**CT River Watershed Pilot Project – Applying Weighting Criteria to Representative Species**

The following matrix is being used by the Terrestrial and Wetland Subteam in applying the weighting criteria that the Subteam previously discussed and identified for use in assigning weights to Representative Species in the context of informing the process of how to identify core areas based on combining species landscape capability models into an optimized selection index. The categories of "threats", "responsibility", and "rarity" are criteria the Subteam agreed would be useful for the purposed of weighting species. "Population Objective" is included in this table to right of the final weight to indicate that this column is not used in the final weight for species, but is presented for purposes of easily comparing how weights relate to population objectives. "Societal/ecological value" is a criterion that was discussed by the Subteam; it was determined to have value in communicating value of conservation actions but would not be used in weighting species.

The notation format in this matrix is to use "+" to indicate elevated concern, responsibility, or value due to rarity for a given species (rows) based on the criteria (columns). "0" is intended to indicate neutral rarity, responsibility or concern for a species, and "-" is intended to indicate reduced concern, responsibility, or rarity for a species, relative to the other species.

**The matrix entries in this document are DRAFT and need Terrestrial and Wetland Subteam input to assign final entries and decide on final weights.** (*Note 8.5"x14" page size for printing the matrix*)

| Species | Habitat Guild | Threats* | | | | | Responsibility | | Rarity | Weight | Population Objective | Societal (S) / Ecological (E) value |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Experienced significant population loss? A: in CRW B: Range-wide (based on population trends from BBS or other source) | Facing significant habitat threats excluding development (includes 1,2,3,4): A: in CRW, B: Range-wide | Facing significant non-habitat threats [includes 5,6,7,8]: A: in CRW, B: Range-wide | Climate[9] vulnerability in CRW? (based on change in climate niche envelope projected for year 2080: >50% reduction = "+") | Vulnerability to urban growth[10,11] in CRW? (based on change in LC due to urban growth projected in year 2080) | High regional responsibility for the Northeast? (based on % of total regional Landscape Capability w/i Northeast Region occurring in CRW: >10% of LC = "+") | High global responsibility? (based on % of global population in CRW; % of global population in Northeast Regional also listed for reference) | Regionally rare? (based on acres of suitable habitat within region as estimated by LC models: <1M acres = "+", >15M = "-", >50M = "- -") | Sum of weighted "+" and "-" entries across 8 columns to the left ( % of LC to be captured in final selection index for core areas) | | (NOTE: these qualities will be used in communicating value of conservation actions, but not used in weighting criteria) |
| | Weight contribution of criteria | A: 0.50 B: 0.25 | A: 1.0 B: 0.5 | A: 0.50 B: 0.25 | 0.5 | 1.0 | 0.50 | 0.25 | 0.5 | | | |
| American Woodcock | Young forest w/openings | A: + -0.4% in BCR14 -4.9% in BCR30^ B: + -1.8%^ | A: +, B: + [1,4] lack of (appropriate) disturbance/ forestry [moderate Severity, moderate Immediacy, high Spatial Extent] | | 0 -6.6% | | A: 0 5.3% of LC in NE | 0 3% in CRW 17% in NE | 0 9 million acres | +2.25 (72.5%) | + Increase 50% | + (S), + (E) hunted/early successional |

| Species | Habitat | Population trend | Threats A/B (1) | Threats A/B (2) | % change | | Land conservation | CRW/NE | Acres | Score | | Goal | Value |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Blackburnian Warbler | Mature mixed forest | A: 0 0.4% in BCR14 -1.4% in BCR30 B: 0 0.1% | | A: +, B: + [6]Hemlock wooly adelgid [mod, mod, mod] | + -70.2% | | A: + 11% of LC in NE | 0 3% in CRW 15% in NE | - 30 million acres | +1.25 (62.5%) | | 0 Maintain | + (S) Aesthetics |
| Blackpoll Warbler | Spruce-fir forest | A: 0 -0.7% in NE B: + -3.8%^ | A: + [2]wind energy B: 0 | A: +, B: + [7]acidification, mercury | + -93.7% | | + 15% of LC in NE | 0 low global resp. | + 900,000 acres | +3.5 (85%) | | 0 Maintain | + (E) Spruce-fir |
| Eastern Meadowlark | Pastures & grasslands | A: + -6.7% in BCR14^ -6.9% in BCR30^ B: + -3.4%^ | A: +, B: + [1,2]habitat loss to ag, energy [mod-high, high, high] | | 0 43.7% | | 0 0.7% of LC in NE | 0 0.1% in CRW 3% in NE | 0 10 million acres | +2.25 (72.5%) | | + Increase 50% | + (S) Aesthetics |
| Louisiana Waterthrush | Riparian forest | A: 0 -1.0% in BCR14 0.1% in BCR30 B: 0 0.4% | A: 0, B: + mining & shale drilling [mod, high, mod] | A: +, B: + [6,7]Pollution, invasive plants [mod, high, mod] | 0 94.7% | | 0 3.5% of LC in NE | 0 2% in CRW 33% in NE | 0 4 million acres | 1.25 (62.5%) | | 0 Maintain | + (E) riparian |
| Marsh Wren | Freshwater & tidal marshes | A: 0 1.6% in BCR14 -1.6% in BCR30 B: 0 2.0% | | A: +, B: + [6,7]Pollution, invasive plants [mod, high, mod] | 0 176.7% | | 0 0.5% of LC in NE | 0 0.4% in CRW 1% in NE | + 800,000 acres | +1.25 (62.5%) | | 0 Maintain | + (E) fresh & tidal wetlands |
| Northern Waterthrush | Forested wetlands | A: 0 -1.2% in BCR14 -1.0% in BCR30 B: 0 0.5% | | | + -76.1% | | 0 2.1% of LC in NE | 0 0.3% in CRW 0.5% in NE | 0 2 million acres | +0.5 (55%) | | 0 Maintain | +(E) forest wetlands |
| Ruffed Grouse | Young forest | A: 0 0.2% in BCR14 -0.5% in BCR30 B:0 -0.4% | | | + -69.0% | | 0 9.1% of LC in NE | 0 | -- 60 million acres | -0.5 (45%) | | 0 Maintain | + (S) hunted |
| Wood Duck | Swamps & floodplain forest | A: 0 3.0% in BCR 14 1.0% in BCR 30 B: 0 2.0% | | | 0 136.9% | | 0 2.0% of LC in NE | 0 | 0 2 million acres | 0 (50%) | | 0 Maintain | +(S), +(E) hunted/wetland |
| Wood Thrush | Mature decid. forest | A: + -4.6% in BCR14^ -2.8% in BCR30^ B: + -2.1%^ | A: 0, B: 0 | A: +, B: + [7]acidification calcium depl. [mod, high, high] | 0 -1.6% | | 0 6.8% of LC in NE | 0 4% in CRW 30% in NE | - - 70 million acres | +0.5 (55%) | | + Increase 50% | +(S) Aesthetics, iconic sounds |
| Wood Turtle | Forested | A: +, B: + | A: +, B: + | A: +, B: + | 0 | | ?? | ?? | 0 | +3.0 | | 0 | + (E) |

| | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | streams & adj. uplands | likely declining? | [1]agriculture practices [mod, mod, high] | [5,7] collecting, sedimentation, pollution [mod, mod, mod] | -14.0% | | | | 2 million acres | (80%) | Maintain? (or incr.?) | Forest streams |
| Black Bear | Large tracts of forest | A: 0, B: 0 | | | | | 0 6.4% of LC in NE | 0 Low global responsibility | - - 100 million acres | -1.0 (40%) | 0 Maintain | +(E) large tracts |
| Moose | Large tracts of mixed forest w/wetlands | A: 0, B: 0 | | | +[#] | | ?? | 0 | ?? | 0.5 (55%) | 0 Maintain | +(E), +(S) large tracts w/wetlands hunted/iconic |

^indicates statistically significant population trend

# although modelling results are not currently available for projected change in climate envelope for Moose, the Subteam reach agreement that many of the issues (e.g., disease) facing Moose specifically had a significant climate change aspect to them and that climate change is an appropriate threat to highlight for the suite of species represented by Moose.

\* <u>Threats</u>: the following categories of threat (reflecting the IUCN threats framework) were evaluated with regard to their current or future impact on the representative species and their suites of represented species.  The threats columns in the weighting matrix reflect the following groupings of these threats and the numerical superscripts in matrix refer to these threat categories:

<u>Habitat Threats</u>

1) **Agriculture & Forestry** (crop & livestock farming, tree plantations, logging/timber harvesting)
2) **Energy production & mining** (drilling, mining, renewable energy development & production)
3) **Geological events** (volcanos, earthquakes, avalanches)
4) **Natural system modifications** (increased disturbance, disturbance suppression, surface or ground water management/removal)

<u>Non-habitat Threats</u>

5) **Biological Resource Use** (hunting, collecting, gathering, control)
6) **Invasive & Other Problematic Species and Genes** (invasive/alien species, disease, genetic material)
7) **Pollution** (sewage, urban run-off, oil spills, mining run-off, excess nutrients, sedimentation, herbicides, pesticides, garbage/solid waste, acid rain, mercury, light/thermal/noise pollution)
8) **Human Intrusions and Disturbance** (recreational activities, military activities)

<u>Threats Evaluated Separately:</u>

9) **Climate change and severe weather** (habitat shifts, drought, temperature extremes, increased storms)
10) **Residential & commercial development** (residential & commercial development, tourism/recreation area development)
11) **Transportation & service corridors** (roads, railroads, utility lines, flight paths)

These threat categories are able to be evaluated separately because of the climate change and urban growth modeling work being done as part of Designing Sustainable Landscapes project and therefore are represented by their own columns in the weighting matrix and are not included in the general habitat threats column.

Final weights are calculated by multiplying the weight contribution of each criterion by the "+", "0", or "-"entries in each column and then summing across the eight columns to the left of the "Weight" column.  Weight contributions were assigned following these guidelines:

1) threats within the CRW receive twice the weight of range-wide threats because they are directly impacting individuals of the species within the Watershed,
2) habitat threats receive twice the weight of non-habitat threats because the landscape conservation design process is intended to directly influence habitat conservation activities but its influence on non-habitat conservation activities will be less direct,
3) vulnerability to urban growth receives twice the weight of vulnerability to climate change because of higher certainty about impacts and more direct nature of impacts from urban growth, while impacts from climate change have higher uncertainty and could be less direct

Final weights would then be applied to the optimization process for creating the final, combined selection index for core areas based on the species Landscape Capability models such that the % of cumulative landscape capability captured in core areas is larger for species with increased weight compared to species with neutral or decreased weight.  The initial assumption is that neutral weight should equate to capturing the top 50% of habitat quality for those species for which the population objective is to maintain their current population level.  See graph below for an example of how cumulative quality of habitat (as reflected by Landscape Capability) relates to percent of habitat necessary to capture that level of habitat quality.  The final weights from the matrix would then be multiplied by 10 and added to the neutral index of 50% of habitat quality to reflect either increase of decreased concern, responsibility, or rarity of the different species.