

Resource Equivalency Analysis: Quantifying Mitigation for Offshore Wind Projects



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Overview

- Section 7 Consultations
 - Development along the Atlantic Coast
 - Species and Impacts
 - Need for Compensatory Mitigation
- Resource Equivalency Analysis
 - What is a Resource Equivalency Analysis (REA)
 - How do REAs work
 - Applying REAs to OSW

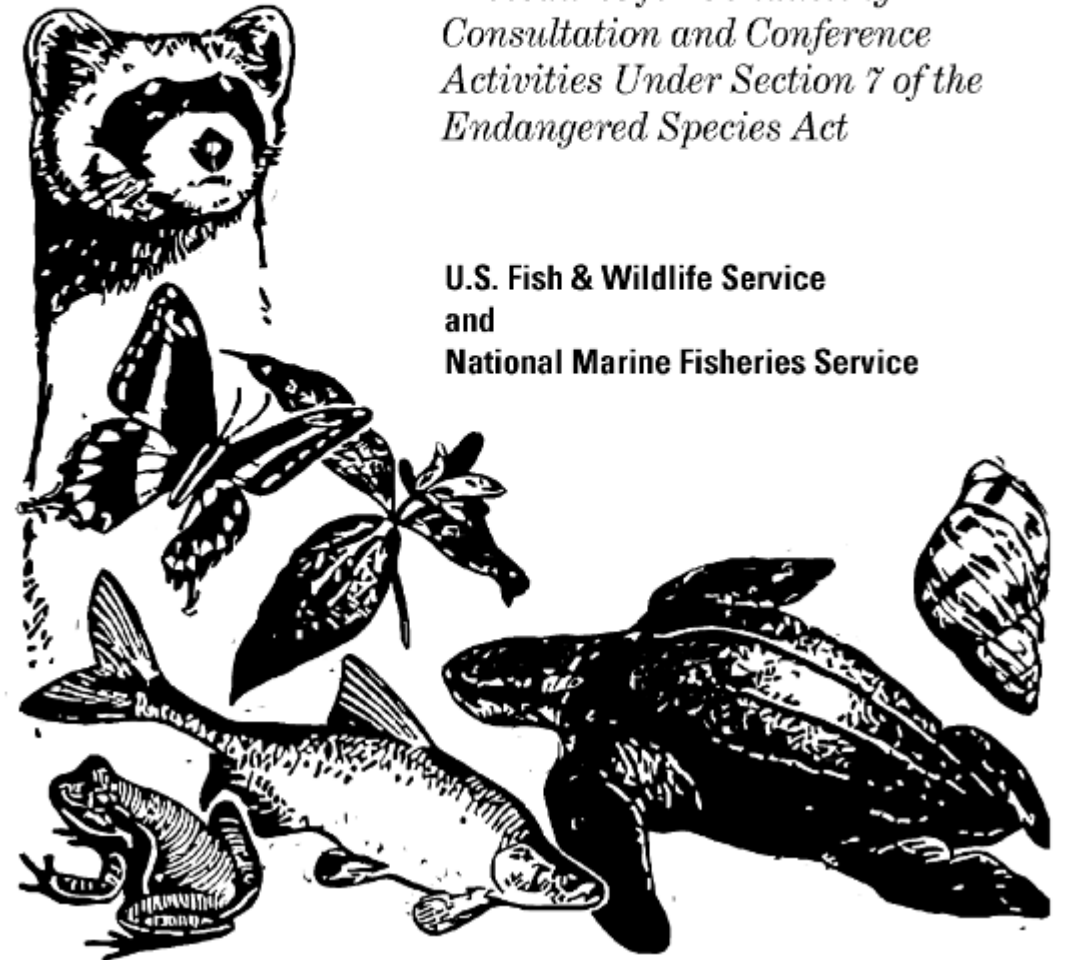
Endangered Species



Consultation Handbook

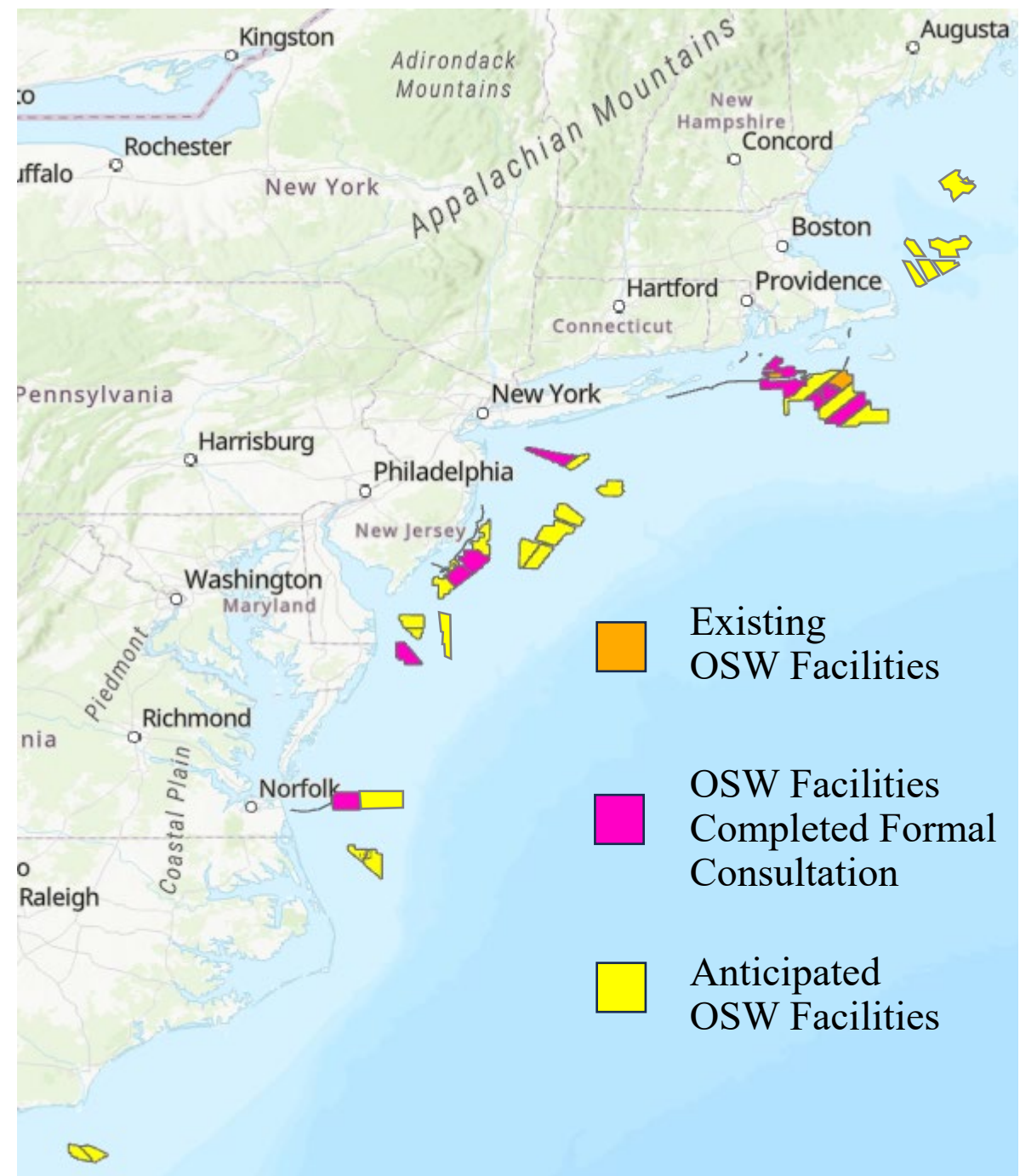
*Procedures for Conducting
Consultation and Conference
Activities Under Section 7 of the
Endangered Species Act*

**U.S. Fish & Wildlife Service
and
National Marine Fisheries Service**

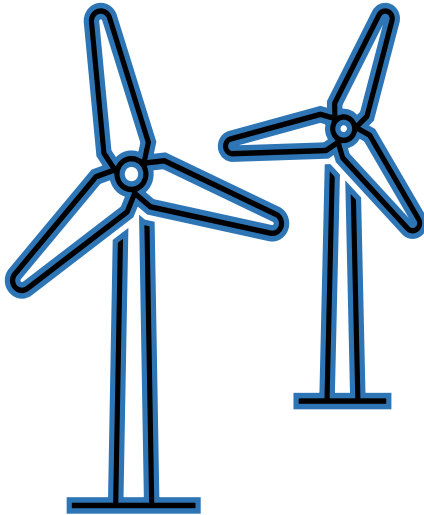


Atlantic Coast OCS OSW Development

- 4 existing OSW facilities
- 30+ projects at various stages of development
 - 9 have completed formal consultation with FWS
- Additional projects expected
 - Gulf of Maine – 8 leases
 - Central Atlantic – 2 leases



Wind Turbine Generators

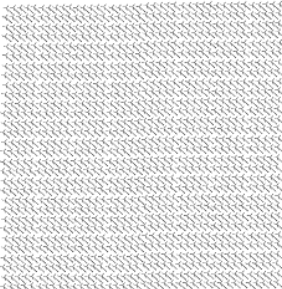


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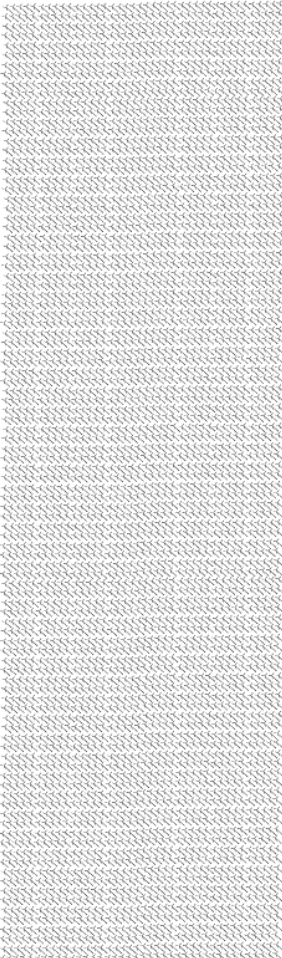
Operational
OSW Turbines

1,200



Permitted
OSW Turbines

4,000+



Total OSW Turbines
at Anticipated Full
Buildout

ESA Section 7 Consultation

- Species
 - Piping Plover
 - Rufa Red Knot
 - Roseate Tern
- Exempted Incidental Take
- Recovery Units



Rufa Red Knot

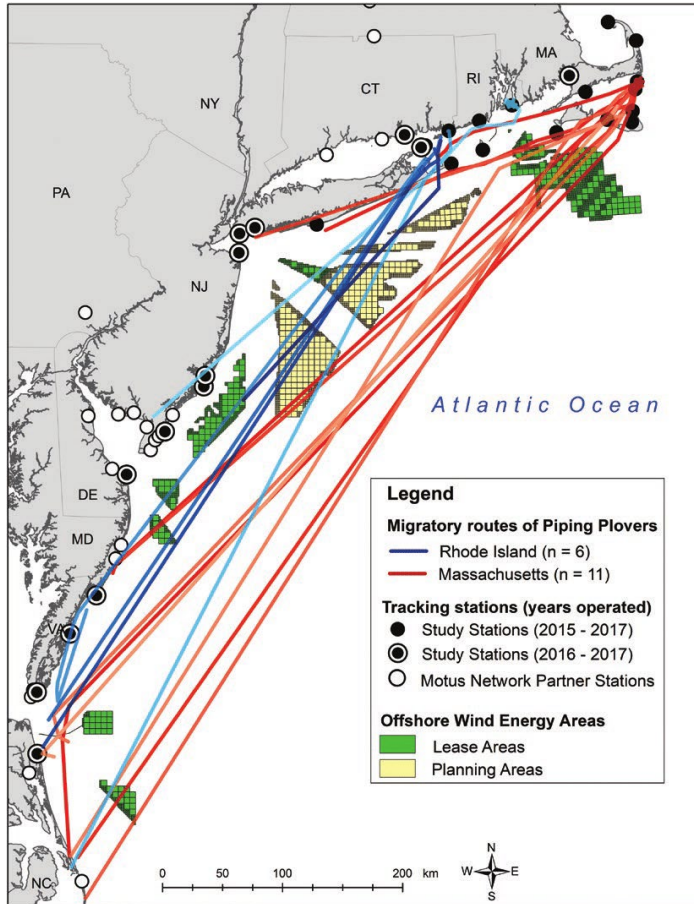


Piping Plover

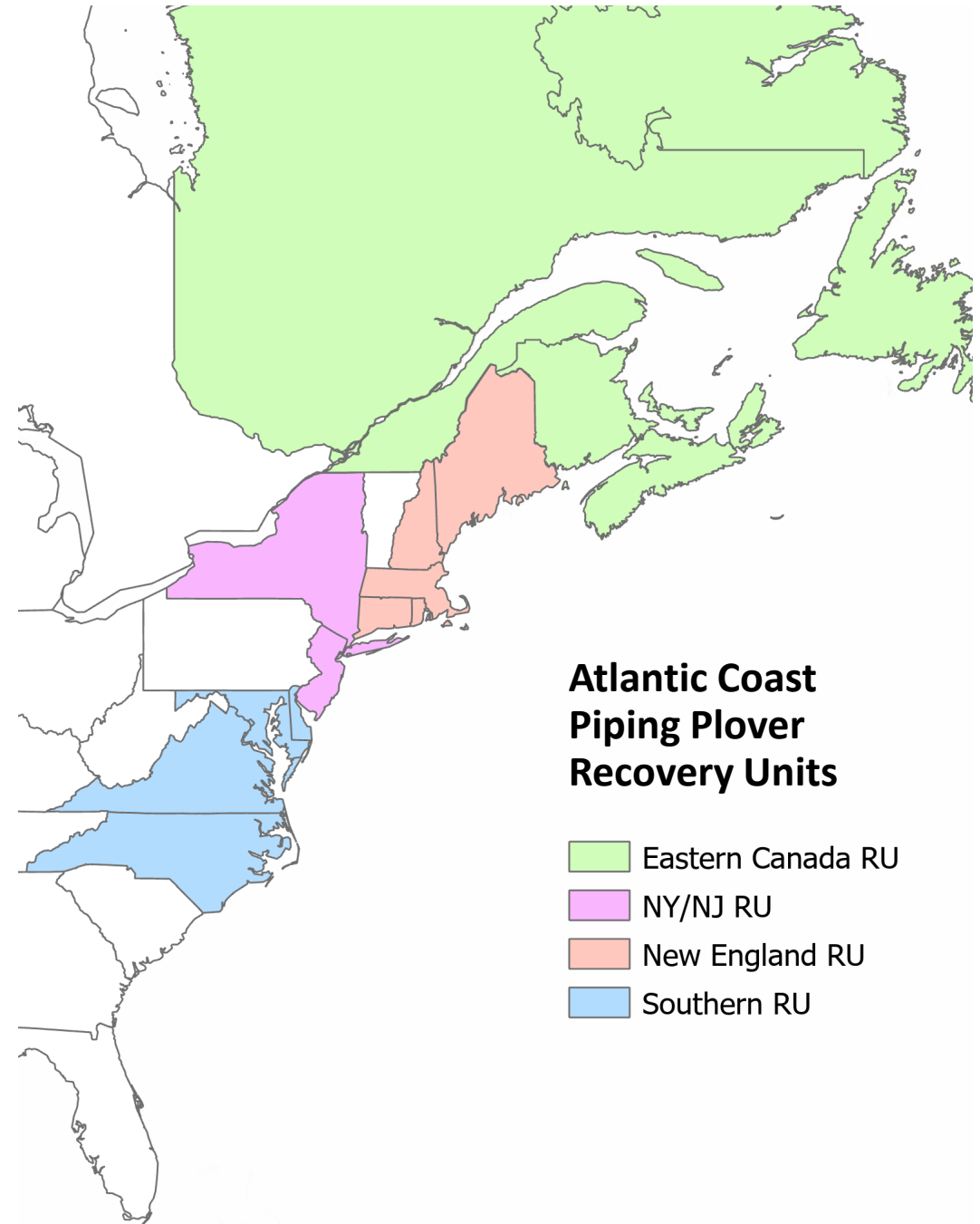


Roseate Tern

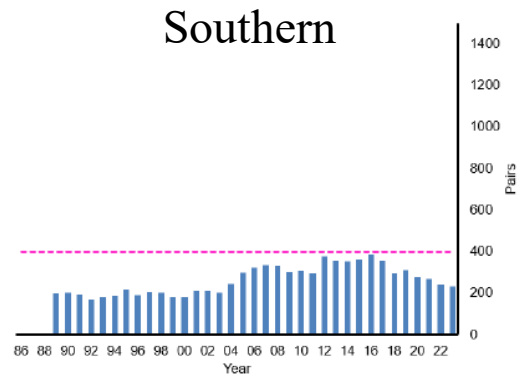
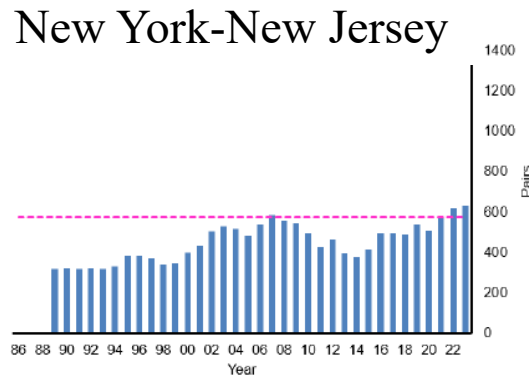
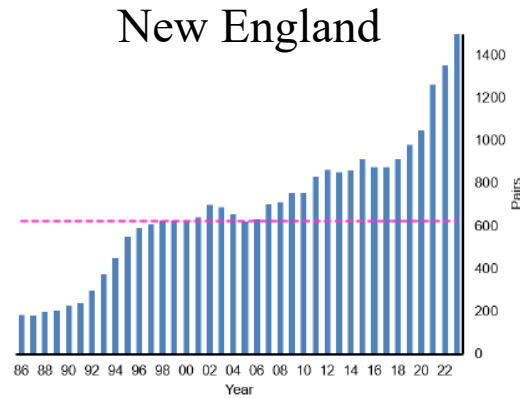
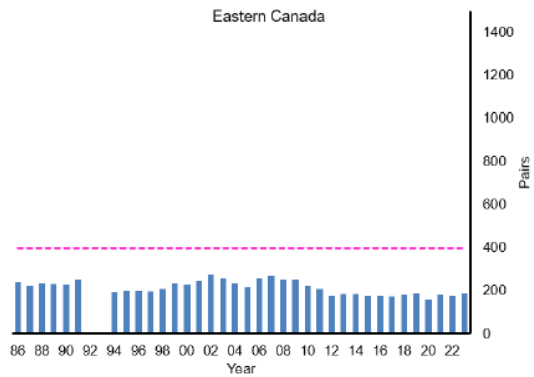
Atlantic Coast Piping Plover (Threatened)



Modeled migratory routes of tagged Piping Plovers (Loring et al. 2020).



Atlantic Coast Piping Plover

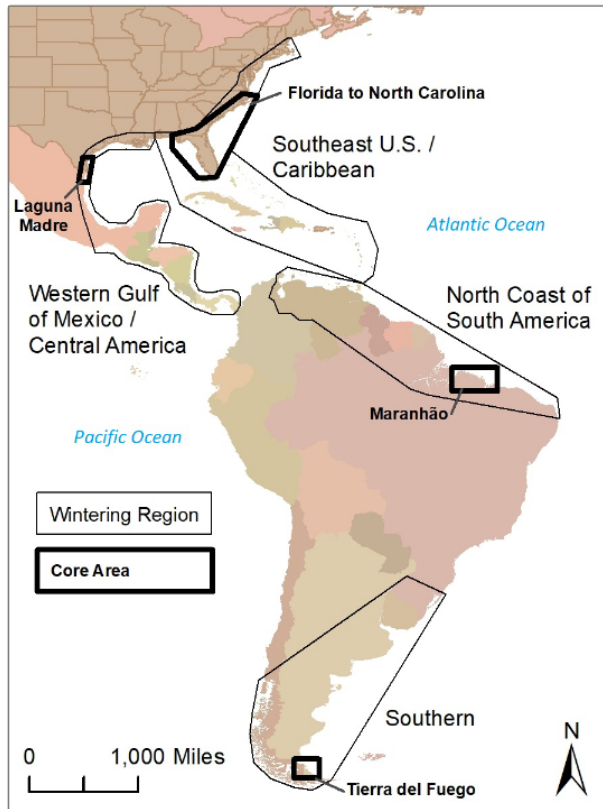


Abundance of breeding pairs by recovery unit, 1986-2023.

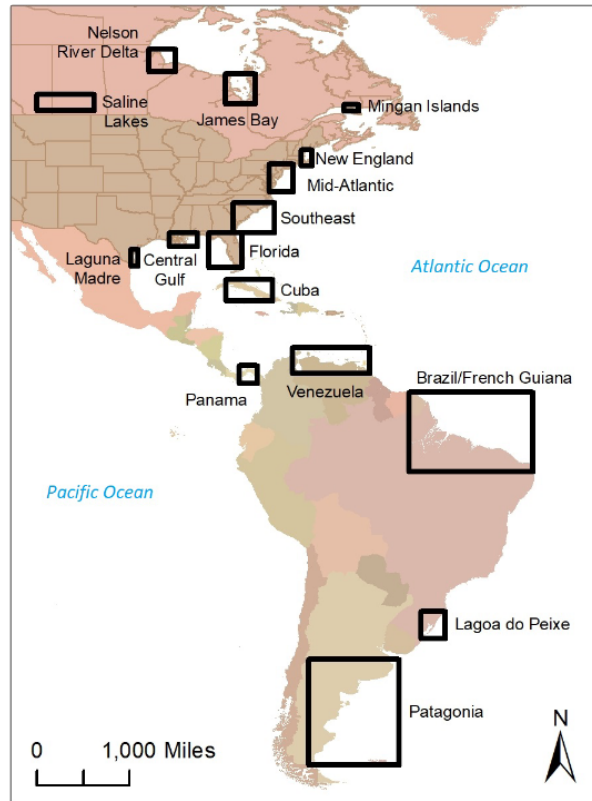
Exempted Incidental Take for Atlantic Coast OSW Projects Over 30-35 Year Project Duration

PIPING PLOVER	
Formal Consultation Complete (9 projects)	50-100
Future Consultations (estimate 30 projects)	?
TOTAL	?

Rufa Red Knot (Threatened)



Wintering Regions



Important Migration Stopover Areas
(Spring and Fall)



Rufa Red Knot

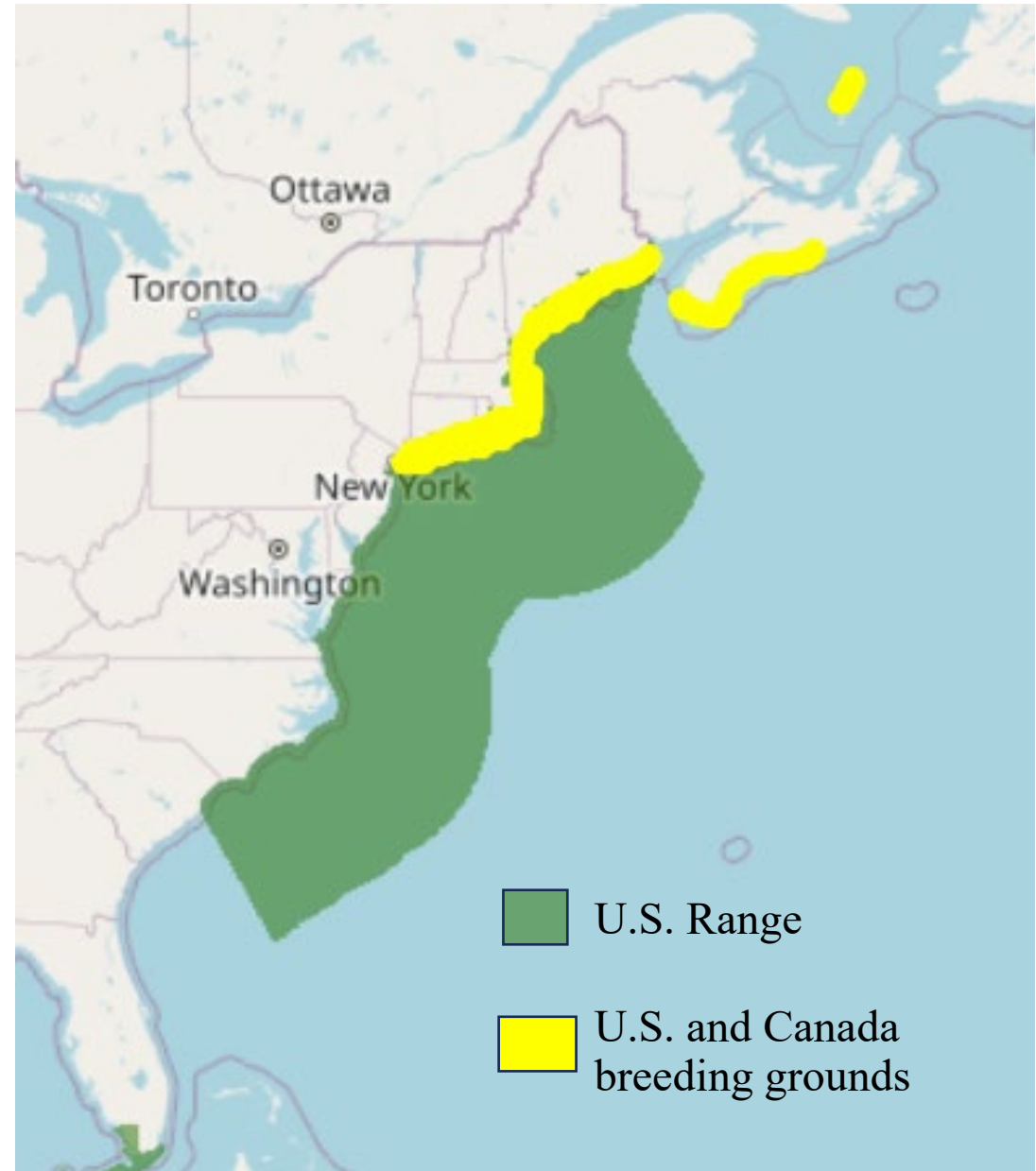
Current estimates of rufa red knot abundance by recovery unit.

Wintering Population/ Recovery Unit	Abundance Estimate
Southeast U.S./Caribbean (SEC)	15,500
North Coast of South America (NCSA)	31,065
Southern	14,484
Subtotal	61,049
Western	5,500
Total	66,549

Exempted Incidental Take for Atlantic Coast OSW Projects Over 30-35 Year Project Duration

RUFA RED KNOT	
Formal Consultation Complete (9 projects)	2,000-2,500
Future Consultations (estimate 30 projects)	?
TOTAL	?

Roseate Tern (Endangered)



Roseate Tern

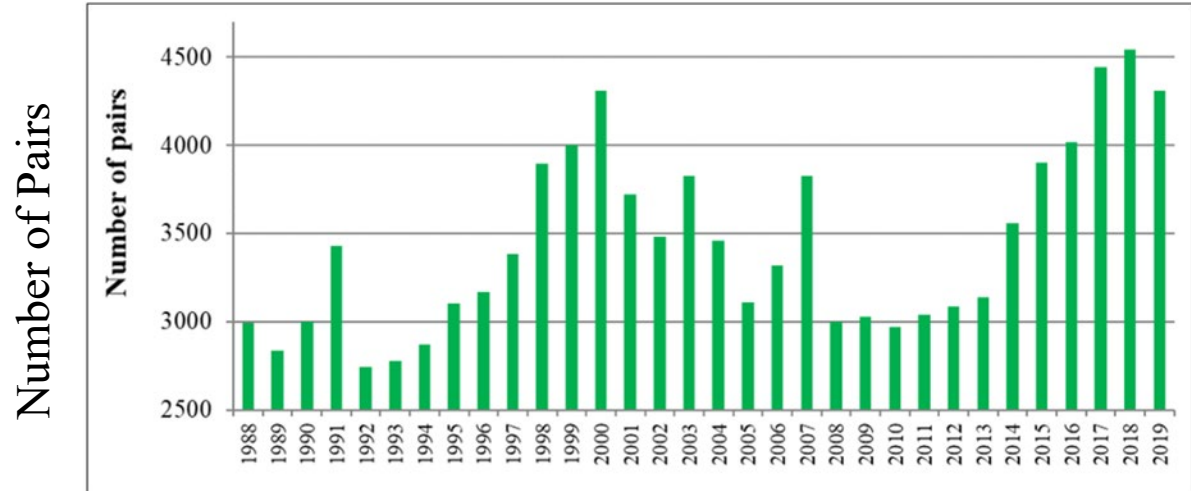


Figure 2. Roseate tern breeding pair abundance, Northeast United States 1988 to 2019⁶.

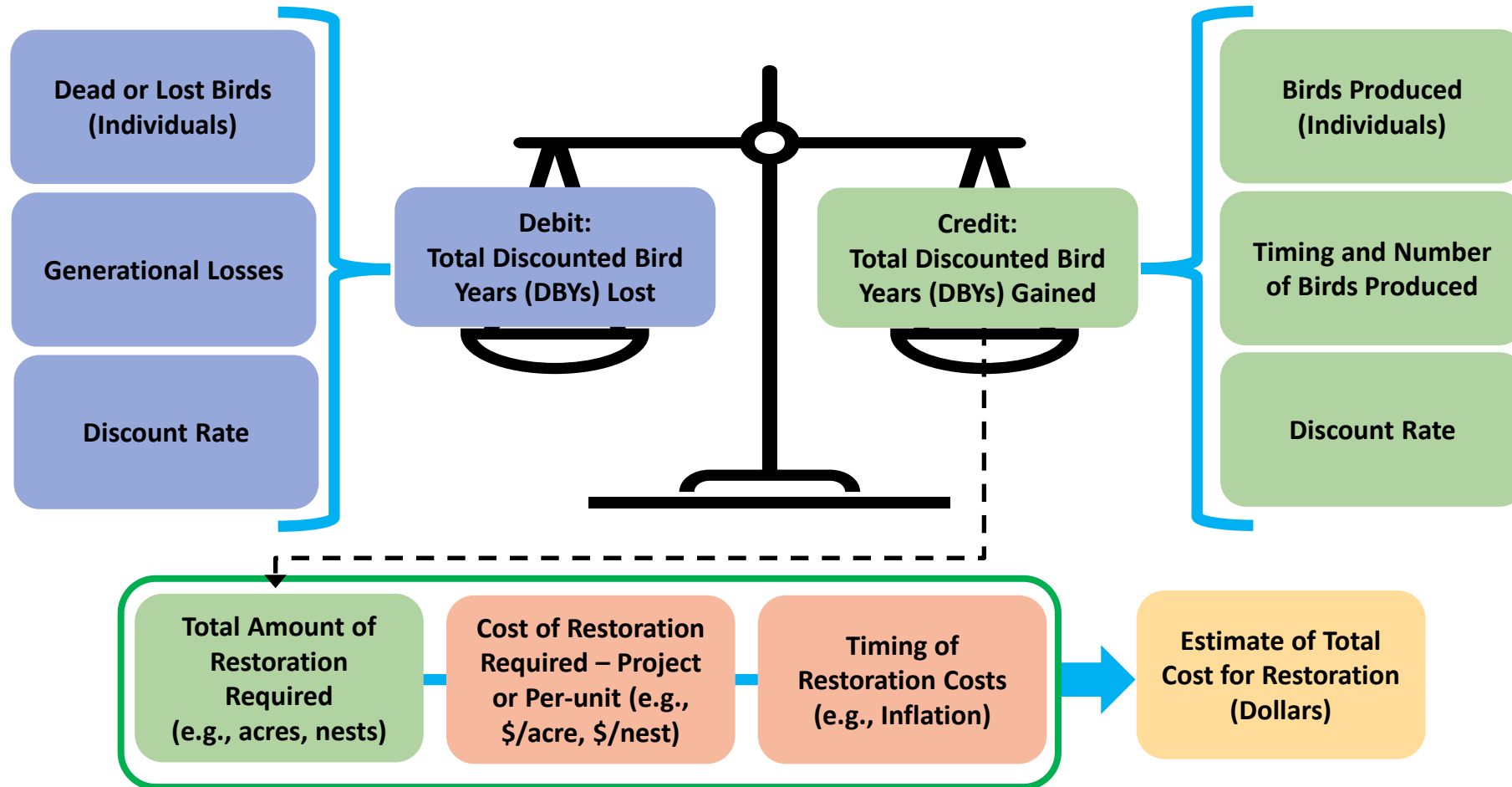
Breeding Pair Abundance, Northeast United States,
1988 to 2019.

Exempted Incidental Take for Atlantic Coast OSW Projects Over 30-35 Year Project Duration	
ROSEATE TERN	
Formal Consultation Complete (9 projects)	0-10
Future Consultations (estimate 30 projects)	?
TOTAL	?

Resource Equivalency Analysis (REA)

- REA is described as a “resource-to-resource” approach to scaling resource losses to gains from resource restoration
 - We want to offset a loss of animals with the addition of animals through restoration
- Although originally developed for use in NRDAR, REA has proven beneficial in a variety of contexts, including:
 - ESA enforcement actions – illegal take of Great Blue Heron, Northeast Beach Beetle, Variegate Darter, and others
 - ESA permitted take – *Villosa perpurpurea* and *Epioblasma florentina walker* and other mussels for bridge expansion; Grizzly Bear for railroad operations; Marbled Murrelet for CA windpower operations; Indiana Bat, Little Brown Bat, and Northern Long-Eared bat for wind energy projects (bat analyses did not include discounting)
 - ESA permit rules – FWS’ Bald and Golden Eagle national windpower guidelines
 - FERC relicensing and mitigation – Use of fish REAs for relicensing efforts

Resource Equivalency Analysis



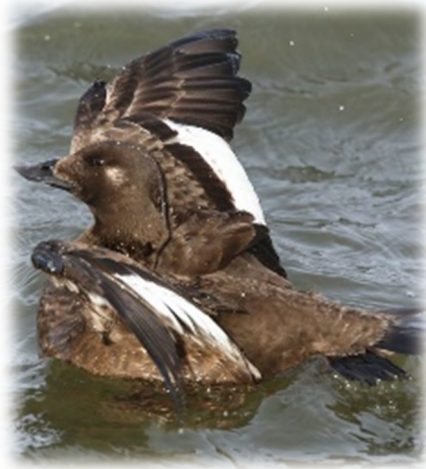
What is a “bird” year?

- The services provided by one bird over one year
 - Eating insects
 - Reproducing
 - Being viewed
 - Being hunted
- Different birds provide different services



REA Example: Simplified Bird Injury

Baseline as an Alternate Future



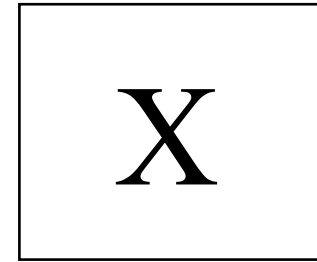
2024

Annual survival rate = 50%

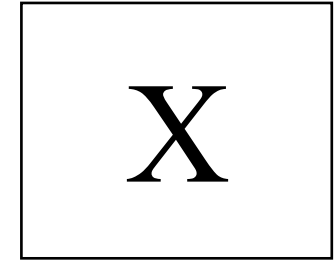
Injury: Dead bird from OSW



2025



Missing: 2026



Missing: 2027

Baseline: Without OSW



pr = $\frac{1}{2}$



2025



pr = $(\frac{1}{2})^2 = \frac{1}{4}$



2026



pr = $(\frac{1}{2})^3 = \frac{1}{8}$



2027

REA Debit



2025



pr = 1/2



2026



pr = 1/4



2027



pr = 1/8



Discounted Bird-Years (DBYs) Lost

REA Credit



What kind of restoration can add birds to the system?

- Nesting/overwintering habitat
- Food sources
- Predator control

How much restoration is needed to produce DBYs of credit to offset the DBYs lost?

Inputs for REA

Debit – Injury

- Evidence of Injury
 - Deaths
 - Sublethal effects:
currently measured as increase in mortality (change in survival rate) or reduction in reproductive success (e.g., nesting, hatching, fledging)
- Life history
 - Life span
 - Age of first breeding
 - Years of breeding
 - % of adult females that breed
 - # eggs per nest
 - Nesting success
 - Fecundity (chicks fledged/pair)
 - Survival rates

Credit – Restoration

- What do you want for restoration?
 - More animals and/or
 - More land and/or
 - More food/better habitat quality?
- Life history
- Limiting factors
- Recovery pattern
- Productivity of proposed restoration options

Applying REA to OSW

Injury Estimation

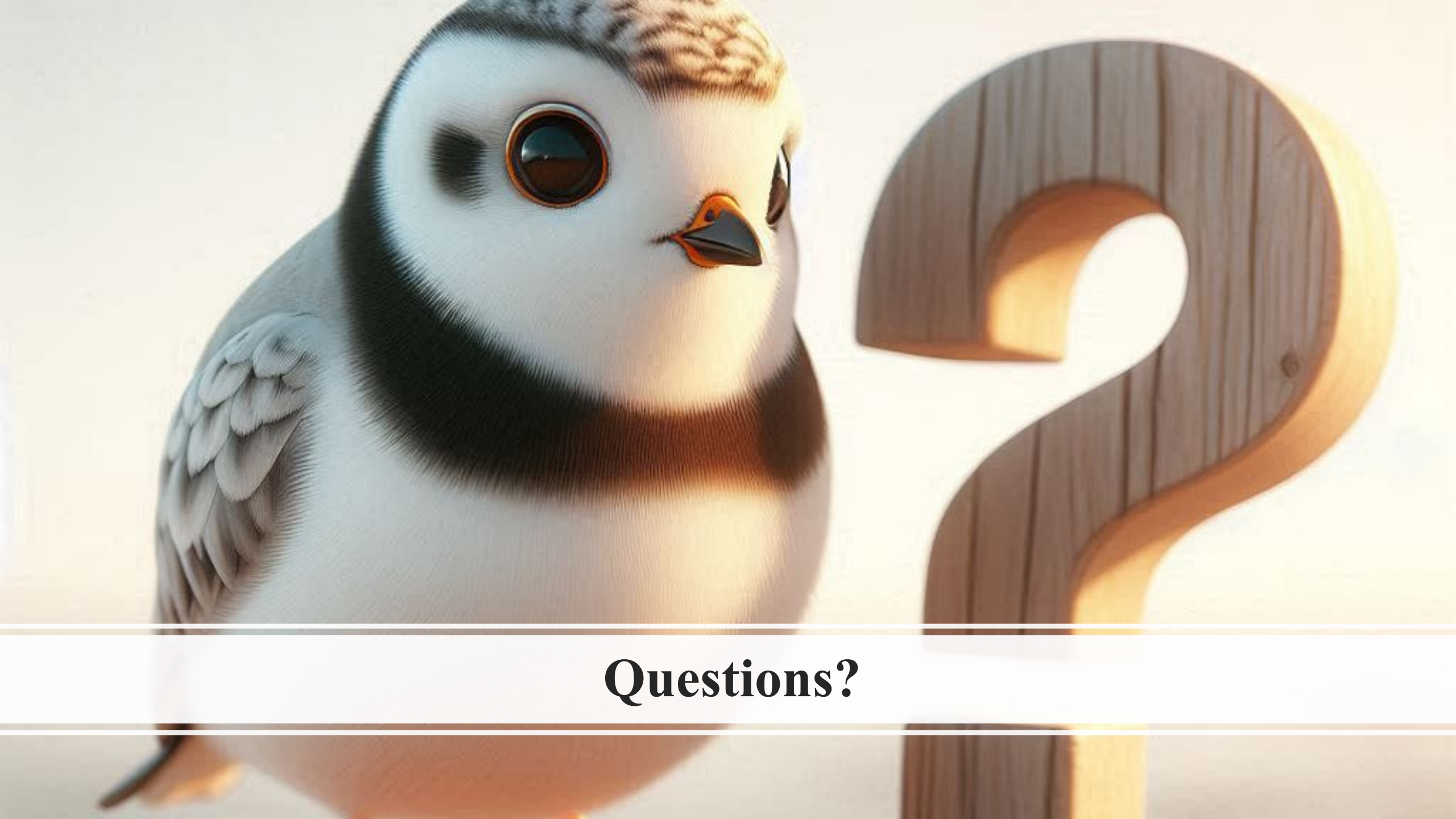
- Must determine amount of direct take
- Utilize Collision Risk Models (Band & SCRAM)
- Issued in Incidental Take Statements in FWS BOs

Life History Information

- Atlantic Coast Piping Plover (Threatened)
 - Available data supports ability to evaluate at a recovery unit scale
- Rufa Red Knot (Threatened)
 - Lack of available data requires evaluation at population scale
- Roseate Tern (Endangered)

Restoration Options

- Identify suitable restoration options for each bird species, such as habitat protection, habitat restoration, etc.
- Costs to implement restoration option(s) for each bird species



Questions?