

# Perspectives on Impacts of Land-based Wind Energy Development in New England

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# Direct vs. Indirect Impacts

# Direct Impacts

- Impact type: Mortality
- Mechanism: Collisions with turbines
- Affected organisms: Birds and bats
- Documentation methods: Mortality surveys
  - Carcass searches
  - Searcher efficiency trials
  - Scavenger removal trials

# Factors included in fatality estimates

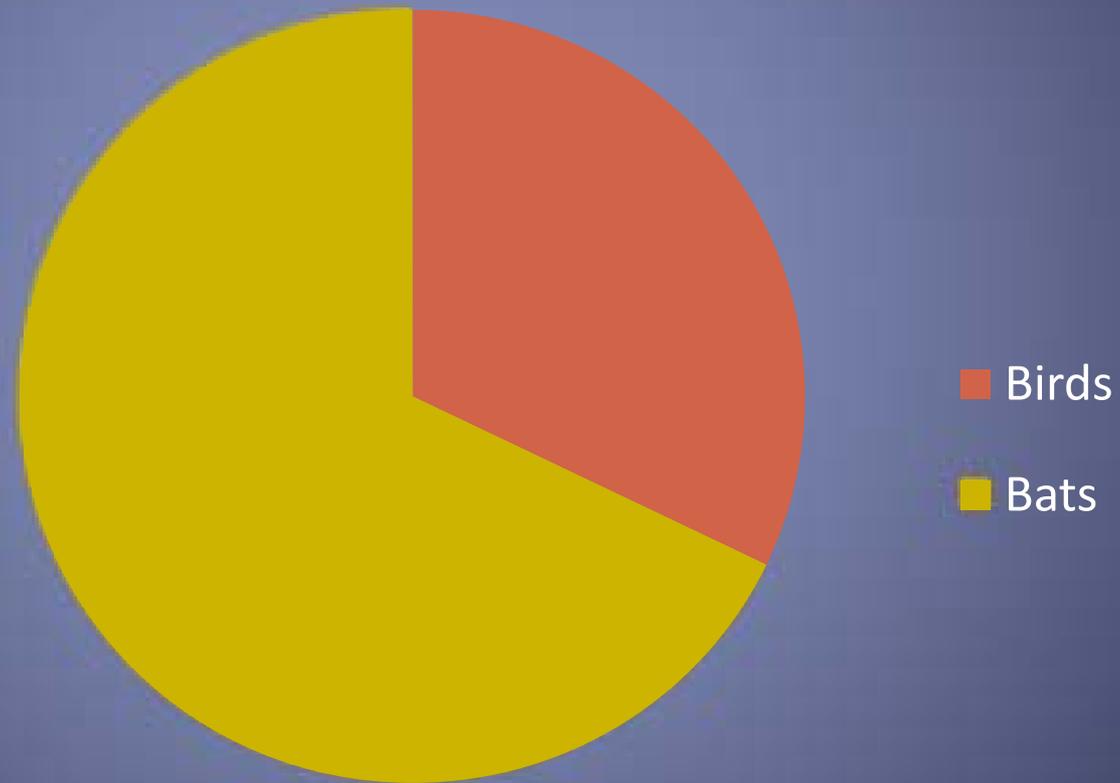
- # of carcasses found
- Searcher efficiency rate
- Carcass removal rate by scavengers
- Proportion of turbines searched
- Correction factor for non-searchable areas in turbine search plots
- Search interval (e.g., daily, weekly)

# Studies included in fatality summary

(J. Costa, 2011. Post-construction wildlife monitoring and results at terrestrial wind farms. Wind Energy and Wildlife Forum, Orono, ME, 5 May 2011)

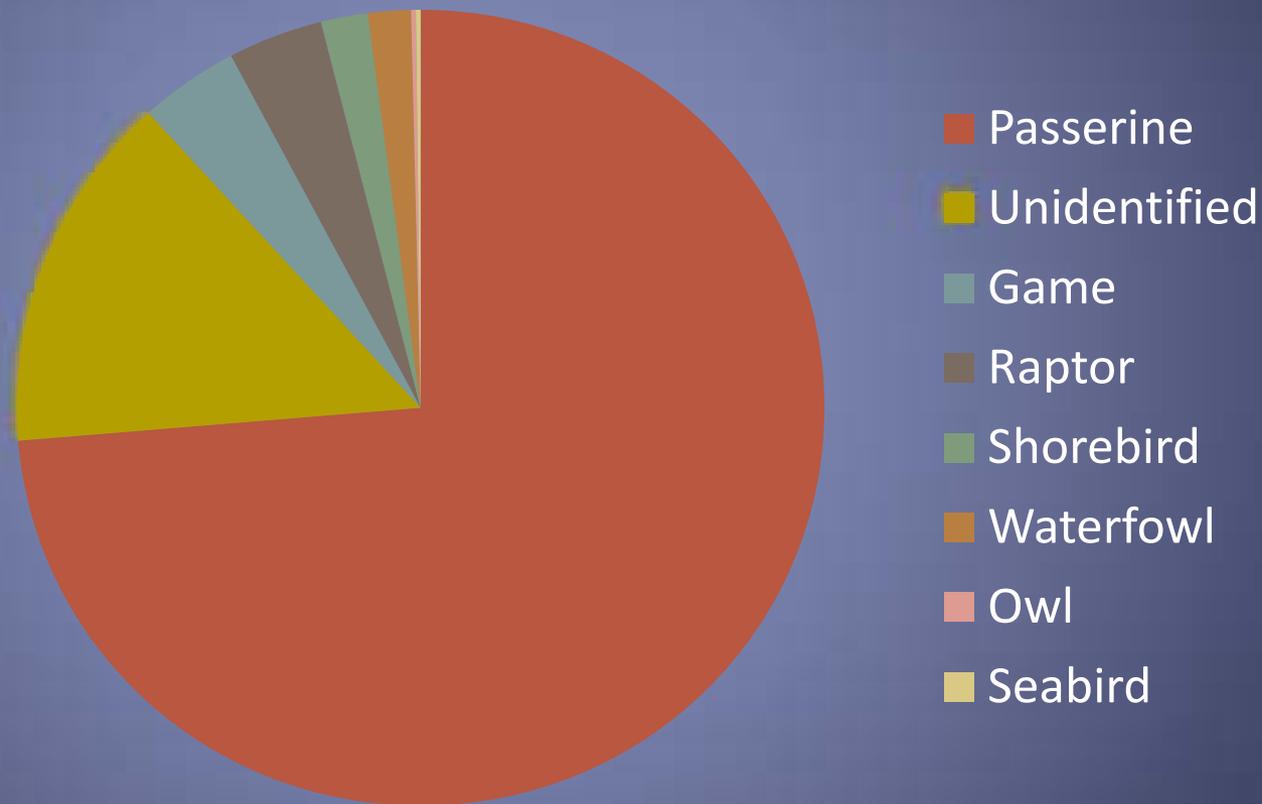
- Maine
  - Mars Hill (2007, 2008)
  - Stetson Mountain I (2009)
  - Stetson Mountain II (2010)
- New Hampshire
  - Lempster (2009)
- New York
  - Bliss (2008)
  - Clinton (2008)
  - Cohocton and Dutch Hill (2009, 2010)
  - Ellenburg (2008)
  - Maple Ridge (2006, 2007, 2008)
  - Munnsville (2008)

# Uncorrected proportions of bird and bat fatalities at New England and New York Wind Energy Facilities



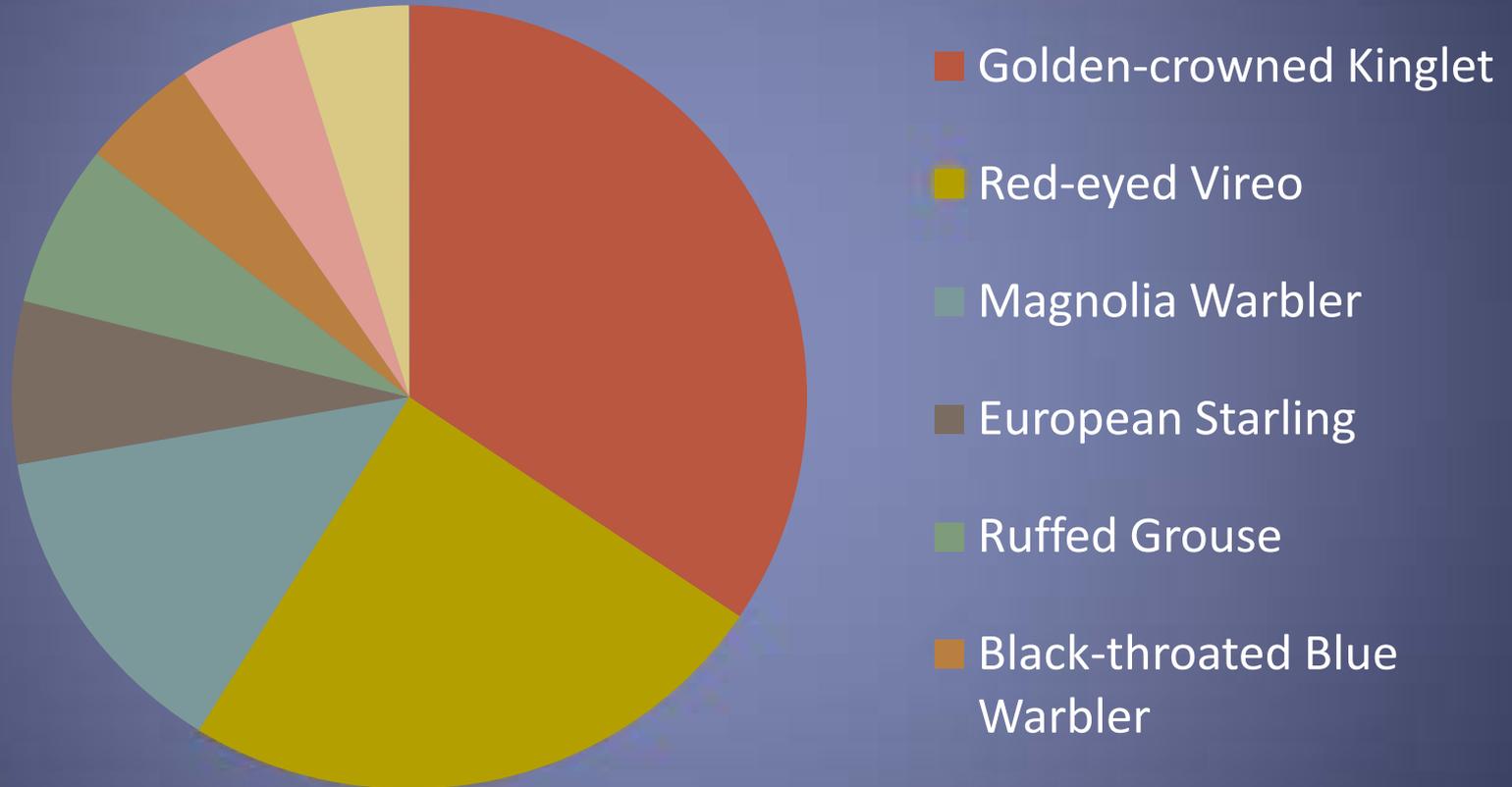
(J. Costa, 2011. Post-construction wildlife monitoring and results at terrestrial wind farms. Wind Energy and Wildlife Forum, Orono, ME, 5 May 2011)

# Uncorrected bird fatalities reported from New York and New England wind energy facilities



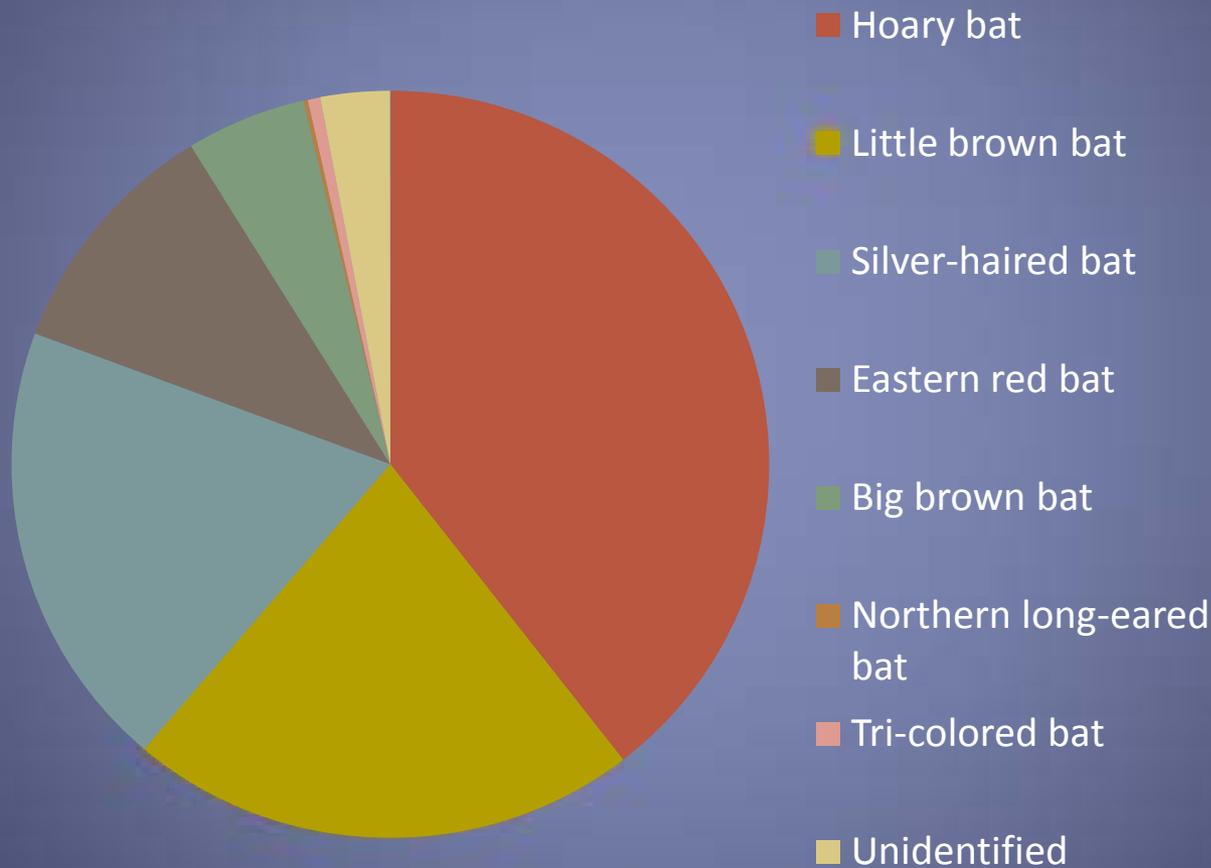
(J. Costa, 2011. Post-construction wildlife monitoring and results at terrestrial wind farms. Wind Energy and Wildlife Forum, Orono, ME, 5 May 2011)

# Predominant bird fatalities at wind energy facilities in New England and New York



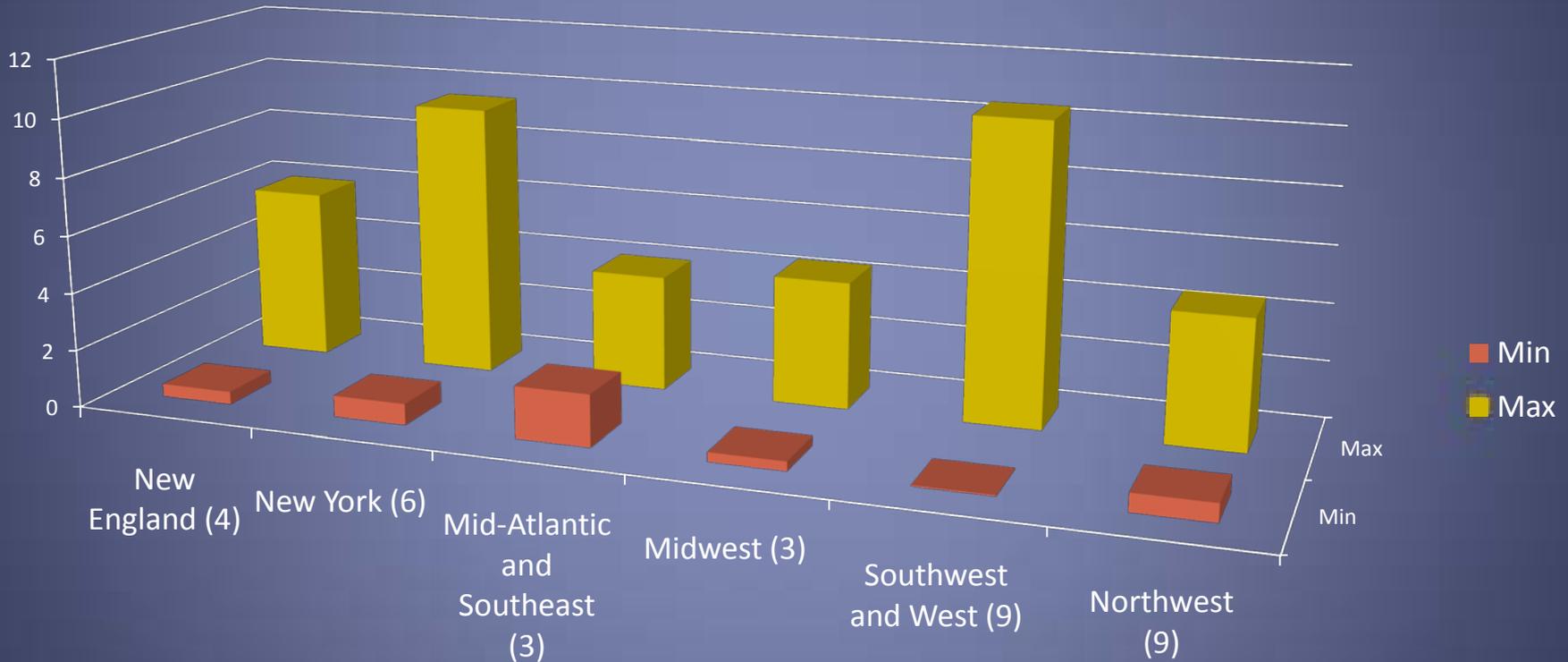
(J. Costa, 2011. Post-construction wildlife monitoring and results at terrestrial wind farms. Wind Energy and Wildlife Forum, Orono, ME, 5 May 2011)

# Uncorrected bat fatalities reported from New York and New England wind energy facilities



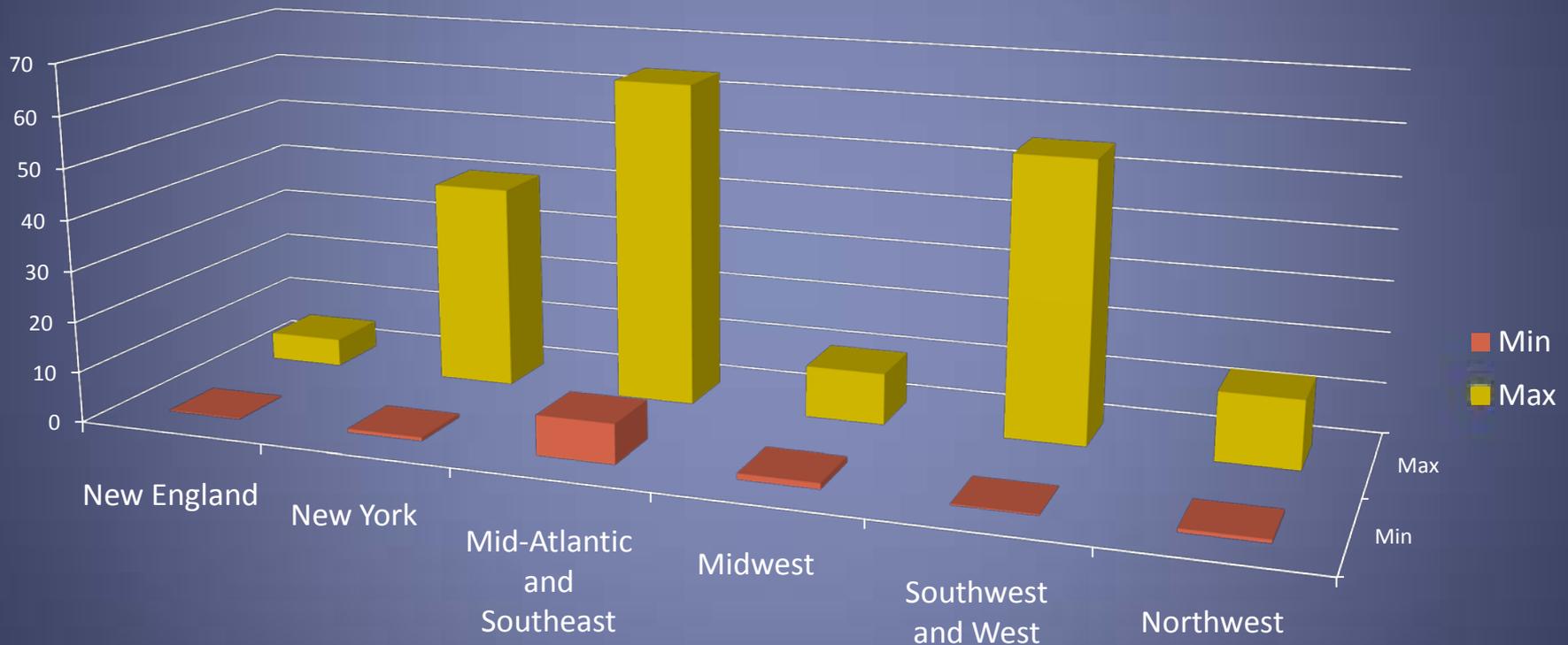
(J. Costa, 2011. Post-construction wildlife monitoring and results at terrestrial wind farms. Wind Energy and Wildlife Forum, Orono, ME, 5 May 2011)

# Regional comparison of estimated minimum and maximum bird mortalities (individual per turbine per study period)



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# Regional comparison of estimated minimum and maximum bat mortalities (individual per turbine per study period)



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# Indirect Impacts

- Impact types: Habitat loss, fragmentation, and degradation
- Mechanisms: Forest clearing, human activity, turbine noise
- Affected organisms: Forest-dependent species
- Documentation methods: Before-after-control-impact studies

# Indirect Impacts

- Indirect impacts in northeastern forests have received little study to date
- Studies of impacts on American marten and Bicknell's thrush are currently underway at the Granite Reliable Power project in Coos County, New Hampshire

- Standardization of methods and metrics is needed to enable regional analyses of mortality data
- Collaborative studies involving multiple sites will be critically important in understanding indirect impacts on wildlife

# Habitat Loss

- Habitats of greatest concern
  - High elevation spruce-fir forest
    - Limited supply on the landscape
    - Support a number of habitat specialists
    - Loss of area can lead to local extirpations if remaining patch size is insufficient to support breeding population
  - Ridge-top mast stands
    - Provide important resource for wide-ranging species
    - Loss of area can impact populations over large areas

# Habitat Degradation

- Habitats of greatest concern
  - High elevation spruce-fir forest
    - Cleared patches expose adjacent forest to increased winds, which leads to progressive wind-throw on shallow soils
    - Cleared patches expose adjacent forest floor to drying effects of sun and wind, decreasing invertebrate populations that support insectivorous species
  - Headwater streams and seeps
    - Roadcuts interrupt natural hydrology, create run-off and siltation that degrade water quality

# Noise Impacts

- Essentially nothing is known about wildlife response to turbine noise in eastern forests
- Areas for research include
  - Potential impacts on predator-prey relationships
    - Target species for study – owls
  - Potential impacts on intra-species communication
    - Target species for study – songbirds
  - Potential impacts on large mammal wintering concentrations
    - Target species for study – moose and deer