Learning from the Forest Chorus
Indicator Songbirds of the Olympic Peninsula

Developed by Levi A. Casto, University of Washington Program on the Environment
Twitter: @CastoLevi  LinkedIn: https://www.linkedin.com/in/levica99/

### Background/Context
- Some songbird species are used by researchers to indicate habitat characteristics
- New songbird monitoring methods and the threat of climate change may affect the usefulness of certain songbirds as indicator species
- New criteria must be developed to address these challenges in indicator species selection

![Fig 1: The Pileated Woodpecker, a common indicator species with a major challenge](Photo Courtesy of Cornell Ornithology Lab)

### Research Question
- What criteria are most relevant for indicator species selection in studies using passive acoustic monitoring to assess the effects of climate change?

### Key Findings
- Diversity is key to indicator species' functionality against climate change
  - Climate change's effect on habitats is unpredictable
  - To capture full range of effects, indicators with diverse needs should be selected
  - Disparate responses of indicators with diverse needs will expose climate realities
- DNR Example: Varied Thrush and Hutton's Vireo (Fig 2)
  - Varied Thrush projected to lose most Olympic habitat
  - Hutton's Vireo projected to keep or gain Olympic habitat

![Fig 2: A comparison of the projected range shifts of Varied Thrush and Hutton’s Vireo. Red represent range lost, yellow represents range maintained, and blue represent range gained.]

### Key Findings (cont.)
- Criteria for PAM use:
  - Frequent and unique vocalization
  - Sound-alike limitation (Fig. 3)
  - Hybrid species limitation
  - Unique vocal timing

![Fig. 3: Indistinguishable Pileated Woodpecker (left) and Northern Flicker (right) calls in a spectrogram]

### Implications
- Forest research can be made more temporally resilient and resource efficient via research and reevaluation of indicator species selection
- Greater information about climate impacts can inform responses by forest management organizations
- Future challenges and opportunities in the field can be addressed with research of more indicator criteria as necessary

### Site Supervisors:
Dr. Teodora Minkova, Washington State Department of Natural Resources
Lauren Kuehne, Omfishent Consulting
Faculty Advisor:
Dr. Tim Billo, University of Washington Program on the Environment

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