Patterns of Migration Counts of Northern Harriers in Eastern North America

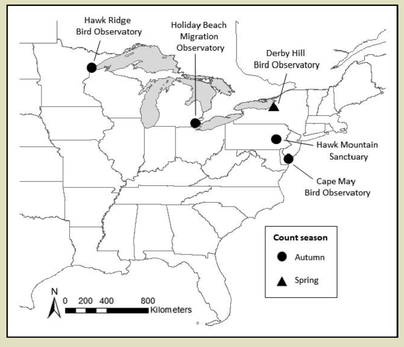
David Schimpf, University of Minnesota Duluth (retired), & Hawk Ridge Bird Observatory

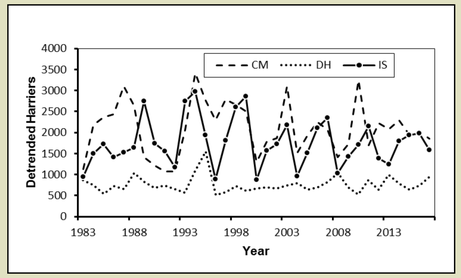
Laurie Goodrich, Hawk Mountain Sanctuary

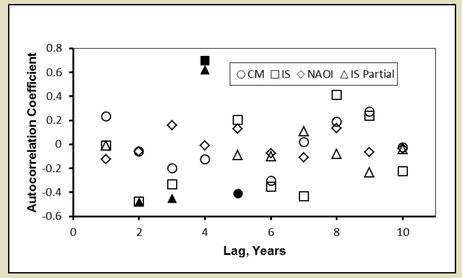
Alison Kocek, SUNY College of Environmental Science and Forestry, & Derby Hill Bird Observatory

David La Puma, Cape May Bird Observatory, & Cellular Tracking Technologies

<u>Background</u>: Autumn counts of Northern Harriers (NOHA), *Circus hudsonius*, had been informally interpreted as following a multi-year cycle, but this idea had not been thoroughly evaluated. We statistically tested time patterns of the 1983–2017 autumn migration counts of NOHA from the major count sites: Hawk Ridge, Holiday Beach, Hawk Mountain, and Cape May; compared them to spring migration counts at Derby Hill; compared them to autumn counts for other diurnal raptor species; and compared them to atmospheric patterns represented by the North Atlantic Oscillation Index. (NAOI).

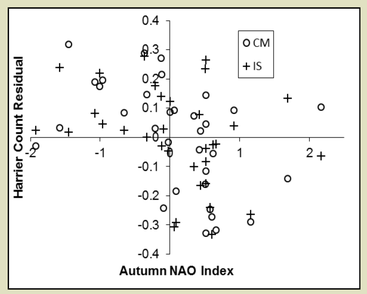






<u>Results</u>:

- The sum of the NOHA counts from Hawk Ridge, Holiday Beach, and Hawk Mountain (Interior Sum or IS) showed a four-year cycle.
- The NOHA counts from each of those three individual sites also did this, but not as strongly as their sum did.
- NOHA counts at Cape May (CM) and Derby Hill (DH) did not show a cycle, but Cape May's were positively correlated with the Interior Sum.
- Spring NOHA counts at Derby Hill were not correlated with counts in the following autumn, but were positively correlated with counts in the previous autumn.
- Interior Sum autumn counts for Sharp-shinned Hawk, Turkey Vulture, and Rough-legged Hawk showed a four-year cycle, but weaker than the one for NOHA .
- The NAOI for September through November did not show a cycle, but when it was negative autumn NOHA counts were not low.



<u>Insights</u>

- When seeking multi-year trends for interior NOHA autumn migration counts, use first and last years that are on the same wave position.
- Autumn numbers of migrating NOHA seem to reflect breeding productivity during the summer of the same year.
- The cycles in vole numbers that are known to drive NOHA nest productivity cycles must be widely synchronous. Where? How?
- Between-year differences in autumn NOHA migration numbers carry through the winter to the following spring migration numbers.
- The negative phase of the autumn North Atlantic Oscillation Index seems to affect the autumn NOHA count (perhaps through wind patterns?)

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For details and more, see the free open–access paper by the authors. (2020) Northern Harriers Have a Geographically Broad Four-year Migration Cycle. *Journal of Raptor Research* 54(1): 38–46.