VALUING WILDLIFE CROSSINGS AND ENHANCEMENTS FOR MITIGATION CREDITS

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Disclaimer:

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PURPOSE OF STUDY

- **Many DOTs are incorporating wildlife connectivity mitigation into projects supported by long-term planning**
- **Frequent regulatory issue for DOTs**
- **Interest to explore current practices and innovations for advance mitigation and credit valuation**

KEY TERMS

- **Credit**—a unit of exchange that serves as the currency for valuing biodiversity, ecosystem services, or an expected ecological outcome. For this report, credit specifically references a measure of gain in wildlife connectivity functions.
- **Wildlife connectivity mitigation**—any functional wildlife crossing (underpass/overpass), or other highway enhancements used by state DOTs to mitigate fragmentation effects of transportation projects to wildlife and habitat connectivity.
- **Advance mitigation**—a process in which credits generated from mitigation measures can be applied at a later date to mitigate unavoidable impacts of future transportation projects and to satisfy permit conditions

WHY MITIGATION CREDITS FOR WILDLIFE CONNECTIVITY?

- **Provides DOTs with greater flexibility to mitigate impacts**
- **Credit purchases can fund high priority wildlife connectivity mitigation**
- **Advance mitigation can generate benefits ahead of impacts**
- **Potential project cost and schedule savings**

STUDY FORMAT

- **Literature Review**
- **Practitioner Survey**
- **Practitioner Interviews**
- **Case Studies**
- **Final Report**

LITERATURE REVIEW

- **Legal, Planning, and Policy Framework Considerations**
- **Potential Valuation Metrics for Wildlife Connectivity Mitigation Credits**
- **Monetary Valuation of Wildlife Connectivity Mitigation Credits**

PRACTIONER SURVEY & INTERVIEWS

- **Practitioner Survey**

- **234 (23%) of 1,035 survey recipients responded**
- **Primarily state transportation agency staff (54%), and natural resource agency staff (26%)**
- **Representatives from 46 states responded**

- **Practitioner Interviews**

- **Four states: Arizona, California, Colorado, Florida**
- **Eight state DOT planners or environmental managers**
- **Seven wildlife biologists at state natural resource agencies**
- **One federal transportation agency staff**

SURVEY FINDINGS

84% of respondents indicated that wildlife connectivity is considered in their transportation planning process.

76% of wildlife connectivity mitigation for ESA compliance or roadway safety concerns

SURVEY FINDINGS

- **Respondents indicated that the majority of mitigation actions involve new or retrofitted structures for passage and fencing.**

SURVEY FINDINGS

- **Quantitative methods used by respondents to locate mitigation actions included:**
 - **WVC and accident data**
 - **research or study results in the project vicinity**
 - **wildlife telemetry data, wildlife monitoring data, wildlife tracking data, pitfall traps, and camera trap photos.**
- **Data analyses included GIS models, Brownian bridge models using global positioning system (GPS) data for ungulates, roadkill surveys, and habitat evaluations**

SURVEY FINDINGS

- **Over 90% of respondents indicated that mitigation credits to offset wildlife connectivity impacts are not available.**
- **Three state DOTs use advance mitigation options:**
 - **Caltrans: Advance Mitigation Program**
 - **CDOT: In-lieu-fee programs for Canada Lynx and Advance Mitigation Program for Short Grass Prairie Initiative**
 - **FDOT: Panther Habitat Assessment Methodology**
- **Respondents (52%) indicated they would utilize credits generated for wildlife connectivity mitigation if available.**

PRACTIONER INTERVIEWS

Key Findings for Wildlife Connectivity Mitigation

- **Interagency Coordination/Collaboration - important for successful outcomes**
- **Support the use of function based metrics to value mitigation credits, though few examples noted**
- **Support use of avoided cost metrics where WVC data is available**
- **Need credit valuation methods that provide consistent credit quantification**
- **Obstacles:**
 - **Lack of funding to construct WVC and connectivity mitigation actions, and staff time for needed collaboration with stakeholders**
 - **Need to develop empirical data sets to define linkages for focal species**
 - **Data limitations in defining and valuing connectivity mitigation for some focal species (availability, changing land use)**

POTENTIAL VALUATION METRICS FOR GENERATING WILDLIFE CONNECTIVITY MITIGATION CREDITS

- **Multiple metrics available, but not consistently used by practitioners.**
 - **Condition-based metric**
 - **Function-based metrics**
 - **Model based metrics**
 - **Avoided cost metrics**
- **DOTs will need to invest in development of metrics that are:**
 - **Species-specific to account for movement behavior and landscape structure / land use**
 - **Cost efficient to implement**
 - **Provide consistent results**
 - **Transparent process**

POTENTIAL VALUATION METRICS FOR GENERATING WILDLIFE CONNECTIVITY MITIGATION CREDITS

- **Condition-based connectivity metrics**—measurements that value wildlife connectivity or assess transportation project impacts based on the physical, chemical, and biological attributes of a system, such as various highway or ecosystem characteristics
- **Seven example metrics:**
 - **Area of highway footprint within the highway crossing zone used by focal species**
 - **Overall project costs (% of total transportation project cost)**
 - **Number of lanes (area of new highway lanes)**
 - **Traffic volume (AADT or vehicles per hour)**
 - **Roadway barriers (Fence length, jersey barriers, median structures, other potential barriers to movement)**
 - **Speed limit (Increased speed limit)**

POTENTIAL VALUATION METRICS FOR GENERATING WILDLIFE CONNECTIVITY MITIGATION CREDITS

- **Function-based connectivity metrics**—measurements that value wildlife connectivity or assess transportation project impacts based on wildlife habitats and ecosystem processes, such as the acreage of suitable habitat or patterns of wildlife movement
- **Seven example metrics:**
 - **Safe passage of focal species (number of individual crossings)**
 - **Genetic interchange of focal species (change in genetic diversity compared to baseline)**
 - **Conservation of rare, threatened and endangered species (acres of suitable habitat connected)**
 - **Migration of focal species (number of migratory animal crossings)**
 - **Dispersal of focal species (number of juvenile crossings)**
 - **Population size(s) of focal species (number of affected individual animals)**
 - **Habitat quality for focal species (quality of habitat)**

POTENTIAL VALUATION METRICS FOR GENERATING WILDLIFE CONNECTIVITY MITIGATION CREDITS

- **Model-based connectivity metrics**—measurements that value wildlife connectivity or assess transportation project impacts based on computer models that combine elements of function- and condition-based metrics to estimate wildlife connectivity.
- **Three example metrics:**
 - **Landscape connectivity models (validated model values)**
 - **Species-specific models (validated model values)**
 - **Traffic forecasting models and/or predictive models of land development (Predicted AADT or vehicles per hour)**

POTENTIAL VALUATION METRICS FOR GENERATING WILDLIFE CONNECTIVITY MITIGATION CREDITS

- **Avoided cost metrics**—measurements that value wildlife connectivity or assess transportation project impacts based on the economic value of wildlife or human life and/or property
- **Three example metrics:**
 - **Property damage, human injury, and/or death from WVCs (number of WVCs over a specified time period)**
 - **Highway maintenance costs due to reduced WVCs (number of roadkill carcasses over a specified time period)**
 - **Economic value of hunted or watchable wildlife affected by WVCs (number of roadkill carcasses of focal species over a specified time period)**

WILDLIFE CONNECTIVITY ADVANCE MITIGATION & CREDITING

Potential Mitigation Measures that could be Credited for Wildlife Connectivity

- **All effective measures to mitigate wildlife connectivity impacts and WVCs have potential to generate credits:**
 - New Wildlife Crossing Structures (over pass or underpass)
 - Retrofit culvert and bridges for wildlife passage
 - Wildlife fencing with jump outs (for large mammals) or barriers for reptiles/amphibians)
 - Animal detection devices and driver warning systems
- **Avoidance, minimization and compensation to minimize adverse impacts precede credit development actions.**

WILDLIFE CONNECTIVITY ADVANCE MITIGATION & CREDITING

- 1. Coordinated, Regional Wildlife Connectivity Planning as a Prerequisite**
- 2. Interagency Working Group Formation and Roles**
- 3. Geographic Service Area for Mitigation Credit Application**
- 4. Credit Management and Debiting**
- 5. Post-Construction Monitoring**
- 6. Long-Term Commitments**

CASE STUDIES

Case Study #1 – Caltrans Advance Mitigation Program

1. Planning Framework

- **Formed through a collaborative effort between Caltrans, state and federal agencies, NGOs and academia.**
- **Goal was to develop a holistic approach to providing mitigation for unavoidable impacts.**
- **Three step planning process for advance mitigation:**
 - 1. Statewide assessment of the potential mitigation need**
 - 2. Perform advance mitigation needs assessment in regions with opportunities for advance mitigation**
 - 3. Candidate mitigation projects are scoped and proposed at District level for funding through program.**
- **CDFG/stakeholders are compiling list of priority wildlife crossing and connectivity actions**

CASE STUDIES

Case Study #1 – Caltrans Advance Mitigation Program

1. Background

- **Caltrans Advance Mitigation program established in 2017 to guide the operation of advanced mitigation for transportation projects.**
- **Provides the mechanism to establish and manage the use of credits through a Credit Agreement (CA).**
 - **purchasing existing advance mitigation credits from conservation or mitigation banks or contributing to an Habitat Conservation Plan.**
 - **establishing advance mitigation credits through existing regulatory processes and/or instruments (i.e., mitigation bank prospectus and instrument)**
 - **As a lead agency under California Environmental Quality Act (CEQA), Caltrans determines when credits may be applied to a transportation project.**

CASE STUDIES

Case Study #1 – Caltrans Advance Mitigation Program

2. Mitigation Crediting

- **Laurel Curve Wildlife Habitat Connectivity Project**
 - **Existing 4 lane highway to be retrofitted with wildlife passage to facilitate passage by cougar and other large wildlife.**
 - **Two-step condition-based approach used to set potential credits:**
 - **Determine road permeability improvement reach (6.6 miles)**
 - **Calculate the number of CEQA mitigation credits where 1 credit = 0.1 acre, and equivalent credit per lane mile**
- **Total credits was based on the footprint of highway served by proposed passage (36.8 acres) = 368 credits**
- **Caltrans obtained 92 credits based on the proportion of project funding (25%) provided from the Advance Mitigation Program.**

CASE STUDIES

Case Study #1 – Caltrans Advance Mitigation Program

2. Mitigation Crediting (continued)

- **Credit Agreement specifies types of impacts credits can be applied to:**
 - **Improvements of existing State Highway System roads that have significant impacts under CEQA**
 - **Impacts of less than 1 acre, such as permanent loss of roadside habitats during road construction**
 - **Impacts from improvements to State Highways System roads that would increase traffic speeds or road capacity, resulting in greater danger to wildlife attempting to cross**
 - **Impacts from new highways or major transportation features**
- **Caltrans approves credit debiting for CEQA impacts**
- **Service Area defined using regional habitat models**

CASE STUDIES

Case Study #1 – Caltrans Advance Mitigation Program

2. Lessons Learned

- **The Laurel Curve Project Credit Agreement provides concise documentation of the credit generation metric, credit tracking and the basis of the service area between parties.**
- **Project serves as a Proof-of-Concept**
- **Condition-based metric used to calculate credits was simple, inexpensive, repeatable.**
- **The metric does not measure ecological improvement; future efforts likely to address this component.**
- **Caltrans Advance Mitigation Program has reduced delivery time for projects by 1.3 to 5 months.**

CASE STUDIES

Case Study #2 – Florida Panther Crossing Projects

1. Background

- **Federally listed subspecies of mountain lion; habitat preservation and reduction in road mortality key management goals.**
- **FDOT locates new crossing structures based on GPS data from collared panthers to identify travel corridors**

2. Mitigation Crediting

- **Mitigation credit metric defined in the USFWS *Panther Habitat Assessment Methodology* for projects that indirectly effect panthers via increased traffic.**
- **Credit is purchased from Habitat Conservation Banks**
- **For FDOT, credit purchase price tied to average cost of passage structure.**

CASE STUDIES

Case Study #2 – Florida Panther Crossing Projects

3. Lessons Learned

- **Example of a condition-based metric based on average cost of wildlife crossing to quantify credits that could be applied.**
- **Alternative to an area- or species-based metrics.**
- **Applicable to a single focal species**
- **Method could be used to incentivize constructing crossing structures to reduce WVCs on existing roadways.**

CASE STUDIES

Case Study #3 – FDOT State Route 40 Wildlife Connectivity Mitigation

1. Background

- **Multi-species habitat connectivity concerns identified for proposed capacity and safety improvements**
- **Established state & federal agency task force to assess feasibility of proposed roadway improvements**
- **Established Wildlife Crossing Committee to develop a comprehensive wildlife and habitat mitigation plan.**
- **Adapted an existing functional assessment tool, Uniform Mitigation Assessment Method (UMAM) to include wildlife crossings in scoring**

CASE STUDIES

Case Study #3 – FDOT State Route 40 Wildlife Connectivity Mitigation

2. Mitigation Crediting

- **Modified UMAM used to evaluate crossing structures (bridges, culverts) between existing conservation areas.**
- **Assessment Area defined for each crossing structure based on focal species habitat and dispersal range.**
- **The presence of crossing structures provided a 1 pt. , or 10%, increase in scoring to account for the connectivity benefits of structures.**
- **Relevant Functional Gain calculated & adjusted for Time Lag and Risk.**

CASE STUDIES

Case Study #3 – FDOT State Route 40 Wildlife Connectivity Mitigation

3. Lessons Learned

- **Collaborative multi-stakeholder approach**
- **Example of the successful adaption of an existing assessment method as a metric for wildlife connectivity mitigation credits.**
- **Application of the modified UMAM also provides a cost-savings incentive to retrofit culverts and bridge to mitigate for both wildlife connectivity and wetland impacts.**

CASE STUDIES

Case Study #4 – CDOT West Slope Wildlife Crossing Prioritization

1. Background

- **Colorado DOT sought to address increasing WVCs on I-70 as it implements planned improvements to address regional growth**
- **WVC hotspots and landscape linkages studied over 20 years.**
- **Initiated the West Slope Wildlife Prioritization Study**
 - **multi-agency comprehensive approach to valuing future high-priority wildlife connectivity mitigation projects**
 - **Focused on safety - WVC risk reduction for elk and mule deer**
 - **Incorporated both current and future land use and traffic scenarios to assess potential future conflicts and solutions**
 - **Established prioritization criteria & developed a WVC risk model**

CASE STUDIES

Case Study #4 – CDOT West Slope Wildlife Crossing Prioritization

2. Mitigation Crediting

- **Project did not establish mitigation credits as part of methodology.**
- **Function-based and avoided cost metrics used to prioritize wildlife crossing structures based on a benefit-cost analysis (BCA).**
- **Approach to assessing benefits can be used to estimate mitigation credit value.**
- **List of prioritized site could be used to identify potential stand-alone mitigation projects**

CASE STUDIES

Case Study #4 – CDOT West Slope Wildlife Crossing Prioritization

3. Lessons Learned

- **Prioritization of wildlife crossing structures supported the development of wildlife connectivity mitigation opportunities.**
- **The use of a WVC risk reduction model and BCA to prioritize wildlife crossing/connectivity mitigation is effective in demonstrating value and return on investment, as well as value of mitigation action.**

Points of Contact

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