

Relationship between the North Atlantic Oscillation and spring migration phenology of Broad-winged Hawks (*Buteo platypterus*) at Hawk Mountain Sanctuary, 1998-2013

ABSTRACT

Climatic factors influence migration behavior in both short- and long-distance migratory birds. The Broad-winged Hawk (*Buteo platypterus*) is a long-distance migrant that exhibits a regular calendar-like migration pattern, with some interannual variability during both the northbound and southbound migrations. We examined the relationship between the North Atlantic Oscillation (NAO) and the timing of spring migration in Broad-winged Hawks based on standardized migration count data collected at Hawk Mountain Sanctuary from 1998 to 2013. A strong negative correlation was found between a higher April NAO index and earlier passage dates for the first 50% ($r = -0.723$, $P = 0.01$) and 95% ($r = -0.565$, $P = 0.02$) and mean passage date ($r = -0.730$, $P = 0.01$) of the hawks passing the watchsite. The April NAO values may serve as a useful indicator of the conditions encountered by Broad-winged Hawks during their northbound migration and our analyses suggest a possible climatic effect on their migration timing, as measured at the migration watchsites in the northeastern United States.

Keyword: Broad-winged Hawk; *Buteo platypterus*; Long-distance migrant; Migration phenology; North Atlantic Oscillation; Passage timing

