Vegetation Surveys Around Small Northeastern Lakes

Background: In 1986, Stephen T. Jackson commenced a project aimed at understanding and testing models of pollen representation in sediments of small lakes, by comparing modern pollen assemblages with vegetation composition in the surrounding region. Because small lakes were widely assumed to collect pollen primarily from a relatively short distance (ca. 10^1 - 10^3 m), sampling was restricted to a 1-2 km radius around the lakes.

An initial study was conducted of 19 very small lakes (0.1 - 0.5 ha) in 1986-1987. The data included 7 lakes in the Matunuck Hills of southern Rhode Island, 3 in or near Douglas State Forest (intersection of Rhode Island, Connecticut, and Massachusetts), 1 from the eastern Adirondack Mountains, and 8 from the Fish Creek region of the central Adirondack Mountains (Jackson 1990).

This study was expanded in 1989-1990 to include additional lakes up to 2.0 ha: 2 in the Berkshire Hills of western Massachusetts, 9 in the eastern Adirondack Mountains, and 6 in the Fish Creek region of the central Adirondacks. Thus, 17 lakes were added to the original 19. However, two of the original Matunuck Hills sites (Strange Pond and Child Crying Pond) were eliminated from the dataset, because they were very close (<150 m) to other sites and could not be considered fully independent. This yielded a dataset comprising a total of 33 small lakes (Jackson 2019).

Vegetation surrounding each lake was surveyed using three methods, each appropriate for a different radial distance around the lakes:

First, intensive sampling was done within 20 m of the margin of each lake. For the smallest lakes, every tree within 20 m of the water's edge was inventoried and measured for diameter at breast height. For 15 larger lakes, 12 rectangular plots (10 x 20 m or 15 x 20 m) were laid out (20-m axis running perpendicular to the tangent of the shoreline) and all trees within the plots were measured and tallied.

Second, forest composition from 20 to 100 m of the lakeshore was inventoried by means of 12 radial transects, with Bitterlich sampling at 10-m intervals from 25 to 95 m distance from the lake. This yielded, in most cases, 96 Bitterlich samples for estimation of basal area within the 20-to-100 m ring.

Third, forest patterns within a 1-2 km radius of each lake were mapped and classified on aerial photographs based on air-photo interpretation and ground surveys. Bitterlich samples were obtained on transects within the various forest types. The maps were digitized, and areas of the respective forest types were estimated. Forest composition (relative and absolute basal area) were estimated using the Bitterlich data and forest-type areas.

Details of the methods, as well as descriptions of the forest composition and landscapes in each of the study areas, have been published (Jackson 1990, 2019). A data paper includes the pollen counts for each of the 33 lakes, and estimates of forest composition within 20, 50, 100, 500, and 1000 m of each of the lakes (Jackson 2019). That paper also includes metadata for all 33 of the sites.

Potential Utility of the Data: The data comprise a form of 'permanent plot data', insofar as the plots (and individual trees) within 20 m of the lake margins and the radial Bitterlich transects 20-100 m from the lakes can be relocated with high precision. The broader-scale forest maps may also be of utility in ecological field work, inventory, and assessment of change. The Bitterlich transects aimed at sampling forest types 100-1000 m from the lake margins can be relocated, with precision varying from moderate to very high.

Field notes on aquatic and wetland vegetation in and near the lakes, as well as on understory plants, are also included, and may be of use in future assessments of local change.

Methods: Described above; see Jackson (2019) for details.

Data: Each lake has a file folder containing the following materials, all pertaining to the lake itself and to the vegetation surveys within 0-20 m and 20-100 m of the lake:

- Field notes, including site descriptions, ownership, sediment-collection records, aquatic and wetland vegetation, understory vegetation, etc.
- Field notes with information on plot placement for 0-20 m surveys (when done as plots)
- Field data sheets with DBH measurements for each individual tree in plots (or entire circumference) 0-20 m from the water margin
- Printouts of compiled DBH measurements and basal area calculations for 0-10 and 10-20 m radii
- Field data sheets with Bitterlich tallies for 12 radiating transects 25-95 m from water margin (including compass bearing off buoy placed in center of lake)
- Printouts of summaries of Bitterlich tallies and basal area calculations between 20 and 50 m (25, 35, 45 m along transects) and between 50 and 100 m (55, 65, 75, 85, 95 m along transects)
- Complete metadata (including geographic coordinates, elevation, etc.) for each site are in Jackson (2019) and accompanying table

Most of the lakes were in geographic clusters (Matunuck Hills, Fish Creek, Douglas State Forest), but nine were isolated (>>2 km from other sites, all in Berkshire Hills or eastern Adirondacks), and two of the eastern Adirondack sites were <2 km from each other. Accordingly, the materials for estimation of forest composition more than 100 m from the lakes were organized differently, in the following groups:

- Matunuck Hills (5 sites – Alderwick, DuMoulin, Goddard, Hollow, Sharpe Ponds)
- Douglas State Forest region (3 sites – East Thompson, Church, Douglas State Forest Ponds)
- Little Howard/Feeder Mountain (2 sites – Feeder Mountain, Little Howard Pond)

- Fish Creek region (14 – Bosquet, Dual, FCKP1, FCKP3, FCKP5, FCKP6, Floodwood Esker, Floodwood Road Bog, Green Bay Camp Bog, Frog, Little Whey, Mud, North Whey, Sochia Ponds)
- Cranberry Pond (MA)
- Hatch Pond (MA)
- Bloody Pond (NY)
- Bullet Pond (NY)
- Clark Pond (NY)
- Lily Pond (NY)
- Penny Pond (NY)
- Rhododendron Pond (NY)
- Round Pond (NY)

Each of these 13 sites or groups has individual sets of folders, which include:

- Aerial photos, with Mylar overlays on which land-cover types and forest types are delineated
    - All of the sites or regions have separate composite maps (traced from the Mylar overlays) delineating the forest types and land-cover types. Some (Matunuck Hills and Douglas State Forest) are on tracing paper and filed with the air photos. Others are on tracing Mylar.
    - The Fish Creek region has a complete (printed) digital vegetation map (original files are as-yet-unlocated, may be on obsolete GIS software)
- Field data sheets and field notes with:
    - origins and bearings of vegetation transects within the respective forest categories,
    - Bitterlich tallies for each point along the transects
    - Miscellaneous field notes (transect deviations, land-surface features)
- Printed summaries of Bitterlich data for each stand type.

The original project design for the 1989/1990 field season included larger lakes ($\geq$5 ha) for comparison with the smaller ($\leq$2 ha) lakes. Vegetation patterns were delineated around several larger lakes in the eastern Adirondacks (Challis Lake, Clear Pond, Howard Pond, Munson Pond, Upper Moss Pond). All were surveyed, some more thoroughly than others depending on logistics and time. Some of the Fish Creek transects were emplaced to get detailed information on some larger ponds (Rat Pond, Little Green Pond, many others); they are with the larger Fish Creek data files.

- Clear Pond – near Round Pond; surveys were extended to encompass vegetation within 1 km of Clear Pond (probably incomplete). All photos and data are included with the Round Pond files.

- Challis Pond – eastern Adirondacks. File includes topographic map, air photos, transect positions (photo 209-161), and field-transect data sheets and compilations. I believe that all major forest types in this region were inventoried.
- Upper Moss Pond: On the Underwood Club property on the eastern edge of the High Peaks. File includes air photos, transect locations, field data, and data compilations.
- Howard and Munson Ponds: These are in the eastern Adirondacks, on the Witherbee topographic Quadrangle, and not far from Little Howard and Feeder Mountain Ponds. File includes air photos, transect information, field data, and compilations.

References:

Jackson, S.T. 1990. Pollen source area and representation in small lakes of the northeastern United States. *Review of Palaeobotany and Palynology* 63:53-76.

Jackson, S.T. 2019. Modern pollen-assemblage data from small lakes paired with local forest-composition data in northeastern United States. *Ecology* 100(1), e02784 (https://doi.org/10.1002/ecy.2784).

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