Ducks Unlimited (DU) high priority conservation regions

By Mike Anderson, Ducks Unlimited Canada

Summary

Ducks Unlimited (DU) believes that the prospects of climate change are serious, and we are taking steps to keep informed and do prudent contingency planning for conservation. There remains, however, a great deal of uncertainty about how this global drama will play out, and that too must be considered as we plan for the future. Here's a sampling of projections for some of DU's high priority conservation regions:

Prairie pothole region

The Prairie Pothole Region is the single most important breeding area for waterbirds in North America. Average spring temperatures have increased in this region over the past 50 years, and all global climate models predict further warming.

Expected ecological changes include fewer wetlands on average; shorter flooding duration for wetlands; greater annual variability in surface water; changes in agriculture; and changes to water depth, salinity, temperature, plants, and aquatic food webs.

Drought affects the breeding success of prairie ducks by decreasing the likelihood of breeding at all; and by causing reduced clutch sizes, shorter nesting seasons, reduced likelihood of re-nesting, lower nesting success, and lower brood survival, collectively resulting in fewer ducks being produced.

Some low-risk adaptations to these threats might include:

- targeting long-term waterfowl conservation actions to less vulnerable sub-regions of the prairies;
- protecting native parkland habitats at the northern fringe of the pothole region where longer growing seasons will favor agricultural expansion;
- reducing existing human-caused stresses on wetlands (e.g., drainage, filling, road impacts) and associated uplands (e.g., overgrazing, intensive tillage);
- restoring or protecting complexes of wetlands of varying permanence in order to hedge against more variable moisture conditions;
- contingency planning for large managed wetlands (e.g., securement of water rights, engineering modifications).

Gulf coast

Gulf Coast wetlands provide wintering habitat for many North American waterfowl, so prospects for climate change here is of great interest.

Globally, average sea level has risen from four to eight inches over the past century, due mostly to thermal expansion of the warming oceans and melting of land ice. Climate models anticipate a further sea level rise of 18 to 20 inches by 2100, and more thereafter.

The rate of sea level change along the U.S. coast has varied from place to place because of differences in vertical movements of land, alluvial deposition, and land subsidence from extraction of water or petroleum. In historic times, relative sea level rise has been greatest in Louisiana, high in Texas and New Jersey, and intermediate along the mid-Atlantic coast.

With a projected 18- to 20-inch rise in sea level, land loss along the U.S. coastline, without additional shoreline protection, has been estimated at: Mid-Atlantic Coast 900 square miles, Louisiana 1,350 square miles, other Gulf areas 900 square miles, and Pacific Coast 550 square miles. Clearly, humans and wetlands will increasingly compete for space in coastal zones, because a 24 percent growth in U.S. coastal county residents is predicted by 2025.

Between 1956-90, Louisiana coastal wetlands were lost at a rate of 25 to 40 square miles per year. About 40 percent of the nation's brackish and freshwater coastal wetlands are found in Louisiana, where seasonal flooding of the Mississippi River successively created six distinct deltas over the last 7000 years. During the last century, however, dam construction on the upper Mississippi has reduced the River's sediment load by about 50 percent, and the construction of levees has greatly reduced flooding. Faster main channel flow also means that less sediment settles out where it can build marshes. So currently, marsh building cannot keep pace with sea level rise.

Extensive loss of habitat in the Gulf Coast region would affect species of concern like lesser scaup and northern pintail. Mid-continent lesser snow geese also winter here in large numbers, and the great majority of the world's redheads depend on shoal grass in the Laguna Madre. Freshwater habitats near the coast are limited and dependent upon uncertain precipitation. In recent decades, flooded rice fields have greatly augmented natural marsh habitats in these regions, but rice agriculture along the Gulf is on the decline in the face of tough competition from other rice-growing regions. If Gulf region coastal habitat losses are severe enough, with few options for redistribution of birds inland, wintering waterfowl could be in trouble in cold years when they concentrate at the southern end of the flyway.

Mid-Atlantic coast

The U.S. Mid-Atlantic Coast (especially Chesapeake Bay, Delaware Bay, Currituck Sound, and Pamlico Sound) historically wintered large numbers of waterfowl, although changes in these estuaries reduced their attractiveness to ducks during the 1900s. Sea level rise is likely to reduce further the amount of suitable shallow water habitat. The latest assessment report for this region predicts a relative sea level rise of 7.5 inches by 2030, and 26 inches by 2095. Chesapeake Bay salt marshes do not receive sufficient sediment and organic matter to keep pace with current rates of sea level rise, and the

discrepancy between sea level rise and sediment accumulation rates is likely to widen in the coming years.

Changing climate also may affect stream flows that could, in turn, affect local salinity, nutrient loading, and aquatic food webs. Maintaining or improving water quality in the Chesapeake Bay and other mid-Atlantic estuaries will be challenging given the projected regional growth in human populations. Species that are able to move to agricultural lands for food may face fewer limitations than the diving ducks dependent upon aquatic foods.

Warming water temperatures combined with continued heavy nutrient inputs from rivers entering Chesapeake Bay could worsen oxygen-depleted dead zones in the Bay during summer. However, different climate models currently offer contrasting predictions about future stream flows in this region. This illustrates the difficulty of climate impact assessment and the challenges policy makers face in trying to respond. It seems, however, that the current conservation focus of DU and its partners on improving water quality in Chesapeake Bay still makes sense.

Mississippi alluvial valley

Uncertainty about future precipitation and runoff also clouds predictions for the Mississippi River Basin, the third largest drainage system in the world. More than half of the land area of the basin is devoted to cropland, much of that former bottomland hardwood forests. Wetlands in the upper basin provide important breeding and staging habitats for Mississippi and Atlantic flyway waterfowl. The lower basin is the most important wintering area on the continent for mallards, and supports large numbers of other dabbling ducks and wood ducks.

The extent of winter flooding in the Valley affects body condition and winter survival of mallards. Presently, however, different climate models offer contrasting predictions about future river flows, leaving us with little ability to predict future flooding patterns in the Valley, and thus the future suitability of the region as waterfowl habitat.

Great Lakes

Great Lakes' shippers struggled last winter as water levels from Duluth to Montreal continued to recede. Now some 39 inches below 1997 levels, the lakes are edging ever closer to record low levels. Reduced precipitation and runoff, coupled with warm temperatures (which means reduced ice cover and more lake-effect snows) are keeping it that way. If climate modelers are on track, the Great Lakes of 2001 will be more the norm than an anomaly. For waterfowl, this could be mixed news. Certainly in the short term, lakeside wetlands could suffer from lower water levels. Reduced water volume could also concentrate nutrients and pollutants entering the lakes, degrading waterfowl food supplies. On the other hand, if we can muster support for far-sighted coastal zone planning, there may be opportunities for enhancing and protecting new shallow-water habitats for wildlife as water levels gradually recede.

Central Valley of California

Until the 19th century, the Central Valley of California contained one of the largest complexes of wetlands in the United States. Drainage for agriculture and human settlement eliminated some 95 percent of those wetlands, although many basins have been restored in the last 20 years, and flooded rice fields provide thousands of acres of supplemental habitat. The densities of waterfowl wintering in California are generally the highest to be found in the United States, so DU views any threat to the integrity of these wetlands with concern.

Recent studies predict that warmer temperatures will cause more precipitation in the Sierra Nevada Mountains to fall as rain. More rapid runoff and earlier snowmelt would lead to higher winter flows and reduced summer flows in most California rivers. Decreased summer stream flows would intensify competing demands for water. Moderate flooding in the Central Valley probably benefits wintering waterfowl by increasing the amount of feeding and refuge habitat available to the birds while simultaneously reducing crowding and the likelihood of disease transmission. So, if future winters are wetter than today, waterfowl may benefit. The value of this flooding, however, depends critically on underlying land use. If the extent of rice culture in the valley were reduced in the future (for instance, if irrigation water become too costly), then winter flooding of agricultural land would be of little value to waterfowl.

Along the California coast, sea levels are projected to rise by eight to 12 inches in the next century. Shallow tidal habitats could be reduced substantially because human development will limit inshore immigration of coastal wetlands. Increased winter stream flows following decreased summer flows to the Delta and San Francisco Bay are predicted to result in higher concentrations of contaminants in the estuary. Waterfowl dependent on the estuaries for food, like greater scaup, scoters, or canvasbacks, could experience decreased food availability or increased contaminant loads, but this is still speculation. Diving duck habitats are generally more limited along the Pacific Coast than the Atlantic, so any deterioration of habitat quality would be cause for concern.

Western boreal forest

The vast Western Boreal Forest of Alaska and northwestern Canada supports some14 million breeding waterfowl. Many more birds use these habitats for molting or staging, or as a retreat when the prairies are dry.

Boreal forest ecosystems could be among the most affected by global warming because of the greater temperature changes expected at high latitudes. Ecological predictions include lengthening ice-free seasons on lakes and rivers; earlier runoff; melting permafrost; and northward range shifts by plants and animals.

Substantial areas of western Canada's boreal forest were in drought conditions through much of the 1980s and early 1990s. Since the 1970s, the area of boreal forest in Alaska burned each year has more than doubled. It is not clear whether more frequent fires

would degrade or improve habitat conditions for breeding waterfowl, but change things it would.

The biggest obstacle to anticipating impacts of climate change on waterfowl in this region is a lack of understanding of the basic ecology of boreal wetlands and breeding ducks. We know little about what limits waterfowl populations breeding in the region or the nature of wetland food webs on which ducks depend. This is a serious knowledge gap because while several duck species (scaup, scoters) in this region are declining, resource development (oil and gas, forestry, mining) is rapidly expanding, and climate change impacts are expected to be profound. While we can say little with confidence yet about consequences of climate change for boreal forest waterfowl, it is clear that basic research and monitoring are urgently needed. DU's expanding Western Boreal Forest Initiative is designed to provide the scientific basis for future conservation of boreal ducks.

Farther north, some arctic regions seem destined to experience greater warming than anywhere else in the northern hemisphere. Longer ice-free seasons will mean longer and more favorable breeding seasons for arctic geese. For some species, this would be great news; for the white geese, however, increased production could aggravate problems with overgrazed breeding habitats.