North American Wetlands Conservation Act: Contributions to Bird Conservation in Coastal Areas of the U.S.[1]

Keith McKnight,[2,3] Robert Ford,[4] and Jennifer Kross[2,5]

Abstract

The North American Wetlands Conservation Act (NAWCA) was passed in 1989, and has been instrumental in restoring, protecting, and enhancing 3.5 million has of wetland and associated habitats across North America. The objective of this study was to assess the extent to which NAWCA projects have addressed the priority habitat needs expressed by the North American Waterfowl Management Plan (NAWMP), Partners in Flight (PIF), and U.S. Shorebird Conservation Plan (USSCP) regional plans in coastal regions of the U.S., by comparing the habitat conservation activities described in approved NAWCA proposals with the habitat priorities outlined in the three bird plans. Assessment of 116 approved NAWCA proposals revealed a significant effect of bird initiative and geographic region on project scores, whereas time period (pre-2001, post-2001) had no effect. Several high priority habitat types, such as coastal wetlands (palustrine and estuarine), forest wetlands, flooded agricultural habitat, and diked marsh, were well represented in NAWCA projects. These habitats support a number of waterfowl, shorebird, songbird, and other species. Some habitats, however, were underrepresented by coastal NAWCA projects, including beach/barrier island habitats, tidal wetlands, riparian forest, and pocosins. Continued coordination and cooperation among bird conservation partners should help ensure that NAWCA continue and increase its contributions to wetland associated bird habitat conservation.

Key words: bird conservation, coastal habitats, NAWMP, NAWCA, North American Wetlands Conservation Act, PIF, USSCP.

Introduction

The North American Wetlands Conservation Act (NAWCA) was passed in 1989 to "conserve North American Wetland ecosystems and waterfowl and the other migratory birds and fish and wildlife that depend upon such systems" (16 USC 64). Since that time, NAWCA has provided over $462 million in federal funds, matched by more than $1.3 billion in partner funds to affect restoration, protection, and enhancement of 3.5 million has of wetland and associated habitats across North America.

The primary mechanism for distributing NAWCA funds in the U.S. is the U.S. Standard Grants program, which provides matching grants of between $50,000 and $1,000,000. Monies available for these grants come from several sources, the most important being NAWCA appropriations, interest from the Federal Aid in Wildlife Restoration Act (Pittman-Robertson Act), and Coastal Wetlands Planning, Protection and Restoration Act (CWPPRA; 16 USC 3951-3956) funds. Coastal funds, as defined by CWPPRA, must be spent on projects located in "coastal watersheds" of the U.S., in states that border the Atlantic, Pacific, the Gulf of Mexico, and the Great Lakes (*fig. 1*; USFWS 2002).

Figure 1— Coastal regions of the United States used to delineate "coastal" NAWCA projects 1991-2003.

The North American Wetlands Conservation Council (Council) is mandated by the Act to provide recommendations for project funding as well as policy guidance for administration of the Act's objectives. Final approval of projects to receive NAWCA funding is given by the Migratory Bird Conservation Commission. Whereas NAWCA has traditionally served as a

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[2]Ducks Unlimited, Inc., One Waterfowl Way, Memphis, TN.
[3]Current Address: Ducks Unlimited, 1620 FM 2218, Richmond, TX 77469.
[4]U.S. Fish and Wildlife Service, Division of Bird Habitat Conservation, 4401 North Fairfax Dr., Arlington, VA.
[5]Current address: Department of Wildlife and Fisheries, Mississippi State University, Box 9690 Thompson Hall, Mississippi State, MS 39762.

primary funding mechanism for the habitat conservation needs of the North American Waterfowl Management Plan (NAWMP; U.S. Department of the Interior and Environment Canada 1986), Council has expressed its intent that NAWCA contribute to the habitat needs of all wetland associated birds. This was most recently stated in December 2000 when "Council reaffirmed its intent that wetlands conservation projects provide conservation benefits to all wetland associated migratory birds, as well as other fish and wildlife that depend on these habitats" (NAWCC 2000).

Our objective here was to assess the extent to which NAWCA projects have addressed the priority coastal habitat needs expressed within the Plans of the NAWMP, Partners in Flight (PIF; Pashley et al. 2000), and U.S. Shorebird Conservation Plan (USSCP; Brown et al. 2001). To do this we compared the habitat conservation activities described in approved NAWCA proposals with the habitat priorities outlined in the three bird plans, using a simple scoring protocol for each proposal. We also were interested in determining if the availability of USSCP and PIF plans in recent years had an effect on the degree to which NAWCA projects addressed the habitat priorities of these initiatives.

Methods

Approved NAWCA coastal proposals were grouped into five geographic areas: Gulf Coast, North Pacific, South Pacific, North Atlantic, and South Atlantic (*fig. 1*). For the purposes of this analysis, we did not include the Great Lakes region, nor did we include unfunded proposals. Two time periods were considered as well: calendar years 1991-2000 and 2001-2003 (only approved projects for the first of two proposal submissions for 2003 were available for this study). Each NAWCA coastal proposal was evaluated for its contribution to the habitat area and activity goals within the physiographic plans of NAWMP, PIF, and USSCP ("Plans"). Summaries of these Plans were generated for each regional area in which a NAWCA project occurred. The Plan summaries elucidated priority habitats and their characteristics that are necessary to the conservation of bird species targeted in each planning region. Priority habitat characteristics included priority geographies, habitat quantity, and other relevant details. These Plan requirements were then used as a basis for scoring the NAWCA proposal.

Individual Proposal Evaluation

NAWCA coastal proposals were evaluated independently for contributions to each of the bird initiative Plans. The number of priority wetland and wetland associated habitat types varied among Plans by region and initiative (*table 1*).

First, habitat area was extracted and placed into the applicable priority habitat category identified by each Plan. The NAWCA proposal was scored for contributions to habitat objectives in three categories: 1) "Habitat Type"; consistency of habitat type and action with the priority habitats of the Plan, 2) "Geography"; consistency of geographic location with the Plan priorities, and 3) "Quantity"; significance of habitat quantity to the recommendations of the Plan. This scoring method was based on a 0-2 scale, where 0 was the lowest and 2 was the highest score a proposal could receive in a given category. The score for each category was determined as described below.

The NAWCA proposal received credit for Habitat Type only if the habitat listed in the proposal matched one of the habitat types and/or actions specified in a Plan. For each priority habitat, a proposal was given a Habitat Type score of 0 if that habitat was not addressed and a score of 2 if it was addressed. Consequently, if the Habitat Type score was 0, then the score for Geography and Quantity was 0. A score of 1 was assigned to Habitat Type where priority and non-priority habitat area was reported collectively.

The Geography score was based on the proposal's contributions to both "Local Geography" and "Broad Geography." Local Geography was defined as habitat improvements that contributed to an existing block of

Table 1— *Number of approved NAWCA projects, area (ha) conserved, and priority wetland and wetland associated habitats for three bird conservation initiatives among five coastal regions of the United States, 1991-2003.*

			Number of priority habitats		
Region	**Number of projects**	**Total ha conserved**	**USSCP**	**PIF**	**NAWMP**
Gulf Coast	22	83,804	7	5	5
South Atlantic	21	37,707	5	9	3
North Atlantic	42	61,648	3	7	4
South Pacific	9	29,344	6	3	3
North Pacific	22	34,287	6	4	5

priority habitat. A proposal received one point for this element if the proposed work added or protected habitat in a significant location relative to existing habitat, zero if not. Where local geography was not an important consideration (as is the case with many NAWMP and USSCP habitats), the proposal received one point for this element.

Broad Geography was defined as a regional priority area such as State Wildlife Management Areas, Wildlife Refuges, Bird Conservation Areas, and other coastal areas of special concern. One point was given if the proposed habitat work fell within one of the priority geographies listed in the Plan, zero if not. If the Plan did not list any priority geographies, then we assumed that all locations within the region were of equal importance and assigned a value of one to Broad Geography. If the Plan identified only one or two regional priority geographies for a given habitat type, and the NAWCA project was located in one of those select areas, the proposal received two points for the Broad Geography element. This essentially constituted a bonus point for activities located within a priority geography in planning regions with only a few (≤2) priority geographies.

The score for Quantity was based on the proportion of priority habitat the NAWCA project contributed to the objective listed in the Plan. Projects contributing less than 0.5 percent of the area called for in the Plan, 0.5-1 percent , and >1percent of priority habitat area scored 0, 1, and 2, respectively. When no priority habitat quantity was specified by the Plan, a score of 1 was assigned.

A subtotal of the points awarded to the NAWCA project under each priority habitat was calculated by combining the scores from the categories (Habitat Type, Geography, and Quantity; total possible score = 6). The final score for an individual NAWCA project was calculated by combining the subtotals (i.e. scores for each habitat type). The overall score was derived by dividing the total points for the project by the total possible points, as below:

$$\text{Overall score} = \sum_{i=1}^{n} HP_i + GP_i + Q_i \; / \; \sum_{i=1}^{n} HPP_i + GPP_i + QP_i$$

n = number of priority habitats listed by the Plan

HP = Habitat Type score for habitat i

GP = Geographic score for habitat i

Q = Quantity score for habitat i

HPP = Total possible Habitat Type score for habitat i

GPP = Total possible Geographic score for habitat i

QP = Total possible Quantity score for habitat i

Thus, the overall project score provided a measure of the percentage of habitat priorities of a given bird Plan within a physiographic region that were addressed by a single project.

Collective Proposal Evaluation

Whereas understanding the relative contribution of each project to individual bird initiatives is informative, the collective contribution of projects within a planning region is essential to an understanding of how NAWCA has contributed to bird conservation. To do this, we totaled the area of priority habitats of all approved NAWCA projects within each of the five geographic regions.

Statistical Analysis

We tested for effects of bird initiative, region, and time period on project score using analysis of variance and least squares means (SAS Institute Inc. 1997). Scores were arcsine transformed to meet assumptions of parametric tests (Sokal and Rohlf 1981). We used linear regression to test for relationship between project score and number of priority habitats.

Results

A total of 116 funded NAWCA Standard Grant projects were evaluated (*table 2*). Collectively, these projects conserved 246,790 ha of wetland and associated upland habitat in coastal areas of the United States. Four approved coastal projects were not included in this analysis due to inadequate information in the proposal.

Individual Project Scores

Project scores varied by Initiative ($P < 0.001$; $F = 59.4$; $df = 2$), Region ($P < 0.001$; $F = 17.0$; $df = 4$), and Initiative x Region ($P < 0.001$; $F = 6.1$; $df = 8$), but did not differ among Periods ($P > 0.05$) nor the interaction of Period with any other factors. NAWMP project scores were higher ($P < 0.05$) than the other two initiatives in the Gulf Coast, South Atlantic, and North Atlantic regions, whereas project scores for NAWMP did not differ ($P < 0.05$) from those for USSCP in the South Pacific, nor from those for PIF in the North Pacific region (*table 2*).

Table 2— *Least squares means of approved NAWCA project scores for North American Waterfowl Management Plan (NAWMP), U.S. Shorebird Conservation Plan (USSCP), and Partners in Flight (PIF) Plans in five coastal regions of the United States.*

	Region				
Initiative	**Gulf Coast**	**South Atlantic**	**North Atlantic**	**South Pacific**	**North Pacific**
NAWMP	0.50 A[1]	0.85 A	1.08 A	0.43 AB	1.00 A
USSCP	0.28 B	0.26 B	0.32 C	0.45 A	0.38 B
PIF	0.25 B	0.30 B	0.53 B	0.20 B	0.61 AB

[1]Means within columns followed by different letters differ ($P < 0.05$) according to least squares means analysis.

Table 3— *Least squares means of project scores for North American Waterfowl Management Plan (NAWMP), U.S. Shorebird Conservation Plan (USSCP), and Partners in Flight (PIF) Plans in five coastal regions of the United States.*

	Initiative		
Region	**NAWMP**	**USSCP**	**PIF**
Gulf Coast	0.50 C[1]	0.28 A	0.25 C
South Atlantic	0.85 B	0.26 A	0.30 BC
North Atlantic	1.08 A	0.32 A	0.53 A
South Pacific	0.43 C	0.45 A	0.20 C
North Pacific	1.00 AB	0.38 A	0.61 A

[1]Means within columns followed by different letters differ ($P < 0.05$) according to least squares means analysis.

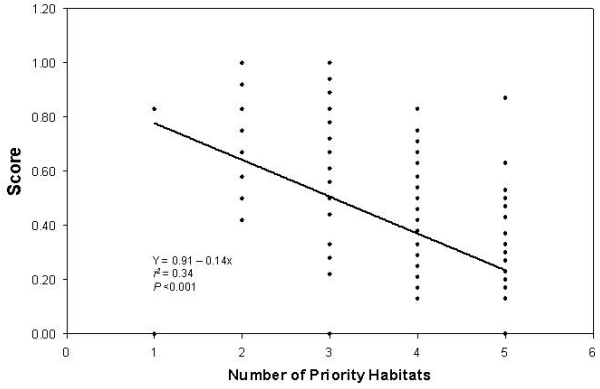

Figure 2— Relationship between project score and number of priority habitats in the Plan region, according to regression analysis for approved NAWCA projects in coastal areas of the United States, 1991-2003.

Scores for NAWMP priority habitats generally were highest ($P < 0.05$) in the North Atlantic and North Pacific regions, whereas NAWMP scores for the Gulf Coast and South Pacific were lower than in the other regions (*table 3*).

For USSCP, project scores did not differ ($P > 0.05$) among planning regions, although USSCP project scores in the North Atlantic region were lower ($P < 0.05$) than those for the other two initiatives (*table 2*). PIF priority habitat scores were greatest ($P < 0.05$) in the North Atlantic and North Pacific regions (*table 3*). Project scores were negatively related ($P < 0.05$; $df = 324$; $r^2 = 0.34$) to the number of priority habitats in the planning region (*fig. 2*).

Regional Project Contribution to Priority Habitats

Area of priority coastal habitat conserved by NAWCA projects since 1991 for NAWMP, USSCP, and PIF priorities were 183,990, 127,695, and 121,124 ha, respectively, with more priority habitat conserved since 2001, than prior to 2001 (*tables 4-6*). Note that area of priority habitats conserved relative to the three bird Plans is not additive. For example, "Coastal Marsh" accounts for 48,567 and 50,289 ha of priority habitat for both NAWMP and USSCP, respectively. Coastal Marsh (including saline, brackish, and fresh marsh), Forest Wetland, Flooded Agriculture, Seagrass Beds, and Upland Buffer comprised the majority of this area.

Priority habitat types consistently underrepresented in funded NAWCA projects were Riparian Forest and Tidal Wetland for NAWMP (*table 4*); Lacustrine Wetland, Beach, Shoreline and Rock Jetties, Tundra Meadows, and Salt Ponds for USSCP (*table 5*); and Pocosins, Pine Savannah, Sand Hill/Longleaf Pine, and Coastal Forest for PIF (*table 6*).

Discussion

NAWCA has contributed to the conservation of more than 200,000 ha of priority bird habitat in coastal regions of the United States through the Standard Grants program since its inception in 1991. These areas provide important habitat to a variety of bird taxa, and contribute significantly to regional habitat components of the three bird conservation initiatives we examined. Projects examined in this study contributed most consistently to the priority habitat objectives of the NAWMP. This was evident in both the individual project scores and the aggregate area (183,990 ha) of priority habitats.

Table 4— *Quantity (ha) of North American Waterfowl Management Plan priority habitats in NAWCA Standard Grant proposals funded in five coastal regions of the U.S. from 1991-2000 and 2001-2003.*

	Gulf Coast		South Atlantic		North Atlantic		South Pacific		North Pacific		Total	
Habitat type	**'91-'00**	**'01-'03**	**'91-'00**	**'01-'03**	**'91-'00**	**'01-'03**	**'91-'00**	**'01-'03**	**'91-'00**	**'01-'03**	**'91-'00**	**'01-'03**
Coastal Marsh	9,387	39,179	[1]-	-	-	-	-	-	-	-	9,387	39,179
Palustrine wetland	4,539	877	11,021	9,727	9,263	7,529	14,744	6,722	5,922	5,281	45,489	30,137
Estuarine wetland	-	-	1,464	1,133	8,856	2,003	-	-	1,076	2,280	11,396	5,416
Agriculture Habitat	2,047	1,012	-	-	-	-	142	0	0	0	2,189	1,012
Upland Buffer	-	-	150	40	841	21,681	-	-	-	-	991	21,722
Forested Wetland	1,824	162	-	-	-	-	-	-	-	-	1,824	162
Seagrass Bed	0	14,536	-	-	-	-	-	-	-	-	0	14,536
Shoreline	-	-	-	-	0	0	-	-	-	-	0	0
Riparian Forest	-	-	-	-	-	-	-	-	23	1	23	1
Tidal Wetland	-	-	-	-	-	-	-	-	0	85	0	85
Water	-	-	-	-	-	-	440	0	-	-	440	0
Total	17,797	55,766	12,635	10,901	18,961	31,214	14,886	6,722	7,021	7,647	71,300	112,250

[1]"-"Denotes habitat type was not a priority in this region.

Table 5-- *Quantity (ha) of U.S. Shorebird Conservation Plan priority habitats in NAWCA Standard Grant proposals funded in 5 coastal regions of the U.S. from 1991-2000 and 2001-2003.*

	Gulf Coast		South Atlantic		North Atlantic		South Pacific		North Pacific		Total	
Habitat Type	**'91-'00**	**'01-'03**	**'91-'00**	**'01-'03**	**'91-'00**	**'01-'03**	**'91-'00**	**'01-'03**	**'91-'00**	**'01-'03**	**'91-'00**	**'01-'03**
Coastal Marsh	10,290	39,999	[1]-	-	-	-	-	-	-	-	10,290	39,999
Freshwater Ponds	3,236	2,999	7,307	1,343	-	-	13,767	5,536	3,911	4,053	28,221	13,931
Esturine Intertidal	0	0	1,464	1,113	9,928	2,003	76	0	1,086	2,268	12,553	5,384
Flooded Agriculture	2,047	4,249	-	-	-	-	142	0	956	0	3,145	4,249
Barrier Island/Beach	0	879	0	0	25	0	-	-	0	0	25	879
Riverine Wetland	727	1,499	0	19	-	-	-	-	-	-	727	1,518
Lacustrine Wetland	0	0	6	59	-	-	-	-	-	-	6	59
Shoreline & Rock Jetties	-	-	-	-	*27	*10	-	-	*95	*45	95	
Diked Marsh	-	-	-	-	-	-	5,615	919	-	-	5,615	919
Tundra Meadows	-	-	-	-	-	-	-	-	80	0	80	0
Salt Ponds	-	-	-	-	-	-	0	0	-	-	0	0
Total	16,301	49,625	8,777	2,533	9,953	2,003	19,600	6,455	6,048	6,320	60,678	66,937

[1]"-"denotes habitat type was not a priority in this region.

*Expressed in kilometers.

Table 6— *Quantity (ha) of Partners in Flight priority habitats in NAWCA Standard Grant proposals funded in 5 coastal regions of the U.S. from 1991-2000 and 2001-2003.*

	Gulf Coast		South Atlantic		North Atlantic		South Pacific		North Pacific		Total	
Habitat type	**'91-'00**	**‘01-'03**	**'91-'00**	**‘01-'03**	**'91-'00**	**‘01-'03**	**'91-'00**	**‘01-'03**	**'91-'00**	**‘01-'03**	**'91-'00**	**‘01-'03**
Forested Wetland	6,881	5,215	3,090	8,244	5,299	4,473	-	-	-	-	15,270	17,931
Coastal Marsh	15,042	43,366	-	-	8,846	2,164	-	-	-	-	23,888	45,530
Salt Marsh	[1]-	-	424	36	-	-	-	-	-	-	424	36
Mangrove	-	-	6,243	0	-	-	-	-	-	-	6,243	0
Emergent Marsh	-	-	1,599	2,158	-	-	-	-	-	-	1,599	2,158
Barrier Island & Beach	-	-	449	360	0	0	-	-	-	-	449	360
Early Succession Scrub	373	0	172	0	57	148	0	0	0	15	602	162
Pocosins	-	-	0	0	-	-	-	-	-	-	0	0
Grassland	1,493	121	-	-	30	73	909	0	0	0	2,432	194
Pine Savanna	-	-	0	0	0	0	-	-	-	-	0	0
Sand Hill/Longleaf Pine	0	0	0	0	-	-	-	-	-	-	0	0
Coastal Forest	-	-	-	-	-	-	-	-	172	0	172	0
Migration Stopover	-	-	-	-	897	1,804	-	-	-	-	897	1,804
Riparian	-	-	-	-	-	-	213	418	192	149	405	566
Total	23,788	48,702	11,977	10,799	15,128	8,661	1,122	418	365	163	52,381	68,743

[1] "-" denotes habitat type was not a priority in this region.

Habitat Priorities Addressed by NAWCA Projects

NAWMP habitat objectives were met more consistently than habitat objectives in either PIF or USSCP Plans for at least two reasons. First, project partners have assembled and delivered NAWCA projects aimed at fulfilling primarily NAWMP habitat objectives, partially because bird conservation Plans from other initiatives have only recently been completed. Second, NAWMP has had a relatively simple classification of habitats in the implementation Plans. NAWMP habitat categories are relatively broad (e.g. palustrine wetland or estuarine wetland) compared to habitat categories used by the other initiatives. For our analysis, a project was more likely to have scored higher if the objectives were composed of relatively few, broad habitat categories. This assertion is supported by the negative relationship between project score and number of priority habitats (*fig. 2*) found in this study. As a Plan increased the number and narrowed the focus of priority habitat types, it became less likely that any single project addressed a significant number of them.

Nonetheless, NAWCA has provided notable habitat contributions to the objectives set forth in both PIF and USSCP Plans. Coastal marsh and forested wetland habitats, both PIF priority habitat types in at least two planning regions, were well addressed in the proposals examined. These habitats are important to a number of species, including Saltmarsh Sharp-tailed Sparrow (*Ammodramus caudacutus*) and Seaside Sparrow (*Ammodramus maritimus*) in coastal marsh, and Swallow-tailed Kite (*Elanoides forficatus*), Northern Parula (*Parula Americana*), and Swainson's Warbler (*Limnothlypis swainsonii*) in forested wetlands (Pashley et al. 2000). For shorebirds, coastal wetlands (palustrine and estuarine) were a priority in every planning region, and these habitats dominated the conservation activities in many projects. In addition to these, conservation of flooded agricultural habitats (Gulf Coast, North and South Pacific) and diked marsh (North Pacific) made up a substantial portion of the projects examined. These constitute important feeding habitats for many USSCP species of High Concern, including Dunlin, Red Knot, Greater Yellowlegs, Whimbrel, and Long-billed Curlew (Brown et al. 2001).

Meeting the needs of a variety of bird taxa is an advantage of a broader, habitat-based program such as NAWCA, compared to a narrowly focused, species-based program (Ford et al. 1995). Furthermore, local and regional delivery of projects through self-directed partnerships (e.g. Joint Ventures) contributes to the effectiveness of integrating different Plan objectives (Williams et al. 1999).

Habitat Priorities Poorly Addressed by NAWCA Projects

Some high priority bird habitats in each of the Plans we examined have received relatively little attention from NAWCA projects. Brown et al. (in press), in an independent evaluation of NAWCA performance for shorebirds in the North Atlantic, found that overlooked species are often specialists, and require habitats and/or microhabitats not addressed in the NAWCA projects. For shorebirds, the most notable habitat omissions in the present study were beach and rocky shoreline/jetties. Beach habitat is listed as priority in all but the South Atlantic region, whereas the rocky shoreline/jetties habitat is priority for North Atlantic and North Pacific shorebirds.

It is not clear why beach habitat was not included to a large extent in NAWCA projects. However, the relative high acquisition cost and limited suite of bird species that benefit from beach conservation may provide some explanation. Further, in most parts of the country beach habitat already is under public ownership, and opportunities for eligible NAWCA-funded activities (restoration, enhancement) likely are limited. Nonetheless, beach habitat conservation has increased in NAWCA projects in the Gulf Coastal region during the past few years (*table 5*).

For Partners in Flight priorities, a number of habitats have been largely absent from NAWCA projects, including barrier island/beach, early succession scrub, pocosins, pine savannah, sandhill/longleaf pine, coastal forest, and riparian habitat. Some of these habitats may be under estimated in our analysis because upland habitat generally was not well quantified or described in proposals. Also, most of these habitats are priority in only one or two regions, and are found within a relatively limited geographical extent. This is especially true with pocosin habitat, which occurs predominantly in North Carolina. The South Atlantic region had more priority (n = 10) and under-represented PIF priority habitats (n = 5) than any other region. Bogart (1996) noted relative under representation of riparian forest habitat in 14 NAWCA projects approved in the Central Valley of California prior to February 1995, which was attributed to the lack of riparian habitat in NAWMP Plan objectives for the Central Valley. It also should be noted that riparian forest vegetation typically occurs in relatively linear strips, even in undisturbed areas. Hence, measuring in hectares the impact of NAWCA regarding this habitat type may underestimate the biological impact of such conservation activities.

Priority habitats for NAWMP that were consistently under represented in NAWCA projects were shoreline, riparian forest, tidal wetland, and securement of water rights ("water"). All four of these habitats (or habitat

issues, in the case of "water") were priority in only one region, with two of them (riparian forest, and tidal wetland) occurring in the North Pacific. Shoreline habitat, tidal wetland, and water may have been underestimated in our study, as they were likely present in many projects, yet not adequately described in the proposals. In particular, shoreline habitat is inherently part of any wetland or aquatic habitat, but rarely described as such. Also, some of the wetland area classified as palustrine in North Pacific proposals likely were tidally influenced, and therefore "tidal wetlands", although they were not noted as such in the proposals.

Limitations of This Analysis

It is important to point out that our assessment of NAWCA is based on information available in project proposals, and not on inspection of project sites. Such an assessment would require substantial resources. Further field evaluations of NAWCA projects, combined with meetings with project directors (e.g. Brown et al. in press) would improve our knowledge of how NAWCA meets objectives for each of the bird Plans. However, our intent was to evaluate the NAWCA program based on the information available to decision makers when funding decisions are made. Whereas the final project certainly differs to some extent from the proposed project, it is our assumption that these differences are not of such magnitude as to change the general trends that emerge from the present analysis.

Other Factors Determining Funding for NAWCA

In response to the recent interest in NAWCA funding and projects spawned by maturation of initiative Plans and the North American Bird Conservation Initiative (NABCI 2000), we attempted to evaluate NAWCA actions relative to bird conservation priorities for three broad taxonomic groups. However, selection of NAWCA projects is not based solely on their contribution to bird conservation. In accordance with language in the law itself, NAWCA projects are selected based on the following factors in addition to bird habitat: (1) conservation of declining wetland types, (2) conservation of listed species (both floral and faunal), (3) contribution to long-term conservation, (4) partnership and non-federal cost-share, and (5) location within established Joint Venture geographies. It is likely no coincidence, then, that the habitat types most prevalent in coastal NAWCA projects (palustrine emergent, palustrine forested, estuarine) are important not only to bird conservation, but are (or were at the time of the project's selection) also declining wetland types.

Conclusions

NAWCA projects have contributed to the conservation of many bird species dependent on wetland and associated upland habitats in coastal regions of the United States. Results of this study clearly indicate that most of the NAWMP habitat objectives and many of the PIF and USSCP objectives for wetlands and associated habitats in coastal regions have been addressed by NAWCA. There were, however, some priority habitats that were not well represented in NAWCA projects. Whereas no single program or granting source can be expected to provide for all of the on-the-ground wetland and associated habitat needs of the existing bird initiatives, NAWCA certainly is poised to provide substantial assistance. Importantly, NAWCA can only fund projects that are proposed. The degree to which future projects include a wider array of priority habitats will depend to a large extent on the degree to which the partners involved in planning, design, and delivery of projects coordinate and collaborate, as suggested by Heitmeyer et al. (1996). Adoption of the objectives of the various bird conservation initiatives by many habitat Joint Ventures in recent years is resulting in improved integration of these objectives. As these efforts mature, it is more likely that quality wetland conservation projects assembled for consideration by NAWCA will contain more of these historically underrepresented habitats.

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Literature Cited

Bogart, R. E. 1996. **Conserving avian diversity in the Central Valley of California: An evaluation of projects funded by the North American Wetlands Conservation Act (NAWCA).** College Park, MD: University of Maryland; 91 p. M.S. thesis.

Brown, S. C., B. A. Harrington, K. C. Parsons, and E. P. Mallory. 2002. **Waterbird use of Northern Atlantic wetlands protected under the North American Wetlands Conservation Act.** Waterbirds 25. Special Publication No. 2:106-114.

Brown, S. C., C. Hickey, B. A. Harrington, and R. Gill. 2001. **United States shorebird conservation plan.** 2nd edition.

Manomet, MA: Manomet Center for Conservation Sciences; 60 p.

Ford, R. P., R. J. Cooper, D. L. Helmers, J. E. Cely, R. M Hatcher, D. H. Orr, and M. S. Woodrey. 1997. **Birds of the southern United States: Resource management programs.** In: G. W. Benz and D. E. Collins, editors. Aquatic fauna in peril: The southern perspective. Special Publication 1. Decatur GA: Lenz Design and Communications, Southeast Aquatic Research Institute; 554 p.

Heitmeyer, M. E., P. J. Caldwell, B. D. J. Batt, and J. W. Nelson. 1996. **Waterfowl conservation and biodiversity in North America.** In: J. T. Ratti, editor. Proceedings of the 7th nternational Waterfowl Symposium; 125-138

North American Bird Conservation Initiative (NABCI). 2000. **The North American Bird Conservation Initiative in the United States: A vision of American bird conservation.** Arlington, VA: Division of Bird Habitat Conservation, Fish and Wildlife Service, U.S. Department of the Interior.

North American Wetlands Conservation Council (NAWCC). 2000. **North American Wetlands Conservation Council meeting notes, Dec. 5, 2000.** On file with Arlington, VA: Division of Bird Habitat Conservation, Fish and Wildlife Service, U.S. Department of the Interior.

Pashley, D. N., C. J. Beardmore, J. A. Fitzgerald, R. P. Ford, W. C. Hunter, M. S. Morrison, and K. V. Rosenberg. 2000. **Partners in Flight: Conservation of the land birds of the United States.** The Plains, VA: American Bird Conservancy; 92 p.

SAS Institute Inc. 1997. **SAS/STAT software: Changes and enhancements through release 6.12.** Cary, N.C.: SAS Institute Inc.

Sokal, R. R. and R. J. Rohlf. 1981. **Biometry.** 2nd edition. New ork: W. H. Freeman.

U.S. Department of the Interior and Environment Canada. 1986. **North American Waterfowl Management Plan.** Washington, DC, USA: U.S. Department of the Interior and Environment Canada.

U.S. Department of the Interior, Environment Canada, and Secretario de Desarrollo Social Mexico. 1998. **1998 update to the North American Waterfowl Management Plan: Completing the legacy, expanding the vision.** Unpublished draft supplied by authors. U.S. Department of the Interior and Environment Canada.

U.S. Fish and Wildlife Service (USFWS). 2002. **National Coastal Wetlands Conservation Grant Program.** Federal Register 67: 49264-49275.

Williams, B. K., M. D. Koneff, and D. A. Smith. 1999. **Evaluation of waterfowl conservation under the North American Waterfowl Management Plan.** Journal of Wildlife Management 63: 417-440.