Challenges in Quantifying the Effectiveness of Avoidance and Minimization Measures

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Avoidance and Minimization Measures

- Different reasons to implement
  - Voluntary (environmental due diligence)
    - migratory birds
    - bats
  - Required (reduce take to the maximum extent practicable)
    - threatened and endangered species
    - eagles
  - Rare events

- Need to quantify the reduction of impacts (i.e., success of implementation)
Effectiveness Monitoring

• Definition: A program designed to evaluate whether or not there is a reduction in impacts as a result of implementation of a given avoidance and minimization measure.

• Variation in program objectives
  ▪ Quantify
    – When already demonstrated to be effective
    – E.g., power-pole retrofits
  ▪ Demonstrate and quantify
    – Predicted reduction, but untested
    – E.g., experimental measures
Challenges

• Poor understanding of factors related to risk/impacts
• Difficult to control for confounding variables
• Sample size may be limited at a single site
• Inherent uncertainty in fatality estimation
Metrics of Effectiveness

• Estimated or observed fatality rate
  ▪ Most common
  ▪ Lack of precision
  ▪ May not accurately capture risk

• Alternative metrics
  ▪ Best metrics use attributes that
    – Can be measured with relative accuracy
    – Have good sample sizes
    – Have baseline data available
    – Are well-correlated with risk
Alternative Metrics

• Measurements of use
• Behavioral responses
• Fatality rates of a surrogate species

Whooping Cranes

Sandhill Cranes
Alternative Metric – Example 1

Audible Deterrent for Raptors

- Flight paths or use in the zone of risk can be quantified and are often collected pre-construction (i.e., baseline)
- Correlation with collision is assumed, and collision probabilities are available in the literature
- Response to initiation of the deterrent can be measured
- Averted flight paths can be equated to avoided collision risk

Photo by Russell Reynolds
Hawaiian hoary bat (Endangered)

- Bat use potentially correlated with risk
- Dim UV light deterrent installed at macadamia nut orchard
- Thermal and acoustic detectors to quantify bat use
- Bat use was greatly reduced with UV light treatment

Rare Events

• Unique challenges
  ▪ Often tied to regulatory risk and permit compliance
  ▪ Hard to detect a rare event
  ▪ Greater level of effort to create precise estimates of fatalities
  ▪ Smaller sample size to detect an effect of a measure
Management Implications

• Study design is crucial
• Include effectiveness monitoring at earliest planning stages
• Results of effectiveness monitoring influence
  ▪ Acceptance of experimental avoidance and minimization measures
  ▪ Adaptive management decisions
  ▪ Compensatory mitigation requirements
• If you didn’t measure it, it didn’t happen
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