Pennsylvania’s Peatlands

Location, Condition, and Change

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Cotton-grass Poor Fen (S3/G3)
Sphagnum – Beak-rush Peatland (S3/GNR)
Red Spruce Palustrine Forest (S3/G3)
Pitch Pine – Leatherleaf Woodland (S2/G3G5)
• Where are these wetlands?
• What’s their condition?
• What is the extent and acreage of these important wetlands?
• Can our typical Heritage program data be used to assess condition?
Sweet Gale – Leatherleaf Shrub Fen (S1/GNR)
Sphagnum – Beak-rush Peatland (S3/GNR)
Leatherleaf – Cranberry Bog (S3/G5)
Black Spruce – Tamarack Woodland (S3/G3G5)
Community Association

- Black Spruce - tamarack peatland forest/woodland
- Highbush blueberry - sphagnum wetland
- Leatherleaf - Cranberry Bog
- Pond
- Red Spruce - Mixed Hardwood Palustrine Woodland
- Sphagnum - beaked rush peatland
Location

Level 3 Ecoregions (EPA)
- Central Appalachians
- Erie Drift Plain
- North Central Appalachians
- Northern Allegheny Plateau
- Ridge and Valley
• EOs as indicator species (n= 127)
• key word searches in PNHP survey records

*Gaultheria hispidula* (Creeping snowberry)

*Carex magellanica ssp irrigua* (Boreal bog sedge)
• Process identified 1831 “high confidence” peatlands across the five EPA ecoregions in PA
• sites were reviewed in GIS and assigned provisional community types
Landscape Condition Model - 2016

Landscape Condition Model Score

- 0 - 328
- 329 - 769
- 770 - 1,197
- 1,198 - 1,667
- 1,668 - 3,634

EPA Ecoregions
Level 1 Next Steps

• Continue to review wetland mapping to add community-level data

• Summarize Level 1 EIA results by type and ecoregion
  – Ecoregional Landscape Condition Model summary
  – Comparison of LCM of peatlands to non-peatland wetlands in each region
  – Other summary analyses?
Characterizing composition and condition: Level 2 assessment
Level 2 Assessment

- Standard NatureServe community classification plot sampling methodology consistent with PNHP work statewide
  - All plants ID to species, cover values estimated, dbh of trees over 10cm dbh, ecological site characteristics,
  - Soils – depth and descriptions of soil horizons, level of decomposition
  - Water pH, EC, TDS, temp
  - Photos
- Plots located within association
Summary of 2016 Field Work and Next Steps

- 2016 – identified and visited 46 sites; assessed vegetation in 96 classification plots
- Focused on S1-S3 community types
- Calculate summary stats on composition and distribution
- Multivariate analyses to determine community type and relationship to environmental variables
- Evaluate stressors
- Calculate FQA scores for communities
- Compare FQA and stressors within and among ecoregions
Conclusions

• Need for more quantitative assessment data at large scales
• Location of specific plant communities will help inform new mapping efforts
• Composition and condition data available to guide conservation and protection efforts
• Important to consider community type when establishing a reference network
Long Term Monitoring Effort

• Focus on high elevation wetlands in PA
  – Cooler habitat in a temperate climate

• Home to northern affinity plants and plant communities

• Temperature and hydrology are important factors in the persistence of plant life in these systems

• Climate change may likely impact these systems
Long Term Monitoring Sites

- 31 long term monitoring sites established in 2010 – 2011
Monitoring Targets

- Climate change vulnerable plant species & communities
- 5yr sampling effort
- In 2016, added bryophytes, birds, and invertebrates

Creeping snowberry (*Gaultheria hispidula*)

Thread-leaved sundew (*Drosera filliformis*)
Sampling Methods - Vegetation

- Plots used to document communities
- Transects documented ecotones and bryophytes
  - Alternating sides random distance from transect
  - Drop 0.5m² quadrat record species & cover
- Frequency arrays and census for target plants
- Soil cores taken
  - Determine depth and type of peat
Sampling Methods - Birds

• Avian point count surveys
  – Breeding season only (May-July)
  – 10 min duration

• Vegetation rapid assessment
  – Community type, cover classes, basal area, etc.
The bright side of early morning surveys...
Sampling Methods - Invertebrates

• Day flying insect surveys
  – Pollard walk line transect method
  – Minimum of 2 transects/site

• Moth surveys
  – Blacklight traps at a subset of sites

• Host plant surveys
Preliminary Results - Bryophytes

- 8 sites completed
- 123 collections/72 species
  - 20 Sphagnum spp.
  - 15 liverwort spp.
  - 37 other moss spp.
- Greater understanding of distribution patterns
- Potential climate change indicators

Photos by S. Schuette

Sphagnum warnstorffii (S1)
Sphagnum wulfianum (S1)
Sphagnum cuspidatum (S3)
Preliminary Results - Bird Surveys

• 21 of 22 peatland focal bird species recorded
  – Ex: alder flycatcher, Canada warbler, Nashville warbler, white-throated sparrow

• 13 bird Species of Special Concern recorded
  – 11 Species of Greatest Conservation Need (PA WAP 2015)
  – Ex: blackpoll warbler, northern waterthrush, yellow-bellied flycatcher, olive-sided flycatcher, northern goshawk
Preliminary Results - Invertebrates

• 15 sites visited for day-flying Lepidoptera and Odonata
• 12 blacklight traps were at 6 sites
• Specimen processing and identification

Black Dash (*Lycaena epixanthe*) (S3)
Incurvate Emerald (*Somatochlora incurvata*) (S1)
Bog Copper (*Lycaena epixanthe*) (S2)
Photos by B. Leppo
• Destruction/loss of permanent markers
• Document, document, document!!!
• Modify species census approach
Selected References


# Community types associated with peatlands in PA

<table>
<thead>
<tr>
<th>Community Type</th>
<th>Association</th>
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<tbody>
<tr>
<td>Acidic Mixed Shrub Sphagnum Wetland</td>
<td>Poison Sumac Red-cedar Bayberry Fen CEGL006103 (S1/GNR)</td>
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<td>CEGL006158</td>
<td>(G5/SNR)</td>
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<td>Alder-leaved Buckthorn - Inland Sedge - Golden Ragwort Shrub Fen CEGL005088</td>
<td>Red Maple Black-gum Palustrine Forest CEGL006014 (S3S4/G4)</td>
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<td>Black Spruce Tamarack Palustrine Woodland CEGL006098</td>
<td>Red Spruce Mixed Hardwood Palustrine Forest CEGL006556 (S3/G3)</td>
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<td>Black Spruce Tamarack Peatland Forest CEGL006098</td>
<td>Red Spruce Palustrine Forest CEGL006277 (S3/G2?)</td>
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<td>Cotton-grass Poor Fen CEGL006570</td>
<td>Sedge Mixed Forb Fen CEGL006551 (S1/GNR)</td>
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<td>Golden Saxifrage Sedge Rich Seep CEGL006448</td>
<td>Sphagnum Beak-rush Peatland CEGL006135 (S3/GNR)</td>
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<td>Highbush Blueberry Sphagnum Wetland CEGL006190,</td>
<td>Sweet-gale Leatherleaf Shrub Fen No NVC Association (S3/GNR)</td>
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<td>CEGL005085 (S5/G3S5)</td>
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<td>Many-Fruited Sedge Bladderwort Poor Fen CEGL005229 (S2/GNR)</td>
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<td>Hemlock Palustrine Forest CEGL006279 (S3/G4?)</td>
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<td>Hemlock – Mixed Hardwood Palustrine Forest CEGL006226</td>
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