SSA) published in 2018, in what we find to be a user-friendly format. This online plan includes copies of the text, maps and all images found in the PDF of the SSA. Unfortunately, because the data or data connections were not provided by FWS, the inclusion of any dynamically linked elements, such as direct integration of near-real time section 7 permitting data, was not possible. This site is built on WordPress given the outcome of discussions with FWS during the early phases of development and the basic needs for adding content and then transferring to the agency for deployment (but see below). Defenders tested various platforms for online plan distribution and developed draft software "plugins" to integrate real-time data. The eastern indigo snake recovery plan was ultimately revised as this project was wrapping up, and Defenders offered recommendations to FWS for improvements to their accompanying draft recovery plan and

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recovery implementation strategy. Unfortunately, these elements were not adopted and therefore were not incorporated in the online example.

Problems encountered

Despite early hopes for success, the online recovery plan project encountered several problems that prevented us from achieving all our objectives. Below we provide a synopsis of those challenges:

1. *Necessary data and information from FWS were delayed or never provided.* Data and information essential for drafting and deploying the online recovery tool were consistently delayed by FWS or were never provided, so that many of the key advances we proposed could not be developed. We ultimately received two draft documents for the recovery plan revision from FWS in late November 2019, after nearly two years of delays in development. Further, this occurred at the same time when the documents were released to the public, which undercut what we believed was a sense of collaboration that should include early engagement. Essential data integrations, such as access to geospatial data APIs, a public API for consultation data, and others were never supplied despite numerous requests and attempts, and Defenders had no way to resolve these data gaps alone.

2. *Delays arising from FWS IT development.* Some of the delays of the technical work arose because FWS is currently developing a new IT infrastructure (ECOSphere). This is a long-term, agency-wide project and it is not clear when it will be complete. As a result of headquarters-level development, regional offices such as the Southeast where this plan was developed are generally unable to move forward with new local IT developments that could use the national "backbone." We have not received any clear answers when we have inquired about how ECOSphere could be used to integrate into online recovery plans, or if it might include modules for recovery planning and implementation resources. Because of this, we have been unable to make further progress on the online recovery tool itself.

3. *Resistance to incorporating external data.* Data from conservation partners, such as reintroduction program data from the Association of Zoos and Aquariums (AZA) or recovery and status data from other federal agencies, would build a more robust and accurate picture of eastern indigo snake recovery. Unfortunately, despite some early indications that we could incorporate this data into online recovery plans, that issue was never resolved with FWS. Ultimately, concern about how much this data should contribute to recovery planning and implementation for the snake without collection/verification oversight from FWS was given too much weight for its inclusion. Further, there were also concerns with the privacy of the online recovery plan data, some of which may be conservation-sensitive (e.g., locality data of poached species). Unfortunately, this problem did not affect just this project but also other collaborations, such as with AZA.

We will continue to maintain the partial recovery plan developed by Defenders for the eastern indigo snake on a demo page linked through the Center for Conservation Innovation's website (https://defenders-cci.org/) to illustrate the ideas of this project, even though we are unable to complete a full integration and transfer to FWS as originally proposed.

Conclusions

In conclusion, we were able to only partially accomplish objective 1, established above; we accomplished objective 2 as far as available content allowed; and were unable to accomplish objectives 3 three and 4. As part of Defenders involvement in the Cooperative Wildlife Protection and Recovery Initiative, of which the U.S. Army Corps of Engineers and many others are partners, we will engage on Least Bell's Vireo conservation and other species for which web-based recovery tools may be applied.

Benefits to the DoD

Unfortunately, because most of the key objectives were not achieved, the realized benefits to the DoD and the military mission (e.g., readiness) are limited.

We intended that this project would allow DoD to enhance military readiness and species recovery by producing at least one fully-functional online recovery plan that FWS and DoD staff would be trained and have access to update and reference. The platform would make recovery plans easier to implement, linkages to DoD operations clearer, and improve tools for collaboration for recovery.

While a full recovery plan platform was not able to be released to provide the described benefits, our hope is that the recommendations below can be adopted and applied by the FWS, DoD, non-governmental organizations and other conservation partners in future projects.

Recommendations

Defenders continues to believe that a transition to web-based recovery plans and implementation tools can significantly improve the efficiency and effectiveness of recovery of ESA-listed species. To help inform future projects—and related topics—we offer the following recommendations:

1. *Formal data- and information-sharing agreements are needed from the start.* To address the fundamental problem of limited data sharing, formal data- and information-sharing agreements should be developed and signed by high-level representatives of FWS, Defenders, and other named parties in a proposal. While FWS signed a general letter of support for the project and there were verbal agreements about making data available and sharing documents like drafts of the SSA or revised recovery plan, the lack of a Memorandum of Understanding or similar agreement meant there was no strong signal that data- and information-sharing was a substantial priority nor any recourse to resolve the gaps that arose. A good MOU will include not only specific types of data and information that are known ahead-of-time, but also provisions for the discovery of new data sources

and partners, as happened with AZA reintroduction data mid-way through the project.

2. *FWS leadership should prioritize use of technology and innovation that improve the efficiency of ESA implementation.* This project was an example focused on one of the primary purposes of the ESA, recovering species so that the protections of the law are no longer necessary, but there are numerous ways in which technology and innovation (e.g., in policy) could be used to improve the efficiency of conserving species. While some newer technology is being developed, such as the increased use of IPaC for consultations, our sense from this and other projects is that it is not a priority at the top of the agency and therefore not a priority down through the ranks. For example, we repeatedly requested that IT specialists in the Southeast region join us to work out details of how a prototype might be hosted and deployed by FWS. Unfortunately, that never occurred; this is consistent with the hypothesis that this is (in part) because there is not a sense of priority for using technology to improve efficiency of ESA implementation. We recognize that adopting new technologies may require new policies and procedures and encourage FWS to be willing to innovate in the policy realm.

3. *FWS leadership should prioritize more collaborative approaches to ESA implementation.* Our experience with this project reflects a common theme: a "go-it-alone" culture that places FWS in a mindset that only they can develop new tools or provide data on species status or recovery. This is not to say the agency should give up regulatory authority (or could if they wanted to), but instead, that a greater focus should be placed on creating a culture of collaboration for recovery. Even if top leadership are not closely involved with similar projects in the future, they set the tone that carries down to the field staff who make recovery happen. Even restricted to just this domain of conservation technology, we hope for a day when FWS personnel embrace and encourage the opportunity to bring in data from other reliable parties in near-real time and when they accept offers for others

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to write applications like web-based recovery plans for them; and seek other opportunities for collaboration that would improve the efficacy and effectiveness of species recovery. Ultimately, FWS cannot address the biodiversity crisis on its own, and must change its culture to be welcoming of the breadth of partners that are needed.

Literature Cited

Malcom, J.W. & Li, Y.-W. (2018). *Missing, delayed, and old: The status of ESA recovery plans*. Conservation Letters, 11, e12601.