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Hurdles to developing quantitative decision support for Endangered Species Act resource allocation

Gwenllian D. Iacona[1,2]*, Stephanie Avery-Gomm[1,2], Richard F. Maloney[3], James Brazill-Boast[4], Deborah T. Crouse[5], C. Ashton Drew[6], Rebecca S. Epanchin-Niell[7,8], Sarah B. Hall[9], Lynn A. Maguire[10], Tim Male[11], Jeff Newman[5], Hugh P. Possingham[1,2,12], Libby Rumpff[13], Michael C. Runge[14], Katherine C. B. Weiss[15,16], Robyn S. Wilson[17], Marilet A. Zablan[9] and Leah R. Gerber[15,18]

[1]Centre of Excellence for Environmental Decisions, University of Queensland, Brisbane, QLD, Australia, [2]School of Biological Sciences, University of Queensland, Brisbane, QLD, Australia, [3]Department of Conservation, Planning and Support Unit, Biodiversity Group, Dunedin, New Zealand, [4]Conservation Programs Branch, Conservation and Regional Delivery, Office of Environment and Heritage, Sydney, NSW, Australia, [5]Retired US Fish and Wildlife Service, Washington, DC, United States, [6]KDV Decision Analysis LLC, Morrisville, NC, United States, [7]Resources for the Future, Washington, DC, United States, [8]Department of Agricultural and Resource Economics, University of Maryland, College Park, MD, United States, [9]United States (US) Fish and Wildlife Service, Ecological Services, Portland, OR, United States, [10]Nicholas School of the Environment, Duke University, Durham, NC, United States, [11]Environmental Policy Innovation Center, Washington, DC, United States, [12]Office of the Chief Scientist, The Nature Conservancy, Arlington, VA, United States, [13]School of BioSciences, The University of Melbourne, Melbourne, VIC, Australia, [14]United States (US) Geological Survey, Eastern Ecological Science Center at the Patuxent Research Refuge, Laurel, MD, United States, [15]School of Life Sciences, Arizona State University, Tempe, AZ, United States, [16]National Socio-Environmental Synthesis Center, Annapolis, MD, United States, [17]College of Food, Agricultural and Environmental Sciences, School of Environment and Natural Resources, The Ohio State University, Columbus, OH, United States, [18]Center for Biodiversity Outcomes, Arizona State University, Tempe, AZ, United States

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EDITED BY
Aaron Haines,
Millersville University of Pennsylvania, United States

REVIEWED BY
Jacob Malcom,
United States Department of the Interior, United States
Mike Scott,
University of Idaho, United States

*CORRESPONDENCE
Gwenllian D. Iacona
gdiacona@gmail.com

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The U.S. Fish and Wildlife Service oversees the recovery of many species protected by the U.S. Endangered Species Act (ESA). Recent research suggests that a structured approach to allocating conservation resources could increase recovery outcomes for ESA listed species. Quantitative approaches to decision support can efficiently allocate limited financial resources and maximize desired outcomes. Yet, developing quantitative decision support under real-world constraints is challenging. Approaches that pair research teams and end-users are generally the most effective. However, co-development requires overcoming "hurdles" that can arise because of differences in the mental models of the co-development team. These include perceptions that: (1) scarce funds should be spent on action, not decision support; (2) quantitative approaches are only useful for simple decisions; (3) quantitative tools are inflexible and prescriptive black boxes; (4) available data are not good enough to support decisions; and (5) prioritization means admitting defeat. Here, we describe how we addressed these misperceptions during the development of a prototype resource allocation decision support tool for understanding trade-offs in U.S. endangered species recovery. We describe how acknowledging these hurdles and identifying solutions enabled us to progress with development. We believe that our experience can assist other applications of developing quantitative decision support for resource allocation.

KEYWORDS

threatened species, conservation decisions, Endangered Species Act recovery planning, stakeholder engagement, conservation resource allocation

Introduction

The U.S. Fish and Wildlife Service (FWS) and the National Marine Fisheries Service (NMFS) are responsible for the recovery of approximately 1,670 species in the U.S. listed under the Endangered Species Act (ESA; https://ecos.fws.gov/ecp/report/boxscore). To guide the recovery of listed species the agencies develop recovery plans that identify the actions needed to improve the status of species and then allocate resources directly to recovery actions or use those resources to support partnerships to achieve recovery. Recovery actions aim to counteract threats so species can be delisted and no longer need protection under the ESA (Goble, 2009). However, available funding perpetually limits the implementation of required recovery efforts (Male and Bean, 2005; Malcom et al., 2019). The recent move toward a Species Status Assessment (SSA)-based approach to recovery facilitates faster development of shorter and better-targeted recovery plans (USFWS, 2019), but this efficiency gain in planning does not often result in the funding necessary to implement those plans. Thus, quantitative decision support based on project cost-efficiency has been suggested as a useful approach for helping managers allocate limited ESA funding to multiple priorities (Possingham et al., 2002; Langpap and Kerkvliet, 2010; Evans et al., 2016).

Modern quantitative decision support frameworks can enhance outcomes of conservation decision making and are widely used in conservation planning (Gregory et al., 2012; Hammond et al., 2015; Hemming et al., 2022). Such frameworks can enhance resource allocation efficiency by aligning efforts to stated objectives, accounting for uncertainty, exploring resources required to maximize gains (or minimize risks) (e.g., Joseph et al., 2009; Martin et al., 2018). However, some end-users regard quantitative decision support frameworks as too simplistic for the complexities of real-world decision-making or too complicated for implementation (Gibson et al., 2017). These perceptions can stem from misconceptions about how quantitative models support decision-making (Addison et al., 2013; Possingham, 2013) or to mismatches between the approach and the realities of a project, such as decision support development that misses the relevant complexity of the decision context or that does not include end-users (Soderquist, 2011).

Careful co-development between subject matter experts and end-users is critical to help ensure an appropriate solution to mismatches of approach and reality in decision support development (Gerber et al., 2020). Mental models are individuals' codified perceptions and these can inform the expectations or intent of a decision-maker (Jones et al., 2011). Thus, a co-development process will need to overcome "hurdles" that arise when stakeholders' mental models of the process are, or are perceived to be, in conflict with the formulation of the decision support tool. Often, these hurdles to development stem from perceptions about what quantitative decision support can and cannot achieve, and what developing it entails. Overcoming these hurdles is critical to enabling the development of decision support tools that can be implemented. Thus, in this paper we document the hurdles that arose during development of a decision support tool for endangered species recovery planning and discuss how we addressed them. We expect that others developing quantitative decision support tools are likely to face similar hurdles and can benefit from what we learned.

Methods

We focused on the 1315 species that had recovery plans at the time of this exercise and were managed by FWS. FWS had previously implemented an agency-level prioritization approach based on assigning each ESA-listed taxa a "recovery priority number" (RPN) based on taxonomic uniqueness and intensity of threat (USFWS, 1983a; USFWS, 1983b). This approach was used primarily for sequencing recovery decisions, not for budget allocation decisions (Restani and Marzluff, 2002; Evans et al., 2016). FWS was interested in understanding new methods to evaluate alternative resource allocation strategies, and supported the establishment of an interdisciplinary working group that convened five times over 2.5 years (2015-2018).

Our working group brought together academic and government scientists and practitioners from federal and state conservation agencies based in Australia, New Zealand, and the U.S. (including FWS) to co-develop potential approaches aimed at resolving critical conservation challenges associated with ESA budget limitations (Gerber et al., 2018). Success in prior efforts at implementing prioritization for decision support has depended on internal buy-in within the institutions responsible for decision-making (Gibson et al., 2017). This can be a slow process that requires strong leadership and careful consideration of concerns and perceived barriers (Kotter and Rathgeber, 2006). Our group included FWS leaders involved in applications of the RPN-based approach, and in decisions on the allocation of resources to endangered species projects. The FWS team members in our working group were recovery program managers from both regional offices (2-3 members, depending on the meeting) and headquarters (3-4 members). These team members shared their perspectives on how the concept of cost effectiveness could be incorporated into FWS operations, and observations drawn from their collective careers of performing and administering ESA recovery actions within the FWS.

Our approach represents "co-production," because our team of academics and practitioners worked together to identify the important characteristics of the resource allocation problem, relevant target decision-makers, and the types of tools available that could be appropriate for this problem (Chambers et al., 2021). The conceptual advances and problem formulation occurred during in-person meetings, while data processing and product development occurred between meetings.

The group agreed that a prioritization approach to resource allocation within FWS could be beneficial, but that legitimacy was a concern for decision-makers and stakeholders. Thus, we aimed to develop a prototype resource allocation tool, based on the Project Prioritization Protocol (Joseph et al., 2009), that could be used at the headquarters level of FWS management. The Project Prioritization Protocol is a ranking approach that orders decisions about resource allocation in terms of the expected benefit of action while also considering social values and resource limitations (Joseph et al., 2009). The intent was that this tool could be used in a demonstration to upper-level FWS management to enable decision-makers to explore the implications and trade-offs of institutional resource allocation choices. In doing so, we hoped to support the conclusion that a structured, quantitative, and cost-effective approach to resource allocation of endangered species recovery funding may improve recovery outcomes (i.e., increase the number of species put on the pathway to recovery for equivalent funding levels).

As we co-produced this prototype resource allocation tool, we identified challenges and solutions related to five hurdles that arose in this process (and which often had been observed by group members in previous efforts in three countries). Identifying and addressing these hurdles throughout the co-production process enabled us to arrive at a common agreement for the approach and to anticipate potential implementation challenges.

Results

We describe each hurdle and its solution below (Table 1).

Hurdle 1: The belief that scarce resources should be spent on action, not decision support

"*We just need more money; we already know how to best spend it*" is a mental model that arose in our work and may be

TABLE 1 Perceived hurdles to using quantitative decision tools to support allocation of endangered species recovery funding.

Perceived hurdle	Mental model	Our solution
1. Scarce resources should be spent on action, not decision support	It is better to use available resources to do the on-the-ground action that is currently underfunded; we know what we need to do, we just need money.	Use prototype tool and success stories from other agencies to explore how transparency allows for cost-efficient funding choices and better outcomes.
2. Quantitative approaches are only useful for simple decisions	Our decisions are influenced by institutional politics, equity, preferences, and inertia.	Formulate problem to enable explicit definition and relevant incorporation of complexity.
3. Quantitative tools are prescriptive "black boxes"	We do not want a "black box" to determine decisions while disregarding management goals and manager knowledge.	Co-develop the tool to ensure manager objectives are explicit and transparently codified into the tool.
4. Available data are not good enough to support decisions	The data we have are uncertain, at the wrong resolution or incomplete and therefore cannot be used in quantitative decision support.	Explore how data quality affects decision tool recommendations (other solutions include elicit data, targeted collection of new data).
5. Prioritization means admitting defeat	It is unethical to deliberately let species go extinct, our job should be to get enough money to save them all.	Note that species are currently going extinct; thus, transparent and formal resource allocation provides opportunities to save more species and get more money to meet the agency's objectives.

shared by many conservation decision-makers. In almost all conservation contexts, managers do need more money (McCarthy et al., 2012, Coad et al., 2019). This can result in the perception that more planning slows things down, can preclude action, and co-opts funding from the critically needed conservation actions.

Coordination of endangered species management and recovery at a national level is an immense and complex responsibility. Recovery program managers often believe that they understand the relative urgency of different possible recovery actions, but frequently face funding constraints to implementation. Managers can therefore be hesitant to divert limited resources to decision support exercises when they already have a long list of projects that need funding. Yet, several analyses suggest that existing processes for allocating recovery funds do not systematically consider how the choice of recovery plans or actions results in the achievement of conservation objectives (Metrick and Weitzman, 1996; Evans et al., 2016; Gerber, 2016) and are therefore allocating funds inefficiently. This mirrors broad conservation spending choices, which can be based on precedent, familiarity, or politics, or are considered at a local scale with little coordination or transparency (Game et al., 2013).

Solution: Explore how improved outcomes from using decision support outweigh the diverted resources

We expected that a resource allocation analysis could help managers identify ways to improve recovery outcomes for endangered species. The utility of such an approach has been demonstrated elsewhere (Joseph et al., 2009; Brazill-Boast et al., 2018) and has been suggested for the ESA recovery resourcing context (Evans et al., 2016). However, FWS staff that we interviewed (including some of the authors) suggested that there may be institutional hesitation to embrace such an approach, as the perceived impediment to increasing recovery outcomes was a lack of funding, rather than the knowledge of what to fund.

To explore whether a new quantitative resource allocation approach could work in this context, group members first shared their personal experiences of implementing transparent approaches to resource allocation in other contexts. Their work had enabled managers to quantify and increase the effects of recovery funding for over 600 species in New Zealand (working group members Maloney and Possingham, reported in Joseph et al., 2009) and led to AUD $100 million of additional recovery funding in Australia due to demonstration of expected biodiversity returns (working group members Brazill-Boast, Possingham, and Maloney, reported in Brazill-Boast et al., 2018 and OEH 2016). These group members had applied quantitative prioritization to threatened species recovery resource allocation in their own contexts and were able to discuss how they had dealt with challenges that included high variability in cost-effectiveness across actions and constrained budgets. These discussions were based on similarities to the ESA allocation case and led the group to conclude that a quantitative prioritization approach could potentially deliver greater outcomes than the status quo.

We then spent three working group meetings co-producing the prototype recovery explorer tool (Gerber et al., 2018) so that the FWS decision-makers could use it to explore potential gains from implementing cost-effective allocation strategies and internally demonstrate potential opportunities for efficiency.

Hurdle 2: The perception that quantitative approaches are only useful for simple decisions

"*My situation is more complicated than existing examples of quantitative decision support, so such approaches cannot be useful here*" is another mental model that we observed that can arise among conservation managers. It is true that quantitative approaches must simplify the depiction of decisions compared to the complexity of the real world. This can lead to concerns about decision support being oversimplified and not useful in contexts where institutional politics, equity, personal preferences of managers and politicians, and inertia are present (Possingham, 2013).

Decisions at FWS often involve multiple linked decisions and decision-makers across the agency's hierarchical structure. Dedicated funding for the recovery of listed species is *via* Congressional appropriation (so-called "1113 funds"). The recovery program element funds are used for a variety of recovery-related activities, including recovery plan development and implementation, and 5-year species status reviews (e.g., https://www.doi.gov/sites/doi.gov/files/fy2022-fws-budget-justification.pdf). Currently, recovery funds are allocated by FWS headquarters to eight regions throughout the country. Each region then allocates funds to its field offices, which make decisions about species-level resource allocation decisions. The regions and field offices have considerable autonomy when making decisions to apply resources locally and take advantage of staff expertise and on-the-ground partnership opportunities. These local managers face complex decisions, such as whether to invest limited funds into activities that result in delisting versus stabilizing vulnerable species, invest in species with potential cost-sharing partnerships versus obscure species with minimal public interest, or continue to fund species that have shown little improvement in status. These choices are critical because funding is limited, but also determines success (Ferraro et al., 2007).

Solution: Formulate problem to include relevant complexity

Such complexity can cloud effective decision-making, rendering quantitative decision support even more valuable in comparing "apples to apples" and making those decisions transparent. Although some decision models can be oversimplified, decision theoretic approaches to problem formulation can identify and explicitly account for relevant complexity (Keeney, 1982). This may take effort, as important complexity can be difficult to parse from unimportant complexity, but careful problem definition can help (Runge et al., 2020).

We sought to first understand the complexities that were most relevant to the decision at hand, and then build a tool that enabled the user to explore the influence of those complexities on the recovery outcomes (i.e., species put on the path to recovery) by viewing scenarios where they were, or were not, in play. Our aim was to explore how decisions at the federal level could result in improved recovery outcomes for endangered species after regional and local allocation decisions were made. We were concerned, however, that the complexity in modeling all three levels of allocation would obscure our ability to see the major drivers. Instead, we constrained our context to objectives related to national allocation to ESA recovery and considered funding recovery plans as the pathway to achieving those objectives. We then explicitly considered the complexity influencing the decision and decided what we could meaningfully incorporate. Our problem formulation settled on including the ability to consider proportional resource allocation across eight FWS regions, so that end-users can incorporate institutional constraints into scenarios. In addition, we focused on incorporating a range of different values intrinsic to particular species *via* weightings that align with the decision-maker's values and priorities (we used phylogenetic distinctiveness as an example, but also discussed how the approach could incorporate cultural value, social value, etc.). Many of these criteria had been previously defined under the Recovery Priority Number (RPN) system. Finally, we incorporated the ability to consider outcomes of either minimizing extinction (focus on funding actions to prevent extinction) or maximizing recovery (focus on funding as many plans as possible to completion). Important complexities that we discussed but omitted from the prototype resource allocation tool were considering the contribution of non-FWS partners to recovery initiatives and accounting for previously funded actions within a recovery plan. Both are topics of ongoing work.

Hurdle 3: Quantitative tools are inflexible and prescriptive "black boxes"

"*This process is opaque and does not provide the nuance of a local decision-make*r" is another mental model we encountered that may be common among stakeholders. This unease centers around a concern that prescriptive decision support can be clunky and out-of-touch, especially compared to the judgment of local experts.

A concern among FWS team members was that a quantitative decision support tool would be perceived by users as a "black box" that excludes local expertise and values from the decision-making process. This concern partially arose from a worry that quantitative approaches are opaque and provide recommendations that are unintuitive. However, more of the concern seemed to relate to overwriting the current decision structure, where species-level resource allocation decisions are often deferred to experts on the ground so that the most up-to-date information can be used.

Solution: Ensure manager objectives are explicit and codified into the tool for transparency

A benefit of well-designed quantitative decision support is that it enables transparency while incorporating manager objectives. This helps when there are insufficient resources because managers are already faced with difficult allocation choices. The design process needs to convey that the tool's intent is never to be prescriptive, but instead that it allows managers to explore a range of meaningful scenarios that compare and contrast the trade-off implications of possible decisions.

To address these concerns, we had many discussions and group exercises about how to clarify and document the logic and approach of a quantitative decision support tool, to both internal and external audiences. Part of this process was to ensure that the developers understood—and codified into the tool—the specific goals that managers aimed to accomplish. Specifically, we worked to describe benefits and actions in terms of previous initiatives (e.g., RPN) and to address the tradeoffs that come from pursuing an objective of preventing extinction *vs*. an objective of maximizing delisting. In addition, while the tool recommends an outcome given the set of criteria that are nationally or regionally important, this does not preclude an individual regional or local team from proposing an alternative choice - because it is recognized that there are sometimes very uniquely localized and unaccounted for needs or opportunities (e.g., a recent extreme event not reflected in data; short term availability of local expert or funding, etc). The tool reveals the large scale recommendation based on foundational conservation principals and the most current data, which would be difficult to do consistently and transparently otherwise.

Hurdle 4: Available data are not good enough to support decisions

"*We collected these data and know their shortcomings, so we hesitate to trust a tool based on them*" is another mental model that arose. Concern about the quality of underlying data is one of the most common arguments against using quantitative approaches to inform conservation decision-making (Addison et al., 2013; Kim et al., 2016; Gibson et al., 2017). This likely interacts with discomfort or confusion over how the data in a model translates into recommendations, or a belief that shortcomings can be better addressed by a human decision-maker. We focused on the concern that known inconsistencies in data used to parameterize the model might invalidate recommendations.

Our prototype resource allocation tool prioritizes recovery plans based on estimates of the weighted relative benefit and cost of funding each plan (Gerber et al., 2018). To obtain the cost estimates, we used all active recovery plans in the FWS Environmental Conservation Online System (ECOS) database (https://ecos.fws.gov/ecp/report/species-with-recovery-plans). We assigned a benefit to each plan based on combining the "threats" and "feasibility" components of the Recovery Priority Number (RPN; FWS, 1983), and a taxonomic weighting based on the "taxonomic priority" component of the RPN (See Gerber et al., 2018 SI for more details). Our working group decided that these data are the best available, and ostensibly most comparable, estimates of benefits and costs across recovery plans, but known shortcomings with the data were a frequent consideration. A primary concern was that, because of how recovery plans are written, the data are not directly comparable across plans. Many factors including when the plan was written, public interest in the species, and the recovery actions recommended, can influence the comparability of value estimates in a plan.

Solution: Explore how data quality affects decisions

Sparse data represent a valid concern because available data are rarely complete, are often at a different resolution than the decision, and include uncertainty. Such inconsistencies are inevitable with the types of data used in decision support tools (e.g., estimates of conservation consequences of possible interventions) as well as in the data that are supporting existing decisions. Yet, the advantage of quantitative decision support is that it forces assumptions about data quality to be explicit and transparent, makes it possible to explore how data quality and uncertainty interact with manager risk tolerance (Tulloch et al., 2015), and can suggest when collecting improved data will benefit decisions (Nicol et al., 2019).

Addressing the concerns about the data comparability and validity was critical to formulate a decision support approach. The ESA requires use of the "best available scientific and commercial data" so we wanted to test how known variability in these "best" data influenced recommendations. We chose to use a sensitivity test to estimate the robustness of high, medium, and low-priority ranked recommendations to variability in input data. This added simulated variation to input values and explored whether plan priority ranks (high, medium, or low) changed. Such an approach can inform a meaningful resolution for priority lists (e.g., Brazill-Boast et al., 2018).

We explored whether the resource allocation approach could reliably identify which projects (i.e., species recovery plans) were cost effective—and thus recommended for funding at a given budget—even in the presence of large discrepancies in the estimates of the costs, benefits, and feasibility for recovery plan actions. We found that even with high data discrepancies, allocation decisions were relatively robust to the uncertainty in the underlying data, both in the magnitude of the current values and in change in those values over time (Avery-Gomm, 2020). Depending on the scenario, 79%-98% of the recovery plans did not change prioritization rank due to data uncertainty, and importantly, the plans that did change could be identified and targeted for additional data capture in the future, rather than assuming that these data improvements were needed across all plans.

Hurdle 5: The belief that prioritization means admitting defeat

"*Prioritization is unethical, because it makes us give up on some conservation outcomes*" is the final mental model we encountered. The language of prioritization for resource allocation can raise concerns that, by prioritizing, you must forgo other goals, values, or species. This can be viewed as "triage," which raises ethical concerns (Jachowski and Kesler, 2009; Vucetich et al., 2017).

We convened this working group to identify tools to help inform efficiency in ESA resource allocation, but knew it was important to address the concern that some (both within FWS and in the general public) may see prioritization as a threat to species recovery. This is because funding the recovery of certain species over others may seem to imply choosing to let some species go extinct. Intentionally choosing extinction conflicts with the intent of the Endangered Species Act to "conserve endangered species and threatened species" by using "all methods and procedures which are necessary to bring any endangered species or threatened species to the point at which the measures provided pursuant to this Act are no longer necessary" (16 U.S.C. Section 1531). FWS decision-makers, understandably, do not want to make such a choice, for conservation, ethical, and legal reasons.

Solution: Demonstrate how formal prioritization opens opportunities to save more species

Prioritization is implicit in any resource-limited decision-making process, whether using decision support tools or not. In the presence of limited funding, any allocation process, including using the judgment of local managers, is a decision to fund some conservation actions and not fund others (at a point in time). Essentially, we all triage when the scale of action needed does not match the available resources.

If the concern with any type of prioritization is that it forces triage and therefore lets some species go extinct, the solution is to (a) be transparent about how decisions are made to select the order of the delivery of actions to save species, (b) identify how different choices may achieve recovery goals faster with reduced extinction risk, and (c) use the results to advocate for additional resources to move towards funding all species (Wiedenfeld et al., 2021).

Our working group did not include entrenched critics of prioritization tools, but did have members that were unsure of their utility in this context. Thus, we needed to show group members, and hopefully, by extension, future internal users, that quantitative resource allocation could promote better outcomes than the status quo. For endangered species, our resource allocation formulation places emphasis on working on feasible and urgent projects. This suggests deferring *ex situ* or additional action on unachievable or less urgent projects, but leaves open the option that, as funding increases or higher priority investments are completed, work can commence on projects further down the list. These principles are logical in theory, but our prototype resource allocation tool helped to communicate the trade-offs by enabling a user to visualize how over-investing resources in expensive and hard-to-recover species is a trade-off against recovery of other vulnerable species, where the same investment might yield major improvements in status or number of species recovered given a goal of maximizing the number of recovered species. We used this prototype tool internally within the working group and at FWS to demonstrate how to consider resource allocation trade-offs, but also made it available on the web for exploration by the public (http://recovery.rc.asu.edu:3838/RecoveryExplorer/). By designing the tool to explore the likely outcomes of funding scenarios, it can support discussions and judgments about the trade-offs inherent in different choices, can promote communication of expected outcomes to stakeholders, and can show how partners can contribute to overall success by supporting highly ranked species or by working on lower-priority species that agencies currently cannot afford to fund.

Discussion

Endangered species recovery resource allocation is a challenge. We developed the "recovery explorer tool" to explore opportunities for efficiency in achieving recovery goals by ordering potential funding of recovery plans in terms of benefits and costs (as described in Gerber et al., 2018). It aims to support FWS decision-makers in taking a structured approach to allocating Endangered Species Act recovery funds and put a greater number of species on the path to recovery than the status quo. During the tool development, we encountered five hurdles that we expect are common to developing quantitative decision-support approaches. Through ongoing, open dialogue and adding features to our tool that enabled the exploration of alternatives, we were able to address these hurdles. We hope that by sharing our experience, we can assist others in overcoming these hurdles should they arise when considering the use of quantitative decision support tools to support other complex conservation problems.

This study details work that was done during the design and development stages of building a prototype quantitative decision support tool. Because one intent of the prototype tool was to help promote internal buy-in, we do not expect it to be implemented as is or to develop prescriptive actions. However, the goal is for the prototype tool to be used to build understanding around the idea of allocating resources based on the concept of return-on-investment. It is also our goal that this prototype will be further refined to achieve the desired level of functionality required to be implemented by FWS. Identifying and addressing these hurdles at the prototype development stage of the project will hopefully address issues that tend to limit or prevent the transition between the development, refinement and implementation of decision support tools in conservation science (Wright et al., 2020).

Two lessons from our experience can address barriers in conservation planning more generally. First, hurdles are an inevitable part of a co-development process in which team members must learn to communicate across disciplines and to see the problem from different viewpoints (i.e., mental models). Identifying hurdles and their solutions is not an obstacle to be cleared as quickly as possible, but rather, can be seen as an important and valuable step in the development process. Second, the identification of hurdles and their solutions is not obvious and immediate. Here, we discuss the hurdles that manifested as recurring points of discussion over the multiple years of our project. Our experience suggests that our progress was enhanced by bringing in participants who faced similar challenges elsewhere and working together to identify and translate solutions to our context; but it took time. In future work we aim to assess the generality of these hurdles across decision support development contexts and codify solutions that resolve them.

In conclusion, making decisions with limited resources and a complex array of potential options is hard. The difficulty for any decision-maker is to absorb the relevant information in a consistent manner, assimilate key elements, apply criteria and weightings, evaluate and report options, and understand the consequences of the decision. Developing quantitative decision support approaches that appropriately incorporate these considerations will inevitably involve hurdles, but working through them and identifying solutions can result in a process that is better able to support the biodiversity outcomes we collectively seek to achieve.

Data availability statement

The original contributions presented in the study are included in the article/supplementary material. Further inquiries can be directed to the corresponding author.

Author contributions

All authors contributed to the conceptual development of this paper. GI, SA-G, and RM drafted the initial version. All authors revised and edited the paper and approved the submitted version.

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Conflict of interest

Author CD is employed by KDV Decision Analysis LLC.

The remaining authors declare that the research was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.

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