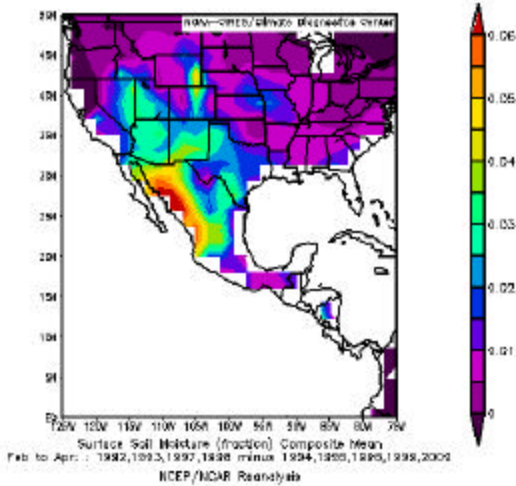


# ENSO and NAO: What Are They ?

By Todd Plummer and Phil Nott

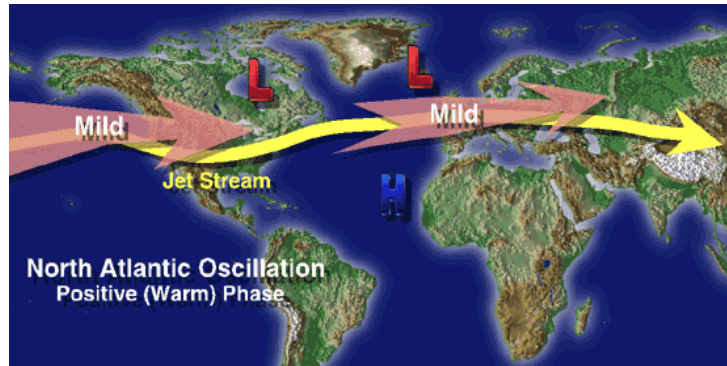
Global short-term climate variability is associated with phases of coupled oceanic and atmospheric phenomena including the El Niño Southern Oscillation (ENSO) and The North Atlantic Oscillation (NAO). These large-scale changes in the atmospheric wave and jet stream patterns influence temperature, rainfall, storm tracks, and jet stream location and intensity over vast areas. Research shows that both ENSO- and NAO-induced seasonal weather conditions can affect primary productivity (as seen in tree ring data) and insect abundance. Both of these factors likely influence avian reproductive success.



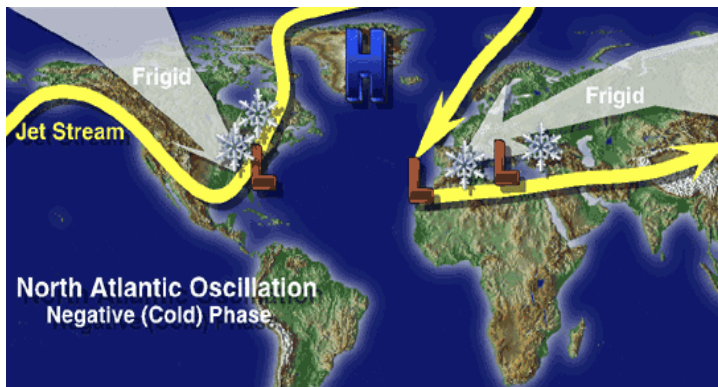
**The El Niño Southern Oscillation (ENSO)** describes climate conditions fluctuating between the extremes of El Niño years (e.g., 1992, 1997, 1998) and La Niña years (e.g., 1994-96, 1999). During El Niño winters the surface waters of the subtropical and tropical Pacific Ocean between South America and the international dateline are abnormally warm. As a result, the weather between February and April in western Mexico, where many neotropical migrant birds overwinter, tends to be cooler and wetter (or hotter and drier in La Niña years). This effect diminishes as you move north into the wintering ranges of temperate wintering birds where weather patterns are more influenced by the North Atlantic Oscillation.

Image provided by the NOAA-CIRES Climate Diagnostics Center, Boulder Colorado <http://www.cdc.noaa.gov/>

**The North Atlantic Oscillation (NAO)** influences weather conditions at northerly latitudes. When the surface waters of the North Atlantic are warmer than normal (warm-phase NAO), the northerly latitudes of the United States can experience mild, wet winters. Conversely, they are more likely to experience cold, dry, snowy winters during cold-phase NAO, especially in the northeast region of North America.



(NAO images courtesy of Intellicast.com)



Over the last few decades the warming trend in the North Atlantic is consistent with reports of a receding tundra line and rapidly melting glaciers at northerly latitudes. While scientists debate the potential ecological and economic disasters that might result from substantial melting of the massive Greenland ice sheet, the insects continue to thrive in the Pacific Northwest - much to the delight of the birds that breed there.