CHALLENGES TO THE WATERFOWL AND CRANE RESOURCES OF THE SACRAMENTO - SAN JOAQUIN DELTA

Frederic A. Reid, Andrew Engilis, Jr., Jack M. Payne, and Holly H. Liberato - Ducks Unlimited, Sacramento, CA

HISTORICAL AND MODIFIED HABITAT

The vast watershed of the Central Valley of California drains into the Sacramento - San Joaquin Delta at the confluence of the Sacramento, San Joaquin, Mokelumne, and Cosumnes rivers. The inland network of 284,000 ha of sloughs and islands form a delta that is one of the 60th largest river deltas in the world (Heitmeyer et al. 1989), and only the Yukon - Kuskokwim and Copper river deltas of Alaska are larger on the entire west coast of North America. Because of its unique geologic formation, the Delta is the largest inland delta and its waters flow through the largest brackish estuary on the west coast. Historically, the Delta was comprised of nearly 100 islands separated by labyrinth of sloughs and channels. Sedimentation and scouring associated with frequent flooding created mosaics of natural levees, abandoned channels, sinks, swamps, and hummocks over the otherwise relatively flat delta (Scott and Marquiss 1984, Heitmeyer et al. 1989). Tidal freshwater marshes covered most of the islands (Thompson 1957, Atwater 1979), and these wetlands ranged from dense tule marshes immediately behind alluvial levees to seasonal wetlands and riparian forests at higher inland elevations. The region receives an annual precipitation of 20 cm, most occurring between November and March (Heitmeyer et al. 1989). In winter and spring (December - May), rain and snowmelt runoff formally combined with high tides to inundate the entire region.

Beginning in the late 1840s, farm settlements were established along the eastern and southern edges of the Delta. By 1850 the first small levees were built in an attempt to control spring inundation. Between 1849 and 1909, over 1.1 billion cubic meters of mud and silt were washed from the Sierra Nevada foothills by gold miners (Thompson 1957). These sediments settled out in the slower waters of the delta and greatly altered flooding cycles. Small levees, initially constructed by individual farmers, were regularly overtopped. By the 1860s, farmers banded together into levee and reclamation districts to coordinate the construction of 2 meter high, 9 meter base levees. Federal and state programs of the 1850s, known as the Swampland Acts, encouraged diking and drainage of "wasteland" wetlands for the establishment of productive farm ground in the rich peaty soils of the delta. By the turn of the century, constructed levees changed the delta profile. High winter tides or spring snowmelt runoff no longer spread shallow sheets of water across the low islands. The islands lay relatively dry behind a system of high, broad levees, whereas the delta water was now restricted to flow within constricted channels. Peaty soils, dried and exposed to the

D-000637

atmosphere, began to decompose and blow away. Islands steadily sank, such that subsidence today may be as great as 7 meters, and continues at an annual rate greater than 1 cm. Initial agricultural efforts for onions, potatoes, and asparagus, have given way to intensive farming, primarily for corn, wheat, safflower, milo, and some truck crops.

Of the original wetland habitat in the Delta and Suisun marsh, less than 7,300 ha remain (Heitmeyer et al. 1989), and recent remote sensing techniques suggest that as little as 5,890 ha of wetlands and 12,450 ha of winter-flooded agriculture may exist in the eastern delta (Kempka and Kollasch 1990). A 1979 classification of the Sacramento - San Joaquin Delta suggests that 78% of the land base is in agriculture, 8% is openwater, 6.5% is upland, 5% is urban, and approximately 2.6% is in palustrine wetland (Herbold and Moyle 1989). Today some 1,800 km of artificial levees protect the 57 islands or tracts that now exist. This conversion of wetlands is one of the most complete within any single region in North America.

HISTORICAL IMPORTANCE TO WATERFOWL AND CRANES

Some waterfowl are present in the delta year-round. Mallard (Anas platyrhynchos), cinnamon teal (A. cyanoptera), gadwall (A. strepera), and wood duck (Aix sponsa) are the most common breeding waterfowl. Concentrations of waterbirds are greatest in fall and winter when large flocks of migrants from northern latitudes join small numbers of locally produced birds. Wetlands in California historically have hosted one of the largest concentrations of wintering waterfowl in the world. As recently as the 1970s, an estimated 10-12 million ducks, geese, and swans wintered in, or migrated through, California (USFWS 1978). Despite the loss of wetland habitats, nowhere in North America do so many waterfowl (3 to 6 million) winter on such a small wetland base. The Delta remains an internationally significant wintering ground for waterfowl because of the remaining wetlands and shallowly flooded agriculture ground.

Today atleast 25 species of waterfowl (including 1 species of swan, 4 species of goose, and 20 species of duck) are present in winter. For most waterfowl, the wintering season in the Central Valley extends from August through April; however, use in the Delta is limited early in the season and most use occurs in mid to late winter.

Based on mean number of waterfowl counted in the Central Valley during U.S. Fish and Wildlife Service mid-winter inventories, 1978-87 (after Heitmeyer et al. 1989), the Delta is critical to four species of waterfowl, tundra swan (Cygnus columbianus), white-fronted goose (Anser albifrons), northern pintail (Anas acuta), and canvasback (Aythya valisineria). The Delta is the single most important wintering area in the Pacific Flyway for tundra swans and ranks second only to Chesapeake Bay in the entire continent (Bellrose 1980). Estimates of the number of

swans wintering in the Delta range from 30,000 to 38,000 annually (Bellrose 1980). These values suggest that 32-40% of the Pacific Flyway population winters in the Delta. Between 22,000 to 45,000 white-fronted geese winter in the Delta, composing about one-third of the flyway population. Of the white-fronted geese banded on the Yukon - Kuskokwim Delta in Alaska, some 17% winter in the Sacramento - San Joaquin Delta (Timm and Dau 1979). Northern pintails are the most numerous waterfowl species found in the Delta. Estimates of wintering populations, including the Suisun marsh, vary from 200,000 to 1.4 million (Michny 1979). State aerial inventories in the early 1950s counted some one million pintails on Staten Island alone. Almost 500,000 pintails were counted in the Yolo Bypass in January 1973, but Delta winter populations crashed to a low of under 4,000 in 1983. Recent population trends have been increasing, such that the Delta supports between 6-10% of the flyway winter population. Canvasback numbers in the Delta vary greatly, but approximately 10% of the flyway population can be found here. Although mallards are usually the second most numerous duck species in the Delta, the midwinter flyway survey indicates that mallards are, on average, only one-tenth as numerous as pintails (Herbold and Moyle 1989). The northeast portion of the Delta is also one of the most important wintering grounds for the Central Valley population of sandhill crane (Grus canadensis). In winter 1983-4, 53% of the population was in the Delta in December, and by January, 76% of the population was on Staten Island, El Dorado, or Cosumnes areas (Pogson and Lindstedt 1991).

CONTINUED DEGRADATIONS

Agriculture and wildlife both face substantial threats from urban expansion. With most of the historic wetland habitat lost in the Delta, continued threats to waterfowl and crane habitat are greatest on agriculture ground or potential wetland restoration areas. Farmers face continued management problems with subsidence of peat soils (through a combination of oxidation and wind erosion), salinity control in soils, erosion of perimeter levees, poor soils for constructing interior dikes, and control of evasive weeds (such as Johnson grass). Both farmers and wildlife managers face direct and indirect pressures with the high human California population. Indirect degradations include water quality concerns from urban runoff, trihalomethanes, salt water intrusion, and contaminants from mosquito abatement. Recreational boating yields increased erosion of levees and human disturbance of wildlife. Some 82,000 pleasure boats are registered in the Delta and yield 12 million estimated annual recreational user-days (Herbold and Moyle 1989). Construction of marinas and dock facilities further degrade limited wetland habitats and perimeter levees (Fredrickson and Reid 1990).

A substantial change in the export of water from the Delta has recently occurred. Since 1950, total annual water export from the Delta has grown from zero to over 4 million acre feet. Since 1968 more than 2 million acre feet is exported annually and since

1978 nearly 4 million acre feet is exported annually (U.S. Bureau of Reclamation). Of the total state runoff, 47% passes through the Delta and supplies water to Contra Costa County, the city of Vallejo, and the state and federal pumping plants that in turn supply water to the San Joaquin Valley and urban Los Angeles.

OPPORTUNITIES

Wintering and migrational habitat for waterfowl, cranes, and other waterbirds must be protected and improved in the Delta if we are to maintain or improve current populations. Such habitat management must be pursued on several fronts, and these include habitat protection, agricultural enhancement, wetland enhancement, and wetland restoration.

Habitat protection includes the establishment of agricultural easements that allow true conjunctive use of grain production and waterbird survival and recruitment. To date neither federal wildlife or agriculture programs nor state programs offer such long-term protection for agricultural lands in the Delta. Protection also includes acquisition of public lands as has been achieved at Cosumnes, Woodbridge Crane Refuge, Twitchell and Jersey islands.

Agricultural enhancement for breeding waterfowl would include cover crops and cutting schedules that allow dabbling ducks to nest from March through June. Restored semi-permanent tule marshes would provide brood habitat. By far the most important enhancement role, however, is for migrant and wintering birds. Early fall flooding to control Johnson grass, retard subsidence of peat soils, and reduce salinity can also provide scarce shallow habitat for migrant northern pintail, mallard, and shorebirds. Corn, rice, wheat, barley, and other small grain crops are highly sought after by a variety of ducks, geese, swans, and cranes. Peas, beans, and sorghum are utilized to a lesser degree. In general, truck crops, orchards, and vineyards are not utilized by waterfowl. Within the Delta, several waterfowl species have grown dependent on crop wastes for food, and the Delta is perhaps supporting larger concentrations than earlier in the century (Michny 1979). The Delta corn crop increased five-fold from 1962 to 1976, but wheat and truck crops may shift to increased planting levels.

Technical assistance by waterbird biologists should emphasize shallow flooding recommendations. Flooding of fields should occur sequentially, so that new fields are slowly flooded across the winter period. Shallow flooding (moist to 4 cm) of farm fields from mid-December to mid-April will provide migrant waterfowl with courting and feeding habitat in the late winter and spring. A gradual flooding regime can take advantage of natural rainfall patterns during wet years. Harvested corn and wheat should rarely be plowed under the soil, and corn should continue to be shelled in the field to optimize the amount of waste grain available. Such programs can result in the most

significant waterfowl habitat in the Delta, as demonstrated on Staten Island where 5,000 acres of flooded ground held over 100,000 ducks, 20,000 tundra swans, and 18,000 cranes in December 1991. Public policy programs should target protection of small grain farms, facilitate winter flooding, and protect water rights and quality for private landowners that provide waterfowl habitat (Payne and Wentz 1992). Replicating shallow, winter and spring flooding will be most beneficial for waterfowl and is compatible with most Delta farming practices. Urban encroachment will bring with it additional demands for water and problems of flood control, additional call for access and recreation (which will lead to greater disturbance of wildlife), and greater demand for mosquito abatement. Water projects that convert limited Delta habitat to reservoir or conveyance structures should be opposed.

Wetland enhancement should restore hydrologic regimes to winter and spring flooding for existing wetlands. Moist-soil and marsh management strategies can improve quality of habitat on limited wetland acreage in the Delta (Fredrickson and Reid 1990, Reid 1993). The Central Valley Habitat Joint Venture calls for the restoration of some 8,100 ha of wetlands in the Delta, yet only a small proportion has been achieved to date. The Cosumnes River Preserve is the largest completed program with 2,230 ha of protected habitat and is managed cooperatively by Ducks Unlimited, The Nature Conservancy, Bureau of Land Management, and California Department of Fish and Game. Ducks Unlimited has completed 300 ha of wetland restoration, creating three wetland complexes and emphasizing seasonal and marsh wetlands. More than 1,600 ha of bottomlands flooded in winter 1992-3, and more than 19,000 ducks and 3,000 cranes responded to this seasonal resource. Restoration of wetlands should continue, with the core of the Delta (Tyler, Staten, Brack, Terminous, Empire, Rindge, Medford, and Mandeville Islands) protected in cooperative small grain, agriculture easements or seasonal wetland enhancement projects. A complex consisting of enhanced, small grain or pasture fields, seasonal wetlands, semi-permanent tule marshes, and riparian corridors will result in the greatest response by waterfowl and cranes.

REFERENCES

Atwater, B.F. 1979. Ancient processes at the site of southern San Francisco Bay: Movement of the crust and changes in the sea level. Pages 143-174 in T.J. Conomos, ed. San Francisco Bay: The urbanized estuary. Pacific Div. Am. Assoc. Adv. Sci. San Francisco, CA.

Bellrose, F.C. 1980. Ducks, geese and swans of North America. 3rd ed., Stackpole Books, Harrisburg, PA, 540pp.

Fredrickson, L.H. and F.A. Reid. 1990. Impacts of hydrologic alteration on management of freshwater wetlands. Pages 71-90 in J.M. Sweeney, ed. Management of dynamic ecosystems. N. Cent. Sect. Wildl. Soc., West Lafayette, IN.

Heitmeyer, M.E., D.P. Connelly and R.L. Pederson. 1989. The Central, Imperial, and Coachella Valleys of California. Pages 475-505 in L.M. Smith, R.L. Pederson, and R.M. Kaminski, eds. Habitat management for migrating and wintering waterfowl in North America. Texas Tech. Univ. Press, Lubbock.

Herbold, B. and P.B. Moyle. 1989. The ecology of the Sacramento - San Joaquin Delta: A community profile. U.S. Fish and Wildl. Serv. Biol. Rep. 85, 106pp.

Kempka, R.G. and R.P. Kollasch. 1990. California waterfowl habitat evaluation using remote sensing techniques. Ducks Unlimited and CA Dept. Fish and Game, Sacramento, 92pp.

Michny, F.J. 1979. Trends of pintails wintering in the Suisun Marsh, California, based on an analysis of 20 years of aerial surveys. U.S. Fish and Wildlife Service, Sacramento, Unpubl. report, 45pp.

Payne, J.M. and W.A. Wentz. 1992. Private property and wetland conservation. Trans. N. Am. Wildl. and Nat. Resour. Conf. 57: 225-233.

Pogson, T.H. and S.M. Lindstedt. 1991. Distribution and abundance of large sandhill cranes, Grus canadensis, wintering in California's Central Valley. The Condor 93:266-278.

Reid, F.A. 1993. Managing wetlands for waterbirds. Trans. N. Am. Wildl. and Nat. Resour. Conf. 58:345-350.

Scott, L.B. and S.K. Marquiss. 1984. A historical overview of the Sacramento river. Pages 51-57 in R.E. Warner and K.M. Hendrix, eds. California riparian systems. Univ. California Press, Berkeley.

Thompson, J. 1957. The settlement and geography of the Sacramento - San Joaquin Delta, California. Ph.D. Dissertation. Stanford Univ., Palo Alto, CA, 50pp.

Timm, D.E. and C.P. Dau. 1979. Productivity, mortality, distribution, and population status of Pacific flyway white-fronted geese. Pages 280-298 in R.L. Jarvis and J.C. Bartonek, eds. Management and biology of Pacific flyway geese. Oregon State University, Portland.

United States Fish and Wildlife Service. 1978. Concept plan for waterfowl wintering habitat preservation, Central Valley, California. USFWS, Region 1, Portland, OR, 116pp.

PRINTING
DWR REPROGRAPHICS

D—000643

D-000643