

Some terrestrial species at the southern limit of their range may also be directly affected by warmer temperatures. At summer temperatures above 57 F and winter temperatures above 23 F moose start to show symptoms of heat stress. When moose experience heat stress, their respiration and heart rates increase, they seek shade and cooling winds or cool water and they bed down and eventually cease foraging increasing their risk of mortality (Franzmann & Schwartz 1998).

Rising sea level

One of the most dramatic predicted effects of climate change in coastal habitats will be sea level rise. Sea level in the United States is rising 2.5 to 3.0 mm/yr. Global warming could raise the sea level by 0.6 to 2 feet by 2050 and 1.6 to 6.6 feet by 2100 (Kirshen et al 2014). The predicted high water levels will inundate salt marshes, deepen estuaries, and convert marsh grass to mudflat and mudflats to subtidal zones. If the rate of sea level rise is rapid, affected habitats will be inundated more frequently, putting their associated species at high risk. Total habitat and species losses are particularly likely in developed areas where there are no natural habitat retreat areas to allow for salt marsh migration.

Dune and beach habitats are important for nesting and loafing seabirds, including Roseate terns, common terns, and marine mammals. Sea level rise may affect habitat availability and the timing of nesting and migration for seabirds (Kushlan et al. 2002, Galbraith et al. 2002). The sand and sediment making up coastal dunes will be driven inland by high tides and storm surges, with the lack of natural sediment movement and coastal development meaning that in many places dunes will be lost altogether. The degradation and loss of dunes will increase the impacts of storms and high tides further inland.

As well as being inundated, salt marsh habitats may also lose pioneer species and salt pannes due to reduced incidence of ice scour. This habitat is also sensitive to changes in salinity from freshwater inputs (NHFG 2013). Rocky shores and islands will not be as affected except in low lying areas. Most intertidal species may shift to higher elevations but will be subject to more heavy surf during storms. Island-nesting birds may lose habitat or experience reduced productivity as a result of changes to available prey (NHFG 2013).

Invasive Species

Climate change will facilitate the introduction and spread of invasive species (including new diseases and pathogens) in New Hampshire. For instance, the hemlock woody adelgid, whose range is limited by temperature, has been steadily pushing north and has reached Moultonborough New Hampshire (NH Forests and Lands 2015). Loss of hemlock would have dramatic effects on forest composition, wildlife habitat, and ecosystem processes in terrestrial and aquatic ecosystems. New pest invasions are also likely including spruce-fir pests currently attacking southern Appalachian forest. The wasting disease pathogen (*Labyrinthula zosterae*), which has decimated eelgrass beds in the past, might become more of a problem because it prefers higher salinity waters (which are expected in some estuaries because of sea-level rise) and warmer water. Many non-native warmwater fish will become more predominant in many watersheds, especially where they are currently limited by temperature. West Nile Virus will likely become more of a threat if climate conditions (milder winters, wetter summers) facilitate mosquito survival and breeding. Floodplain habitats may experience increased erosion due to floods and provide more disturbed habitat for invasive plants. Transmission lines create areas of shrublands and avenues for invasive species. Control of invasive could exacerbate existing issues if chemical or biological controls are used in sensitive areas, affect non-target organisms or are used improperly.