Methodology and Justifications for Important Area Animal Models
Hudson River Valley Important Areas 2018

Part I – Methodologies

Numbers listed for Justifications under each Methodology refer to a section in Part II -- Justifications

Methodology_Ref: I.A.1. Basic Riverine

Species

Alasmidonta heterodon, Alasmidonta varicosa, Anodonta implicata, Argia translata, Cordulegaster erronea, Cordulegaster obliqua, Gomphurus fraternus, Gomphus abbreviatus, Gomphus quadricolor, Gomphus rogersi, Gomphus vastus, Gomphus viridifrons, Lampsilis cariosa, Lanthus vernalis, Leptodea ochracea, Ligumia nasuta, Margaritifera margaritifera, Nasiaeschna pentacantha, Neurocordulia obsoleta, Ophiogomphus aspersus, Somatochlora linearis, Stylurus plagiatus, Tachopteryx thoreyi, Notropis bifrenatus

Steps

1 - Select all EOs with IA_Model = 01ERIV_G01,01HRIV_G01. Select shapefiles: "01ERIV_G01_fish" and "01HRIV_G01_fish" from the following path: W:\\Projects\HRE_Culverts\GIS_data\non_tracked_IA_Model_Ready.

2 - Add a 10 meter buffer to point features (non-EO).

3 - Run the Riverine Community IA model on these polygons. (Note: the upstream component of this methodology was clipped at 3 km.)

4 - Aggregate all adjacent polygons, dissolve internal boundaries, and eliminate all ‘donut holes’.

Justifications: 1, 2

Methodology_Ref: I.A.2. Riparian Tiger Beetle

Species

Cicindela ancocisconensis

Steps

1 - Select all EOs with IA_Model = 01ERIV_TGB.

2 - Capture the stretches of river/stream (same river only; not tributaries) in between known occupied polygons.

3 - Run the riverine community IA model on these polygons.

4 - Aggregate all adjacent polygons, dissolve internal boundaries, and eliminate all ‘donut holes’.

Justifications: 5

Methodology_Ref: I.A.7. Salvelinus fontinalis (Brook Trout)

Species

Salvelinus fontinalis

Steps

1 - Select all records containing the following: 01ERIV_WBT.
The following was only used for HREP Culverts: Select all records containing the following: "01ERIV_ABT" and "01ERIV_WBT".

2 - Select the stream systems for each point based on the drainage catchment.
3 - Run the riverine community IA model on these polygons. (Note: the upstream component of this methodology was clipped at 3 km.)
4 - Remove the Hudson River, if it is included, from the model results. (The lower Hudson River is not suitable habitat for Brook Trout (Fred Henson, personal communication).
5 - Aggregate all adjacent polygons, dissolve internal boundaries, and eliminate all 'donut holes'.

Justifications: 48

Methodology_Ref: I.B.1. Basic Lacustrine 1

Species

Anax longipes, Argia translata, Enallagma laterale, Ladona deplanata, Lestes australis, Lestes unguiculatus, Ligumia nasuta, Rhionaeschna mutata

Steps

1 - Select all EOS with IA_Model = 01ELAC_G01, 01HLAC_G01. Also select shapefiles containing "01ELAC_ABT" and "01ELAC_WBT" from projects\HRE_Culverts\GIS_data\non_tracked_IA_Model_Ready\.
2 - For non-EO points- select the nearest lacustrine waterbody within 50 meters. Omit any points that are not within this distance.
3 - Capture the wetlands within 100 meters of these occurrences (open water ponds/lakes and associated palustrine communities) and digitize the surrounding wetland boundary using a combination of NWI, State Regulated,
4 - Run the Palustrine Community IA model on these polygons.
5 - Clip out NWI Estuarine and Marine Deepwater.
6 - Aggregate all adjacent polygons, dissolve internal boundaries, and eliminate all 'donut holes'.

Justifications: 1, 2

Methodology_Ref: I.C.1.a. Basic Palustrine

Species

Lestes australis, Lestes unguiculatus, Libellula needhami, Somatochlora forcipata, Somatochlora kennedyi, Protonotaria citrea

Steps

1 - Select all EOs with IA_Model= 01EPAL_G01.
2 - Capture the wetlands within 100 meters of these occurrences using a combination of NWI, State Regulated, and land use/land cover wetlands.
3 - Run the Palustrine Community IA model on these polygons.
4 - Aggregate all adjacent polygons, dissolve internal boundaries, and eliminate all 'donut holes'.

Justifications: 2, 38

Methodology_Ref: I.C.1.b. Common Tern Foraging Area

Species

Sterna hirundo

Steps

1 - all EOs with IA_Model = 01ETES_COT, 01HTES_COT.
2 - Place an additional 5 km buffer that includes only water, clipping out any terrestrial areas.

Justifications: 22

Methodology_Ref: I.C.10. Acris crepitans (Northern Cricket Frog)

Species

Acris crepitans

Steps

1 - Select all EOs with IA_Model= 01EPAL_NCF.
2 - Capture the contiguous wetlands (palustrine communities from NWI, land use/land cover, and state regulated and 21-water from CCAP 2006) that
3 - Buffer these wetlands by 340 meters.
4 - Using a land use–land cover layer (CCAP 2006), capture all undeveloped areas that fall within 450 meters of the EO boundary (NOT the wetland boundary).
5 - Aggregate all adjacent polygons, dissolve internal boundaries, and eliminate all 'donut holes'.

Justifications: 55

Methodology_Ref: I.C.3. Eurycea longicauda (Longtail Salamander) -Palustrine

Species

Eurycea longicauda

Steps

1 - Select all EOs with IA_Model= 01EPAL_LTS
2 - Buffer the occurrence boundary by 30 meters (known movement distance- not maximum).
3 - Capture the contiguous wetlands (palustrine communities from NWI, land use/land cover, and state regulated) that intersect these occurrences.
4 - Buffer these wetlands by 340 meters. (290 meter buffer for amphibians and 50 meter terrestrial buffer added to protect from edge effects). Explanation: Amphibian buffer suggested by Semlitsch and Bodie (2003). "We propose the stratification should include three terrestrial zones adjacent to core aquatic wetland habitats: (1) a first terrestrial zone immediately adjacent to the aquatic habitat, which is restricted from use and designed to buffer the core aquatic habitat and protect water resources; (2) starting again from the wetland edge and overlapping with the first zone, a second terrsestrial zone that encompasses the core terrestrial habitat defined by semiaquatic focal-group use (e.g., amphibians 159-290 m); and (3) a third zone, outside the second zone, that serves to buffer the core terrestrial habitat from edge effects from surrounding land use (e.g., 50 m; Murcia 1995)." As this "buffer" is designed to protect upland habitat as well as the wetland for amphibians in general, and is greater than the NYNHP palustrine buffer, it seems appropriate to use this instead of the palustrine buffer in order to protect all areas that may be potentially used by the salamanders.
5 - Aggregate all adjacent polygons, dissolve internal boundaries, and eliminate all 'donut holes'.

Justifications: 7

Methodology_Ref: I.C.4. Glyptemys muhlenbergii (Bog Turtle)

Species

Glyptemys muhlenbergii

Steps

1 - Select all EOs with IA_Model= 01EPAL_BOG.

2 - Capture the contiguous wetlands (palustrine communities and unclassified wetlands from NWI (omitting lacustrine types), land use/land cover, and state regulated) that intersect these occurrences.

3 - Capture all NYSDEC Regulatory Freshwater wetlands polygons, and Hydro 24 (lines) that fall within a 1.0 km buffer of the NYNHP EO boundary.

4 - Capture wetland polygons from the National Wetlands Inventory and State Regulatory Freshwater wetlands coverages, even if they extend beyond the 1 km buffer, and merge these polygons with the EO polygons.

5 - Run the Palustrine Wetland Community IA model on these polygons.

6 - Clip polygons at class 1 and class 2 roads. Include other road classes in the

7 - Remove fragmented polygons that are disconnected from the polygons that include the NYNHP bog turtle occurrence, if they exist.

Justifications: 11

Methodology_Ref: I.C.5. Emydoidea blandingii (Blanding's Turtle)

Species

Emydoidea blandingii

Steps

1 - Select all EOs with IA_Model= 01EPAL_BLT.

2 - Include all uplands and palustrine wetlands depicted on National Wetlands Inventory maps (polygon and line coverages, including the lacustrine types), all NYSDEC Regulatory Freshwater wetlands (polygons), and Hydro 24 (lines) that fall within a 1.0 km buffer of the NYNHP EO boundary.

3 - Include entire wetland polygons from the National Wetlands Inventory and State Regulatory Freshwater wetlands coverages that extend beyond the 1 km buffer.

4 - Merge overlapping polygons (NYNHP Element Occurrence, NWI coverage, NYSDEC Regulatory Freshwater Wetlands polygons).

5 - Using the palustrine community methodology, buffer these polygons.

6 - Merge 1 km buffer with polygon.

7 - Clip polygons at class 1 roads. Include other road classes in the coverage.

8 - Remove fragment polygons that are disconnected from the polygon that includes the NYNHP Blanding's turtle occurrence.

9 - Aggregate all adjacent polygons, dissolve internal boundaries, and eliminate all 'donut holes'.

Justifications: 12

Methodology_Ref: I.C.8. Lithobates kauffeldi (Atlantic Coast Leopard Frog)

Species

Lithobates kauffeldi

Steps

1 - Select all EOs with IA_Model= 01EPAL_SLF.

2 - Buffer the occurrence boundary by 200 meters (approximate maximum distances of Northern Leopard Frogs from breeding wetlands during nocturnal rains).

3 - Capture the contiguous wetlands (palustrine, estuarine, and lacustrine communities from the following: NWI (polygons and lines) with code L, R, or P; LU/LC raster (CCAP2006) palustrine and estuarine, but no open water; 1:24K hydrography (lines and polygons for open water; and DEC Wetlands that intersect these buffers (Step 2).

4 - Buffer these wetlands by 340 meters. (290 meter buffer for amphibians and 50 meter terrestrial buffer added to protect from edge effects).
Explanation: Amphibian buffer suggested by Semlitsch and Bodie (2003). “We propose the stratification should include three terrestrial zones adjacent to core aquatic wetland habitats: (1) a first terrestrial zone immediately adjacent to the aquatic habitat, which is restricted from use and designed to buffer the core aquatic habitat and protect water resources; (2) starting again from the wetland edge and overlapping with the first zone, a second terrestrial zone that encompasses the core terrestrial habitat defined by semi-aquatic focal-group use (e.g., amphibians 159-290 m); and (3) a third zone, outside the second zone, that serves to buffer the core terrestrial habitat from edge effects from surrounding land use (e.g., 50 m; Murcia 1995).” As this “buffer” is designed to protect upland habitat as well as the wetland for amphibians in general, and is greater than the NYNHP palustrine buffer, it seems appropriate to use this instead of the palustrine buffer in order to protect all areas that may be potentially used by the frogs.

5 - Capture the contiguous wetlands and open water (palustrine, estuarine, and lacustrine communities from the following: NWI (polygons and lines) with code L, R, or P; LU/LC raster (CCAP2006) palustrine and estuarine, but no open water; 1:24K hydrography (lines and polygons for open water; and DEC Wetlands that intersect these buffers (Step 4).

6 - Clip buffered polygons at Class 1 and 2 roads.

7 - Clip polygons (from Step 6) at suburban and urban areas.

8 - Ensure no marine habitats are included, and clip them out if necessary.

9 - Aggregate all adjacent polygons, dissolve internal boundaries, and eliminate all ‘donut holes’ except those associated with development.

Justifications: 25

Methodology_Ref: I.E.10. Crotalus horridus (Timber Rattlesnake)

Species

Crotalus horridus

Steps

1 - Select all EOs with IA_Model= 01ETPL_TRS. These should only include hibernacula. Select all Timber Rattlesnake EOs from adjacent states.

2 - Select all roadless blocks that intersect timber rattlesnake hibernacula in NY (from the Dutc-tblk.shp layer). Note* This cannot be done with adjacent states coverage, unless we have a roadless layer for the adjacent states.

3 - Remove the Hudson River portion of the roadless block (the Hudson River is included during the select roadless blocks statement above).

4 - Create a 3.5 kilometer buffer, with dissolved overlapping boundaries, around each of the timber rattlesnake hibernacula (NY EOs plus adjacent states coverage (this would include MA and CT – note: the 3.5 km buffer was applied

by biologists in NJ and PA before the data was received by us).

5 - Create a second 4.5 kilometer buffer, with dissolved overlapping boundaries around each of the timber rattlesnake hibernacula (NY EOs plus adjacent states coverage (this would include MA. and CT – note: add a 1.0 km buffer around the 3.5 km buffer that was applied by biologists in NJ and PA before the data was received by us).

6 - Clip the roadless block layer that intesects the timber rattlesnake dens with the 4.5 kilometer buffer.

7 - Capture all suitable habitats within the 3.5 kilometer buffer around these dens by selecting all habitats from CCAP 2006 except developed land types (2-5) and cultivated (6). Exclude the tidal estuary (Hudson River) from the suitable habitat layer.

8 - Add an 0.8 km buffer around each den.

9 - Merge the 0.8 km buffer around each den, the clipped suitable habitat layer, the clipped roadless blocks, and the rattlesnake EO boundaries.

10 - Clip this merged layer at major barriers to movement (i.e., highways that we formerly discussed).

11 - Remove any fragments that result and fill in any holes.

Justifications: 59

Methodology_Ref: I.E.11. Cistothorus platensis (Sedge Wren)

Species

Cistothorus platensis

Steps

1 - Select all EOs with IA_Model= 01ETPE_SEW.

2 - Capture open areas/grasslands with the following CCAP 2006 codes: Open Spaces Developed (5), Pasture/Hay (7), Grassland (8), and Bare land (20) and wetlands that are contiguous with the EO using LU/LC raster (CCAP 2006) with the following: Palustrine Emergent Wetland (15), Palustrine Scrub/Shrub Wetland (14), Estuarine Scrub/Shrub Wetland (17), Estuarine Emergent Wetland (18). Capture non-forested palustrine and estuarine wetlands from NWI polgyons including lacustrine habitats and DEC Regulated wetlands that intersect the EO.

3 - Identify the natural community type (palustrine or estuarine).

4 - Run the Estuarine Community IA model for "salt marsh" on EOs located in estuaries. -OR- Run the Palustrine Community IA model on EOs located in freshwater wetlands.

5 - Aggregate all adjacent polygons, dissolve internal boundaries, and eliminate all ‘donut holes’.

Justifications: 61

Methodology_Ref: I.E.12. Ammodramus henslowii (Henslow's Sparrow)

Species

Ammodramus henslowii

Steps

1 - Select all EOs with IA_Model= 01ETPL_HES.

2 - Calculate the size of the EO. If the area is greater than or equal to 133 acres, then no further mapping is needed (go to Step 4). If the area is less than 133

acres, then go to Step 3.

3 - Capture grassland habitats with the following LU/LC (CCAP 2006) codes: Open Spaces Developed (5), Pasture/Hay (7), Grassland (8), and Bare land (20) that is contiguous with the EO boundary until 133 acres is reached, but going no more than 0.5 km from the EO boundary. Capture wetlands that are contiguous with the EO using LU/LC raster (CCAP 2006) with the following: Palustrine Emergent Wetland (15), Palustrine Scrub/Shrub Wetland (14). Capture non-forested palustrine and estuarine wetlands from NWI polgyons and DEC Regulated Wetlands that intersect the EO.

4 - Aggregate all adjacent polygons, dissolve internal boundaries, and eliminate all 'donut holes' that are not associated with development or unsuitable habitat.

Justifications: 62

Methodology_Ref: I.E.2. Wetland Birds

Species

Ardea herodias, Ixobrychus exilis, Podilymbus podiceps, Rallus crepitans, Rallus elegans

Steps

1 - Select all EOs with IA_Model= 01EPES_WTB.

2 - Digitize the wetlands within 100 meters using the NWI coverage, except the NWI riverine layer (as these species will generally be found in emergent marshes, shrub swamps, and sedge meadow/fens), land use/land cover wetlands coverage, and the NYS regulated wetlands coverage.

4 - Identify the natural community type (palustrine or estuarine).

5 - Run the Estuarine Community IA model for "salt marsh" on EOs located in estuaries. -OR- Run the Palustrine Community IA model on EOs located in freshwater wetlands.

6 - Remove the following 2006 LU/LC CCAP that intersect with the Step 5 results: Bare Land (20).

7 - Aggregate all adjacent polygons, dissolve internal boundaries, and eliminate all 'donut holes' except for those associated with development or unsuitable habitat.

Justifications: 13

Methodology_Ref: I.E.4. Grassland/Marsh Raptors

Species

Circus cyaneus

Steps

1 - Select all EOs with IA_Model= 01ETPE_GMR, 01HTPE_GMR.

2 - Capture open areas/grasslands with the following CCAP 2006 codes: Open Spaces Developed (5)*, Pasture/Hay (7), Grassland (8), and Bare land (20) and wetlands that are contiguous with the EO using LU/LC raster (CCAP 2006) with the following: Estuarine Emergent Wetland (18) and Palustrine Emergent Wetland (15). Capture non-forested palustrine and estuarine wetlands from NWI polgyons (but not open water) and DEC Regulated wetlands that intersect the EO. (*CCAP Class may only apply to Long Island Occurrences.)

3 - Calculate the area from the Step 2 results (EO and contiguous habitat, if any). If the area is less than 202 ha (500 acres), select noncontiguous suitable habitat (patches should be 1.5 acres or larger) using the same layer selection from Step 2 until 202 ha (500 acres) is reached OR until you get 5 km away from

the EO boundary, whichever comes first. If the EO boundary is greater than or equal to 202 ha (500 acres) in the calculation at the beginning of step 3, no further mapping methodology is necessary (go to Step 4).

4 - Aggregate all adjacent polygons, dissolve internal boundaries, and eliminate all 'donut holes' that are not associated with developed areas or woodland habitats.

Justifications: 30

Methodology_Ref: I.E.5.a. Beach/Wetland Colonial Waterbirds

Species

Sterna hirundo

Steps

1 - Select all EOs with IA_Model= 01ETES_CWB, 01HTES_CWB, 01ETES_COT, 01HTES_COT, 01ETES_GBT, 01HTES_GBT.

2 - Select the following 2005 CCAP LU/LC Estuarine Emergent Wetlands (18), Bare Land (20), and Unconsolidated Shore (19) that intersects the EOs.

3 - Apply a 200 meter Buffer to the portion of the EO that intersects 2005 CCAP LU/LC = Bare Land (20) and/or Unconsolidated Shore (19). (Explanation: Average recommended set-back distance for installing symbolic fencing around colonial waterbird colonies is 50 m; average distance in which human activity will not disturb colonial waterbird colonies is 200 m (Erwin 1989; Rodgers and Smith 1995; Kress and Hall 2002).

4 - Run the Community Estuarine Model for "salt marsh" on the portion of the EO boundary that intersects the selected 2005 CCAP LU/LC = Estuarine Emergent Wetlands (18).

5 - Aggregate all adjacent polygons, dissolve internal boundaries, and eliminate all 'donut holes' except those associated with unsuitable habitat and development.

Justifications: 19

Methodology_Ref: I.E.7. Diadromous Fishes

Species

Acipenser brevirostrum, Acipenser oxyrinchus, Strongylura marina

Steps

1 - Select the shapefile named 01ERES_DIF.

2 - Select all open waters downstream of the locations.

3 - Apply the Riverine Community Model to streams and rivers except for the Hudson River.

4 - Apply the Estuarine Community Model for "non-woody tidal community" to the Hudson River.

5 - Apply a 5 kilometer buffer that only includes marine waters that are contiguous with the results from Step 4. (OMIT for HRE Culverts- time constraints. Instead, clip to HRE Boundary provided by ANC.)

6 - Aggregate all adjacent polygons, dissolve internal boundaries, and eliminate all 'donut holes' that are not associated with development.

Justifications: 39, 49

Methodology_Ref: I.E.8. Menidia beryllina (Inland Silverside)

Species

Menidia beryllina

Steps

1 - Select all EOs with IA_Model= 01ERES_ISS

2 - Apply the Riverine Community Model.

3 - Apply the Estuarine Community Model for “non-woody tidal community”.

4 - Aggregate all adjacent polygons, dissolve internal boundaries, and eliminate all ‘donut holes’ that are not associated with development.

Justifications: 40

Methodology_Ref: I.E.9. Menidia menidia (Atlantic Silverside)

Species

Menidia menidia

Steps

1 - Select all EOs with IA_Model= 01ERES_FAS

2 - Apply the Riverine Community Model.

3 - Apply the Estuarine Community Model for “non-woody tidal community”.

4 - Apply a 5 kilometer buffer to step 3 results that only includes open Marine or Estuarine waters.

5 - Aggregate all adjacent polygons, dissolve internal boundaries, and eliminate all ‘donut holes’ that are not associated with development.

Justifications: 41

Methodology_Ref: I.F.2. (Haliaeetus leucocephalus) Bald Eagle and Aquila chrysaetos (Golden Eagle)

Species

Aquila chrysaetos, Haliaeetus leucocephalus

Steps

1 - Select all EOs with IA_Model = 01EALL_NBR. This includes EOs where Location Use Class=Nonbreeding, and source feature descriptor=Foraging Area and Wintering Area and includes communal use sites. This also includes EOs where Location Use Class=Breeding, but there are no nest points.

2 - Buffer 01EALL_NBD EO boundaries by 300 feet. First capture the river layer that intersects the EO boundary, buffer this by 300 feet, then merge that with the EO boundary. Particular EOs, while generally following the river shoreline, are sometimes less than or greater than 300 feet from the river shoreline at different points along the river. By buffering the river layer that intersects the EO boundary, we are ensuring that the shoreline is buffered by a minimum of 300 feet at any location along the river.

3 - Select all Eos with IA_Model = 01EALL_BER. This includes EOs where Location Use Class=Nonbreeding, and source feature descriptor=Roosting Sites.

4 - Buffer 01EALL_BER EO boundaries by 1500 feet.

5 - Select all EOs with IA_Model = 01EALL_BEN. This includes Eos where Location Use Class=Breeding, and source feature descriptor=Nest.

6 - Buffer 01EALL_BEN EO boundaries by 1500 feet.

7 - Select Hydro 24 lines that are 5 km upstream and downstream from 01EALL_BEN Eos. Select open water polygons (i.e. lakes, reservoirs) within 5 km of the EO, including the waterbody the nest is on. In general: If nest is on a lake, include the lake or portion of the lake that is within 5km of the nest point. If nest is on a river, include those parts of the 5km upstream and downstream buffer that overlay the river.

8 - For the Hudson River, include tidal tributaries only and clip at tidal barrier (dam/waterfall).

9 - Buffer the shoreline of the intersected waterbody by 300 feet to protect perch sites.
10 - Merge steps into one layer.

Justifications: 23

Methodology_Ref: I.F.3. Scaphiopus holbrookii (Eastern Spadefoot)

Species

Scaphiopus holbrookii

Steps

1 - Select all EOs with IA_Model=01EALL_EST.
2 - Buffer the EOs by 500 meters.
3 - Clip polygons at Class 1-3 roads.
4 - Clip polygons at high and medium intensity developed areas.
5 - Ensure no marine habitats are included, and clip them out if necessary.
6 - Aggregate all adjacent polygons, dissolve internal boundaries, and eliminate all 'donut holes' that are not associated with developed areas.

Justifications: 26

Methodology_Ref: I.F.4. Species Represented by EO Only

Species

Bagisara rectifascia, Callophrys henrici, Celastrina neglectamajor, Cordulegaster erronea, Macrochilo bivittata, Paectes abrostolella, Raptor Winter Concentration Area, Renia nemoralis, Asio flammeus, Circus cyaneus, Falco peregrinus

Steps

1 - Select all EOs with IA_model= 01EALL_NOB (no other steps needed).

Justifications: 34, 46, 71

Methodology_Ref: I.G.1. Terrestrial Reptiles 1

Species

Carphophis amoenus, Sceloporus undulatus

Steps

1 - Select all EOs with IA_Model= 01ETER_TR1.
2 - Buffer the EO by 200 meters.
3 - Clip the buffered layer to uplands only.
4 - Clip buffered polygon(s) at Class 1 and 2 roads.
5 - Clip buffered polygon(s) with high intensity developed areas.
6 - Select only the upland polygons that intersect the EO within that 200 meter buffer, merge them with the EOs, dissolve all internal boundaries and remove 'donut holes.'

Justifications: 20, 21

Methodology_Ref: I.G.10. Oak or Pine Foodplant Lepidoptera

Species

Chaetaglaea cerata, Hemileuca maia maia, Satyrium edwardsii, Speranza exonerata, Zale curema, Zale lunifera

Steps

1 - Select all EOs with IA_Model= 01ETER_OPF.

2 - Apply a temporary 1.17 kilometer buffer.

3 - Select the following NYNHP natural community EOs that intersect with the buffer: Coastal Oak-Heath Forest, Dwarf Pine Plains, Maritime Pitch Pine Dune Woodland, Pitch Pine-Oak Forest, Pitch Pine-Oak-Heath Woodland, Pitch Pine-Scrub Oak Barrens, Pitch-Pine Oak Heath Rocky Summit. (If a natural community EO is not selected, then the Important Area is represented by the EO.)

4 - Clip the selected community EOs with the temporary buffer.

5 - Remove temporary buffer.

6 - Run Ecology Terrestrial Model.

7 - Aggregate all adjacent polygons, dissolve internal boundaries, and eliminate all 'donut holes' that are not associated with development.

Justifications: 43

Methodology_Ref: I.G.11. Barrens Habitat Lepidoptera

Species

Cerma cora, Chytonix sensilis, Cleora projecta, Cleora projecta, Erastria coloraria, Virbia aurantiaca, Virbia aurantiaca, Zanclognatha martha

Steps

1 - Select all EOs with IA_Model= 01ETER_BAR.

2 - Apply a temporary 1.2 kilometer buffer.

3 - Select the following NYNHP natural community EOs that intersect with the buffer: Dwarf Pine Plains, Pitch Pine-Oak-Heath Woodland, Pitch Pine-Oak Forest, Pitch Pine-Scrub Oak Barrens, Pitch-pine oak heath rocky summit.

4 - Clip the Step 3 results with the temporary buffer (Step 2).

5 - Remove temporary buffer.

6 - Run Ecology Terrestrial Model.

7 - Aggregate all adjacent polygons, dissolve internal boundaries, and eliminate all 'donut holes' that are not associated with development.

Justifications: 43

Methodology_Ref: I.G.13. Alleghany Woodrat

Species

Neotoma magister

Steps

1 - Select EO with IA_Model= 01ETER_RAT.

2 - Apply 160 m buffer around EO.

3 - Exclude any open water habitat (CCAP 2006 code 21) from the buffered layer.

Justifications: 54

Methodology_Ref: I.G.14. Catharus bicknelli (Bicknells' Thrush)

Species

Catharus bicknelli

Steps

1 - Select all EOs with IA_Model= 01ETER_BTH.

2 - Select the following NYNHP natural community EOs that intersect with the Bicknell's thrush EO boundaries: Mountain Spruce-Fir Forest, Mountain Fir.
3 - Using the DEM layer, capture all elevations above 1067 meters that intersect the EO.
4 - Combine the EO boundary, community boundary, and DEM boundary.
5 - Buffer this merged layer by the terrestrial community buffer.

Justifications: 56

Methodology_Ref: I.G.15. Sylvilagus transitionalis (New England Cottontail)

Species

Sylvilagus transitionalis

Steps

1 - Select all EOs with IA_Model= 01ETER_NEC.
2 - Apply a buffer of 0.4 km around the EOs.

Justifications: 57

Methodology_Ref: I.G.16. Falco peregrinus (Peregrine Falcon)

Species

Falco peregrinus

Steps

1 - Select all EOs with IA_Model= 01ETER_PEF.
2 - Apply a buffer of 0.8 km around the EOs.

Justifications: 58

Methodology_Ref: I.G.17. Floodplain Forest Lepidoptera (Ostrich Fern Borer Moth)

Species

Papaipema sp. 2 nr. Pterisii

Steps

1 - Select all EOs with IA_Model= 01ETER_FLD.
2 - Apply a temporary 1 kilometer buffer.
3 - Select the following habitats CCAP 2006 LU/LC that are within the temporary buffer: Deciduous Forest (9), Mixed Forest (11), Palustrine Forested Wetland (13).
4 - Eliminate the Step 2 buffer.
5 - Run Ecology Terrestrial Model.
6 - Aggregate all adjacent polygons, dissolve internal boundaries, and eliminate all 'donut holes' that are not associated with development.

Justifications: 43

Methodology_Ref: I.G.18. Pieris virginiensis (West Virginia White)

Species

Pieris virginiensis

Steps

1 - Select all EOs with IA_Model= 01ETER_WVW.
2 - Apply a 1 kilometer buffer.
3 - Select the following habitats CCAP 2006 LU/LC that are within the temporary buffer: Deciduous Forest (9), Mixed Forest (11), Palustrine Forested Wetland (13).

4 - Clip buffered polygon(s) at all unshaded paved roads (Classes 1-6 in ALIS road layer), rivers, and unshaded streams (all waterbodies and named streams in Hydro 24 lines or all size 2-5 rivers in NAHCS flowlines).

5 - Aggregate all adjacent polygons, dissolve internal boundaries, and eliminate all 'donut holes' that are not associated with development.

Justifications: 60

Methodology_Ref: I.G.19. Cicindela patruela partruela (Northern Barrens Tiger Beetle)

Species

Cicindela patruela partruela

Steps

1 - Select all EOs with IA_Model= 01ETER_PAT.

2 - Select the entire boundary of the following NYNHP natural community EOs that intersect with the EO: Dwarf Pine Ridges.

3 - Run Ecology Terrestrial Model.

4 - Aggregate all adjacent polygons, dissolve internal boundaries, and eliminate all 'donut holes'.

Justifications: 63

Methodology_Ref: I.G.2. Grassland Birds

Species

Bartramia longicauda

Steps

1 - Select all EOs with IA_Model= 01ETER_GRB.

2 - Calculate the size of the EO. If the area is greater than or equal to 61 ha (150 acres), then no further mapping is needed (go to Step 4). If the area less than 61 ha, then go to Step 3.

3 - Capture grassland habitats with the following LU/LC (CCAP 2006) codes: Pasture/Hay (7), Grassland (8), Bare land (20), Open Spaces- Developed (5)*, Low Intensity Development (4)*, Cultivated Land (6)* that is contiguous with the EO boundary until 61 ha is reached, but going no more than 0.5 km from the EO boundary. Use Class 1 and Class 2 roads as a barrier (still attempt to reach the desired hectares, but don't go beyond Class 1 and Class 2 roads). *These LU/LC selections are largely based on habitats used by Upland Sandpiper on Long Island. A review may be needed if this model is used for Upstate NY.

4 - Aggregate all adjacent polygons, dissolve internal boundaries, and eliminate all 'donut holes' that are not associated with development or unsuitable habitat.

Justifications: 33

Methodology_Ref: I.G.20. Melanerpes erythrocephalus (Red-headed Woodpecker)

Species

Melanerpes erythrocephalus

Steps

1 - Select all EOs with IA_Model= 01ETPL_RHW.

2 - If the EO area is more than 8.5 hectares, then no further buffering is needed. If the EO area is less than 8.5 hectares, then increase the patch size from the EO boundary one pixel at a time until 8.5 hectares is reached including only the following habitats from CCAP 2006 LU/LC: Deciduous Forest (9), Mixed Forest

(11), Palustrine Forested Wetland (13), Palustrine Scrub/Shrub Wetland (14), Grassland (8) , Pasture/Hay (7). If 8.5 hectares cannot be reached, the maximum distance from the EO is 0.5 km.

3 - Aggregate all adjacent polygons, dissolve internal boundaries, and eliminate all 'donut holes' that are not associated with development.

Justifications: 64

Methodology_Ref: I.G.21. Myotis sodalis (Indiana Bat) Spring Staging/Autumn Swarming

Species

Myotis sodalis

Steps

1 - Select all EOs with IA_Model= 01ETER_MYH.

2 - Using CCAP, capture a suitable habitat layer within 2.5 miles of the EO. This layer should include mixed forest, deciduous forest, evergreen forest, and palustrine forested wetland.

3 - Apply 30-meter buffer.

4 - Aggregate all adjacent polygons and dissolve internal boundaries. Donut holes: (1) eliminate those that are smaller than 1 square mile and (2) leave all donut holes associated with high intensity development.

Justifications: 70

Methodology_Ref: I.G.22. Myotis sodalis (Indiana Bat) Foraging Area

Species

Myotis sodalis

Steps

1 - Select all EOs with IA_Model= 01ETER_MYR.

2 - Using CCAP 2006, capture a suitable habitat layer within 2.5 miles of the EO. This layer should include water (21), low intensity residential (4), mixed forest (11), deciduous forest (9), grassland (8), pasture/hay (7), scrub/shrub (12), palustrine forested wetland (13), palustrine emergent wetland (15), and palustrine scrub/shrub wetland (14).

3 - Clip any portions of this layer that are greater than 275 m in elevation (900 feet) and remove these from the suitable habitat layer.

4 - Aggregate all adjacent polygons, dissolve internal boundaries, and eliminate all 'donut holes'.

Justifications: 70

Methodology_Ref: I.G.24. Myotis septentrionalis (Northern Long-eared Bat) Foraging Area

Species

Myotis septentrionalis

Steps

1 - Select all EOs with IA_Model= 01ETER_NLS.

2 - Using CCAP, capture a suitable habitat layer within 1.5 miles of the EO. This layer should include mixed forest, deciduous forest, evergreen forest, and palustrine forested wetland.

3 - Apply a 30-meter buffer to step 2 results.

4 - Aggregate all adjacent polygons and dissolve internal boundaries. Donut holes: (1) eliminate only those that are smaller than 1 square mile and (2) leave all donut holes associated with high intensity development.

Justifications: 70

Methodology_Ref: I.G.25. Myotis septentrionalis (Northern Long-eared Bat) Spring Staging/Autumn Swarming

Species

Myotis septentrionalis

Steps

1 - Select all EOs with IA_Model= 01ETER_NLH.

2 - Using CCAP, capture a suitable habitat layer within 5 miles of the EO. This layer should include mixed forest, deciduous forest, evergreen forest, and

3 - Apply a 30-meter buffer.

4 - Aggregate all adjacent polygons and dissolve internal boundaries. Donut holes: (1) eliminate only those that are smaller than 1 square mile and (2) leave all donut holes associated with high intensity development.

Justifications: 70

Methodology_Ref: I.G.27. Myotis leibii (Eastern Small-footed Myotis) and Bat Colony Hibernacula

Species

Myotis leibii, Bat Colony

Steps

1 - Select all EOs with IA_Model= 01ETER_MLH.

2 - Using CCAP 2006, capture a suitable habitat layer within 0.5 mile of the EO. This layer should include water (21), low intensity residential (4), mixed forest (11), deciduous forest (9), grassland (8), pasture/hay (7), scrub/shrub (12), palustrine forested wetland (13), palustrine emergent wetland (15), and palustrine scrub/shrub wetland (14).

3 - Apply a 30-meter buffer.

4 - Aggregate all adjacent polygons and dissolve internal boundaries. Donut holes: (1) eliminate only those that are smaller than 1 square mile and (2) leave all donut holes associated with high intensity development.

Justifications: 70

Methodology_Ref: I.G.28. Myotis leibii (Eastern Small-footed Myotis) Foraging

Species

Myotis leibii

Steps

1 - Select all EOs with IA_Model= 01ETER_MLR

2 - Using CCAP 2006, capture a suitable habitat layer within 0.5 mile of the EO. This layer should include water (21), low intensity residential (4), mixed forest (11), deciduous forest (9), grassland (8), pasture/hay (7), scrub/shrub (12), palustrine forested wetland (13), palustrine emergent wetland (15), and palustrine scrub/shrub wetland (14).

3 - Apply a 30-meter buffer.

4 - Aggregate all adjacent polygons and dissolve internal boundaries. Donut

holes: (1) eliminate only those that are smaller than 1 square mile and (2) leave all donut holes associated with high intensity development.

Justifications: 70

Methodology_Ref: I.G.29. Antrostomus vociferous (Whip-poor-will)

Species

Antrostomus vociferous

Steps

1 - Select all EOs with IA_Model= 01ETER_WPW.

2 - Explode EO shapefile to create multipart features.

3 - If the area for each feature is more than 15 hectares contiguous hectares, then no further buffering is needed in this step. If the EO area is less than 15 hectares, then increase the patch size from the EO boundary one pixel at a time until 15 hectares is reached including only the following habitats: Deciduous Forest, Mixed Forest, Evergreen Forest, Pasture/Hay and Grassland. If 15 hectares cannot be reached, create as large a boundary as possible using these criteria.

4 - Select cultivated lands, pasture/hay, and grasslands that are within 30 meters of Step 3.

5 - Apply Ecology's Terrestrial IA model to step 4.

6 - Aggregate all adjacent polygons, dissolve internal boundaries, and eliminate all 'donut holes' that are not associated with development.

Justifications: 68

Methodology_Ref: I.G.3. Woodland Birds

Species

Geothlypis formosa

Steps

1 - Select all EOs with IA_Model= 01ETER_WB1.

2 - If the EO area is more than 21 hectares, then no further buffering is needed. If the EO area is less than 21 hectares, then increase the patch size from the EO boundary one pixel at a time until 21 hectares is reached including only the following habitats from CCAP 2006 LU/LC: Deciduous Forest (9), Mixed Forest (11), and Palustrine Forested Wetland (13). If 21 hectares cannot be reached, create as large a boundary as possible using these criteria.

3 - Aggregate all adjacent polygons, dissolve internal boundaries, and eliminate all 'donut holes' that are not associated with development.

Justifications: 29

Methodology_Ref: I.G.30. Bumble Bees

Species

Bombus (Bombus) terricola, Bombus (Thoracobombus) fervidus

Steps

1 - Select all EOs with IA_Model= 01ETER_BEE.

2 - Buffer the EO by 2.0 kilometers.

3 - Remove open water.

4 - Clip buffered polygon(s) at Class 1 and 2 roads.

5 - Dissolve all internal boundaries and remove 'donut holes' that are not

associated with lacustrine habitats.

Justifications: 67

Methodology_Ref: I.G.7. Evergreen Forest Lepidoptera

Species

Calephelis borealis, Zale curema

Steps

1 - Select all EOs with IA_Model= 01ETER_EGF.
2 - Apply a temporary 1.5 kilometer buffer.
3 - Select the following habitats from CCAP 2006 LU/LC that are within the temporary buffer : Evergreen Forest (10), Mixed Forest (11).
4 - Eliminate the Step 2 buffer.
5 - Run Ecology Terrestrial Model.
6 - Aggregate all adjacent polygons, dissolve internal boundaries, and eliminate all 'donut holes' that are not associated with development.

Justifications: 43

Methodology_Ref: I.G.8. Deciduous Forest Lepidoptera

Species

Asterocampa clyton, Calephelis borealis, Satyrium edwardsii, Satyrium favonius ontario

Steps

1 - Select all EOs with IA_Model= 01ETER_DCF.
2 - Apply a temporary 1 kilometer buffer.
3 - Select the following habitats CCAP 2006 LU/LC that are within the temporary buffer: Deciduous Forest (9), Mixed Forest (11).
4 - Eliminate the Step 2 buffer.
5 - Run Ecology Terrestrial Model.
6 - Aggregate all adjacent polygons, dissolve internal boundaries, and eliminate all 'donut holes' that are not associated with development.

Justifications: 43

Methodology_Ref: I.G.9. Understory Foodplant Lepidoptera Associated with Openings

Species

Atrytonopsis hianna, Callophrys irus, Dargida rubripennis, Erynnis martialis, Glena cognataria, Plebejus melissa samuelis, Sympistis dentata

Steps

1 - Select all EOs with IA_Model= 01ETER_USF.
2 - Apply a temporary 1.3 kilometer buffer.
3 - Select the following NYNHP natural community EOs that intersect with the buffer: Dwarf Pine Plains, Hempstead Plains, Maritime Dunes, Maritime Grassland, Maritime Heathland, Maritime Pitch Pine Dune Woodland, Pitch Pine-Oak-Heath Woodland, Pitch Pine Oak Forest, and Pitch Pine-Scrub Oak Barrens, Pitch-Pine Oak Heath Rocky Summit, Dwarf Pine Ridges. (If a natural community EO is not selected, then the Important Area is represented by the Important Area is represented by the EO.)

4 - Clip the results from Step 3 with the temporary buffer (Step 2).
5 - Remove temporary buffer.
6 - Run Ecology Terrestrial Model.
7 - Aggregate all adjacent polygons, dissolve internal boundaries, and eliminate all 'donut holes' that are not associated with development.

Justifications: 43

Methodology_Ref: I.H.1. Basic Estuarine: Salt Marsh

Species

Erythrodiplax berenice, Ammodramus maritimus

Steps

1 - Select all EOs with IA_Model= 01EEST_G01, 01HEST_G01.
2 - Run the Estuarine Community Model for "salt marsh".
3 - Aggregate all adjacent polygons, dissolve internal boundaries, and eliminate all 'donut holes' that are not associated with development.

Justifications: 28, 69

Methodology_Ref: I.H.2.a. Basic Estuarine: Woody Tidal

Species

Egretta thula, Nyctanassa violacea

Steps

1 - Select all EOs with IA_Model= 01EEST_G02, 01HEST_G02.
2 - Run the Estuarine Community Model for "woody tidal communities".
3 - Aggregate all adjacent polygons, dissolve internal boundaries, and eliminate all 'donut holes' that are not associated with development.
4 - Clip the results for EO ID 7557 (Snowy Egret) 2.8 km* from the EO boundary. *2.8 km is the lower distance of the foraging range.

Justifications: 35

Methodology_Ref: I.H.2.b. Wading Bird Foraging Area

Species

Egretta thula, Nyctanassa violacea

Steps

1 - Select all EOs with IA_Model= 01EEST_G02, 01HEST_G02.
2 - Apply a 5 kilometer buffer to the EO boundary that includes the following habitats from CCAP 2006 LU/LC: Grassland (8), Estuarine Emergent Wetland (18), Open Water (rivers, ponds, but not open marine habitat).
3 - Aggregate all adjacent polygons, dissolve internal boundaries, and eliminate all 'donut holes' that are not associated with development.

Justifications: 35

Methodology and Justifications for Important Area Animal Models
Hudson River Valley Important Areas 2018

Part II -- **Justifications**

based on life histories and habitats for the methodologies described in Part I

1 - Mollusks

Notes:

Freshwater mussels are susceptible to habitat loss and degradation due to a variety of factors. These factors include, but are not limited to, water temperature changes that result from human-induced activities, siltation, scouring, industrial and agricultural contaminants, and barriers between populations. Mussels included in this project are dependent upon several host fish species, which may also require stable water quality or lack of barriers (especially for anadromous host fishes). In order to preserve water quality and identify areas important to freshwater mussels, it makes sense to define the watershed that each occurrence falls within. Once defined, all waters upstream of the mussel occurrence should be delineated and appropriately buffered to protect these waters from potentially negative impacts that could impact a mussel occurrence farther downstream (e.g., siltation, contaminant loads, etc.). However, a buffer of this type presents challenges as the areas depicted become so large that they are often impractical for conservation planning efforts. Therefore, a buffer distance of 3 km will be applied to the NYNHP EO boundary in order to capture the EO and the associated section of stream that is likely to be important to the species being buffered. Freshwater mussels that sometimes have occurrences in lakes, like Ligumia nasuta, should be adequately protected by applying a lacustrine (palustrine) community buffer to the lake and associated wetland boundary.

Citations:

NatureServe. 2011. NatureServe Explorer: An online encyclopedia of life [web application]. Version 7.1. NatureServe, Arlington, Virginia. Available http://www.natureserve.org/explorer. (Accessed: December 5, 2011).

Strayer, David L. and K.J. Jirka. 1997. The Pearly Mussels (Bivalva: Unionoidea) of New York State. New York State Museum Memoir 26. The New York State Education Department.

Strayer, David L., J.A. Dowling, W.R. Haag, T.L. King, J.B. Layzer, T.J. Newton and S.J. Nichols. 2004. Changing perspectives on Pearly Mussels, North America's most Imperiled Animals. BioScience 54:429-439.

2 - Odonates

Notes:

Odonates are dependent on various types of aquatic habitats for breeding and larval maturation, as well as surrounding forested areas for adult maturation, foraging, and roosting. The riverine and palustrine community buffers should adequately designate areas important to odonates with the selections of wetland habitats that provide aquatic vegetation to lay their eggs and allow immatures to reach adulthood. In addition, the upland buffer used in the Ecology methodologies includes a baseline of 163m or more. This distance appears to be appropriate for lentic and lotic habitats to capture most of the upland habitats used for maturing individuals.

Citations:

4 - Freshwater Fishes

Notes:

Fish are susceptible to habitat loss and degradation due to a variety of factors. These factors include, but are not limited to, water temperature changes that result from human-induced activities, siltation, scouring, industrial and agricultural contaminants, and barriers to movement and between populations. In order to preserve water quality and identify areas important to fish, it makes sense to define the watershed that each occurrence falls within. Once defined, all waters upstream of the fish should be delineated and appropriately buffered to protect these waters from potentially negative impacts that could impact a fish occurrence farther downstream (e.g., siltation, contaminant loads, etc.). However, a buffer of this type presents challenges as the areas depicted become so large that they are often impractical for conservation planning efforts. Therefore, a buffer distance of 3 km will be applied to the original location in order to capture the known habitat and the associated section of stream that is likely to be important to the species being buffered. Fish that have occurrences in lakes should be adequately protected by applying a lacustrine (palustrine) community buffer to the lake and associated wetland boundary. Note: Comely Shiner is not actively tracked by NYNHP. We obtained point locations only. Data were not reviewed at the same level as Element Occurrences.

Citations:

NatureServe. 2011. NatureServe Explorer: An online encyclopedia of life [web application]. Version 7.1. NatureServe, Arlington, Virginia. Available http://www.natureserve.org/explorer. (Accessed: December 5, 2011).

New York State Department of Environmental Conservation, Bureau of Fisheries. 2011. Statewide fisheries database version 40.

Smith, C.L. 1985. The Inland Fishes of New York State. New York State Department of Environmental Conservation. Albany, NY. 522pp.

5 - Riparian Tiger Beetle

Notes:

Tiger beetles are known to be long-distance dispersers (Pearson and Vogler 2001) but few data exist on distances traveled within one season. Hudgins et al. (2011) documented a C. marginipennis that moved over 300 m from one cobble bar to another in 2008. Capturing the stretches of river/stream in between known occupied polygons is important because 1) suitable but unsurveyed habitat is likely to occur in between known occupied sites; 2) some sites without documented presence might have tiger beetles present in subsequent years; and 3) cobble bars are dynamic, with sedimentation patterns changing the location, size, and composition of cobble bars frequently. The Riverine community model is appropriate for riparian tiger beetles because disturbances in the watershed that increase sedimentation could negatively affect burrowing larvae, especially during flood events. Deposition of sediments on cobble bars has been associated with subsequent lack of use by adult tiger beetles (D. Basset, personal communication).

Citations:

Basset, D. 2007. Personal communication. Letchworth State Park, Mount Morris, NY.

Hudgins, R., C. Norment, M. Schlesinger, and P. Novak. 2011. Habitat selection and dispersal of the cobblestone tiger beetle (Cicindela marginipennis) along the Genesee River, NY. Am. Midl. Nat. 165:204-318.

Pearson, D. L. and A. P. Vogler. 2001. Tiger beetles: The evolution, ecology, and diversity of the Cicindelids. Cornell University Press, Ithaca, NY.

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7 - Eurycea longicauda (Longtail Salamander) - Palustrine

Notes:

Longtail Salamanders generally occur at the margins of streams and wetlands (e.g., marsh). Typically, they remain within 20-30 meters of these aquatic habitats (Semlitsch and Bodie 2003). We suggest capturing the continuous wetland area that intersects the salamander EOs and protecting this wetland area with the amphibian buffer suggested by Semlitsch and Bodie (2003) to adequately protect the core wetland. The following is the amphibian buffer suggested by Semlitsch and Bodie (2003): “We propose the stratification should include three terrestrial zones adjacent to core aquatic wetland habitats: (1) a first terrestrial zone immediately adjacent to the aquatic habitat, which is restricted from use and designed to buffer the core aquatic habitat and protect water resources; (2) starting again from the wetland edge and overlapping with the first zone, a second terrestrial zone that encompasses the core terrestrial habitat defined by semi-aquatic focal-group use (e.g., amphibians 159-290 m); and (3) a third zone, outside the second zone, that serves to buffer the core terrestrial habitat from edge effects from surrounding land use (e.g., 50 m; Murcia 1995).” As this “buffer” is designed to protect upland habitat as well as the wetland for amphibians in general, and is greater than the NYNHP palustrine buffer, it seems appropriate to use this instead of the palustrine buffer in order to protect all areas that may be potentially used by the salamanders.

Citations:

NatureServe. 2011. NatureServe Explorer: An online encyclopedia of life [web application]. Version 7.1. NatureServe, Arlington, Virginia. Available http://www.natureserve.org/explorer. (Accessed: December 5, 2011).

Semlitsch, Raymond D. and J. Russel Bodie. 2003. Biological criteria for buffer zones around wetlands and riparian habitats for amphibians and reptiles. Conservation Biology 17(5):1219-1228.

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11 - Glyptemys muhlenbergii (Bog Turtle)

Notes:

To ensure the continued persistence of bog turtle populations at each site, overlapping state and national wetland boundaries will be incorporated into the site, as bog turtle “sites” are generally part of larger wetland complexes. In order to protect the viability of the smaller bog turtle component of these wetland complexes, the surrounding wetlands must also be protected. Stream corridors (Hydro 24 lines) will also be included in the initial steps of the methodology to capture wetland/stream corridors that may connect “closely associated” bog turtle sites. With this included, some streams that are not “important” to the protection of the bog turtle EO may be captured. However, if eliminating these “unimportant” sections of the resulting polygons means that we have to remove this data layer from the model, we will end up dividing our larger polygons into smaller units and lose some of these connections in some areas; connections that may be important to the conservation of metapopulations. Therefore, we have decided to keep the stream (Hydro 24) layer, which will explain why some areas such as mountainside streams show up in the model.

To ensure connectivity between adjacent sites and protect dispersal corridors, all continuous wetlands within 1 km of the identified bog turtle habitat should be included. These connecting corridors are essential for providing routes of dispersal between known sites or areas of suitable habitat. Barriers and non-habitat (i.e., class 1 and 2 roads, and developed areas) will break up or separate polygons, as it can safely be assumed that these areas will not be used. In the case of class 1 and class 2 roads, even though individual turtles may successfully cross from time to time, repeated crossings will ultimately result in loss of individuals (through possible collection or road-mortality). Even though some polygons may be separated with this methodology, it should provide guidance on where connectivity issues may need to be addressed.

Citations:

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12 - Emydoidea blandingii (Blanding's Turtle)

Notes:

Blanding's turtles are known to make extensive overland movements between wetlands for nesting. Currently, the NYNHP depicts occurrences of Blanding's turtles as occupied wetlands, areas of known use as determined through radio-telemetry or other methods, or road-crossing records. In order to capture areas that are used outside of the depicted NY Heritage occurrences, we are using a methodology that captures wetlands and uplands within the known range of the Blanding's turtle, using conservative estimates. This methodology should create polygons that encompass the majority of the areas used by the turtles when making upland movements, as well as protecting the known occupied wetlands.

Citations:

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13 - Wetland Birds

Notes:

The natural community buffers for both Palustrine and Estuarine communities should capture important areas for breeding wetland birds and areas important to the integrity of the wetland. See the Natural Community (Ecology) Important Area methodology for Palustrine and Estuarine wetland justifications.

The mean home range size for Pied-billed Grebe is 1.31 hectares. However, areas as large as 35 hectares have been recorded. Typically, they defend the area within approximately 45 meters of the nest platform (Muller and Storer 1999). It can be difficult to locate this species because of their secretive nature.

One study in New York, found the Least Bittern mean home range size to be 9.7 hectares with a range of 1.8-35.7 hectares (Poole et al. 2009). There is little information on territoriality of Least Bittern.

Vennesland and Butler (2011) summarized the average distance Great Blue Herons travel to foraging areas as about 3km, but they have been known to travel up to 30 km.

Citations:

Gibbs, J.P., and S.M. Melvin. 1992. Least bittern, Ixobrychus exilis. pgs. 71-88 in K.J. Schneider and D.M. Pence, eds. Migratory nongame birds of management concern in the northeast. United States Department of the Interior, Fish and Wildlife Service, Newton Corner, MA. 400 pp.

Gibbs, J. P., and S. M. Melvin. 1992. Pied-billed grebe, Podilymbus podiceps. Pages 31-49 in K. J. Schneider and D. M. Pence, editors. Migratory nongame birds of management concern in the Northeast. U.S. Fish and Wildlife Service, Newton Corner, Massachusetts. 400 pp.

Muller, Martin J. and Robert W. Storer. 1999. Pied-billed Grebe (Podilymbus podiceps), The Birds of North America Online (A. Poole, Ed.). Ithaca: Cornell Lab of Ornithology; Retrieved from the Birds of North America Online: http://bna.birds.cornell.edu/bna/species/410doi:10.2173/bna.410

NatureServe. 2010. NatureServe Explorer: An online encyclopedia of life [web application]. Version 7.1. NatureServe, Arlington, Virginia. Available http://www.natureserve.org/explorer. (Accessed: May 11, 2011).

New York Natural Heritage Program. 2011. Online Conservation Guide for Rallus elegans. Available from: http://www.acris.nynhp.org/guide.php?id=6838. Accessed February 13th, 2013.

Poole, Alan F., Peter Lowther, J. P. Gibbs, F. A. Reid and S. M. Melvin. 2009. Least Bittern (Ixobrychus exilis), The Birds of North America Online (A. Poole, Ed.). Ithaca: Cornell Lab of Ornithology; Retrieved from the Birds of North America Online: http://bna.birds.cornell.edu/bna/species/017doi:10.2173/bna.17

Vennesland, Ross G. and Robert W. Butler. 2011. Great Blue Heron (Ardea herodias), The Birds of North America Online (A. Poole, Ed.). Ithaca: Cornell Lab of Ornithology; Retrieved from the Birds of North America Online: http://bna.birds.cornell.edu/bna/species/025 doi:10.2173/bna.25

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19 - Sterna hirundo (Common Tern)

Notes:

Common terns nest in colonies in a variety of habitats. Along coastlines they nest on sandy mainland beaches, dredge spoil islands, barrier islands, and salt marshes. Inland, they nest on rocky, barren islands in rivers and lakes, freshwater marshes, and on artificial structures including navigation lights (Karwowski 1995), rafts, platforms, and barges. Terns have a tendency to return to the same nesting area year after year if breeding has been successful at that location during previous years. Substrates consist of sand, gravel, or shell with enough vegetation for shelter and protection (Nisbet 2002).

The Ecology Important Area methodology for “salt marsh” estuarine communities should capture the important areas for Common Terns that breed in wetlands on Long Island. (See the Ecology justifications for more details).

A 200 meter buffer will be applied to terrestrial nesting Common Tern occurrences based on average distance in which human activity will not disturb colonial waterbird colonies is 200 m (Erwin 1989; Rodgers and Smith 1995; Kress and Hall 2002).

Citations:

Cuthbert, F.J., L. R. Wires, and K. Timmerman. 2003. Status assessment and conservation recommendations for the Common Tern (Sterna hirundo) in the Great Lakes Region. U.S. Department of the Interior, Fish and Wildlife Service, Ft. Snelling, MN.

Erwin R. M. 1989. Responses to human intruders by birds nesting in colonies: experimental results and management guidelines. Colonial Waterbirds 12: 104-108.

Gochfeld, M. 1978. Observations on feeding ecology and behavior of Common Terns. Kingbird 28: 84-90.

Karwowski, K., J. E. Gates, and L. E. Harper. 1995. Common Terns nesting on navigational aids and natural islands in the St. Lawrence River, New York. Wilson Bulletin 107: 423-436.

Kress S. W. and C. S. Hall. 2002. Tern management handbook: coastal northeastern United States and Atlantic Canada. Prepared for the US Fish and Wildlife Service in cooperation with the Canadian Wildlife Service.

Nisbet I. C. 2002. Common Tern (Sterna hirundo). The birds of North America online (A. Poole, Ed.). Ithaca: Cornell Lab of Ornithology.

Rodgers J. A. Jr. and H. T. Smith. 1995. Set-back distances to protect nesting bird colonies from human disturbance in Florida. Conservation Biology 9: 89-99.

20 - Sceloporus undulatus (Fence Lizard)

Notes:

Fence lizard dispersal distances have not been well documented. In addition, home range sizes are small (NatureServe 2010). NatureServe (2010) suggested a separation of 1 km for unsuitable habitat and 5 km for suitable habitat with the following justification:

“The separation distance for suitable habitat is a compromise between the typical sedentary habits of these lizards, their physical ability to cover fairly large distances in a short period of time, their tendency to occur throughout patches of suitable habitat, and the likely low probability that two occupied locations separated by less than several kilometers of suitable habitat would represent independent populations.”

Given this sedentary nature and the recommended inferred minimum extent of habitat use (when actual extent is unknown) is 0.2 km (NatureServe 2010), a buffer of this distance should capture additional habitat around the known EO that the fence lizards may use at various times.

Citations:

NatureServe. 2010. NatureServe Explorer: An online encyclopedia of life [web application]. Version 7.1. NatureServe, Arlington, Virginia. Available http://www.natureserve.org/explorer. (Accessed: December 22, 2010).

21 - Carphophis amoenus (Eastern Wormsnake)

Notes:

Eastern wormsnake is a secretive species making it difficult to study movement patterns. Studies by Barbour et al. (1969, cited in NatureServe 2010) and Clark (1970, cited in NatureServe 2010) found that eastern wormsnakes generally have a home range size that is less than 1 ha.

Given this sedentary nature and a recommended inferred minimum extent of habitat use (when actual extent is unknown) is 0.2 km, a buffer of this distance will hopefully capture additional habitat around the known EO that the Eastern Wormsnakes may use at various times.

Citations:

NatureServe. 2010. NatureServe Explorer: An online encyclopedia of life [web application]. Version 7.1. NatureServe, Arlington, Virginia. Available http://www.natureserve.org/explorer. (Accessed: January 4, 2011).

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22 - Sterna hirundo (Common Tern)- Foraging Area

Notes:

Nisbet's (2002) review of literature suggests that common terns forage over open water 100 m - >20 km away from breeding sites. This vast range is largely based on location and abundance of prey. Nisbet (2002) also references foraging studies conducted in Lake Ontario in which the mean foraging distance of 99 male common terns making over 1000 trips was 2.4 – 4.2 km. An observation on 29 May 1960 at Jones Inlet, Nassau County, New York described common terns consistently flying out to forage in an area about 3 km away from the nesting colony (Gochfeld 1978). A 5 km buffer here seems appropriate; being over the mean but under the maximum distance recorded in several foraging studies.

Citations:

Gochfeld, M. 1978. Observations on feeding ecology and behavior of Common Terns. Kingbird 28: 84-90.

Nisbet I. C. 2002. Common Tern (Sterna hirundo). The birds of North America online (A. Poole, Ed.). Ithaca: Cornell Lab of Ornithology.

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23 - Haliaeetus leucocephalus (Bald Eagle) and Aquila chrysaetos (Golden Eagle)

Notes:

Federal Bald Eagle Guidelines and consultation with Pete Nye recommend a 1500 foot buffer for Bald Eagle nests. This is meant to protect the nest sites from disturbance that may cause nest abandonment.

This model starts out by buffering the foraging and wintering areas (01EALL_NBR) by 300 feet to capture perching areas immediately adjacent to the EO. For our EOs along the Neversink and Delaware Rivers, we first capture the river layer that intersects the EO boundary and we buffer this by 300 feet and then merge that with the EO boundary. This is because these particular EOs, while generally following the river shoreline, are sometimes less than or greater than 300 feet from the river shoreline at different points along the river. By buffering the river layer that intersects the EO boundary, we are ensuring that the shoreline is buffered by a minimum of 300 feet at any location along the river. Steps 2 and 3 buffers the nest point locations (01EALL_BEN) and winter roosting areas (01ALL_BER) by 1500 feet. This is a buffer in the Federal Guidelines for bald eagle nests and it is meant to protect the nests (and roosts) from any disturbance that would likely cause eagle abandonment of the site. Step 4 captures the portions of open water bodies (i.e., lakes, rivers, reservoirs) where the nest is located and within 5 km of the nest site. This distance is based on the actual area used by nesting Bald Eagles on the Hudson River, approximately 10 km total distance up and downriver from nest locations and seems appropriate to apply to reservoirs and lakes as well. Step 5 captures the mouths of Hudson River tributaries which are often heavily used by Hudson River bald eagles. Step 6 buffers this waterbody layer that was captured in step 5 by 300 feet to protect perch sites in the important area (Note: perhaps step 1 can be eliminated as step 6 applies the 300 foot buffer) and step 7 merges all layers for the final Important Area boundary.

Citations:

Nye, Peter. pers. comm. 2007. NYS DEC, Albany, NY

Schlesinger, Matt. 2009. personal communication, NYNHP.

U.S. Fish and Wildlife Service. 2000. National Management Guidelines for Bald Eagles. U.S. Fish and Wildlife Service, Division of Migratory Bird Management, 4401 North Fairfax Drive, Suite 634, Arlington, Virginia 22203-1610. 14 pp.

Wenger, S. 1999. A review of the scientific literature on riparian buffer width, extent, and vegetation, Institute of Ecology Office of Public Outreach and Service, University of Georgia, Athens, GA. 59 pp.

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25 - Lithobates kaufeldi (Atlantic Coast Leopard Frog)

Notes:

Little is known about movements of Atlantic Coast leopard frog. It is assumed movement distances of northern leopard frog are similar and therefore were used to create the IA methodology for Atlantic Coast leopard frog. Northern leopard frog summer movements range from a few meters to 45 m. However, movements increase during nocturnal rains to as much as 200 m. Fall migration to overwintering sites can be up to two miles from breeding sites. Using the fall migration movements would create areas too large for the purposes of these models, so 200 m was used to capture nearby habitats.

Note: In Important Areas prior to 2014, this species was thought to be Lithobates sphenocephalus (southern leopard frog). Geneic studes revaled a new species: Lithobates kaufeldi (Atlantic coast leopard frog). Methodology and the justification has not changed, but the scientific and common names have changed.

Citations:

Semlitsch, Raymond D. and J. Russel Bodie. 2003. Biological criteria for buffer zones around wetlands and riparian habitats for amphibians and reptiles. Conservation Biology 17(5):1219-1228.

United States Environmental Protection Agency. no date. Species Profile: Northern Leopard Frog. http://www.epa.gov/ne/ge/thesite/restofriver/reports/final_era/B%20-%20Focus%20Species%20Profiles/EcoRiskProfile_leopard_frog.pdf (Accessed July 14, 2010).

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26 - Scaphiopus holbrookii (Eastern Spadefoot)

Notes:

Little is known about eastern spadefoot movements as they are a secretive toad that spends most of its life underground. Habitats include sand, gravel, or soft soil types in forested or more open areas. This species is known to migrate up to “several hundred meters” to and from suitable breeding habitat (NatureServe 2010). For purposes of these models, several hundred meters is represented by 500 m.

Citations:

NatureServe. 2010. NatureServe Explorer: An online encyclopedia of life [web application]. Version 7.1. NatureServe, Arlington, Virginia. Available http://www.natureserve.org/explorer. (Accessed: November 17, 2010).

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28 - Salt Marsh Birds

Notes:

Most of the birds in this model have small home ranges and typically forage within the wetland in which they breed. The exception to this is Laughing Gull. It appears that Laughing Gulls will use a wide variety of foraging habitats including those with a variety of human activities (Burger 1996). Burger and Galli (1987) suggest that it is probable that resident gulls are less likely to respond to human activities if they have remained unharmed at a particular location in the past. We decided that it was most important to determine the areas that are most important for nesting Laughing Gulls since they have some tolerance of disturbances in their foraging range.

In a study conducted in Massachusetts, the mean home range for Seaside Sparrow was 3,953 m^2 (Marshall and Reinert 1990). In another study on Long Island, Post (1974) found that Seaside Sparrows that occurred in unaltered salt marshes had a mean foraging range of 1,039 m^2 (range 170-5,135 m^2) and those that inhabited altered salt marshes had a larger mean foraging range of 8,121 m^2 (range 520-17,510 m^2). Post (1974) also found that some Seaside Sparrows foraged outside of the defended territory, while Marshall and Rienert (1990) found that the birds foraged within their territories.

Little is known about Black Rail foraging habits and home range sizes (Eddleman et al. 1994). Davidson (1992) estimated territories of 3-4 ha in Maryland.

Forster’s Terns tend to forage within or close to the wetlands in which they breed (McNicholl et al. 2001, McNicholl 1980, Baltz et al. 1979) and in waters ≤1 meter (Baltz et al. 1979). Specific distances from the breeding wetland were not found. Since there is evidence that they tend to stay close to the breeding wetland, we decided the Important Area for foraging should be the same as the breeding wetland.

The natural community buffer for estuarine communities (e.g., salt marshes) should capture important areas for breeding salt marsh birds and areas important to the integrity of the wetland. See the Natural Community (Ecology) Important Area methodology and justification for Estuarine methodology and justification.

Citations:

Baltz, D.M., G.V. Morejohn, and B.S. Antrim. 1979. Size and selective predation and food habits of two California terns. West. Birds 10:17-24.

Burger, Joanna and Joan Galli. 1987. Factors affecting distribution of gulls (Larus spp.) on two New Jersey coastal bays. Environmental Conservation 14:59-65.

Burger, Joanna. 1996. Laughing Gull (Leucophaeus atricilla), The Birds of North America Online (A. Poole, Ed.). Ithaca: Cornell Lab of Ornithology; Retrieved from the Birds of North America Online: http://bna.birds.cornell.edu/bna/species/225 doi:10.2173/bna.225

Davidson, L.M. 1992. Black rail, Laterallus jamaicensis. pgs. 119-134 in K.J. Schneider and D.M. Pence, editors. Migratory nongame birds of management concern in the northeast. U.S. Department Interior, Fish and Wildlife Service, Newton Corner, MA. 400 pp.

Eddleman, W.R., R.E. Flores and M. Legare. 1994. Black Rail (Laterallus jamaicensis), The Birds of North America Online (A. Poole, Ed.). Ithaca: Cornell Lab of Ornithology; Retrieved from the Birds of North America Online: http://bna.birds.cornell.edu/bna/species/123 doi:10.2173/bna.123

Greenlaw, J.S. 1992. Seaside sparrow, Ammodramus maritimus. pgs. 211-232 in K.J. Schneider and D.M. Pence, editors. Migratory nongame birds of management concern in the northeast. U.S. Department Interior, Fish and Wildlife Service, Newton Corner, MA. 400 pp.

Marshall, R.M. and S.E. Reinert. 1990. Breeding ecology of Seaside Sparrows in a Massachusetts salt marsh. Wilson Bull. 102:501-513.

McNicholl, M.K. 1980. Territories of Forster’s Terns. Colon. Waterbirds Group 3:196-203.

McNicholl, Martin K., Peter E. Lowther and John A. Hall. 2001. Forster's Tern (Sterna forsteri), The Birds of North America Online (A. Poole, Ed.). Ithaca: Cornell Lab of Ornithology; Retrieved from the Birds of North America Online: http://bna.birds.cornell.edu/bna/species/595 doi:10.2173/bna.595

NatureServe. 2010. NatureServe Explorer: An online encyclopedia of life [web application]. Version 7.1. NatureServe, Arlington, Virginia. Available http://www.natureserve.org/explorer. (Accessed: May 11, 2011).

Post, W. 1974. Functional analysis of space-related behavior in the Seaside Sparrow. Ecology 55:564-575.

Post, William, W. Post and J.S. Greenlaw. 2009. Seaside Sparrow (Ammodramus maritimus), The Birds of North America Online (A. Poole, Ed.). Ithaca: Cornell Lab of Ornithology; Retrieved from the Birds of North America Online: http://bna.birds.cornell.edu/bna/species/127 doi:10.2173/bna.127

Salt, G.W. and D.E. Willard. 1971. The hunting behavior and success of Forster's Tern. Ecology 52:989-998.

29 - Woodland Birds (Oporonis formosus (Kentucky Warbler))

Notes:

Kentucky Warblers are typically found in bottomland hardwood stands or other woodlands near streams. They require a dense understory with a well-established ground cover (McDonald 1998). Gibbs and Faaborg (1990) found that this species is tolerant of some forest fragmentation.

Nott (2000) found that Kentucky Warbler breeding success was directly correlated with forest patch size. Breeding success was higher at sites 21 ha or larger (Nott 2000). Any EOs with a patch size < 21 ha will be increased to that amount based on availability of suitable habitat. EOs ≥ 21 ha will not be buffered.

Citations:

Gibbs, J.P. and J. Faaborg. 1990. Estimating the viability of Ovenbird and Kentucky Warbler populations in forest fragments. Conserv. Biol. 4:193-196.

McDonald, Mary Victoria. 1998. Kentucky Warbler (Oporornis formosus), The Birds of North America Online (A. Poole, Ed.). Ithaca: Cornell Lab of Ornithology; Retrieved from the Birds of North America Online: http://bna.birds.cornell.edu/bna/species/324 doi:10.2173/bna.324

NatureServe. 2010. NatureServe Explorer: An online encyclopedia of life [web application]. Version 7.1. NatureServe, Arlington, Virginia. Available http://www.natureserve.org/explorer. (Accessed: May 11, 2011).

Nott, M. Philip. 2000. Identifying management actions on DOD Installations to reverse declines in Neotropical birds. Available from: https://www.denix.osd.mil/denix/Public/ES-Programs/Conservation/Legacy/Neo-Tropical/neotropical.html.

30 - Grassland/Marsh Raptors (Breeding)

Notes:

Areas of approximately 50 ha (124 acres) or larger of low, open grasslands or similar habitat with abundant small mammal populations should be considered as potential breeding or wintering habitat for short-eared owls. Short-eared owl breeding territories average 64-74 hectares (Holt 1992, Clark 1975). The largest territory recorded in Scotland was 156 hectares. In North America, the largest documented territory was 137.2 hectares (Tate 1992).

The wintering/breeding areas documented for northern harrier range between 1 km2 and 40 km2 per pair (approximately 247 and 9,884 acres per pair). Vickery et al. (1994) suggested that Northern Harriers and Short-eared Owls prefer breeding habitats ≥ 200ha.

Barn Owl habitat includes non-forested wetlands (salt marshes, wetlands) and grassland habitats, including abandoned agricultural land. They have large home ranges than can span between 198 and 921 hectares. Some scientists suggest that Barn Owls need between 60 and 260 ha of suitable habitat (see notes in comp book). Nests are typically in cavities of trees, nest boxes, and buildings. It appears that they defend the area around the nest, but not the foraging habitat (Marti et al. 2005).

Since short-eared owls are similar in size to northern harriers and often co-exist on wintering grounds, we are recommending that they also be included in the same model as northern harrier (Paul Novak recommendation 9/9/04). Barn Owls have less overlap with Short-eared Owls and Northern Harriers and according to some literature review may require slightly more area for foraging. However, general habitat preferences and area needed are similar enough to be included in the same model. We decided to use 50 ha instead of a larger area because we wanted to use a size that will be useful conservation planning while being what appears to be large enough to identify sufficient habitat around the EO.

Citations:

Clark, R. J. 1975. A field study of the Short-eared Owl, Asio flammeus (Pontoppidan), in North America. Wildlife Monographs 47:1-67.

Macwhirter, R. Bruce and Keith L. Bildstein. 1996. Northern Harrier (Circus cyaneus), The Birds of North America Online (A. Poole, Ed.). Ithaca: Cornell Lab of Ornithology; Retrieved from the Birds of North America Online: http://bna.birds.cornell.edu/bna/species/210 doi:10.2173/bna.210

Marti, Carl D., Alan F. Poole and L. R. Bevier. 2005. Barn Owl (Tyto alba), The Birds of North America Online (A. Poole, Ed.). Ithaca: Cornell Lab of Ornithology; Retrieved from the Birds of North America Online: http://bna.birds.cornell.edu/bna/species/001 doi:10.2173/bna.1

NatureServe. 2010. NatureServe Explorer: An online encyclopedia of life [web application]. Version 7.1. NatureServe, Arlington, Virginia. Available http://www.natureserve.org/explorer. (Accessed: May 11, 2011).

Rosenburg, C. 1992. Barn owl, Tyto alba. pgs. 253-279 in K.J. Schneider and D.M. Pence, editors. Migratory nongame birds of management concern in the northeast. U.S. Department Interior, Fish and Wildlife Service, Newton Corner, MA. 400 pp.

Serrentino, P. 1992. Northern harrier, Circus cyaneus. pgs. 89-117 in K.J. Schneider and D.M. Pence, editors. Migratory nongame birds of management concern in the northeast. U.S. Department Interior, Fish and Wildlife Service, Newton Corner, MA. 400 pp.

Tate, G.R. 1992. Short-eared owl, Asio flammeus. pgs. 171-189 in K.J. Schneider and D.M. Pence, eds. Migratory nongame birds of management concern in the northeast. U.S. Department of the Interior, Fish and Wildlife Service, Newton Corner, MA. 400pp.

Vickery, P. D., M. L. Hunter, Jr., and S. M. Melvin. 1994. Effects of habitat area on the distribution of grassland birds in Maine. Conserv. Biol. 8:1087-1097.

Wiggins, D. A., D. W. Holt and S. M. Leasure. 2006. Short-eared Owl (Asio flammeus), The Birds of North America Online (A. Poole, Ed.). Ithaca: Cornell Lab of Ornithology; Retrieved from the Birds of North America Online: http://bna.birds.cornell.edu/bna/species/062 doi:10.2173/bna.62

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33 - Grassland birds (Upland Sandpiper)

Notes:

Upland sandpipers (Bartramia longicauda) are a grassland species that prefer the shelter of tall grass for nesting and brood cover. Shorter grasses are used for foraging and courtship displays. For successful breeding and chick rearing, Upland Sandpipers require a relatively large home range size. (Carter 1992). Jones and Vickery (1997) suggested a minimum of 150 acres (61 ha) and Vickery et al. 1994 stated that upland sandpipers prefer habitats larger than 200 ha in Maine. Most models in New York won't approach 61 ha, so we should at least capture contiguous suitable habitat within the home range of the species from the EO boundary. Reported home range size varied from 8.5 ha to 85.6 ha in Wisconsin (Ailes and Toepfer 1977 from Houston and Bowen 2001). The largest home range reported here, 87.5 ha is approximately equivalent to a circle with a radius of 0.5 kilometers. Therefore, if the mapped area of the EO is less than 61 ha (150 acres), the model will capture all contiguous suitable habitat within 0.5 km or until the polygon size equals 61 ha, whichever comes first.

Fragmentation of Henslow's Sparrow (Ammodramus henslowii) breeding habitats should be prevented. In Illinois, this species is rarely encountered on grassland fragments of less than 100 ha). In New York, this species is present in pastures consisting of at least 30 ha of grassland (Smith and Smith 1990). This result corresponds to the casual observations of Zimmerman (1988) in Kansas, who recommends that management should be carried out on plots of at least 30 ha. These values also fall within Samson's (1980) estimation of 10-100 ha as the minimum area required to support a viable breeding population, though Samson does not elaborate upon the basis for his conclusions. Peterson's (1983) study in Broome County, New York, found that occurrence was related to distance from the horizon, a measure strongly correlated with grassland area. The calculated mean of these ranges (100 ha, 30 ha, 30 ha, and 10-100 ha) results in 54 ha (133 acres). Although territory size is significantly smaller than for upland sandpiper, 0.3-0.6 ha (NatureServe 2013), this species will be included in the same model as minimum suitable habitat size is approximately equal.

Citations:

Ailes, I.W. and J.E. Toepfer. 1977. Home range and daily movement of radio-tagged upland sandpipers in central Wisconsin. Inland Bird Banding News 49: 203-212.

Carter, J.W. 1992. Upland sandpiper, Bartramia longicauda. Pages 235-252 in K.J. Schneider and D.M. Pence, editors. Migratory nongame birds of management concern in the northeast. U.S. Department Interior, Fish and Wildlife Service, Newton Corner, MA. 400 pp.

Houston, C. Stuart and Daniel E. Bowen, Jr. 2001. Upland Sandpiper (Bartramia longicauda), The Birds of North America Online (A. Poole, Ed.). Ithaca: Cornell Lab of Ornithology; Retrieved from the Birds of North America Online:
http://bna.birds.cornell.edu/bna/species/580
doi:10.2173/bna.580

Jones, A.L. and P.D. Vickery. 1997. Conserving grassland birds: managing agricultural lands including hayfields, crop fields, and pastures for grassland birds. Massachusetts Audubon Society, Lincoln, MA

Melvin, Scott M.; Vickery, Peter D.; Hunter, Jr., Malcolm L. Effects of habitat area on the distribution of grassland birds in Maine. Conservation Biology, Dec1994, Vol. 8 Issue 4, p1087-1097, 11p

Smith, D.J., and C.R. Smith. 1990. Summer bird species diversity and the use of pastures by summer birds of the Finger Lakes National Forest. U.S. Dept. of Agric., Forest Serv., Green Mountain Natl. Forest, Final Proj. Rep. P.O. No. 40-1681-9-0470, Middlebury, VT. 55pp.

Vickery, P. D., M. L. Hunter, Jr., and S. M. Melvin. 1994. Effects of habitat area on the distribution of grassland birds in Maine. Conserv. Biol. 8:1087-1097.

34 - Falco peregrinus (Peregrine Falcon)- Manmade Structures

Notes:

Loucks (personal communication 2010) stated that it would be difficult to add a meaningful buffer to Peregrine Falcon Element Occurrences that are located on manmade structures, especially in areas with frequent human presence. Therefore, the Important Area will be the Element Occurrence boundary without additional buffers. However, when maintenance is needed in close proximity to an active eyrie, NYS DEC staff should be consulted to determine ways to minimize disturbances to the birds.

Citations:

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35 - Estuarine Wading Birds (Woody Tidal)

Notes:

The natural community buffers for Estuarine communities should capture important areas for breeding wading birds and areas important to the integrity of the wetlands in which they breed. See the Natural Community (Ecology) Important Area methodology for estuarine wetland methodology and justification. These birds nest in groups (colonial) and are not considered territorial. An additional Important Area has been established for foraging areas because these birds often forage away from the colony site.

Foraging distance are somewhat variable for these species. The following distances have been recorded:
Yellow-crowned Night-heron 1.4 kilometers (mean)
Glossy Ibis 7.3 kilometers (NatureServe 2010)
Snowy Egret 2.8-5 kilometers (NatureServe 2010)
Tri-colored Heron 6.7 km (mean, Freshwater), 10.2 (mean, Marine), 2.9 km (coastal) (BNA)

A 5 kilometer buffer should capture the core foraging areas for these species even though the maximum distance is not included here.

Citations:

Davis, Jr., William E. and John Kricher. 2000. Glossy Ibis (Plegadis falcinellus), The Birds of North America Online (A. Poole, Ed.). Ithaca: Cornell Lab of Ornithology; Retrieved from the Birds of North America Online:
http://bna.birds.cornell.edu/bna/species/545doi:10.2173/bna.545

Frederick, Peter C. 1997. Tricolored Heron (Egretta tricolor), The Birds of North America Online (A. Poole, Ed.). Ithaca: Cornell Lab of Ornithology; Retrieved from the Birds of North America Online: http://bna.birds.cornell.edu/bna/species/306

NatureServe. 2010. NatureServe Explorer: An online encyclopedia of life [web application]. Version 7.1. NatureServe, Arlington, Virginia. Available http://www.natureserve.org/explorer. (Accessed: May 11, 2011).

Parsons, Katharine C. and Terry L. Master. 2000. Snowy Egret (Egretta thula), The Birds of North America Online (A. Poole, Ed.). Ithaca: Cornell Lab of Ornithology; Retrieved from the Birds of North America Online: http://bna.birds.cornell.edu/bna/species/489
doi:10.2173/bna.489

Rodgers, Jr., James A. and Henry T. Smith. 1995. Little Blue Heron (Egretta caerulea), The Birds of North America Online (A. Poole, Ed.). Ithaca: Cornell Lab of Ornithology; Retrieved from the Birds of North America Online: http://bna.birds.cornell.edu/bna/species/145 doi:10.2173/bna.145

Telfair II, Raymond C. 2006. Cattle Egret (Bubulcus ibis), The Birds of North America Online (A. Poole, Ed.). Ithaca: Cornell Lab of Ornithology; Retrieved from the Birds of North America Online: http://bna.birds.cornell.edu/bna/species/113 doi:10.2173/bna.113

Watts, Bryan D. 1995. Yellow-crowned Night-Heron (Nyctanassa violacea), The Birds of North America Online (A. Poole, Ed.). Ithaca: Cornell Lab of Ornithology; Retrieved from the Birds of North America Online: http://bna.birds.cornell.edu/bna/species/161 doi:10.2173/bna.161

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38 - Protonotaria citrea (Prothonotary Warbler)

Notes:

Prothonotary Warblers breed in wooded wetlands typically near slow-moving or standing water (Petit 1999). In addition, this species tends to prefer habitats greater than 100 ha and waterways with wooded borders over 30 m wide (Khal et al. 1985 cited in Petit 1999). Nests are constructed in the cavities of trees or nest boxes where available. Foraging areas range from 5.4 ha for females that are feeding nestlings to 3.7 ha for males (Reynolds 1997 cited in Petit 1999). Males have been documented to defend territories ranging from 0.5 ha (Petit 1989) to 1.5 ha (Walkinshaw 1953). Since these birds typically prefer a wetland system, it seems logical to use the palustrine community methodology in designating Important Areas for these occurrences. (Note: The methodology includes all palustrine habitats, which should work for this species. However, careful review of the results is needed when new EOs are added to the Important Areas to ensure sufficient wooded habitat is included.)

Citations:

Kahl, R.B., T.S. Baskett, J.A. Ellis, and J.N. Burroughs. 1985. Characteristics of summer habitats of selected nongame birds in Missouri. Res. Bull. 1056. Agric Exp. Sta., Univ. of Missouri, Columbia.

NatureServe. 2010. NatureServe Explorer: An online encyclopedia of life [web application]. Version 7.1. NatureServe, Arlington, Virginia. Available http://www.natureserve.org/explorer. (Accessed: May 11, 2011).

Petit, L.J. 1989. Breeding biology of Prothonotary Warblers in riverine habitat in Tennessee. Wilson Bull. 101:51-61.

Petit, Lisa J. 1999. Prothonotary Warbler (Protonotaria citrea), The Birds of North America Online (A. Poole, Ed.). Ithaca: Cornell Lab of Ornithology; Retrieved from the Birds of North America Online: http://bna.birds.cornell.edu/bna/species/408 doi:10.2173/bna.408

Reynolds, K.D. 1997. Accumulation of DDT and mercury in diets and selected tissues of Prothonotary Warblers (Protonotaria citrea) as related to foraging dynamics on a spatially heterogeneous contaminated site in Alabama. Master's Thesis. Clemson Univ. Clemson, SC.

Walkinshaw, L.H. 1953. Life-history of the Prothonotary Warbler. Wilson Bull. 65:152-168.

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39 - Acipenser brevirostrum (Shortnose Sturgeon)

Notes:

There is one Shortnose Sturgeon occurrence in New York State, the Hudson River. This species is known to use only the tidal portion of the river (NYC to Troy Dam) and its tributaries and associated estuaries (NatureServe 2010) . (Note: The Federal Dam in Troy is a barrier.) Fish that have been captured in the ocean were found close to shore (National Marine Fisheries Service 1998). The occurrence is mapped to the “Tidal River” community. Therefore, this occurrence follows Ecology's "tidal river" methodology.

Citations:

Hattala, Kathy. 2006. Species group report for shortnose sturgeon. Pages 63-65 of Appendix A3, Species group reports for marine fish in: New York State comprehensive wildlife conservation strategy. New York State Department of Environmental Conservation. Albany, NY.

National Marine Fisheries Service. 1998. Recovery Plan for the Shortnose Sturgeon (Acipenser brevirostrum). Prepared by the Shortnose Recovery Team for the National Marine Fisheries Service, Silver Spring, Maryland. 104 pages.

NatureServe. 2010. NatureServe Explorer: An online encyclopedia of life [web application]. Version 7.1. NatureServe, Arlington, Virginia. Available http://www.natureserve.org/explorer. (Accessed: June 6, 2011).

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40 - Menidia beryllina (Inland Silverside)

Notes:

Inland and Atlantic Silversides use similar estuarine habitats, but Atlantic Silverside can tolerate higher salinity (Weinstein 1986) and will use Marine habitat for part of its life cycle (Fay et al. 1983). Inland Silversides do not use Marine habitat. Therefore, the Inland and Atlantic silversides are in separate models. The Inland Silversides appear to have a small home range although there is little information available. Hoff (1972) found that all recaptured fish were within 100 meters of the tagging site. Extensive effort was made to locate fish farther away (Hoff 1972). The estuarine buffer for non-woody tidal communities should capture important areas for Inland Silverside.

Citations:

Heins, Steve. 2006. Species group report for estuarine forage species. Pages 31-36 of Appendix A3, Species group reports for marine fish in: New York State comprehensive wildlife conservation strategy. New York State Department of Environmental Conservation. Albany, NY.

Hoff, James G. 1972. Movements of adult tidewater silverside, Menidia beryllina (Cope), tagged in New England waters. American Midland Naturalist 88(2): 449-502.

Weinstein, M.P. 1986. Habitat suitability index models: inland silverside. U.S. Fish and Wildlife Service. Biol. Rep. 82(10.120). 25pp.

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41 - Menidia menidia (Atlantic Silverside)

Notes:

During the spring, summer, and fall, Atlantic Silversides are typically found in estuaries. During the winter months they appear to hibernate in deep Marine water as far as 15 km from shore. Therefore, the methodology for this species follows that of the Estuarine- non-woody tidal community. An additional buffer is added to include marine waters. However, an additional 5 km marine water buffer will be applied to community buffers instead of 15 km to capture potential winter habitat within New York State jurisdiction.

Citations:

Fay, C.W., R.J. Neves, and G.B. Pardue. 1983. Species profiles: life histories and environmental requirements of coastal fishes and ivertebratesinvertebrates (Mid-Atlantic) – Atlantic silverside. U.S. Fish and Wildlife Service, Division of Biological Services, FWS/OBS-82/11.10. U.S. Army Corps of Engineers, TR EL-82-4. 15 pp.

U.S. Fish and Wildlife Service. 1983. Species profiles: life histories and environmental requirements of coastal fishes and invertebrates. U.S. Fish and Wildlife Service, Division of Biological Services, FWS/OBS-82/11. U.S. Army Corps of Engineers, TR EL-82-4.

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43 - Lepidoptera: Terrestrial Habitat and/or Foodplant-based models

Notes:

When Lepidoptera are known to inhabit specific habitats, it seems appropriate to base the IA model on general habitat preferences of the species. For these models, a buffer was applied to the EO that is the average of the recommended Inferred Extent (IE) (NatureServe 2010) of all the species within the specific model. IE distances were used because the EO locations are typically, although not always, small, precise areas. In addition, home range and dispersal distances are more typically unknown than known. Suitable habitat within the buffer was selected, including non-contiguous habitat because many Lepidoptera species are known to at least fly across some unsuitable habitat. (Note: for some models, specific ecological communities could not be identified.) After capturing the suitable habitat, it seems logical to apply additional ecological buffer as suggested by NYNHP Ecology IA methodology.

Citations:

NatureServe. 2010. NatureServe Explorer: An online encyclopedia of life [web application]. Version 7.1. NatureServe, Arlington, Virginia. Available http://www.natureserve.org/explorer. (Accessed: August 10, 2011).

Rawlins, J.E. 2005. Pennsylvania Comprehensive Wildlife Conservation Strategy. Invertebrates. Version 1.1. A report submitted to Pennsylvania Game Commission and Pennsylvania Fish and Boat Commission (January 12, 2007). ii +227pp.

University of Alberta E.H. Strickland Entomological Museum. 2011. Museums and Collections Services. Euchlaena madusaria. Available http://www.entomology.ualberta.ca/searching_species_details.php?s=4200. (Accessed: August 10, 2011).

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46 - IA represented by EO Boundary (no additional buffers)

Notes:

This option was used for some species across a variety of taxonomic groups when it was difficult to determine habitat needs, usually because of a lack of movement data. Additionally, wintering locations

Citations:

48 - Salvelinus fontinalis (Brook Trout)

Notes:

Brook Trout inhabit clear, cool, well-oxygenated waters (e.g., creeks and small-medium rivers), and lakes. They prefer water temperatures that range from 14-16°C, and they rarely thrive in water over 20°C for extended periods of time (NatureServe 2010). They can tolerate pH as low as 5 (Trout Unlimited 2011), and they prefer dissolved oxygen levels that are greater than or equal to 6.0mg/l (Osmond et al. 1995). (Note: In the future, it may be desirable to incorporate water temperature, pH, and dissolved oxygen levels into the IA models. There were time constraints that inhibited reviewing possible datasets.) Movement distances can be as high as 65-100 km (NatureServe 2010). The Lower Hudson River is not suitable habitat for Brook Trout. In order to preserve water quality and identify areas important to Brook Trout, it makes sense to define the watershed that each occurrence falls within. Once defined, all waters upstream of the Brook Trout occurrence should be delineated and appropriately buffered to protect these waters from potentially negative impacts that could impact populations farther downstream (e.g., siltation, contaminant loads, etc.). However, a buffer of this type presents challenges as the areas depicted become so large that they are often impractical for conservation planning efforts. Therefore, a buffer distance of 3 km will be applied to the original location in order to capture the known habitat and the associated section of stream that is likely to be important to the species being buffered. Brook Trout that inhabit lakes should be adequately protected by applying a lacustrine (palustrine) community buffer to the lake and associated wetland boundary. Notes: (1) This species is not actively tracked by NYNHP. We obtained point locations only. Data were not reviewed at the same level as Element Occurrences. (2) Heritage strains of Brook Trout have not been well documented by extensive genetic studies. Streams in the HRE Culverts study area have been heavily stocked over several decades. It's assumed there are few, if any, Heritage strain populations in the area. Heritage strains are known from the Adirondacks and a few locations on Long Island (Fred Hanson (NYSDEC), personal communications).

Citations:

Keller, W.T. 1979. Management of wild and hybrid brook trout in New York lakes, ponds, and coastal streams. NYS DEC.

McKerrow, A. 2009. Atlantic States Marine Fisheries Commission diadromous fish maps In: Atlantic coast diadromous fish habitat: A review of utilization, threats,recommendations for conservation, and research needs. Atlantic States Marine Fisheries Commission Habitat Management Series No. 9, Washington, D.C.

NatureServe. 2010. NatureServe Explorer: An online encyclopedia of life [web application]. Version 7.1. NatureServe, Arlington, Virginia. Available http://www.natureserve.org/explorer. (Accessed: October 18, 2011).

Osmond, D.L., D.E. Line, J.A. Gale, R.W. Gannon, C.B. Knott, K.A. Bartenhagen, M.H. Turner, S.W. Coffey, J. Spooner, J. Wells, J.C. Walker, L.L. Hargrove, M.A. Foster, P.D. Robillard, and D.W. Lehning. 1995. WATERSHEDS: Water, Soil and Hydro-Environmental Decision Support System, http://h2osparc.wq.ncsu.edu.

Perkins, D.L., G.C. Kruegar, and B. May. 1993. Heritage brook trout in Northeastern USA: Genetic variability within and amoung populations. Transactions of American Fisheries Society 122: 515-532.

Trout Unlimited. 2011. Eastern Conservation: Brook Trout. http://www.tu.org/conservation/eastern-conservation/brook-trout. Accessed: October 18, 2011.

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49 - Diadromous Fishes

Notes:

This model includes freshwater, estuarine, and marine components to cover all habitats occupied by diadromous fish stages of life within New York State jurisdiction. The freshwater/estuarine component uses the Ecology methodology for estuarine and riverine habitats. These models should capture important areas for diadromous fishes. The marine component is captured by adding a 5 km marine water buffer to the freshwater/estuarine results. (Note: These fishes are typically found in deep marine habitat during at least one life stage. It is likely that the majority of marine habitat that is used by the various species covered in this model is not represented in the final results.) Fish are susceptible to habitat loss and degradation due to a variety of factors. These factors include, but are not limited to, water temperature changes that result from human-induced activities, siltation, scouring, industrial and agricultural contaminants, and barriers to movement and between populations. In order to preserve water quality and identify areas important to fish, it makes sense to define the watershed that each occurrence falls within. Once defined, all waters upstream of the fish should be delineated and appropriately buffered to protect these waters from potentially negative impacts that could impact a fish occurrence farther downstream (e.g., siltation, contaminant loads, etc.). However, a buffer of this type presents challenges as the areas depicted become so large that they are often impractical for conservation planning efforts. Therefore, a buffer distance of 3 km will be applied to the original location in order to capture the known habitat and the associated section of stream that is likely to be important to the species being buffered. Notes: The species in this model are not actively tracked by NYNHP. We obtained point locations only. Data were not reviewed at the same level as Element Occurrences.

Citations:

Dittman, Dawn, Leonard S. Machut, and James H. Johnson. 2011. American eels, data assimilation and management options for inland waters. NYS DEC SWG Grant.

NatureServe. 2010. NatureServe Explorer: An online encyclopedia of life [web application]. Version 7.1. NatureServe, Arlington, Virginia. Available http://www.natureserve.org/explorer. (Accessed: October 18, 2011).

NatureServe. 2011. NatureServe Explorer: An online encyclopedia of life [web application]. Version 7.1. NatureServe, Arlington, Virginia. Available http://www.natureserve.org/explorer. (Accessed: December 5, 2011).

New York State Department of Environmental Conservation, Bureau of Fisheries. 2011. Statewide fisheries database version 40.

The Nature Conservancy. 2008. Upper Delaware American Eel distribution data. Unpublished data.

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54 - Neotoma magister (Alleghany Woodrat)

Notes:

Foraging movements, while often focused within rock habitat, may extend beyond the protection of rocks up to 160 meters from the den site (Wright and Hall1996). Castleberry et al. (2001) documented woodrat the maximum distance of nightly foraging movement as 151 m. Den shifts tend be less than 100 meters with a median of 40 m (Wright 1998), and woodrats, particularly females, often live their entire lives in the same outcrop (Feller,pers. Obs., 1998). There are reports of large unidirectional movements of displaced woodrats, e.g., 1 km and 4 km (McGowan 1993), as well as naturally dispersing individuals, 0.3-1 km (McGowan 1993), 1 km (Feller, pers. Obs., 1995), and up to 6 km(Wright, pers. Comm., 1998). While woodrats can travel long distances between patches, as distances increase, the chance of successful emigration between patches is likely to decrease, particularly in the absence of protective rock crevices. Barriers to dispersal are not clearly known, as woodrats have been documented to traverse seemingly inhospitable terrain, including roads, small streams, and small fields, though movements are largely within rock habitat (Feller, pers. Obs.; Mengak, pers. Comm., 1998; Wright, pers. Comm., 1998). However, woodrats display unwary behavior when crossing roads 19 (Feller, pers. Obs.), and roadkills have been documented (Feller, pers. Obs., 1993;McGowan 1993).

Citations:

Castleberry, S. B., W. M. Ford, P. B. Wood, N. L. Castleberry, and M. T. Mengak. 2001. Movements of Allegheny woodrats in relation to timber harvesting. The Journal of wildlife management:148–156.

McGowan, E. M. 1993. Experimental release and fate study of the Allegheny woodrat (Neotoma magister). Appendix I- Unpubl. Rpt., Endang. Spec. Unit, Div. of Fish and Wildlife, New York State Dept. of Envir. Conser.

Wright, J. 1998. Radiotelemetry study of experimental recolonization of an Allegheny woodrat (Neotoma magister) population. Final Report to Wild Res. Cons. Fund.

Wright, J. and J. S. Hall. 1996. Radiotelemetry study of movements and resource use by Allegheny woodrats (Neotoma magister) in Pennsylvania. Report to Pennsylvania Game Comm. Wild Res. Fund, Project #SP247621.

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55 - Acris crepitans (Northern Cricket Frog)

Notes:

Cricket frogs generally occupy aquatic communities that contain emergent vegetation that sometimes includes bog or fen mats. They have been documented in NY to move up to ca. 1300 feet from the wetland boundary (at several sites) during the fall, apparently as movements to uplands for hibernation. Semlitsch and Bodie (2003) suggested “...three terrestrial zones adjacent to core aquatic wetland habitats: (1) a first terrestrial zone immediately adjacent to the aquatic habitat, which is restricted from use and designed to buffer the core aquatic habitat and protect water resources; (2) starting again from the wetland edge and overlapping with the first zone, a second terrsestrial zone that encompasses the core terrestrial habitat defined by semiaquatic focal-group use (e.g., amphibians 159-290 m); and (3) a third zone, outside the second zone, that serves to buffer the core terrestrial habitat from edge effects from surrounding land use (e.g., 50 m; Murcia 1995).” Therefore, a buffer of 340 meters (290 meter buffer for amphibians and 50 meter terrestrial buffer added to protect from edge effects) will be used to capture and protect the continuous wetland area that intersect the frog EOs. To ensure the protection of the uplands that may be used for hibernation by cricket frogs, we capture an undeveloped zone of suitable habitat that is 450 meters from the EO boundary. As cricket frogs are known to move 400 meters from wetlands, incorporation of this additional distance around the EO is appropriate. The 50 meters added to this will help protect frogs that move this maximim distance from activities at the edge of their home range. Suitable habitat is defined as “undeveloped lands” (not necessarily forested lands) as cricket frogs have been documented to make extensive use of an orchard (in Ulster Co.), forested settings in NY, and old fields in the south (Al Breisch pers. comm.). The 450 meter buffer around the frog EOs should serve to protect the uplands in the vicinity of known frog occurrences, while the identification and buffering of contiguous wetlands that intersect the EO will help protect the core wetland and help define and protect the connections between closely associated sites.

Citations:

Breisch, Alvin. 2003. Personal communication with Jesse Jaycox on October 7, 2003 regarding northern cricket frog (Acris crepitans) mapping methodology for the Hudson River Estuary Program project.

Semlitsch, R. D., and J. R. Bodie. 2003. Biological criteria for buffer zones around wetlands and riparian habitats for amphibians and reptiles. Conservation Biology 17(5): 1219-1228.

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56 - Catharus bicknelli (Bicknell's Thrush)

Notes:

The literature suggests elevations above 1100 meters are appropriate for Bicknell's thrush breeding in the Catskill's (Rimmer et al. 2001a; Rimmer et al. 2001b). However, Pierce-Berrin (2001) uses elevations above 1067 meters (3500 feet) for Bicknell' thrush habitat in this region. Since two of our Catskills EOs do fall below the 1100 meter elevation, 1067 meters seems appropriate. Bicknell's thrush breed in Montane forests dominated by balsam fir, with lesser amounts of spruce. By capturing the Bicknell's thrush EO boundaries, elevations above 1067 meters that intersect these, and Mountain fir/Mountain spruce-fir Forests EOs that also intersect these, we should be able to identify appropriate habitat. The terrestrial community buffer applied to this layer will provide for community persistence.

Citations:

Pierce-Berrin, C. 2001. Distribution and Habitat Selection of Bicknell's Thrush (Catharus bicknelli) in the Catskill Mountains of New York State. Master's thesis, Department of Environmental Studies, Antioch New England Graduate School, Antioch University.

Rimmer, C. C., K. P. McFarland, and J. D. Lambert. 2001a Conservation Assessment for Bicknell's Thrush (Catharus bicknelli). Unpublished report to the USDA Forest Service, Eastern Region, Milwaukee, Wisconsin.

Rimmer, C.C., K.P. McFarland, W.G. Ellison, and J.E. Goetz. 2001b Bicknell's Thrush (Catharus bicknelli). In The Birds of North America, No. 592 (A. Poole and F. Gill, eds.). The Birds of North America, Inc., Philadelphia, PA.

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57 - Sylvilagus transitionalis (New England Cottontail)

Notes:

Based on an average home range size of about 3.5 hectares (Fitch 1947, Trent and Rongstad 1974, Althoff and Storm 1989) a buffer of 0.2 km around known locations would capture the average home range, assuming the point (where droppings/live capture/roadkill was located) is at the center of that home range. Arbuthnot (2008) suggests habitat blocks of at least 25 acres (about 10 ha) of suitable early successional habitat with a woody understory and access to other habitat patches nearby in order to sustain populations. As New England Cottontail locations in the NYNHP database are based on confirmation of the species through live-captures and/or scat collection, it is not known what part of the home range the species was confirmed in (i.e., the capture location could have been at the center of the range, but it also could have been at the edge of the home range or somewhere in between). Therefore, a buffer of 0.4 km is suggested, which would take into account this uncertainty.

Citations:

Althoff, D. P., and G. L. Storm. 1989. Daytime spatial characteristics of cottontial rabbits in central Pennsylvania. Journal of Mammalogy 70:820-824.

Arbuthnot, M. 2008. A Landowner's Guide to New England Cottontail Habitat Management. Environmental Defense Fund. 36 pp.

Fitch, H. S. 1947. Ecology of a cottontail rabbit (SYLVILAGUS AUDUBONII) population in central California. California Fish and Game 33:159-184.

Trent, T.T. and O.S. Rongstad. 1974. Home range and survival of cottontail rabbits in southwestern Wisconsin. Journal of Wildlife Management 38:459-472.

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58 - Falco peregrinus (Peregrine Falcon)- Natural Habitat

Notes:

Loucks (1989) indicates the difficulty of mapping the area important to peregrine falcon existence due to variation among eyries (nest sites). Ellis (1982) recommended no human disturbance within a distance of 0.8 km (0.5 mi) from cliff nest sites at a minimum. Since this species is wide-ranging in its foraging habits, this species is most likely to be disturbed by human activities within proximity to their next sites (Herbert and Herbert 1969), which they actively defend. The NJ Landscape Project used a distance of 1 km in their modeled habitat buffer for this species. The New York model is designed at identifying habitat adjacent to the eyrie that should be left undisturbed.

Citations:

Ellis, D.H. 1982. The peregrine falcon in Arizona: Habitat utilization and management recommendations. Report No. 1, Institute for Raptor Studies, Oracle, Arizona.

Herbert, R. A., & Herbert, K. G. S. (1965). Behavior of peregrine falcons in the New York City region. The Auk, 62-94.

Loucks, Barbara A. 1989. New York State recovery plan: peregrine falcon (Falco peregrinus). Endangered Species Unit. New York State Department of Environmental Conservation. Delmar, NY.

New Jersey Department of Environmental Protection Division of Fish and Wildlife Endangered and Nongame Species Program. 2012. New Jersey Landscape Project Version 3.1: Wildlife habitat mapping for community land-use planning and species conservation. Available at: http://www.state.nj.us/dep/fgw/ensp/landscape/index.htm

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59 - Crotalus horridus (Timber Rattlesnake)

Notes:

This methodology incorporates suitable habitat within 3.5 kilometers of timber rattlesnake hibernacula. The 3.5 km distance is a reasonable distance that timber rattlesnakes can be expected to move during the foraging/mating season. The core areas containing the dens are often located within large roadless blocks. In many cases, these roadless blocks may exceed 3.5 km in some directions, but fall short in others. By clipping the roadless blocks at 4.5 km from the den and incorporating a contiguous suitable habitat layer (essentially all forested and wetland layers) out to 3.5 km from the den, we should be able to capture the majority, if not all, of the suitable habitat within the 3.5 km foraging area (not a buffer), capture a significant portion of the roadless block that is important to this species, AND eliminate the circular shapes of the original 3.5 kilometer buffer. (Note- a roadless block layer clipped to 3.5 kilometers still yields a circular area for some of the Heritage areas. I went with 4.5 after a little experimentation and consultation with ESU). Clipping the polygon at major barriers helps to identify core areas. The 3.5-kilometer buffer was obtained after a review of the published and unpublished data and draft element occurrence specifications distributed by NatureServe to Heritage Programs (see references below).

Citations:

Brown, W.S. 1993. Biology, status, and management of the timber rattlesnake (Crotalus horridus): a guide for conservation. SSAR Herp. Circ. No. 22 vi + 78 pp.

Bushar, L. M., H. K. Reinert, and L. Gelbert. 1998. Genetic variation and gene flow within and between local populations of the timber rattlesnake, Crotalus horridus. Copeia 1998: 411-422.

Hammerson, G. A., and R. Lemieux. 2001. Population status, movements, and habitat use of timber rattlesnakes (Crotalus horridus) in central Connecticut, 1998-2000: final report. Unpublished report submitted to the Connecticut Department of Environmental Protection, Hartford. 88 pp.

Hammerson, G. A., and R. Lemieux. 2001. Population status, movements, and habitat use of timber rattlesnakes (Crotalus horridus) in central Connecticut, 1998-2000: final report. Unpublished report submitted to the Connecticut Department of Environmental Protection, Hartford. 88 pp.

Jaycox, J. W., and E. McGowan (unpublished data) 2000.

Martin, W. H. 1989. Phenology of the timber rattlesnake (Crotalus horridus) in an unglaciated section of the Appalachian Mountains. Pp. 259-277 in J. A. Campbell and E. D. Brodie, Jr., eds. The Biology of the Pitvipers. Selva Press, Tyler, Texas.

McGowan, E. 1999. Spatio-temporal aspects of timber rattlesnake mating behavior in the northern Shawangunk Mountains, Ulster County, New York. Unpublished report of April 19, 1999 prepared for the Eastern New York Chapter of the Nature Conservancy. 61 pp.

Reinert, H. K., and R. T. Zappalorti. 1988. Timber rattlesnakes (Crotalus horridus) of the Pine Barrens: their movement patterns and habitat preference. Copeia 1988: 964-978.

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60 - Pieris virginiensis (West Virginia White)

Notes:

When Lepidoptera are known to inhabit specific habitats, it seems appropriate to base the IA model on general habitat preferences of the species. For the terrestrial lepidopteran models, a buffer was applied to the EO that is the average of the recommended Inferred Extent (IE) (NatureServe 2010) of all the species within the specific model. IE distances were used because the EO locations are typically, although not always, small, precise areas. In addition, home range and dispersal distances are more typically unknown than known. Suitable habitat within the buffer was selected, including non-contiguous habitat because many Lepidoptera species are known to at least fly across some unsuitable habitat. After capturing the suitable habitat, it seems logical to apply additional ecological buffer as suggested by NYNHP Ecology IA methodology.

In the case of West Virginia White (Pieris virginiensis), the species is associated with deciduous forest, mixed forest, and palustrine forested wetland habitat types in New York, with a minimum inferred extent of 1 km (NatureServe 2013). However, unlike Ostrich Fern Borer Moth, a Floodplain forest moth, open areas are a barrier to P. virginiensis. As unshaded paved roads, powerlines, rivers, and unshaded streams are major barriers to the movement of this species, existing lepidopteran models were modified to clip habitats at such barriers.

Citations:

NatureServe. 2013. NatureServe Explorer: An online encyclopedia of life [web application]. Version 7.1. NatureServe, Arlington, Virginia. Available http://www.natureserve.org/explorer.

New York Natural Heritage Program. 2011. Online Conservation Guide for Pieris virginiensis. Available from: http://www.acris.nynhp.org/guide.php?id=7830. Accessed February 10th, 2013.

Rawlins, J.E. 2005. Pennsylvania Comprehensive Wildlife Conservation Strategy. Invertebrates. Version 1.1. A report submitted to Pennsylvania Game Commission and Pennsylvania Fish and Boat Commission (January 12, 2007). ii +227pp.

University of Alberta E.H. Strickland Entomological Museum. 2011. Museums and Collections Services. Euchlaena madusaria. Available http://www.entomology.ualberta.ca/searching_species_details.php?s=4200. (Accessed: August 10, 2011).

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61 - Cistothorus platensis (Sedge Wren)

Notes:

Sedge Wren (Cistothorus platensis) is known to inhabit and nest in wet meadows, hayfields, bogs and marshes, the uplands of ponds, and brackish marshes. For this reason, CCAP 2006 habitats that correspond to these habitat types will be selected. While cultivated areas and palustrine forested wetland habitats occur near Eos in the Hudson River Valley, these types were not selected as this species tends to avoid cropland (with the exception of retired croplands) and woody vegetation (Johnson and Igl 2001). Nesting territories are reported to be less than an acre (0.44-0.49ac) (Herkert et al. 2001, NatureServe 2013).

The natural community buffers for both Palustrine and Estuarine communities should capture important areas for breeding wetland birds and areas important to the integrity of the wetlands in which they breed. See the Natural Community (Ecology) Important Area methodology for Palustrine and Estuarine wetland justifications.

Citations:

Herkert, James R., Donald E. Kroodsma and James P. Gibbs. 2001. Sedge Wren (Cistothorus platensis), The Birds of North America Online (A. Poole, Ed.). Ithaca: Cornell Lab of Ornithology; Retrieved from the Birds of North America Online: http://bna.birds.cornell.edu/bna/species/582

Johnson, D. H., & Igl, L. D. (2001). Area requirements of grassland birds: a regional perspective. The Auk, 118(1), 24-34.

NatureServe. 2013. NatureServe Explorer: An online encyclopedia of life [web application]. Version 7.1. NatureServe, Arlington, Virginia. Available http://www.natureserve.org/explorer.

New York Natural Heritage Program. 2011. Online Conservation Guide for Cistothorus platensis. Available from: http://www.acris.nynhp.org/guide.php?id=7006. Accessed February 13th, 2013.

62 - Ammodramus henslowii (Henslow's Sparrow)

Notes:

Fragmentation of Henslow’s Sparrow (Ammodramus henslowii) breeding habitats should be prevented. In Illinois, this species is rarely encountered on grassland fragments of less than 100 ha). In New York, this species is present in pastures consisting of at least 30 ha of grassland (Smith and Smith 1990). This result corresponds to the casual observations of Zimmerman (1988) in Kansas, who recommends that management should be carried out on plots of at least 30 ha. These values also fall within Samson's (1980) estimation of 10-100 ha as the minimum area required to support a viable breeding population, though Samson does not elaborate upon the basis for his conclusions. Peterson's (1983) study in Broome County, New York, found that occurrence was related to distance from the horizon, a measure strongly correlated with grassland area. The calculated mean of these ranges (100 ha, 30 ha, 30 ha, and 10-100 ha) results in 54 ha (133 acres). The territory size is reported to be 0.3-0.6 ha (NatureServe 2013).

Citations:

NatureServe. 2013. NatureServe Explorer: An online encyclopedia of life [web application]. Version 7.1. NatureServe, Arlington, Virginia. Available http://www.natureserve.org/explorer.

Peterson, A. 1983. Observations on habitat selection by Henslow's sparrow in Broome County, New York. Kingbird 33:155-164.

Samson, F.B. 1980. Island biogeography and the conservation of nongame birds. Transactions of the North American Wildlife and Natural Resources Conference 45:245-51.

Zimmerman, J.L. 1988. Breeding season habitat selection by the Henslow's Sparrow (AMMODRAMUS HENSLOWII) in Kansas. Wilson Bulletin 100(1):17-24.

64 - Melanerpes erythrocephalus (Red-headed Woodpecker)

Notes:

Red-headed Woodpeckers (Melanerpes erythrocephalus) breed in habitat usually described as open deciduous woodlands and wooded swamps (Smith et al. 2000). Several New York breeding sites are open grassland areas, or even mowed picnic areas of State Parks, with scattered large trees and snags. Summer territories can be 3.1-8.5 ha with high fidelity to a breeding site in subsequent years (NatureServe 2013).

Citations:

NatureServe. 2013. NatureServe Explorer: An online encyclopedia of life [web application]. Version 7.1. NatureServe, Arlington, Virginia. Available http://www.natureserve.org/explorer.

Smith, Kimberly G., James H. Withgott, and Paul G. RodewaldSmith, Kimberly G., James H. Withgott and Paul G. Rodewald. 2000. Red-headed Woodpecker (Melanerpes erythrocephalus), The Birds of North America Online (A. Poole, Ed.). Ithaca: Cornell Lab of Ornithology; Retrieved from the Birds of North America Online: http://bna.birds.cornell.edu/bna/species/518

67 - Bumble Bees

Notes:

Bumble bees, unlike many rare species, are generalists. They can be found in nearly all habitats including urban areas if there are nesting and foraging areas. The population decline has been attributed to climate change, intensified agricultural practices (included pesticide use), and pathogens from introduced bumble bees (Schweitzer et al. 2012).

At the time of the HREP 2018, the bumble bee element occurrences are based on observations of worker bees. We do not have locations of nesting or overwintering areas. The buffer distance is somewhat arbitrary for these locations, but is based on the estimated distances bumble bees move from their nest sites. Most worker bees will go approximately 600-1700 meters (Schweitzer et al. 2012).

Citations:

Hatfield, R. S. Jepsen, E. Maser, S.H. Black, and M. shepard. 2012. Conserving bumble bees. Guidelines for creating and managing habitat for America's declining pollinators. 32pp. Portand OR: The Xerces Soceity for Invertebrate Conservation.

Schweitzer, D.F., N.A. Capuano, B.E. Young, and S.R. Colla. 2012. Conservation and management of North American bumble bees. NatureServe, Arlington, Virginia, and USDA Forest Service, Washington, D.C.

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68 - Whip-poor-will

Notes:

Whip-poor-wills require wooded habitat for nesting and open habitats for foraging. More research is needed to better understand whip-poor-will biology. A study in New Hampshire found that the home range size ranged from 1 to 13 ha and that birds most typically nest less than 100 meters from the edge (Hunt 2013). However, Akresh and King (2016) found that some birds nest greater than 150 meters from the forest edge in western Massachusetts. Element Occurrence records in New York are not based on extensive survey efforts and nest locations were not found (NYNHP 2018). It is difficult to determine the best Important Area methodology for this species because so little is known about their biology. For the purposes of the Important Areas, the buffer was increased slightly to reach the size of 15 ha of suitable habitat per male heard singing to include some locational uncertainty. Another 30-meter buffer was included that only selects for open habitats to ensure foraging habitat inclusion in the model. Ecology's Terrestrial methodology was then applied to buffer the selected habitats.

Citations:

Akresh, Michael and David King. 2016. Eastern whip-poorwill breeding ecology in relation to habitat management in pitch pine-scrub oak barren. Wildlife Society Bulletin 40(1): 97-105.

Hunt, Pamela. 2013. Habitat use by eastern whip-poor-will (Antrostomus vociferous) in New Hampshire. Report to the New Hampshire Fish and Game Department Nongame and Endangered Wildlife Program.

New York Natural Heritage Program. 2018. Element Occurrence Database. State University of New York College of Environmental Science and Forestry, Albany, NY.

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69 - Estuarine Odonates

Notes:

The natural community buffer for estuarine communities (e.g., salt marshes) should capture important areas for salt marsh odonates and areas important to the integrity of the wetland. See the

Natural Community (Ecology) Important Area methodology and justification for Estuarine methodology and justification.

Citations:

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70 - Bats

Notes:

We consulted with Carl Herzog (2018) from NYS DEC to determine the best buffers and Land Use/Land Cover classifications for bats in New York. He based the recommendations on studies and USFWS recommendations for Myotis septentrionalis and Myotis sodalis. Myotis leibii are not as well-studied as the other two bats included in the Important Areas. The following are recommendations from Carl Herzog:

Myotis septentrionalis (northern long-eared bat)

- Summer/Foraging: 1.5-mile buffer on known location
- Fall Swarming/Spring Emergence*: 5-mile buffer on hibernacula during fall and spring
- Winter/Hibernaculum: 0.5-mile buffer on hibernacula

Myotis sodalis (Indiana bat)

- Summer/Foraging: 2.5-mile buffer on known location
- Fall Swarming/Spring Emergence*: 2.5-mile on hibernacula during the fall and spring
- Winter/Hibernaculum: 0.5-mile buffer on hibernacula

Myotis leibii (eastern small-footed bat) and Bat Colony**

- Summer/Foraging: 0.5-mile buffer on known location
- Fall Swarming/Spring Emergence*: 0.5-mile on hibernacula during the fall and spring
- Winter/Hibernaculum: 0.5-mile buffer on hibernacula

*Fall swarming and spring emergence buffers are new to the Important Areas in 2018. These areas are important because bats gather near the hibernacula in the autumn to mate as early as late August. Bats also may spend some time near hibernacula after emerging in the spring.
**Additional research is needed to determine the best buffer distances for these species.

Citations:

Herzog, Carl. 2018. Personal Communication. NYS DEC, Albany, NY.

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71 - Grassland/Marsh Raptors (wintering)

Notes:

Wintering locations for raptors are well documented in the Hudson River Valley. At this time, a winter raptor buffer is not needed in the study area defined by the Hudson River Estuary Program.

Citations: