

Habitat Restoration and Bird Responses at the Sacramento Regional County Sanitation District Bufferlands

Chris Conard, Sacramento Regional County Sanitation District, 8521 Laguna Station Road, Elk Grove, CA 95758

With a bird list of 226 species and growing, the Sacramento Regional County Sanitation District (SRCSD) Bufferlands is a bright spot for conservation in one of the Central Valley's most rapidly developing areas (Figures 1 and 2). When the Sacramento Regional Wastewater Treatment Plant (SRWTP) was constructed in 1978, in addition to 365 hectares (900 acres) of plant process area, 1,070 hectares (2,650 acres) were set aside to buffer the surrounding community from odors, noise, and industrial activities related to wastewater treatment, including the on-site storage of chlorine and sulfur dioxide (Jones & Stokes 1982, 2000). What has come to be known as the Bufferlands is now an island of open space between South Sacramento and Elk Grove, situated between Interstate 5 (I-5) and Franklin Boulevard, and to the north of Laguna Boulevard. An additional 65 hectares (160 acres) west of I-5, owned by the County Sanitation District I (CSD-1) and managed by Bufferlands staff, contains 10 hectares (25 acres) of climax Valley Oak (*Quercus lobata*) riparian forest and leased agricultural lands; Stone Lakes National Wildlife Refuge (SLNWR) is immediately to the southwest.

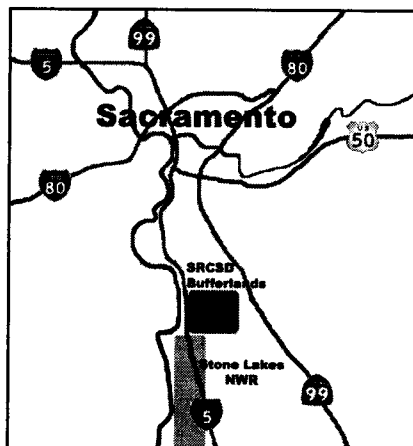
HISTORY OF HABITAT MANAGEMENT

In 1983, the SRCSD Board approved management goals consistent with the property's primary buffering function, including open space and wildlife conservation (Jones & Stokes 1982, 2000). As a large area of open space adjacent to Sacramento, there were the expected problems of trespassing and dumping, and a surprising amount of illegal shooting. Roy Nelson, the Bufferlands' first manager, saw past these problems and "was stunned by how beautiful it was and how much wildlife was out there." He, along with Robert Shanks, the SRCSD District Engineer, saw the need to develop a framework for managing the property. Without this early recognition and the dedication to see it through, the many habitat improvements described below may not have been initiated, and the development of the Bufferlands could have taken a very different course. Into the late 1980s, much of the area on the west side of the Bufferlands was leased to grow safflower, sugar beets, and hay. Proposals had been presented to SRCSD to use the Bufferlands as a massive eucalyptus plantation for paper pulp production, as well as uses incompatible with the buffering function, such as an equestrian center, sports fields, and golf courses.



Figure 1 (above). Aerial view of the Sacramento Regional County Sanitation District Bufferlands. Numbered habitat areas include: 1a) Upper Beach Lake Wetlands, lower cell, 1b) Upper Beach Lake Wetlands, upper cell, 2) Constructed Wetlands, 3) Lost Lake, 4) Fishhead Lake, 5) Nicolaus Pond, 6) Black Crown Lake, 7) Meadowlark Lake.

Figure 2 (right). Location of the Sacramento Regional County Sanitation District Bufferlands within the Sacramento area.



These proposals led to development of an updated management plan, with a supporting resource evaluation (Jones & Stokes, 1989). In 1987, beavers (*Castor canadensis*) dammed Morrison Creek, preventing the pumping down of water in time to allow for agricultural use. A dense patch of smartweed (*Polygonum* sp.) quickly established and the area supported nesting Northern Harriers (*Circus cyaneus*), and, in the fall, a large flock of Canvasbacks (*Aythya valisineria*) and other waterbirds (D. Airola, pers. comm.). These and other observations led to the recognition of the potential for habitat restoration and enhancement (D. Airola, pers. comm., Jones & Stokes 1991).

In April 1990, the SRCSD adopted an Urban Forest Master Plan to maintain extensive open space, improve aesthetic values, "provide an abundance of high-quality wildlife habitat," and allow for limited public access consistent with habitat goals and public safety (Jones and Stokes 1989). The Upper Beach Lake Wildlife Enhancement Project, constructed between 1992 and 1996, was a major step toward reaching those goals. Much of the surveying and heavy equipment costs were offset through a unique partnership with the Sacramento County Job Corps, a vocational training program (S. Chainey, pers. comm.). Job Corps students learned surveying, carpentry, and heavy equipment operation, while improving the habitat values of their community. Additional funds came from the Packard Foundation, the Whitecap Foundation, and the California Environmental Protection Agency (Gleick et al. 1999). The Trail of Trees project was implemented in 1994 in partnership with the Sacramento Tree Foundation, with over 6,500 native trees planted along Franklin Boulevard and Sims Road. The Sacramento Tree Foundation has continued to support volunteer-based plantings each fall since 2003.

Also in 2003, SRCSD entered into a cost-sharing agreement with the U. S. Army Corps of Engineers for habitat enhancement on 105 hectares (265 acres). By the end of 2005, this ambitious project had resulted in planting over 10,000 trees and shrubs, and had established the native understory. The restored areas included 38 hectares (95 acres) of valley oak savanna, 37 hectares (92 acres) of perennial grassland, and smaller areas of aquatic habitat, riparian woodland, seasonal wetlands, and emergent marsh (SRWTP Bufferlands 2006).

An ongoing commitment to restoration, habitat management, and staffing to carry out these goals was signaled by the adoption of the Bufferlands Master Plan by the SRCSD Board of Directors (Jones and Stokes 2000). Prior to the restoration projects initiated in 1990, approximately 20 hectares (50 acres) of riparian forest existed in thin bands along Morrison and Laguna Creeks. To date, over 100 hectares (250 acres) of riparian forest and associated woodlands have been planted with 31,000 trees and shrubs, 45 hectares (115 acres) of grasslands have been seeded with native species, and over 120 hectares (300 acres) of wetlands are managed for waterfowl and other waterbirds (SRWTP Bufferlands 2006). SRCSD currently maintains a staff of 9 resource professionals responsible for managing and enhancing the Bufferlands' habitat values, and

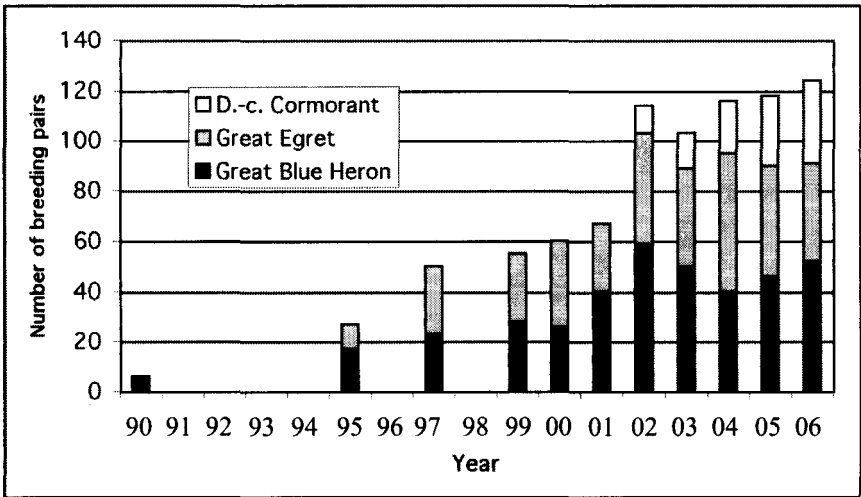
maintaining roads, fences and other infrastructure. The staff also assists with the environmental review and monitoring of SRWTP projects as well as many off-site projects occurring throughout the SRCSD coverage area, partners with SLNWR on shared management goals, assists other county and regional agencies, performs and manages weed abatement and landscaping for SRWTP and outlying facilities, monitors water quality in Laguna and Morrison Creeks, and leads public tours with assistance from volunteers.

The variety of habitats at the Bufferlands supports a high diversity of birds. For example, on the Bufferlands portion (Area 1) of the Rio Cosumnes Christmas Bird Count (CBC) and on “big day” tours conducted in late April, one-day totals of over 110 species have been recorded. Roughly speaking, there is a lower elevation (near sea-level) wet side on the west in the Morrison Creek flood plain, and a drier side with open grassland on the higher elevation (5-6 m [15-20 ft]) eastern portion of the property. In addition to Morrison and Laguna Creeks, there is year-round open water in two borrow pits (Meadowlark and Black Crown Lakes—7.5 hectares (19 acres) and 11 hectares (28 acres) respectively) created during construction of I-5, a shallow 5-hectare (12-acre) agricultural pond constructed in 1971 and now managed for waterbird habitat (Nicolaus Pond), and an abandoned gravel mine (Lost Lake) with 5 hectares (12 acres) of open water. Fishhead Lake was created in the early 1980s to mitigate for wetlands impacted by the expansion of the treatment plant. It contains 8 hectares (20 acres) of permanent open water and 12 hectares (30 acres) of managed seasonal wetlands. Between Fishhead Lake and Laguna Creek are another 7 hectares (17 acres) of seasonal wetlands created to mitigate for the 1988 flood control modifications to Laguna Creek by the City of Sacramento (Jones & Stokes 1989). The 9-hectare (22-acre) Constructed Wetlands, designed to study the feasibility of using on-site wetlands to treat wastewater, provides excellent habitat for rails and other marsh birds; this is the only place on the Bufferlands where wastewater has been used in the wetlands. It is also the site of Sacramento County’s first recorded Least Bittern (*Ixobrychus exilis*), 1 May 1996, and Great-tailed Grackle (*Quiscalus mexicanus*), 25 March 1996. Nearly 405 hectares (1,000 acres) are under agricultural leases (primarily hay crops and grazed pasture on the east side of the property), which are managed with wildlife-friendly farming practices (SRWTP Bufferlands 2006).

MANAGEMENT AND MONITORING PROGRAMS

Water control structures on the 65 hectares (160 acres) of seasonal wetlands within the Upper Beach Lake Wildlife Area allow for water management to optimize foraging for waterfowl, shorebirds, and colonially-breeding waterbirds. High counts of over 15,000 Canvasbacks, 2,000 Ring-necked Ducks (*Aythya collaris*), and 1,000 Lesser Scaup (*Aythya affinis*) have been recorded. The managed seasonal wetlands at Fishhead Lake and the

Figure 3. Nesting pairs of Great Blue Heron, Great Egret, and Double-crested Cormorant at the Sacramento Regional County Sanitation District Bufferlands, 1990-2006. Surveys were not conducted in 1991-94, 1996 and 1998.



shallower portions of the Upper Beach Lake wetlands provide excellent winter habitat for large numbers of dabbling ducks, with Mallards (*Anas platyrhynchos*), Northern Shoveler (*Anas clypeata*), Northern Pintail (*Anas acuta*) and Green-winged Teal (*Anas crecca*) the most common. More than 50 nest boxes augment naturally occurring cavities for breeding Wood Ducks (*Aix sponsa*). Gadwall (*Anas strepera*), Mallards, and Cinnamon Teal (*Anas cyanoptera*) also breed at the Bufferlands, along with a semi-wild population of Canada Geese (*Branta canadensis*)—a species that did not historically breed in the Central Valley.

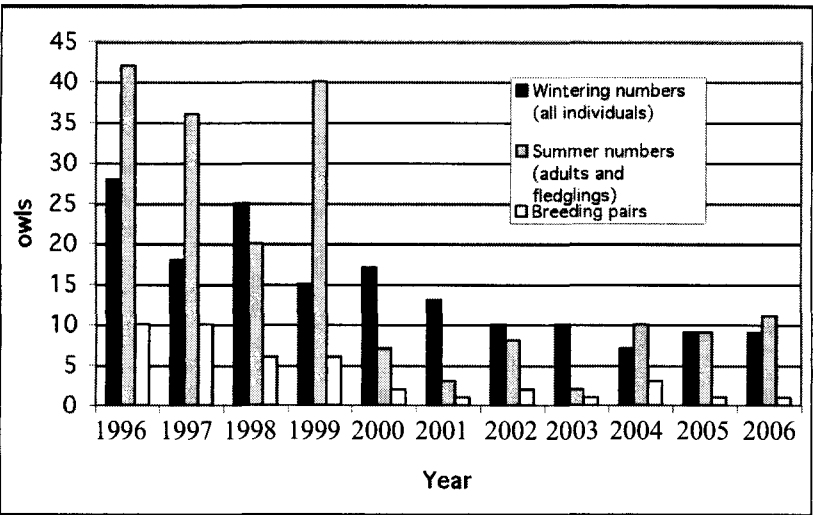
Water is drawn down in spring in Upper Beach Lake to grow seed-producing vegetation for the following year's waterfowl. Drawdown also is timed to coincide with shorebird migration. Single-day counts of over 2,000 for both Western Sandpipers (*Calidris mauri*) and Long-billed Dowitchers (*Limnodromus scolopaceus*) are typical. A Great Blue Heron (*Ardea herodias*), Great Egret (*Ardea alba*), and Double-crested Cormorant (*Phalacrocorax auritus*) rookery has expanded since the construction of the Upper Beach Lake wetlands. Heron and egret nests have increased from five or six in 1990 before the project (D. Airola pers. comm.), to 27 nests in 1995, to over 100 each year since 2002 (Figure 3). This increase is certainly a response to the restored wetland habitat on the Bufferlands, as well as to additional restored wetlands on the adjacent SLNWR. These species benefit from the concentration of prey as water levels drop in the spring when they are feeding young. Oddly, a rookery of Black-crowned Night-Herons (*Nycticorax nycticorax*) that was known to occur as early as 1986 and reported as 30 nesting pairs in 1988 (Sacramento County Breeding Birds Atlas, unpub. data) had disappeared by the early 1990s

(R. Jones, pers. comm.). This species is still recorded year-round on the property, and is known to nest in nearby residential areas.

The Bufferlands staff has cultivated good working relationships with regulatory agencies to ensure the protection of special-status species and other wildlife. Three or four Swainson's Hawk (*Buteo swainsoni*) nests are typically recorded each year. The nests of this state-threatened species are carefully monitored to document nest success and to ensure that treatment plant operations and projects crossing the Bufferlands do not disturb nesting birds. The Bufferlands is also home to Burrowing Owls (*Athene cunicularia*). Despite continued efforts to enhance habitat for this species, including artificial burrow construction and vegetation management, numbers have declined at an alarming rate (Figure 4). The decline of the Bufferlands population coincides with the loss of habitat to development in South Sacramento and Elk Grove, and is consistent with a region-wide decline of this species. There is an influx of Burrowing Owls in the fall, but most disperse prior to breeding season. Additional study is needed to determine where these wintering owls are breeding.

Over 20 years of data on bird populations exist for the Bufferlands, beginning with surveys for special-status species, waterfowl, wading birds, raptors, and shorebirds conducted during the late 1980s and early 1990s for the preparation of planning documents (Jones & Stokes 1991, D. Airola, unpub. data). Breeding species were identified as a part of the Sacramento County Breeding Bird Atlas effort from 1987-92. Since the early 1990s, the Bufferlands staff has monitored the rookery and all recorded raptor nests,

Figure 4. Breeding pairs and total numbers of wintering and summering Burrowing Owl at the Sacramento Regional County Sanitation District Bufferlands, 1996-2006.



performed weekly waterfowl counts from late fall to early spring, and has surveyed the Bufferlands for the Rio Cosumnes CBC since it began in 1995. Jesse Grantham, National Audubon Society, performed bird surveys at Upper Beach Lake from 1994-95, and additional observations incidental to management activities have added to the growing database. A 1996 study documented bird usage of the Constructed Wetlands, and showed that it compared favorably to a reference wetland site (Jones et al. 1998).

Intensive songbird monitoring efforts began with the banding program initiated by Kris Stevens as part of the Effie Yeaw Nature Center's Wildlife Watch Program. A banding station was set up near Meadowlark Lake and operated under Tim Manolis' master banding permit from November 1990 through December 1993. During 29 sessions, 393 birds were banded out of the 445 that were mist-netted. Additional observations were recorded, adding many firsts to the Bufferlands bird list, including a Dusky Flycatcher (*Empidonax oberholseri*) on 3 May 1992 (T. Manolis, pers. comm.). Stan Wright of the Sacramento-Yolo Mosquito and Vector Control District conducted additional banding from September 1996 through October 1999 in addition to taking blood samples from selected species to monitor mosquito-borne diseases. During 28 visits, 432 birds were banded (S. Wright, pers. comm.). Since 2003, a point count route through a portion of the property's restored and remnant riparian forest has tracked breeding landbird populations. Some of the points were set prior to new restoration plantings so that bird response to the maturing sites can be shown. Other points show breeding activity by species such as Nuttall's Woodpecker (*Picoides nuttallii*), House Wren (*Troglodytes aedon*), Common Yellowthroat (*Geothlypis trichas*), Spotted Towhee (*Pipilo maculatus*), Song Sparrow (*Melospiza melodia*), and Black-headed Grosbeak (*Pheucticus melanocephalus*) at riparian sites planted in 1992. Additional species have been documented on public birding tours and volunteer surveys.

NOTES ON SELECTED SPECIES

From December through March, up to 600 Canada Geese may be present, and though Greater White-fronted Geese (*Anser albifrons*), Snow Geese (*Chen caerulescens*), and Ross's Geese (*Chen rossii*) are often seen flying over the Bufferlands, they are recorded infrequently on the ground. Surprisingly, there are only three separate records of Eurasian Wigeon (*Anas penelope*). American Wigeon (*Anas americana*) are usually present in far lower numbers (average during CBC of 22) than at the Cosumnes River Preserve 16 km to the south, where Eurasian Wigeon are found annually—typically among American Wigeon flocks (C. Conard pers. obs., J. Trochet, pers. comm.). Blue-winged Teal (*Anas discors*) occur annually in very low numbers from late winter through spring. Redheads (*Aythya americana*) and Greater Scaup (*Aythya marila*) are nearly annual among the thousands of diving ducks, as are Hooded Mergansers

August and September. Tricolored Blackbirds (*Agelaius tricolor*) are regular flyovers in summer, but do not breed on the property. Yellow-headed Blackbirds (*Xanthocephalus xanthocephalus*) are irregular in spring and summer, but have been encountered less frequently in recent years, and there is no recent evidence of nesting. Great-tailed Grackles are regular breeders, but are often absent from late summer through winter. There are several records of Hooded Orioles (*Icterus cucullatus*), mostly in late summer.

RARITIES

An American Golden-Plover (*Pluvialis dominica*) was present within a Black-bellied Plover flock from 6 November to 17 November 2006 (the 17 November record was from SLNWR; the last SRWTP sighting was 15 November). A flock of 9 Ruddy Turnstones (*Arenaria interpres*) was found on 7 May 2000 and there have been three Sanderling (*Calidris alba*) records (two in spring, one in fall). A Ruff (*Philomachus pugnax*), likely a female, was present on Upper Beach Lake from 30 April to 9 May 2001.

Songbird rarities include a kingbird reported on the 21 December 1995 Rio Cosumnes CBC. It was observed the following day and reported as a Tropical/Couch's Kingbird (*Tyrannus melancholicus*/ *T. couchii*). It was likely a Tropical Kingbird, but it was not identified to species since it was not heard calling (A. Engilis, pers. comm.). Sage Thrashers (*Oreoscoptes montanus*) have been recorded on two occasions. The handful of rare warblers found include a singing male Northern Parula (*Parula americana*) present from 23-24 May 2004 and a singing male Blackburnian Warbler (*Dendroica fusca*) found on 13 June 2005. A fall female Canada Warbler (*Wilsonia canadensis*) was found on 8 September 2000. Other rarities have included a Green-tailed Towhee (*Pipilo chlorurus*), 17 September 2007, a Brewer's Sparrow (*Spizella breweri*), 12 September 2003, and a singing male Indigo Bunting (*Passerina cyanea*), 10 July to 23 August 2006.

Sacramento County's second Brown Pelican (*Pelecanus occidentalis*) came within a few meters of making the Bufferlands bird list during its stay at SLNWR from 19 July to 14 October 2004 (Conard 2004).

DISCUSSION

The Bufferlands project is not without major challenges. Urban development has extended to its boundaries, resulting in a loss of habitat continuity to the north, south, and east. With residential and commercial development of additional agricultural lands northwest of the Bufferlands already planned, the occurrence of wintering raptors such as Ferruginous Hawk and Golden Eagle, and the foraging habitat of Swainson's Hawks and Long-billed Curlews will be reduced. Non-native invasive weeds reduce habitat

quality in wetlands, grasslands, and riparian forest, and weed management will be a major focus for years to come. A largely unchecked beaver population, resulting from altered hydrology, urban runoff, and a lack of predators, has disproportional impacts on the forests and greatly reduces the recruitment of young trees—especially Fremont Cottonwoods (*Populus fremontii*). Urban runoff from summer watering has turned seasonal streams into perennial streams, allowing a now year-round beaver population greater access to the riparian forests. Levees prevent the natural flow of Morrison Creek, which now enters the Sacramento River through a large pump station. The streams are further altered by upstream channelization and a largely non-native fish fauna. Water quality is often poor and the impacts to aquatic invertebrates and other foundational components of the aquatic ecosystem cannot be good, but are largely unexplored. Since West Nile virus arrived in our area, there has been increased pressure to drain wetlands earlier in the season to avoid producing mosquitoes. This reduces the amount of time the wetlands can hold water and the ability of staff to effectively manage and irrigate wetland vegetation. Despite these challenges, the substantial benefits of the Bufferlands to birds and other wildlife are evident in the number and variety of species and individuals recorded.

Bufferlands staff members, most of whom have been with the project for more than ten years, have had the all-too-rare opportunity to gain long-term knowledge of a property and fine-tune techniques to improve habitat quality. Early tree plantings have been revisited to add native grass and sedge understory plants. Restoration has come a long way since the first wetlands mitigation project, Fishhead Lake, was completed on the property in the early 1980s, when non-native pines (*Pinus* sp.) were planted—though these have attracted Red-breasted Sapsuckers (*Sphyrapicus ruber*), and roosting Barn Owls (*Tyto alba*) and Great Horned Owls (*Bubo virginianus*). The staffing level needed to properly manage these wetlands was not in place until the early 1990s; however, the wide array of restoration and enhancement projects and the obvious benefits to wildlife were made possible by the long-range planning and foresight that led to setting aside the Bufferlands long before it was actively managed. In a region with heavy development pressure, it also took the vision to pursue habitat improvement, open space protection, and goals compatible with SRWTP's primary wastewater treatment function, as opposed to more intrusive proposals.

BIRDING OPPORTUNITIES

Public access to the Bufferlands is restricted to guided tours. A growing list of public events is scheduled to view the property's avian highlights, including waterfowl, the rookery, and spring and fall migration. Bird-related tours are published in the Sacramento Audubon Society's Observer and on their Web

site (sacramentoaudubon.org). Information on tours and additional background information, including a bird list and a SRWTP Bufferlands Annual Report, can be found at the Bufferlands Web site (bufferlands.com).

ACKNOWLEDGEMENTS

Dan Airola suggested the topic and encouraged me to write this paper. He provided extensive background information and a wealth of bird data from the early years. He also suggested that I contact Steve Chainey, who was instrumental in the design and management planning for the Bufferlands, and Steve filled in some of the gaps in the story. Roy Nelson explained how the Bufferlands concept grew into what it is today and provided much needed historical information. Roger Jones, who has been with the Bufferlands since 1990, answered questions, provided access to his files, and helped me with the graphics. The bird information contained herein is built upon the surveys and data compilation that he initiated in the early 1990s. Bryan Young answered my questions and provided access to the planning documents listed below. Much of the information on the rookery, Swainson's Hawks, Burrowing Owls, and other survey data comes from Jennifer Albright's thorough surveys and data compilation. Shawn Petrash shared his bird observations going back to 1996. Steve Scott provided additional bird data, Bufferlands history, and technical information. Thanks to all of my co-workers at the SRCSD Bufferlands, past and present. Tim Manolis and Stan Wright provided information on their bird banding programs and Tim provided Bufferlands staff with detailed summaries of his banding data and other observations. Thanks also to Gil Ewing for his bird records from the late 1980s and to Andy Engilis for his work on the Rio Cosumnes CBC. Dan Airola, Sid England, Roger Jones, Kimya Lambert, Roy Nelson, and Bryan Young greatly improved the text through their careful reviews.

LITERATURE CITED

- Conard, C. 2004. Brown Pelican in Sacramento County in 2004, and discussion of previous Central Valley records. *Central Valley Bird Club Bulletin* 7: 61-70.
- Gleick, P. H., and A. K. Wong. 1999. *Sustainable Use of Water, California Success Stories*. Pacific Institute. Oakland, CA.
- Jones, R. D., S. A. Scott, and J. I. Albright. 1998. The avifauna of constructed wetlands used for treating secondary wastewater at the Sacramento Regional Wastewater Treatment Plant. *Central Valley Bird Club Bulletin* 1:19-25.

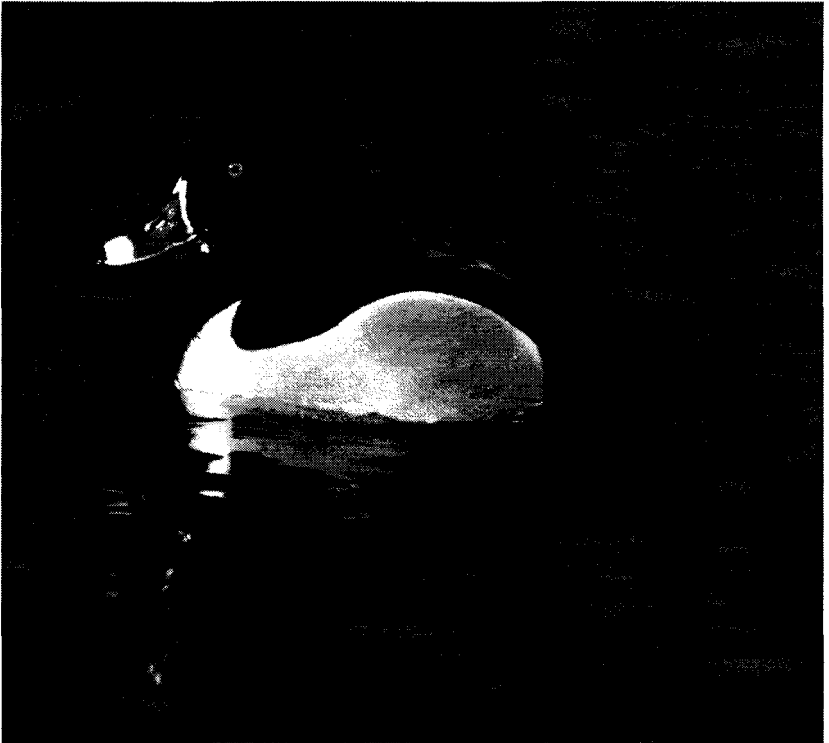
Jones & Stokes Associates. 1982. Draft land use management plan for the buffer lands surrounding the Sacramento Regional Wastewater Treatment Plant. Sacramento, CA.

Jones & Stokes Associates. 1989. Urban forest master plan for the buffer lands surrounding the Sacramento Regional Wastewater Treatment Plant. (JSA 88-078.) Sacramento, CA.

Jones & Stokes Associates. 1991. Upper Beach Lake Wildlife Area specific plan. (JSA 89-119.) Sacramento, CA.

Jones & Stokes Associates. 2000. Bufferlands master plan. Final draft. August. (JSA 97-324.) Sacramento, CA. (Available on-line at bufferlands.com)

Sacramento Regional Wastewater Treatment Plant. 2006. SRWTP Bufferlands Annual Report 2005. (Available on-line at bufferlands.com)



Male Ring-necked Duck (*Aythya collaris*) at the Sacramento County Regional Sanitation District Bufferlands.

Photo by Chris Conard