Prioritizing Species for Biological Planning in the North Atlantic Landscape Conservation Cooperative (NALCC)

USFWS Region 5 Strategic Habitat Conservation Steering Committee

University of Massachusetts Amherst

U.S. Forest Service

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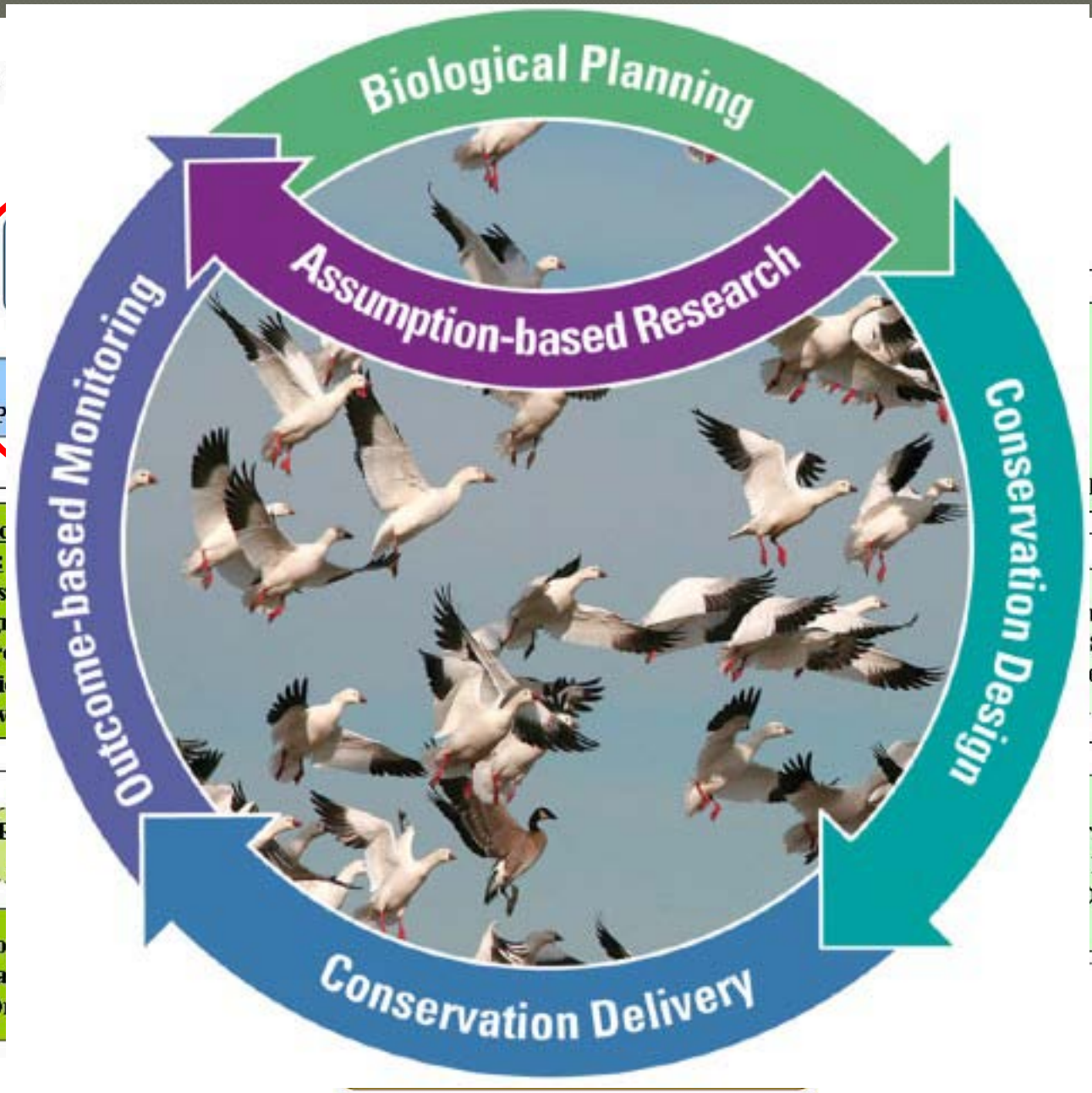

Assess Current State of Focal Species Populations

Species ort Tools

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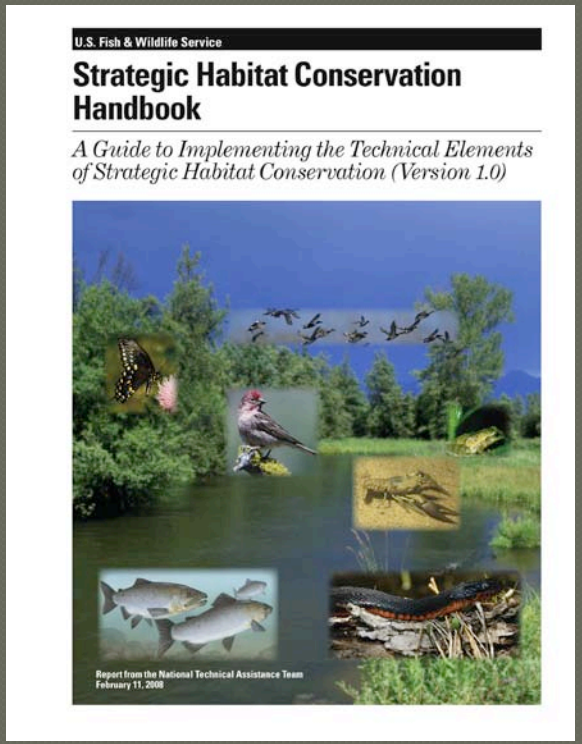
Biological Planning

Use of transparent, replicable processes and procedures to derive conservation objectives expressed as **measurable biological outcomes**

- Identify priority species
- Select subset of representative species
- Formulate population objectives
- Assess current state of priority species
- Identify limiting factors
- Compile & apply models of population-habitat relationships



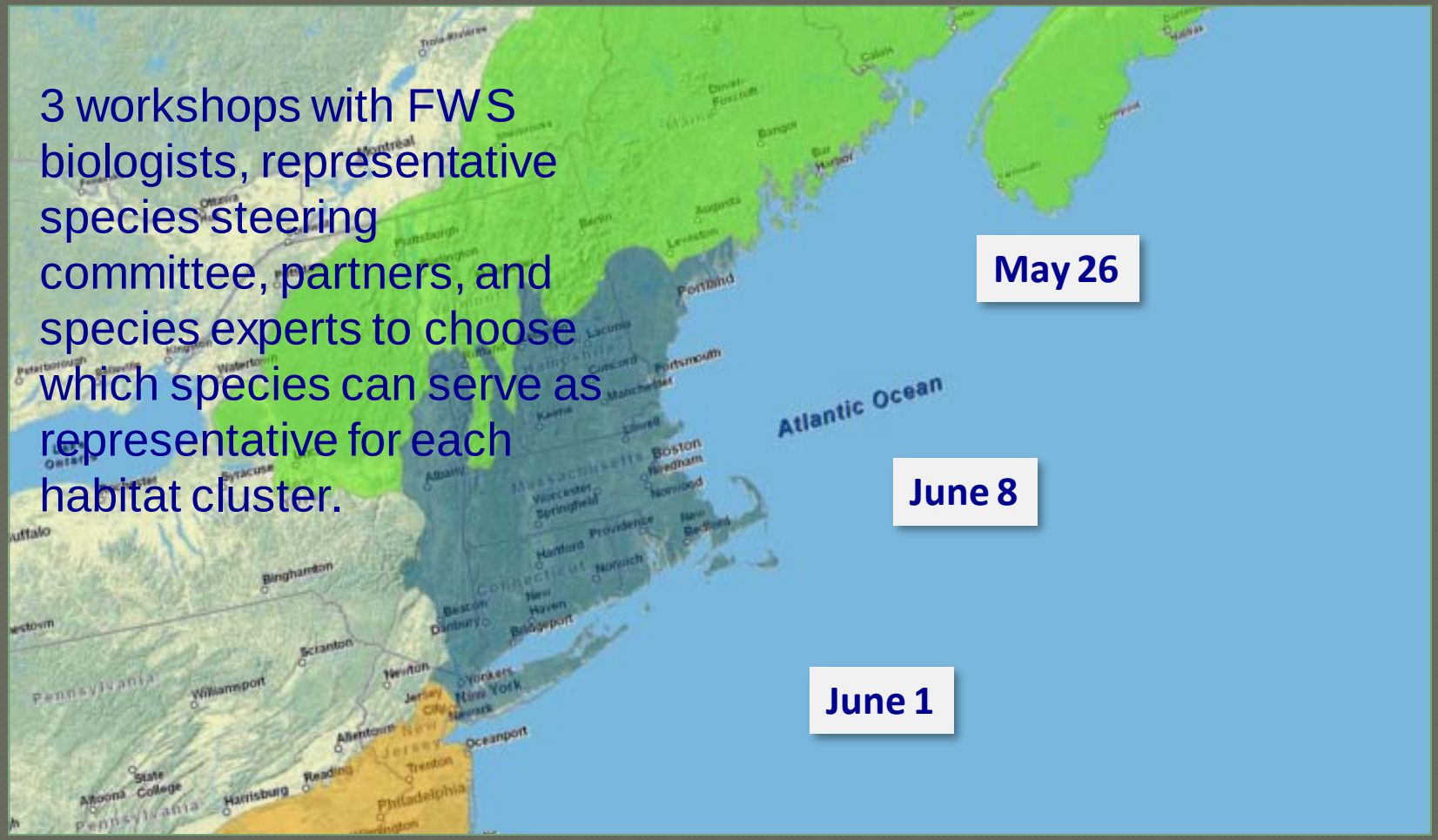
Why This Project?

- FWS has responsibility to manage and conserve all trust species
- Subset of trust species & state species of greatest conservation need (SGCN) were identified as “Priority Species”
- List of “Priority Species” exceeded the resources available for moving forward into SHC and LCC planning efforts (n=411)
- Need to identify a suite of "Representative Species" that can represent the larger group of Priority Species

What Is a Representative Species?

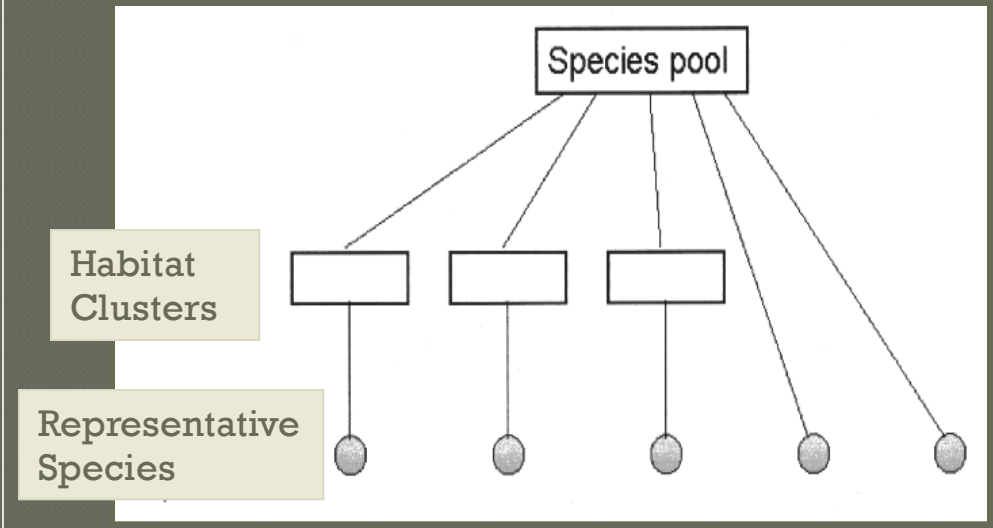
- ..a species whose habitat needs, ecosystem function, or management responses are similar to a group of other species.
  - other species in that group are expected to respond in a similar way as the representative species to conservation actions
- ..will also likely need to plan for stand-alone species that have
  - unique habitat or ecosystem function;
  - needed to prioritize management actions; or
  - needed to help achieve a more comprehensive suite of species for biodiversity conservation.

Sub-Regional Workshops



Representative Species Process:
Overview

- Phase I
  - Compile list of priority species
- Phase II
  - Develop species-habitat association database
  - Expert review
- Phase III
  - Conduct cluster & indicator species analyses
- Phase IV
  - Develop ranking criteria
- Phase V
  - Conduct region-wide workshops



Phase I - Priority Species List

- Priority species lists provided by FWS & state partners (total = 411)
  - terrestrial (341)
  - aquatic (76)
  - threatened and endangered (106)
  - State Species of Greatest Conservation Need (SGCN) (32)

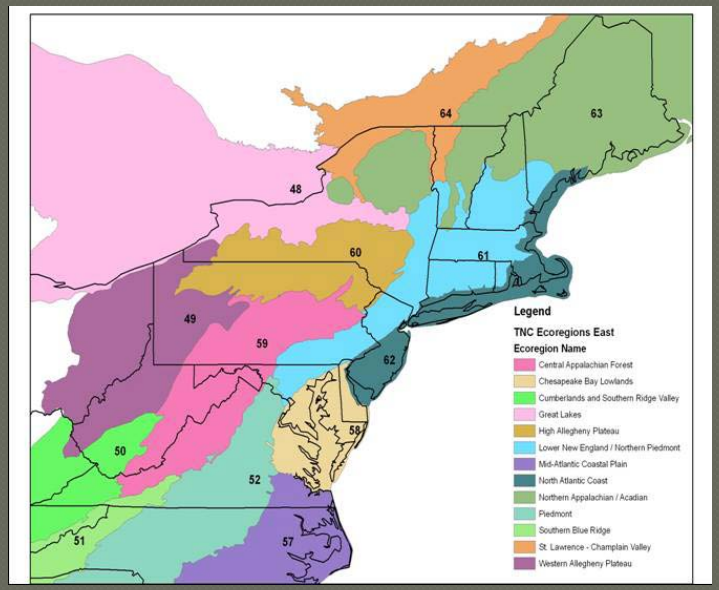
- ✓ **Planning efforts from Bird Conservation Regions (species of high & highest concern)**
- ✓ **Fisheries Priority Species**
- ✓ **Endangered Species Program**
- ✓ **Species of Greatest Conservation Need (SGCN) identified by ≥ 8 states in their State Wildlife Action Plans (SWAP)**

Phase II – Species-Habitat Terrestrial Database

NEAFWA - NE Wildlife Habitat Classification & Mapping Project

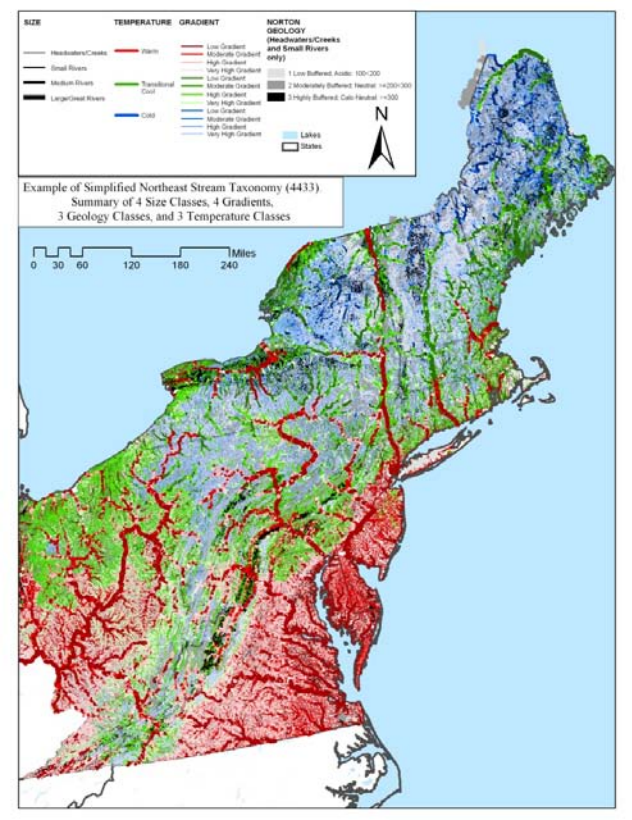
NLCD	# of Habitat systems
21 - Developed, Open Space	2
22 - Developed, Low Intensity	2
23 - Developed, Medium Intensity	1
24 - Developed, High Intensity	1
31 - Barren Land	17
32 - Unconsolidated Shore	3
41 - Deciduous Forest	15
42 - Evergreen Forest	14
43 - Mixed Forest	11
52 - Scrub/Shrub	15
72 - Grassland/Herbaceous	6
81 - Pasture/Hay	1
82 - Cultivated Crops	1
90 - Woody Wetlands	40
95 - Emergent Herbaceous Wetland	9
96 - Palustrine Emergent Wetland (Persistent)	5

- Hierarchical classification
  - formation
  - macrogroups
  - habitat systems n=144



Phase II – Species-Habitat Aquatic Database

NEAFWA – NE Aquatic Habitat Classification



- 92 simplified aquatic habitat types
  - size
  - gradient
  - geologic setting & buffering capacity
  - temperature
- No lake habitat classification developed (size dataset)
- No marine/estuarine systems

Species-Habitat Matrices

- Utilized online databases and current literature
- Supplementary habitats added to fill-in gaps in TNC classifications
- Designated breeding and non-breeding habitats
- Preferred & utilized habitat use values assigned

Species	Habitat System		
	A	B	C
Species X	0	.5	0
Species Y	.5	0	1

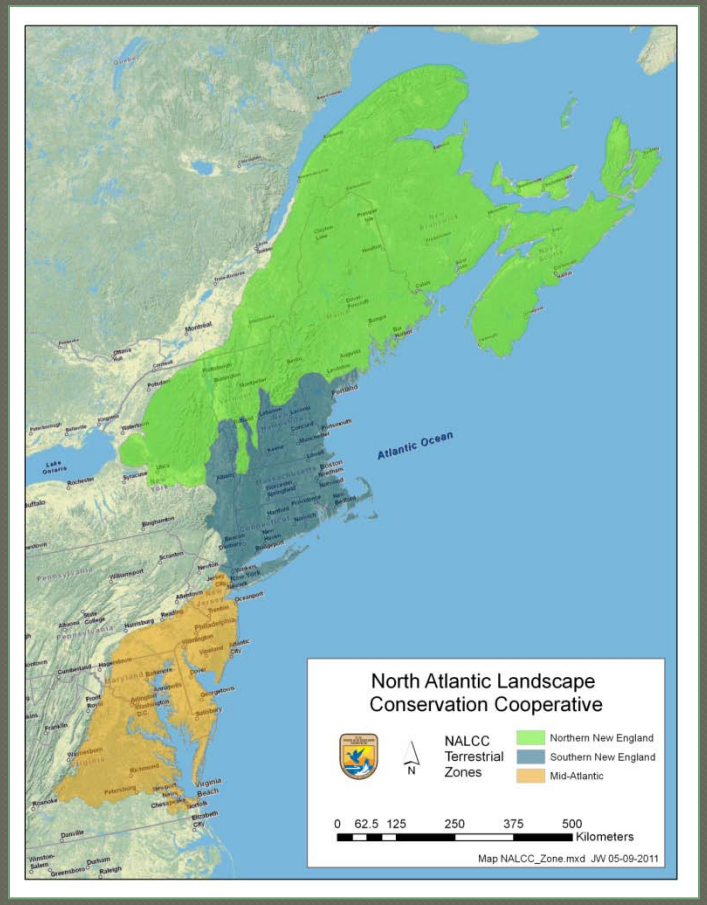
0 = not utilized, 0.5 = utilized, 1 = preferred

Database Review

- review conducted by over 50 species experts both inside and outside of FWS (~7 months to complete)
- many omissions/commissions identified
- possible New England bias identified
- many challenges associated with lack of familiarity with the habitat classification systems, and
- lack of detailed knowledge of species associations with the detailed habitat system level of the classifications

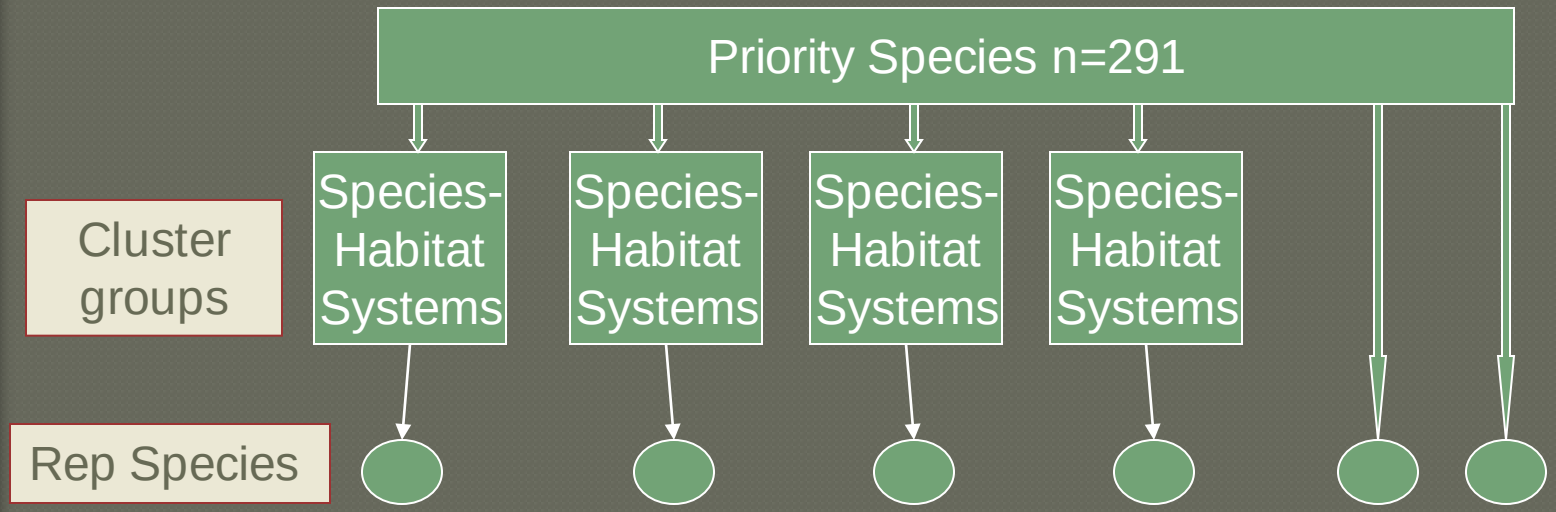
Phase III - Cluster Analyses

- separate analyses for terrestrial and aquatic species
- used NEAFWA habitat systems and supplementary habitats only
- species were divided into separate breeding and non-breeding 'species'for those that use different suites of habitats seasonally
- divided NALCC into 3 sub-regions based on habitat system and species distributions for terrestrial only



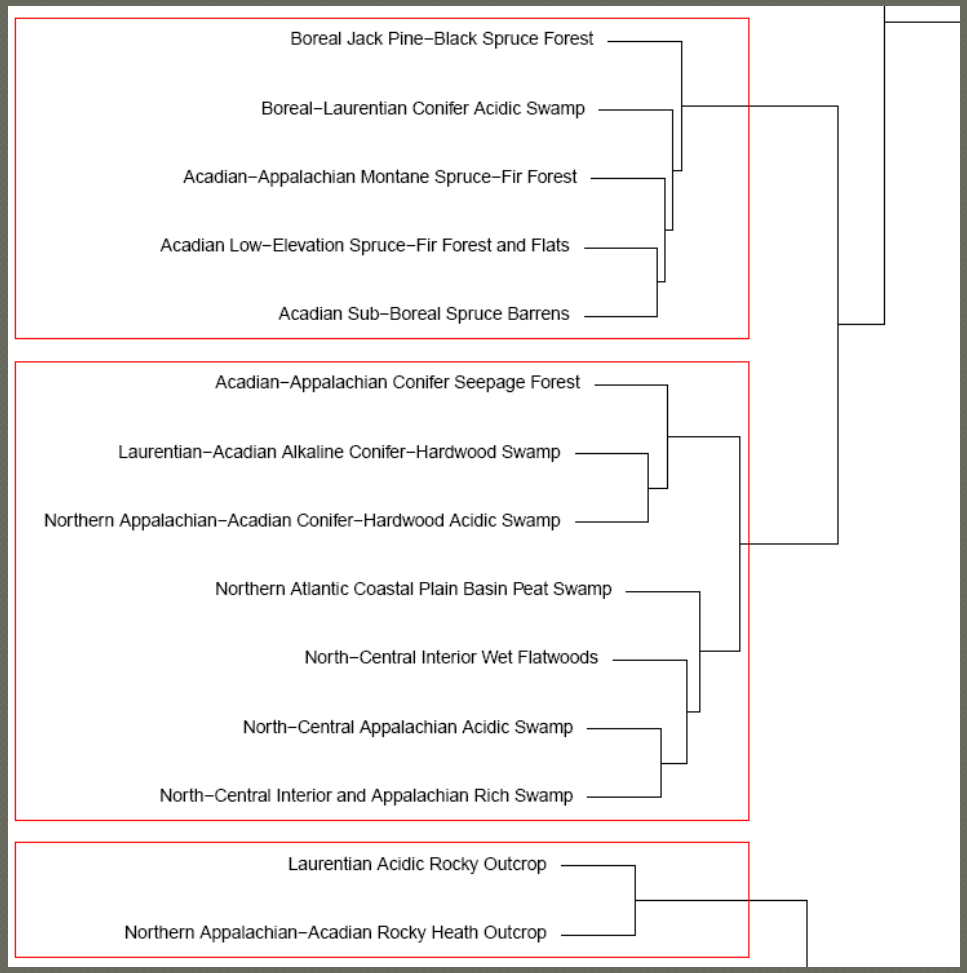
Selecting Representative Species & Habitats

- Reduce the numbers of priority species & habitat systems
- Identify representative species for biological planning & conservation design



Cluster Analyses

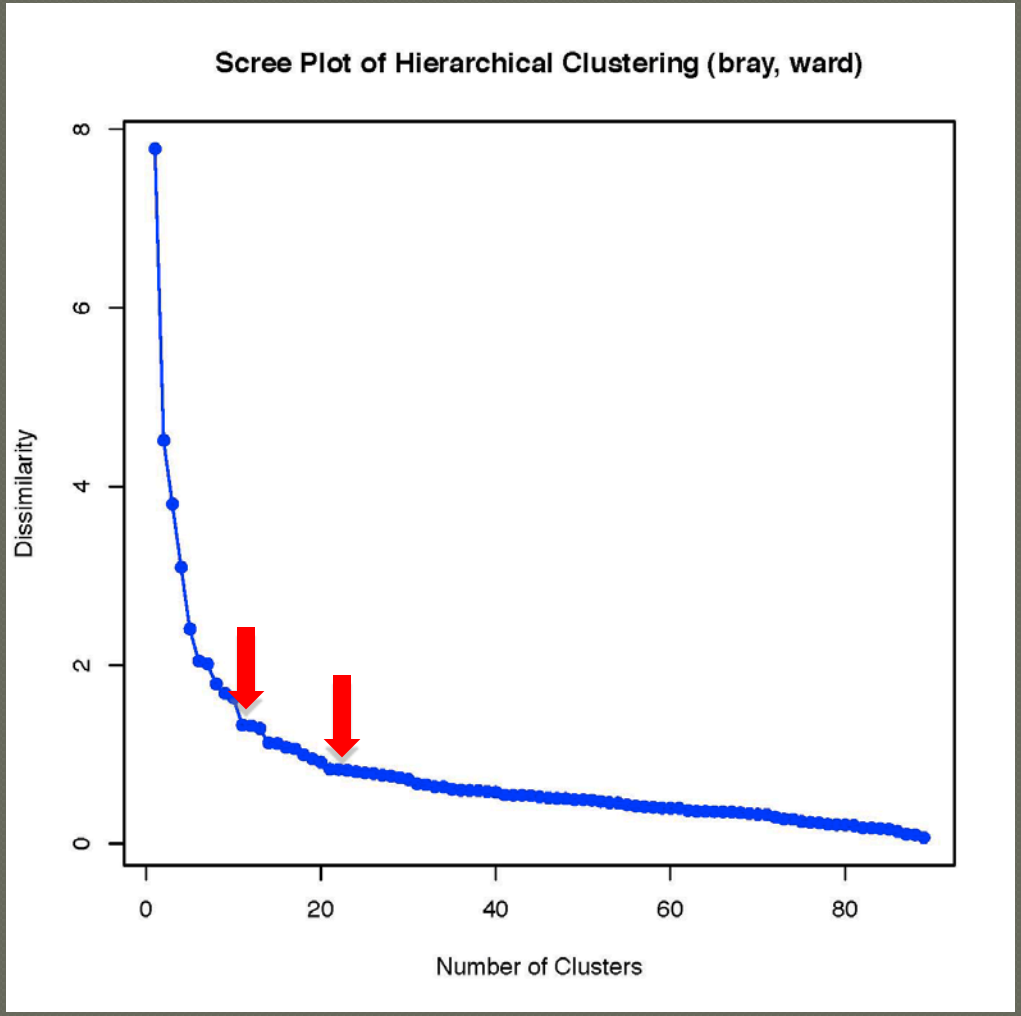
- Hierarchical Agglomerative Cluster Analysis
  - habitat systems clustered based on the similarity of their wildlife species composition



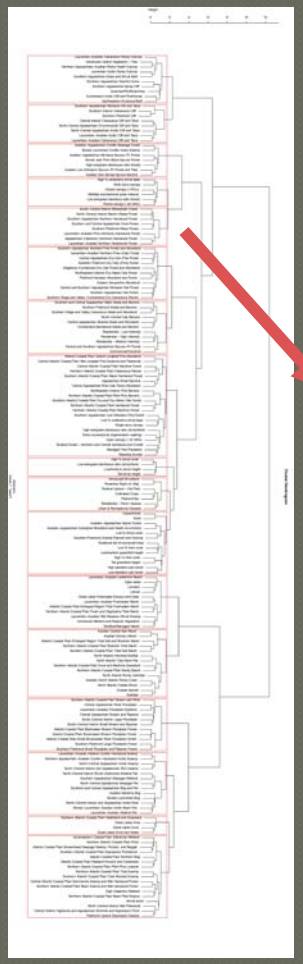
Numbers of Cluster Groups

Southern NE Sub-region

- Terrestrial
  - Primary (n = 14 cluster groups)
  - Secondary (n = 21 cluster groups)
- Aquatic
  - Primary (n=8 cluster groups)
  - Secondary (n=14 cluster groups)



Cluster Analyses



- Habitat system clusters based on similarity of species composition

8 habitat systems clustered with 19 species

Species Groups

Species
Broad-winged Hawk
Black and white Warbler
Pogonia, small whorled
Yellow-bellied Sapsucker
Black-throated Green Warbler
Cerulean Warbler
Chestnut-sided Warbler
Baltimore Oriole

- A species occurs in only 1 habitat system cluster if their breeding & non-breeding habitats are similar
- If the breeding & non-breeding habitats are distinct for a species, a species may occur in 2 cluster groups (i.e. Black-throated green warbler, Yellow-bellied sapsucker)

Indicator Species Analyses

- Assigns species to **best** habitat system cluster and provides an indicator value and p-value

$$IndVal_{ij} = A_{ij} * B_{ij}$$

A_{ij} = *N* individuals$_{ij}$/*N* individuals$_{i}$

ij = The average amount of the species i in zone j (abundance: 0.5=utilized, 1.0=preferred)

i = Mean values for i in all clusters

B_{ij} = *N* habitat systems$_{ij}$/*N habitat systems*$_{i}$

ij = Number of habitat systems in cluster j where species i is present (frequency)

i = Number of habitat systems in cluster j

Species	Cluster	Indicator Value	P-value
Black.backed.Woodpecker.NB	3	0.8182	0.001
Bay.breasted.Warbler.B	3	0.8000	0.002
Boreal.Owl.NB	3	0.8000	0.001
Cape.May.Warbler.B	3	0.8000	0.002
Pine.Grosbeak.B	3	0.8000	0.001
Black.backed.Woodpecker.B	3	0.6923	0.001
Boreal.Owl.B	3	0.6400	0.004
Blackpoll.Warbler.B	3	0.6000	0.001
Boreal.Chickadee.B	3	0.4500	0.01
Gray.Jay.B.NB	3	0.4500	0.014
Olive.sided.Flycatcher.B	3	0.4356	0.015
Northern.Saw.whet.B.NB	3	0.4170	0.015
White.throated.Sparrow.B	3	0.3584	0.029

Indicator Value

- Those species most commonly associated with the habitat systems & preferred use in the habitat systems within that cluster group

Perfect indicator species (1.0) = the species only occurs in those habitats within a cluster, and all of those habitats are preferred

Phase IV - Ranking Criteria for Selecting Representative Species

- Selected for another sub-region
- Indicator value
- Geographic & habitat representation
- Sensitivity to landuse & climate changes, and other stressors
- Feasibility of monitoring
- Life history & population dynamics well known
- Modeling & mapping data availability

Fundamental Objectives

- Represent as many priority species as possible with the fewest number of representative species (i.e. minimize number of rep species selected)
- Maximize geographic coverage across the LCC by selecting representative species with the widest geographic distributions (when possible, choose a species that occurs in all 3 zones).
- Select representative species that occur across as many habitat systems as possible within the LCC (i.e. utilize primary cluster group if possible)