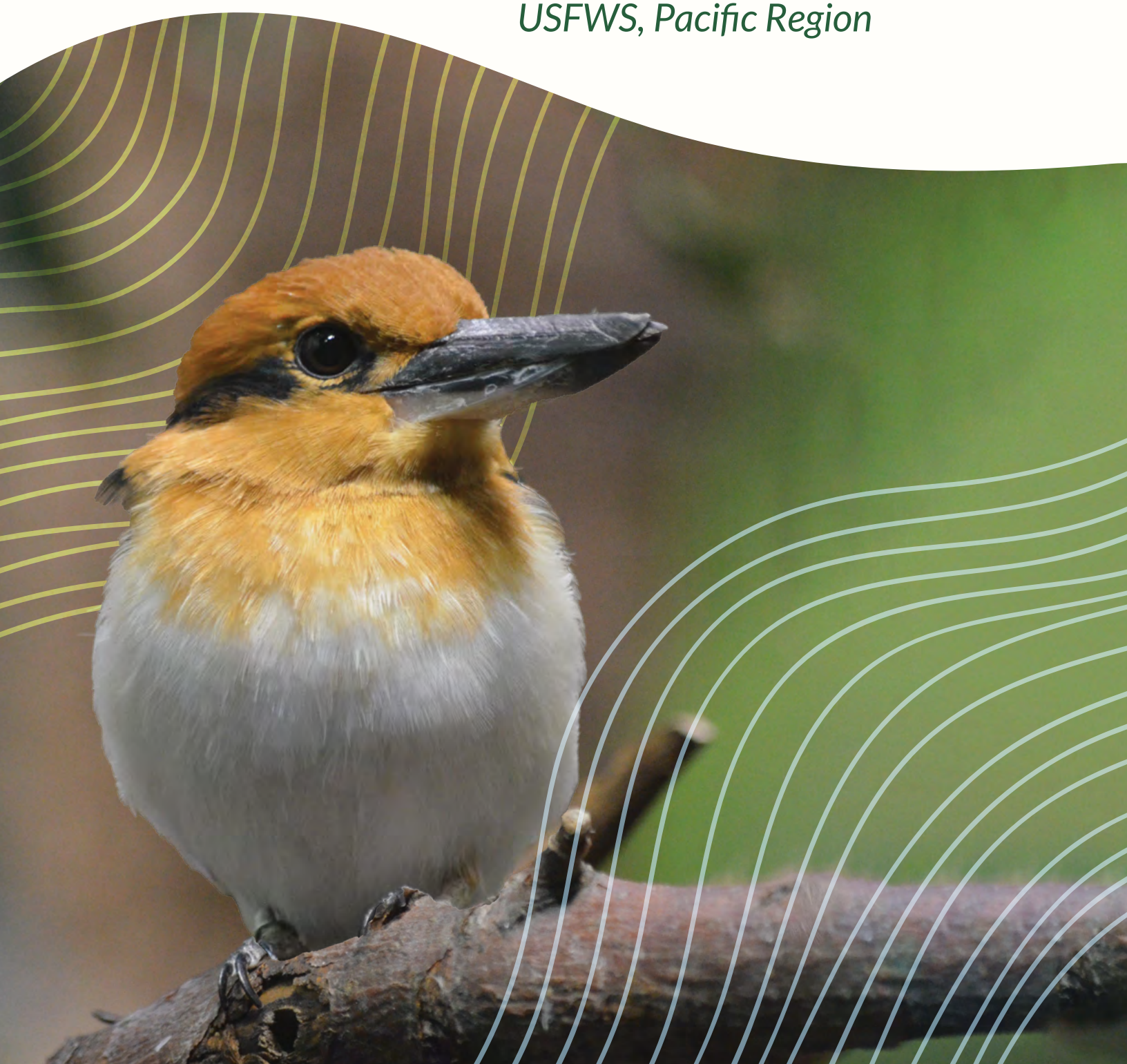
U.S. Fish & Wildlife Service

A Decision Support Framework for Conservation Introductions

USFWS, Pacific Region



ABOUT THE PACIFIC REGION

The U.S. Fish and Wildlife Service's Pacific Region serves Hawai'i, Idaho, Oregon, Washington, American Samoa, the Commonwealth of the Northern Mariana Islands, Guam, the Federated States of Micronesia, the Republic of Palau, and the Republic of the Marshall Islands. This region is ecologically diverse, with landscapes that range from coral reefs, broadleaf tropical forests, and tropical savannahs in the Pacific Islands; to glacial streams and lakes, lush old-growth rainforests, inland fjords, and tidal shorelines in the Pacific Northwest; to the forested mountains, shrub-steppe, and native grasslands in the Inland Northwest. As part of its mission, the Pacific Region is committed to collaborating with our numerous partners, including Tribes and state, local and federal agencies, Native Hawaiians, and Indigenous Pacific Islander communities; being inclusive and welcoming to all people in the communities we serve; and conserving, protecting and enhancing some of the most spectacular landscapes, wildlife and plants on the planet.

ACKNOWLEDGEMENTS

The U.S. Fish and Wildlife Service is grateful to over 200 contributors from the Pacific Islands, Pacific Northwest, and Tribes who strengthened this framework by sharing their experiences, insights, and recommendations. We also thank the 7 national and international peer reviewers whose subject-matter expertise improved this framework. Finally, we recognize the important role that workshop facilitation teams and USFWS staff and partners played in making this framework possible.

RECOMMENDED CITATION

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On the cover: Sihek (Guam kingfisher, Todiramphus cinnamominus). *Sihek are endemic to the island of Guam, but have been extinct in the wild since 1988 due to the introduction of a predatory snake on Guam. They now survive only in zoos under human care. Population models demonstrated a high extinction risk because of the limited ability to increase the population in captivity. In response, managers convened a group of species experts, translocation experts, community members, government agencies, and other stakeholders in a series of workshops to identify alternatives to safeguard the species. Because of the continued presence of the snake on Guam, and the risk of keeping the population only in captivity, conservation introduction to Palmyra Atoll (3,650 miles from Guam) was ultimately identified as the preferred management option. The first birds will be released on Palmyra Atoll in 2024. Credit: Scott Morrison, Lincoln Park Zoo.*

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GLOSSARY

Biocultural resources: The tangible and intangible cultural heritage relating to human interaction with the natural environment and the organisms, ecosystems, and geophysical components within that environment that are essential to such cultural heritage.

Captive propagation: The process of keeping plants or animals in controlled environments, such as wildlife reserves, zoos, botanic gardens, and other conservation facilities, to maintain or increase their populations.

Climate adaptation: Adjustments in ecological, social, or economic systems in response to actual or expected climatic stimuli and their effects to moderate potential damage or to benefit from opportunities associated with climate change.

Conservation introduction: The intentional movement and release or outplanting of an organism outside its indigenous range for the purpose of conservation. A type of conservation translocation.

Ecological replacement: The intentional movement and release or outplanting of an organism outside its indigenous range to perform a specific ecological function. A type of conservation introduction.

Ecological trajectory: A somewhat predictable, directional change over time in an area's species composition and ecological interactions (i.e., not a repeating cycle).

Exit strategy: A set of actions that terminate commitment to a project, triggered by achievement of the objective, assessment of probable failure, or other predetermined criteria.

Focal species: The species under consideration for a potential conservation introduction or alternative conservation strategy.

Framework: A structured problem-solving approach which allows for other practices and tools to be included but provides much of the process required to arrive at a solution.

Historical analog: A documented situation, event, or ecological configuration that is broadly similar to a current or projected future state.

Indigenous range: The known or inferred distribution of a species generated from historical (written or verbal) records or physical evidence of the species' occurrence.

Reintroduction: The intentional movement and release or outplanting of an organism within its indigenous range, usually in an area from which it has disappeared.

Translocation: The deliberate movement of organisms from one site for release in another to yield a measurable conservation benefit at the level of a population, species, or ecosystem.

INTRODUCTION

The purpose of this non-regulatory decision support framework for conservation introductions (hereafter, framework) is to foster transparent, inclusive, and defensible decision-making when considering conservation introduction as a strategy.

Conservation introductions can be used for preventing extinction of a species or extirpation of a population or populations, re-establishing an ecological function lost through extinction, and/or directing ecosystem change toward a state that better supports conservation goals[1,2]. The framework was developed for use by the U.S. Fish and Wildlife Service (USFWS) in the Pacific Region. In cases where others (e.g., States, Territories, Tribes, Federal agencies, other USFWS Regions, or foreign governments) are considering a conservation introduction, we welcome them to use this framework to aid their conservation decisions.

The USFWS Pacific Region will use this framework when current conservation approaches within a species' range appear to be insufficient to prevent extirpation or extinction. We will also apply it when restoring an extinct species' ecological functions could improve conservation outcomes, and when analysis of ecological trajectories suggests a conservation benefit from introducing a species not historically present. The USFWS Pacific Region developed the framework with input from partners in the Pacific Islands and Pacific Northwest, and in alignment with the 2013 IUCN/SSC "Guidelines for Reintroductions and Other Conservation Translocations" and the National Research Council recommendations for decision frameworks[1,3]. We intend for it to accomplish the aims in **Box 1**, and we may periodically update this document based on experience with its implementation.

This framework does not modify our obligations under the National Environmental Policy Act (NEPA) and its implementing regulations to assess environmental impacts of our actions, evaluate alternatives, coordinate with other agencies and governments, and engage the public in decision-making. In many cases, we envision there will be significant overlap in meeting our obligations under NEPA and implementing this framework. This framework is meant to provide additional guidance regarding considerations and risks specific to conservation introductions. In some cases, enhanced coordination and engagement prior to, or during, the decision-making process may be needed due to the inherent risks and uncertainties that accompany conservation introductions. In such cases, this framework provides guidance for implementing enhanced coordination and engagement above and beyond the public engagement required under NEPA. Similarly, this framework does not fulfill requirements for compliance with other environmental statutes, such as the Endangered Species Act, Migratory Bird Treaty Act, and National Historic Preservation Act, and their implementing regulations. However, the process described here may help project teams identify when and how to address the requirements associated with these statutes.

We define *conservation introduction* as the intentional movement and release or outplanting of an organism outside its indigenous range for the purpose of conservation[1]. This technique, among others, can be used to prevent extinctions of wild populations, restore lost ecological function, or facilitate climate change adaptation by

Box 1. Aims of this Framework

- *Encourage transparent, inclusive, and defensible decision-making*
- *Develop shared knowledge and respectful relationships, and honor people's relationships with place*
- *Build long-term partnerships to collaboratively address conservation challenges in the future*
- *Recognize and work within applicable legal constraints and requirements*
- *Integrate ecological and social values into the decision process*
- *Learn to inform future conservation introduction decisions*
- *Acknowledge uncertainty and risk, and explain how we make decisions under risk*
- *Recognize that the complexity, scale, and timing of the decision process will vary and that planning for rapid ecological change will require adaptability*

directing ecosystem change to better support conservation goals. One potential example of this application involves preventing extinction of Hawaiian forest birds (see **Box 2**). The indigenous range of a species is its known or inferred distribution, as understood from historical (written or verbal) records or physical evidence of the species' occurrence. Project proponents must consider on a case-by-case basis whether a proposed translocation would be a reintroduction, population augmentation within the indigenous range, or a conservation introduction. Considerations might include, but are not limited to, taxonomy and phylogenetics, biogeography, or a species' known or inferred range. This framework is not intended to include translocations for the primary purpose of controlling invasive species or for moving species for agricultural, hunting, fishing, and/or recreational purposes.

As climate change alters species' habitats and the natural processes on which they depend, our ability to use historical and current conditions as guides for species conservation and habitat restoration is diminishing. Therefore, use of this framework might be appropriate even for translocations within a species' indigenous range, as habitat characteristics may be shifting beyond previous bounds. To improve the likelihood that the benefits of our conservation work are durable in a changing world, we must consider approaches that do not assume stability of ecological systems. Conservation introduction is one tool that can be used to respond to emergencies such as imminent extinction, complement other conservation strategies, or facilitate adaptation to climate change as species assemble into new biotic communities with no historical analog. However, the use of conservation introductions, while increasingly common around the world[4] (see the IUCN's regularly updated compilation of translocation case studies, including conservation introductions[5]), remains controversial or unfamiliar to many people within and outside the conservation community. Therefore, to address this need in the Pacific Region and in anticipation of eventual national policy, we developed this framework to provide a structured process for considering whether to pursue a conservation introduction.

We welcome those who use this framework to share their experiences with the USFWS. We anticipate the framework will be periodically updated and improved to support conservation needs in the Pacific Region.

Box 2. Conservation Introductions: An Urgent Need in the Pacific Region

We developed this framework partly based on experience with the ongoing extinction crisis facing Hawaiian forest birds. The steadily warming climate in the islands is enabling avian malaria (carried by non-native mosquitos) to infect birds at ever-higher elevations. As a result, disease-free habitat is shrinking for Hawaiian honeycreepers, species highly susceptible to malaria. This habitat only persists now on parts of Hawai'i Island and small areas of Maui. Kaua'i and Maui harbor several endemic honeycreepers that will vanish within a few years without intervention. Some of these species are in captive propagation, but until methods and resources exist for reliable, landscape-scale mosquito control, they cannot be returned to their home islands, even if they reproduce well in captivity. Moreover, captive propagation is extremely costly and, for this and a variety of biological, ecological, and cultural reasons, is often considered a last resort for preventing extinction.

Conservation introduction of these island-endemic honeycreepers to suitable habitat on neighboring, higher elevation islands is a critically important conservation strategy under consideration for keeping these species from disappearing. However, decision-making about how best to protect endangered Hawaiian honeycreepers is challenging. The suite of threats to these birds, diverse concerns about moving them outside their indigenous range, myriad ecological and social questions, and uncertainty of outcomes surrounding any given course of action, create a highly complex environment for decision-makers, interested parties, and communities in the islands to navigate. Because the growing impacts of climate change make circumstances like these increasingly common, the USFWS needs a clear path for engaging others and making decisions about whether and when to employ conservation introduction, a controversial but in some instances essential conservation tool.

Recommended resource: Paxton E, Laut M, Enomoto S, Bogardus M. *Hawaiian Forest Bird Conservation Strategies for Minimizing the Risk of Extinction: Biological and Cultural Considerations.* University of Hawai'i at Hilo: Hawai'i Cooperative Studies Unit Technical Report 103. 2022; 125 pp. Available from: http://hdl.handle.net/10790/5386

FRAMEWORK OVERVIEW

The purpose of the framework is to guide decision-making about whether a conservation introduction is the preferred strategy to achieve a conservation goal when considered alongside other possible conservation strategies. The framework does not address prioritization of species considered for a conservation introduction or allocation of resources among species, nor is it a guide on how to implement and monitor a conservation introduction. The framework is intended as a foundation to build upon and adapt to unique circumstances and needs.

A Structured Process – The framework offers a structured process for transparent, inclusive, and defensible decision-making[6,7] that is intended to help articulate assumptions, considerations, and rationales at each step. In some situations, it may be helpful to use other decision support tools in concert with this one[8].

Iterative – While the framework describes discrete steps in a decision process (**Fig. 1**), interaction among the steps is a crucial component of quality decision-making[9]. Insights gained in one step can inform subsequent steps or reveal the need to review previous steps. Therefore, the decision process should be viewed as iterative. Revisiting previous steps if new insights arise, or if the conservation situation changes, is strongly encouraged.

Scalable – Translocating species carries inherent uncertainties and risks, and every situation is different. The framework is meant to be scalable to the complexity of the conservation situation, the urgency of the decision, and the risks of each conservation introduction. Users must exercise professional judgement to scale the time and effort expended on using this framework to their specific conservation challenge, balancing the necessity for action with ecological, cultural, and economic risk.

Collaborative – Collaboration is a key component in the success of conservation introductions, and biodiversity and biocultural conservation more broadly. The framework prioritizes collaboration and supports flexibility with respect to the needs of the human communities that may be affected by a conservation introduction.

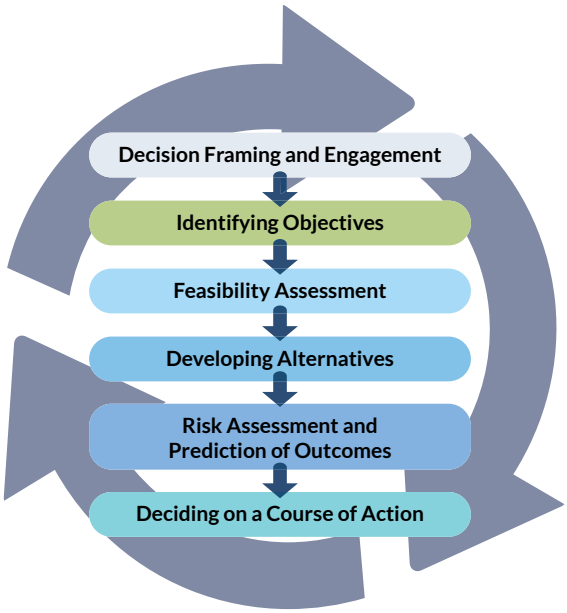


Figure 1. Conservation Introduction Decision Support Framework Process

The steps in the framework, which are further described in subsequent chapters, are:

Step 1: Decision Framing and Engagement – Engage decision makers and interested parties to develop a common understanding of the conservation situation and overall conservation goal, identify the conservation introduction decision being considered, and identify the decision-making structure.

Step 2: Identifying Objectives – Identify the desired outcomes of the decision and develop performance measures for assessing management alternatives.

Step 3: Feasibility Assessment – Identify potential barriers that may constrain consideration of a conservation introduction or other alternative conservation management actions, and identify the legal, permitting, and other approval processes that are required prior to implementation.

Step 4: Developing Alternatives – Develop a set of management options, including but not limited to a conservation introduction. These management options are called "alternatives."

Step 5: Risk Assessment and Prediction of Outcomes – Characterize risk and predict outcomes for each alternative relative to the objectives.

Step 6: Deciding on a Course of Action – Assess the alternatives in a transparent and deliberative manner and decide on a course of action.

1 | DECISION FRAMING AND ENGAGEMENT

Step 1: *The purpose of the decision framing and engagement step is to develop a common understanding of the conservation situation and decision, and to lay the foundation for the rest of the framework process. This step addresses the following process components:*

- *Identify the Conservation Situation and Conservation Goal*
- *Engage Decision Makers and Interested Parties and Identify the Team and Decision-Making Structure*
- *Develop a Written Decision Statement*

Decision framing and engagement is a collaborative process grounded in careful thought and dialogue. This step is the foundation for the subsequent steps of the framework. While the components of this step are described here as discrete parts, in practice they are integrated components developed in an iterative manner. For example, an initial identification of the conservation situation is necessary to identify and engage interested parties and build the right team. Once engagement begins, definition of the conservation situation will be revisited in a collaborative manner.

Throughout the framework, we use the terms "decision makers," "interested parties," "technical advisors," "facilitators," and "team" to represent different entities involved in the process. Here, we define decision maker as the entity (or entities) with authority to commit to action. This can include States, Territories, Tribes, international governments, and others. Interested parties are those who can affect a decision or who have a vested interest that may be affected by the outcomes of the decision, including those who have authority or resources to implement management actions that will impact the success of a conservation introduction. Coordination with affected communities early in the process is important, especially with States, Territories, Tribes, Indigenous Peoples, local governments, landowners, and others with interests in the lands, waters, or species in or near both donor sites (where the species undergoing a conservation introduction is sourced) and recipient sites (where the species undergoing a conservation introduction will be released or outplanted). Technical advisors are those with specialized knowledge of the ecological or social aspects of the decision. Facilitators are neutral parties who structure and guide the team. The team may consist of decision makers or their delegates, representatives of interested parties, select technical advisors, and facilitators who work together through the framework. These different entities are described in greater detail throughout this section.

Identify the Conservation Situation and Conservation Goal

For the USFWS Pacific Region to consider a conservation introduction, the aim must be to (a) avoid extinction of a species or extirpation of a population or populations, (b) re-establish an ecological function lost through extinction, and/or (c) direct ecological change toward a state that better supports conservation goals in a system undergoing transformation. Although any entity may initially identify the potential need for a conservation introduction, articulating the current understanding of the conservation situation and goal provides clarity of purpose to everyone involved right at the outset.

When considering the potential use of a conservation introduction, for example, to prevent extinction, we must consider the causes of declines or extirpations of a species, and evidence should exist that those same mechanisms will not prevent potential establishment of the species in a new location[1]. Additionally, we must identify uncertainties about the causes of population declines, current and projected climatic conditions, effectiveness of conservation measures, appropriate species for ecological replacement, indigenous range delineations, and other key considerations. The social context also needs careful analysis, including an understanding of how people have interacted with this species over time and how a conservation introduction may change these interactions and therefore influence social and ecological systems.

Engage Decision Makers and Interested Parties

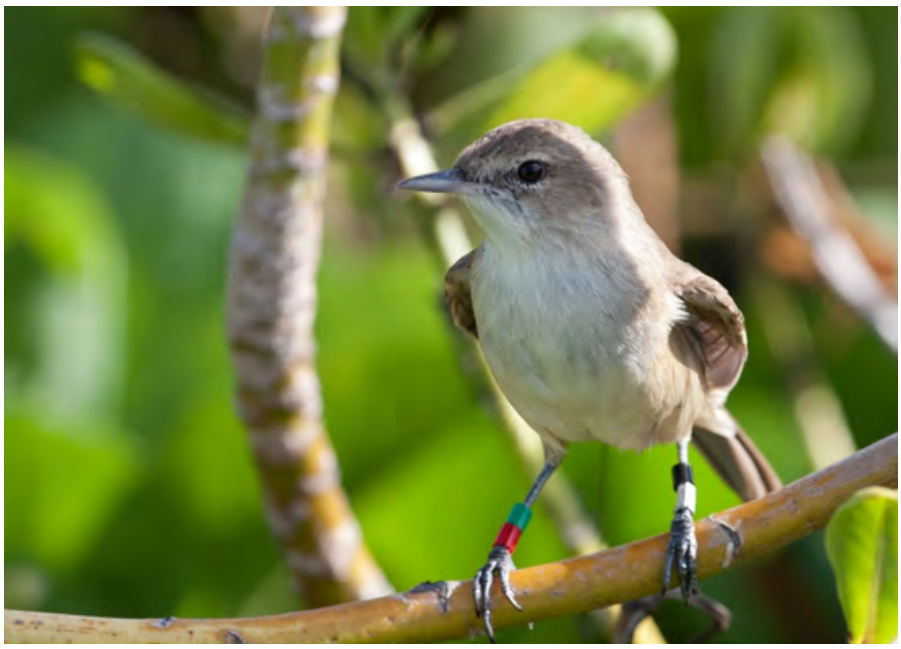
Each conservation introduction decision-making process is an opportunity to forge new

relationships and deepen existing ones, enabling both current and future conservation challenges to be addressed more effectively. It is critical that the process be transparent and inclusive, and promote mutual learning, respectful dialogue, and trust-building[10]. This requires sufficient time, capacity, and resources for meaningful engagement. It also means carefully considering how to reduce or eliminate barriers to participation for groups historically excluded from natural resource decision-making.

The USFWS Pacific Region should work with others to identify and engage decision makers and interested parties as early in the process as possible. The best individual to represent any community or group may not be immediately clear and may require help to identify. When developing a team to work through the framework, it is important to consider technical advisors with relevant knowledge (e.g., scientists, cultural practitioners, and local experts) and individuals that represent the human communities near both the donor and recipient sites. Some interested parties may not choose to be part of the core team, and other forms of engagement might be considered to reach those groups, especially if they may hold views not represented by the core team. Purposefully introducing a species outside its indigenous range often prompts ethical questions, and therefore may require broader thinking about who to engage and how (e.g., consultation with an ethicist). All areas within the Pacific Region are the ancestral lands of one or more Indigenous Peoples. As the original caretakers and stewards of lands and waters, Indigenous communities have knowledge of and a reciprocal connection with their environment that is ingrained in their identity, as well as preserved and perpetuated in their culture and many traditional practices. For guidance in identifying and engaging Tribes, and Native Hawaiian and Indigenous communities, USFWS must follow Department of the Interior policies, where they exist. These policies communicate the agency's unique trust responsibilities to Tribes and the Native Hawaiian community[11,12,13]. Given these longstanding connections to place, spending time to understand Indigenous biocultural connections to, and Indigenous rights related to, species and areas that may be affected by a conservation introduction is an important part of the engagement process. Such learning might take place through web searches, literature and policy review, relationship-building, and conversations with Indigenous communities. The framework described here does not substitute for consultation with affected communities, Tribes, Native Hawaiians, or other Indigenous groups, nor does it supplant the public input process. Rather, it lays out a complimentary and fully inclusive process for making a carefully deliberated decision to pursue a conservation introduction or other conservation strategy.

Effective engagement is an inherently adaptive and learning-based process. As such, it will necessarily be context-dependent and iterative. At the outset, resources necessary for a successful decision-making process should be identified and committed to ensure a transparent, robust, and inclusive process.

Facilitators should ensure a safe and culturally appropriate setting and process of engagement in which participants can develop considerations, negotiate trade-offs, and make recommendations that will inform the decision. Facilitators can support the team by paying attention to both facts and values, and by promoting explicitness about uncertainties and assumptions[14]. More facilitation recommendations are provided in **Box 3**, *Planning for Framework Facilitation.*



Endemic to the island of Nihoa, the ulūlu niau (Nihoa millerbird) was at risk of extinction due to a small population size and the increasing threat of hurricanes and invasive species. Ulūlu niau were introduced to the island of Laysan (Kamole), over 650 miles away from Nihoa, in 2011 and 2012 to reduce its extinction risk and improve its conservation status. Credit: Robby Kohley, American Bird Conservancy and USFWS

Box 3. Planning for Framework Facilitation

Meaningful engagement hinges on the ability of the USFWS and facilitators to support a transparent, inclusive, and defensible decision-making process. Plan for:

- ☐ **Dedicated staff time** to facilitate the involvement of interested parties throughout the decision-making process.
- ☐ **Clear communications** (e.g., invitations, updates, meetings, documentation) that demonstrate respect of people's knowledge, experience, and time.
- ☐ **Awareness of existing procedures** for engagement and consultation where they exist (e.g., USFWS Director's Order No. 227[12]; Standard Operating Procedure for Consultation with the Native Hawaiian Community[13]).
- ☐ **Establishment of a common understanding** of circumstances, roles, and expectations.
    - Provide all participants with succinct summaries of the best available science pertaining to the conservation situation.
    - Ensure a shared understanding among participants of how the process will work and what their roles are.
    - Discuss and address procedural questions and concerns as early as possible.
- ☐ **A safe space** supported by an external, neutral facilitator who ensures that all participants feel respected and able to meaningfully contribute. It is important that those facilitating the process have the needed experience to address power imbalances and build good rapport with diverse partners, including Indigenous Peoples and local communities. Professional facilitators are often trained in conflict resolution, which can be beneficial when controversial choices are under consideration.
- ☐ **A learning space** where contributors commit to listening to diverse perspectives and learning from others' experiences and areas of expertise.
- ☐ **An accessible space** that removes common barriers to participation, including logistical and economic hurdles that disproportionally impact historically underrepresented communities.
- ☐ **Sufficient time** for contributors to reflect on the conservation situation and formulate their input. Contributors may want to consult with other people and resources to inform their feedback.
- ☐ **Respectful relationships** that consider local perspectives and values.
    - Become aware of and respect Tribal, Native Hawaiian, and Pacific Islander conventions and protocols.
    - Be mindful of the significance of history on present-day circumstances.
    - Be aware that community members and team members have other duties and obligations, and look for creative ways to be inclusive, work cooperatively, and avoid burnout.
- ☐ **Transparency** in how decisions are made. This includes documentation of and transparency in (a) the process, (b) the information that contributors provided to inform the process, and (c) the reasonings behind the decision(s) ultimately made.
- ☐ **Continued communications** after the decision-making process concludes to share relevant updates with contributors and interested parties.

Recommended resource: Ruano-Chamorro C, Gurney G, Cinner JE. Advancing procedural justice in conservation. *Conservation Letters.* 2022; 15:e12861. Available from: https://doi.org/10.1111/conl.12861

Identify the Team and Decision-Making Structure

Forming a team to work through the framework steps will support mutual learning, creative problem-solving, and transparency. Team composition will depend on the specific decision context and may include the decision maker(s) or their delegates, representatives of interested parties, technical advisors, and facilitators. A clear understanding of the various management authorities relevant to each project is necessary to ensure that the right groups are invited to participate. While the team will work through the framework process in detail, opportunities for input from other entities and/or the general public must be considered at various points in the process. A clear decision-making structure is essential for fostering a common understanding of the process. This enables interested parties to decide early on if they would like to be involved and reduces the potential for conflict. To enhance transparency and to identify ways to support environmental justice, the team may wish to evaluate how the decision-making structure aligns with the principles of recognition (addresses who is included, heard, and recognized for their contributions) and procedural justice (the fairness of the decision-making process)[15].

Understanding and incorporating aspects of local and Indigenous customary decision-making processes into the decision-making structure may also support environmental justice and could be considered at this stage. Clearly identifying who has decision-making authority (i.e., the decision makers) is a critical first step. The team should consult their own agency policies to determine at what level decision-making authority is delegated. Once identified, the decision makers must describe how decisions will be made, for example, whether decision-making is delegated to the team or whether the team is making recommendations to the decision makers. Will decisions be made by majority opinion, consensus of team members, or executive agreement among decision makers? The answer to this question will depend on the details of each situation. In addition to addressing how decisions will be made, this structure informs the roles and responsibilities of team members, who speaks for each organization or interested party, and how their input will be incorporated into the decision process.

Develop a Written Decision Statement

A decision statement, for this framework, is a concise written description of the main components of the conservation problem, the overall conservation goal, and a broad description of the ecological, cultural, economic, and other issues to be considered (see **Box 4**). Developing a decision statement is an iterative process. An initial decision statement, developed by the USFWS and/or interested parties, provides the information needed to identify and engage the organizations, agencies, and individuals to be involved in the decision process[1]. A decision statement could address one or more species (see the Hawaiian forest bird case study[16] for an example). In some circumstances, a decision statement might be designed in anticipation of taking action if and when a defined threshold is crossed (e.g., sea level rise, glacier melt, habitat change, species decline). Once all interested parties are engaged, consider revisiting the initial decision statement to ensure that it reflects the shared vision of the team.

Box 4. Components of a Decision Statement

The problem: What are the conservation situation and circumstances prompting the consideration of a conservation introduction?

Conservation benefit:

- What is the overarching conservation goal (e.g., extinction prevention, ecological replacement, direct ecosystem change)?
- What contribution would a conservation introduction provide to meeting the goal?

The decision(s) to be made: What management options are under consideration in addition to a conservation introduction? How are decisions linked? Is one decision predicated on a previous decision?

Values: Generally, what values (e.g., environmental, cultural, economic) are involved?

Temporal components of the decision, including:

- What is the deadline for making a decision? Is the situation an emergency?
- What is the estimated time for design, permitting, and implementation once a decision is made?
- Will a lag occur before conservation benefits are realized? How long are those benefits likely to persist? (i.e., when might the desired conservation benefit be achieved)?
- Is this an interim step in a broader conservation strategy?

Geographic scope: What are the current habitat and range of the focal species, and what location(s) are being considered as recipient site(s) for the conservation introduction?

Constraints: Do legal, financial, political, or other constraints exist that limit the array of potential management alternatives? Are the constraints demonstrated or perceived?

Risk: Generally, what are the ecological, social, and economic risks associated with the potential conservation introduction and with other management alternatives? What are the key uncertainties?

Reversibility and exit strategy: Can the conservation actions under consideration be reversed if undesirable outcomes should occur? What options are there for changing course and/or ceasing a strategy if deemed necessary?

2 | IDENTIFYING OBJECTIVES

Step 2: *Objectives describe what the team hopes to achieve, or avoid, by deciding on a course of action. Objectives are used to assess potential management alternatives (conservation options including a conservation introduction), identify a preferred alternative, and, ultimately, identify thresholds and benchmarks to monitor the success of the implemented alternative. Activities to identify objectives include:*

- *Elicit Objectives*
- *Classify and Structure Objectives*
- *Develop Performance Measures*

Choices in conservation introductions are based on individuals' or organizations' perceptions of what is important and on applicable legal and policy guidelines. Objectives are value statements, describing what the team hopes to achieve or avoid by deciding on a course of action. Objectives define the desired outcomes of conservation introductions or other management alternatives, and they form the basis for assessing management alternatives and deciding which to pursue. Ecological objectives may be the initial focus of conservation introductions, but the social objectives, including local and Indigenous community values related to the decision, are also key considerations. It is important to elicit objectives (see **Box 5** and **Box 6**); failure to recognize and include objectives that are fundamentally important to interested parties will likely lead to lack of community support, resulting in a suboptimal outcome or potentially failure to achieve the conservation goal[17]. **Box 7** provides a sample list of concerns that groups can use as a starting point to identify objectives. Ultimately, decisions about conservation introductions will involve balancing multiple objectives, some of which may be in conflict with each other. Ignoring or obscuring conflicting objectives can complicate communication and lead to decisions that are difficult to defend or implement. This process can be made more explicit through the development and consideration of performance measures (see **Box 8**).

Box 5. Eliciting Objectives

To elicit objectives, start by asking the team and other interested parties to:

- *List all of the concerns that they want to address in making the decision.*
- *Think about the best and worst possible outcomes.*
- *Think about what they want to achieve or avoid.*

The team can then convert concerns or wishes into clearly defined objectives that indicate a preferred direction of change, such as "increase the probability of persistence of species X," "minimize the cost of management," or "maximize public connection with a species."

Note that objectives are not targets. Objectives are used to decide whether to pursue a conservation introduction, whereas targets describe a specific level of performance towards an objective or a threshold to achieve, often have implications across multiple objectives, and are associated with monitoring project implementation[17].

Box 6. Classifying and Structuring Objectives

Once an initial list of objectives is developed, classifying and structuring objectives can help organize a seemingly large list into a coherent and tractable set of key objectives. It is particularly important to identify and organize the following:

> ***Fundamental objectives:*** the primary, long-term desired outcomes that represent what one cares about regardless of how it is achieved (the "Why"). These objectives are the focus of the framework steps.
>
> and
>
> ***Means objectives:*** intermediate outcomes that help fulfill fundamental objectives. These are means to an end; the "How."

Fundamental objectives are the tools for assessing management alternatives and deciding on a preferred alternative. To identify fundamental objectives, ask, *"Why is this important?"* If the answer is "just because," "it is the law," "it has inherent value," etc., then it is likely a fundamental objective. To identify means objectives, ask the question, *"How could we achieve that?"*

Fundamental and means objectives will be specific to the decision context, and a different decision may require different objectives. Means objectives can help in developing alternatives; different management alternatives will likely employ different means to achieve the fundamental objectives.

If a large set of objectives emerges, the team can use objective hierarchies (grouping and sorting of objectives) and means-end diagrams to organize, understand, and communicate the relationships between objectives.

Recommended resource: Gregory R., et al. *Structured Decision Making: A Practical Guide to Environmental Management Choices.* Oxford, UK: Wiley-Blackwell; 2012. 312 pp.

Box 7. Considerations Related to Conservation Introductions

This is a list of potential considerations for developing objectives and assessing management alternatives, including conservation introductions. Use this as a *starting point* to help the team think about possible objectives. Actual considerations will be context- and case-dependent. (Adapted from 2022 USFWS Conservation Introduction Workshops output, IUCN Translocation Guidelines[1], National Park Service Ecological Risk Assessment of Managed Relocation[19], Richardson et al. 2009[20], and Cole et al. 2022[21].)

Nature of Considerations:	Source Ecosystem or *Ex Situ* Populations	Recipient Ecosystem	Other
Ecological Considerations	Risk of extinction (short-term and long-term) Risk of declines in abundance (short-term and long-term) Adaptive ability of focal species Natural colonization ability of focal species Traditional Ecological Knowledge that can support conservation of the focal species Ability of source population to withstand reduction in numbers associated with a conservation introduction or other translocation (effective population size, negative genetic consequences, disturbance from collecting individuals) Focal species' role in the source ecosystem	Survival and persistence (short-term and long-term) Undesired genetic consequences (e.g., reduced fitness) in focal species Risk of transmission of novel disease, pest, or pathogen to other species, including aquatic and marine species Negative impacts on the distribution or abundance of non-focal species Undesired genetic consequences (e.g., reduced fitness) in non-focal species Indirect negative impacts on the ecosystem structure Hybridization Logistical and financial feasibility of managing the habitat and implementing a monitoring program Limitations to managing habitat for other species	Invasion (spread beyond the recipient ecosystem) of the focal species and/or associated pathogens or parasites Ability to manage the introduced population if negative impacts are observed Reversibility (ability to remove introduced population)
Social Considerations	Importance of the focal species to local and Indigenous communities Cultural impacts if the focal species declines or goes extinct Economic loss if the focal species declines or goes extinct Disparate impact of removal of focal species on a particular community or group (environmental justice)	Restrictions on land use due to focal species protections Negative/positive social, economic or cultural impacts of focal species presence Negative/positive social, economic or cultural impacts due to impacts of focal species on other species/ecosystem Disparate impact of introduction of focal species on a particular community or group (environmental justice) Administrative burden for managers of the recipient ecosystem	Transboundary acceptance (social and legal) Willingness to accept potentially irreversible consequences Ethical questions surrounding intentional movement of species Resources/budget to engage partners in planning and for short and long-term management Resources/budget to implement an alternative and long-term management costs

Box 8. Developing Performance Measures

Performance measures should be designed for each of the fundamental objectives identified by the team. These performance measures are used to predict (approximately) how progress towards objectives may be affected by each management alternative. This prediction, in turn, informs the choice of an optimal alternative and assessment of outcomes once an alternative is implemented. As such, performance measures are not targets. For example, a performance measure might be "number of sites occupied by species X" while a target would be "three occupied sites." Targets are often developed during the planning and implementation stages. Articulating and documenting fundamental objectives and developing accompanying performance measures increases transparency in decision-making and leads to more defensible decisions that are responsive to the values of the interested parties.

Performance measures can articulate desired outcomes, progress toward outcomes, components of program implementation, or the needed resources, inputs, and circumstances for success[22]. Performance measures should be sensitive or meaningful to the decision, and are intended to provide the evidence needed to answer questions about whether a given management alternative will be effective, and how it can be improved. Prior to selecting performance measures, it is important to have a shared understanding of:

- *Vision of success:* What are the aims and objectives?
- *Purpose:* How are the performance measures going to be used?
- *Audience:* Who is the information on performance measures for?
- *Feasibility:* Are there sufficient resources, funding, and time to collect the needed data for the performance measures?

Categories of performance measures, with accompanying examples of questions these measures seek to address, include:

- *Program benchmarks:* What intermediary achievements are needed for long-term success?
- *Efficiency and comparative efficiency:* What are the costs for X conservation action, and how do the costs compare with Y conservation action?
- *Effectiveness:* How effective will the conservation action be at accomplishing the objective?
- *Satisfaction:* How satisfied will the public be with this conservation action?

In the framework, each alternative is assessed according to its predicted effectiveness in the future. This involves making informed assumptions about how each alternative will perform, based on the best available quantitative and qualitative data. Once a management alternative is selected and acted upon, the accuracy of these assumptions can be evaluated and can inform changes to improve outcomes. The temporal component of the decision statement will guide the predictive time frame.

Recommended resource: Weiss CH. *Evaluation* (2nd Edition). Upper Saddle River, NJ: Prentice Hall. 1998; 372 pp.

3 | FEASIBILITY ASSESSMENT

Step 3: *A feasibility assessment identifies potential ecological and social barriers that may constrain consideration of a conservation introduction or other management action. During the feasibility assessment, the intent is not to resolve feasibility issues, but rather to identify and incorporate possible actions into management alternatives to address constraints.*

Before including a conservation introduction, or any other management action, in a slate of alternatives (see Step 4, *Developing Alternatives*), one should assess the ecological and social feasibility. The scope and scale of a feasibility assessment should be proportional to the potential risks from implementing a conservation introduction or other management action.

Any decision involving the potential use of a conservation introduction should consider monitoring as an integral part of the conservation introduction rather than a separate endeavor. Monitoring is crucial to determining the status of performance measures and establishing whether targets of the conservation introduction are met, and for informing adaptive management and exit strategies. Therefore, feasibility assessments should encompass the ecological and social dimensions of monitoring alongside other feasibility considerations. Fully developed monitoring plans may not be necessary for initial feasibility assessments of conservation introductions or other management alternatives; however, developing the essential components of a monitoring plan, as well as monitoring intervals and a monitoring time horizon, will help ensure that the feasibility of monitoring is considered alongside any management action. We expect monitoring programs will vary considerably depending on multiple factors, including: the biology and ecology of the species, potential impacts to species and habitats from monitoring activities, monitoring techniques, accessibility and logistics, costs, and risks associated with the conservation introduction.

Ecological Considerations

The focus of an ecological feasibility assessment will depend on the type of conservation introduction proposed (preventing extinction or extirpation, replacing a lost ecological function, or directing ecosystem change toward a state that better supports conservation goals). For conservation introductions aimed at preventing extinction or extirpation, questions that a feasibility assessment should address include, but are not limited to:

- Is enough known about the biology and ecology of the species to inform selection of individuals for release or outplanting and areas where this would occur?
- Are there, or could there be, enough individuals of the focal species from genetically appropriate wild or captive source populations to conduct a conservation introduction?
- Is enough known about the biology and ecology of the species to inform a monitoring plan?
- Can the past cause(s) of decline or extirpation be identified and addressed at the potential release area(s)?
- Do available locations exist with suitable habitat and climate requirements for the focal species? If not, can suitable habitat be created or restored?
- What procedures may be necessary to prevent the accidental spread of invasive pathogens?
- Has there been an evaluation of risks that translocated individuals may pose to the conservation interests of other species and habitats, including aquatic and marine ecosystems? (Note: In some cases, this may be an initial assessment, with a more detailed assessment conducted during Step 5, *Risk Assessment and Predicting Outcomes*).

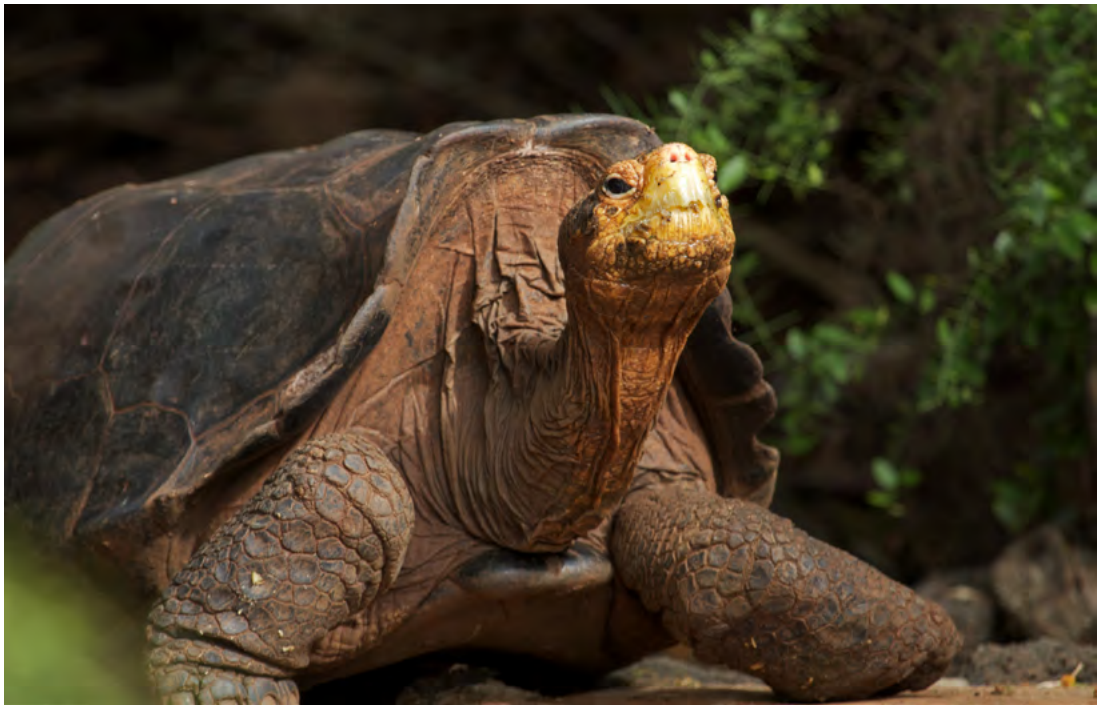
For ecological replacement and directing ecosystem change, in addition to the relevant questions above, a feasibility assessment should address whether there is a species suitable for achieving the desired ecological state.

Social Considerations

Social considerations are critical to the success of conservation introductions and include legal, policy, economic, ethical, and cultural considerations. An underlying consideration is whether sufficient societal support exists for the conservation introduction. Specific questions that a feasibility assessment should address include, but are not limited to:

- Are the human communities near the potential recipient and donor areas, relevant government agencies, non-government organizations, and informal interest groups aware of the conservation problem? What forms of engagement and outreach are needed to raise awareness of the problem and increase understanding of public and partner perspectives on possible responses?
- Do established mechanisms exist for communication, engagement, and problem-solving between interested parties (including affected communities) and decision makers?
- What contingencies are needed to prepare for a conservation introduction not going as planned (e.g., exit strategy)? How feasible will implementation of these contingency plans be?
- What cultural opportunities and impacts need to be assessed?
- What economic opportunities or impacts need to be considered?
- Are there livelihood and/or cultural impacts and opportunities unique to Indigenous peoples that need to be considered?
- Has there been an assessment of applicable compliance requirements with federal, state, territorial, and Tribal laws and policies? What regulatory actions might be needed? For example, would experimental population designation under the Endangered Species Act be appropriate? If translocating a species across international borders, has there been an assessment of the feasibility of securing international permits and moving species across these borders? Does the translocation schedule account for regulatory and policy compliance?
- Do sufficient human and financial resources exist (or can they be acquired) to accomplish the conservation introduction, including post-release or post-outplanting monitoring and management?
- What are the administrative burdens associated with the conservation introduction?
- What are the ethical implications of intervening (or not intervening), and how do ethical perspectives vary across affected communities?
- What steps will minimize harm to individual organisms or other species that will or might be affected by a conservation introduction or other intervention?

Further social and ecological considerations are listed in **Box 7**. If the feasibility assessment reveals that a conservation introduction appears infeasible, teams should fully explore whether limiting constraints can be addressed before dismissing conservation introduction as a valid alternative. If it is unclear whether a limiting constraint can be addressed prior to implementing a conservation introduction, one can include a conservation introduction as an alternative and assess the risks of unresolved constraints during the risk assessment stage and when deciding on a course of action.



The Hood Island Giant Tortoise, native to Española Island (also known as Hood Island) in the Galapagos Islands, was introduced to nearby Santa Fe Island in 2015. The species was introduced to re-establish ecological functions such as grazing, seed dispersal, and the trampling of vegetation which were lost when Santa Fe Island's endemic tortoise species went extinct more than 150 years prior. Credit: Brian Gratwicke

4 | DEVELOPING ALTERNATIVES

Step 4: *A decision to pursue a conservation introduction must consider other management strategies to achieve the conservation objectives. In this step, the team develops alternatives. The subsequent prediction and assessment steps involve comparing the alternatives in terms of their ability to meet the objectives. Alternative development is critical for assessing risks and benefits of a conservation introduction.*

Developing a set of management options ("alternatives"), including but not limited to a conservation introduction, and comparing them relative to fundamental objectives provides context for assessing whether a conservation introduction is the preferred strategy to pursue[1]. Preexisting alternatives (developed prior to working through this decision framework) may not be the only alternatives that could meet the objectives; in some cases, developing new, potentially more effective options might be possible[7,18].

Considerations when developing alternatives:

- The number and breadth of alternatives will be context-specific and depend on the complexity of the conservation situation, constraints, and other factors. Ensure that alternatives are substantially different from one another and encompass a reasonable range of management actions that meet the goals of the action and that are technically and socially feasible. In some cases, this will entail evaluation of different management strategies (e.g., captive propagation, reintroduction, conservation introduction). However, in other cases, there may be enough variation within the effects of a single management strategy (e.g., conservation introductions to different sites or at a different pace) to capture a sufficient breadth of alternatives.
- Alternatives can include combinations of different management actions. For example, an alternative could include a conservation introduction and *in situ* conservation actions.
- All decisions should consider a "no action" alternative to illustrate the improvement, in terms of the objectives, that can or cannot be achieved by implementing an alternative.
- Delaying a decision to collect more data or conduct additional analyses can be included as an alternative when critical information gaps or substantial uncertainty exist. However, assess the risks of delaying a decision if such an alternative is included.
- The decision context and objectives will drive the level of detail needed when developing alternatives (see **Box 9**). Fully developed implementation and monitoring plans and exit strategies[23] may not be necessary for initial assessments of conservation introductions and other management alternatives; however, include enough information at this stage about the scope and extent of implementation, monitoring, and exit strategies to adequately estimate outcomes of each alternative.

Box 9. Guidance for Developing Alternatives

General guidelines for developing alternatives include:

- Explore whether and how each alternative could achieve each objective.
- Facilitate a robust brainstorming process (see **Box 3**) with sufficient time for brainstorming as a team and with partners.
- Consult with relevant knowledge holders (e.g., natural resource management practitioners, biocultural practitioners) and interested parties.
- Develop a diverse range of scenarios to describe future conditions and explore how alternatives might perform in each scenario.

Alternatives to conservation introductions could include the following (adapted from the IUCN/SSC 2013, Annex 3)[1]:

- *Area-based:* Increasing habitat availability through restoration, new/expanded protected areas, corridor establishment, or habitat protection.
- *Species-based:* Increasing population viability through reintroductions; pathogen, predator, or invasive species control; food provisioning; assisted reproduction; captive propagation; or holding in captivity while habitat is restored.
- *Society-focused:* Further investing in conservation through changes in community engagement, partnership building, public education, legislation, regulations, or financial incentives to promote species survival.
- *No action:* Choosing inaction in hopes that focal species or ecosystems may naturally adapt.
- *Delaying a decision* to collect more data or for other reasons.

Recommended resource: IUCN/SSC. *Guidelines for Reintroductions and Other Conservation Translocations.* Gland, Switzerland: International Union for the Conservation of Nature, Species Survival Commission. 2013; 57 pp.

5 | RISK ASSESSMENT AND PREDICTING OUTCOMES

Step 5: *A risk assessment establishes the relevant risk factors and assesses the probability of an undesirable outcome occurring as well as the severity of its impact. Predictions of outcomes assess how well each alternative meets the objectives. Together, risk assessment and prediction of outcomes are used to decide on a course of action in Step 6, Deciding on a Course of Action.*

Deciding on a preferred alternative requires assessing the risks of each alternative and predicting how well each alternative meets the objectives. Risk is assessed as the probability of a less-than-desirable outcome and the severity of its impact. Predicted risks and outcomes are not value-based judgements about the relative importance of the consequences; rather, they are primarily an analytic undertaking, using existing information, models, and other tools. Individuals with relevant expertise should be engaged. This can include natural and social scientists and holders of local ecological and/or Indigenous knowledge. Local ecological knowledge provides important insights from those most familiar with the species and its habitat (e.g., field biologists, biocultural practitioners). Indigenous knowledge should be used when it is considered authoritative by the Indigenous Peoples who possess it, and it is freely available or shared with consent. Because predictions of future conditions inherently involve uncertainty, documentation and transparency about the information and assumptions underlying these predictions is necessary[24].

Conduct a Risk Assessment

A risk assessment establishes relevant risk factors, whether a risk is present, and if so, the magnitude or impact of that risk. The extent and level of detail needed in a risk assessment will depend on the decision context, the timeframe for deciding, and the level of identified risk. A risk assessment should be conducted for all alternatives under consideration. To appropriately identify the landscape potentially at risk, assessments should include predictions of species range expansion after a conservation introduction over various periods of time. Existing conservation introduction risk assessment tools can be used to categorize risk. For example, the National Park Service's ecological risk assessment protocol for managed relocations can be used for an initial assessment of biological and ecological risks[19]. More detailed risk assessments may be necessary when risks and consequences are high, and opportunities to reverse the conservation introduction are low. Categorization of risks for the other alternatives under consideration should also use existing tools, when appropriate, and be sufficient to reasonably consider the risks and benefits of all the alternatives at the decision-making step.

Risk assessments should focus on the objectives that the team has identified in previous steps. Some factors specific to conservation introductions that a risk assessment should generally address include, but are not limited to:

- Risk to *ex situ* and *in situ* source populations[23]
- Ecological risk, including impacts of the conservation introductions on other species and ecosystem functions in the recipient site[23]
- Biosecurity risks, including the risk of spreading pests, pathogens, or parasites accidentally moved with the focal species, or through subsequent monitoring activities[23]
- Risk of degradation of adjoining ecosystems, including aquatic and marine ecosystems, caused by the focal species or unintended hitch-hiking species expanding their distribution with adverse impacts to other native species or to ecosystems[23]
- Risk of hybridization or gene escape[23]
- Risk of harmful impacts on people and their livelihoods, lifeways and culture, including indirect ecological impacts that negatively affect ecosystem services[23]
- Risks associated with a species moving across national or other jurisdictional boundaries where protections may differ
- Financial risk to management agencies or groups, including the potential for lost opportunity costs (conservation gains sacrificed when dedicating staff and funding towards one management option over another), and an

assessment of the availability of additional resources to cope with issues that might emerge during the conservation introduction

- Risks associated with conservation inaction

Risk assessments should consider ways to reduce the risk of undesirable outcomes. Mitigation measures can be added to the alternatives, and predictions of consequences and risk can be reanalyzed to reflect the mitigation measures. One obvious way to reduce the risk of undesirable outcomes for a conservation introduction is to allow for the removal of the focal species from the recipient site—through implementation of an exit strategy—should unforeseen impacts arise. The risk assessment could evaluate the feasibility of reversing the conservation introduction as one means of reducing risk; however, this may not be feasible for many conservation introductions.

When conducting risk assessments, new objectives may arise that were not identified during previous steps (e.g., minimizing risk of certain outcomes). In some cases, these new objectives may require revisiting the slate of alternatives under consideration (i.e., returning to Step 4, *Developing Alternatives*).

Predict Outcomes

In addition to assessing risks, predictions of the benefits of each alternative and how well each meets the objectives is needed to make an informed decision. The methods used for predicting how well the alternatives meet objectives will vary and depend on the decision context and urgency of the decision. Initial predictions might be made using existing data, existing models, or informed judgements of the team. If the accuracy of initial predictions is deemed inadequate for determining a preferred alternative, effort should be directed to improving the predictions through conceptual models, expert elicitation, pilot studies, quantitative models, or other methods[25,26,27].

Some general types of models for predicting the ecological consequences of conservation introductions include habitat models, population models, dispersal models, and interaction models[26]. For social objectives, surveys, interviews, or other community engagement methods can be used. A "consequence table" can be a useful tool for succinctly displaying and comparing alternatives against the set of objectives[18]. This can build on the work done during Step 3, *Feasibility Assessment.* A consequence table lists the management alternatives under consideration, the objectives, and the predictions of how each alternative would affect each objective, in terms of the performance measures.

The temporal component of the objectives, as described in the decision statement and defined by the performance measures, is an important consideration in predicting consequences. Incorporating climate projections, in particular local or regional projections, into predictions for all management alternatives is important, including predictions related to the long-term suitability of the recipient ecosystem for the focal species.

Describe Uncertainty

Uncertainty in an assessment of risks and outcomes may result from variations in natural systems that are difficult or impossible to forecast, or from lack of knowledge or information. Identifying the sources of uncertainty can help guide decisions about gathering more information, either by delaying a decision and conducting research or by implementing adaptive management[25,27].

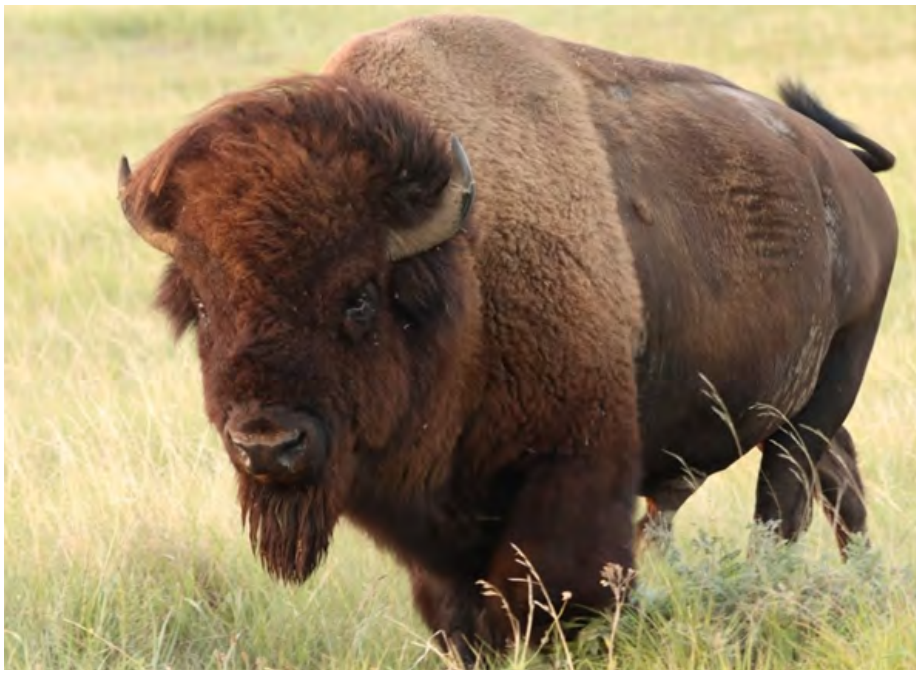
For ecological predictions, uncertainty can often be described using statistical methods that can account for chance variation, but in cases of high uncertainty or where there is a general lack of information, expert elicitation[25], scenario planning[28], or other predictive methods may be more appropriate. Predictions for how well alternatives meet social objectives may involve quantitative or qualitative methods, and often use constructed scales to measure impacts[29]. Uncertainty in social outcomes may be difficult to quantify but should be described, at least qualitatively.

6 | DECIDING ON A COURSE OF ACTION

Step 6: *The goal of this step is to assess the alternatives in a transparent and deliberative manner and decide on a course of action. Assessment of conservation introductions and other management alternatives is complex, and teams will likely face multiple challenges in assessing and deciding on a preferred course of action. These challenges include:*

- *Considering Multiple Objectives*
- *Dealing with Uncertainty and Risk*
- *Considering the Decision-Making Timeframe*
- *Making a Decision*

Deciding on a course of action involves integrating the predictions, results of the risk assessments, and the values-based aspects of the decision. Decision-making about conservation introductions is challenging for many reasons, including competing objectives in the donor and recipient sites, substantial uncertainty in predictions and the risk of adverse outcomes, and, sometimes, a need for rapid action in response to population declines, extinction risk, or ecosystem changes[20,30,31]. Deciding to pursue a conservation introduction or choosing another alternative should involve a thoughtful, deliberate, and transparent assessment of the predicted outcomes of each alternative under consideration. Depending on the decision-making structure identified at the outset of the process (Step 1, *Decision Framing and Engagement*), when deciding on a course of action the decision makers need to be actively engaged, especially those with management authorities over the relevant lands and species. In some situations, teams may assess the alternatives first and then provide decision makers with a summary of the results, highlighting the most important trade-offs and risks to consider. In other situations, the decision makers themselves will work through the assessments. If a preferred alternative emerges that is expected to perform better than other alternatives for each objective, then the decision may be relatively straightforward. In many cases, teams and decision makers will need to weigh the trade-offs among competing objectives, think about risk tolerance, and consider the decision-making timeframe. The methods and tools used to assess alternatives and identify a preferred alternative will be specific to each decision, but a general guide to addressing some of the major challenges in assessing alternatives follows.



Land managers are considering introducing bison at Kenai National Wildlife Refuge in Alaska to aid in directing ecological change as grasslands expand in a changing climate. With their habits of patchy grazing and wallowing, bison create heterogeneity across grasslands which can support more biodiversity. Credit: Sandra Uecker, USFWS

Considering Multiple Objectives

Decisions on conservation introductions involve consideration of multiple objectives. Maximizing the achievement of some objectives may require compromising some level of achievement on other objectives[1,18,30]. A starting point for discussion at this stage is review of the range of alternatives and the expected performance of each in achieving each of the objectives. By focusing on the pending decision, the team can transform general

statements about priorities or principles into discussions about real choices among alternatives and the consequences of choosing one or another[24].

If the team cannot identify a preferred alternative via discussion, a variety of formal multi-criteria methods for decision analysis exist that can provide insights, particularly in situations with many competing objectives, which may be difficult to consider in an unstructured discussion[9,18,24]. Discussion and use of formal methods may not fully resolve the challenges inherent in conservation introduction decisions. If this is the case, it can be helpful to identify areas of agreement and disagreement and clearly identify why participants support or oppose different alternatives[18]. Depending on the decision-making structure, identifying these areas may facilitate a decision, or point to areas for additional discussion, research, or analysis.

Dealing with Uncertainty and Risk

When deciding on a course of action, uncertainty and risk need to be integrated into the assessment of alternatives. Decisions on whether to pursue a conservation introduction require weighing potential risks against expected benefits[3] for all alternatives under consideration. Weighing risks and benefits is a values-driven exercise, including assessing the risk tolerance of the decision makers. Since risk tolerance is context-dependent, no statement about acceptable level of risk can be made that covers all potential situations where conservation introductions may be under consideration. Additionally, risks associated with conservation introductions may be difficult to predict in advance, creating another layer of complexity in assessing relative risks and benefits[30].

Considering the Decision-Making Timeframe

The timeframe for making a decision will influence the assessments that can be done, particularly considerations of uncertainty and risk. For example, if the conservation goal is to prevent extinction, failure to act quickly can result in extinction of a species before a conservation strategy can be implemented[31]. The team and the decision makers must carefully consider the trade-off of the costs and benefits of delaying a decision in order to gather more information or conduct additional analyses, versus acting quickly to prevent an adverse outcome (see **Box 10**).

Box 10. Considering the Costs and Benefits of Reducing Uncertainty: Value of Information

Conducting research or developing new models might reduce uncertainty associated with predicted outcomes of a conservation introduction, but delaying a decision for this purpose may also involve significant costs[31,32]. Value of information, a formal method for assessing the costs and benefits of reducing uncertainty, can help guide decisions as to when delaying a decision and collecting more information is warranted[25,33].

Making a Decision

After assessing the alternatives and revisiting any steps based on insights gained during the process, a decision needs to be made on a course of action. The point at which the team and decision makers are comfortable moving forward with a decision will be unique for each conservation situation. Decisions on conservation introductions fall broadly into three categories:

Pursuing a conservation introduction

If the decision is to pursue a conservation introduction, an optimal implementation plan will be developed[34]. Planning and implementing a conservation introduction will involve a series of decisions, focused on how to implement a conservation introduction considering the multiple objectives, risks, and uncertainties identified through the use of this framework. A decision process similar to the one outlined in this framework (forming a team, identifying objectives, developing alternatives, considering risks and predicting consequences, etc.) should be used to work through the planning and implementation stages. Planning and implementing a conservation introduction should be consistent with the transparent and defensible decision-making process described in this framework, and should build upon the outputs of the framework (team formation, objectives, etc.). While conservation introduction planning and implementation may be viewed as a natural sciences endeavor by some, social objectives must also be considered and therefore social science expertise is recommended. Additionally, there may be high levels of uncertainty related to many aspects of a conservation introduction plan, necessitating a clear process for considering different scientific perspectives.

General considerations and critical steps for conservation introduction planning and implementation can be found in IUCN reports[1,5,34] and in other conservation planning and translocation literature[4,35]. At any point during the implementation planning process, factors may arise, such as new information, changes in permit requirements, or insufficient funding, that necessitate revisiting the decision to implement a conservation introduction.

or

Pursuing an alternative management strategy

If the decision is to not pursue a conservation introduction, clearly identify the management strategy that will be pursued instead and describe why a conservation introduction was not chosen. A decision to not pursue a conservation introduction might be revisited if the conservation situation significantly changes, new information arises that informs the process, or objectives are modified or added.

or

Delaying a decision

Delaying a decision to develop new alternatives, gather more information, develop new models, conduct additional engagement, or for other reasons may be an outcome of the framework process. The team must clearly communicate the rationale, anticipated outcome, and benefits of the decision to delay. Clearly identifying the timeframe for completion of the additional work is advisable so that teams and the general public have a clear expectation for when a decision will be made.

Whatever course of action is decided, clear communication is necessary to explain the decision to the public and other parties who were not involved in the decision process. The form of communication and reporting should be suitable for the intended audience and may include written reports, public forums, internet resources, and peer reviewed media. A public reporting of the process, including descriptions of the information used, assessments of risks and uncertainty, and assumptions made, can foster the transparent, inclusive, and defensible decision-making that the USFWS Pacific Region is striving for. Dissemination of information will also help inform subsequent conservation introduction decisions and improve future decision-making.

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