Overview of PIER- Avian Program and Introduction to Research Needs

Linda Spiegel
Melinda Dorin
CEC Began Avian/Wind Studies in late 1980’s

- Identification of Problem – *Estep 1989*
- Altamont Pass/Solano Work – *Orloff and Flannery 1992, 96*
- Tehachapi Baseline Study – *Orloff 1992*
- Annotative Bibliography – *1995*
- Avian Monitoring & Risk Assessment in Tehachapi and San Gorgonio (1996-98) – *Anderson et al. 2004, 05*
PIER – EA Avian Research Program

- Began 2001
- 2002 - Prepared Roadmaps on Avian Electrocution with Power Poles, Collision with Power Lines, and Collision with Wind Turbines

www.energy.ca.gov/pier/environmental/reports.html#habitat
2002 Initiated Contract w/ UCSC to administer program
   – *Avian-Transmission System Mitigation*

2004 Broadened Scope to Include Wind
   – *Avian Interactions with Utility Structures*

Awards through Competitive Solicitation & Sole Source

Awards w/ utilities, universities, consultants, conservation
groups, federal govt., Electric Institutes, species experts,
graduate students, national labs.
Electrocution and Mitigation Web Site and Product Encyclopedia
- [http://bems.edmlink.com](http://bems.edmlink.com)
- Helps identify problems
- Provides solutions
- Commercially available products
- Advantages/Disadvantages
- Testimonials
Transmission System Products

- On-Line Annotated Bibliography of Avian Collisions & Electrocutions
  - [www.energy.ca.gov/pier/environmental/avian_bibliography/index-new.html](http://www.energy.ca.gov/pier/environmental/avian_bibliography/index-new.html)
  - >1,200 citations
  - Searchable: title, author, year, keyword
Transmission Systems Products

- Raptor Mortality Field Guide
- Corona Testing of Line Marking Devices
- Update APLIC’s Suggested Practices for Raptor Protection on Power Lines
- Validating a Model for Predicting Electrocution on Distribution Poles
- Raptor Electrocution on Power Lines: Problem Assessment, Mitigation, & Monitoring
- Remote Sensor of Bird Strikes on Power Lines
- Line Marker Effectiveness Studies (2)
Avian – Wind Research

- Predicting Effects of Turbine Morality on Golden Eagles in the APWRA
- Follow-up Survey in 2005 – Trends in Territory Occupancy
- 2004 Fatality Association Investigation
- Siting Turbines (Repowering) in APWRA to Minimize Collision Risk
- Screening Tool to Assess Potential Risk in Secondary WRAs
- Feasibility Study for Collision Monitor
- Habitat Manipulation
Focus on research to strengthen protocols
- Pre-, Post construction, Mitigation
- Address Highest Priority Issues
- Seek Collaborative Opportunities to Leverage $1M
Issues Related to Pre-construction

- How do we Identify Risk?
  - Strength in numbers
    » As more standardized, comparable info becomes available/better, we can rely on predictions and decision tree or phased approaches

- What are the appropriate metrics?
  - Vary by frequency, duration, area covered
    » Denominators (#/time, #:area) - high affect
Risk Probability Models
- Do not account for avoidance, species specific flight behaviors
- Behaviors may vary by sit-specific factors
- Getting this data is time and cost intensive

Range maps very general & at poor scales

Pt counts vs. visual scans
- relative abundance, behavior
Pre-construction: Nocturnal Species Survey Tools

- Ultrasonic detectors – 30 m
  - Sonobat – ID’s echolocation calls, no position
- Mist netting – height of turbine blade
- Thermal infrared thermography – limited field, high computer memory
- Next Generation Radar – no species ID, limited by # and placement of stations
- Radar – good for passage rates, flight paths, cannot Id, costly for adequate survey time frames
Issues Related to Post Construction

- Key to validate pre-construction methods
- Currently – small ‘n’, short duration, experimental controls, inconsistent metrics
  - Survey area (25 -120m from turbines)
  - Search frequency (daily – qrtly)
  - Duration (few weeks to years)
  - Searcher Detection – small vs. large birds, bats
  - Scavenger Bias – species, freshness, coloration, equation (average vs. %)
Initial studies will require intensive, long-term protocols to derive at metrics that are reliable and do not reach diminishing returns.

Consistent/comparable to facilitate meta-analyses and improve forecasts.
Understanding Mitigation Requires Large Sample

- Risk Associations Difficult to Quantify
  - Turbine Attributes vary and continue to change
    » Ht, Blade Length, RSA, RPM
  - Topography – Bird Use Varies
  - Confounding Interactions

- Associations explored at smaller turbines in APWRA (Orloff & Fannery 92,96; Smallwood & Thelander 04) – not tested
Mitigation Strategies

- Auditory warnings
  - Dooling (01) - ineffective due to ambient noise
  - Rabin (06) - small mammals changed behavior
  - Bats – under investigation

- Blade Painting
  - Hodos - promising lab studies; patent
  - UV – No advantage against high ambient background
  - Applied at manufacturing stage
Mitigation Strategies

- **Micro-siting**
  - WEST - WY, located turbines away from ridge w/ high No. of flights
  - Smallwood and Neher – Digitized bird flight data AP:
    » flights more frequent on windward side, place turbines on leeward side.
  - Spacing/Density
  - End of Row (Confounding effects, e.g. canyon?)
  - Removal/Seasonal shutdown of Highest Risk Turbines
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  - Repowering with larger turbines
Mitigation Strategies

- Environmental Modifications
  - Use dependent on condition of resources
  - Can we make areas less attractive
    » Entire WRA vs around turbines
  - Rodent Control (chemical and other)
  - Explore all ecosystem implications and legal requirements
Mitigation Strategies

- Habitat Compensation
  - Common requirement for habitat loss
  - How to deal with fatalities
    » WA $75/turbine/year – shrub-steppe habitat
    » Shiloh – Conservation Easements, area = RSA
    » Buena Vista - $500 per MW for conservation Easements. Double if predicted thresholds breached
  - No agreement on how to off-set fatalities
    » Large home ranges, multiple nesting territories, land costs, willing sellers
Possible Categories for Research List

- Survey Techniques
- Risk Assessment
- Fatality Estimation
- Mitigation
“Research Powers the Future”