

Sonoran Joint Venture Bird Conservation Plan

Waterfowl Management Supplement

Version 1.0



**Sonoran Joint Venture
Binational Bird Conservation**

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Executive Summary

The Sonoran Joint Venture's Waterfowl Management Supplement (Supplement) is a blueprint for regional waterfowl conservation. It guides and informs the SJV staff, Board, committees, and partners in their conservation activities in a science-based, dynamic process of adaptive conservation planning and delivery. The Supplement also demonstrates and emphasizes the need for conservation action and for the resources to achieve the SJV's biological objectives. This Supplement outlines population and habitat objectives, implementation strategies, monitoring and research topics, priority areas, and other information essential for the SJV and its partners to conserve waterfowl and wetlands.

The SJV area has a wide variety of significant wetlands. The 5,540 km (3,440 miles) of coastline in northwestern Mexico and southern California support a critically important series of coastal wetlands that provide wintering habitat for a vast number of waterfowl. The arid interior of the SJV's six states (two in the U.S. and four in Mexico) also contains large important wetlands such as the Salton Sea, Colorado River valley, Imperial Valley, San Jacinto wetlands, and Willcox Playa. Ducks Unlimited Mexico (DUMAC) lists 13 priority wetlands along the SJV coast. In addition, there are 11 locations in the SJV area that are designated as Ramsar Wetlands of International Importance.

The expansive wetlands in the SJV area are the winter home for significant populations of waterfowl. For example, over 80% of Pacific Brant winter on the coasts of the Baja peninsula and mainland Mexico. Of the Pacific Flyway Redheads, 70% winter in Mexico most of these along the Sonora-Sinaloa coast with some along the coast of the Baja peninsula. More than 25,000 Snow and Ross's geese and over 50% of the Pacific Flyway's Ruddy Ducks winter on the Salton Sea. The coast of Sinaloa alone supports 22.5% of the migratory waterfowl that winter in Mexico.

Wetlands in the SJV area have experienced significant losses and are under threat today. Water over-allocation in the arid southwestern U.S. is a problem. Aquaculture and development are threatening to destroy mangroves and estuarine wetlands in Mexico. Despite these very real threats, there are many opportunities for improving wetlands both in the U.S. and Mexico. The opportunities in Mexico are unique in that many areas of nearly pristine wetlands still exist.

Our general approach to bird conservation is an iterative cycle of four parts: Biological Planning and Foundation, Conservation Design, Conservation Delivery, and Monitoring and Applied Research. Each of these elements is discussed in relation to the Strategic Habitat Conservation paradigm. We discuss the work that has already been undertaken or is planned in the near future by the SJV in each element. However, the SJV is a relatively young joint venture and some of these elements are beyond our capacity at present. For these tasks we describe how we intend to accomplish the needed work.

The SJV's highest waterfowl priorities are Brant, Northern Pintail, Lesser Scaup, and Mallard. The next tier, moderately high priority species, includes Surf, Black, and White-winged scoters,

American Wigeon, Redhead, Blue-winged and Cinnamon teal, and Canvasback. The SJV has adopted the population objectives given by the North American Waterfowl Management Plan.

In this Supplement important wetlands in the SJV area are described and prioritized. The following steps are described and planned: developing species-habitat relationship data, using remote sensing and Geographic Information Systems (GIS) to build geographic models to predict where the most effective and efficient use of resources should be spent, and building decision support tools and habitat objectives to guide our activities. Additionally research and monitoring are needed to test assumptions made during development of our objectives and to track waterfowl population changes. Towards this end, the SJV supports the continuation of the U.S. Fish and Wildlife Service's Mid-winter Survey especially in northwestern Mexico.

“Most of these coastal wetlands are nearly pristine. It is remarkable to go out into the hundreds of thousands of acres of coastal wetlands and see the masses of birds of all types that winter there. Key duck species include northern pintails, green-winged teal, and lesser scaup. Equally remarkable is the realization that these wetlands look and function very much as they have for thousands of years. One has the sense of being in an untouched wilderness. The water is just a few inches deep for thousands of acres.”

Bruce Batt, Ducks Unlimited chief biologist, Memphis,
about the coasts of Sonora, Sinaloa, and Nayarit

PART I. Planning and Conservation Strategy

Introduction

Waterfowl are among North America's most highly valued wildlife species. They are hunted, studied, photographed, watched, and marveled at. The North American Waterfowl Management Plan (NAWMP) states that waterfowl should be conserved at sustainable levels across their natural ranges to provide ecological and socioeconomic benefits.

Wetlands are the prime habitat for North America's waterfowl. They generate ecological, social, scientific, recreational, and economic benefits. Wetlands provide fundamental ecological services; they are regulators of water quality and regimes and sources of biodiversity at all levels – ecosystem, species, and genetic. They allow us to witness interactions between cultural and biological diversity. They challenge us to understand and appreciate their complexity. Progressive encroachment on, degradation of, and loss of wetlands has caused serious and sometimes irreparable damage to ecological services they produce. However, wetlands can and should be restored, rehabilitated, enhanced, and protected when and where possible.

For over a century, conservationists have worked to sustain and enhance waterfowl populations, by creating wildlife refuges and management areas, conducting breeding bird surveys, and managing wetland. In 1986 the North American Waterfowl Management Plan (NAWMP) was signed by Canada and the United States. Mexico became a full partner in 1994. The NAWMP was developed to address concerns about long-term declines in waterfowl populations linked to losses of wetlands. The NAWMP identified habitat loss and degradation as the major waterfowl management problem. The NAWMP established population goals for various species of ducks, geese, and swans based on historical years of relative abundance. It also established a strategy for cooperation in the conservation of waterfowl. It emphasized the importance of a partnership approach to conserving habitats important to waterfowl and to improving our scientific understanding of waterfowl populations. The approach included the formation of Joint Ventures, which through extensive partnerships endeavor to organize programs and scientific data to increase wetland and waterfowl populations. In 1989, the North American Wetlands Conservation Act (NAWCA) was passed by Congress, which funds many wetland partnership projects.

The Sonoran Joint Venture (SJV) is one such partnership that works to sustain and increase waterfowl populations. The SJV is a partnership of diverse organizations and individuals from the southwestern United States and northwestern Mexico that share a common commitment to bird conservation. The mission of the SJV is to conserve the unique birds and habitats of the southwestern United States and northwestern Mexico. The SJV accomplishes this through collaborative partnerships. A science-based, dynamic process of adaptive conservation planning and delivery guides SJV activities. The SJV prides itself on being an active, dynamic group of partners that views bird conservation based on habitats and bird populations without regard to borders or jurisdictions.

The Sonoran Joint Venture completed the SJV Bird Conservation Plan (Plan) in 2006. The Plan is a comprehensive, all-bird plan intended as the biological foundation of the joint venture. It summarizes the status of avian species, prioritizes these species, provides population objectives, habitat discussions and conservation recommendations, and lists Focus Areas for conservation action. The Plan is a blueprint for regional bird conservation. It guides the SJV staff, Board, and committees in their actions and informs SJV partners of beneficial activities. Finally, and most importantly, the Plan demonstrates and emphasizes the need for conservation action and for the resources to achieve the SJV's biological objectives. Several other in-depth guidance documents were anticipated covering different subjects to supplement the Plan. One of those subjects was waterfowl and wetlands.

Purpose, Scope, and Intended Audience

The purpose of this document, the Waterfowl Management Supplement (Supplement), is to highlight and add to the information and recommendations found in the Plan for waterfowl species and their habitats. The Supplement's goal is to prioritize species, set species population objectives, set habitat objectives, establish implementation strategies, and identify monitoring and research topics, priority areas, and other information essential for the SJV partnership to effect conservation of waterfowl and wetlands. Recently the National Science Support Team (NSST) of the NAWMP produced a document, *Desired Characteristics for Joint Venture Implementation Plans* (draft 15 June 2007) that guides the organization and development of the "specific approach" steps that are used in the Supplement. This document lists two levels of expectations, one for mature, long-standing waterfowl Joint Ventures and one for newer, developing Joint Ventures. We follow the elements for the newer, developing Joint Ventures in this Supplement. The steps involving priority waterfowl species, population objectives, and priority wetland sites are completed. However, we currently lack information on energetic requirements, vital rates, and spatial habitat characteristics, as well as information for other steps that require remote sensing and GIS capability. We discuss how we plan to build these steps in the Supplement. Through partnerships and increased funding we intend to develop these missing components in the future.

The geographic scope of the Supplement is the region covered by the SJV (Figure 1). The species coverage includes the 43 Anseriformes documented in the SJV region, of which all but eight are regularly occurring. Although the wetlands, fresh and marine-influenced, agricultural, and riparian, used by waterfowl are shared by many other bird species, the focus here is on waterfowl.

The information presented in this Supplement is intended to guide wetland acquisitions, restoration, and enhancement projects, assist planners, proposal writers, funding agencies and organizations, conservation managers, evaluators, and researchers who work with waterfowl and wetlands. Conservation planners and proposal writers can use the objectives and focus areas to target actions and prioritize work. Funding sources and organizations can verify our priority species, habitats, and goals. Implementers can find recommendations for actions. Researchers will find potential topics of investigation.

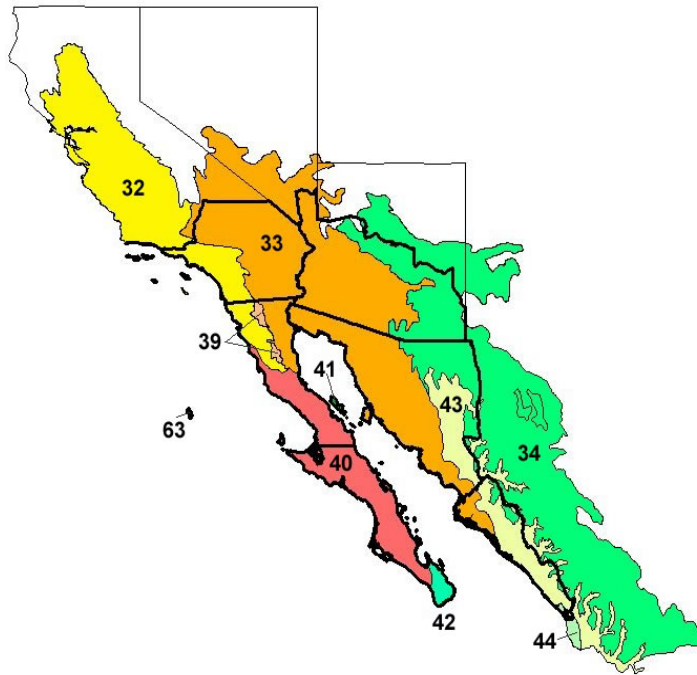


Figure 1. Sonoran Joint Venture boundaries with state lines (bold line) and Bird Conservation Regions (colored polygons with BCR numbers).

Significance of SJV Wetlands and Waterfowl Populations

The coasts of northwestern Mexico and southern California support a critically important series of coastal wetlands that provide wintering habitat for a vast number of waterfowl primarily from the Pacific Flyway. The arid interior of the SJV's six states also contains large important wetlands such as the Salton Sea, Colorado River valley, Imperial Valley, San Jacinto wetlands, and Willcox Playa. Many areas along the coasts and the above mentioned inland sites are recognized by one or more organizations or agencies as priority wetlands (see below and Priority Areas discussion).

There are over 5,540 km (3,440 miles) of coastline in the SJV area. This includes about 400 km (250 miles) of the southern California coastline and about 5,140 km (3,192 miles) of coastline along the states of Baja California, Baja California Sur, Sonora, and Sinaloa (which is 46% of the total Mexican coastline; Vega 2006). Offshore islands were not included in this estimate of SJV coastline. The Mexican National Commission for Knowledge and Use of Biodiversity (Comisión Nacional para el Conocimiento y Uso de la Biodiversidad, CONABIO) lists 19 priority marine regions in our area. Ducks Unlimited de Mexico (DUMAC) lists 13 priority wetlands along the Mexican coast in the SJV area.

The Convention on Wetlands, signed in Ramsar, Iran, in 1971, is an intergovernmental treaty that provides the framework for national action and international cooperation for the

conservation and wise use of wetlands and their resources. There are 11 locations in the SJV area that are designated as Ramsar Wetlands of International Importance (see Box; www.wetlands.org/reports/rammap/mapper/cfm). Several more sites are being considered for inclusion (Vega 2006) including Ensenada Pabellones, which is considered “the most important site for waterfowl in Mexico (Perez-Arteaga et al. 2002). Ensenada Pabellones has an average waterfowl count of >300,000 birds and a peak count of >500,000 individuals” (Perez-Arteaga et al. 2002). Additionally, it is estimated to hold almost 10 % of the wintering waterfowl found in Mexico (Ducks Unlimited 2001).

In addition to Ramsar sites, there are 14 Important Bird Areas (IBAs) in California and 9 in Arizona that are significant wetlands. Over 24 wetland Áreas de Importancia para la Conservación de las Aves (AICAs) have been designated in the SJV area of México (see “Current State of the Ecosystem” discussion later in this document). Additionally, the lower Colorado River is a NAWMP priority wetland for waterfowl in the U.S.

The expansive wetlands in the SJV area are the winter home for significant populations of waterfowl. Fifteen percent of the continent’s ducks and geese winter on the west coast of Mexico. The Mexican state of Sinaloa supports 22.5% of the migratory waterfowl that winter in Mexico (www.ducks.org/conservation/initiative27.aspx and [initiative30.aspx](http://www.ducks.org/conservation/initiative30.aspx)). Over 80% of “Pacific” Brant winter on the coasts of Baja peninsula and mainland Mexico (Pacific Flyway Council 2002; see Appendix E for scientific names of waterfowl used throughout). Of the Pacific Flyway population of Redheads, 70% winter in northwestern Mexico. Most of these along the Sonora-Sinaloa coast with some along the coast of Baja in Laguna San Ignacio and Bahía San Quintín (Bellrose 1976). San Diego Bay winters over 25% of the Pacific Flyway’s Surf Scoters; many are also found at Laguna San Ignacio and Laguna Ojo de Liebre in Baja (Bellrose 1976). More than 25,000 Snow and Ross’s geese and over 50% of the Pacific Flyway’s Ruddy Ducks winter on the Salton Sea (www.ducks.org/conservation/initiative26.aspx).

Ramsar Sites

1. Tijuana River National Estuarine Research Reserve - California
2. Humedales del Delta del Río Colorado - Baja California and Sonora/San Fransiquito
3. Corredor Costero la Asamblea – Baja California
4. Estero de Punta Banda – Baja California
5. Isla San Pedro Mártir - Sonora
6. Isla Rasa – Baja California
7. Laguna Ojo de Liebre – Baja California Sur
8. Laguna San Ignacio – Baja California Sur
9. Parque Nacional Bahía de Loreto – Baja California Sur
10. Laguna Playa Colorada/Santa María la Reforma – Baja California Sur
11. Playa Tortuguera/El Verde Camacho - Sinaloa

Wetland Descriptions

“Backwater lagoons teemed with waterfowl and other aquatic life. The Green Lagoons described so elegantly by Aldo Leopold in 1949 were off the northeast side of Mesa de Andrade, just upstream from the present-day Ciénega de Santa Clara.”

“The dense, verdant riverine habitats of the Rio Colorado stood in sharp contrast to the adjacent extremely sparse desert vegetation of the Mesa de Sonora. Cattails, reed grasses, rushes, sedges, and other emergent and submerged hydrophytes cloak this wetland with a brilliant green mantle. This flora is similar to that surrounding the Ciénega de Santa Clara and is ... a continuation of

that wetland system. Nineteenth- and early twentieth-century photographs show dense, tall forests of cottonwood and willow all along the river channels. This vast riverine system formed myriad meandering and anastomosing channels that writhed across the deltaic flatlands, often changing course from flood to flood or year to year. ”

Richard Felger (2000) describing the early Colorado River wetlands in Mexico

Some of what Felger describes along the lower Colorado River and its delta is gone today but he goes on to say, “The remnant pockets of wetland vegetation in the delta region deserve vigorous protection and a surprising degree of restoration is possible.”

Although northwestern Mexico and southwestern U.S. is an extremely arid region, its wetlands are diverse and extensive (Felger 2000). Generally the SJV area includes all wetland categories, salt water and fresh, deep and shallow, natural and man-made, forested, and rocky. Some wetlands are owned by government agencies or nongovernmental organizations, many are privately or communally owned. Some wetlands are highly managed moist-soil units, others have no management. Some have little to no threats, others are highly threatened. Because the SJV has 44 Wetland Priority Areas, specific threats, needs, and actions for individual wetlands will not be addressed in this Supplement. However, regional threats and actions are discussed later. Table 1 lists the wetland systems, subsystems, and examples of each wetland type found in the SJV area.

Table 1. Wetland types found in the SJV area as classified by Cowardin (1979) with examples.

System	Subsystem	SJV Example
Marine	Subtidal – submerged	Open waters along all coastlines
	Intertidal – exposed and flooded by tides	Shore and rock beds, such as the shoreline around Isla Alcatraz
Estuarine	Subtidal – submerged	Open water in estuaries, bays, and lagoons such as Ensenada Pabellon, Estero la Cruz
	Intertidal – exposed and flooded by tides	Mudflats, mangrove forests along edges of bays, lagoons, and estuaries, such as Bahía Santa Maria
Riverine	Tidal – under tidal influence	Colorado River near the delta
	Lower Perennial – low gradient and velocity, flows year round	Larger rivers such as the Gila River
	Upper Perennial – high gradient and velocity, some flow year round	Mountain streams in the Sierra Madre Occidental
	Intermittent – flows for part of the year	Various desert streams and washes
Lacustrine	Limnetic – deepwater habitat	Various lakes and reservoirs such as the Salton Sea and along the Colorado River
	Littoral – shoreward to 2 m depth	Willcox Playa
Palustrine	None – nontidal wetlands dominated with various vegetation types	Marshes, ciénegas, and oases, that have trees, shrubs, and/or persistent emergents

Marine wetlands consist of open ocean overlying the continental shelf and its associated high-energy coastline (Cowardin 1979). Marine habitats are exposed to the waves and currents of the open ocean and salinities exceed 30‰. This system includes shallow coastal bays without appreciable freshwater inflow and coast with exposed rocky islands. It does not include areas with wetland emergent vegetation, trees or shrubs or the deepwater oceanic habitats. Subtidal subsystems are continuously submerged, while intertidal subsystems are exposed and flooded by tides. Examples of waterfowl that use the marine habitat in winter are the three species of scoters, Brant, Canvasback, Redhead, and Greater Scaup. In the SJV area this wetland system is found along all of our 5,540 km (3,440 miles) of coastline in Mexico and the U.S. Eelgrass (*Zostera marina*) is probably the most important plant species of this system especially to Brant. Benthic invertebrates such as clams, barnacles, mussels, and crustaceans that are found in this system are also taken by waterfowl.

Estuarine wetlands are deepwater tidal habitats and adjacent tidal wetlands that are semi-enclosed by land but have open, or sporadic access to the open ocean and in which ocean water is diluted by freshwater runoff from land at least occasionally. Estuarine systems extend upstream to where salinity is less than 0.5‰ and seaward to the limit of wetland emergents or the enclosing line of the bay or river mouth (Cowardin 1979). This system includes what are regionally called bays/bahías, estuaries/esteros, and lagoons/lagunas. Persistent emergent vegetation such as mangroves (*Rhizophora mangle*, *Laguncularia racemosa*, and *Avicennia germinans*), cordgrass (*Spartina foliosa*), pickleweed (*Allenrolfea occidentalis*), and glasswort (*Salicornia virginica*) dominate. Other plants including saltgrass (*Distichlis spicata*), arrowgrass (*Triglochin maritima*), giant bulrush (*Scirpus californicus*) and cattail (*Typha dominguensis*) occasionally occur (Brown 1994). The definitions of subtidal and intertidal from above apply. Examples of waterfowl that use estuarine wetlands are Northern Pintail, scaup, American Wigeon, and Northern Shoveler. In the SJV area examples of this wetland system are found at the Colorado River delta, Tijuana Estuary, and at the numerous bays and estuaries along the coastline.

Mangrove swamps are a significant and important estuarine wetland component in the SJV area deserving of a separate discussion. They occur north to Punta Sargento on the Mexican mainland, to Bahía de Los Angeles on the east side of the peninsula, and to Laguna San Ignacio on the west side of the peninsula (Brown 1994). The three species of mangroves that can be found are red mangrove (*Rhizophora mangle*) black mangrove (*Avicennia germinans*), and white mangrove (*Languncularia racemosa*). Some locations have considerable expanses of mangroves; others have small areas protected from sea action. There is often a conspicuous break between mangrove habitat and adjacent communities such as tidal marsh, strand, or saltbush scrub. Breeding Black-bellied Whistling-Ducks are found in mangrove swamps, as well as wintering species such as Northern Pintail and Lesser Scaup.

Palustrine systems include all nontidal wetlands dominated by trees, shrubs, and persistent emergent vegetation. Riverine systems include all wetland and deepwater habitats contained within an artificial or natural channel, excluding wetlands dominated by trees, shrubs, and persistent emergent vegetation. These systems regionally include marshes, ciénegas, oases, and riparian corridors. Riverine/Palustrine systems in the SJV area include, the San Pedro, Gila, Colorado, Bill Williams, Santa Cruz, Yaqui, Mayo, Santa Ana, Tijuana, New, Alamo, Santa

Margarita, and Sonora rivers and vegetated areas around the Salton Sea, San Jacinto WMA, Lake Elsinore, Ciénega Santa Clara, Picacho Lake, and Mittry Lake. Inland marshes are surrounded by saltgrass, reed (*Phragmites australis*), cattail, rushes (*Juncus* spp.), and bulrushes (*Scirpus* spp.). Semi-aquatic plants include pennywort (*Hydrocotyle verticillata*), smartweed (*Polygonum fusiforme*), pondweed (*Potamogeton* spp.), duckweed (*Lemna* spp.), and various sedges (*Cyperus* spp.) and grasses (*Eleocharis* spp.). Marshes as well as riparian areas are already or are in the process of being invaded by salt cedar (*Tamarix chinensis*) throughout the SJV area. Riparian plant species vary according to elevation and latitude. Low elevation riparian forest (<1,000 m; Brown 1994) support Goodding's willow (*Salix gooddingi*), and Fremont cottonwood (*Populus fremonti*), while higher elevation riparian situations are known for sycamore (*Platanus wrightii*), narrowleaf cottonwood (*Populus angustifolia*), and arroyo willow (*Salix lasiolepis*). Mallards, Wood Ducks, Cinnamon Teal, and whistling-ducks are examples of waterfowl that breed in palustrine wetlands in the SJV area. Examples of waterfowl that use palustrine wetlands during the winter are Green-winged and Cinnamon teal, Northern Pintail, Mallard, Gadwall, and American Wigeon.

The Lacustrine category includes wetlands and deepwater areas >8 ha (20 acres) in size and with >30% vegetative cover. In the SJV area lacustrine wetlands are most often formed by the damming of a river channel. The Salton Sea, Lake Perris, Roosevelt Reservoir, San Carlos Lake, Laguna Salada, Presa Agua Caliente, and Presa Obregon are some of the lacustrine wetlands in the SJV area. Canvasback, Redhead, and Ring-necked Duck are examples of waterfowl that use lacustrine wetlands during winter.

Wetland Losses and Threats

Wetlands in this arid region are fragile and vulnerable and have suffered in the past or are now suffering serious modification or destruction from human causes. Southern coastal California wetlands have been reduced by 75% (www.coastal.ca.gov/wetrev/wetch4.html). At this time a similar value for the amount of loss of northwestern Mexico coastal wetlands is not available. Similarly loss of gallery riparian wetlands in Arizona has been estimated at 90% (Lofgren 1990). California has lost 98.5% of its historic riparian habitat (Krueper 1993). The threats are complex and the issues are often contentious. Of importance are the lessons to be learned from the habitat losses that have occurred in southern coastal California and inland Arizona so that informed decisions can be applied to situations in Mexico.

Inland wetlands have been degraded by water diversion, channelization, over-allocation, flood control projects, disruptions or changes to natural hydrological regimes, and other threats that have reduced habitat value to waterfowl. In this arid climate and with booming population growth, water is at a premium and typically supplies human uses before wildlife. Often wetland and riparian projects must budget the cost of paying for water.

Non-native species have invaded various wetlands throughout the SJV area; some have altered ecological processes significantly. Plants such as salt cedar (also called tamarisk; *Tamarix* spp.), giant reed (*Arundo donax*), and giant salvinia (*Salvinia molesta*) have severe ecological impacts

(Arizona Wildlands Invasive Plant Working Group 2005). Invasive non-native plants pose problems by replacing native vegetation, reducing open waterways, and increasing soil salinity.

Loss of habitat to urban, suburban, commercial, and light industrial development is particularly acute near population centers and along waterways and coasts. Development not only destroys habitat by filling and draining but it contributes many environmental modifiers such as pollution, non-native species of plants and animals, increased sediment discharge, accelerated soil erosion, and also requires large amounts of water to sustain.

Aquaculture is a relatively new and expanding industry in Mexico. Ninety-five percent of the nation's shrimp production is from the states of Sinaloa and Sonora (Vega et al. 2006). The total area for shrimp farming was noted as 35,000 ha (86,485 ac) in 2000. Shrimp farms are often constructed in fragile wetland ecosystems such as mangroves, intertidal areas, and marshes. Not only do shrimp farms destroy important coastal habitat but effluent contaminated with organic matter and chemical runoff has been pouring directly into adjacent bays as well as altering the natural drainage (Vega et al. 2006).

Wetland areas are also being drained and/or filled for agriculture or cattle ranching. Agricultural developments often apply agrochemicals (e.g., pesticides and fertilizers) at levels that move into water systems and impact the health of wetland species. Unsustainable grazing can lead to erosion that creates heavy sediment loads that are carried into waterways and wetlands smothering vegetation and changing water chemistry. Unsustainable grazing also occurs in some wetlands impacting vegetation that is necessary for waterfowl and other wetland species and that acts as a filter for contaminants and silt.

Port, marina, and tourist development activities along coasts are major factors in waterfowl disturbance and habitat loss. This development includes dredging new and expanded channels and direct filling of wetlands. Increased development for tourist infrastructure (hotels and marinas) is paving over or is planned to destroy wetlands in Mexico. A project by the federal government of Mexico, Escalera Náutica, is proposing a series of marinas and associated infrastructure along the coasts in the SJV area. If implemented these marinas will destroy or compromise some of northwest Mexico's best wetlands.

Overexploitation of the fisheries resource is becoming a problem in the Gulf of California. A visible effect of low sardine fish stocks during some periods has forced Brown Pelicans, a marine species, to migrate into arid parts of California and Arizona to look for food. Forage for fish-eating waterfowl such as mergansers may also be jeopardized in the Gulf of California.

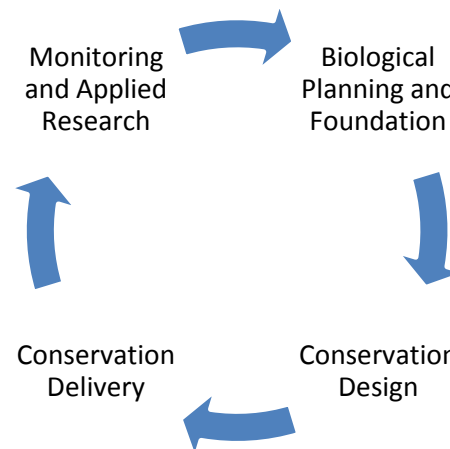
Relationship to Other Plans and Initiatives

The North American Waterfowl Management Plan (NAWMP) is the continental level document that provides general direction, historical perspective, and population objectives for waterfowl conservation. The SJV Waterfowl Management Supplement (Supplement) functions as the regional step-down of the NAWMP that combined with other JV's waterfowl plans will deliver the stated continental objectives. The National Science Support Team (NSST) generates

information and products concerning the scientific underpinnings of the NAWMP. SJV staff participates on the NSST and have used several of their documents to develop this Supplement. A particularly important contribution of the NSST is the “Desired Characteristics for Joint Venture Implementation Plans”, which was used as the outline of the Specific Approach section of the Supplement. There are “species group” Joint Ventures, such as the Sea Duck Joint Venture, that provide information included in this Supplement. The Pacific Flyway Council has several Management Plans for individual species that were used. Not only does the SJV use this information but it is our intent to contribute to these groups’ goals and objectives through our population and habitat conservation actions. The SJV participates either directly through staff or indirectly through partners in all of the entities mentioned in order that communication flows in both directions.

General Approach

Our general approach to bird conservation is an iterative cycle of four parts, Biological Planning and Foundation, Conservation Design, Conservation Delivery, and Monitoring and Applied Research. This process has been developed and promoted by Joint Ventures, Partners in Flight (PIF), the U.S. Fish and Wildlife Service (FWS) and U.S. Geological Survey (USGS) in the past few years. (for PIF, Will et al. 2005, for FWS and USGS, National Ecological Assessment Team 2006). The SJV partnership is committed to supporting all four parts. SJV partners will contribute in their individual areas of strength and expertise to the cycle, thus in total implementing the entire approach. The SJV staff may focus on one geographic region or one element of the cycle for a period of time knowing that each part will receive emphasis in due course. This is an iterative process that will not succeed if we think of conservation as a linear approach and fail to put the results of our efforts back into the cycle for the next iteration making our efforts even more efficient and effective.



For non-breeding Joint Ventures the general process used for determining habitat objectives and conservation strategies is: (1) compile biological information and data about species and habitats and their relationships to each other, (2) design the conservation landscape using information from the biological foundation and build models and perform analyses, (3) implement the recommendations emerging from the design phase, and (4) evaluate results and test assumptions made during planning, design, and implementation phases.

(Definitions of the steps under Specific Approach are primarily taken from the NSST’s document, *Draft Desired Characteristics for Joint Venture Implementation Plans*, June 15, 2007.)

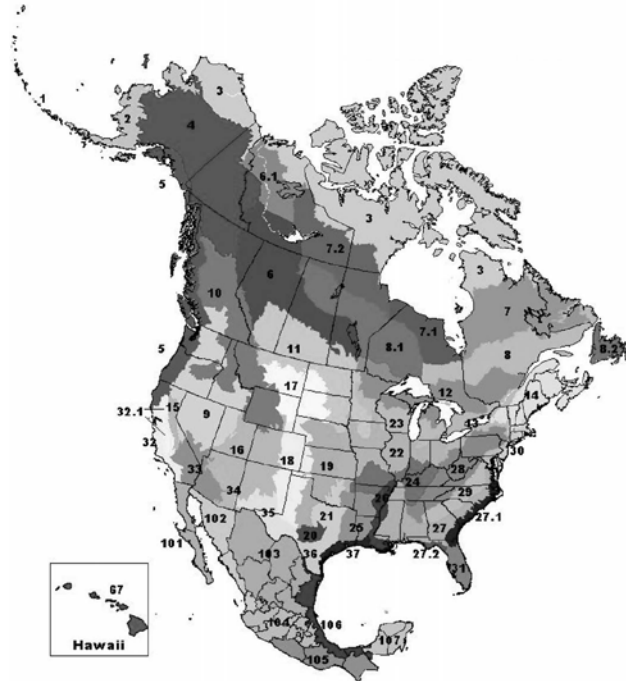
Specific Approach

- I. **Biological Planning** is the process of determining the biological foundation for population and habitat management. The Planning Unit is defined, species are prioritized, measurable population objectives for selected species are given, limiting factors are considered, and species-habitat models are proposed.

Biological Planning Unit: In this step the spatial Planning Unit is defined and the expected temporal importance (i.e., breeding, wintering, or staging) is identified. Deviations from NAWMP conservation ecoregions are justified and supported.

Combinations of the North American Bird Conservation Initiative's (NABCI) Bird Conservation Regions (BCR) are used in the SJV Bird Conservation Plan (Plan) and for other activities of the SJV. The four combinations of BCRs are referred to as SJV Regions. We will continue their use for waterfowl conservation implementation. They are useful because they span and connect the ecological areas in which we work and are not restricted by political boundaries (i.e., the U.S.-Mexican border). We will use SJV Regions also for coordination rather than the NAWMP's Waterfowl Conservation Areas (WCR; Figure 2) because they provide the connection upon which our partners insist and because we have developed regional teams. The SJV's goal is to consider our two countries' avian resources continuously across the landscape, rather than separately. However, the planning scale has not changed from the NSST's recommendation as BCRs and WCRs are the same in the U.S. portion of the SJV area. Our waterfowl priorities are given by WCR and population objectives are given by country because that is the level at which they were developed by the NSST. However, we will translate these into SJV Regions in the future for implementation.

Figure 2. Map of Waterfowl Conservation Areas in the U.S., Canada, and Mexico.



The four SJV Regions are combinations of BCRs that have similar ecological systems and conservation issues (Figure 1). They are as follows: BCR 32 (southern part only), 39, and 63 comprise the SJV's Californian Coasts and Mountains Region; BCR 33, 40, 41, and 42 are called the Arid Borderlands Region; BCR 34 is the Mexican Highlands Region; and BCR 43 is the Pacific Lowlands Region (compare Figure 1 to Figure 2). "WCRs" are similar to BCRs used in this Supplement with the exception that WCRs 32, 33, and 34 are those portions of BCRs only in the U.S. WCR 101 is all of the Baja Peninsula, and WCR 102 is Sonora, Sinaloa, and Nayarit, whereas SJV Regions follow BCR lines in Mexico.

Figure 3. Map of the Sonoran Joint Venture and adjacent Joint Ventures. (SJV in dark blue)



SJV boundaries with other Joint Ventures divide some BCRs (Figure 3). The SJV abuts the Intermountain West Joint Venture in the northern portions of BCRs 33 and 34; and abuts the Central Valley Joint Venture in the northern part of BCR 33 and the southern part of BCR 32. The Supplement addresses only the parts of those BCRs within the SJV boundaries in Arizona and California. This differs from the SJV Bird Conservation Plan (Plan), in which BCR 33 and 34 were discussed in their entirety. Another deviation from the Plan is that the SJV does not now include BCR 44, Marismas Nacionales in Sinaloa, as that BCR has formed a separate Joint Venture-like alliance. Our avifaunal analysis in the Plan also included all of BCR 34 in Mexico. However, the Supplement includes only those portions of BCR 34 that are in Arizona, Sinaloa, and Sonora. There is a gap between the SJV and the Rio Grande Joint Venture (RGJV) on our eastern boundary, as the RGJV reaches only to the BCR 34-35 border. We chose to deviate from our Plan for priorities and objectives because the waterfowl population objectives analysis was

done for counties rather than for BCRs (other bird initiatives follow BCRs for analyses) and we could closely approximate the SJV boundaries with county lines. Also wetland locations are more discrete and more closely linked with JVs than the extensive habitats landbirds use.

The SJV area has a limited number of breeding waterfowl but has significant wintering populations (see Significance of SJV Wetlands and Waterfowl and Part II. Species Accounts for information on seasonal distributions). Recommendations in this Supplement refer to wintering unless otherwise stated.

Priority Species: In this step a list of priority waterfowl species is identified and justified. We explain any deviation from the most recent NAWMP update.

The SJV has 43 species of Anatids (see Part II. Species Accounts and the SJV website) that have been documented in our area. Thirty-seven of these are considered regularly occurring and of these 32 have a large enough population (manageable population) in at least one location for which the habitat can be managed. The variety of waterfowl species and wetland types in the SJV area underscores the need for prioritization. By prioritizing species we recognize that we must make decisions about where and how we spend resources. Therefore, prioritization is a necessary step of strategic planning.

The NAWMP Implementation Framework (2004) prioritized waterfowl species for conservation action at the continental and regional scales. Duck species are prioritized at a continental level based on two factors: continental population trend and combined continental sport and subsistence harvest data. Geese and swans are prioritized based on population trend and population size relative to objective. The NAWMP Implementation Framework (2004) further developed priority species lists for each WCR to target regional conservation efforts in the appropriate phase of annual cycles and in appropriate locations. Geographic importance (i.e., distribution and perceived threats) and conservation need (a function of geographic importance of the WCR and overall continental priority) were used for WCR-scale species prioritization. An important note for interpreting conservation need is that a high conservation need for a species within a particular WCR can indicate either a need for habitat conservation and/or the need for monitoring. Other caveats are that these priorities should be considered “a starting point” for Joint Ventures and that within a region there are areas of more and less importance, which should be interpreted by local expertise.

Table 2 lists waterfowl priorities from the NAWMP Implementation Framework (2004) in the SJV area. The SJV may add other species to the priority list through the use of other methods especially the Mexican Species Assessment Process. One deviation from the NAWMP prioritization is the addition of Mexican Duck; it is currently considered a subspecies of the Mallard (American Ornithological Union 1983). The SJV’s Mexican partners have a keen interest in Mexican Ducks, which appear to be increasing in the SJV area. The SJV is tracking their expansion and investigating their reproductive success and habitat use.

Generally if a species has a “High” or “Moderately High” continental priority, it is a priority for the SJV. If a species has a “Low” continental priority it is not considered an SJV priority. In the

latter case it usually means that the species population is stable or increasing or has a small population size in the area. Also if a species has “Low” Regional Importance or Need it is not considered an SJV priority. This combination usually means that a species population is increasing or there is not a manageable population in the SJV area. The combination of “Moderate” and “Moderately Low” (either at the Continental or Regional level) indicates that the species might be a priority only at locations where there are manageable populations. But that combination of priority levels usually signifies species that can be managed along with other similar species (i.e., dabbling or diving ducks, or freshwater or salt water) as a “Moderate” priority.

Table 2. Waterfowl Priorities from the 2004 Implementation Framework.

WCR	Species	Continental Priority	Regional Breeding Importance	Breeding Need for Conservation	Regional Non-Breeding Importance	Non-breeding Need for Conservation
32	Brant-Pacific	High			High	Highest
	Lesser Scaup	High			Mod High	High
	Mallard	High	Mod Low	Moderate	Mod Low	Moderate
	Northern Pintail	High			Mod High	High
	American Wigeon	Mod High			Mod High	Mod High
	Black Scoter	Mod High			Mod High	Mod High
	Canvasback	Mod High			Mod Low	Mod Low
	Common Goldeneye	Mod High			Mod Low	Mod Low
	Surf Scoter	Mod High			Mod High	Mod High
	White-winged Scoter	Mod High			Mod High	Mod High
	Bufflehead	Moderate			Mod High	Mod High
	Greater Scaup	Moderate			Mod High	Mod High
	Green-winged Teal	Moderate			Mod Low	Mod Low
	Northern Shoveler	Moderate			Mod High	Mod High
	Wood Duck	Moderate	Mod Low	Mod Low	-	-
	Ruddy Duck	Mod Low			Mod High	Moderate
	Trumpeter Swan – Rocky Mountain	High			Mod Low*	Moderate
33	Mallard	High			Mod Low	Moderate
	Mexican Duck	SJV priority				
	Northern Pintail	High			Mod Low	Moderate
	American Wigeon	Mod High			Mod Low	Mod Low
	Blue-winged/Cinnamon Teal	Mod High			Mod Low	Mod Low
	Canvasback	Mod High			Mod Low	Mod Low
	Common Goldeneye	Mod High			Mod Low	Mod Low
	Redhead	Mod High			Mod Low	Mod Low
	Bufflehead	Moderate			Mod Low	Mod Low
	Gadwall	Moderate			Mod Low	Mod Low
	Green-winged Teal	Moderate			Mod Low	Mod Low
	Northern Shoveler	Moderate			Mod Low	Mod Low
34	Mallard	High			Mod Low	Moderate
	Mexican Duck	SJV priority				
	Northern Pintail	High			Mod Low	Moderate
	Canvasback	Mod High			Mod Low	Mod Low
	Bufflehead	Moderate			Mod Low	Mod Low
	Gadwall	Moderate			Mod Low	Mod Low
	Green-winged Teal	Moderate			Mod Low	Mod Low

	Northern Shoveler	Moderate			Mod Low	Mod Low
101	Brant – Pacific	High			High	Highest
	Lesser Snow Goose – Western Central Flyway	Moderate			Mod Low	Mod Low
	White-fronted Goose- Mid-continent	Mod Low			Mod High	Moderate
	White-fronted Goose- Pacific Flyway	Mod Low			Mod High	Moderate
	Northern Pintail	High			Mod High	High
	Lesser Scaup	High			Mod Low	Moderate
	American Wigeon	Mod High			Mod Low	Mod Low
	Blue-winged Teal	Mod High			Mod Low	Mod Low
	Canvasback	Mod High			Mod Low	Mod Low
	Cinnamon Teal	Mod High			Mod Low	Mod Low
	Redhead	Mod High			Mod High	Mod High
	Gadwall	Moderate			Mod High	Mod High
	Green-winged Teal	Moderate			Mod Low	Mod Low
	Northern Shoveler	Moderate			Mod Low	Mod Low
	Ring-necked Duck	Moderate			Mod Low	Mod Low
102	Brant – Pacific	High			Mod High	High
	Lesser Snow Goose – Western Central Flyway	Moderate			High	High
	White-fronted Goose- Mid-continent	Mod Low			Mod High	Moderate
	White-fronted Goose- Pacific Flyway	Mod Low			Mod High	Moderate
	Mallard	High			Mod High	High
	Mexican Duck	SJV Priority				
	Lesser Scaup	High			Mod Low	Moderate
	Northern Pintail	High			High	Highest
	American Wigeon	Mod High			Mod Low	Mod Low
	Blue-winged Teal	Mod High			Mod High	Mod High
	Canvasback	Mod High			Mod High	Mod High
	Cinnamon Teal	Mod High			Mod High	Mod High
	Masked Duck	Mod High	Mod Low	Mod Low	Mod Low	Mod Low
	Redhead	Mod High			Mod High	Mod High
	Gadwall	Moderate			Mod High	Mod High
	Green-winged Teal	Moderate			Mod High	Mod High
	Northern Shoveler	Moderate			Mod High	Mod High
	Ring-necked Duck	Moderate			Mod High	Mod High
	Black-bellied Whistling-Duck	Mod Low	Mod High	Moderate	Mod High	Moderate
	Fulvous Whistling-Duck	Mod Low	High	High	Mod High	Moderate

* The listing of Trumpeter Swans in this WCR is in question. Trumpeter Swans are not listed in Small 1994, Monson and Phillips 1981, Massey and Zembal 2002, or of more that accidental occurrence in the Nevada portion of BCR 33 (L. Neel, pers. comm.). There is only one published record of Trumpeter Swan in Arizona (Mitchell 1994, but also see Species Accounts.). There may be some confusion with Tundra Swans, which are found every winter along the Lower Colorado River.

By combining Continental Priority and Regional Importance and Need, we get a picture of the highest priorities for the SJV. The SJV's highest priority is Brant along the west coast of the Baja Peninsula and the southern coast of California and Northern Pintail along the west coast of

mainland Mexico (Continental priority of “High” and Regional Need of “Highest”; in bold in Table 2.). The second tier of high priorities is Lesser Scaup and Northern Pintail along the southern California coast, Northern Pintail along the west coast of the Baja Peninsula, and Brant and Mallard along the Sonora-Sinaloa coasts (Continental priority of “High” and Regional Need of “High”; also in bold). These are the species for which the SJV will actively pursue habitat conservation, monitoring, and research. The next level of species priorities is those of “Moderately High” Continental priority with “Moderately High” Regional Importance and Conservation Need. This level includes Surf, Black, and White-winged scoters and American Wigeon on the southern California coast, Redhead on the coasts of the Baja Peninsula, and Blue-winged and Cinnamon teal, Canvasback, and Redhead along the Sonora-Sinaloa coasts. The SJV will actively encourage partner participation in habitat project development for this group of species. All other species in Table 2 are considered of moderate priority for the SJV but may be elevated in priority due to local circumstances. For instance the population of Wood Ducks in southern California has a “Moderately Low” Regional Importance and Need, but they are the westernmost population and disjunct, so may be of conservation interest.

Population Objectives: A description of the process that was used to develop population objectives is presented. Interim population objective variables (i.e., abundance) are identified. The link to NAWMP continental objectives is discussed.

Population objectives are the basis for waterfowl conservation strategies and should be explicit and measurable for efficient use of time and money. Population objectives provide the foundation for planning habitat objectives, including the location, configuration, condition, and management of habitat. Objectives are performance metrics for evaluating outcomes, measuring success, and documenting accomplishments. They also establish that we intend to be accountable for our conservation actions. Objectives provide clear and concise statement of purpose and should be easily communicable marketing devices for several types of audiences. Population objectives have several characteristics. They can be abundance-based or performance-based or both. Objectives can be based on the change of populations from some time period in the past to present or on what current habitat and potential habitat may support, or a combination of these two abundance-based approaches. A performance-based objective factors in a vital rate indicator. Population objectives may also seek to maintain or restore waterfowl distributions. Other characteristics of population objectives are that they are consistent with other waterfowl management objectives and are able to be evaluated in relation to data from monitoring programs. Additionally objectives are interrelated with subsistence and recreational harvest of waterfowl. Work is currently underway within the waterfowl scientific community to integrate population objectives and harvest management decisions.

The SJV’s overall goal is to provide sufficient habitat to maintain continental waterfowl populations at objective levels during periods of “average environmental conditions” in their current distribution. The following describes the method by which we have determined our specific population objectives.

Waterfowl population objectives have been established for many species and populations at the continental level by the NAWMP. The SJV has stepped down those population objectives to our

area and will “step up” our successes to contribute to overall continental objectives of the NAWMP. The NSST developed midwinter waterfowl population objectives to assist with conservation planning during the nonbreeding season (Koneff undated). For each species, county-level objectives were established. Counties were aggregated by Joint Ventures to produce regional midwinter objectives. We obtained the county-level objectives from Koneff (undated) and aggregated them by the SJV boundaries in the U.S. for ducks; objectives for geese were not given by county. The approach taken by Koneff (undated), while good at a large-scale may have some irregularities when applied at the regional/county level. We suspect that some objectives are much larger in some locations than the potential capacity to produce habitat to sustain these objective levels. Also some objectives are not given for some species such as, scoters, goldeneyes, Bufflehead, and mergansers. However, we believe that the objectives are a reasonable starting place for the SJV’s purposes.

SJV waterfowl population objectives were taken from Koneff (undated) with some modifications (Table 4). Duck population objectives for the California and Arizona portions of the SJV are taken directly from Koneff’s (undated) supporting spreadsheet adding all of the county objectives in the SJV area for each species to derive the U.S. SJV’s objectives. (Koneff’s document presents totals for counties using old SJV boundaries, but the spreadsheet provides data on all counties, which were totaled for our current boundaries.) Goose population objectives for California and Arizona are taken from Koneff (tables in his document rather than the supporting spreadsheets which did not include geese; undated). The 1990s mid-winter goal distributions were used for both ducks and geese. A table giving 1970’s mid-winter goal distributions is found in Appendix A.

Objectives for Mexico are given for each species only for the entire country, not by state, BCR, or county as the U.S. objectives are (Koneff undated). The SJV’s population objectives for Mexico are derived by taking a proportion of the Mexican objectives (Koneff undated) that corresponds to the proportion of the amount of each species’ Mexican winter range in the SJV area. The area of each species’ winter range in Mexico and in the SJV area was calculated using NatureServe maps (P. Blancher, pers. comm.). We added Mexican Duck to our objectives because of the high level of interest and concern by our Mexican partners; the proportion of its range in Mexico to the SJV range was estimated. The total mid-winter SJV objective for all ducks in each of the U.S. and Mexico is about 1,000,000. The SJV objective for all geese for the U.S. and Mexico combined is about 230,000. The total for all waterfowl combined is about 2,200,000 (Table 4).

Table 4. SJV winter waterfowl population objectives, based on 1990s distribution from Koneff (undated).

Species	SJV - U.S. Regional Objective (totaled)	SJV - Mexican winter objective	WCRs and Comments
Ducks			
Mallard	33,236 ¹	1,918	32, 33, 102
Mexican Duck	NG ²	8,235 (65,882 for all of Mexico)	33, 34, 102; estimated distribution in SJV area is 12.5%
Northern Pintail	379,237 ¹	178,089	32, 33, 34, 101, 102

Gadwall	16,665 ¹	10,195	101, 102
American Wigeon	110,794 ¹	79,687	32, 33, 101, 102
Green-winged Teal	83,126 ¹	73,985	102
Blue-winged/Cinnamon Teal	NG	57,782	33, 101, 102; objectives are given for both species combined and for Cinnamon Teal alone as shown below
Cinnamon Teal	NG	63,589	33, 101, 102
Northern Shoveler	111,838 ¹	172,199	32, 33, 102
Fulvous/Black-bellied Whistling-Duck	NG	22,437	102
Redhead	568 ¹	88,528	33, 101, 102
Canvasback	4,878 ¹	6,305	32, 33, 34, 101, 102
Lesser/Greater Scaup	134,781 ¹	174,933	32, 33, 34, 101, 102
Ring-necked Duck	10,033 ¹	9,311	102
Ruddy Duck	53,409 ¹	18,899	32
Total Ducks	938,564	965,978	1,904,542
Geese			
Brant	NG	162,200	32, 102, 102
Greater White-fronted/Canada Geese	13,215	7,761	None; Pacific Flyway/Rocky Mountain populations
Snow/Ross's Geese	34,175	10,816	102; Western Arctic in US and Western Central Flyway in Sinaloa/Sonora
Total Geese	47,390	180,577	227,967

¹For ducks in the U.S. portion we use Koneff's spreadsheet that supports his undated manuscript. The spreadsheet allowed us to add objectives for California counties not included in the SJV area in his manuscript.

² NG=Not given.

Our population objective will be abundance-based for the present time. The SJV should not only use a population size criteria for meeting objectives but also should develop a vital rate objective at some point in the future. A vital rate objective could be a winter survival rate or body condition level. No such vital rate strategy currently exists for any nonbreeding species under the NAWMP (B. Sullivan, pers. comm.). While we believe a vital rate objective is important, the SJV does not have the capacity to investigate and develop these markers at this time. As we evolve and have capacity for research, we will be able to measure vital rates such as survival and body condition, and add them to our objectives. A body condition objective such as "to maintain or improve body condition of waterfowl while in the SJV" could be part of the bioenergetics approach to developing habitat objectives. The SJV area is also valuable for fall and spring migration. Migration chronology data is necessary to develop objectives during migration. This would be a task for the future but at a lower priority than winter research tasks.

Waterfowl populations fluctuate with environment conditions both in wintering and breeding areas. Populations that winter in the SJV area are influenced by limiting factors in their breeding range. For all the intentions of population objectives it is often difficult to detect increases or declines in waterfowl numbers especially in winter. It has been said that regional (i.e., joint venture) waterfowl objectives are best viewed as baselines for the establishment of habitat objectives, not as performance metrics (Koneff undated). However, long-term declines from objective levels indicate cause for concern and suggest that habitats may have changed significantly. Additionally there are debates about whether counting individuals on the wintering

grounds is a valid measure of success when movement among locations is so prevalent. At this time we believe that the population objectives we have given plot the direction and magnitude of where our waterfowl populations should be and where to put our efforts.

Some assumptions regarding population objectives:

1. The density of each waterfowl species is equal over the distribution of the species in Mexico.
2. The winter range of species in Mexico is calculated correctly by Nature Serve.
3. The estimate of Mexican Duck distribution in the SJV area is correct.
4. The estimates of species distribution by county for the U.S. portion are calculated correctly.

Limiting Factors: In this step, a list of potential factors thought to limit waterfowl populations in our planning units is discussed.

Limiting factors are a range of factors that influence abundance, survival, and body condition of wintering waterfowl. Limiting factors are often associated with the carrying capacity of habitat to maintain and sustain waterfowl including, habitat condition and type, size of patch, configuration, and adjacent land use. Foraging conditions including the extent, density, and energetic content of food items are equally important. Other factors that affect populations or individuals are disease, contaminants, small population dynamics, hunting pressure, and human disturbance. Populations can be limited by factors beyond the control of an individual joint venture such as weather and factors waterfowl encounter elsewhere during their life cycle. However, we are assuming that in the SJV area we can meet the objectives above by removing the impact of known limiting factors in our area.

The primary factors limiting waterfowl survival during the winter period in the SJV area are (1) the availability, density, and quality of the food/energy resources to meet daily energetic needs as well as needs to begin migration and breeding, (2) wetland availability and extent for roosting and foraging, (3) wetland condition, and (4) context or compatibility of the surrounding landscape. Secondary limiting factors that could be significant are: disease, contaminants, over-harvesting, and disturbance. We assume the above are limiting factors based on information from other Joint Ventures and other studies.

A basic environmental limiting factor that underlies almost all inland wetland sites in the SJV area is the simple availability of water. Almost all water is allocated and used in the arid West. Wildlife needs usually fall behind urban and agricultural water needs. Water for inland wetland restoration is either purchased or negotiated, or otherwise confirmed by partners before projects proceed.

Limiting factors present themselves differently in the various regions of the SJV area. For instance, the reduced availability, extent, and condition of wetlands as well as shortage of inland water overshadow other factors in the Salton Sea, Imperial Valley, lower Colorado River Valley, and southern California. In these areas of the U.S. many wetlands have been destroyed. Restoring and enhancing wetlands becomes the first priority before undertaking work on other factors (see the Habitat Delivery section). However, along the Mexican coasts many wetlands still exist and are in good condition. The high priority for action there is protection of existing wetlands and their watersheds, and research into food resources and secondary limiting factors.

Also along the California coast contaminants in marine habitats may be a major limiting factor for sea ducks that needs to be studied (www.werc.usgs.gov/scoter/study.html).

Species and Habitat Relationships: In this step population-habitat models are expected to be developed in the future (for the Comprehensive Content/Mature JVs level) are described that will relate population response to various habitat and limiting factor scenarios (empirical or conceptual).

Adaptive management uses modeling as a tool to structure the decision making process and inform and analyze problems. Biological models are useful conceptual or mathematical descriptions of what we know or assume to know about a system, for example, how a population reacts to a given habitat management practice. In advanced models, determining the relationship between habitat and populations usually involves demographic indices in the breeding grounds and/or survival indices during winter to determine what characteristics produce source and sustainable populations, what densities are found in various habitat types, and if regional differences exist. Building models gives us the ability to determine the size of the population that the habitat will support and if there is a deficit that we must work to rectify. Population-habitat models whether qualitative and conceptual, or quantitative and highly detailed also predict the effects of management actions. Alternative actions are easily tested for the desired response. The process becomes transparent for partners to understand, which inputs show which outputs. The act of building even simple conceptual models shows us where we should go next with research. By expressing uncertainty and stating assumptions we also build testable hypotheses.

Different species have different habitat needs so one model will not fit all. Based on the SJV waterfowl priorities, the following species are candidates for population-habitat models: Brant, Northern Pintail, Lesser Scaup, Mallard, Redhead, Canvasback, teals, and scoters. This group represents the major waterfowl groups found in the SJV area: geese, sea ducks, divers, and dabblers. Little research has been done to enable models to be built with empirical data from the SJV area. Therefore our initial models will be conceptual. Data may be used from these species in other areas similar to the SJV until our partners can undertake the necessary research in our area.

Before we develop models, we will collect baseline data from the primary habitats with the SJV. We also will begin with a basic literature search to find data about species and their habitats. We will locate information from the SJV area if available or from other similar landscapes. The types of data we will need are: distribution, habitats use, time of season, food items taken, energetic demands, energetic levels of food items, and the effects of disturbance, contamination, over-harvesting, and disease. Research and monitoring topics will naturally arise as we accumulate more habitat information. Our questions (and what we assume about them) will become our research and monitoring topics.

The SJV wants to work toward having advanced population-habitat models. Because meeting energy demands of wintering waterfowl is considered the most important limiting factor, most winter-emphasis Joint Ventures use a model that estimates energetic demands for nonbreeding waterfowl using duck use-day equivalents (DUDEs). To estimate energetic demands of

nonbreeding waterfowl in the SJV, we would first developed use-day objectives for each species and multiply them by the number of days in the period to give period objectives.

The energetic carrying capacity (ECC; kcal/day) of waterfowl habitats often is expressed in units of energy sufficient to meet daily energy requirements of a Mallard-sized duck during winter. Therefore period use-days objectives are adjusted for each species relative to Mallard body mass to obtain “Duck Use-Day Equivalents” (DUDEs). DUDEs are coupled with available energy/unit of habitat area to generate habitat objectives. These can be built by species or guild within various habitats using non-breeding residency time or data from migration chronology. As funding and partnerships allow, the SJV will ultimately be able to produce this level of modeling.

The SJV has two basic types of waterfowl during the winter: waterfowl that use inland sites and rely on agricultural crops, emergent vegetation, or moist-soil plants for foraging, and waterfowl that use coastal sites and forage on marine plants and invertebrates. Therefore, the input for the models developed will be vastly different for these two groups. We anticipate that for waterfowl using inland sites we can use models similar to those developed by other Joint Ventures that are dependent on emergent vegetation or moist-soil units (though not on the rice culture, which has disappeared from our area). For waterfowl using coastal sites we will investigate models such as those developed by the Gulf Coast Joint Venture on which to base our calculations.

Biological Planning Summary:

- 1. Planning Unit Defined: Completed.*
- 2. Priority Species Selected: Completed.*
Need – Assumptions need to be tested.
- 3. Population Objectives: Completed for priority species.*
Need – Develop vital rate markers (lower priority).
- 4. Limiting Factors: Speculated upon based on literature from other areas.*
Need – Investigate limiting factors in various areas of the SJV.
- 5. Species-Habitat Relationships: Basic literature search begun (see Species Accounts).*
Need - Conduct a detailed literature search for our area. Expand to information from other areas to supplement. Develop models that estimate DUDEs for each species (or guild) in each habitat.

II. Conservation Design involves compiling the information gathered in the Biological Planning step into easily understood products that will enable partners to determine how much, where, in what configuration, and in what condition habitat should be conserved.

Landscape/Habitat Characterization: This step generates a general description of the types, amount, and location of wetlands relative to meeting waterfowl objectives. Drivers that impact waterfowl habitat and implications to waterfowl populations in the absence of partnership intervention are discussed. Assumed limiting factors and population/habitat relationships are linked.

The section on Wetland Habitat Descriptions above describes the physical characteristics, dominant vegetation types, and examples of specific wetland types in the SJV area. Table 5 lists the types, acreages, and states in which wetlands occur for Mexico from Ducks Unlimited de México (DUMAC). This analysis classified and tallied the various coastal wetland types of Mexico in Sonora, Sinaloa, and the Baja peninsula using Cowardin's classification system (1979; www.dumac.org/dumac/habitat/esp/mundodumac/conservation/satelite/tablas; Table 5). Similar data is being compiled from existing National Wetlands Inventory work or other similar programs for SJV area in the U.S. and inland areas in Mexico. While we have a large percentage of our wetlands classified by DUMAC, other information on protection status, etc. is also needed (see Current State of the Ecosystem section). Further division of these habitat types may be necessary if they have differing values to waterfowl to enable estimating carrying capacity.

Table 5. Wetland types and areas in northwest Mexico as classified and compiled by Ducks Unlimited de Mexico A.C.

Wetland System/Subsystem/Class	Hectares in Sinaloa	Hectares in Sonora	Hectares in Baja California	Total hectares
Marine Subtidal Open Water	796,231	389,886	679,004	1,865,121
Marine Intertidal Shore	2,469	4,796	1,434	8,699
Estuarine Subtidal Open Water	166,976	29,296	144,047	340,319
Estuarine Subtidal Aquatic Vegetation		596	1,741	2,337
Estuarine Intertidal Aquatic Vegetation	13,441	11,586	57,134	82,161
Estuarine Intertidal Inundated Coastal Plain	98,479	82,973	119,087	300,539
Estuarine Intertidal Emergent Vegetation	70,746	44,354	25,214	70,746
Estuarine Intertidal Mangrove	73,974	15,740	25,425	115,139
Estuarine Intertidal Modified Coastal Plain	13,859	6,029	48,908	68,796
Lacustrine Limnetic Open Water	20,229	24		20,253
Lacustrine Limnetic Aquatic Vegetation	3,178			3,178
Lacustrine Littoral Open Water	4,958	1,568	14,496	21,022
Lacustrine Littoral Aquatic Vegetation	252			252
Palustrine Open Water	502	302	1,727	2,531
Palustrine Aquatic Vegetation	282			282
Palustrine Emergent Vegetation	27,291	4,082	3,843	35,216
Palustrine Emergent Modified	1,946		306	2,252
Riverine	22,415	497	3,961	26,873
Riverine with Vegetation	27,775	5,551	9,126	42,452
Riverine Artificial	7,660	1,660	97	9,417
Upland Agriculture	1,435,527	270,653	35,437	1,741,617
Upland without Vegetation	20,259	17,191	44,004	81,454
Upland Developed	97,888	4,694	1,876	104,458
Upland Halophytic Vegetation	42,418			42,418
Upland Natural Vegetation	2,178,071	519,766	1,215,862	3,913,699

Totals	5,126,826	1,411,244	2,432,729	8,970,799
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Threats such as those mentioned above: urban development, aquaculture, non-native invasive species, tourism development, over allocation of water resources, water diversion, etc. are impacting wetland and waterfowl. These threats have already had tremendous impacts in areas of southern California and along the lower Colorado River, and will steadily increase in other areas of the SJV. Threats will be addressed on a case by case basis when we are working with local communities and conservation organizations. We find that working with local partners to effect change in local issues is the most productive. However, the SJV Management Board can take the lead in the appropriate decision-making bodies in which they participate to modify policy concerning these threats.

The SJV partnership provides coordination of efforts for waterfowl and wetlands conservation in the SJV area. It also allows promotion and support that is needed to begin and continue the research and planning called for above. Currently groups such as, Ducks Unlimited, California Waterfowl Association, Pronatura, Comisión de Ecología y Desarrollo Sustentable del Estado de Sonora (CEDES), Centro de Investigación Científica y de Educación Superior de Ensenada (CICESE), Comisión Nacional de Áreas Naturales Protegidas (CONANP), the National Wildlife Refuge System, state wildlife agencies, and the lower Colorado River Multi-Species Conservation Plan partners and others are working in their areas of influence to protect and improve wetland. Without these efforts and efforts of other partners we expect continued loss and degradation of wetlands. The SJV's role is to facilitate partnerships, locate funding, provide technical assistance, and analyze and provide information on a regional basis. Regarding the latter, we believe that this is the first time a cross border synthesis of basic waterfowl information has been done between the U.S. and Mexico, providing a true perspective of the importance of our area.

Modeling the effects of limiting factors to population and habitat relationships will be a task for future iterations of this Supplement. However, we speculate that habitat condition, type, and amount/size, as well as, foraging conditions and energy availability have the most impact on populations in the SJV area. They suggest that providing habitat where it has been degraded or lost particularly in southern California is a high priority. While protecting relatively intact wetlands in the Mexican portion is the priority for those efforts. Sensitivity analyses of the models will be able to direct the SJV to high priority areas and projects. A full exploration of the association between limiting factors and population/habitat relationships will provide hypotheses for research and monitoring.

Assessment of the Conservation Estate: In this step wetland and landscape characteristics and attributes are collected and built into a Geographic Information System (GIS). It may include, current protection/management level, a comparison of historic ecological systems to present, conservation opportunity, a preliminary summary of waterfowl habitat (acres) protected, managed, and restored in the planning unit, and an assessment of conservation lands that will benefit waterfowl.

The SJV plans to develop a spatially explicit characterization of the current state of wetland and associated habitats via remote sensing and GIS. The envisioned process will collect spatial data on wetland condition, protection level, and management status. We need to quantify major landscape cover types important to waterfowl to get a complete summary of waterfowl habitat protected, managed, and restored in our planning units and potential sites to restore, manage and protect. However, the SJV does not have the capacity to perform these characterizations at present. In the interim, we are working with the Region 2 National Wetlands Inventory office to begin this work. Table 6 lists most of the largest wetland complexes, their acreages, the waterfowl most associated with them, and level of threats and protection if known.

Threats, protection status, landownership, management regime, and conservation need are critical pieces to fully assess habitats for waterfowl. For example, in Arizona initially we can use Southwest Regap's protection status 1-4 for our data set. However, Regap is fairly general in this characterization and we will need to improve on the data. The management status of landholdings will also be a useful part. Information from partners about whether they have restored, enhanced, or protected land parcels can be included. An analysis of whether parcels are suitable for enhancement, restoration, acquisition or other protection measures will help partners design projects. As we have the capacity in the future, we hope to obtain the missing information using satellite imagery, remote sensing techniques, and/or field truthing and add it to our landscape inventory to further characterize habitat and be the basis of our decision support tools. In this step we will add GIS layers and/or attributes that will enable us to find potential partners for conservation work and land parcels to proactively conserve. The level of protection and/or management of units can allow us to determine the conservation level needed and direct partners to possible projects. As protection, restoration, and enhancement proceed we will be able to track our projects on the landscape.

In the Plan the SJV has listed its Focus Areas. These areas are known locations that support priority birds. We used the California and Arizona Audubon Important Bird Area programs to develop our U.S. Focus Areas. Similarly in Mexico we used the Áreas de Importancia para la Conservación de las Aves (AICAs; Arizmendi 2000), which is the Mexican Important Bird Area program to develop our Mexican Focus Area lists. For the list of SJV Priority Wetlands we have selected the wetland Focus Areas from the Plan list. Table 6 lists Priority Wetlands for each SJV Region with the states in which they are located, size, waterfowl data, and management agency, and status or threats. In Mexico priority wetlands for the Pacific coasts have been compiled by DUMAC (shown in Table 6 with **;
<http://www.dumac.org/dumac/habitat/esp/mundodumac/conservacion/humedales.htm>). Partners can use Table 6 to locate areas for project development. Management recommendations and objectives will be added by SJV partners as part of a future exercise.

Table 6. Priority Wetlands in the SJV area by Region with extent, associated waterfowl, management agency, and level of threat.

Site	State(s)	Hectares (Acres)	Waterfowl	Management Agency/Status or Threats
Californian Coasts and Mountains – BCRs 32, 39, 63				

Baldwin Lake	California	<365 ha (1000 ac)	>5,000 waterfowl*	None/Critical threats
Lake Elsinore	California	<365 ha (1000 ac)	>5,000 waterfowl	City of Lake Elsinore, private?/High threats
Mission Bay	California	365-3,650 ha (1,000-10,000 ac)	>5,000 (Brant)	City of San Diego, Univ. of Cal., private/Low threats
Orange Coast Wetlands	California	365-3,650 ha (1,000-10,000 ac)	>5,000 (10,000 waterfowl excluding scoters)	Private, US Navy, USFWS, State of Cal., City of Huntington Beach/High threats
Point Mugu	California	365-3,650 ha (1,000-10,000 ac)	>5,000 (8,462 Northern Shovelers)	Various/Critical threats
San Diego Bay	California	365-3,650 ha (1,000-10,000 ac)	>5,000 (15,740 waterfowl, up to 30% of Pacific Brant, Lesser Scaup, ~10% of Pacific coast Surf Scoters)	National Wildlife Refuge (NWR), US Navy, others/partial protection, medium threats
San Jacinto Wetlands	California	365-3,650 ha (1,000-10,000 ac)	>5,000 (25,217 waterfowl)	State, private/partial protection, high threats
San Pasqual Valley	California	365-3,650 ha (1,000-10,000 ac)	>5,000 (5,000-8,000 waterfowl)	San Diego Wild Animal Park and others/partial protection, high threats
Upper Santa Ynez River	California	>18,250 ha (50,000 ac)	>5,000 waterfowl	Various/medium threats, unknown protection status
Bahía Todos Santos	Baja California	27,838 ha aica	Northern Pintail, American Wigeon, Blue-winged Teal, Lesser Scaup	Ejidal, private, federal/not known
Arid Borderlands – BCRs 33, 40, 41, 42				
Topolobampo**	Sinaloa	106,977 ha (264,233 ac)	Green-winged Teal, Blue-winged Teal, Northern Pintail, Northern Shoveler, American Wigeon, Lesser Scaup, Redhead, Brant, Gadwall	Not known
Bahía San Quintín**	Baja California	10,000 ha (24,700 ac); 38,460 ha aica	Brant, Northern Shoveler, Green-winged Teal	Ejidal, federal, private/not known
Laguna Ojo de Liebre/Guerrero Negro**	Baja California, Baja California Sur	87,052 ha (238,522 ac); 36,000 ha aica	Brant	Ejidal, federal/not known
Bahía San Ignacio**	Baja California Sur	104,255 ha (285,659 ac); 107,626 ha aica	Brant, Lesser Scaup	Ejidal, federal, private/not known
Bahía Magdalena**	Baja California Sur	171,879 ha (470,948 ac); 96,725 ha aica	Brant (30,000), Northern Pintail, American Wigeon, Blue-winged Teal, Lesser Scaup (Arizmendi 2000)	Federal/not known
Bahía Lobos**	Sonora	29,543 ha (80,948 ac); 46,807 ha aica	Northern Pintail, Green-winged Teal, American Wigeon, Lesser Scaup, Northern Shoveler, Gadwall, Blue-winged Teal	Ejidal, federal, private/not known
Isla Tóbari**	Sonora	12,989 ha (35,590 ac); 16,700 ha aica	American Wigeon, Northern Pintail, Northern Shoveler, Green-winged Teal, Lesser Scaup, Gadwall, Blue-winged Teal	Ejidal, federal, private/not known
Santa Bárbara**	Sonora	486 ha (1,332 ac)	Blue-winged Teal, Northern Pintail, Northern Shoveler, Brant, Gadwall, American Wigeon	Not known
Agiabampo**	Sonora	30,182 ha (82,699 ac); 41,393 ha aica	Northern Pintail, Green-winged Teal, Gadwall, Lesser Scaup, Northern Shoveler,	Ejidal, federal, private/not known

			Blue-winged Teal, Brant, American Wigeon, Redhead	
Imperial Valley	California	>18,250 ha (50,000 ac)	>5,000 (Snow and Ross's geese in the thousands)	NWR, State, private/ partial protection, high threats
Edward's Air Force Base	California	>18,250 ha (50,000 ac)	>5,000 (7,265 Northern Shovelers)	US DOD/no protection, Critical threats
Lower Colorado River (including the National Refuge System lands; Imperial, Cibola, Bill Williams, and Havasu NWR)	California/Arizona	3,650-18,250 ha (10,000-50,000 ac) For the Bill Williams (6,105 ac) For Imperial (1,040 ha) (2,850 ac)	>5,000 California; 1,915 on the Yuma CBC; Redhead, Canvasback, Cinnamon, Blue-winged, and Green-winged Teal, Lesser Scaup, Gadwall, American Wigeon, Ring-necked Duck	NWR, various/partial protection, high threats
Salt and Lower Gila River	Arizona	3,102+ ha (8,500+ ac)	Black-bellied Whistling-Duck (20 pairs)	State, County, BLM/evaluate
North Mojave Dry Lakes	California	3,650-18,250 ha (10,000-50,000 ac)	>5,000 (25,000 Snow Geese)	US DOD, others/high threats, protection not known
Mittry Lake	Arizona	1,305 ha (3,575 ac)	Cinnamon, Blue-winged, and Green-winged Teal, Lesser Scaup, Gadwall, American Wigeon, Ring-necked Duck, Ruddy Duck	BLM, BoR, State/evaluate
Delta del Río Colorado	Baja California/Sonora	250,000 ha aica		CONANP, ejidal, private/high threats, partial protection
Archipiélago de Bahía de los Angeles	Baja California	21,490 ha aica		Federal/not known
Bahía Lechugilla	Sinaloa	66,190 ha aica		Not known
Bahía Navachiste	Sinaloa	101,178 ha aica		Not known
Ensenada de la Paz	Baja California Sur	28,341 ha aica		Not known
Estero del Soldado	Sonora	778 ha aica	Northern Pintail	Ejidal, federal, private/not known
Estero de San José	Baja California Sur	13,000 ha aica		Ejidal, federal, private/not known
Isla Tiburón-Canal, El Infiernillo-Estero Santa Cruz	Sonora	222,482 ha aica	Canada Geese, Brant	Seri group
Sistema San Luis Gonzaga	Baja California	2,508 ha aica		Federal/not known
Sistema Guásimas	Sonora	17,805 ha aica		Ejidal, federal, private/not known
Salton Sea	California	<18,250 ha (50,000 ac)	>5,000 (>50,000 waterfowl in winter)	NWR, State, various/partial protection, high threats
Mexican Highlands – BCR 34				
Watson and Willow Lake Ecosystem	Arizona	693 ha (1,900 ac)	Northern Pintail 1,400, Northern Shovelers 1,200, American Wigeon 770, Ring-necked Duck 850, Ruddy Duck 2,000, Common Merganser 753	Prescott Creeks Preservation Association, City of Prescott/evaluate
Tuzigoot	Arizona	26+ ha (70+ ac)	>1,000 (Canada Geese, Gadwall, Mallard, Northern Shovelers, Green-winged Teal, Canvasback, Ring-necked Duck)	Phelps Dodge Mining Corp. State, city of Clarkdale/evaluate
Arivaca Cienega and Creek, Buenos Aires National Wildlife Refuge	Arizona	Not given	12 Black-bellied Whistling-Ducks	NWR
Willcox Playa	Arizona	Not given	Proposed IBA; Snow Geese,	State, DoD/Evaluate

			Mallard, Green-winged and Blue-winged teal, Lesser Scaup	
Pacific Lowlands – BCR 43				
Bahía de Pabellones**	Sinaloa	75,452 ha (206,738 ac) 76,148 ha aica	Northern Shoveler, Blue-winged Teal, Gadwall, American Wigeon, Northern Pintail	Ejidal, private/not known
El Dorado**	Sinaloa	Not given	Northern Pintail, Green-winged Teal, Blue-winged Teal, White-fronted Goose, Northern Shoveler, Whistling-Duck	Not known
Laguna Caimanero**	Sinaloa	20,908 ha (57,288 ac) 72,111 ha aica	Northern Shoveler, Northern Pintail, American Wigeon, Lesser Scaup, Redhead, Green-winged Teal, Blue-winged Teal, Gadwall, Whistling-Duck	Not known
Bahía de Santa María**	Sinaloa	121,338 ha (332,466 ac) 47,000 ha aica	Redhead, Northern Shoveler, Green-winged Teal, Lesser Scaup, Northern Shoveler, American Wigeon, Gadwall, Blue-winged Teal	Not known

*for California a criteria for designation was greater than 5,000 waterfowl present during at least one season, sometimes more information is given on bird presence and numbers and other times there is no other supporting information.

** DUM-AC priority wetland.

Because of the nature of the arid southwest and the importance of wetlands large and small to the aquatic birds of the area, we do not want to restrict our list to only the above Priority Wetlands that have relatively large waterfowl populations. This list undoubtedly leaves out many areas that also deserve attention. This may be because they are not currently known by the SJV, are sporadically used, are ephemeral, or are relatively small. Because they are not on the Priority Wetland list, does not imply that they are not important to waterfowl. Projects in areas outside of the Priority Wetland list should document waterfowl use, describe habitat characteristics, proximity to nearest Focus Area, and otherwise describe reasons why they provide important habitat.

Decision Support Tools: Data collected in the steps above are used to make the products identified and developed in this step. Maps, one of the typical products, can be used to identify populations or habitats in need of protection, management, restoration, or research. How the partnership might develop spatially explicit decision support models/tools is discussed. If deemed appropriate a preliminary set of spatially explicit focus areas to guide interim conservation delivery activities is developed.

The SJV will use a biological model-based approach to build decision support tools. In this step we will apply the relationships between habitat, populations, and landscape characteristic built in the previous steps to spatial systems to show areas of suitable and potential habitat projects to attain our conservation objectives. Models and maps are useful products to communicate credible and clear messages about the bases for actions, decisions, and recommendations.

The model we develop will include comparing the total DUDEs necessary to meet SJV population objectives (desired carrying capacity) to the DUDEs that are produced at our Priority Wetlands (current carrying capacity). This will result in either a shortfall or sufficiency of habitat to support populations at objective level. Built into the model will be the energetic requirements of the species targeted and the energy produced by the various food sources in the habitats being modeled. In the case of a shortfall we can model via GIS capability where the shortfall can be supported by looking at expanding current areas, improving the condition of areas, or restoring compromised areas. Because none of the models or GIS capacity have been built as of this writing, the potential and exact nature of decision support tools we will produce is conceptual at present.

We have identified the priority wetland areas in the previous step. The Decision Support Tool for our priority wetlands will be to map the wetland areas and assign attribute data in an easily used web-based format. When we have GIS capacity we will produce maps and other products that will be put on our website and be available to our partners for implementation.

Habitat objectives: In this step a general estimation of the magnitude of habitat protection, restoration, and enhancement that might be expected of the partnership is formed. Habitat objectives are usually expressed in the number and types of wetland acres that are needed to meet the population objectives of priority waterfowl species, but are also expressed as the carrying capacity of the habitats found in our Joint Venture.

The general goal of the SJV in regard to wetlands is to stop loss and reverse deterioration while protecting existing wetlands through various techniques, and to improve the waterfowl value of appropriate agricultural lands. Habitat objectives for the SJV at this time are to protect, restore, and enhance lands within our Priority Wetlands (Table 6; see acreage figures). It is premature to estimate or refine habitat objective acreages or define condition or functionality beyond those found in the Priority Wetland list. Determining these specific objectives will result from completion of conservation design tasks.

Carrying capacity will be determined for specific SJV wetland types through research or extrapolated from other studies when data are lacking. We will apply carrying capacity figures based on our population-habitat models to the appropriate acreages to determine the total carrying capacity for each type and produce habitat objectives.

Development of the information outlined above into decision support tools will guide us to more specifically describe our habitat objectives. We can express habitat objectives in a number of ways, such as in number of acres protected, restored, or enhanced, number of acres by region, or number of acres by wetland type, or carrying capacity and functionality. In some cases we will be working with habitats that need much restoration. Decision support tools can help find the best sites for restoration. Availability of food resources can be modeled under various management scenarios such as controlling water depth, flooding and draw down at different times, and disturbing soil substrates through disking and mowing to produce optimal conditions.

We may also develop economic data to determine how much effort and money will be needed to restore areas, so our partners will be fully aware of the costs. A cost-benefit analysis can determine the most efficient way to make up the habitat deficit. (This is not meant to address the value of wetland ecosystem services but to compare benefits among potential restoration sites.) The development of an Assessment of Habitat Protection Needs and Habitat Protection Strategy can also assist prioritizing projects and inform decision making.

Integration with Non-waterfowl Avian Populations: Integrating waterfowl habitat objectives with other avian species planning is considered in SJV activities.

The SJV was discussed as an “all-bird” joint venture from the time of the first scoping meetings in early 1999. The partners that came to the table to organize the SJV were from the various bird initiatives or had responsibilities that superseded the individual initiatives, so that “all-bird” was assumed from the beginning. The SJV Bird Conservation Plan assessed, prioritized, and gave recommendations on all birds. The status of all bird species was assessed individually and then aggregated by habitat. Recommendations for management were presented by habitat. Coastal and freshwater wetlands and their associated species were discussed including priority waterfowl. We believe that bird groups are fully integrated currently. When we are able to incorporate GIS capability we will carefully assess more detailed information about habitat condition and other variables to develop further recommendations for all bird groups. In addition, SJV staff will participate in the bird initiatives so that new and developing information can be incorporated into the SJV’s work.

With regard to how planning is applied, conceptually the SJV looks at wetlands and makes recommendations that will benefit the functioning of the ecosystem with special recommendations that benefit a particular species or species group that has the highest priority as found and described in the SJV Plan. In practice the SJV integrates the needs of the partners and the needs of the species and habitat. If a project is focused on a specific bird group, staff or partners can provide technical assistance so the project can benefit other bird groups as well. This has happened recently in developing NAWCA grant proposals. The grantee and SJV staff has worked together to develop additional actions to benefit shorebirds and waterbirds. There are other areas of cooperation among bird initiatives as well that the SJV is participating in such as coordination of monitoring of habitat and birds, outreach, and education.

From the SJV Strategic Plan

<u>Objective:</u>	Biological Planning and Conservation Design: Use a species and habitat assessment and analysis and existing bird initiative and other conservation plans to determine SJV biological objectives; use the biological objectives and other factors to design a landscape approach to bird conservation that will be applied at the species, habitat, community, and/or site level. Develop a planning and evaluation cycle that drive integrated and efficient delivery of projects.
<u>Strategies:</u>	<ol style="list-style-type: none">1. Assess status of bird species breeding in, wintering in, and/or migrating through the SJV and determine priority species from this assessment.2. Calculate population objectives for priority species.3. Compile conservation recommendations for priority species.4. Analyze priority species by habitat and determine priority habitats from this analysis. Assess status of SJV habitats.5. Calculate objectives for priority habitat.6. Compile conservation recommendations by habitat type.7. Use priority species and habitats to identify Focus Areas (targeted conservation areas).8. Prioritize Focus Areas based on their biological value, threats, conservation opportunities, and other appropriate factors.9. Write a bird conservation plan for individual Focus Areas, if needed.10. Write the SJV Conservation Plan based on the above assessment, analysis, and recommendations.11. Continue to update and refine assessments, analyses, and recommendations in the conservation plan.

Conservation Design Summary:

1. Landscape and Habitat Characteristics - Basic characteristics for Mexico by state are completed.

Need: Characterize wetlands for Arizona and California.

2. Current State of the Ecosystem - Focus Areas are designated.

Need: Further Characterize Focus Areas. Acquire GIS capability. Map country, state, BCR lines, Focus Area boundaries, and landcover in GIS.

3. Decision Support Tools - Envisioned.

Need: Apply species-habitat relationships and other models to GIS.

4. Habitat Objectives - General Habitat Objectives given.

Need: Use decision support tools to describe specific habitat objectives.

5. Integration with Non-waterfowl Avian Population - All-bird Conservation Plan completed.

Need: Continue to work with partners habitat by habitat, project by project to conserve all birds. Cooperate with bird initiatives on monitoring, outreach, and education.

III. Habitat Delivery will be carried out mainly by working through partnerships to implement projects. The SJV is positioned to provide the biological foundation and facilitate partner implementation to achieve our goals and objectives.

The main focus of the SJV's habitat delivery is to cultivate partners that can work with local landowners and managers whether private or public to conserve wetlands and associated uplands. An important aspect of our Joint Venture is that we facilitate partners' involvement by holding meetings/workshops in which we develop priorities, objectives, and/or recommended actions together based on the biological foundation of the Plan. These workshops provide the

forum for partners to engage each other about management issues that otherwise does not happen and creates synergy for bird conservation. We have successfully used a workshop format many times to develop information about the biological foundation and landscape design that contribute to developing population and habitat objectives. For example, workshop participants/partners decided to use DU-MAC's priority areas in Mexico and wetland Important Bird Areas in the U.S. Participants can provide the specific details we need for planning such as extent, protection level, and threats, which much of the time is not available otherwise (e.g., National Wetland Inventory for much of southern Arizona and some of California is NOT available digitally). The process has its basis in Strategic Habitat Conservation but includes developing specific details in a workshop format. The process develops buy-in, thus our partners understand how their work contributes to objectives. We also develop and provide information on funding sources and other possible partners. Partners take this information and carry out on-the-ground work. This style of habitat delivery is consistent with other Joint Ventures. For example, the SJV does not have the capacity to engineer moist-soil units but our partners do. This cooperative style of work is particularly important in developing and continuing our international relations.

Partner Facilitation: Partnerships are established to deliver wetland and waterfowl programs.

The following are SJV strategies to facilitate partner involvement and accomplishments:

1. By providing a forum for interchange partnerships are built with municipal, state, tribal, and federal governments, local conservation groups, and universities.
2. Local wetlands awareness programs and wetland community involvement projects have been developed and have been successful and will be continued.
3. Technical assistance and information for decision-making is provided by staff or through the SJV website.
4. Capacity within our partner groups and organizations is being built. Our funding of small projects in new areas galvanizes local interest and support.
5. Support for formal declarations of protection and recognition can be provided.
6. Training opportunities for professionals, para-professionals, and professional-track university students is provided. Example workshops that have been facilitated or supported are: wetland management, winter bird surveys, and wetland conservation for teachers.

Program Objectives: This step describes how national and regional conservation programs will be linked to biologically derived waterfowl habitat objectives.

The following are SJV strategies for on-the-ground restoration, protection, and enhancement:

1. Work with private landowners and natural resource agency managers through partners to conserve and increase wetlands and associated uplands to meet waterfowl habitat objectives.
The SJV will investigate programs such as FWS's Partners for Fish and Wildlife, the NRCS's Wildlife Habitat Incentive Program, Wetlands Reserve Program, and other incentive programs to find funding opportunities. We will also work with non-

governmental partners such as The Nature Conservancy and various Land Trusts who contact landowners and obtain conservation easements. We will help develop conservation actions directly with agency land managers such as the National Wildlife Refuge System, state agency Wildlife Areas, Biosphere Reserves, and wildlife management areas in Mexico (Unidad para la Conservación, Manejo y Aprovechamiento de la Vida Silvestre; UMAs) to manage existing wetlands.

2. Use the North American Wetlands Conservation Act to fund wetland projects.

The SJV will work with cooperators such as Ducks Unlimited, California Waterfowl Association, and Pronatura to develop proposals. As part of the process we will help find partners, write or review sections of proposals and coordinate review and ranking of NAWCA proposals within the SJV.

3. Facilitate use of programs for habitat acquisition, designation, conservation easement, and financial incentives for habitat conservation.

The SJV will identify and foster use of programs such as those mentioned above and the Bureau of Land Management, California Wildlife Conservation Board's Inland Wetlands Conservation Program, Arizona Game and Fish Department, California Department of Fish and Game's California Waterfowl Habitat Program, Pronatura, CONANP, and other agency or conservation organizations' programs. Easements may be used to protect existing wetlands, manage wetlands to provide food resources, or to buffer important habitat from incompatible land uses. Easements or fee title acquisition will aid in the protection of existing habitats that are at risk of development for non-wildlife uses. Protection offered by these types of programs will ensure long term protection and viability of the target habitats.

4. Seek out other programs and new partners that could be used to acquire, restore, enhance, and protect wetlands.

This may include the development and promotion of habitat management incentive techniques (e.g., conservation easements, technical assistance, funding opportunities) or programs aimed at teaching landowners various techniques to manage wetlands efficiently.

5. Develop and implement or effect changes in natural resource policy to benefit wetlands and waterfowl.

Policy shifts are of special importance in the water policy arena. We need to seek to restore and/or manage water to dewatered or altered wetlands including riparian. This is a huge issue in the SJV area and the basis of much wetland degradation. The SJV Management Board might write letters of comment or support on behalf of the SJV's waterfowl and wetlands based on the science presented here, in the Conservation Plan, and developed subsequently to these documents.

Conservation Treatments: In this step we give general descriptions of anticipated conservation tools/treatments the partnership expects to use to meet the needs of waterfowl.

The following are prescriptions that could apply to most wetlands. In the future we will describe specific recommendations for each Priority Wetland.

1. Maintenance of existing habitat. There are many regularly occurring actions that are needed to maintain the quality of existing habitat. These are yearly or regularly scheduled activities that are often overlooked when budgeting. Wetland managers use such techniques as annual discing or mowing, noxious weed control, seasonal irrigation, water control structure maintenance, and levee repairs to keep wetlands in a productive and manageable condition. All managed wetlands require some type of annual management to keep the habitat productive.

2. Protection of existing wetland functions and values. Prevention of additional loss and degradation, particularly in remaining coastal marshes that are most vulnerable to conversion is an important need. The SJV will seek to secure long term protection of wetlands using acquisition, easement, or agreement through the above mentioned programs. Protection may also be established through federal and state regulatory programs and conservation easements. An example of this is the Multi-Species Conservation Plan for the lower Colorado River that through a Section 7 consultation is restoring wetlands. Protection options should be investigated in Mexico with SJV partners. The SJV and partners can also provide technical guidance on protection options. Protection options also include control of invasive non-native plants and animals, construction of fences to prevent livestock overgrazing, compaction, and disturbance, and acquisition of easements to act as buffers.

3. Enhancement of habitat. This treatment entails re-establishment of historic functions of wetlands. Partners and the programs mentioned above can provide guidance and/or can develop projects that will improve the management capability of existing wetlands and lead to higher quality of habitat. Enhancement projects should strive to provide efficient water control, stable levee establishment and water delivery infrastructure, and/or water conveyance networks to flood agricultural wetlands or moist-soil wetland units. In some cases the manager might also acquire water for wetland enhancement, alter vegetation and/or substrate mechanically to maximize food availability, and provide adjacent agricultural easements for maintaining waterfowl foods or to act as buffers. Ultimately the more control a manager has the better the results will be produced by the management practices. Improved habitat conditions and increased management capabilities will provide early migrating, wintering or brooding waterfowl with resources.

4. Restoration of degraded habitat by reestablishing naturally occurring functions. This conservation tool includes restoring salinities or freshwater levels, water quality and quantity, including seasonality of flooding, and recreating a diversity of topography such as, swales, islands, and broad slopes. Restoration is often more active and requires more initial disturbance than enhancement.

5. Creation of habitat. Construction of wetlands where none previously existed historically is done in special circumstances. Creating the ecological functions of a wetland where none originally occurred is expensive. It may be done for education purposes or to connect existing wetlands. Actions include developing the hydrological, geochemical, and biological components necessary to maintain a wetland, using dredge spoil or other available material to create emergent wetlands and mudflats or removing material to create wetland contours as appropriate,

and seeding or planting appropriate wetland vegetation. Creation of wetlands in the Salton Sea area may be an exception depending on point of view. Lake Cahuilla occupied the basin until it dried out about 300 years ago, and then it was reborn as the Salton Sea in 1905 when the Colorado River flowed “off course”. Today drainage from agricultural irrigation feeds the Sea and provides water for waterfowl habitat creation or restoration.

Habitat Delivery Summary:

1. Partner Facilitation – Many partner networks through workshops, meetings, the SJV website, training opportunities have been built.

Need – Continue to provide assistance, training, and help with capacity building.

2. Program Objectives – We have worked with managers or landowners in various projects. Several standard and small NAWCA grants have been awarded.

Need – Continue to generate NAWCA projects. Seek other programs and partners to promote and implement projects.

3. Conservation Treatments – General conservation treatments have been described and implemented.

Need – Prescribe specific recommendations for typical wetland types and Focus Areas.

IV. Monitoring and Applied Research is an integral part of the conservation process.

Assumptions made in modeling and development of decision support tools must be tested and the effects of management on habitats and species must be researched. Monitoring tells us about our progress toward meeting population objectives and the status of our species. Monitoring and research all too often are not considered part of conservation. However the strategic conservation process that Joint Ventures have adopted is completely reliant on monitoring and research closing the circle of planning, design, and delivery. Joint Ventures provide the forum and impetus for coordinating and using the data from researchers and inserting it into the conservation planning, design, and implementation process.

Monitoring will be necessary to document changes on the landscape, observe the effects of conservation actions, and determine progress toward meeting objectives. Monitoring provides important data on population trends, population size, distribution, and threats that enable assessment of species status so priority species may be determined. Monitoring data will allow biologists to track how restoration of wetland ecosystems enhances waterfowl populations allowing managers to improve treatments and make better choices in applying conservation actions.

Conservation Tracking System: In this step a general description of anticipated need for tracking partnership activities (gross partnership accomplishments) is proposed.

An evaluation process that tracks accomplishments and assesses program effectiveness is essential to the progress of the SJV. The SJV Strategic Plan has tasks related to accomplishment tracking (see text box). A prototype tracking system for compiling partnership conservation projects has been developed (2006). However, it has only been in operation for one year. It needs

to be tested and refined. It relies on partners completing a standardized form that reports their activities. The Science Coordinator enters the information into a spreadsheet. This provides the yearly habitat acreages and other summaries for the various reports that the SJV submits.

However, an internet-based entry system is planned, which would streamline the process. In this system, partners can go to the SJV website and fill in a report for each wetland/waterfowl project they conduct each year. The form would include acreage, type of wetland, and whether it was restored, enhanced, or protected. This would automatically populate a spreadsheet that can be tallied for our yearly reports. Partners can also use the website to track their wetland accomplishments, in that they could access their data and print out various types of reports by year, wetland type, etc.

Habitat Inventory and Monitoring Programs: The anticipated process that will be employed to inventory and monitor net habitat change over time and net progress toward population objectives (gains and losses) is described.

As discussed at recent NSST meetings (2006-2007), Joint Ventures will rely on the National Wetland Inventory (NWI) of the Fish and Wildlife Service to monitor wetland change over time. Members of the NSST have been asked to prioritize areas for wetland delineation and areas for converting to digital data. The SJV has submitted this information for our area. Part of the strategy is to elevate the importance of the NWI in general so that it will have the funding base to provide these products to Joint Ventures. The SJV will rely on this effort to monitor wetland change over time. NWI is especially suited to this as it will measure wetland gain and loss in a consistent manner across all Joint Ventures. Global climate change is likely to raise sea levels in the SJV area. The ability to predict what coastal areas would be affected and to monitor changes will be especially important considering the length of coastlines in our area. Changes in condition and function of wetlands will also be needed because the NWI does not collect data on these parameters. The SJV will need to determine how to augment NWI data with similar data from Mexico.

Population Monitoring Program: In this step a description of an anticipated process for prioritizing and coordinating monitoring of bird population response over time is given.

The SJV supports the mid-winter waterfowl counts in the U.S. and along the west Mexican coasts. At present in Mexico, Brant are monitored every winter while all other waterfowl species are monitored only every three years. We would be particularly interested in having all waterfowl species monitored every year because we believe that yearly data points more accurately reflect the cyclical nature of populations considering the vagaries of weather and other environmental conditions. At this time the mid-winter counts will be our main monitoring program. As our incipient coastal all-bird monitoring program develops we will be able to determine if more specific waterfowl monitoring can be added. See the box below from the SJV Strategic Plan for our process to address our monitoring needs.

From the SJV Strategic Plan

Objective: Inventory and Monitoring: Develop an inventory and monitoring program by performing a needs assessment that outlines a baseline inventory and trend monitoring program, and a project-based monitoring program to ensure that an adaptive management approach is taken.

Strategies:

1. Write an assessment of monitoring needs.
2. Develop an inventory of current monitoring projects.
3. Develop an SJV monitoring program in coordination with the bird initiatives and NABCI's monitoring programs.
4. Support, coordinate, and/or facilitate short- and long-term trend and project-based monitoring.
5. Coordinate with and contribute to national and international bird monitoring programs (e.g., Breeding Bird Survey, Mid-winter Survey, NABCI, Coordinated Bird Monitoring) to improve methodology, analysis, information dissemination, data contribution, coordination, etc.

In addition to monitoring, research plays a key role in improving conservation delivery. Research addresses the many assumptions that are made in the steps of Strategic Habitat Conservation process. These assumptions become testable hypotheses for research. Research questions having the most effect on outcomes will be of higher priority. Sensitivity analyses may also be of importance in prioritizing research needs. The research results, in turn, provide feedback into the objectives and models used to develop them. Research also tests assumptions about management activities. Are our efforts producing birds? Research, when combined with monitoring results, will help set more precise objectives and apply better management techniques across the landscape. The SJV will encourage, facilitate, and coordinate research and disseminate results to increase partners' knowledge of SJV birds and habitats and to improve conservation actions. See the box below from the SJV Strategic Plan for our process to address our research needs.

From the SJV Strategic Plan

Objective: Applied Research: Increase the knowledge of SJV bird populations and habitats by assessing and prioritizing research needs; communicating those needs to partners; and encouraging, facilitating, and coordinating with partners to accomplish needed research to improve conservation design and delivery.

Strategies:

1. Complete a research needs assessment to support conservation planning and delivery.
2. Prioritize research needs.
3. Post research needs on SJV website.
4. Encourage partners to conduct research that applies to SJV bird needs.
5. Maintain a directory of completed and ongoing research on the SJV website.
6. Work with regional, national, and international groups to standardize, coordinate, and improve research efforts.
7. Coordinate with and participate on the NAWMP Science Support Team, the PIF International Science Committee, and other bird initiative science teams.
8. Incorporate research results and science teams' information into SJV plans and work.

Population-Habitat Model Assumptions: A preliminary list of assumptions for population and habitat parameters used in models and decision support tools are given for the steps that have been taken to date (see assumptions in boxes in text). Assumptions are listed below based on work we anticipate. Others will be developed as the steps outlined above proceed (e.g., priority species' limiting factors, predicted densities, habitat quality).

1. Processes and rule sets for selecting species provide the best list of priorities. In developing our priority species, we relied upon previously conducted prioritization efforts, as well as prioritization by our partners. Priority species should be reevaluated at intervals. Lack of data for

some species and in some locations presents difficulties in prioritization as well as model development.

2. Model parameters, such as land cover, correctly define the habitat for a given species. We should continue literature searches and research to produce the most recent information and data for our models.
3. The scale of data used to represent the parameters in our models is appropriate. Microhabitat conditions, for example, which are not usually described by GIS data, could be necessary for a species to survive and thrive.
4. The habitat objectives will be sufficient to meet habitat needs for the majority or all of the priority waterfowl species in the SJV area and will contribute to the long-term health of conservation targets.
5. Improved management as described for priority species will benefit other waterfowl species as well as other wetland associated birds.

Conservation Treatment Assumptions: A list of conservation treatments for which the impacts on bird abundance and vital rates may not be well known.

There are many conservation treatments where the general results are very well-known. Wetland productivity and nutrient cycles have been research are often applied to wetland conservation treatments. However, we must test the treatments, their response, and their ability to produce waterfowl habitat in the SJV area. We will be able to address this set of assumptions when the SJV partners have more experience applying conservation treatments.

Sensitivity Analyses: A list of key habitat parameters most likely to influence (1) response variables, (2) population objectives, and (3) habitat objectives is proposed.

While we could speculate about factors that are likely to create the biggest changes in models at this time, it would be a more useful exercise after we have had some experience preparing species/habitat models.

Spatial Data Analyses: A list of concerns relating to the limitations of current spatial databases as they may affect conservation planning is described.

The concerns that we have currently about spatial data analyses are basic.

1. The availability and usefulness of land cover data for the SJV area needs to be assessed. Whether land cover data exists at a scale and includes habitat information for our entire area that will be useful to predict changes in relationships that affect conservation, is unknown. If land

cover data is not available from existing sources, we would need to create our own classification from “raw” spatial data. However, this option is costly.

2. The ability to edge-match land cover data for California, Arizona, and Mexico for consistent coverage is not known. Some data will be lost if edge-matching is not straight-forward because vegetation classes usually have to be combined. Currently the southwestern U.S. (that includes Arizona) has performed a Regap exercise but California has not. A pilot study on the lower Colorado River presented us with problems using older California spatial data and the newer Southwest Regap. Whether California will use similar land cover classes to Arizona if and when they do another Gap iteration has yet to be determined. We feel confident that there is land cover data for Mexico and we think we will not need to edge-match our four Mexican states, but we will need to edge-match among Arizona, California, and Mexico. National Land Cover Data (NLCD) is also another possible dataset to be considered. It is at a coarser scale than Gap, but could prove useful for certain applications.

3. Landownership data is easily available for the U.S. in general classes (e.g., BLM, state, private, DOD, tribal, etc.). But this data has proven difficult for Mexican biologists to acquire. Small scale projects in Mexico have recently shown that legal land tenure ranges from clear and unequivocal to non-existent. For the latter situation the best recourse is to identify areas of concern and conduct parcel by parcel interviews.

4. Whether we will be able to fund or work with partners to acquire and manipulate spatial data, is unknown at present. At this point in time the SJV does not have the funds nor do we anticipate having in-house funds to create a GIS system. We are in the process of and will continue to pursue finding funds through various grants and through the Fish and Wildlife Service’s GIS capabilities.

Monitoring and Applied Research Summary:

1. Conservation Tracking System – A prototype tracking system has been developed.

Need: Test and refine the tracking system. Move into a web-based system.

2. Habitat Inventory and Monitoring Programs – Areas have been prioritized for delineation by NWI.

Need: Coordinate with the NSST and NWI to track change in SJV wetlands.

3. Population Monitoring Program – Work has begun on planning a coastal aquatic bird monitoring program.

Need: Coordinate with FWS Mid-Winter Survey as needed. Implement above program.

4. Population-Habitat Model Assumptions – Basic assumptions have been listed.

Need: As work progresses on models list assumptions. Compile and communicate assumptions to researchers for projects.

5. Conservation Treatment Assumptions – No assumptions specific to SJV developed.

Need: As work progresses on conservation recommendations list assumptions. Compile and communicate to researchers for projects.

6. Sensitivity Analyses – Not sensitivity analyses specific to SJV developed.

Need: Perform analyses on variables and objectives when developed.

7. Spatial Data Analyses – A basic needs list has been compiled.

Need: Acquire GIS capability.

SJV Waterfowl Management Supplement Availability, Update, and Revision

New information, recommendations, and adjustments based on research and monitoring, partner input, and advances in modeling and GIS capabilities will lead to updates and revisions to the Supplement. It is important that the SJV allows feedback into the cyclical steps of biological foundation, conservation design, habitat delivery, and monitoring and applied research. This Supplement will be reviewed every 5 years and updated (5 years as recommended by the NSST). Full revisions will be made at least every 8 years. Revisions will likely be triggered by program evaluation and development of new information from models, decision support tools, and GIS. This Supplement will be put on the SJV website with the SJV Bird Conservation Plan and version numbering will document changes.

PART II. Species Accounts

All regularly occurring species with NAWMP priorities of High or Moderately High are discussed in the Species Accounts below. This gives users of this document easy access to information on SJV species compiled from many sources and across borders. Species Accounts of regularly occurring species with NAWMP priorities of Moderate, Moderately Low, and Low are available on the SJV website with their NAWMP population objectives. A list of rare waterfowl with very few records is also found on the website.

Distribution maps are presented, however, the reader interested in distribution and abundance in the SJV area should consult the individual species discussions by state and BCR. The maps treat abundance in all wintering or breeding range the same, which in reality can span from no records to abundant. Also the individual accounts discuss specific occupied and unoccupied areas in distribution. Maps are from *Birds of North America* accounts (see individual citations).

Species accounts are given in NAWMP continental priority order (for species prioritized at the regional level) and then taxonomic order, as follows:

High Continental Priority:

- Brant
- Mallard
- Northern Pintail
- Lesser Scaup

Moderately High Continental Priority:

- American Wigeon
- Blue-winged Teal
- Cinnamon Teal
- Canvasback
- Redhead
- Surf Scoter
- White-winged Scoter
- Black Scoter
- Common Goldeneye
- Masked Duck

The following accounts are only found on the SJV website:

Moderate Continental Priority:

- Snow Goose
- Wood Duck
- Gadwall
- Northern Shoveler
- Green-winged Teal
- Ring-necked Duck
- Greater Scaup

Bufflehead

Moderately Low Continental Priority:

Black-bellied Whistling-Duck
Fulvous Whistling-Duck
White-fronted Goose
Ruddy Duck

Not Prioritized for the SJV area by NAWMP:

Emperor Goose
Ross's Goose
Cackling Goose
Canada Goose
Trumpeter Swan
Tundra Swan
Eurasian Wigeon
Barrow's Goldeneye
Hooded Merganser
Common Merganser
Red-breasted Merganser

Frequently used citations in the Species Accounts are abbreviated as follows with area covered:

Barnum and Johnson (2004) = (Barnum); Imperial and Coachella Valleys, CA (BCR 33).
Corman and Wise-Gervais (2005) = (ABBA); Arizona Breeding Bird Atlas.
Howell and Webb (1995) = (H&W); Mexico.
Koneff (undated) = (Koneff); winter population objectives.
Krueper (1999) = (Krueper); upper San Pedro River valley, AZ (BCR 34).
Massey and Zembal (2002) = (M&Z); Salton Sea area, CA (BCR 33).
Monson and Phillips (1981) = (M&P); Arizona (BCRs 33, 34).
North American Waterfowl Management Plan, Plan Committee (2004) = (2004 Framework)
Perez-Arteaga and Gaston (2004) = (Perez-Arteaga); summary of Mexico MWS results.
Rosenberg et al. (1992) = (KVR); lower Colorado River valley, AZ and CA (BCR 33).
Russell and Monson (1998) = (R&M); Sonora, MX (BCRs 33, 34, 43)
Small (1994) = (Small); California.
SJV spreadsheet = (SJV spreadsheet); found in Appendix C.; see explanation in population objectives section above.
U. S. Fish and Wildlife Service (2005) = (Waterfowl Status 2005); U.S.

High Continental Priority

Species: Brant

Range and status in Arizona: Casual or very rare winter visitor and spring transient in the lower Colorado River valley (KVR); a few winter records in lower Colorado River valley and others in central Arizona (M&P); no breeding records (ABBA); not mentioned in the upper San Pedro River valley (Krueper).

Range and status in California: Locally common winter resident, fairly common spring and fall transient, mostly coastal but some regular inland during migration especially at Salton Sea probably crossing from the Gulf of California, rare wintering on San Diego Bay, no longer at Mission Bay (Small); fairly common visitor in winter and spring in the Salton Sea/Imperial Valley (M&Z).

Range and status in Northwest Mexico: Common to fairly common winter resident along Pacific coast of Baja south to Bahía Magdalena; since 1950s has expanded its winter range to coasts of Sonora and Sinaloa where locally fairly common (H&W); have ranged from not mentioned in early accounts to 25,000 in the mid-1960s (R&M), winters along the west coast of Baja California (Bahía San Quintín, Laguna Ojo Liebre, Laguna San Ignacio, Bahía Magdalena) and along the mainland coast of Mexico (Tiburón, Obregón, Agiabampo, Topolobampo, Santa María; Reed et al. 1998).



(Reed et al. 1998)

Abundance and status by BCR:

BCR 32 – uncommon winter resident
BCR 33 – fairly common winter resident, rare inland
BCR 34 – no records
BCR 39 – no records
BCR 40 – common to fairly common winter resident
BCR 41 – no records?
BCR 42 – uncommon winter resident
BCR 43 – fairly common winter resident
BCR 63 – record (H&W)

NAWMP Continental Priority: High (Pacific population).

NAWMP Regional Priorities: See Table below.

Regional Priority –	WCR* 32	WCR 33	WCR 34	WCR 101	WCR 102
Breeding Importance					
Regional Breeding Need					
Regional Nonbreeding Importance	High			High	Mod High
Regional Nonbreeding Need	Highest			Highest	High

*WCR=Waterfowl Conservation Region from the NAWMP.

Habitat needs:

Breeding habitat: Not applicable.

Winter habitat: In Mexico, coastal bays and estuaries, feeds mostly on eelgrass (*Zostera spp.*) (H&W); large shallow coastal lagoons, tidal estuaries and river mouths where eelgrass is plentiful, occasionally on interior lakes (Small); intertidal mudflats in well-protected, shallow marine waters where eelgrass and/or green algae are abundant, in lagoons (Reed et al. 1998).

Limiting Factors: Recreational hunting may be limiting in specific areas, pesticides and chemical runoff from adjacent agricultural lands, habitat destruction by power dredges and dumping used in oyster farming destroys eelgrass, and human disturbance such as boating and hunting and new recreational development (Reed et al. 1998).

Population information:

Continental: Population mean is 122,700 (Pacific population; 2001-2003); no population trend (1994-2003; 2004 Framework); the 2005 mid-winter survey estimate of Brant in the Pacific Flyway and Mexico was 101,400, 15% fewer than in 2004; these estimates have decreased an average of 3% per year for 1996-2005 (Waterfowl Status 2005); for Mexico 117,125 (1961-2000 average count, -0.7 P<0.01 trend) and 112,891 (1981-2000; -0.9 ns trend; Perez-Arteaga).

Regional: Bays of Baja California are the primary winter sites, supporting >80% of the population (Pacific Flyway Council 2002). Of these the bay at San Quintín is probably the most important being both a wintering and staging site. During an “El Nino” year it hosted over 50% of the population. Population estimates of Brant wintering in Mexico have varied but show a slight downward trend since 1965. On the mainland coast Brant have not been recorded south of

Bahía Santa Maria, which may be the southern limit of eelgrass (Pacific Flyway Council 2002). There is a declining long-term trend, although the last 10 years have remained stable (Reed et al. 1998). The Winter Waterfowl Survey (Conant and King) found 14,068 Brant on the mainland coast with a 10-year average of 14,894, and 87,483 on the Baja peninsula count with a 10-year average of 84,871.

Population goals:

U.S. Continental Objective*	U.S. Regional Objectives Total **	Mexico Regional Objectives Total **	SJV U.S. Regional Objective	SJV Mexico Regional Objective***
150,000 (Pacific population)	154,019 (both populations)	162,200 (Pacific population)	ng	162,200 (assumed, Pacific population)

*2004 Framework

**Koneff (undated) totaled for all JVs

***calculated using Koneff country objective adjusted by the % of distribution in SJV.

Notes: Objectives from the Pacific Flyway Council plan (2002): 77,000 winter objective for Baja and 30,000 for mainland portion of Mexico, none for U.S. portion of JV. Because there are negligible Brant on the east coast of Mexico we assume that the SJV portion of the Mexican objective would be the same as the country objective.

SJV Actions: This species is one of two of the SJV's highest priority waterfowl species. We have the "highest" Regional nonbreeding need designation from the NAWMP in BCRs 32 and 40, and "high" need in BCR 33. The Winter Waterfowl Survey (2006) and the Pacific Flyway plan (2002) for Brant suggest we have met the winter objective on the Baja peninsula, but need to double the mainland population.

Even if the Baja peninsula's objective has been met, the Brant's wintering grounds are still vulnerable there. The SJV needs to protect critical winter habitat along the Baja peninsula specifically at Bahía de Magdalena, Bahía San Ignacio, Laguna Ojo de Liebre, and Bahía San Quintín. Along the mainland coasts of Mexico, specifically in the area of Tiburón, Obregón, and Bahía Santa Maria we need to create, enhance, and protect habitat. (In this section of the Species Abstracts, if we note that protection, restoration, enhancement, maintenance, or creation of habitat is needed, refer to the Conservation Treatment section above in Part I for more specific actions.)

Other Recommendations:

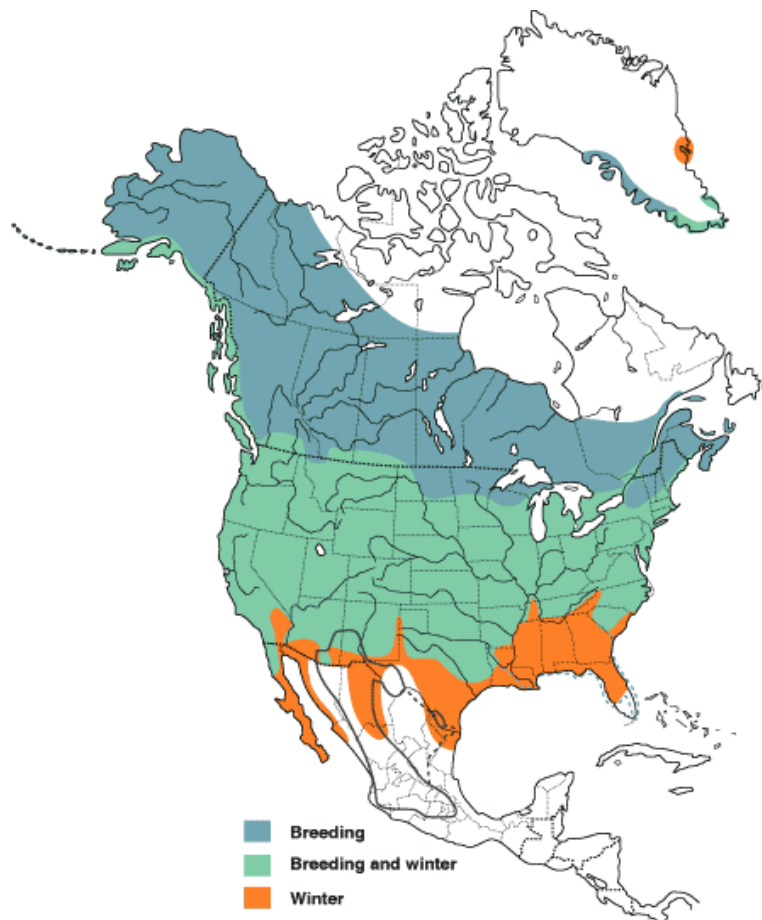
1. Continue California and Mexican winter counts, possibly increasing coverage.
2. Assess threats in Mexico and quantify impact of human activity including coastal development and other human disturbance.
3. Estimate the distribution and rate of harvest in Mexico.
4. Identify and describe existing and needed protection measures for wintering populations.
5. Improve coordination of habitat management activities with Mexico.
6. Develop and implement eelgrass surveys, study eelgrass ecology.
7. Determine breeding area affiliation of Mexican winter populations.
8. Determine carrying capacity of primary wintering sites.

Species: Mallard

Range and status in Arizona: Common breeder throughout (ABBA); abundant transient and common to uncommon winter resident (M&P); uncommon to fairly common winter resident in the lower Colorado River valley, several breeding records (KVR); Mexican Duck breeds in se AZ and along the upper Gila River (ABBA); uncommon resident in the upper San Pedro River area, Mexican Ducks are the breeders (Krueper).

Range and status in California: Fairly common especially as winter resident in southern California (Small); common resident in the Salton Sea area (M&Z).

Range and status in Northwest Mexico: Uncommon breeder (SL-1000m) locally in northern Baja California, uncommon winter resident (SL-2000m) south to northern Sinaloa; formerly more numerous and widespread (H&W); Mexican Duck: common to fairly common resident in northeastern Sonora (H&W); Mallards: uncommon winter resident in northern Sonora in open water including the Colorado River delta, formerly more common; Mexican Duck increasing in Sinaloa (M. Gonzalez-Bernal pers. comm.); Mexican Duck: regular resident in NE Sonora (R&M).



(Drilling et al. 2002)

Abundance and status by BCR:

BCR 32 – fairly common winter

resident, uncommon breeder

BCR 33 – fairly common winter

resident, common breeder

BCR 34 – uncommon resident,

Mexican Duck increasing breeder

BCR 39 – no records

BCR 40 – no records

BCR 41 – no records

BCR 42 – no records

BCR 43 – uncommon winter

resident, Mexican Duck increasing

resident

BCR 63 – record

NAWMP Continental Priority: High.

NAWMP Regional Priorities: See Table below.

Regional Priority –	WCR* 32	WCR 33	WCR 34	WCR 101	WCR 102
Breeding Importance	Mod Low				
Regional Breeding Need	Moderate				
Regional Nonbreeding Importance	Mod Low	Mod Low	Mod Low		Mod High
Regional Nonbreeding Need	Moderate	Moderate	Moderate		High

*WCR=Waterfowl Conservation Region from the NAWMP.

Habitat needs:

General: Mexican Duck: irrigated valleys of streams (R&M); no limiting factors discussed on the wintering grounds (Drilling et al. 2002).

Breeding habitat: In Arizona, dense vegetation for nest concealment and with shallow water nearby, marshes, ciénegas, lakes, ponds, rivers and streams, also stock ponds, irrigation ditches, canals; Mexican Ducks are found along streams, ciénegas, and alkali ponds surrounded by semiarid grasslands (ABBA).

Winter habitat: Mallard: In Mexico, lakes, marshes, estuaries, arable fields (H&W); freshwater lakes, ponds, rivers and flooded grassy fields, city parks and golf courses, less frequently on salt water lagoons, estuaries, and tidal marshes (Small).

Population information:

Continental: Mean continental population estimate is 13,000,000 (1994-2003), no long-term trend (1970-2003; 2004 Framework). Mean population estimate for the Mexican Duck subspecies is 56,000 (1994-2003) with an increasing population trend (1970-2003; 2004 Framework); in Mexico for Mallards 4,317 (1961-2000 average count, -4.2 P<0.001 trend) and 2,562 (1981-2000; -8.9, P<0.05 trend; Perez-Arteaga); and for Mexican Ducks in Mexico 16,333 (1961-2000 average count, +2.5, P<0.05 trend) and 24,615 (1981-2000; -5.1 ns trend; Perez-Arteaga).

Regional: For the Imperial and Coachella valleys 389 (1978-1987 population mean; Barnum); up to 166 seen on winter counts in the Salton Sea area, breeding noted (M&Z); 3,718 during winter urban Phoenix count (Corman pers. comm.); in northwest Mexico 72 in 2006 and 6,564 in 2003 (Conant and King).

Population goals:

U.S. Continental Objective*	U.S. Regional Objectives Total**	Mexico Regional Objectives Total**	SJV U.S. Regional Objective	SJV Mexico Regional Objective***
8,200,000	12,934,707	4,251 (for Mexican Ducks 65,882)	9,478 (33,236 for the current SJV boundaries)	1,918

*2004 Framework

**Koneff (undated) totaled for all JVs

***calculated using Koneff country objective adjusted by the % of distribution in SJV.

SJV Actions: Mallards are slightly above objective level for the continent. Their high priority warrants active conservation efforts on the wintering grounds. SJV partners should manage for Mallards in appropriate habitat. Most conservation recommendations refer to breeding habitat.

Other Recommendations:

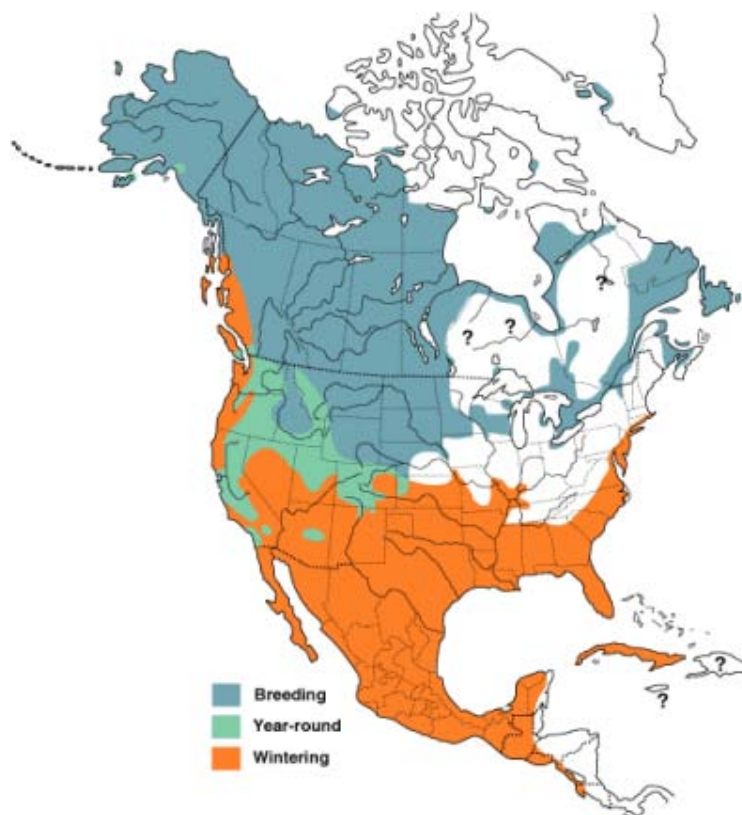
1. Determine the effects of winter habitat conditions on recruitment.
2. Investigate the breeding population of Mexican Duck in the SJV area.
3. Continue winter duck counts (Mid-winter Survey and refuge surveys).

Species: Northern Pintail

Range and status in Arizona: Breeding records along the Mogollon Rim in BCR 34 but not in SJV area (ABBA); abundant to common transient and winter resident (M&P); uncommon transient and winter resident in the upper San Pedro valley (Krueper); abundant to common transient and winter resident (M&P); common to abundant transient and fairly common to common winter resident (KVR).

Range and status in California: Common winter resident and transient along the coast, in eastern deserts and valleys, lower Colorado River and Salton Sea, small numbers have bred as far south as San Diego and Imperial counties (Small); common year-round visitor, breeding? (M&Z).

Range and status in Northwest Mexico: Common to fairly common transient and winter resident (SL-2500m), small numbers oversummer in BCN (H&W); most are in coastal waters adjacent to farmlands, from 1948 – 1956 were very abundant near Ciudad Obregon feeding on rice, changing farm practices caused movement farther south to Sinaloa, large numbers remain in the Yavaros and Agiabampo areas, during spring migrations flock are large (R&M).



(Austin and Miller 1995)

Abundance and status by BCR:

BCR 32 – common winter resident, very rare breeder

BCR 33 – common winter resident, very rare breeder

BCR 34 – uncommon winter resident

BCR 39 – no records

BCR 40 – fairly common winter resident

BCR 41 – no records

BCR 42 – fairly common winter resident

BCR 43 – fairly common winter resident

BCR 63 – record (H&W)

NAWMP Continental Priority: High.

NAWMP Regional Priorities: See Table below.

Regional Priority –	WCR* 32	WCR 33	WCR 34	WCR 101	WCR 102
Breeding Importance					
Regional Breeding Need					
Regional Nonbreeding Importance	Mod High**	Mod Low	Mod Low	Mod High	High
Regional Nonbreeding Need	High	Moderate	Moderate	High	Highest

*WCR=Waterfowl Conservation Region from the NAWMP.

** Includes part of WCR 32 not in the SJV.

Habitat needs:

Breeding habitat: Not applicable.

Winter habitat: Freshwater lakes, ponds, marshes, and flooded agricultural fields; salt water bays, lagoons, estuaries, and tidal channels (Small); estuaries, marshes, lakes, and arable fields (H&W); wide variety of shallow inland freshwater and intertidal habitats, flooded agricultural habitats, reservoirs, tidal wetlands, bays and estuaries; especially along the west coast of mainland Mexico uses areas where excess irrigation water goes into salt flats or tidal basins, also mangrove mud flats, and nearby agricultural habitat (Austin and Miller 1995).

Population information:

Continental: Mean continental population estimate is 3,600,000 (1994-2003) with a decreasing long-term trend (1970-2003; 2004 Framework); for Mexico 563,000 (1961-2000, -2.1 P<0.05) and 399,015 (1981-2000, -7.9, P<0.001; Perez-Arteaga). Variation in recruitment rates and annual and winter survival rates, vary with dry periods in the Prairie Pothole region (Austin and Miller 1995).

Regional: In northwestern Mexico along the coast of the Baja Peninsula and the mainland 89,342 (2006; MWS) and 86,766 (2003; MWS; Conant and King); in Phoenix winter 2007 1,178 (Corman pers. comm.); in the Imperial and Coachella valleys 14,091 (1978-1987) and 14,108 (1986-2000; Barnum); up to 2,250 at the Salton Sea (M&Z); shifts in winter populations to restored wetlands have been documented (Austin and Miller 1995).

Population goals:

U.S. Continental Objective*	U.S. Regional Objectives Total**	Mexico Regional Objectives Total**	SJV U.S. Regional Objective**	SJV Mexico Regional Objective***
5,600,000	7,317,939	916,846	191,764 (379,237 with current SJV boundaries)	178,089

*2004 Framework

**Koneff (undated) totaled for all JVs

***Calculated using Koneff country objective adjusted by the % of distribution in SJV.

SJV Actions: Northern Pintail are a high priority winter species in the SJV area. Indications from the MWS and various other counts show that our area is significantly below regional objective levels. Projects should be designed to increase the winter survivability of this species. Habitat protection, acquisition, and management should be high priorities.

Other Recommendations:

1. Determine genetic make-up of local populations relative to survival and condition during winter and productivity on nesting grounds.
2. Investigate nutrition and energy expenditure during winter.
3. Determine response of wintering populations to restored wetlands and increasing urbanization of winter habitat.
4. Investigate food habits during winter in Mexico, and at staging areas.
5. Continue and expand winter surveys.
6. Determine relationships among harvest, natural mortality, and winter survival (from Austin and Miller 1995).

Species: Lesser Scaup

Range and status in Arizona: Common to abundant transient and winter resident with the largest concentrations on river reservoirs and below dams (ABBA; M&P); uncommon to common winter resident in the lower Colorado River valley (KVR); uncommon to fairly common winter resident in the upper San Pedro River valley (Krueper).

Range and status in California: Fairly common to abundant winter resident (Small); common winter resident and rare in summer, no breeding at the Salton Sea (M&Z).

Range and status in Northwest Mexico: Common to fairly common winter resident (SL-2500m; H&W); moderately common winter resident in brackish and saltwater, uncommon winter inland in freshwater (R&M).



(Austin et al. 1998)

Abundance and status by BCR:

BCR 32 – common winter resident
BCR 33 – common winter resident
BCR 34 – uncommon winter resident
BCR 39 – no records
BCR 40 – fairly common winter resident
BCR 41 – no records
BCR 42 – fairly common winter resident
BCR 43 – fairly common winter resident
BCR 63 – no records?

NAWMP Continental Priority: High.

NAWMP Regional Priorities: See Table below.

Regional Priority –	WCR* 32	WCR 33	WCR 34	WCR 101	WCR 102
Breeding Importance					
Regional Breeding Need					
Regional Nonbreeding Importance	Mod High			Mod Low	Mod Low
Regional Nonbreeding Need	High			Moderate	Moderate

*WCR=Waterfowl Conservation Region from the NAWMP.

Habitat needs:

Breeding habitat: Not applicable.

Winter habitat: In Mexico, lakes, ponds, coastal lagoons, estuaries, rarely open ocean (H&W); brackish and saltwater habitats along the coast (R&M); salt water bays, lagoons, estuaries, and harbors, also on larger, deeper freshwater lakes and rivers (Small); in the lower Colorado River area they are found primarily below spillways of dams, in coves of large lakes, and along the channelized river (KVR).

Population information:

Continental: Mean continental population estimate is 4,400,000 (1994-2003), decreasing long-term trend (1970-2003; 2004 Framework); for Mexico 201,294 (1961-2000 average count, -1.4 ns trend) and 182,400 (1981-2000; -8.3, P<0.05 trend, for both scaup combined; Perez-Arteaga).

Regional: The MWS of northwestern Mexican coast line counted 56,115 in 2006 and 24,305 in 2003 (Greater and Lesser scaup combined; Conant and King 2006); Phoenix winter count 339 (Corman, pers. comm.); in the Imperial and Coachella valleys for Greater and Lesser combined, 1,760 (1978-1987 mean count) and 1,662 (1986-2000 mean count; Barnum).

Population goals:

All objectives are for Lesser and Greater scaup combined.

U.S. Continental Objective*	U.S. Regional Objectives Total**	Mexico Regional Objectives Total**	SJV U.S. Regional Objective**	SJV Mexico Regional Objective***
6,300,000	8,540,079	896,656	43,706 (134,781 for current SJV boundaries)	174,933

*2004 Framework

**Koneff (undated) totaled for all JVs

***Calculated using Koneff country objective adjusted by the % of distribution in SJV.

SJV Actions: This species is a “high” continental priority and “moderately high” in BCR 32. It is well below objective level and should be the focus of projects. Protection, restoration, and enhancement measures should be taken with potential partners at appropriate sites.

Other Recommendations: Separate population estimates and trends are needed. MWS need to improve coverage and accuracy. Continue winter surveys with effort to separate Greater Scaup from Lesser Scaup.

Moderately High Continental Priority

Species: American Wigeon

Range and status in Arizona: Few records of breeding at high elevation lakes (ABBA); common to abundant winter resident (M&P); uncommon to fairly common transient and winter resident in the upper San Pedro River area (Krueper); fairly common to common winter resident in the lower Colorado River valley (KVR).

Range and status in California: Common to abundant winter resident in southern California (Small); common resident although no breeding records for the Salton Sea (M&Z).

Range and status in Northwest Mexico: Common to fairly common transient and winter resident (SL-2500m; H&W); common along the coast during migration and winter, well-distributed but less frequent in the interior (R&M).



(Mowbray 1999)

Abundance and status by BCR:

BCR 32 – common to abundant in winter

BCR 33 – common to abundant in winter

BCR 34 – fairly common in winter; irregular breeder

BCR 39 – no records?

BCR 40 – common to fairly common in winter

BCR 41 – no records

BCR 42 – common to fairly common in winter

BCR 43 – common to fairly common in winter

BCR 63 – no records

NAWMP Continental Priority: Moderately High.

NAWMP Regional Priorities: See Table below.

Regional Priority –	WCR* 32	WCR 33	WCR 34	WCR 101	WCR 102
Breeding Importance					
Regional Breeding Need					
Regional Nonbreeding Importance	Mod High	Mod Low		Mod Low	Mod Low
Regional Nonbreeding Need	Mod High	Mod Low		Mod Low	Mod Low

*WCR=Waterfowl Conservation Region from the NAWMP.

Habitat needs:

General: Weather, land-use patterns, and nest site availability may limit breeding; winter limiting factors are not addressed (Mowbray 1999); seem to be responding to either the Conservation Reserve Program (CRP) and NAWMP or increased rainfall in breeding areas (Dubovsky et al. 1997).

Breeding habitat: Not applicable.

Winter habitat: In Mexico, estuaries, lakes, marshes, large flocks, mostly feeds by grazing (H&W); feeds in agricultural fields near open water (R&M); rivers, freshwater marshes, lakes and ponds, grazing on lawns, pastures, agricultural lands, also found on lagoons, estuaries, and salt water bays (Small); feed in agricultural areas close to open water in Sonora (R&M).

Population information:

Continental: Mean continental population estimate is 3,300,000 (1994-2003), no long-term trend (1970-2003; 2004 Framework); for Mexico 150,103 (1961-2000 average count, -0.8 ns trend) and 151,896 (1981-2000; -0.1, P<0.001 trend; Perez-Arteaga).

Regional: Between 23,000 and 50,000 American Wigeon winter along the southern coast of Sonora (1965-1992; R&M); up to 3,400 in the Salton Sea area (M&Z); 5,623 (1978-1987 mean winter population) and 5,080 (1986-2000 mean winter population for the Imperial and Coachella Valleys (Barnum); 9,535 during 2007 urban Phoenix winter count (Corman pers. comm.); 25,772 MWS 2006 in northwest Mexico and 15,543 in 2003(Conant and King 2006).

Population goals:

U.S. Continental Objective*	U.S. Regional Objectives Total**	Mexico Regional Objectives Total**	SJV U.S. Regional Objective	SJV Mexico Regional Objective***
3,000,000	3,741,097	375,125	34,493 (110,794 for the current SJV)	79,687

*2004 Framework

**Koneff (undated) totaled for all JVs

***calculated using Koneff country objective adjusted by the % of distribution in SJV.

SJV Actions: Average population size is near objective at the continental level. American Wigeon should not be the focus of a project but can be managed in appropriate habitat with other dabblers.

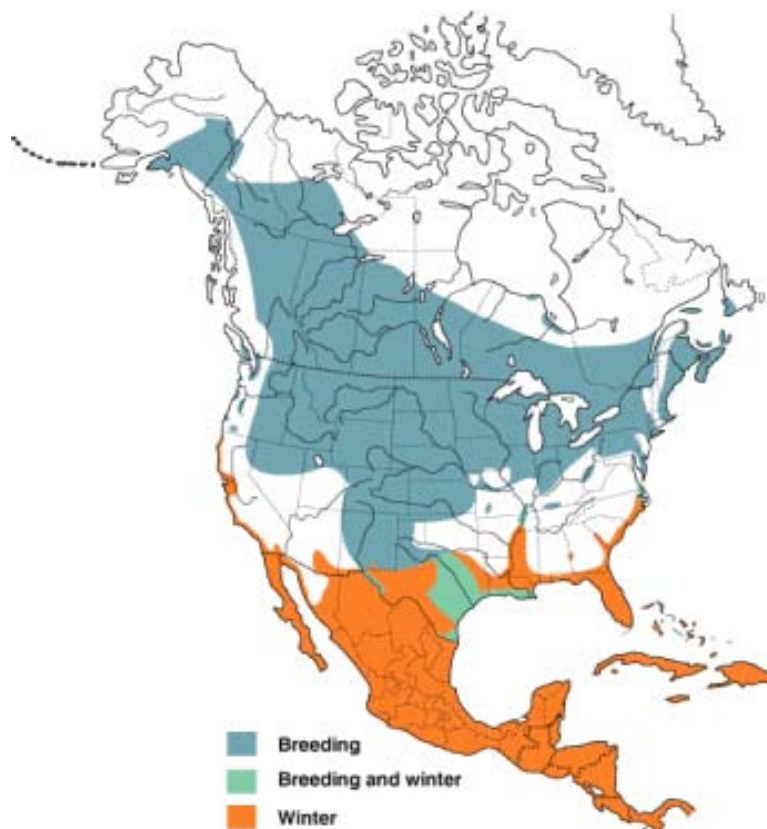
Other Recommendations: Need to investigate the wintering ecology of this species particularly in Mexico; continue winter monitoring programs (Mowbray 1999).

Species: Blue-winged Teal

Range and status in Arizona: Local breeders at mountain sites in BCR 34 but not in SJV area (ABBA); common transient (M&P); uncommon transient, rare winter (Krueper); irregular winter, rare to uncommon transient, rare summer (KVR).

Range and status in California: Uncommon transient and winter resident in southern California, few breed locally in Ventura, San Bernardino, and Orange counties (Small); uncommon visitor all seasons (M&Z).

Abundance and status in Northwest Mexico: Common to fairly common transient and winter resident (SL-2500m), uncommon in Baja (H&W); casual transient and winter visitor in Sonora (R&M).



Range and status by BCR:

BCR 32 - rare breeder, uncommon winter resident

BCR 33 – common transient, rare winter resident

BCR 34 – uncommon transient, rare breeder in AZ

BCR 39 – records?

BCR 40 – uncommon winter resident

BCR 41 – no records

BCR 42 – uncommon winter resident

BCR 43 – common winter resident

BCR 63 – no records

(Rohwer et al. 2002)

NAWMP Continental Priority: Moderately High.

NAWMP Regional Priorities: See Table below.

Regional Priority –	WCR* 32	WCR 33	WCR 34	WCR 101	WCR 102
Breeding Importance					
Regional Breeding Need					
Regional Nonbreeding Importance		Mod Low		Mod Low	Mod High
Regional Nonbreeding Need		Mod Low		Mod Low	Mod High

*WCR=Waterfowl Conservation Region from the NAWMP.

Habitat needs:

Breeding habitat: In Arizona, shallow ponds, marshes and lake edges (ABBA).

Winter habitat: In Mexico, marshes, lakes, coastal lagoons (H&W); freshwater lakes, ponds, streams and marshes, occasionally on salt water lagoons, and tidal channels in California (Small).

Population information:

Continental: Mean continental population estimate is 7,240,000 (1994-2003), no long-term trend (1970-2003; 2004 Framework); populations fluctuate greatly depending on wetland (water) conditions in the prairie pothole region (Rohwer et al. 2002); for Mexico 287,805 (1961-2000 average count, +3.4, P<0.01 trend) and 365,084 (1981-2000; -3.5 ns trend; Perez-Arteaga).

Regional: In northwestern Mexico 24,015 (2003; MWS) and 64,952 for Blue-winged and Cinnamon teal combined (2006; MWS includes Marismas Nacionales; Conant and King 2006); Phoenix urban winter survey counted 3 (Corman, pers. comm.).

Population goals:

All objectives are for Blue-winged and Cinnamon teal combined.

U.S. Continental Objective*	U.S. Regional Objectives Total**	Mexico Regional Objectives Total**	SJV U.S. Regional Objective**	SJV Mexico Regional Objective***
4,700,000 (Blue-winged and Cinnamon combined)	218,500 (Blue-winged and Cinnamon combined)	305,900 (Blue-winged and Cinnamon combined)	ng	57,782 (Blue-winged and Cinnamon combined)

*2004 Framework

**Koneff (undated) totaled for all JVs

***Calculated using Koneff country objective adjusted by the % of distribution in SJV.

SJV Actions: Current populations are above objective levels. Blue-winged Teal are primarily a transient in the U.S. portion of the SJV area, wintering farther south in Mexico and beyond. This species would not be the focus of an SJV project, but could benefit from spring and fall habitat improvements.

Other Recommendations:

1. Determine harvest rates in Mexico.
2. Investigate competition for food resources in Mexico (Rohwer et al. 2002).
3. Determine winter habitat use in Mexico.

Species: Cinnamon Teal

Range and status in Arizona: Fairly common breeder in selected wetlands throughout (ABBA); abundant transient but uncommon in winter (M&P); rare in winter, no breeding, fairly common transient in upper San Pedro River area (Krueper); fairly common transient, uncommon and local in summer with few breeding records in the lower Colorado River valley (KVR).

Range and status in California: Common transient in southern California, less common winter resident, very uncommon in deserts, fairly common breeder in southern California (San Diego and Imperial counties; Small); common resident (although most breed elsewhere) and transient in the Salton Sea area (M&Z).

Range and status in Northwest Mexico: Uncommon to fairly common summer resident breeding in Baja California, common to fairly common transient and winter resident (SL-2500m) through remainder of JV (H&W); fairly common transient along the coast of Sonora, mostly Rio Yaqui delta south, uncommon winter resident, scattered inland sightings, may nest in Sonora (R&M).



(Gammonley 1996)

Abundance and status by BCR:

BCR 32 – fairly common breeder, common transient, uncommon winter resident

BCR 33 – uncommon in winter, fairly common breeder in north

BCR 34 – uncommon in winter, fairly common breeder in north

BCR 39 – records?

BCR 40 – uncommon to fairly common winter resident

BCR 41 – no records

BCR 42 – uncommon to fairly common winter resident

BCR 43 – uncommon to fairly common winter resident

BCR 63 – record

NAWMP Continental Priority: Moderately High.

NAWMP Regional Priorities: See Table below.

Regional Priority –	WCR* 32	WCR 33	WCR 34	WCR 101	WCR 102
Breeding Importance					
Regional Breeding Need					
Regional Nonbreeding Importance		Mod Low		Mod Low	Mod High
Regional Nonbreeding Need		Mod Low		Mod Low	Mod High

*WCR=Waterfowl Conservation Region from the NAWMP.

Habitat needs:

Breeding habitat: In Arizona, marshes and ponds, lakes, reservoirs, and rivers with emergent cover; also wastewater ponds, canals and irrigation ponds (ABBA).

Winter habitat: In Mexico, marshes, lakes, coastal lagoons; nests in dense cover near water (H&W); freshwater lakes, ponds, streams, and flooded grassy fields, often coastal lagoons, tidal estuaries, river mouths, salt water marshes, and tidal channels (Small).

Population information:

Continental: Mean continental population estimate is 260,000 (1994-2003), no long-term trend (1970-2003; 2004 Framework); not in Perez-Arteaga. Factors influencing population sizes unknown, conditions on wintering grounds may affect survival, availability and quality of wetlands in the arid West likely contribute to population regulation (Gammonley 1996).

Regional: 64,952 on west Mexico FWS-MWS flight in 2006 and 24,015 in 2003 (combined Blue-winged and Cinnamon teal; included Marismas Nacionales, Conant and King); in the Imperial and Coachella valleys 242 (1978-1987 winter population mean; Barnum); Phoenix urban winter survey counted 74 (Corman, pers. comm.).

Population goals:

Objectives are for Blue-winged and Cinnamon teal combined except those in the second row, which are for Cinnamon Teal only.

U.S. Continental Objective*	U.S. Regional Objectives Total**	Mexico Regional Objectives Total **	SJV U.S. Regional Objective**	SJV Mexico Regional Objective***
4,700,000 (Blue-winged and Cinnamon combined)	218,500 (Blue-winged and Cinnamon combined)	305,900 (Blue-winged and Cinnamon combined)	ng	57,782 (Blue-winged and Cinnamon combined)
ng (Cinnamon Teal only)	2,990 (Cinnamon Teal only)	296,010 (Cinnamon Teal only)	ng	ng (Cinnamon Teal only)

*2004 Framework

**Koneff (undated) totaled for all JVs

***Calculated using Koneff country objective adjusted by the % of distribution in SJV.

SJV Actions: This species would not be the focus of a project but could be combined with other dabblers for conservation measures. For breeding habitat within the SJV area curtailment of grazing, construction of nesting islands, and creation of wetlands on individual wetland basins should increase use and production (Gammonley 1996).

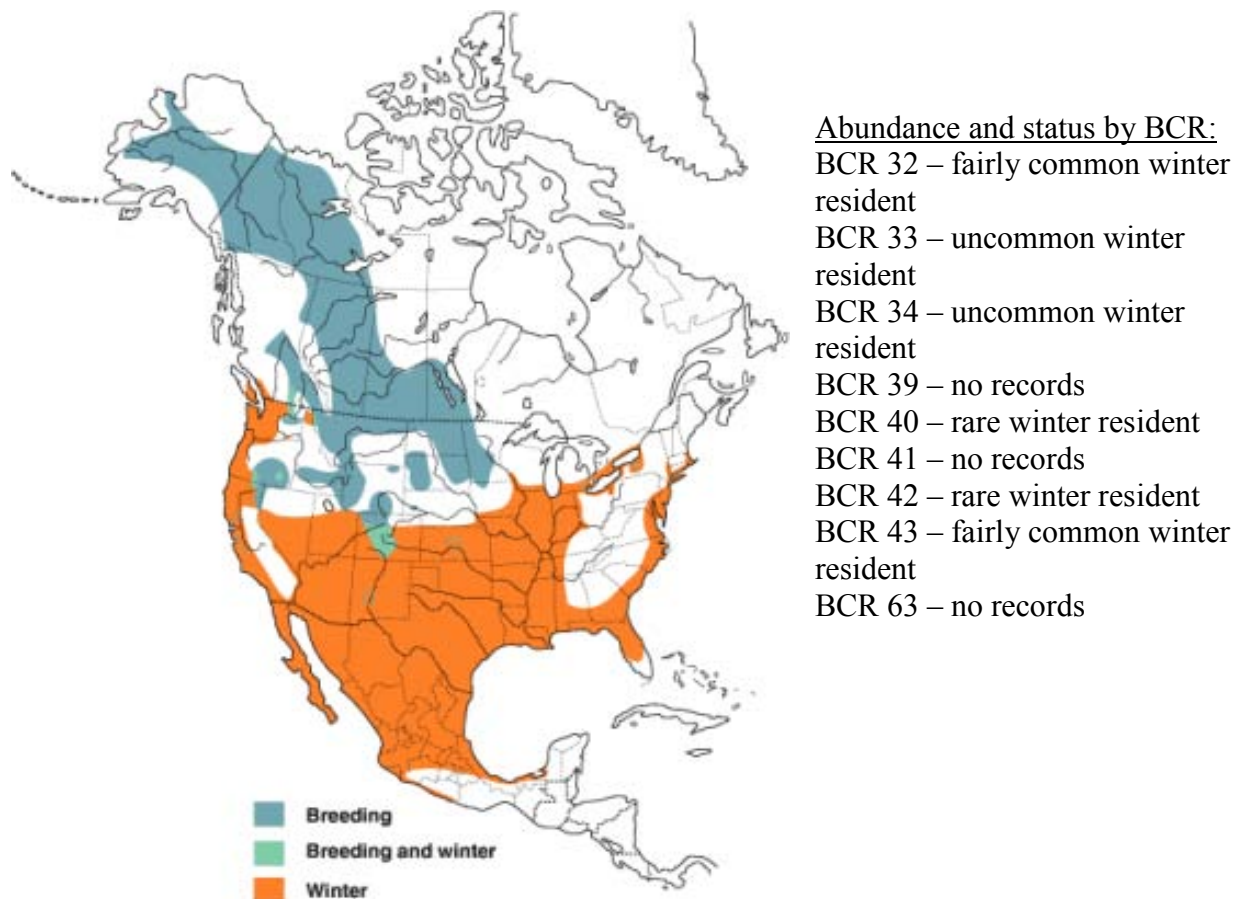
Other Recommendations: Information on wintering ecology and the effects of wintering habitat conditions on survival and reproductive effort are needed (Gammonley 1996).

Species: Canvasback

Range and status in Arizona: Uncommon during migration, during winter concentrations found on lakes, ponds, and open deep rivers, no breeding records in SJV area (ABBA); winters locally to abundantly (M&P); uncommon transient and winter resident in the upper San Pedro River valley (Krueper); rare to locally uncommon winter resident on the lower Colorado River (KVR).

Range and status in California: Fairly common to common winter resident, rare to locally uncommon along the Colorado River and desert lakes (Small); uncommon winter resident at the Salton Sea (M&Z).

Range and status in Northwest Mexico: Fairly common to common winter resident (SL-2500), uncommon in Baja (H&W); rare winter visitor and transient (R&M).



(Mowbray 2002)

NAWMP Continental Priority: Moderately High.

NAWMP Regional Priorities: See Table below.

Regional Priority –	WCR* 32	WCR 33	WCR 34	WCR 101	WCR 102
Breeding Importance					
Regional Breeding Need					
Regional Nonbreeding Importance	Mod Low	Mod Low	Mod Low	Mod Low	Mod High
Regional Nonbreeding Need	Mod Low	Mod Low	Mod Low	Mod Low	Mod High

*WCR=Waterfowl Conservation Region from the NAWMP.

Habitat needs:

General: Land-use patterns and weather are key factors in the breeding grounds (Mowbray 2002).

Breeding habitat: Not applicable.

Winter habitat: In Mexico, lakes, coastal bays and lagoons (H&W); primarily salt water bays, lagoons and estuaries, with eelgrass, also freshwater lakes and occasionally large rivers (Small).

Population information:

Continental: Mean continental population estimate is 740,000 (1994-2003), no long-term trend (1970-2003; 2004 Framework); in Mexico 15,694 (1961-2000, +3.9/yr, $P < 0.01$ trend) 28,807 (1981-2000, -9.7/yr, $P < 0.01$ trend; Perez-Arteaga) .

Regional: 1,900 for FWS northwestern Mexico flight in 2006 and 320 in 2003 (Conant and King); 206 in Phoenix during the winter 2006 (Corman, pers. comm.); in the Imperial and Coachella valleys, 1,691 (1978-1987 mean count) and 488 (1986-2000 mean count; Barnum).

Population goals:

U.S. Continental Objective*	U.S. Regional Objectives Total**	Mexico Regional Objectives Total**	SJV U.S. Regional Objective**	SJV Mexico Regional Objective***
540,000	664,987	29,274	1,470 (4,878 with current boundaries)	6,305

*2004 Framework

**Koneff (undated) totaled for all JVs

***Calculated using Koneff country objective adjusted by the % of distribution in SJV.

SJV Actions: Canvasbacks have reached their continental objective. However, the SJV may be under objective for our region. Projects for this species should focus on protecting feeding and roosting areas from human disturbance and protecting watersheds to improve water quality and restoring submerged vegetation (Mowbray 2002).

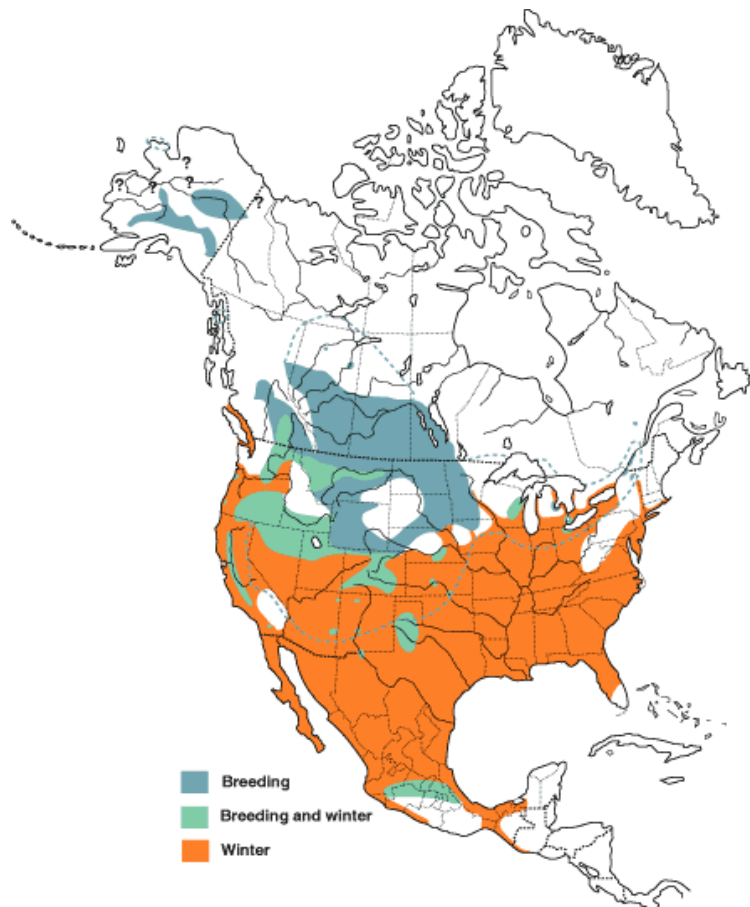
Other Recommendations: Investigate the carrying capacities of natural habitats in the winter and feeding strategies, energy balance, and survival (Mowbray 2002). Continue winter surveys especially in Mexico.

Species: Redhead

Range and status in Arizona: Fairly common to abundant transient and winter resident, has nested locally in the lower Colorado River valley and Mogollon Plateau (M&P); rare breeder in south and central AZ (ABBA); in the lower Colorado River area uncommon to locally fairly common transient and winter resident (KVR); uncommon transient and fairly common winter resident in the upper San Pedro River area (Krueper).

Range and status in California: Uncommon to locally common transient and winter resident along the lower Colorado River, breeds to San Diego and Imperial counties and formerly along the lower Colorado River, fairly common winter elsewhere (Small); common resident at the Salton Sea most frequently during winter but has nested (M&Z).

Range and status in Northwest Mexico: Common to fairly common winter resident (SL-2500m) (H&W); common transient and winter resident in Sonora along the coast, few inland records but probably fairly common transient and winter resident (R&M).



Abundance and status by BCR:

BCR 32 – fairly common winter

resident, local breeder

BCR 33 – common winter

resident, rare breeder

BCR 34 – common winter resident

BCR 39 – no records

BCR 40 – fairly common winter resident

BCR 41 – no records

BCR 42 – fairly common winter resident

BCR 43 – fairly common winter resident (absent from Sonoran portion)

BCR 63 – no records

(Woodin and Michot 2002)

NAWMP Continental Priority: Moderately High.

NAWMP Regional Priorities: See Table below.

Regional Priority –	WCR* 32	WCR 33	WCR 34	WCR 101	WCR 102
Breeding Importance					
Regional Breeding Need					
Regional Nonbreeding Importance		Mod Low		Mod High	Mod High
Regional Nonbreeding Need		Mod Low		Mod High	Mod High

*WCR=Waterfowl Conservation Region from the NAWMP.

Habitat needs:

Breeding habitat: Marshes, ponds, and lake edges with dense cattails, bulrush, and sedge (ABBA).

Winter habitat: In Mexico, lakes, coastal bays and lagoons (H&W); saline bays connected to open ocean (R&M); freshwater marshes and lakes, locally on salt water bays and lagoons (Small); prefer deep water such as open lakes and channelized rivers, but may also seek marshes and ponds (KVR); lakes, coastal bays and lagoons (H&W); heavily dependent on shallow, low-energy, coastal ecosystems dominated by sea grasses (Woodin and Michot 2002).

Population information:

Continental: Mean continental population estimate is 1,200,000 (1994-2003), no long-term trend (1970-2003; 2004 Framework); in Mexico 164,197 (1961-2000, +7.3/yr $P < 0.001$ trend) and 282,691 (1981-2000, -2.5/yr $P < 0.01$ trend; Perez-Arteaga).

Regional: 27,185 FWS mid-winter flight for northwest Mexico 2006 and 21,335 in 2003 (Conant and King); 152 during the Phoenix urban winter count (Corman, pers. comm.); 336 (1978-1987 mean count) and 262 at the Salton Sea (1986-2000; Barnum).

Population goals:

U.S. Continental Objective*	U.S. Regional Objectives Total**	Mexico Regional Objectives Total**	SJV U.S. Regional Objective**	SJV Mexico Regional Objective***
640,000	691,652	366,509	0 (568 for current boundaries)	88,528

*2004 Framework

**Koneff (undated) totaled for all JVs

***Calculated using Koneff country objective adjusted by the % of distribution in SJV.

SJV Actions: The continental objective for Redheads has been met at this time, but it appears that the regional objective may not have been met. Population fluctuations are assumed to reflect long-term regional changes in water levels of the Prairie Pothole Region and Great Basin (Woodin and Michot 2002). Assuming that Redheads feed on sea grass beds here as in the Gulf of Mexico, projects for this species should focus on protecting sea grass beds.

Other Recommendations: All winter habitat and energetic studies have been done along the coast of the western Gulf of Mexico; similar studies are needed for the Gulf of California. Continue winter counts, especially the FWS mid-winter northwest Mexico count.

Species: Surf Scoter

Range and status in Arizona: Rare transient (M&P); casual fall transient in the upper San Pedro River valley (Krueper); rare and irregular fall visitor, extremely rare winter visitor (KVR); not mentioned in ABBA.

Range and status in California: Common to abundant winter resident, very rare transient along the Colorado River, rare on the Salton Sea during migration and winter (Small); uncommon winter resident at the Salton Sea (M&Z).

Range and status in Northwest Mexico: Common to fairly common winter resident along Pacific coast of Baja California Sur to Bahía Magdalena and N Gulf of California, some oversummer locally (H&W); common wintering sea duck, typically well off shore (R&M).



Abundance and status by BCR:

BCR 32 – common winter resident
BCR 33 – common winter resident along coasts, rare inland fall and winter
BCR 34 – casual transient
BCR 39 – no records
BCR 40 – common winter resident
BCR 41 – no records?
BCR 42 – 1 record (H&W)
BCR 43 – no records
BCR 63 – no records

(Savard et al. 1998)

NAWMP Continental Priority: Moderately High.

NAWMP Regional Priorities: See Table below.

Regional Priority –	WCR* 32	WCR 33	WCR 34	WCR 101	WCR 102
Breeding Importance					
Regional Breeding Need					
Regional Nonbreeding Importance	Mod High				
Regional Nonbreeding Need	Mod High				

*WCR=Waterfowl Conservation Region from the NAWMP.

Habitat needs:

Breeding habitat: Not applicable.

Winter habitat: In Mexico, open ocean, coastal bays, estuaries, harbors (H&W); inshore seacoast, larger salt water bays, lagoons, estuaries, and harbors occasionally on larger freshwater lakes (Small); shallow (<10 m) coastal waters or farther off-shore (Sea Duck Joint Venture 2004).

Population information:

Continental: Mean continental population estimate is 600,000 (1994-2003), decreasing long-term trend (1970-2003; 2004 Framework); in Mexico 4,425 (1961-2000, +6.0/yr ns trend) and 4,343 (1981-2000, +10.3/yr ns trend; all scoters combined; Perez-Arteaga).

Regional: The MWS of northwestern Mexican coast line counted 18,260 in 2006 and 9,250 in 2003 (Surf, Black, and White-winged scoters combined; Conant and King 2006).

Population goals:

Continental Population Objective: No continental objective given (2004 Framework); no objectives found on the Sea Duck Joint Venture's website (www.seaduckjv.org/).

SJV Regional Population Objective: No winter objectives given (Koneff).

SJV Actions: This is a declining species and has no population objectives, although we have a "moderately high" priority for BCR 32 (it is also found commonly in BCR 33). The SJV is not in

the core part of this species winter habitat but we should protect coastline habitat where possible. No management actions were found for winter habitat.

Other Recommendations:

1. Delineate and monitor wintering Surf Scoters.
2. Determine the wintering areas used by birds from various breeding areas.
3. Assess the winter ecology including diets.
4. Characterize winter habitat.
5. Screen for diseases, parasites, and contaminants. (all recommendations are from the Sea Duck Joint Venture Strategic Plan 2001-2006; <http://www.seaduckjv.org/>).

Species: White-winged Scoter

Range and status in Arizona: Extremely rare transient and winter visitor along lower Colorado River (M&P); very rare winter visitor in the lower Colorado River valley (KVR); not mentioned (Krueper or ABBA).

Range and status in California: Uncommon irregular winter visitor in southern California, rare on inland lakes, rare but regular during summer at the Salton Sea (Small).

Range and status in Northwest Mexico: Uncommon winter resident along Pacific coast of BCN, rare to BCS and in N Gulf of California (H&W); rare wintering sea duck usually well off shore, records to Cabo Lobos (R&M).



Abundance and status by BCR:

BCR 32 – uncommon winter resident
BCR 33 – rare in winter
BCR 34 – very rare winter visitor
BCR 39 – no records
BCR 40 – record (H&W)
BCR 41 – no records?
BCR 42 – no records
BCR 43 – no records
BCR 63 – no records

(Brown and Fredrickson 1997)

NAWMP Continental Priority: Moderately High.

NAWMP Regional Priorities: See Table below.

Regional Priority –	WCR* 32	WCR 33	WCR 34	WCR 101	WCR 102
Breeding Importance					
Regional Breeding Need					
Regional Nonbreeding Importance	Mod High				
Regional Nonbreeding Need	Mod High				

*WCR=Waterfowl Conservation Region from the NAWMP.

Habitat needs:

Breeding habitat: Not applicable.

Winter habitat: In Mexico, open ocean, coastal bays, estuaries (H&W); inshore seacoast, larger salt water bays, lagoons, estuaries, and harbors, occasionally on inland lakes (Small).

Population information:

Continental: Mean continental population estimate is 600,000 (1994-2003), decreasing long-term trend (1970-2003; 2004 Framework); in Mexico 4,425 (1961-2000, +6.0/yr ns trend) and 4,343 (1981-2000, +10.3/yr ns trend; all scoters combined; Perez-Arteaga).

Regional: The MWS of northwestern Mexican coast line counted 18,260 in 2006 and 9,250 in 2003 (Surf, Black, and White-winged scoters combined; Conant and King).

Population goals:

Continental Population Objective: No continental objective given (2004 Framework); no objectives found on the Sea Duck Joint Venture's website (www.seaduckjv.org/).

SJV Regional Population Objective: No winter objectives given (Koneff).

SJV Actions: This is a declining species and has no population objectives, although we have a “moderately high” priority for BCR 32 (it is also found fairly commonly in BCR 33). The SJV is not in the core part of this species winter habitat but we should protect coastline habitat where

possible. Coastal habitats especially are vulnerable to oil spills and contaminants in productive bays and estuaries this species uses (Brown and Fredrickson 1997).

Other Recommendations:

1. Delineate and monitor wintering White-winged Scoters.
2. Determine the wintering areas used by birds from various breeding areas.
3. Conduct a combination of surveys, intensive studies of breeding biology from several areas, long-term banding and satellite telemetry from several wintering populations.
3. Assess the winter ecology including diets.
4. Characterize winter habitat.
5. Screen for diseases, parasites, and contaminants. (all recommendations are from the Sea Duck Joint Venture Strategic Plan 2001-2006; <http://www.seaduckjv.org/>).

Species: Black Scoter

Range and status in Arizona: Very rare in south during winter (M&P); extremely rare/casual winter along the lower Colorado River (1 record; KVR); no records (Krueper and ABBA).

Range and status in California: Rare to very uncommon winter resident, extremely rare winter visitor on the Salton Sea (Small); accidental to the Salton Sea (May and July; M&Z).

Range and status in Northwest Mexico: Rare winter resident along Pacific coast of BCN south to Ensenada area (H&W); one record at Puerto Lobos Jan. 1988 (R&M).



(Bordage and Savard 1995)

Abundance and status by BCR:

BCR 32 – very uncommon winter resident

BCR 33 – very rare winter visitor

BCR 34 – no records

BCR 39 – no records

BCR 40 – no records

BCR 41 – no records

BCR 42 – no records

BCR 43 – no records

BCR 63 – no records

NAWMP Continental Priority: Moderately High.

NAWMP Regional Priorities: See Table below.

Regional Priority	WCR* 32	WCR 33	WCR 34	WCR 101	WCR 102
Breeding Importance					
Regional Breeding Need					
Regional Nonbreeding Importance	Mod High**				
Regional Nonbreeding Need	Mod High				

*WCR=Waterfowl Conservation Region from the NAWMP.

** For the northern part of WCR 32 not in the SJV area.

Habitat needs:

Breeding habitat: Not applicable.

Winter habitat: In Mexico, open ocean, coastal bays, rarely estuaries and harbors (H&W); inshore seacoast, larger saltwater bays, lagoons, estuaries, and harbors, occasionally on inland lakes (Small); near-shore marine and estuarine areas (Sea Duck Joint Venture 2003).

Population information:

Continental: Mean continental population estimate is 400,000 (1994-2003), decreasing long-term trend (1970-2003; 2004 Framework); in Mexico 4,425 (1961-2000, +6.0/yr ns trend) and 4,343 (1981-2000, +10.3/yr ns trend; all scoters combined; Perez-Arteaga).

Regional: The MWS of northwestern Mexican coast line counted 18,260 in 2006 and 9,250 in 2003 (Surf, Black, and White-winged scoters combined; Conant and King 2006).

Population goals:

Continental Population Objective: No continental objective given (2004 Framework); no objectives found on the Sea Duck Joint Venture's website (www.seaduckjv.org/).

SJV Regional Population Objective: No winter objectives given (Koneff).

SJV Actions: This is a declining species that has no population objectives, although we have a “moderately high” priority for BCR 32. The SJV is not in the core winter range but we should protect coastline habitat where possible. No management actions were found for winter habitat.

Other Recommendations:

1. Determine wintering areas used from various breeding areas.
2. Delineate and monitor numbers of winter Black Scoters.
3. Assess the winter ecology along the Pacific Coast.
4. Assess diets during the winter.
5. Characterize wintering habitat.
6. Screen for disease, parasites, and contaminant levels (from the Sea Duck Joint Venture Strategic Plan 2001-2006; <http://www.seaduckjv.org/>).

Species: Common Goldeneye

Range and status in Arizona: Sparse to uncommon winter resident in central and west, but locally abundant on lower Colorado River (M&P); accidental winter visitor in the upper San Pedro River valley (Krueper); fairly common to common winter resident on the lower Colorado River (KVR); not mentioned (ABBA).

Range and status in California: Locally rare to fairly common in southern California, locally common along the Colorado River, San Diego Bay and occasionally on the Salton Sea (Small); uncommon winter resident at the Salton Sea (M&Z).

Range and status in Northwest Mexico: Uncommon to fairly common winter resident on Pacific coast of Baja and in Gulf of California to northern Sinaloa (coastal in this part of Mexico, not inland; H&W); rare to uncommon (varies by year) winter resident (R&M).



(Eadie et al. 1995)

Abundance and status by BCR:

BCR 32 – uncommon to fairly common winter resident
BCR 33 – rare to fairly common winter resident
BCR 34 – extremely rare winter visitor
BCR 39 – no records
BCR 40 – uncommon to fairly common winter resident
BCR 41 – no records?
BCR 42 – no records
BCR 43 – extremely rare winter visitor
BCR 63 – no records

NAWMP Continental Priority: Moderately High.

NAWMP Regional Priorities: See Table below.

Regional Priority	WCR* 32	WCR 33	WCR 34	WCR 101	WCR 102
Breeding Importance					
Regional Breeding Need					
Regional Nonbreeding Importance	Mod Low	Mod Low	Mod Low		
Regional Nonbreeding Need	Mod Low	Mod Low	Mod Low		

*WCR=Waterfowl Conservation Region from the NAWMP.

Habitat needs:

Breeding habitat: Not applicable (cavity nester).

Winter habitat: In Mexico, lakes, estuaries, coastal bays, (H&W); in California, salt water bays, lagoons, estuaries, harbors, rarely on the ocean close to shore, also lakes, deeper ponds, and large rivers (Small); deep open lakes and channelized sections of the Colorado River especially near dams (KVR); primarily marine in shallow coastal bays, estuaries, and harbors, also on larger lakes and river in the interior (Eadie et al. 1995).

Population information:

Continental: Mean continental population estimate is 1,345,000 (1994-2003), no long-term trend (1970-2003; 2004 Framework); not mentioned in Perez-Arteaga.

Regional: The MWS of northwestern Mexican coast line counted 0 in 2006 and 577 in 2003 (Conant and King); Phoenix winter count 16 (Corman, pers. comm.); (not in Perez-Arteaga or Barnum).

Population goals:

Continental Population Objective: No continental objective given (2004 Framework); no objectives found on the Sea Duck Joint Venture's website (www.seaduckjv.org/).

SJV Regional Population Objective: No winter objectives given (Koneff).

SJV Actions: The SJV area has a “moderately low” priority for Common Goldeneyes. They should not be the focus of a project. However, they can be bundled with other sea ducks for projects to provide protection for their often vulnerable habitat.

Other Recommendations:

1. Develop and implement better survey techniques in wintering areas. (Sea Duck Joint Venture Strategic Plan 2001-2006; <http://www.seaduckjv.org/>).
2. Sample birds for disease, parasites, and contaminant levels. (Sea Duck Joint Venture Strategic Plan 2001-2006; <http://www.seaduckjv.org/>).
3. Investigate the winter ecology especially how survival is influenced by habitat quality and the effects of environmental stresses such as oil spills and disturbance (Eadie et al. 1995).
4. Monitoring of hunting on winter grounds to ensure that over harvesting of local populations does not occur (Eadie et al. 1995).
5. Monitoring of water quality and contaminant levels in winter habitats (Eadie et al. 1995).

Species: Masked Duck

Range and status in Arizona: No records for Arizona (ABBA, KVR, Krueper, M&P).

Range and status in California: No records for California (Small, M&Z).

Range and status in Northwest Mexico: Locally/seasonally uncommon to rare resident (SL-1000m), on Pacific slope from central Sinaloa south (H&W); not treated (R&M); uncommon to rare local resident along Pacific slope from central Sinaloa south (Eitnien 1999).



(Eitnien 1999)

Abundance and status by BCR:

BCR 32 – no records

BCR 33 – no records

BCR 34 – no records

BCR 39 – no records

BCR 40 – no records

BCR 41 – no records

BCR 42 – no records

BCR 43 – uncommon

permanent resident

BCR 63 – no records

NAWMP Priority: Moderately High.

Regional Priority: See table below.

Regional Priority	WCR* 32	WCR 33	WCR 34	WCR 101	WCR 102
Breeding Importance					Mod Low
Regional Breeding Need					Mod Low
Regional Nonbreeding Importance					Mod Low
Regional Nonbreeding Need					Mod Low

*WCR=Waterfowl Conservation Region from the NAWMP.

Habitat needs:

General: Freshwater ponds and marshes with emergent vegetation, especially rushes, small bodies of water such as roadside ditches (H&W); swamps, marshes, streams, stock ponds, and rice fields heavily overgrown with emergent vegetation, reeds and rushes (Eitniear 1999).

Breeding habitat: Nest platform of reeds, etc. well hidden in emergent marshy vegetation (H&W).

Winter habitat: See general above.

Population information:

Continental: Mean continental population estimate is 6,000 (1994-2003), unknown long-term trend (1970-2003; 2004 Framework); not mentioned in Perez-Arteaga.

Regional: No information found; not mentioned by Conant and King.

Population goals:

Continental Population Objective: No continental objective given (2004 Framework).

SJV Regional Population Objective: No winter objectives given (Koneff).

SJV Actions: The SJV has “moderately low” priority for this species. Little is known about this species’ ecology, distribution, and population size and trends. Our first obligation would be to investigation. While this species would not be the focus of a project, management for Masked

Duck might include clearing invasive water hyacinth and other non-native aquatic vegetation providing open water for regrowth of native plants; complete removal of aquatic vegetation should be avoided; stock ponds and other stable artificial water bodies might be used by this species (Eitnien 1999).

Other Recommendations:

1. Investigate life history, ecology, behavior, and habitat use in the SJV area.
2. Determine hunting mortality.

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APPENDIX A. Sonoran Joint Venture waterfowl population objectives using 1970's distribution (Koneff unpublished).

Species	SJV - U.S. Regional Objective (totalled)	SJV - Mexican winter objective	Comments
Ducks			
Mallard	32,745 *	1,918 **	
Mexican Duck	ng	8,235 (65,882 for all of Mexico)	
Northern Pintail	361,611*	178,089	
Gadwall	5,077*	10,195	
American Wigeon	106,923*	79,687	
Green-winged Teal	49,142*	73,985	
Blue-winged/Cinnamon Teal	ng	57,782	
Cinnamon Teal	Ng	63,589	
Northern Shoveler	165,495*	172,199	
Wood Duck	ng	0	
Fulvous/Black-bellied Whistling-Duck	ng	22,323	
Redhead	313*	88,528	
Canvasback	15,582*	6,305	
Lesser/Greater Scaup	41,463*	174,933	
Ring-necked Duck	1,782*	9,311	
Ruddy Duck	55,863*	18,899	
Total Ducks	835,996/938,564	965,978	1,904,542 total
Geese			
Brant	0	162,000	
Greater White-fronted/Canada Geese	13,215	7,761	Pacific Flyway/Rocky Mountain populations
Snow/Ross's Geese	34,175	10,816	Western Arctic in US and Western Central Flyway in Sinaloa/Sonora
Total Geese	47,390	18,577	65,967 total

Ng = not given.

* Using Koneff's spreadsheet and adding the objectives from 7 counties in California that were not in his original paper.

**Using Koneff's 1990's distributions.

APPENDIX B. List of acronyms used in this Supplement.

AOU – American Ornithological Union
ABBA - Arizona Breeding Bird Atlas (Corman and Wise-Gervais 2005)
ACJV – Atlantic Coast Joint Venture
AICA - Área de Importancia para Conservación de las Aves en Mexico
BBS – Breeding Bird Survey
Plan – SJV Bird Conservation Plan
BCR - Bird Conservation Region
BLM – Bureau of Land Management
CBC – Christmas Bird Count
CEDES - Comisión de Ecología y Desarrollo Sustentable del Estado de Sonora
CICESE - Centro de Investigación Científica y de Educación Superior de Ensenada
CONABIO – Comisión Nacional para el Conocimiento y Uso de la Biodiversidad
CONANP - Comisión Nacional de las Áreas Naturales Protegidas
DOD – Department of Defense
DUMAC – Ducks Unlimited de Mexico, Asociación Civil
DUDEs – Duck Use Daily Equivalents
FWS – U.S. Fish and Wildlife Service
GCJV – Gulf Coast Joint Venture
GIS – Geographic Information System
H&W - Howell and Webb 1995
IBA - Important Bird Area
KVR – Rosenberg et al. 1991
LCR – Lower Colorado River
M&Z – Massey and Zembal 2002
MWS – Mid-Winter Survey
M&P – Monson and Phillips 1981
NG – Not given
NSST – National Science Support Team
NWI – National Wetlands Inventory
NWR – National Wildlife Refuge
NABCI - North American Bird Conservation Initiative
NAWCA - North American Wetlands Conservation Act
NAWMP - North American Waterfowl Management Plan
PFP – Pacific Flyway Population
PIF - Partners in Flight
R&M - Russell and Monson 1998
RGJV – Rio Grande Joint Venture
SPRNCA – San Pedro River National Conservation Area
SEMARNAT - Secretaría de Medio Ambiente y Recursos Naturales
SJV - Sonoran Joint Venture
SL – Sea Level
WCR - Waterfowl Conservation Regions
Supplement – SJV Waterfowl Management Supplement
UMA – Unidad para la Conservación, Manejo y Aprovechamiento de la Vida Silvestre

APPENDIX C. Population objectives for the Mexican portion of the SJV using NatureServe ranges.

Species	<u>Winter Range (km2)</u>		% SJV Range in Mexico	Mexico objective **	SJV MX popn. goal
	SJV_mxStates	Mexico			
American Wigeon	381,836	1,787,903	0.21356629	373,125	79,686.92
Black-bellied Whistling-Duck	65,406	617,758	0.10587635		
Fulvous Whistling-Duck	48,558	377,761	0.12854026		
Whistling-Ducks	113,964	995,519	0.11447643	196,000	22,437.38
Brant (1990s)	14,996	14,996	1	162,200	162,200.00
Brant (2000-2002)	14,996	14,996	1	142,700	142,700.00
Cackling Goose	53,902	200,600	0.26870565		
Canada Goose	61,563	253,863	0.24250657		
Greater White-fronted Goose	100,529	850,014	0.11826745		
Dark Geese (1990s)	215,995	1,304,477	0.16557963	46,873	7,761.21
Dark Geese (2000-2002)	215,995	1,304,477	0.16557977	55,165	9,134.21
Canvasback	383,405	1,519,900	0.2522568	24,996	6,305.41
Cinnamon Teal	381,824	1,777,423	0.2148189	296,010	63,588.54
Blue-winged Teal	309,195	1,880,838	0.16439239	305,900	50,287.63
Cinnamon and Blue-winged Teal	691,019	3,658,261	0.1888929	305,900	57,782.34
Gadwall	386,184	1,757,159	0.21977752	46,388	10,195.04
Greater Scaup	0	0	0.97664071		0.00
Lesser Scaup	380,674	1,951,229	0.19509467	896,656	174,932.80
Scaup	380,674	1,951,229	0.19509467	896,656	174,932.81
Green-winged Teal	378,578	1,785,248	0.21205884	348,888	73,984.78
Mallard	214,208	474,821	0.45113408	4,251	1,917.77
Northern Pintail	378,578	1,949,014	0.19424053	916,846	178,088.65
Northern Shoveler	378,578	1,792,648	0.21118344	815,399	172,198.77
Redhead	382,953	1,585,436	0.24154439	366,509	88,528.19
Ring-necked Duck	378,578	1,594,643	0.23740595	39,220	9,311.06
Ross's Goose	5,379	167,153	0.03218282		0.00
Snow Goose	40,061	262,078	0.15285851		0.00
Light Geese (1990s)	45,440	429,231	0.10586441	102,168	10,815.96
Light Geese (2000-2002)	45,440	429,231	0.10586374	196,872	20,841.61
Ruddy Duck	378,578	1,747,509	0.21663851	87,236	18,898.68
Wood Duck	174,420	1,117,829	0.15603432	0	0.00
					894,267.80
No objective given					
Barrow's Goldeneye	3,977	3,977	1	ng	
Black Scoter	0	0		ng	
Bufflehead	383,079	1,407,608	0.27214909	ng	
Hooded Merganser	26,806	52,882	0.506901	ng	
Common Goldeneye	44,237	245,287	0.18034736	ng	

Common Merganser	27,997	195,762	0.14301804	ng
Masked Duck	14,162	394,707	0.0358789	ng
Muscovy Duck	11,692	508,468	0.02299373	ng
Red-breasted Merganser	0	0		ng
Surf Scoter	0	0		ng
Tundra Swan	9,249	134,074	0.06898503	ng
White-winged Scoter	0	0		ng
Goldeneyes	ng	ng		ng
Scoters	ng	ng		ng
Mergansers	ng	ng		ng

**Objective given/No
NatureServe Range**

Mexican Duck	ng	ng	0.12*	65,882	7,906.00
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*estimated by SJV

** Koneff (undated)

APPENDIX D. Scientific names of waterfowl.

<i>Dendrocygna autumnalis</i>	Black-bellied Whistling-Duck
<i>Dendrocygna bicolor</i>	Fulvous Whistling-Duck
<i>Anser albifrons</i>	Greater White-fronted Goose
<i>Chen canagica</i>	Emperor Goose
<i>Chen caerulescens</i>	Snow Goose
<i>Chen rossii</i>	Ross's Goose
<i>Branta bernicla</i>	Brant
<i>Branta bernicla nigricans</i>	“Black or Pacific” Brant
<i>Branta hutchinsii</i>	Cackling Goose
<i>Branta hutchinsii leucopaeia</i>	"Aleutian" Cackling Goose
<i>Branta canadensis</i>	Canada Goose
<i>Cygnus buccinator</i>	Trumpeter Swan
<i>Cygnus columbianus</i>	Tundra Swan
<i>Cairina moschata</i>	Muscovy Duck
<i>Aix sponsa</i>	Wood Duck
<i>Anas strepera</i>	Gadwall
<i>Anas falcata</i>	Falcated Duck
<i>Anas penelope</i>	Eurasian Wigeon
<i>Anas americana</i>	American Wigeon
<i>Anas platyrhynchos</i>	Mallard
<i>Anas platyrhynchos diazi</i>	“Mexican Duck” Mallard
<i>Anas discors</i>	Blue-winged Teal
<i>Anas cyanoptera</i>	Cinnamon Teal
<i>Anas clypeata</i>	Northern Shoveler
<i>Anas acuta</i>	Northern Pintail
<i>Anas querquedula</i>	Garganey
<i>Anas formosa</i>	Baikal Teal
<i>Anas crecca</i>	Green-winged Teal
<i>Aythya valisineria</i>	Canvasback
<i>Aythya americana</i>	Redhead
<i>Aythya collaris</i>	Ring-necked Duck
<i>Aythya fuligula</i>	Tufted Duck
<i>Aythya marila</i>	Greater Scaup
<i>Aythya affinis</i>	Lesser Scaup
<i>Somateria spectabilis</i>	King Eider
<i>Histrionicus histrionicus</i>	Harlequin Duck
<i>Melanitta perspicillata</i>	Surf Scoter
<i>Melanitta fusca</i>	White-winged Scoter
<i>Melanitta nigra</i>	Black Scoter
<i>Clangula hyemalis</i>	Long-tailed Duck
<i>Bucephala albeola</i>	Bufflehead
<i>Bucephala clangula</i>	Common Goldeneye

<i>Bucephala islandica</i>	Barrow's Goldeneye
<i>Lophodytes cucullatus</i>	Hooded Merganser
<i>Mergus merganser</i>	Common Merganser
<i>Mergus serrator</i>	Red-breasted Merganser
<i>Nomonyx dominicus</i>	Masked Duck
<i>Oxyura jamaicensis</i>	Ruddy Duck