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# **Endangered Species Mitigation Needs Assessment**

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<b>16. Abstract</b> The Illinois Department of Transportation, like most other state transportation agencies, must undergo an environmental review for each transportation project. IDOT identified several challenges that involve regulatory and implementation of federal and state laws protecting threatened and endangered species. We evaluated each state's environmental review process as it pertained to statutes governing state imperiled species (i.e., threatened, and endangered, rare, or otherwise imperiled). Our recommendations from this review of what other state transportation and natural resource agencies have done to improve environmental review processes at the state level include establishing liaison agents with outside regulatory agencies. We also suggest that IDOT, after establishing a liaison, work with each agency to evaluate species or habitats that repeatedly cause issues to project timelines and budgets. Conservation banking and advanced mitigation frameworks are often built upon state legislation that would require conservation banks to be established or a series of programmatic agreements and other instruments into a comprehensive plan, respectively. Lastly, research funding, often a favorite of state agencies because it is easy to implement, often does not prevent species loss from occurring. Our research has identified successful examples from other state transportation agencies that have improved upon the efficiency and predictability of compensatory mitigation for the incidental take of threatened and endangered species.					
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The contents of this report reflect the view of the authors, who are responsible for the facts and the accuracy of the data presented herein. The contents do not necessarily reflect the official views or policies of the Illinois Center for Transportation, the Illinois Department of Transportation, or the Federal Highway Administration. This report does not constitute a standard, specification, or regulation.

## EXECUTIVE SUMMARY

The Illinois Department of Transportation (IDOT), like most other state transportation agencies, must undergo an environmental review for each transportation project. In Illinois, this process includes a section 7 consultation of the Endangered Species Act with the United States Fish and Wildlife Service (USFWS) when impacts to federally protected species cannot be avoided or minimized. Often, compensatory mitigation is implemented when threatened or endangered species (T&E) are impacted. Additionally, IDOT coordinates with the Illinois Department of Natural Resources (IDNR) to comply with the Illinois Endangered Species Act. Mitigation requirements imposed by federal and state regulatory agencies are not necessarily congruent, which leads to several challenges with project coordination and planning.

IDOT identified several challenges that involve the regulation and implementation of federal and state laws protecting T&E species. These were identified as having significant impacts to the efficiency and predictability of the environmental process, often leading to project delays and budgetary escalation. Many of the projects with unanticipated additional costs or delays involved state incidental take authorizations (ITAs) that require consultation with the Illinois Department of Natural Resources. Most ITAs involved aquatic habitats and species and were associated with bridge projects. The mitigations costs associated with ITAs increased with estimated take of individuals regardless of species, and these mitigation costs did not rise over the most recent nine years after controlling for estimated take. Our review focused on identifying endangered species mitigation strategies to improve IDOT's environmental review process. We examined coordination regulations of other state transportation agencies to identify creative solutions where middle ground could be found to help forge agreements or new strategies to this problem.

We evaluated each state's environmental review process as it pertained to statutes governing state imperiled species (i.e., threatened, and endangered, rare, or otherwise imperiled). From this review we identified several approaches that other states have implemented to streamline the review process for both agencies, increase the benefit to the protected species, particularly in cases where small-scale mitigation efforts were ineffective at preventing species loss, and make predictable the expected costs associated with compensatory mitigation.

Our recommendations include establishing liaison agents with external regulatory agencies, a strategy many states have adopted. These liaison agents facilitate streamlined project coordination, as all consultations are centralized. IDOT could establish liaisons with both the IDNR and USFWS to provide consistency in proposed mitigation strategies while working with the state and federal regulatory agencies. This approach should eventually lead to streamlined processes and fewer delays while finding acceptable mitigation solutions to both IDOT and the respective agencies.

We also suggest that IDOT, after establishing a liaison, work with each agency to evaluate species or habitats consistently impacting project timelines and budgets. Recognizing these critical areas allows for the development of legal agreements outlining predictable best practices and expected compensatory mitigation measures. Such programmatic agreements, common in other states, could streamline the review process, benefit imperiled species, and stabilize project costs. In-lieu fee

programs could be established in cases where project-by-protect mitigation does not provide ample compensation to prevent species loss. For example, in cases involving species like freshwater mussels, dependent on healthy large-river ecosystems, in-lieu fees could support land acquisition or research to benefit these species and identify new best practices.

Conservation banking and advanced mitigation frameworks, often built upon state legislation, typically require the establishment of conservation banks or the integration of programmatic agreements and other instruments into a comprehensive plan. These compensatory mitigation solutions are often well designed by multiple agencies and objective third parties and are designed to provide long-term mitigation solutions. Although developing these frameworks is a challenge, the benefits to both the resources and the agencies involved often justify the effort. Our suggestion would be to recognize the value of these approaches when developing trusting relationships with regulatory agency partners and strive toward implementing established guidelines that one day could comprise a more comprehensive solution.

Lastly, research funding, often a favorite of state agencies because it is easy to implement, does not always prevent species loss. Because IDOT plays a role in proposing mitigation measures, it can actively identify research that can be applied specifically to T&E species mitigation practices. USFWS discourages the use of research funding as compensatory mitigation unless the research is aimed at improving current mitigation practices to the benefit of the species as a whole; however, if used too often, research funding could ultimately lead to a more rapid decline of the protected species in question.

Our research has identified successful examples from other state transportation agencies that have improved upon the efficiency and predictability of compensatory mitigation for the incidental take of T&E species. We are optimistic that implementing some of these identified strategies will improve IDOT's efficiency and predictability, foster better relationships between the regulators and project developers, and benefit the species these laws aim to protect.

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## CHAPTER 1: INTRODUCTION

Under the Federal Endangered Species Act (ESA) and the National Environmental Policy Act, avoidance, minimization, and mitigation of impacts to threatened and endangered species are regulatory requirements. There are similar requirements under the Illinois Endangered Species Act. The Illinois Department of Transportation (IDOT) encounters a variety of challenges related to the implementation of rapidly and frequently changing regulations and policies and in certain instances, permits may need to be obtained. Responding to these challenges and navigating the permitting process often leads to added project costs and delays in IDOT's construction program and the ability to deliver projects for letting. The lack of environmental planning and available tools to identify up-front costs associated with threatened and endangered (T&E) species mitigation also leads to delays in the development of IDOT construction projects.

To address these challenges IDOT proposed this Illinois Center for Transportation special project with the goal of documenting these challenges and proposing potential solutions for meeting IDOT's T&E species regulatory requirements and mitigation needs. The purpose of this report is to:

- Identify, document, and define the challenges facing IDOT when it comes to threatened and endangered species avoidance, minimization, and mitigation.
- Provide IDOT scoping information and a literature review focused on identifying gaps and successful solutions implemented in other states that are associated with evaluating effective avoidance and minimization measures, identifying impacts to threatened and endangered species and calculating mitigation.
- Serve the long-term goal of implementing a multidiscipline, scientific approach to T&E species impact evaluation and improve project planning, development, and implementation.

During this project, the following approaches and methods were used:

- Provide an overview of past and present IDOT mitigation programs and outline aspects of needs, challenges, and successes of past and current projects.
- Circulate a questionnaire to various external transportation industry personnel to identify a variety of approaches implemented by other states. These approaches address planning and response to regulatory requirements and mitigation needs for threatened and endangered species.
- Investigate how other states respond to T&E species regulatory requirements and mitigation needs.
- Summarize recent changes in regulations and policy, challenges, approaches, and responses or initiatives adopted by other states.

# **CHAPTER 2: OVERVIEW OF ENDANGERED SPECIES ACT REGULATIONS APPLICABLE TO AVOIDANCE, MINIMIZATION, MITIGATION, TAKE AUTHORIZATION, OR OTHER APPROACHES TO THREATENED AND ENDANGERED SPECIES MANAGEMENT**

## **FEDERAL ENDANGERED SPECIES ACT**

Section 7 of the Endangered Species Act of 1973 (ESA) mandates that all federal agencies use their authorities to conserve endangered and threatened species in consultation with the US Fish and Wildlife Service (USFWS). The Illinois Department of Transportation is subject to Section 7 of the ESA when a project utilizes federal funding from the Federal Highway Administration (FHWA) or other sources, or has a federal nexus, such as a 404 permit from the US Army Corps of Engineers. Therefore, IDOT, as a designated federal agency representative for FHWA, must review projects to make sure that the actions it carries out will not jeopardize the continued existence of endangered or threatened species or destroy or adversely modify critical habitat.

Under Section 7 of the ESA, there are three determinations that can be reached:

- No Effect
- May Affect but Not Likely to Adversely Affect
- Likely to Adversely Affect

A determination of “Not Likely to Adversely Affect” may be reached with the implementation of avoidance and minimization measures to protect the endangered species present in the project area. It requires informal consultation with USFWS and concurrence from them. USFWS, like the National Environmental Policy Act, allows for five different types of mitigation: avoid, minimize by rectifying or reducing over time, and compensate (US Fish and Wildlife Service, 2023a).

USFWS may determine that certain scopes of work or thresholds of impact are likely to adversely affect a threatened or endangered species. In such cases, formal consultation and a biological opinion stating that the project will not jeopardize the existence of the species are required from USFWS. The formal consultation process can take up to 120 days once initiated.

State or locally funded projects without federal funds or federal nexus are subject to Section 10 of the ESA. In this case USFWS would provide technical guidance. If a project is Likely to Adversely Affect a species, any non-federal entity (such as private companies, local or state governments, etc.) may pursue an incidental take permit for their otherwise lawful activity. Permits issued by the USFWS under Section 10 require a habitat conservation plan (US Fish and Wildlife Service, 2023b) to be prepared by the applicant and can take several years to complete (US Fish and Wildlife Service, 2022).

## **THE ILLINOIS ENDANGERED SPECIES PROTECTION ACT**

The Illinois Endangered Species Protection Act (ILESPA) states “that it is unlawful to take—harm, kill, or harass—a species on the IL Threatened or Endangered Species list.”

The act is broken down into two parts: Part 1075 and Part 1080. Part 1075 is required by law for any project or action that is being carried out, authorized, funded, or permitted by IDOT or the local public agency. IDOT and local public agencies are required to evaluate whether the proposed actions are likely to jeopardize the continued existence or recovery of Illinois listed endangered or threatened species. This process is called consultation.

During consultation under Part 1075, IDNR provides a response letter to the project sponsor that includes an effect determination for any Illinois threatened or endangered species and may include recommendations for avoidance measures or that the sponsor pursue an incidental take authorization (ITA) under Part 1080. The letter closes or terminates consultation with IDNR. There are two determinations that IDNR may issue:

- No Adverse Impact
- Adverse Impacts Likely

Per Illinois Administrative Code 1075 adverse impact is defined as a “direct or indirect alteration of the physical or biological features of the air, land, or water that may affect the survival, reproduction or recovery of a listed species or that may diminish the viability of a natural area.” IDNR may recommend that the applicant pursue an ITA based on a project’s potential for take of a threatened or endangered species.

Part 1080 covers the incidental taking of endangered species for otherwise lawful activities. The IDOT Natural Resource Unit handles all ITAs on behalf of the Division of Highways and the Bureau of Local Roads and Streets. If an ITA is sought by the applicant, they must submit a conservation plan and public notice for IDNR to review. The conservation plan must address the items outlined in the regulations for Part 1080. These components include but are not limited to a discussion of avoidance, minimization, and mitigation measures that will be implemented to the maximum extent practicable. Once the conservation plan is complete there will be a public notice and comment period. After this, IDNR will again internally review the conservation plan. The time to obtain an incidental take authorization takes a minimum of 150 days.

# CHAPTER 3: SUMMARY OF IDOT'S EXISTING CHALLENGES AND SUCCESSES WITH IMPLEMENTATION OF AVOIDANCE MINIMIZATION AND MITIGATION

## REGULATORY AND IMPLEMENTATION CHALLENGES

Regulatory challenges are external to IDOT. Regulatory policy is set by state or federal agencies and can change with court rulings or shifts in administrative initiatives/policies. Regulatory policy changes can cause uncertainty and may take months or years for the regulatory agencies to implement rules and guidance in response to legal or policy changes. This can cause confusion and delays as IDOT awaits guidance from the agencies.

Implementation challenges are those that IDOT can address by developing new policies or amending existing policies and procedures. These range from administrative to technical and operational challenges. Current regulatory and program implementation challenges include:

- Adapting to changes in the state and federal endangered species laws and lists of protected species: The federal and state threatened and endangered species lists are always changing as new species are listed or delisted. Additionally, there are numerous changes in legal wording or interpretation of the state and federal laws. Once a species is listed as threatened or endangered, its updated status and protection is effective immediately. However, even a species already listed may be reclassified, bringing its own set of changes and challenges. IDOT is then required to evaluate the potential impact its projects may have on these newly listed species with little guidance from resource agencies, USFWS, and the Illinois Department of Natural Resources. Awaiting guidance from the state or federal agencies on implementation or interpretation of new regulations or listed species causes confusion, inconsistency, and often project delay.
  - One success that should be recognized is that USFWS and FHWA along with several other federal agencies developed a programmatic Biological Opinion for bats. This agreement outlines avoidance and minimization measures for bats that can easily be implemented by IDOT. It streamlines consultation for the species covered and outlines specific impacts and mitigation thresholds. The agreement is easily updated to address additional newly listed bat species or new species information. This significantly improves IDOT's project delivery. A challenge is that the Biological Opinion for bats is the exception rather than the rule and that not every species has a programmatic agreement or set of avoidance and minimization measures, or impact thresholds defined, which makes it more likely that IDOT projects will experience delays when addressing these species or projects involving multiple species.
  - FHWA supports the concept of programmatic mitigation planning (PMPs) as is outlined in FHWA (2023), where it is encouraged to develop PMPs based on long-range transportation plans, forecasts for potential impacts, and corridor transportation plans. PMPs, developed



through this process, are meant to be flexible and can encompass single or multiple resources across various geographic scales to best meet the objectives and goals of the transportation agency or project proponent. In contrast to traditional project-based mitigation strategies, PMPs can produce benefits, including:

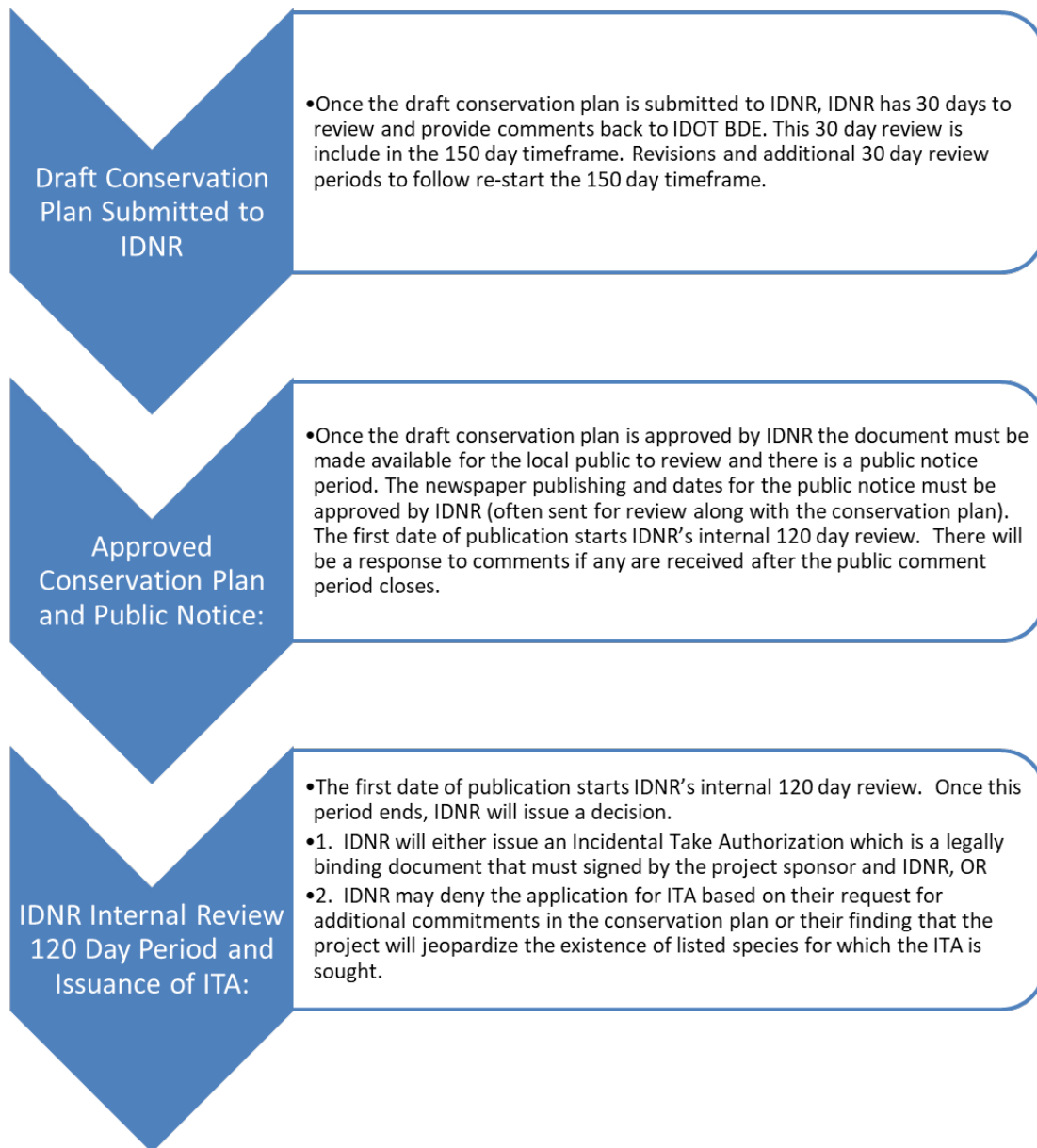
- Improved environmental outcomes.
- Accelerated project delivery with reduced project delays.
- Fulfillment of permit requirements and environmental commitments.
- Reduced mitigation costs.
- Increased quality and predictability of mitigation measures.

Therefore, development of PMPs should be considered a potential opportunity for IDOT to pursue through their local FHWA Illinois Division and other federal resource agency partners and explore this concept with state resource agency partners. It may even be possible for local public agencies to pursue similar opportunities with local conservation or stewardship groups.

- Implementation of legal or permitting requirements for avoidance, minimization, and mitigation under state and federal policies: avoidance, minimization, and mitigation are components of both the federal and state Endangered Species Acts. IDOT must look at avoidance measures, followed by minimization measures, and lastly mitigation. Challenges arise when little information is known about a species or consistent avoidance and minimization measures or mitigation thresholds have not been developed or defined by resource agencies. This puts the responsibility on IDOT. Not every species has guidance or avoidance and minimization measures developed for it because little is known about its needs or because there are other species of greater concern. While it is advantageous for IDOT to develop transportation-related avoidance and minimization measures, this takes time and often causes project delays if no current standards exist or if species must be addressed on a project-by-project basis.
  - There are sometimes discrepancies between state and federal regulations. While avoidance and minimization measures are significant components of the federal ESA, aimed at avoiding mitigation and incidental take (formal consultation requirements), the Illinois ESA heavily focuses on either avoidance or incidental take authorization, leaving little room for the evaluation of minimization measures although it is a required component. These discrepancies can lead to project delays or differing opinions between resource agencies on how to address species that are both state and federally listed. There are also different requirements and time frames for obtaining incidental take authorization/permits from IDNR compared to USFWS. This makes it difficult for IDOT to develop appropriate avoidance and minimization measures and commitments for contract plans for projects and thus makes it difficult for projects to achieve or identify a targeted letting.

- One success is IDOT's existing Memorandum of Understanding (MOU) with IDNR, which addresses consultation under Part 1075, granting IDOT certain authorities of implementation. This streamlines the consultation process, which is the bulk of IDOT's coordination with IDNR, with incidental take under Part 1080 being less common but not uncommon. The MOU has improved IDOT's project delivery. However, when projects go through the Part 1080 process to obtain an incidental take authorization, there is no programmatic agreement and projects are much more likely to experience delays at this point. The process takes a minimum of 150 days to obtain an ITA but that does not account for any prep work or revisions.

The 1080 process requires multiple steps before final authorization can be obtained (Figure 1) and can experience delays at any time. The preparation time for IDOT, the local agency, or a consultant to prepare a conservation plan to submit to IDNR is not included in the 150-day time frame, nor is any time for revisions that need to be made for IDNR to approve the document. With each revised conservation plan submittal, IDNR can take another 30 days to review the document. With just one revision, the time frame to obtain the ITA goes from 150 to 180 days. Additionally, the public notice period has a very strict set of legal requirements and must be approved by IDNR. Any lapse time that it takes to identify the local paper and dates for publishing (as this is based on the approval of the conservation plan first) are not included in the 150-day time frame, and frequently causes additional delay. IDNR has an internal review period that starts on the first date of the newspaper publication. If the requirements for publication are not met, then the entire public notice must be redone, which resets the internal 120-day review time frame for IDNR to issue the ITA. Given that the legal requirements for the public notice are so strict, it is not uncommon for there to be errors during this process, which are sometimes out of the applicant's control and can add extensive delays to the expected date that the ITA will be obtained. While any deficiencies in the conservation plan are supposed to be addressed before approval, often IDOT will receive additional comments at the end of the 120-day internal review period. Mitigation is discussed below, but often the final number for mitigation is not known until the end of the 150 days despite having been proposed in the initial conservation plan submitted for review and approval.

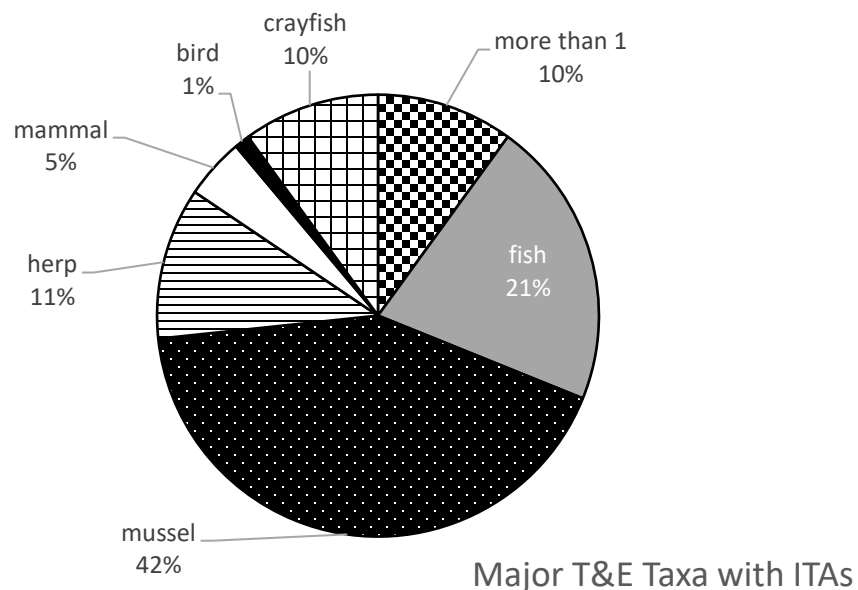


**Figure 1. Chart. Process and timeline for Illinois Department of Natural Resources incidental take authorization from draft conservation plan to issuance of ITA.**

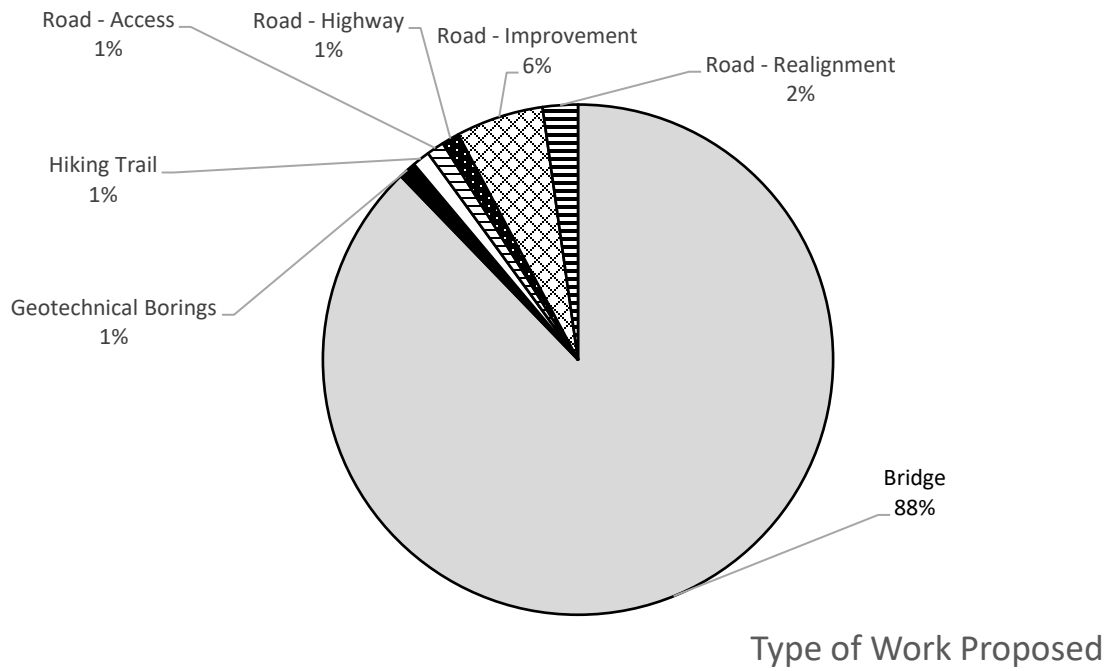
- Planning and programming for permitting and mitigation needs: The difficulties in developing avoidance and minimization measures, coordination with resource agencies, and securing permitting or mitigation to offset project impacts often involve reacting under short timelines based on outlined construction project schedules. Currently, the most common approach within IDOT is to assess and address all these needs on a project-by-project basis. This approach may be appropriate for smaller projects but is not suitable for larger projects or projects involving multiple species. Integrating the development of standardized avoidance and mitigation measures, tailored specifically to IDOT projects or species, into long-term planning could help avoid project delays.

## INCIDENTAL TAKE AUTHORIZATIONS HISTORICAL SUMMARY

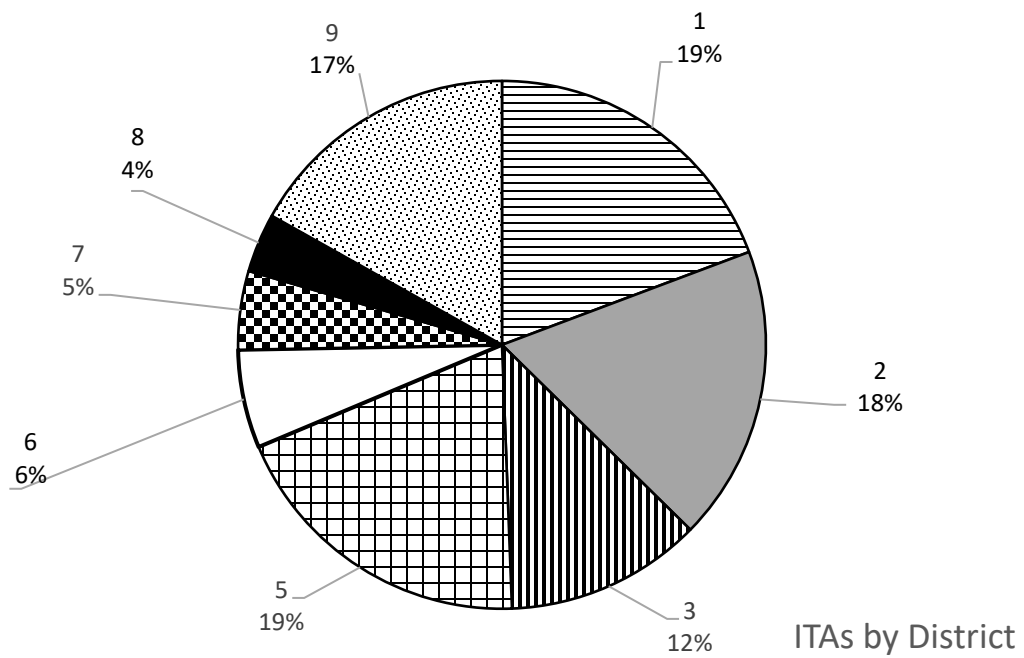
One of the largest challenges IDOT faces when it comes to planning and programming for mitigation needs is related to incidental take authorization under Part 1080 of the Illinois State Endangered Species Act. From 2002 to 2022, IDOT applied for 90 ITAs, of which 81 were executed with IDNR. Forty-seven percent of the executed ITAs were within the Bureau of Local Roads and Streets and 53% within the Division of Highways. Eighty-nine percent of the ITAs submitted in the past 20 years have been for aquatic species and only 11% for terrestrial species. The taxonomic group with the largest proportion of ITAs by far were freshwater mussels (42%) with fish placing a distant second (21%) (Figure 2). For the type of work proposed, 88% were from bridge projects and the remainder were broken out for various types of projects from road improvements, realignments, and others (Figure 3). The proportion of ITAs coming from each district varied, with Districts 1, 2, 5, and 9 having the most (Figure 4). For a subset ( $n = 36$ ) of ITAs executed from 2013 to 2021, where monetary mitigation was documented, IDOT paid a total of \$954,966 in monetary mitigation fees to IDNR, local counties, or municipalities. Based on the most recent nine years ( $n = 27$ ) after excluding an outlier from the massive-scale project involving replacement of the I-74 bridge over the Mississippi River (i.e., mitigation costs were \$545,000 for mussel relocation), mitigation fees per project did not change with time ( $F = 1.26$ ,  $df = 1$ ,  $p = 0.278$ ) but did increase with the maximum estimated take of individuals ( $F = 6.34$ ,  $df = 1$ ,  $p = 0.022$ ) (Figure 5). The total cost of mitigation per project also varied by district ( $F = 2.77$ ,  $df = 6$ ,  $p = 0.046$ ) with Districts 2 and 7 having the highest per-project mitigation costs after accounting for the maximum estimated take (Figure 6). Based on the 27 executed ITAs from 2013–2021, average cost per project did not vary based on major taxonomic group involved ( $F = 1.43$ ,  $df = 4$ ,  $p = 0.27$ ) (Figure 7), although the scale of the take was based on either estimated number of individuals or acreage of habitat and was inconsistently reported, and therefore could not be controlled for in this analysis.



**Figure 2. Pie Chart. Major threatened and endangered taxa with ITAs. The percentage of submitted ITAs from 2002–2022 that involved different major taxonomic groups.**



**Figure 3. Pie Chart. Type of work proposed. The percentage of submitted ITAs from 2002–2022 that involved several types of proposed work.**



**Figure 4. Pie Chart. ITAs by district. The percentage of ITAs submitted from 2002–2022 originating from the different IDOT districts.**

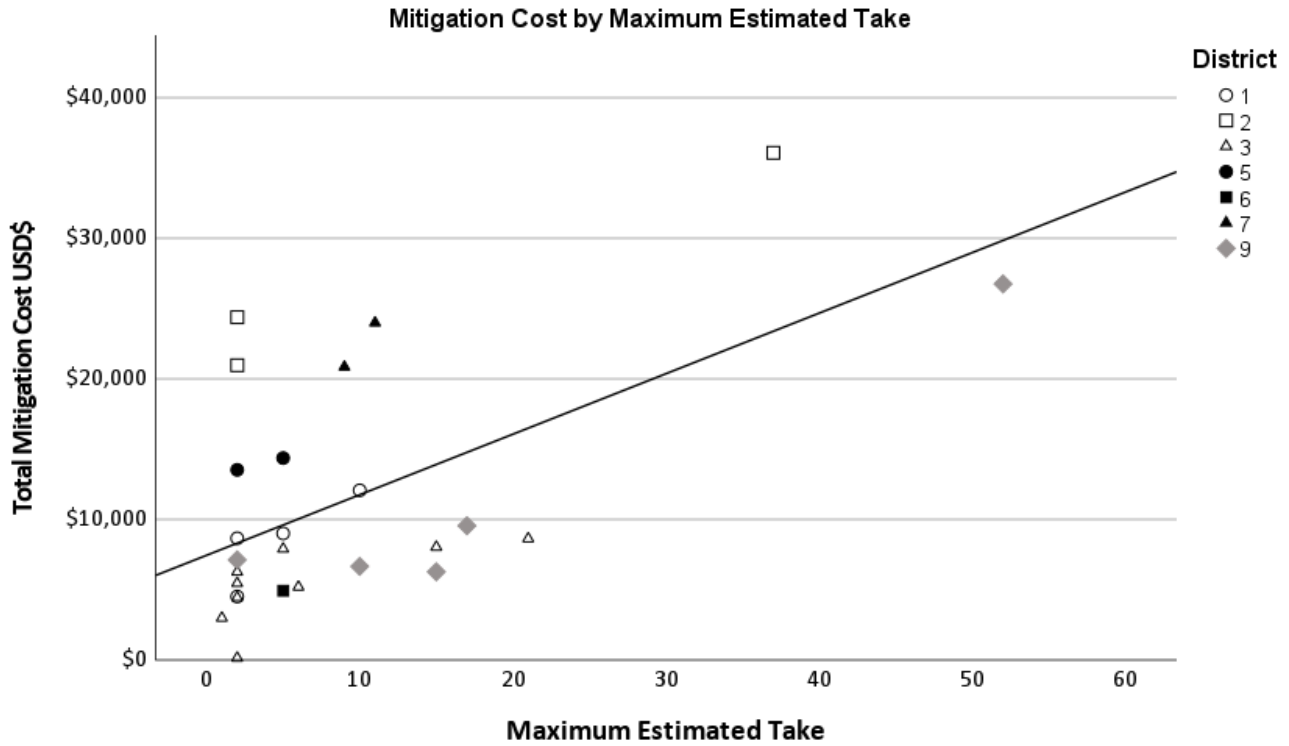


Figure 5. Graph. Mitigation cost by maximum estimated take. Total mitigation costs per project based on the maximum estimated take of individuals. Projects are grouped by IDOT district.

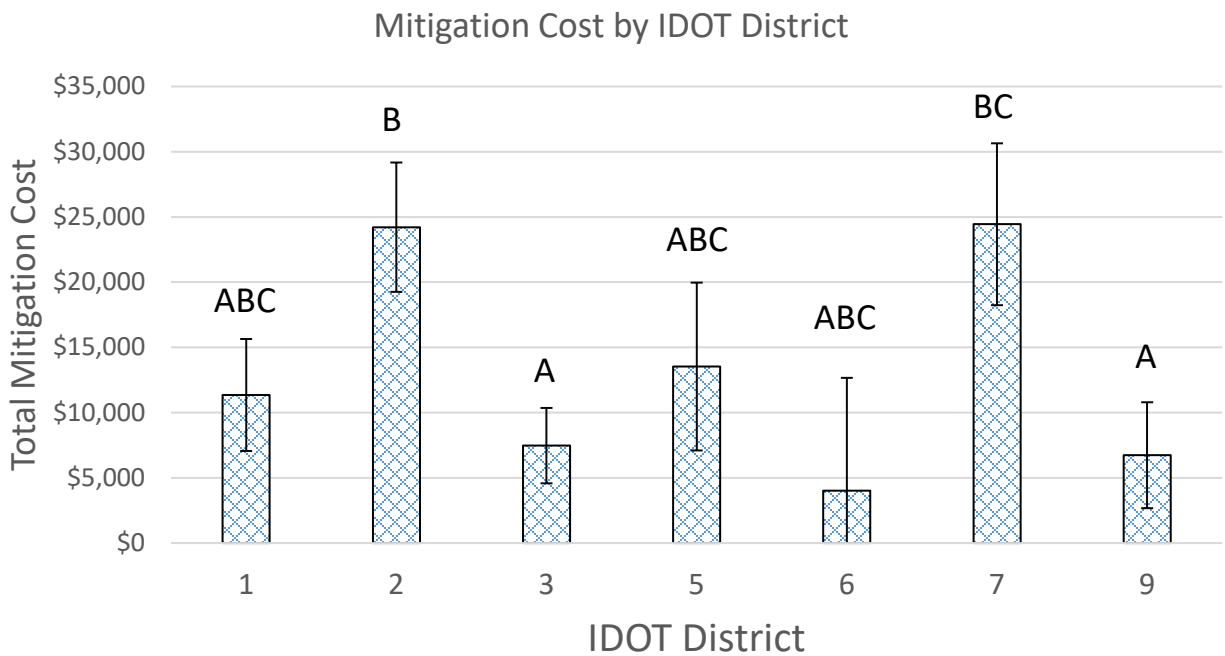
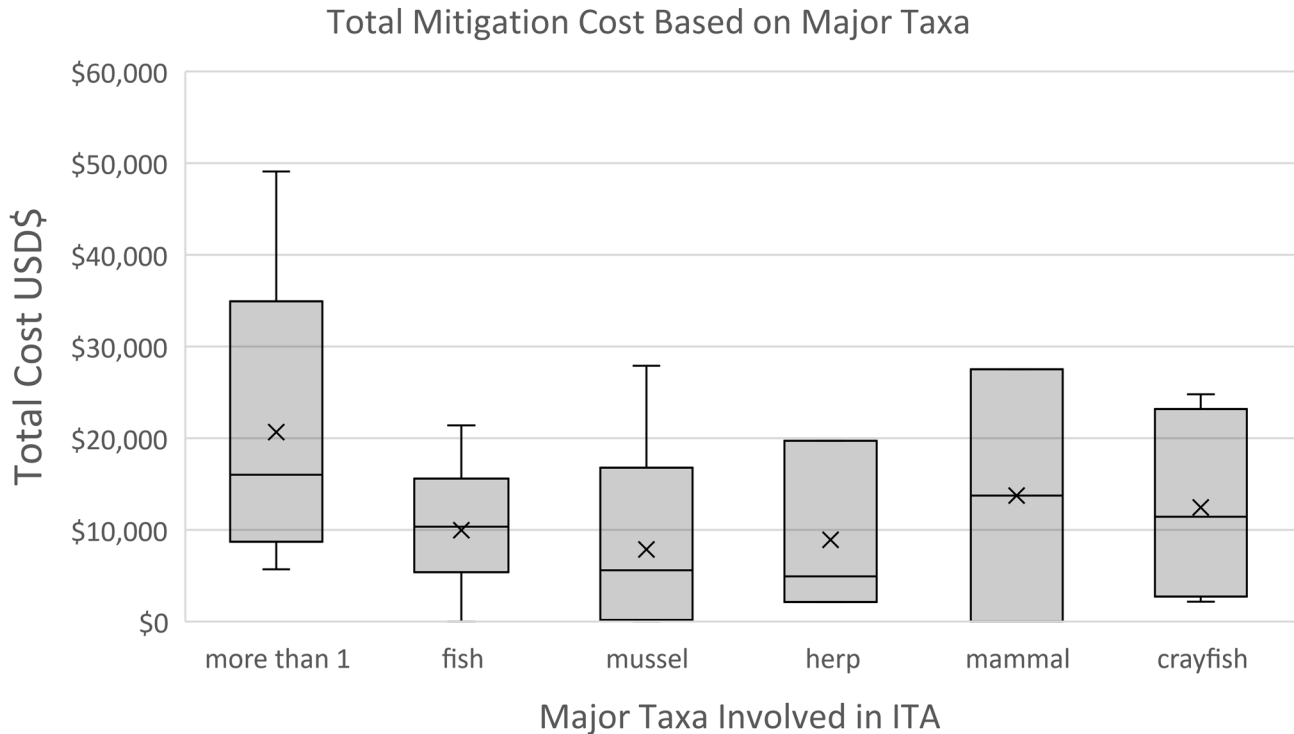


Figure 6. Graph. Mitigation cost by IDOT district. Total mitigation cost per project for seven of the nine IDOT districts. Bars with matching letters are not different from each other.



**Figure 7. Graph. Total mitigation cost based on major taxa. The mean (depicted as x) total project cost of projects involving major taxonomic groups. Box depicts 95% CI, horizontal line represents median, and whiskers represent range of values.**

## INCIDENTAL TAKE IDOT PRACTICES AND CHALLENGES

Currently IDOT addresses mitigation needs on a project-by-project basis. Typically, mitigation funds have not been identified or programmed in advance of project consultation. One reason this approach has remained in place is due to external factors from outside agencies. The varying costs of mitigation make it unpredictable and there has not been a publicly available calculation tool from IDNR for ITA applicants to estimate project mitigation costs. This makes budgeting and planning for individual projects or even a long-range program extremely difficult.

The most frequently encountered species are aquatic species because of the substantial number of water bodies and large rivers within Illinois. Additionally, the current long-range transportation plan heavily focuses on addressing structurally deficient bridges and infrastructure. Significant project costs and delays come from bridge projects which often go through the process to obtain ITAs from IDNR because of the high concentration of aquatic habitats and the T&E species found within. The minimization measure that IDNR requires to be implemented on bridge projects when there is an ITA for fish or mussel species can be quite costly and contribute significantly to project delays as well. One minimization measure that is commonly required by IDNR is mussel relocation. Depending on the water depth, this may need to be done by professional divers that requires a subcontractor, which can cost upwards of \$120,000. Mussels can only be relocated during certain water and weather temperatures and conditions. Likewise, divers cannot dive if water levels or flow velocity or

turbulence provide unsafe working conditions; thus, the timing of relocations must occur during a narrow window (i.e., late summer/early fall) when water levels have decreased to a safe depth and velocity, but before fall and winter weather decreases water temperature. Construction cannot begin until mussel relocations are completed, and mussel relocation cannot occur until after IDOT has a fully signed and executed ITA. These unpredictable water levels and weather conditions and the lengthy 1080 process present significant unknowns, which can delay construction start dates and incur substantial costs to IDOT or the local agency due to delay of the project. Additionally, the costs for minimization mitigation do not always represent what is practicable despite the wording in the ITA “to the maximum extent practicable.” For example, what is a practicable minimization or mitigation measure for one project may not be such for another. And what is a practicable cost associated with minimization and mitigation measures for a local agency may be substantially different than a practicable cost for a Division of Highways project.

Considering the importance of keeping projects on schedule, proactive communication about any state or federal T&E species permitting or mitigation needs is crucial for cooperation and for getting a project to letting. Improved communication at both the planning and project levels could facilitate better coordination between Central Office Natural Resources Unit (NRU) and IDOT districts, as well as inter-district cooperation. Potential approaches to address these challenges include:

- Developing and implementing a centralized, standardized workflow for approaching project development.
- Developing and implementing standardized species-specific avoidance and minimization measures that IDOT can quickly add to project plans.
- Improving existing project-tracking systems or developing new systems to track complex projects where threatened or endangered species are present and coordination is required with resource agencies. This includes improved tracking of avoidance and minimization measures utilized for a project, permitting time frames, and mitigation tracking.
- Assessing potential permitting and mitigation needs based on the Long-Range Transportation Plan, updated every 5 years.
- Developing education and training programs to improve and maintain staff skills and knowledge regarding mitigation issues.
- Working with the FHWA Illinois Division to explore programmatic mitigation planning opportunities between other federal resource agency partners such as USFWS and exploring how a similar concept may work with state resource agency partners and local conservation or stewardship groups.



# **CHAPTER 4: SUMMARY OF STATE DEPARTMENTS OF TRANSPORTATION EXISTING IMPLEMENTATION OF AVOIDANCE, MINIMIZATION, AND MITIGATION STRATEGIES**

## **APPROACH**

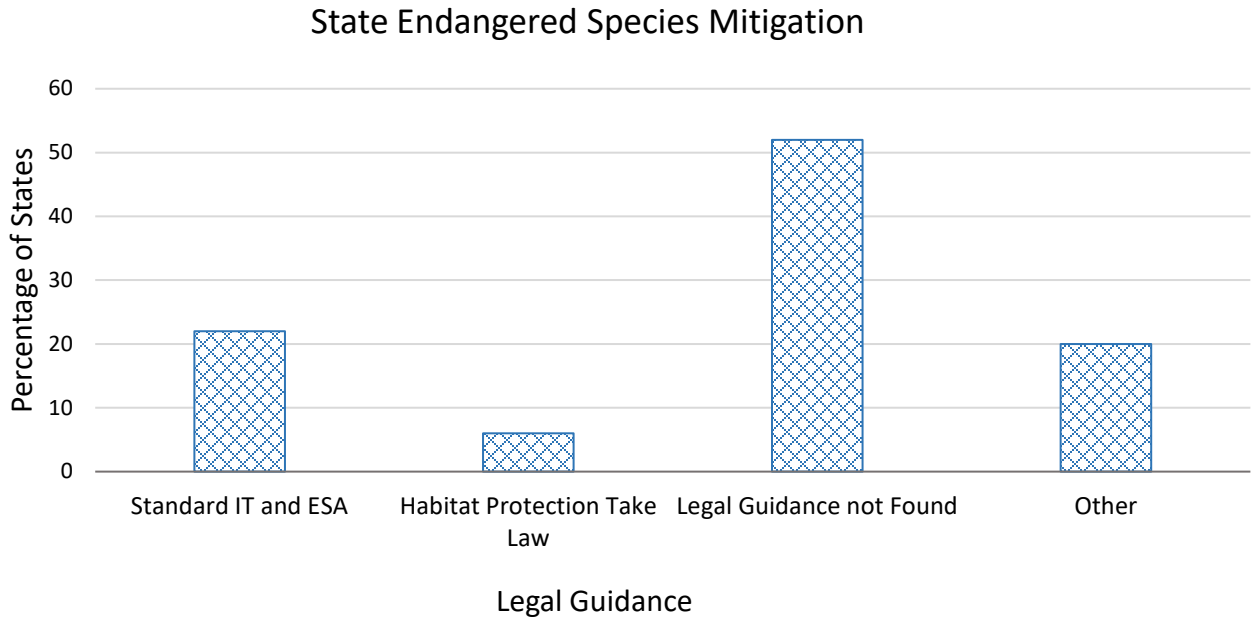
We investigated publicly available documents and websites from transportation and natural resource agencies to accrue information on how other state DOTs regulate species protections at the state level and provide guidance on how to implement avoidance, minimization, and mitigation strategies. Our investigation focused on state-level species protections and evaluated whether other states provide clear guidance on permitting and state laws as they pertain to project impacts to state-protected species. We attempted to classify each state's approach to state-level species protections, evaluate the transparency of the process, determine whether states declare in advance what will be required of DOTs when state endangered species are found, and identify what mitigation strategies have been developed and implemented.

## **STATE-LEVEL SPECIES PROTECTIONS AND MITIGATION DEVELOPMENT**

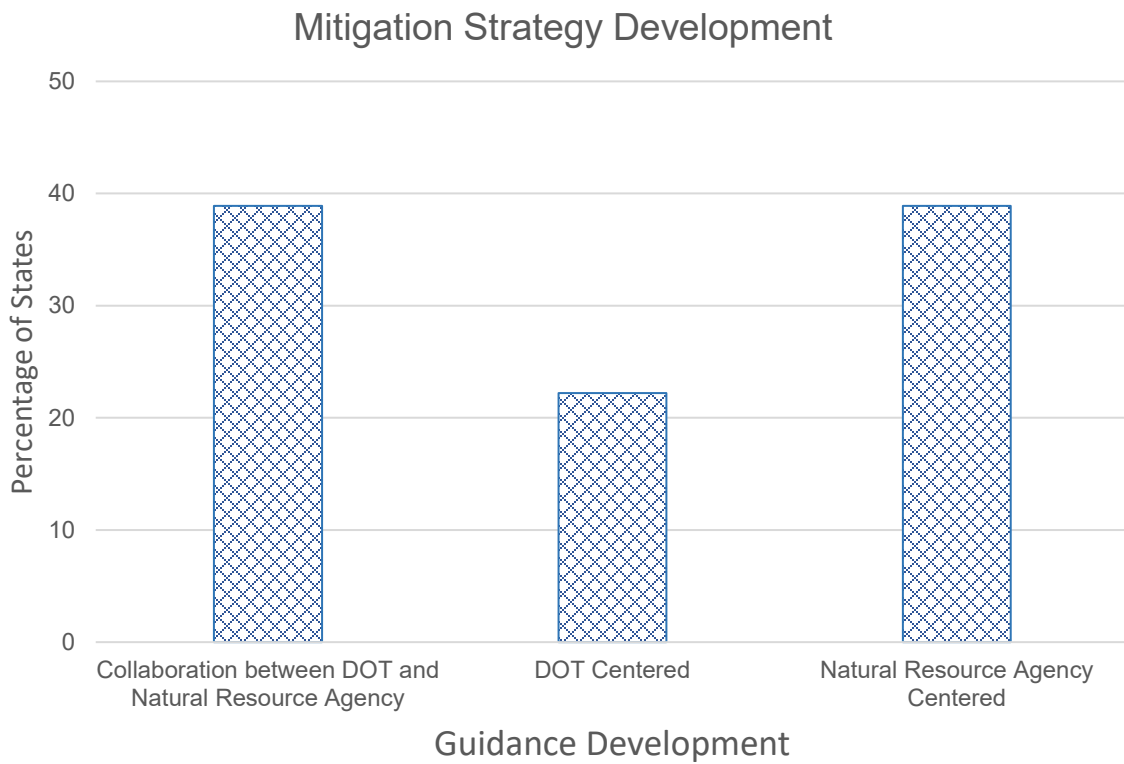
All states except four (North Dakota, Utah, West Virginia, and Wyoming) provide some state-level protection to non-game wildlife (Mothes et al., 2020). Despite most states proclaiming protection for species beyond the Federal ESA, less than half offer clear guidance on how those state laws are enforced (Figure 8, Appendix A). Only 22% of states have enacted their own state Endangered Species Acts and allow for clear avoidance, minimization, and mitigation approaches, including incidental take permits when other practices do not alleviate impacts. Twenty percent of states take other actions such as individual species protections, conditional protections depending on project type, and comprehensive environmental permitting that lumps all protection and mitigation measures into a single permit application. Six percent of states provide species protection via habitat take authorization and mitigation measures. The majority, or 52% of states, either provide no additional protection or no transparent legal guidance beyond the federal ESA on how state-protected species losses are mitigated. In these states, species protections defer to the federal ESA and Section 7 Consultation is the only requirement for avoidance, minimization, and mitigation of project impacts.

## **INCIDENTAL TAKE AND COMPENSATORY MITIGATION**

For states where suggested mitigation strategies pertaining to species/habitat are available (n = 18), 39% were developed in collaboration with state DOTs and their natural resource agency, 22% are state-DOT centered, and 39% are developed by the state natural resource agency alone (Figure 9, Appendix B). The types of approaches that have been developed are highly variable and depend on the type of species/resource involved, state-level laws protecting habitats and species, and level of collaboration between agencies (Table 1).



**Figure 8. Graph. Types of legal guidance for state threatened and endangered species mitigation for all 50 states.**

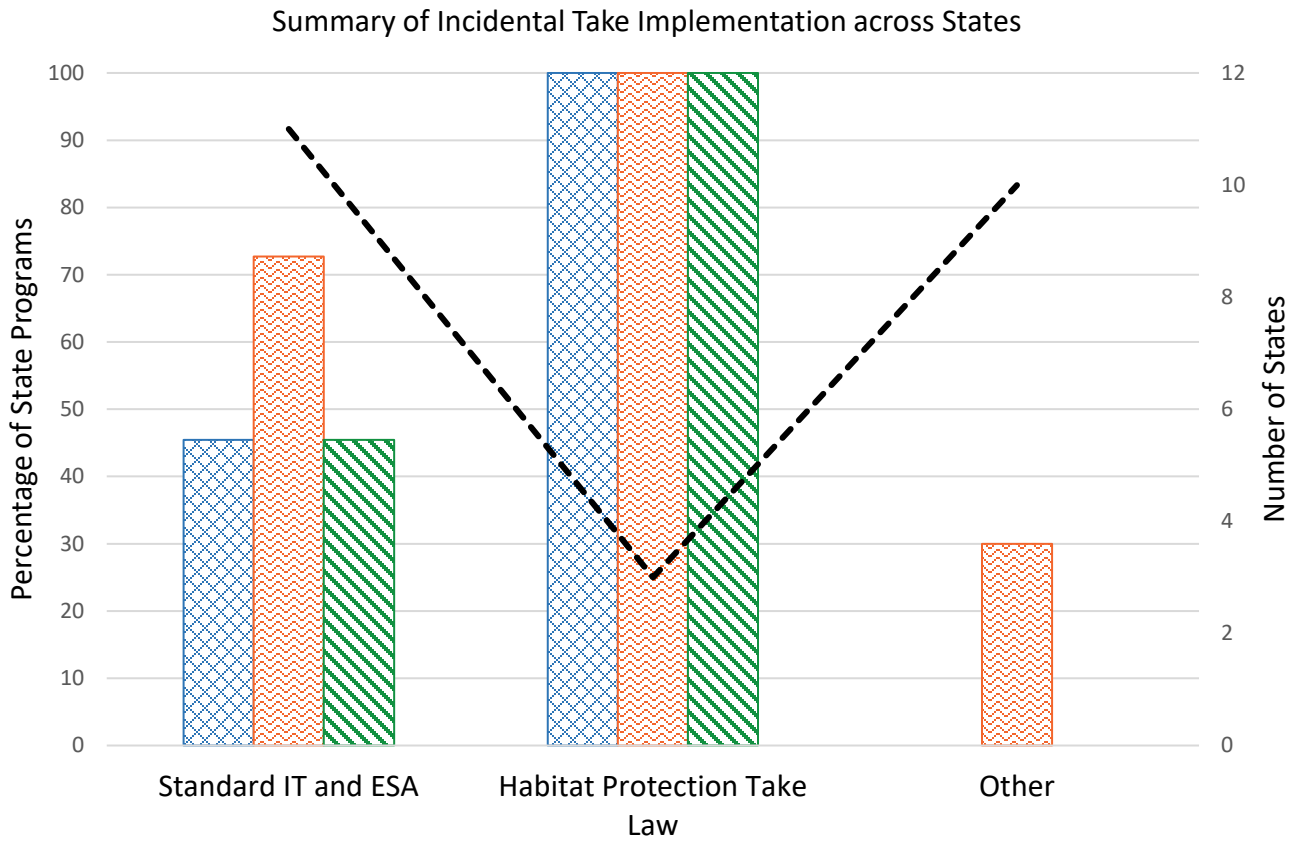


**Figure 9. Graph. Protected species mitigation approaches at the state level have been developed by separate agencies or in collaboration between agencies.**

**Table 1. Types of Mitigation for Compensatory Mitigation of State-Protected Species by State**

State	State Unique BMPs	MOUs between DNR and DOT	Advanced Mitigation Frameworks	Unique Programmatic Agreements	Other Technique of Note	Explain Technique
AZ	x					
CA	x	x	x	x		
CO	x	x	x	x		
CT	x					
FL	x	x	x	x		
ID	x			x	x	Sage Grouse Mitigation Bank
IL		x				
ME				x		
MA	x					
MN	x	x			x	DOT/DNR liaison
NM	x					
NY	x	x		x		
OR	x	x	x	x		
TX	x	x	x	x	x	interagency team between TxDOT and TPWD
WA	x					
WI	x	x		x	x	Blanket ITAs

For states where some level of legal protection was found beyond the federal ESA (n = 24), the degree to which they outlined the determining factors that would require state-level species mitigation involving incidental take (IT) and the types of proposed compensatory mitigation varied drastically by how the state enforced the protection laws (Figure 10, Appendix A). In states where IT of protected species involves habitat take law (n = 3), all provided clear determining factors and suggested compensatory mitigation. In contrast, states with their own ESA and IT process (n = 11) did a poorer job of listing determining factors that require compensatory mitigation with only 45% doing so. However, most of these states (73%) do provide suggestions for types of compensatory mitigation.

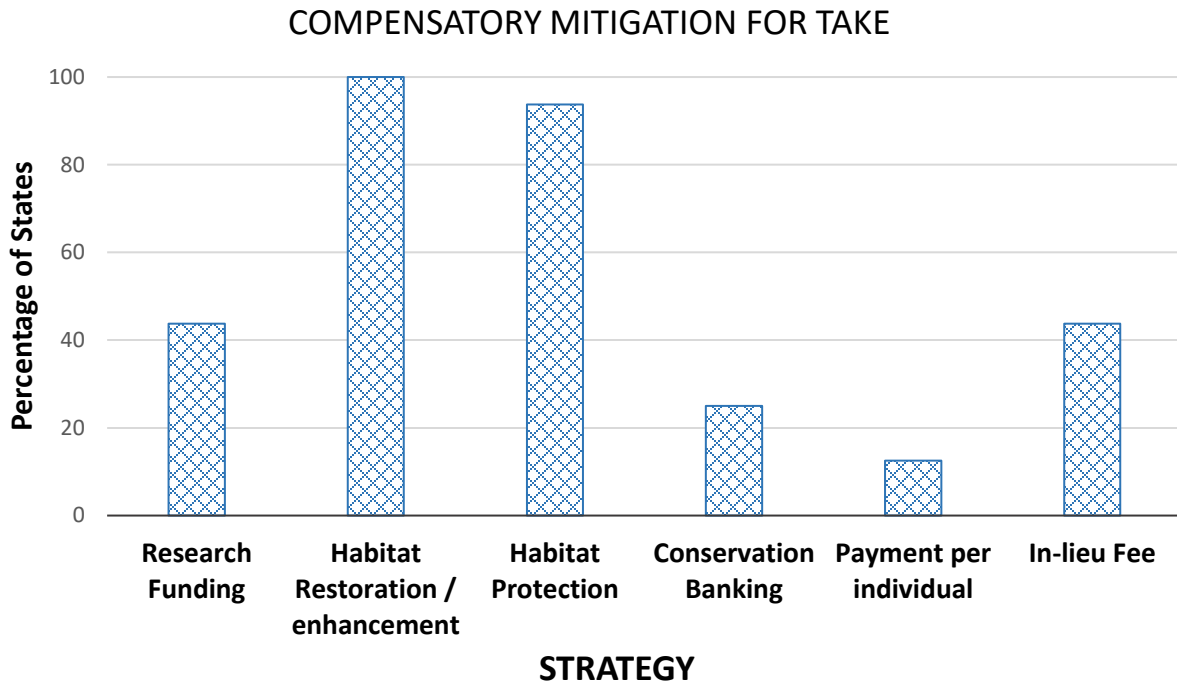


### Incidental Take Classifications

**Figure 10. Graph. Summary of the percentage of state programs (left vertical axis) that provide determining factors (blue diamond), mitigation suggestions (orange zigzag), or both (green diagonal) based on which type of incidental take classifications the state implements for permitting. The black hatch line represents the number of states (right vertical axis) in each incidental take classification (horizontal axis).**

For states where compensatory mitigation measures have been proposed and are required with the IT process, the majority recommend habitat-associated mitigation measures whereas other measures

such as research funding, conservation banking, and in-lieu fees are proposed by the minority of states (Figure 11, Appendix C).



**Figure 11. Graph. The percentage of states employing different mitigation strategies on compensatory mitigation for take of protected species. This includes states that provide clear guidance and documentation (n = 16).**

## MITIGATION APPROACHES

Below is a summary of the major types of compensatory mitigation including a description of their typical form, examples of how other states have designed and implemented the mitigation, barriers to implementation, and benefits of mitigation implementation.

### In-lieu Fee Agreements

#### *Description*

In-lieu fee agreements (ILFs) are a form of transferring monetary or compensatory mitigation to another source, generally into an established fund. This can take many forms, both in the organization that administers the fund, and how the fund is used. The rationale for establishing an ILF is based on the needs of a species. For certain species, there is only a possibility of protecting small, disjointed parcels of land when performing off-site mitigation, which can lead to mitigation efforts that do little to benefit the species. By creating a fund with an ILF, larger projects can occur which should provide greater benefit to species than protection of individual parcels of land. This could involve paying for larger parcels of land, habitat restoration, captive breeding and release, research,

or other applicable solutions. ILFs are particularly useful for species where the amount of protected land is not an issue, or not enough is known to identify the key issues, thus making useful solutions difficult to formulate. ILFs allow for variability in responses, and a larger pool of money to work with, enabling larger and more comprehensive projects. One of the issues with ILFs is that there is a strong argument for “no net loss” not being reached, as projects that are performed with established funds can often be disjointed from the impacts that are being mitigated. There can also be issues with the determination of when funds are used and what projects they are used for. It is important to set thresholds for when funds will be released for use, and how much money should be used for projects. Some funds implement a time-based release system (e.g., every 5 years all money must be used for mitigation projects) or a collection-based release system (e.g., funds are used for a project once a certain amount is collected). However, some ILF programs and administrators have found it difficult to act within these time requirements (Stephenson & Tutko, 2018). It is important for ILFs to be specific to the impacts they aim to mitigate, at least down to a species level, as large ILFs that collect funds from different species may neglect to use funds on some of the species for which the mitigation was intended. An ILF generally requires:

- Description of the ILF account
- Comprehensive planning frameworks
- Advanced credits
- Methods for determining fees and credits.

### *Other States*

As mentioned in the overview, the implementation of ILFs varies significantly, with some established through federal nexus and others focused on state regulation. We will outline a few different systems to highlight the variability in implementation. One system with a federal nexus is the ILF agreement for Canada lynx in Colorado (FHWA, CDOT, & USFWS, 2015). This was established between CDOT (Colorado Department of Transportation), FHWA, and USFWS with a Memorandum of Agreement (MOA), which is a formal agreement between parties in which the roles and responsibilities of each party for a project are established. The rationale for the system was that mitigation for lynx on a project-by-project basis was extremely expensive, in many cases more expensive than the project itself, according to a response to our survey (Chapter 5). The mitigation occurring was also found to have limited success for aiding lynx populations. As a result, an ILF was created to fund larger scale mitigation projects in hopes of creating more benefit to lynx in the state. It is worth noting that this MOA did not require use of the ILF, and other mitigation could occur, such as if it were more feasible to perform project-specific mitigation, or if USFWS determined that a direct mitigation effort was necessary. The pricing system was based on a sliding percentage basis. A higher impact to lynx, based on specific metrics set forth in the MOA, would increase the percentage of the total cost of the project CDOT would have to pay into the fund. For example, the creation of a permanent barrier to movement meant an additional payment of 2% of the total cost of the project, with all the possible increases leading to a maximum of 5%. Two established teams, comprising lynx experts and members from various organizations, including CDOT, FHWA, USFWS, and CPW (Colorado Parks and Wildlife),

form the advisory committee. This committee focuses on framework and concept development, identifying beneficial projects and target areas. The other is a fund management team who takes the suggestions of the advisory committee and implements them into projects. This was a solution to ensure the funds would be used properly and in a timely fashion. This method ensures proper and timely fund utilization and allows for more effective lynx conservation across the state, providing CDOT with a predictable mitigation cost structure, previously highly variable before the ILF's establishment.

Minnesota DNR has an established ILF for freshwater mussels. According to our survey (Chapter 5) the Minnesota DOT exercises this option on many of their projects. This ILF is used to fund research regarding mussels and captive breeding of them for release at designated sites in the state. The cost is \$25,000 per acre of disturbed habitat, which was formulated in consultation with the DOT, but ultimately determined by the DNR. This is an option for mitigation, not a requirement, so other techniques can be employed by the DOT, if it is more feasible for them to perform mitigation themselves. This system is effective for aquatic species, as protecting small parcels of habitat is ineffective. The largest reason for mussel decline occurs because of problems within the watershed. This system allows for the state to ensure mussel populations remain stable and allows for research to further the knowledge of mussels, and hopefully create solutions to these larger-scale problems. Based on our desktop research, Minnesota DNR has a similar response to mitigation as that of Illinois, with a preference for collecting funds to direct as deemed appropriate. This system appears to be more effective than that of Illinois, as the response is both more directly focused at maintaining the current population of mussels, as well as finding new opportunities for success in the future. The use and relative success of different techniques are also more effectively tracked with a dedicated ILF, and the price is far more predictable, as a protocol has been established that is known to be highly effective.

Many other statewide ILFs exist, such as the Tennessee Stream Mitigation Program, which is a water-focused approach designed to meet US Army Corps of Engineers (USACE) requirements. The techniques used could be applied to stream-based mitigation for T&E species. Louisiana has a coastal focused Louisiana Coastal In-Lieu Fee Instrument (LDNR, 2014), which contains components aligning with federal ESA requirements and other regulations. Maryland has a unique reforestation law, which is intended to protect forested environments. When cutting or clearing is done for development in forested areas in Maryland, all removed trees must be replaced by replanting. To facilitate this, Maryland DNR has established an ILF so the DNR can replant the trees (MD. NATURAL RESOURCES Code Ann. § 5-103, 2013). This is established in a hierarchy, with the ILF being the last and least favorable option. The priority being that the developer replants on the developed area. If this is not possible, they have mitigation banks in place where credits of reforested land can be bought. If this is also not possible, be it that there are no credits available, or there are no credits available near the area where work has occurred, then the ILF option can be exercised. There is an established rate, which is \$0.10 per cleared square foot, and \$4,356 per cleared acre. The Florida Wildlife Council established a management plan for gopher tortoises (FWC, 2020), which includes a fee system for relocations of tortoises. The fee system involves a classification of land being used for relocation into tiers based on habitat suitability for tortoises, as well as level of protection. These factors determine the fee paid to the state as compensation. It is used to incentivize projects to manage for a lower

impact, as well as aiding the identification of suitable replacement habitat. For areas with long-term protection (over 1.5 years) no matter the quality, the fee for the first five tortoises is \$234. After that if the habitat is in the highest tier of quality, the price is \$351 for each additional tortoise; if it is lower quality, then it is \$702 per additional tortoise. The price increases based upon decreased quality of habitat for relocation, and decreased duration of land protection for those habitats. The price can exceed \$6k per tortoise if the land the tortoises are being moved to is not protected, regardless of quality. The fee varies based on habitat suitability and protection level, incentivizing lower impact projects, and aiding in identifying suitable replacement habitats. The fee system is effectively an ILF, pooling funds for research and land acquisition for tortoises.

ILFs can also range across states when established by USFWS. One such ILF, which is widely known and utilized by many states, is the range wide Indiana bat and long-eared bat ILF. This was established by the USFWS with The Conservation Fund, the program sponsor. This has created a nationwide program to be used for large-scale mitigation projects and can be paid into by projects affecting either of these species. USFWS established a programmatic Biological Opinion (PBO) for transportation projects in the range of Indiana bats and northern long-eared bats (USFWS, 2018). A PBO is a type of programmatic agreement (PA), which is a legal document created to streamline the permitting process for environmental review by laying out a set response to specific environmental conditions. The fee system has a formula for calculating ILF contributions (Table 2).

**Table 2. Range-wide Indiana Bat In-lieu Fee Program Instrument Fee Schedule for Calculating Compensatory Mitigation Fees. Modified from US Fish and Wildlife Service (2023c)**

<b>Estimated Land Value</b>	Estimated per acre cost <sup>1</sup>
<b>Estimated Real Estate Transaction Costs</b>	\$12,000 <sup>2</sup>
<b>Estimated Restoration &amp; Adaptive Management Costs</b>	Estimated per acre cost <sup>3</sup>
<b>Title &amp; Closing Costs</b>	2% of estimated land value
<b>Estimated Real Estate Assurance Costs</b>	5% of estimated land value
<b>Project Cost Subtotal</b>	Sum of above categories
<b>ILF Program Administrative Fee</b>	8% of project cost subtotal
<b>Contingency Costs</b>	2% of project cost subtotal
<b>TOTAL FEE PER ACRE</b>	Project Cost Subtotal + Admin Fee + Contingency Costs

<sup>1</sup>Estimated land value will be determined by USDA Farmland Values for each state. <sup>2</sup>One-time fee: estimated cost of fees related to real estate transactions; this number is divided by the number of acres to provide the per acre fee cost. <sup>3</sup>Restoration and adaptive management costs were derived from USDA NRCS EQUIP restoration cost estimates for each state, and a \$1,800 per acre cost has been included for 2017.



The ratio mentioned in the formula is also determined using a system set forth in the PBO. It varies based on several factors, including how far from the roadway work will occur, whether the habitat is actively being used by the bats, and the percentage of forest cover. While an ILF of this scale is not something Illinois would necessarily try to establish, projects of this scale do exist.

### *Barriers to Implementation*

The main barrier to implementation for IDOT would be simply that they are limited to the ILFs that are in existence. IDOT could create their own ILF, though this would take a dedicated team to establish and operate. An option could be to work with either IDNR or nonprofit conservation programs around the state to establish ILFs for species that would most benefit from the extra mitigation options. Working with non-governmental third parties to collect and use in-lieu payments for desired projects can help avoid the government budgeting process, which might otherwise redirect the in-lieu payments (Poulton & Driedzic 2017).

Other barriers pertain to establishing successful ILFs. As there are so many different forms an ILF can take in terms of implementation, it is important to establish an effective system early that can be altered as more research and monitoring is done. Establishing ground rules for how often projects will be performed, how much mitigation should cost, and what projects should be prioritized should be a primary concern. Several options for managing how often projects occur were discussed in the overview section. For the cost of mitigation, there are several options. There is some debate about how costs should be assessed, with the consensus being a negative view of price-per-individual take. Some sources have argued that the price of mitigation should be as if the developing entity was performing the mitigation themselves. For example, they should pay the cost of purchasing and managing a parcel of land to the ILF agency, and then the ILF agency performs the work. This could also be done for the price of hand rearing individuals and releasing them, or the price of a research project to study the species impacted. Another option, as used in Colorado for lynx, would be to pay a percentage of the project cost, with the percentage varying based on the level of impact from the project. This method suits species with large ranges and high mitigation costs compared to individual project benefits. Minnesota's freshwater mussel ILF uses a fixed rate per acre. The payment strategy for an ILF should be established upfront to ensure effective mitigation and fairness for both the ILF operator and the developer. When determining the optimal methods for mitigation from an ILF, this should be determined by the needs of the species. For aquatic species reliant on overall watershed health, protecting individual parcels may be ineffective. Better options for mitigation could be restoring areas of the watershed that are leading to a decline in the health of the system, research into the needs of the species, captive breeding to increase populations, or purchase and protection of areas of particular importance in the watershed. An ILF is better poised to do this than many other solutions, as they can look at a species in the entire watershed it occupies, or even in its entire range to determine the best solutions. Most other mitigation options are focused on the area in which development is occurring, which is important, but may not provide the best solutions depending on species' needs. Other species may need large and continuous swaths of land. While this can be achieved with direct establishment of banks, it can often be more easily done by an ILF, which can amass significant funds to purchase and manage extensive land tracts. When well-managed, this approach can significantly benefit imperiled species.

While an effective solution, managing an ILF takes a lot of work and should have a dedicated team. The challenge lies in convincing an organization to establish an effective ILF and working with them to ensure it is successful by prioritizing its use when mitigating impacts. Like establishing a conservation bank or implementing an advance mitigation framework, setting up an ILF has upfront costs. However, these costs are likely lower since projects are executed after the system is established and funds are accrued. This is particularly true if you can find an organization that can run an ILF and create an agreement with them, as then they have assurances that you will pay them for mitigation in future.

### *Benefits of Implementation*

The obvious benefit of ILFs, like conservation banking, is that the responsibility for mitigation is shifted to the ILF operator. Once payment is given over, the legal responsibility to see the mitigation through is transferred. While conservation banking has less uncertainty, as the credits are normally generated before the payment is made, ILFs have set programs to ensure the mitigation is performed properly. One added benefit of the ILF is that the cost of mitigation is often more predictable. Though the required payment is variable depending on the ILF rules, most systems provide some level of predictability for the cost, and in some cases, like with Minnesota's freshwater mussel ILF and Colorado's lynx ILF, the cost of mitigation can be determined exactly in the planning process, allowing for far easier budgeting.

Furthermore, ILFs can provide high ecological benefits when established effectively. They are especially beneficial for species about which less is known regarding habitat requirements or effective mitigation strategies. The ILF system allows for changes in the approach, which ideally would involve direct research into best practices to increase the security of the existing population and opportunities for expansion, and then implementation of those strategies when they have been determined. This system allows for greater flexibility, which should be leveraged as the knowledge base grows.

Another advantage of ILFs is their versatility. They provide fund managers with flexibility in response, as evidenced by the varied applications observed in different states. Examples include research funding, land acquisition, captive breeding, reforestation, habitat restoration, among others. Due to the flexibility of response, ILFs can be used in more situations than other options. This is apparent in the diverse ways states use them, particularly in fitting into unique state laws. Maryland's distinctive reforestation law demonstrates that an ILF can be tailored to meet a state's specific needs, even with highly specialized legislation.

## **Conservation Banking**

### *Description*

Conservation banking involves the purchase and management of land to use as off-site mitigation. According to the USFWS a conservation bank requires:

- Mitigation site protection (conservation easements protecting land in perpetuity).

- Management and monitoring using adaptive approaches.
- Short- and long-term financial assurances.

The land is then managed to a set threshold deemed capable of supporting an endangered species. Once the threshold has been reached, credits are assigned to the land, which can then be used as mitigation. The USFWS oversees and monitors the implementation of banks at a federal level, but several states also produce credits for state-level mitigation. Systems vary and can be owned by public or private entities. Private owners sell credits to those needing to perform mitigation, thereby transferring the responsibility for mitigation to the private bank. California and Florida are two states that implement private conservation banking on a larger scale than others and have robust state laws regarding conservation banking. There have been arguments made that states must create laws and guidance for conservation banking to create a market for mitigation credits.

Governmental organizations can also own and operate banks, and they act similarly, though they are still responsible for land management. The land purchased must be ecologically viable for the species for which “credits” are generated in perpetuity (in most cases). This viability can be achieved by preserving existing quality habitat, restoring degraded habitat, or creating new habitat.

The method of determining credits also varies. The USFWS guidance allows for a direct area replacement, where 1 acre of habitat is equivalent to 1 credit, a ratio commonly used by most banks in the US. However, there is significant debate over the ecological benefit from a direct area exchange, as there can be significant drops in quality in the habitat exchanged. There are many different credit valuation schemes, which can change depending on the needs of the species for which the mitigation is intended.

### *Other States*

Several states have conservation banks with a federal nexus, such as Texas, Arkansas, North Carolina, and many others. Many of these banks are part of broader federal plans. For example, in Texas, the only banks are for black-capped vireos and golden-cheeked warblers, both of which are T&E species that breed on military lands. Therefore, Texas purchases credits for conservation easements on nearby ranches.

For state-focused conservation banking, there are only two states that do this on a large scale: California and Florida. Both states, like Illinois, have a state equivalent to the ESA and require incidental take permitting for state-protected species. Thus, they have banks established for crediting both state and federally protected species, as well as banks for species that are protected at only a state level. These states have, by far, the most robust guidelines and laws regarding conservation banking, effectively creating a market for conservation banks (CDFW, 2019).

There are some differences, however, in the implementation of these banks. In Florida, fewer species are covered, one being banks for the wood stork, which maintain a federal nexus. The banks are designed to protect core foraging areas for the wood stork, closely linked with wetlands. The requirements stipulate that banks must restore or refurbish wetlands to replace the lost habitat value, not just protect existing habitat. They must replicate the hydroperiod of the wetland that is

lost and provide foraging value at the same level or higher than the habitat lost. There are also large systems in place for Florida panthers, which are protected at both a state and federal level, so banks are regulated by both Florida Wildlife Council and USFWS. These banks focus less on habitat requirements and more on preserving connectivity and larger areas of land, which is necessary for the success of these species. There is also a state-led conservation banking program for the gopher tortoise (FWC, 2020). The gopher tortoise is protected federally, but only in certain portions of its range which lie outside of Florida, so the federal protections no longer apply in Florida. There are, however, still state-level protections. This is an odd hybrid system, which involves relocation of tortoises impacted by development. There is a fee associated based on the number of tortoises moved (as mentioned in the In-Lieu Fee Agreements section), adjusted by the relocation area. The more protection in an area, the cheaper the cost is for relocations. As such, an area with high-quality habitat and protection in perpetuity leads to far lower fees than in areas with low-quality habitat and low protection. FWC (Florida Fish and Wildlife Conservation Commission) uses the funds from relocation fees to perform larger-scale projects for gopher tortoise, be it land acquisition, restoration, or research. This qualifies as conservation banking, as there are “banks” where people pay for tortoise relocations, and the FWC manage these relocations and habitat.

California’s system covers a wider range of species, with differences in implementation depending on the species. Some of these species are protected at both a state and federal level, and some only at a state level, though the process for establishing banks is more uniform, particularly when compared to Florida’s gopher tortoise system. For species eligible for conservation banking, the California Department of Fish and Wildlife (CDFW) creates areas of conservation emphasis (ACEs) (CDFW, 2015). ACEs are identified as high-quality habitats, with significant connectivity and expansion potential. A notable example is the San Joaquin swift fox, which moves frequently and is experiencing major pressures from habitat loss. CDFW directs banks to buy lands in certain areas to either protect or restore and protect land to maintain corridors for movement and quality habitat. In cases where habitats are limited and difficult to reproduce, such as the vernal pool fairy shrimp, CDFW identifies crucial areas for protection, making them targets for bank acquisitions.

ACEs are primarily meant to direct private bank land acquisition, but Caltrans (California’s DOT) also does some banking of their own. Caltrans has created a robust advance mitigation program, the Caltrans Advance Mitigation Program (Caltrans, 2019), identifying regions with high development potential. This program was initially funded and is used to generate credits for projects. This could involve buying existing credits from private banks, paying into in-lieu fee agreements, or creating its own credits as a bank. The program is “self-sustaining,” as Caltrans pays for program credits during project execution, funding future credit acquisitions. This approach allows Caltrans to know the price of mitigation far in advance and have a plan for mitigation long before project initiation.

### *Barriers to Implementation*

There are significant barriers to both privately and governmentally owned conservation banks. For government conservation banks, the main issue is a significant upfront cost. The cost of buying land, setting aside money to manage and monitor banks in perpetuity, or restore degraded habitats would be extremely large. Establishing a significant bank useful to IDOT would require a large initial investment, and it might take time to see results. Although methods like California’s system, which

generates and then sells credits, can help reduce costs over time, the need for a substantial upfront investment is unavoidable for a hypothetical IDOT conservation bank.

The main issue for private banking is encouraging banks to establish in the state. The two states with the most conservation banks, both for state and federal mitigation, are Florida and California. These states also have the most robust state laws governing their conservation banking systems. A system needs to be well defined and established to create a market for private bankers to move into the state. This would involve either IDNR creating robust guidelines for the implementation of banks, or legislation being passed to establish a system.

Another major problem is the difficulty in establishing an effective crediting system. As previously mentioned, there is significant debate over the effectiveness of a direct areal exchange, as there can be significant hidden losses in overall ecological quality of land parcels exchanged (Maron, Rhodes, & Gibbons, 2013; Fox & Nino-Murcia, 2005). There are many techniques which can and have been used around the world to add metrics to track biological statistics across the parcels of land, leading to more equitable exchanges (Quétier & Lavorel, 2011). However, stricter conditions make credit generation more difficult and costly, potentially deterring private banks and driving up credit prices. Therefore, balancing ecological success probability and bank profitability is crucial, ensuring credits are reasonably priced.

When planning for conservation banking it is important to remember that private banks, while they do have a vested interest in the ecological soundness of their credits, are still for-profit businesses, and thus they will make strides to increase profit margins. A major indicator of this is that in the USFWS guidance they encourage the use of more in-depth credit valuation, incorporating environmental factors to ensure there is less uncertainty in exchange of land quality. Gamarra and Toombs (2017) examined the implementation of conservation banks in the US and found that 79% of reporting banks did not incorporate any measures of habitat quality in their crediting scheme, and 70% of banks used a 1 acre is equivalent to 1 credit system. This highlights that while the banks will protect habitats, they are doing so for profit, and it is cheaper and easier to use a simple credit scheme. Thus, guidelines need to be established to ensure banks are creating credits that are high enough in quality to prevent concealed ecological loss. Similarly, buying credits from private banks will almost always be more expensive than simply performing the off-site mitigation yourself, though the tradeoff is time and effort. Credits from private banks have inelastic demand, meaning that regardless of the price, demand for those credits will still exist due to the need for mitigation and the lack of competition in credit production. The prices are set by the banks and are determined in agreements between the private bank and the developer. This can make the prices quite high and can force difficult decisions between paying high prices for credits or undertaking costly and time-consuming self-mitigation.

Due to its profit-driven nature, private conservation banks will generally only be established in areas of high development for species that are often impacted. Also, conservation banking, like all habitat replacement techniques, is only effective for species whose decline is due primarily to habitat loss. While these are not barriers to implementation per se, they are limitations within the system and important factors to consider when establishing a conservation bank system.

### *Benefits of Implementation*

One of the most direct and obvious benefits is the ability to simply purchase credits. This allows for far easier planning for mitigation, and more predictability in cost of mitigation, though this price may be steep. Also, this provides a lot of security for the developer and the permitting agency, as for credits to be sold, it must already be created, meaning there should be no time delay in delivery.

Private conservation banking is also an effective tool as it allows conservation to be a profit-creating business, something that is rare, and as such can increase the money put into conservation. As such, conservation agencies can use this as a tool to push banks to buy and protect ecologically important parcels of land and can be assured of the protection and management of this land in perpetuity.

## **Advance Mitigation Frameworks**

### *Description*

Advance mitigation frameworks (AMF) are not so much a direct tactic for mitigation as they are systems to plan for mitigation for projects happening in the future. The forms they take and the tools they use vary depending on the species impacted, the areas they are employed in, and the needs of regulators and the developers. Some of the tools involved could be conservation banking, in-lieu fee agreements, and they are often used in conjunction with MOAs or programmatic agreements. Some of these are established to be used in perpetuity, and some are shorter term, though generally still lasting for many years.

### *Other States*

At the state level, AMFs are rare because of the large degree of coordination and information needed, and the steep cost to install such programs. Of the two types, long and short term, the best examples are California and Colorado.

As mentioned in the section on conservation banking, Caltrans has the Caltrans Advance Mitigation Program (Caltrans, 2019). This system involves two types of needs assessments for mitigation around the state. The systems are called the State and Regional Advance Mitigation Needs Assessment (SAMNA and RAMNA). SAMNA occurs first and is used to identify the regions around the state that are predicted to have the most development that will affect T&E species in the coming years. Following SAMNA, regional Caltrans divisions conduct RAMNAs to pinpoint species likely to be affected and potential mitigation options, such as existing conservation banks, in-lieu fee agreements, areas of conservation emphasis, and relevant local requirements. This process also determines whether Caltrans needs to establish its own bank in the region to provide mitigation for themselves. The program is sustained by a revolving fund, which was initially funded with at least \$30 million from the state government. These credits are then “purchased” from the AMF on a project-by-project basis, replenishing the fund, thereby allowing it to be self-sustaining. This allows for better planning of the cost of mitigation, as the credits are already owned by Caltrans when they are used, ensuring the fee is planned and budgeted for each project.

Colorado has used a shorter-term AMF, the Shortgrass Prairie Initiative (SGPI), established in 2003 to assist with mitigation over the next 20 years for interstate construction projects in the eastern half of

the state. The agreement was made between CDOT, CPW, FHWA, USFWS, The Nature Conservancy, and others (CDOT, FHWA, USFWS, CDNR, CDOW, & TNC, 2001). The project involved the protection and management of over 15,000 acres of prairie, containing habitats for all the T&E species that could be impacted. The acres that were protected matched their entire scope of work, even though they would not impact T&E species at all the sites. The project effectively negated any off-site mitigation requirements for all projects in this area for the next 20 years, though it did not remove the requirement for on-site mitigation. Funded primarily by FHWA and CDOT, this unique program was driven by the need to protect shortgrass prairies, one of the most endangered ecosystems in the US. This project provides great benefits to both conservation agencies and CDOT, despite its substantial up-front cost.

### *Barriers to Implementation*

The primary barrier to implementing AMFs is cost. Establishing AMFs requires significant financial investment, and the benefits are often delayed, sometimes by years or even decades. This approach is essentially an investment in the future. Additionally, AMFs take a lot of planning and information, requiring time and money to be spent developing a program, possibly even establishing a team dedicated to starting and running the program. Furthermore, high levels of coordination between regulatory agencies, specifically IDNR and USFWS, and IDOT will be required. AMFs need to provide equitable solutions for all parties involved, which can be challenging to achieve. This is especially true for agreements such as SGPI, which occurred under a somewhat rare set of circumstances, including a particularly valuable ecosystem and the ability to buy large continuous tracts of it. This is not easy to replicate, and thus would take a lot of careful planning and collaboration to create an effective system. While California's AMF is a bit easier to duplicate in the sense that it is broader, it still requires collaboration between many different entities and a lot of planning.

Another challenge is that AMFs meant to act on a larger scale, like California's, rely heavily on existing frameworks. The prevalence of private conservation banks and ILFs around the state allows for an AMF to be an effective solution, as there are different avenues to explore to find the most logical solutions. An AMF becomes less effective when there are limited choices for mitigation, as there are limited actions that can be done. For implementation in Illinois, this might necessitate the prior establishment of other systems to expand mitigation options, thereby enhancing the ecological and financial effectiveness of solutions.

### *Benefits of Implementation*

The major benefit of AMFs is that they make mitigation planning significantly easier and costs more predictable. Using a system like California's AMF allows a DOT to easily weigh their options and decide on the most financially viable solution well before projects begin. Furthermore, it generally leads to equitable solutions for both the DOT and DNR. Also, with careful planning and collaboration it can allow for mitigation solutions that satisfy both state and federal requirements.

For a shorter-term solution, like SGPI, the need for planning and budgeting for off-site mitigation is then eliminated for new projects. This makes planning for construction projects far easier, with limited delays on projects due to mitigation. Furthermore, this solution was equitable, with all sides agreeing while still achieving significant ecological benefit to the resource.

Although AMFs are the most difficult of the listed solutions to implement, when properly executed, they can benefit both planning and ecological outcomes. They utilize many different tactics to create a framework to streamline mitigation, representing a goal to strive for in conservation and development planning.

## **Establishing Memorandums of Understanding or Programmatic Agreements**

### *Description*

This strategy involves a formal document or agreement between parties involved in a project. These agreements can occur between any number of entities, including governmental organizations, NGOs, and businesses. The agreement outlines the responsibilities and steps that each party must take to address impacts during a project. Programmatic agreements are designed to speed up and reduce the time required for review and approval of environmental projects, as well as ensure compliance with federal environmental laws.

### *Other States*

MOUs and programmatic agreements (Pas) are variable across different states and can be used to establish protocols and plans for anything relevant to the parties involved. As a result, different states use them in vastly different ways, with some agreements being established between agencies within a state, and others being established with the federal government. These agreements can, and often do, include multiple parties, particularly in the case of agreements with federal organizations. Some of the most common agreements for T&E mitigation are between a state DOT, FHWA, and USFWS.

The implementation of MOUs and PAs can vary greatly, so we will highlight a few examples from different states. Several of the strategies mentioned in other sections of this document were created using MOUs or PAs. The Canada lynx ILF in Colorado was established with a memorandum of agreement between FHWA, CDOT, and USFWS (FHWA, CDOT, & USFWS, 2015). Colorado's Shortgrass Prairie Initiative, a programmatic biological assessment (a type of PA), was established in collaboration with CDOT, USFWS, FHWA, Colorado Department of Wildlife (now Colorado Parks and Wildlife), The Nature Conservancy, and Colorado Natural Heritage Program (CDOT, FHWA, USFWS, CDNR, CDOW, & TNC, 2001).

Florida utilizes several different PAs, including one for wood stork foraging habitat established with USFWS, as mentioned in the conservation banking section. They also have a PA for crayfish with USFWS and the National Fish and Wildlife Foundation, establishing an ILF for Panama City crayfish. They have another PA with USFWS regarding freshwater mussels (FDOT & USFWS, 2018). The gopher tortoise relocation program discussed in earlier sections was aided by an MOA established between FDOT and Florida Forest Service (FDOT & FFS, 2021), enabling FDOT to relocate tortoises onto FFS lands, making it easier for FDOT to find quality relocation areas.

Many states utilize sweeping PAs established by USFWS for the entire range of T&E species. One well-known example is the range-wide federal PA for Indiana and long-eared bats (USFWS, 2023). Many states have established unique PAs for species present in their state with USFWS, and some have unique considerations based on a range-wide PA.



Several states use MOUs or MOAs with a more procedural focus. For instance, Texas Parks and Wildlife Department and Texas Department of Transportation (TxDOT) have an MOU creating an interagency team to develop effective long-term transportation plans (Texas Administrative Code Part 1, Chapter 2, Subchapter G, RULE §2.206, 2021). This team meets at least twice yearly and includes several members from each department.

There are many kinds of agreements, which serve many different purposes. MOUs, MOAs, and PAs can be used to create effective and reproducible processes to create quality mitigation solutions that are predictable for all organizations involved in the agreement.

### *Barriers to Implementation*

A major barrier to implementation is the inability for parties to agree on the specificity of the contract, leading to delays in reaching complex solutions. Because these are legally binding documents, they might lack the flexibility to deal with complex projects or challenges and can become outdated as new challenges emerge. Successful implementation also requires both sides to be transparent and forthcoming about completing or implementing their agreed-upon responsibilities and these responsibilities for each party must be explicitly detailed. Failure of one party to uphold their end of the agreement can lead to contentious disputes, bringing implementation to a standstill.

Equity is another critical issue and can be difficult to balance in these legally binding agreements. An emphasis must be placed on ecological implications of the actions which will be performed, as an established agreement allows for use of those actions as long as they remain valid. This means if an agreement does not produce quality ecological results, the negative impacts will compile and can lead to significant biodiversity losses down the line. PAs, in particular, can be an attractive trap, as both sides can believe that they are doing what is necessary. However, without continuous monitoring and adaptation based on outcomes, there can be substantial hidden losses. Alternatively, the prices associated with the agreed upon actions need to be reasonable. If they are not, the options specified in the agreement are unlikely to be utilized, rendering the agreement ineffective and pointless.

Research is also a major barrier, as each species will have dissimilar needs, and as such the PAs should be built around those needs. A PA should not be established unless the techniques being agreed upon are proven effective. For species about which little is known, or if the challenges are not easily addressed, PAs may not be a viable option. Either way, sufficient research into a species should be done to determine if a species may benefit from a PA.

### *Benefits of Implementation*

Predictability in execution is the primary benefit for both sides of these agreements. If a quality solution can be found, then the permitting agency can be assured of solutions that they know are effective and reliable. For the developer, they will be able to plan far in advance the actions that they need to perform for mitigation, and with that, the ability to effectively budget early in the planning stages.

Efficiency is another major benefit. The agreements are generally intended to streamline processes, so when established properly, they can shorten the time required for approval, collaboration on solutions, or determination of pricing, as these aspects can all be established in an agreement. Organization-focused agreements can also allow for more efficient communication, solve problems quickly, and possibly even identify holdups and delays before they may occur.

Another additional benefit is that these agreements can serve as effective steppingstones for forging stronger and more collaborative relationships between departments. If these agreements are established and proven to be effective and equitable, it makes it far easier to establish more agreements in the future.

## **Liaisons between Departments**

### *Description*

This strategy involves assigning an employee to serve as a liaison between IDOT and IDNR for mitigation matters. This individual will facilitate agreements and compromises on which strategies should be employed and the associated costs of mitigation.

### *Other States*

From our surveys we learned that Massachusetts and Minnesota both have liaisons for coordination on mitigation projects. Massachusetts has a dedicated environmental reviewer who serves as a transportation liaison. This employee “reviews all of our projects and through early coordination, we are able to reach a mutually agreeable outcome.” In Minnesota, a DNR employee supported by the state acts as a DOT-DNR liaison.

Colorado DOT employs a liaison for USFWS. They said this has effectively aided the mitigation process. They are considering extending this approach to other organizations, such as CPW (Colorado’s DNR equivalent). However, it is worth noting that Colorado does not have a state ESA.

Texas Parks and Wildlife Department and Texas DOT (Texas Administrative Code Part 1, Chapter 2, Subchapter G, RULE §2.206, 2021) have an interagency team that meets twice a year to ensure their visions for mitigation and planning line up. Texas also does not have a state ESA.

### *Barriers to Implementation*

One major barrier is making sure a liaison is impartial in their relationships with both the DNR and DOT. Determining attributes for the position, such as who will pay them and where they will work, could be difficult and could lead to hang-ups in agreements on the implementation of the role. Furthermore, the person employed should have a good working knowledge regarding construction, ecology, and mitigation procedures. This leads to a smaller applicant pool and a higher pay rate.

### *Benefits of Implementation*

A cross-agency liaison should decrease delays in communication and streamline processes, as all feedback and information can go through one channel for both sides. This employee can also be

integral in establishing agreements like those mentioned in the previous section, as the liaison should understand repeated responses and could help to formalize a standardized mitigation strategy.

## **Research Funding**

### *Description*

Research is a method frequently used for mitigation, though a subject of significant debate. Its popularity stems from its simplicity as a solution: simply fund research on a species to offset impacts from development. This can lead to significant habitat and population loss if it is not used to further the standing of the species. While Illinois has no formal “no net loss” requirement for mitigation, striving for “no net loss” should be a standard goal when establishing mitigation practices. Research, unless performed in specific circumstances, will lead to a net loss, as increased knowledge of a species generally does not serve as an adequate replacement for the habitat lost. This is particularly true when research funding becomes the norm for mitigation, as habitat will continue to be lost with no commensurate gain. Furthermore, if research is not directed toward improving mitigation tactics, or at the very least the standing of the species, then there is little evidence that the loss is being mitigated. The USFWS (2016) guidance on research from the US Fish and Wildlife Service Mitigation Policy states,

Research and education, although important to the conservation of many resources, are not typically considered compensatory mitigation, because they do not directly offset adverse effects to species or their habitats. In rare circumstances, research or education that is directly linked to reducing threats, or that provides a quantifiable benefit to the species, may be included as part of a mitigation package. These circumstances may exist when: (a) The major threat to a resource is something other than habitat loss; (b) the Service can reasonably expect the outcome of research or education to more than offset the impacts; (c) the proponent commits to using the results/recommendations of the research to mitigate action impacts; or (d) no other reasonable options for mitigation are available.

This indicates that even the USFWS has pause regarding the use of research as mitigation. To effectively use research as a mitigation strategy, it should aim to enhance understanding of a species in ways relevant to better mitigation and be seen as a temporary tool for adaptively managing and improving mitigation solutions. Too often, research is seen as a permanent mitigation solution, ultimately leading to net loss.

### *Other States*

Despite the cautions in the USFWS guidance, research as mitigation is common across the US due to its ease and low cost. However, it often requires retooling to improve overall mitigation strategies. States like Illinois, Delaware, Idaho, New Hampshire, and a few others frequently utilize research as a mitigation strategy without a clear plan to adaptively manage and improve mitigation strategies.

States such as Arizona, Massachusetts, Florida, Minnesota, and a few others allow research for mitigation, but direct it to improve future mitigation projects. Some states use ILFs to plan and direct

research, such as Minnesota's freshwater mussel ILF, which supports mussel propagation and release, along with research aimed at improving mitigation strategies. In Arizona, developers are encouraged to perform the mitigation themselves, but are directed toward preferred mitigation strategies, including specific areas of research to improve mitigation for commonly impacted species. Arizona's guidance on mitigation at solar farms, for instance, includes specific research questions to explore as part of mitigation efforts, such as the impact of utility-scale solar facilities on vegetation, micro-climate, migratory birds, and bats in desert ecosystems (AGFD, 2010).

Several states in their guidance do not mention research at all as a mitigation option. California, Washington, Connecticut, Maine, and many more do not have any guidance on research as a means for mitigation. This could mean that they simply do not provide guidance on research that is done, but for states like California and Washington who have well-established mitigation programs, it would seem they simply do not often consider research a viable option for mitigation, or perhaps research may not effectively reduce or prevent species loss over the longer term.

### *Barriers to Implementation*

The major barrier is ensuring that research is used as a tool to create better mitigation strategies. Research can be a tempting shortcut for both developers and permitting agencies, as it is easy, and the prices can be far lower than acquiring land for mitigation. However, this approach will inevitably lead to net loss. As land is traded for research, the amount of viable habitat for endangered species decreases, and with that biodiversity decreases.

When using research as a mitigation option, it is paramount to take inventory of the current knowledge base and fill gaps in ways that will directly aid conservation and mitigation, rather than merely expanding knowledge for the sake of expanding knowledge. As such, it may be important to create profiles for the different species to determine what needs to be done to establish more effective mitigation strategies. To ensure the long-term ecological integrity of the state, both regulators and developers need to be unwilling to use research as a mitigation tactic if it will not be effective in conserving the listed species which are impacted. This approach may require more effort and cost but is necessary for the sake of conservation.

### *Benefits of Implementation*

While research offers an easy option for developers when allowed by regulating agencies, IDOT should aim to ensure successful mitigation projects and strive for no net loss, an objective that is unattainable if research is the sole form of mitigation. Research can be a great tool to improve and formulate new strategies. It should be seen as a means to an end, not a permanent solution.

## **CHAPTER 5: SURVEY SUMMARY OF ENDANGERED SPECIES MITIGATION PLANNING AND IMPLEMENTATION FROM OTHER STATES**

A web survey was conducted to assist in gathering information from additional state DOTs about their approaches to threatened and endangered species mitigation (Appendix D). We asked how other state DOTs manage the costs of T&E species mitigation, what their consultation process entails and how involved they are in the process, which other agencies are involved, and how much and which types of compensatory mitigation were decided upon in advance or typically agreed upon after consultation. The survey was activated on August 24, 2023, and a link was sent to 12 US state DOT contacts during the following weeks. As of November 16, 2023, we have had eight states respond (Arkansas, Colorado, Florida, Massachusetts, Minnesota, Nevada, Oklahoma, and Washington).

Table 3 summarizes the findings from our survey. Most states plan for and fund mitigation during the environmental review process, and the associated costs of mitigation are generally included within the total for project. Several states use both program-level funding and project-by-project level funding, but most handle it on a project-by-project basis during planning and environmental review. Similarly, most DOTs do not allocate program funding, as these costs are determined project by project. Some states had mechanisms to find additional sources of funding. Half of the states surveyed have a state-level ESA, enforced by their respective natural resource agencies. For long-range project planning, most DOTs consider project locations and project types when planning for mitigation costs, rather than employing large-scale multi-year planning, database screening, or cost evaluation (Figure 12). The agency that determines compensatory mitigation varies, ranging from the DOT to DNR equivalents, a blend, or via a liaison embedded within the regulatory agency—in most cases, the DOT proposed mitigation for T&E species. A few states have developed tools to aid in calculating costs of T&E species mitigation in advance, but most of these are developed for individual species or habitats and, for the most part, these tools incorporate voluntary conservation measures but few other consistent factors. Mitigation banking in some form was used by half the states, some were in response to programmatic Biological Opinions from USFWS, except for Florida, which has devised extensive guidance in response to wood stork foraging habitat and gopher tortoise relocation, preferably into established mitigation banks comprised of high-quality habitat.

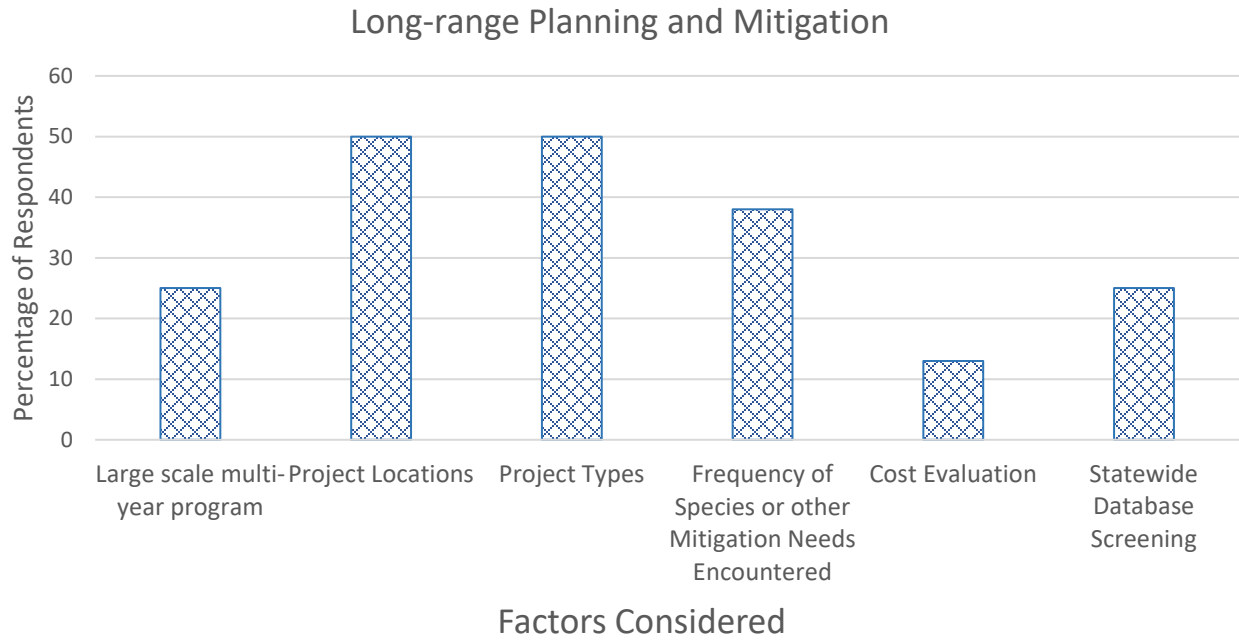
**Table 3. Summary of State DOT Responses to Web Survey**

State	How Plan/Fund T&E Mitigation	Project-by-project or Program level Planning	Does State Allot Program Funding?	Does your state have its own ESA?	Who enforces state ESA?	Who determines compensatory mitigation?	How involved is DOT with T&E costs?	Tools to aid in calculating costs	What do tools factor?	Conservation Banking?
AR	Determined during environmental review in association with USFWS liaison and included in project cost	Both		No			DOT proposed	Working to finalize tool that converts acreage impacts in karst recharge areas to conservation dollars	Voluntary conservation measures	Yes, mitigation bank for Indiana Bat
CO	Determined during environmental review and included in project cost	Both	No, allocation happens when projects are developed	No			CDOT is very involved in establishing mitigation costs	In-Lieu Fee for Canada Lynx	Voluntary conservation measures	Yes, Shortgrass Prairie Initiative

State	How Plan/Fund T&E Mitigation	Project-by-project or Program level Planning	Does State Allot Program Funding?	Does your state have its own ESA?	Who enforces state ESA?	Who determines compensatory mitigation?	How involved is DOT with T&E costs?	Tools to aid in calculating costs	What do tools factor?	Conservation Banking?
FL	Species Mitigation Banks	Mostly Project-by-project		Yes	Florida Fish and Wildlife Conservation Commission (FWC)	FWC	Not at all	Service-approved mitigation bank for Wood Stork and Gopher Tortoise. BO for Panama City Crayfish	Voluntary conservation measures	Yes, Wood Stork Foraging Habitat, Gopher Tortoise Relocation Habitat
MA	Determined during environmental review and included in project cost	Project-by-project	No, but can seek internal and external funds	Yes	MA Division of Fisheries and Wildlife	DOT proposes, MA Fish and Wildlife approves	Mutual Agreement			No
MN	Determined during environmental review and included in project cost or additional grants are sought	Project-by-project	No, allocation happens when projects are developed	Yes	MN DNR	DNR staff including MnDOT supported DNR-DOT Liaison	Pre-established mussel mitigation costs. Others via mutual agreement			Yes, Rusty patched bumblebees and Northern Long-eared Bat

State	How Plan/Fund T&E Mitigation	Project-by-project or Program level Planning	Does State Allot Program Funding?	Does your state have its own ESA?	Who enforces state ESA?	Who determines compensatory mitigation?	How involved is DOT with T&E costs?	Tools to aid in calculating costs	What do tools factor?	Conservation Banking?
NV	Determined during environmental review and included in project cost	Project-by-project		No			Mutual agreement			No
OK	Programmatic Biological Opinion (FHWA)	Project-by-project		No						No
WA	Mitigation involves single species	Project-by-project	No	Yes	WA Department of Fish and Wildlife	WA Fish and Wildlife Area Biologist	None	National Marine Fisheries Service has developed nearshore calculator to quantify impacts and mitigation needs	Voluntary conservation measures	No





**Figure 12. Graph. Long-range planning and mitigation. Percentage of respondents (total n = 8) that considered six main factors when considering future mitigation costs.**

# CHAPTER 6: SUMMARY OF SUCCESSES, CHALLENGES, AND OPPORTUNITIES FOR FURTHER ENVIRONMENTAL PROGRAM DEVELOPMENT AT IDOT

## CHALLENGES

IDOT has identified the following challenges pertaining to federal and state environmental review and ESA requirements for T&E species mitigation that regularly hamper project progression and adherence to planning and construction timelines:

- Adapting to changes to the state and federal Endangered Species Laws and Lists of Protected Species.
- Implementing legal and/or permitting requirements for avoidance, minimization, and mitigation under state and federal policies.
- Planning and programming for permitting and mitigation needs.

## SOLUTIONS

Our research has identified several strategies that could aid IDOT in improving overall efficiencies and predictability in project consultation and mitigation implementation. One of the simplest approaches, if agency partners agree, might be to create a liaison position agreed upon between IDNR and/or USFWS and IDOT. Pre-established guidelines for their role in consultation and their relationship to both departments are essential to ensure equitable solutions. This person should make mitigation agreements easier for both agencies involved. The employee should be able to identify what each side will want from a mitigation project, thus making compromises easier, leading to effective economic and ecological solutions. Furthermore, mitigation consultation would be handled by a single entity who would have the best interest of each agency involved allowing for repeated implementation of solutions and perhaps paving the way for other approaches in the future. Pitfalls include inequitable representation as a liaison would be employed by one of the two involved parties. However, if the person is reputable, has working knowledge of both sides of the consultation process, and can see things through an objective lens, then this strategy has promise for addressing all three of IDOT's major challenges. States like Arkansas and Minnesota have liaisons with USFWS and MN DNR, respectively. In Texas, a variant on liaisons has been established, where an interagency (DOT-DNR) committee meets regularly to explore and agree upon various best practices for mitigation.

A step beyond establishing a liaison would be to forge legal agreements about commonly discussed consultation issues with resource agencies. These MOUs, MOAs, and PAs can take various forms and include agreements between state DOTs and their federal and respective state agencies. In some cases, all three are involved, such as with Colorado Shortgrass Prairie Initiative that was established to protect limited habitat along the front range in Colorado. This agreement began as an MOU between CDOT, Colorado Parks and Wildlife, FHWA, and The Nature Conservancy. Illinois has

established MOUs with IDNR and often implements the sweeping PA from USFWS for federally listed bats. MOUs and PAs, like an appointed liaison officer, require a good working relationship between the agencies involved and require the ability to come to agreement on what species and processes will be covered in the agreement. IDOT could pursue additional MOUs with IDNR regarding species often requiring mitigation such as aquatic species including fish, freshwater mussels, crayfish, and herps. Like Wisconsin DNR, IDOT could encourage IDNR to issue a Broad Incidental Take Permit, which allows the applicant to relocate state listed freshwater mussels based on their pre-established guidelines without the need to enter consultation (WIDNR, 2019). This would allow IDOT to predict and appropriately plan for projects when mussels are encountered. Establishing legal agreements or broad incidental take permits could be a logical next step if a constructive liaison-mediated process is established. FHWA supports the concept of programmatic mitigation planning (PMPs), as is outlined in FHWA (2023), where it is encouraged to develop PMPs based on long-range transportation plans, forecasts for potential impacts, and corridor transportation plans. PMPs, developed through this process, are meant to be flexible and can encompass single or multiple resources across various geographic scales to best meet the objectives and goals of the transportation agency or project proponent. In contrast to traditional project-based mitigation strategies, PMPs can produce benefits, including:

- Improved environmental outcomes.
- Accelerated project delivery with reduced project delays.
- Fulfillment of permit requirements and environmental commitments.
- Reduced mitigation costs.
- Increased quality and predictability of mitigation measures.

While the regulatory agency determines the decision for which compensatory mitigation is or is not allowed, IDOT does have some discretion in deciding which strategies to use. As such, since IDNR clearly allows for research funding to be used for mitigation, this is an excellent opportunity to use mitigation as a tool. If gaps in knowledge in terms of effective mitigation were determined, particularly for species that are frequently encountered on projects, then research could be used as a tool to create more effective and feasible mitigation solutions down the line. IDOT could make efforts via this existing pathway to steer research toward alternative mitigation strategies that are employed elsewhere in the Midwest, such as in Minnesota, where mussel propagation is an active area of mitigation research and is part of an established MOU with MN DNR.

IDOT could also work to establish ILF agreements with consulting agencies, meaning that IDOT could be instrumental in creating a system that will work well for them. Establishing equitable and effective payment systems could be a great option for budgeting mitigation and should create solutions that will be acceptable to IDNR. These more complex solutions do not happen quickly and often result from building trust and relationships over time through solutions like liaison officers and legal agreements. ILFs provide a mechanism to outline established guidelines for use of compensatory mitigation funds, expenditure timelines, and allowable expenses. Successful ILFs have been

implemented by various state DOTs and their respective natural resource agencies. An example includes Minnesota DOT and DNR that established an ILF for T&E mussel mitigation. Like Illinois, Minnesota DNR uses mitigation funds for research, but specifically targets research regarding alternative mitigation efforts rather than a research fund to be spent at the discretion of the DNR. Other states such as Florida and Colorado have established ILFs for mitigation for Gopher Tortoise and Canada Lynx, respectively. ILFs can be attractive to state DOTs because they often have a role in establishing the guidelines, but also hand over managing of the mitigation effort. ILFs can be effective management tools when small-scale off-site habitat creation or restoration has little impact to conservation of the affected species.

Advanced mitigation frameworks are a comprehensive solution that could possibly address multiple issues faced by IDOT. Because they often provide multiple approaches combined with longer-term and larger-scale planning, an AMF would likely benefit IDOT in both efficiency and predictability, although the coordination required with both federal and state agencies would be extensive. An AMF is a forward-looking goal, but IDOT should focus on assembling component parts first rather than implementing the entire framework at once.

While there are significant barriers, conservation banking can be a highly effective strategy when implemented correctly. This is likely one of the best avenues to protect species that are struggling with habitat loss, particularly wide-ranging ones that need connectivity. Banks can easily be used as a tool for conservation planning, as shown in California's implementation. IDNR and USFWS could easily identify areas of high conservation concern for either protection or restoration within Illinois, and direct private or agency owned banks to purchase lands in these areas. This strategy would enhance connectivity and increase the land area protected in perpetuity, provided effective guidelines are set. While this approach might mean that IDNR receives less funding from direct mitigation efforts, it could be repurposed to steer conservation efforts toward areas that would otherwise be considered for direct land acquisition by the agency. IDNR could then reallocate funds initially intended for land purchase to other conservation projects. For IDOT, the benefit of using private banks is obvious: the prices for mitigation are more predictable, so they can easily be budgeted for, and the onus for mitigation success shifts to the banks as soon as credits are purchased. The biggest challenges include establishing a market for private bank operators to establish in the state, which often requires legislation to create an incentive structure. If IDOT were to decide to establish its own conservation banks, the upfront cost would be extensive, and the payoff would be delayed while the banks become established.

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# APPENDIX A: LIST OF STATES, STATE ENDANGERED SPECIES ACT OR EQUIVALENT PROTECTION, CLASSIFICATION OF MITIGATION FRAMEWORK, LIST OF DETERMINING FACTORS, AND PROPOSED MITIGATION ACTION

Table 4. State Level Legal Protection Status and Published Guidance

State	State Legal Protections for Species	Classification (1- Standard IT and ESA, 2 - Habitat Protection take law, 3- No Statewide Law found 4- Other	List of Determining Factors?	Compensatory Mitigation Suggestions?
Alabama	Y	3	N	N
Alaska	Y	3	N	N
Arizona	Y	2	Y	Y
Arkansas	Y	3	N	N
California	Y	1	Y	Y
Colorado	Y	4	N	N
Connecticut	Y	4	N	Y
Delaware	Y	3	N	N
Florida	Y	1	Y	Y
Georgia	Y	3	N	N
Hawaii	Y	1	N	N
Idaho	Y	4	N	N
Illinois	Y	1	N	Y
Indiana	Y	3	N	N
Iowa	Y	3	N	N
Kansas	Y	4	N	N
Kentucky	Y	3	N	N
Louisiana	Y	3	N	N
Maine	Y	1	N	Y
Maryland	Y	4	N	N
Massachusetts	Y	1	Y	Y
Michigan	Y	3	N	N
Minnesota	Y	1	Y	Y
Mississippi	Y	3	N	N
Missouri	Y	3	N	N
Montana	Y	3	N	N
Nebraska	Y	1	N	N
Nevada	Y	3	N	N



State	State Legal Protections for Species	Classification (1- Standard IT and ESA, 2 - Habitat Protection take law, 3- No Statewide Law found 4- Other	List of Determining Factors?	Compensatory Mitigation Suggestions?
New Hampshire	Y	4	N	Y
New Jersey	Y	4	N	N
New Mexico	Y	3	N	N
New York	Y	1	Y	Y
North Carolina	Y	3	N	N
North Dakota	N	3	N	N
Ohio	Y	3	N	N
Oklahoma	Y	3	N	N
Oregon	Y	2	Y	Y
Pennsylvania	Y	4	N	N
Rhode Island	Y	3	N	N
South Carolina	Y	3	N	N
South Dakota	Y	3	N	N
Tennessee	Y	3	N	N
Texas	Y	3	N	N
Utah	N	3	N	N
Vermont	Y	1	N	Y
Virginia	Y	4	N	N
Washington	Y	4	N	Y
West Virginia	N	3	N	N
Wisconsin	Y	1	N	N
Wyoming	N	2	Y	Y

## APPENDIX B: LIST OF STATES THAT HAVE ESTABLISHED PROTECTED SPECIES MITIGATION STRATEGIES AND THE APPROACH TAKEN

Table 5. State DOT Approaches to Mitigation

Collaboration	DOT Centered	DNR Centered
California	Colorado	Arizona
Florida	Idaho	Connecticut
Maine	Nevada	Illinois
Minnesota	Vermont	Massachusetts
New York		New Mexico
Oregon		Washington
Texas		Wisconsin

## APPENDIX C: STATE APPROACHES TO COMPENSATORY MITIGATION FOR THREATENED OR ENDANGERED SPECIES

Table 6. State Approaches to Compensatory Mitigation for Protected Species Incidental Take

State	Research Funding	Habitat Restoration / enhancement	Habitat Protection	Conservation Banking	Payment per individual	In-lieu Fee
Arizona	Y	Y	Y	N	N	N
California	N	Y	Y	Y	N	Y
Connecticut	N	Y	Y	N	N	N
Florida	Y	Y	Y	Y	N	Y
Illinois	Y	Y	Y	N	N	Y
Maine	N	Y	Y	N	N	Y
Massachusetts	Y	Y	Y	N	N	N
Minnesota	Y	Y	N	N	Y	Y
New Hampshire	Y	Y	Y	N	N	N
New York	N	Y	Y	N	N	N
Oregon	N	Y	Y	Y	N	N
Texas	N	Y	Y	N	N	Y
Vermont	N	Y	Y	N	Y	Y
Washington	N	Y	Y	N	N	N
Wyoming	N	Y	Y	Y	N	N
Wisconsin	Y	Y	Y	N	N	N

## **APPENDIX D: WEB SURVEY FORM DEVELOPED FOR COLLECTING INFORMATION FROM OTHER STATE DOTs**

State Department of Transportation Approaches for Threatened and Endangered Species Mitigation

### **Contact Information**

**Name**

**Email address**

**Phone number**

**Organization**

**Job title or role**

**Is there a contact from your state that the Illinois Department of Transportation (IDOT) could reach out to if IDOT had any further questions?**

Please provide name, organization, email address and phone number of contact.

### **Start of Survey Questions**

**1. How does your State Department of Transportation (DOT) plan for and/or fund threatened and endangered species mitigation?**

**2. Does your State DOT approach mitigation funding on a project-by-project level or at a program planning level?**

Please elaborate.

**2a. If on a long-range program planning level, what factors are you considering and how was this developed?**

Check all that apply.

Large scale multi-year program

Project locations

Project types

Frequency of species or other mitigation needs encountered.

Cost evaluation

Statewide database screening

Does not apply

Other

Enter text

**2b. Does your state allot program funding that can be utilized for mitigation costs when it is needed on projects and how is that value decided?**

Please answer if your state has a long-range planning program

**3. Does your state have its own Endangered Species Act (ESA) for threatened and endangered (T&E) species?**

Yes

No

**3a. Who is responsible for enforcing compliance of the ESA for your state?**

Please include links to webpages that might outline the governing agencies guidelines or provide other details about how your state ESA is enforced.

**3b. If your state has its own ESA who determines the mitigation and or any monetary costs for T&E species impacted by transportation projects?**

**4. How involved is your State's Department of Transportation (DOT) in the process for establishing costs associated with T&E mitigation? What roles, if any, do you have in this process?**

**5. Does your State DOT have any planning or budgeting tools to address Threatened or Endangered species monetary mitigation requirements?**

Please explain.

**6. Are monetary mitigation requirements done on an individual project basis or with programmed conservation funds?**

Individual project basis

Programmed conservation funds

Other

Enter text

**7. Has your State or any of your resource agency partners developed any assessment tools to aid in calculating required T&E species mitigation/valuation?**

Yes

No

**7a. If so, can you share what those tools are and how they were developed or provide a link if they are publicly available?**

**7b. Do these tools factor in: voluntary conservation measures, feasibility constraints related to construction standards or needs, timeframes, cost of implementation, etc.?**

Please explain

**8 Has your State DOT or state regulatory agencies developed a system of conservation banking to provide a multifaceted approach to mitigation needs ranging from wetlands to T&E species, to potentially other habitat types (prairie, etc.)?**

If so, please explain

Yes

No

**8a. Can you share a little about how that system was established and whether this is a Federal or State partnership or both or a public -private partnership initiative?**

**9. Please provide any links to documents (or PDF's) related to topics above that your State DOT has developed and feels comfortable sharing. (maximum file size: 15MB)**



**I** ILLINOIS