Restoration Options for Neotropical Migratory Birds: a Look Toward the Future

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Outline

- NRDA overview
- NRDA and migratory birds
- Restoration framework
- Rationale for international off-site restoration
- Information needs & challenges
- Case study: South River, VA mercury contamination
NRDA overview

- Resolved hundreds of cases
- Collected hundreds of millions of dollars for natural resource compensation
- Protected hundreds of thousands of acres of wildlife habitat
- Restoration projects from
  - Alaska to Argentina
  - Florida to New Zealand

Marbled murrelet, USFWS
NRDA overview

- Trustee council makes restoration decisions (with public input)
- Nexus of restoration to the injury
- Preference for in-kind, in-place
- Species’ life-history traits are vitally-relevant foci for restoration efforts
Types of Restoration

- Purchase & protect quality habitat
- Decrease (other causes of) mortality
- Return habitat to pre-damage conditions
- Enhance or restore quality of other existing habitat
- Reintroduction/restocking of populations
NRDA and Migratory Birds

- OPA projects – both on- and off-site restoration of waterbirds and shorebirds

<table>
<thead>
<tr>
<th>Species</th>
<th>Location</th>
<th>Type</th>
<th>Location</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sooty Shearwaters</td>
<td>New Zealand</td>
<td>predator ctl</td>
<td>2 CA oil spills</td>
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<tr>
<td>Ruddy Ducks</td>
<td>prairie potholes</td>
<td>habitat</td>
<td>MD oil spill</td>
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<td>Common loons</td>
<td>Maine lakes</td>
<td>habitat</td>
<td>MA oil spill</td>
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<tr>
<td>Red Knots</td>
<td>Argentina/Chile</td>
<td>management</td>
<td>NJ oil spill</td>
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<tr>
<td>Razorbills</td>
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<td>predator ctl</td>
<td>VA oil spill</td>
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<tr>
<td>Brown Pelicans</td>
<td>Baja</td>
<td>habitat</td>
<td>CA oil spill</td>
</tr>
<tr>
<td>Ancient Murrelets</td>
<td>Canada</td>
<td>habitat</td>
<td>CA oil spill</td>
</tr>
</tbody>
</table>
NRDA and Migratory Birds

- CERCLA-related projects
- Neotropical migratory songbirds
- Injury incurred at CERCLA/hazardous substance sites
- Populations may be limited by factors outside of CERCLA site
- Full restoration may require both on- and off-site projects that span international borders
- No historical examples of such a broad-scale approach
Framework for restoration

- Establish restoration objectives
- Identify scientific information needs
- Assemble available information; collect new data
- Identify restoration possibilities
  - local
  - off-site (international)
- Assess likelihood of successful implementation
- Implement restoration actions
- Monitoring, adaptive management
Framework for restoration

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- Implement restoration actions
- Follow-up monitoring, adaptive management
Rationale for international restoration

- Many bird species that breed in the US spend ~ 2/3 of the year south of the border
- Populations are affected by conditions experienced throughout the life cycle
- Winter conditions can be especially important
- Restoration of wintering habitat can improve success of on-site restoration efforts
- Cost/benefit ($) ratio is greater in Neotropics
Restoration objectives

- Target species, habitats
- Identify reasonable restoration types for target species and habitats
- Need to consider full life cycle
  - International projects for long-distance migrants
- Establish measures of success (abundance of target species, survival rates, productivity, diversity, etc.)
Scientific information needs

- Assess migratory connectivity
- Assess population parameters: 
  - Distribution (occupancy), abundance, vital rates
- Assess environmental drivers of populations
  - Habitat, climate
Migratory Connectivity

- Satellite transmitters now providing detail for many large species

Bob Gill, USGS Alaska Shorebird Project
Migratory Connectivity

- More challenging for small species
  - Stable isotopes
  - Genetics
  - Geolocators
  - Morphometrics

from Kelly et al. 2005

Swainson’s Thrush
*Catharus ustulatus*
Migratory Connectivity

- More challenging for small species
  - Stable isotopes
  - Genetics
  - Geolocators
  - Morphometrics

Wood Thrush *Hylocichla mustelina*

Stuchbury et al. 2009
Migratory Connectivity

- More challenging for small species
  - Stable isotopes
  - Genetics
  - Geolocators
  - Morphometrics
Scientific information needs

- Migratory connectivity
- Population parameters:
  - Distribution (occupancy), abundance, vital rates
- Environmental drivers of populations
  - Habitat, climate
Population parameters: distribution, abundance

BBS

EBird

http://www.pwrc.usgs.gov/bbs/results/

http://ebird.org/ebird/eBirdReports
Population parameters: vital rates

- Bird-banding data (MAPS, MoSI)

http://www.birdpop.org

Common Yellowthroat

Saracco et al. J Ornith. 2010
Population parameters: vital rates

- Bird-banding data (MAPS, MoSi)

Gray Catbird
(Dumetella carolinensis)

Spatial variation in trend driven by adult survival

Saracco and DeSante (2008) report to NFWF
Scientific information needs

- Migratory connectivity
- Population parameters:
  - Distribution (occupancy), abundance, vital rates
- Environmental drivers of populations
  - Habitat, climate
Environmental drivers of populations

- Local factors
  - e.g., forest cover, fragmentation

- Carry-over effects
  - Events at one point in life cycle affect demography at later stage
  - Seasonality of winter habitat – Climate Change
Environmental drivers of populations

Large-scale land-use change

Land Area

Forest loss 1990-2000

Forest growth 1990-2000


Climate change

Predicted precipitation change between 1980-1999 and 2090-2099

IPCC Fourth Assessment (2007)
Seasonality of winter habitat

- Overwintering period transitions from wet to peak dry seasons
- Dry forests drop leaves
- Many humid forests of Caribbean slope leaf out
- Higher quality habitats resilient to drying
Case Study: South River mercury contamination in Virginia

- Partnership among industry, government agency, academic institution, and NGO
- Target habitats and species established
- In process of collecting and analyzing data to guide restoration scaling/crediting:
  - Breeding surveys in South/Shenandoah River basin completed this summer
  - Analysis of MoSI data 2003-2010 to guide with winter restoration efforts
- Identification of potential restoration sites and partners underway
South River target species and habitats

- Forest predominant historical habitat
- Currently mosaic of agriculture, shrub, forest, and riparian/wetland
- Species selected to represent variation in natural habitats
- Detections on surveys in local landscape
- Data available to guide restoration
- Priority for species of high conservation concern
  - Partners in Flight (PIF) ranking, USFWS
## South River target species and habitats

<table>
<thead>
<tr>
<th>Species</th>
<th>Detected on South River Surveys 2005-06</th>
<th>Significant BBS decline 1966-09</th>
<th>USFWS National Species of Concern</th>
<th>PIF Continental Score &gt; 13</th>
</tr>
</thead>
<tbody>
<tr>
<td>Wood Thrush</td>
<td>X</td>
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<tr>
<td>Ovenbird</td>
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<tr>
<td>Yellow Warbler</td>
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<td>X</td>
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<tr>
<td>Gray Catbird</td>
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<td>X</td>
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<tr>
<td>Kentucky Warbler</td>
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<tr>
<td>Black-and-white Warbler</td>
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<tr>
<td>Common Yellowthroat</td>
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<tr>
<td>Hooded Warbler</td>
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<td>X</td>
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<td>Worm-eating Warbler</td>
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<tr>
<td>Yellow-breasted Chat</td>
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<tr>
<td>American Redstart</td>
<td>X</td>
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Breeding Surveys (July 2011)

- 180 point counts have been completed to:
  - derive habitat-specific species densities; and
  - develop a restoration scaling tool.
Identification of off-site opportunities, partners

Belize
Why Belize?

- Politically stable, English primary language
- Strong environmental ethic, yet has the usual pressures from development and economic growth
- Large private landholdings of conservation concern available for protection
- Established environmental non-profits present and are strong conservation stakeholders
- North American neotropical migrants are widely distributed and overwinter in high densities
Neotropical migrant link is strong between Virginia and Belize

http://www.partnersinflight.org/pubs/ts/o4-Connections/
Criteria for Belize site selection

(1) High proportion and abundance of both
   (a) neotropical migrants and
   (b) highly ranked species of conservation concern (per Partners in Flight);

(2) Overall high conservation value of property;

(3) High connectivity with other protected properties;

(4) Solid ability of land steward to protect and maintain the property;

(5) Risk of development pressure and/or habitat degradation;

(6) Cost reasonableness
Belize Restoration Example 1 - Acquisition

- Belizean private land owner
- Managed by US Citizen (NGO)
- 1,153 acres
- Cost - $1,500/acre
- Total Cost – Approximately $1.8 million
- **Status:** Property could be sold at any time
Background: Primary forest area adjacent to NGO-controlled preserve area has been converted to agricultural land

- Farmers’ local practice is to grow pineapple and/or bananas
- Monocultures with pesticide = poor bird habitat
Belize Example 2 - Habitat Enhancement

- Support transitioning land to shade grown agricultural use - coffee, vanilla bean, etc.
- Avian monitoring to evaluate species diversity and abundance
- Use geolocators to track migration of birds from Belize as well as at impacted sites in the U.S. (coordinate with neotropical migrant education program)
- School to school outreach
SUMMARY
International Restoration Challenges

- Establish biological basis and need for the project(s)
- Establish governmental and local support
- Coordinate with other Federal programs
- Funding mechanisms
- Develop the project to guarantee performance
  - On site oversight
  - Legal protections
- Design a project that enables evaluation of success
- Conduct site visits when practical
Summary

- NRDA-recovered funds have successfully restored habitats and populations of a variety of wildlife

- Projects involving migratory birds should consider costs/benefits of restoration at multiple sites that target different points of life cycle

- Science-based framework proposed to guide selection of restoration opportunities

- Case study in progress, but should provide model for leveraging variety of data to design, implement, and assess, multi-site restoration

- Post-implementation monitoring critical for gauging success
Acknowledgements

- DuPont - Mike Liberati, Ralph Stahl
- College of William and Mary - Dan Cristol
- Contributors to MAPS, MoSI
- USFWS NMBCA funding
QUESTIONS?

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