Derivation of Regional Waterfowl Planning Objectives from NAWMP Continental Population Objectives

Introduction

The North American Waterfowl Management Plan (Plan) is predicated on the premise that the cumulative effects of many targeted local-scale management actions will ultimately affect continental waterfowl populations through improvements in recruitment and survival processes. The ultimate objective of Plan management actions is to provide sufficient habitat to maintain continental waterfowl populations at objective levels during periods characterized by "average environmental conditions."

Joint ventures attempt to utilize the best available quantitative data and expert opinion to develop explicit assumptions about their regional role in sustaining continental waterfowl populations. These assumptions are critical as they provide the foundation for establishing habitat objectives and implementation strategies. In non-breeding joint ventures, particularly those which are important wintering areas, a three-step process has been employed in development and evaluation of habitat objectives and conservation strategies. First, it is necessary to estimate the proportion of continental waterfowl populations which would be expected to occupy a particular joint venture during the non-breeding season, and the duration and timing of that occupancy, when continental populations are at objective levels. This process is often referred to as a "step-down" of continental goals to regional scales. Second, it is the responsibility of the joint venture to explicitly state assumptions about physiological needs of waterfowl during their residency period and about regional factors influencing availability of and access to important resources, assess resource status and trends, and utilize this information to develop habitat objectives and conservation strategies in a landscape context. Lastly, joint ventures seek to evaluate the validity of explicitly-stated assumptions made during planning phases. In joint venture areas where little evidence of resource limitation exists, it may be difficult to evaluate certain primary planning assumptions regarding the role of regional habitats in continental population dynamics, however, many secondary assumptions (e.g., resource availability in particular habitat types, seasonal changes in resource availability, etc.) can be the focus of evaluation efforts to refine habitat objectives and strategies.

The objectives of this analysis were to derive a cohesive set of species-specific regional waterfowl planning objectives from the continental population objectives of the Plan and assess distributional changes over that past 30 years that might require consideration in setting habitat objectives, to identify potential short-comings in the methodology employed, and to suggest potential remedies for consideration by the Plan Science Support Team (NSST). It is important to note that many factors influence the number of waterfowl that occupy a joint venture in any given year. Some of these factors are not determined by habitat availability and condition within the joint venture. Regional waterfowl planning objectives then are best viewed as baselines for the establishment of habitat objectives, not as performance metrics.

Methods

I derived species-specific regional population objectives from Plan continental population objectives using a 4 step process. First, I computed the 1970-1979 mean proportion of the total continental (i.e., including the U.S. and Mexico) Mid-winter Inventory (MWI) count occurring in

each U.S. state or in Mexico for each species. Second, I computed the 1970-1979 mean proportion of the total U.S. state harvest occurring in each county for each species. Third, I computed a county-level population objective for each species using

N_x~=~{rho_s_x~*~ phi_cs_x~*~O_x} OVER {0.85}

where, N_xis the derived county-level population objective for species *x*, rho_s_x is the proportion of the total 1970-1979 MWI count of species *x* occurring within state *s*, phi_cs_xis the proportion of state *s*'s total 1970-1979 harvest of species *x* which occurred in the county *c*, O_xis the 1970-1979 mean continental population estimate (i.e., mean surveyed area estimate plus estimate of un-surveyed area population) for species *x* from the 1986 Plan, and the constant 0.85 is a conservative correction factor to account for mortality occurring between January and arrival on the breeding grounds. This correction factor was only applied to goose populations for which winter population objectives have been established. For geese I performed 2 separate computations where,O_x was the 2000-2002 mean population estimate or the population objective presented in the draft 2003 Update to the Plan. Because of difficulties in discriminating certain goose species and populations in the MWI database, I combined mean estimates and objectives for "light geese" (i.e., all populations of snow and Ross's geese) and "dark geese" (i.e., all populations of Canada and white-fronted geese).

Lastly, I assigned each U.S. county to a joint venture (Fig. 1) and a Bird Conservation Region (BCR; Fig. 2) based on the proportion of the county in a joint venture or BCR and summed county-level population objectives to derive joint venture and BCR regional population objectives. I then repeated these computations using MWI data from 1990-2002 and county-level harvest estimates from 1990-1999. MWI state total counts were obtained from the U.S. Fish and Wildlife Service (USFWS), Division of Migratory Bird Management, Flyway Representatives. County-level harvest estimates were obtained from the USFWS, Division of Migratory Bird Management, Branch of Harvest Surveys. Mexican MWI data were obtained from the USFWS, Division of Migratory Bird Management, Branch of Migratory Bird Population Assessment. All computations were performed using the SAS statistical software package and the geographic information system Arc/Info.

Limitations for Specific Duck Species or Species Groups

The approach I utilized did not perform well for several ducks including the mottled duck, the whistling ducks, blue-winged and cinnamon teal, and wood ducks.

Mottled Duck and the Whistling Ducks – This approach did not adequately estimate mottled duck or whistling duck populations in the U.S. For mottled ducks, this was particularly true for Florida where the MWI is known to provide a poor index to abundance for this species. I made no attempt to adjust the process for mottled ducks. For whistling ducks, I used a modified process in which I computed the proportion of the MWI count in Mexico, Texas/Louisiana, and Florida during both the 1970s and 1990s. I then multiplied these proportions by the mean MWI count for the 1970s. Because of the restricted distribution of these species in the U.S., the best approach to setting regional population objectives may be the

use of expert opinion.

Blue-winged and Cinnamon Teal – Most blue-winged teal winter in Latin and South America. Significant numbers, however, winter along the U.S. Gulf coast and in Mexico. Also, during the Mid-winter Inventory, blue-winged and cinnamon teal are not distinguished to the species level, rather their counts are aggregated. I therefore utilized actual estimates of the numbers of blue-winged teal wintering on the Gulf coast and in Mexico and cinnamon teal wintering in the western U.S. and Mexico (Bellrose 1980) to derive regional population objectives. For cinnamon teal Bellrose (1980) reports the estimated proportion of the population wintering in Mexico versus the western U.S (primarily the Central Valley of California). I then multiplied these proportions with the estimated total breeding population reported by Bellrose (1980) and divided by the constant 0.85 to obtain regional population objectives for this species. Bellrose (1980) does not report specific proportions of blue-winged teal wintering on the U.S. Gulf Coast and Mexico so I could not base blue-winged teal regional objectives on the breeding population objective of the Plan. Instead I divided estimated wintering populations in these regions as reported by Bellrose (1980) by 0.85 to obtain the regional objectives for blue-wings.

Wood Duck – The wood duck is not well represented in MWI counts due to its cryptic coloration and use of wooded habitats. To derive regional population objectives for this species, I computed the mean total county-level harvest for all states within the primary and secondary winter range of this species (Bellrose 1980). As suggested for geese above, I assumed that the distribution of harvest at the county-level is a correlate of actual wood duck winter distribution. I computed the county-level objectives for wood ducks as the product of the proportion of county harvest to total harvest for states in the primary and secondary winter range and the continental population estimate for eastern and western populations of wood ducks from the 2003 Update divided by the 0.85 correction factor. County-level population objectives were then summed to derive joint venture and BCR objectives.

Other Limitations and Solutions

Population Objectives versus Total Use-days – The results of this derivation provide non-breeding population objectives in January. More useful in developing habitat conservation objectives would be an assessment of season-long use of regional habitats by waterfowl including birds stopping during migration, but subsequently leaving the region of interest. This total season long use has been termed by some non-breeding joint ventures as "use-days." Estimation of total use-days has been attempted by some non-breeding joint ventures. For this continental analysis, it may be possible to use the migration chronology curves and migration regions (Fig. 3) in Bellrose (1980) in conjunction with the of species-specific county-level population objectives (which provide an estimate of population size in January) to compute total use-days by species for each county and sum these use-days for joint ventures and BCRs.