

## **4. Management Alternatives**

### **4.1 Introduction**

An important step in the planning process is the development and analysis of alternatives. Alternatives are developed to identify and analyze different ways to achieve Refuge purposes, contribute to the mission of the NWRS, meet Refuge goals, and resolve issues identified during scoping and throughout the CCP process. The development of alternatives is also an important component of the NEPA process, and as described in Chapters 1 and 2, compliance with NEPA for this CCP is being accomplished through an integrated document, a draft CCP/EA, which addresses both the requirements of NEPA and the CCP process. As such, this chapter describes the process that was followed to develop a range of management alternatives for the Sonny Bono Salton Sea NWR and the Coachella Valley NWR; provides detailed descriptions of the alternative developed for each Refuge; identifies the proposed action for each Refuge; compares the way in which each alternative addresses identified issues; summarizes the similarities among the alternatives; and presents alternatives that were considered, but eliminated from detailed study.

### **4.2 Alternatives Development Process**

The alternatives development process for the Sonny Bono Salton Sea NWRC was an iterative process that required consideration of a number of factors, some of which were known at the beginning of the process and others that became evident during the process as a result of public comments, analysis by the planning team, and information provided by other agencies and interested parties. The issues, constraints, and opportunities affecting management of the Refuges within the Complex (as described in Chapter 2) were all taken into consideration during alternatives development. Also influencing this process were Refuge purposes, as well as the vision, goals, and objectives for each Refuge.

One of the first steps in the alternatives development process was identifying and describing the various programs and management actions currently being implemented on these Refuges, as these practices represent the “No Action” Alternative. Under the No Action Alternative, the current management of the Refuges would continue to be implemented for the next 15 years or until changes in management direction are approved through a revision to the CCP. It is important to describe the No Action Alternative accurately because it serves as the baseline to which all other alternatives are compared.

Next, the planning team reviewed and evaluated the comments received during the initial phases of the CCP planning process, including scoping and alternatives review, as well as the issues, management concerns, threats, and opportunities presented in Chapter 2 of this document. Through further analysis of the issues and general public comment, the team developed various objectives for achieving Refuge goals, the mission of the NWRS, and other mandates. Based on the objectives and an analysis of the types of strategies that might be implemented to achieve the objectives, a range of draft alternatives were developed for how the Refuge should be managed over the next 15 years. These draft alternatives were further refined during the analysis of environmental consequences.

Three management alternatives, including a no action alternative and two action alternatives, were developed for each Refuge for evaluation in the draft CCP/EA. The three alternatives for each Refuge differ in the extent and focus of wildlife and habitat management actions to be

implemented and in the types and levels of public use opportunities to be provided. For each Refuge, Alternative “B” represents the proposed action. Following consideration of the comments received during public review of the draft CCP/EA, the proposed action for one or both of the Refuges may be altered to include one or more of the actions addressed in another alternative described for the Refuge, or some elements of the alternative may be modified or deleted. The preferred management alternative will be described in the Final CCP.

### 4.3 Sonny Bono Salton Sea NWR

#### 4.3.1 Past Refuge Management Activities

Following Refuge establishment in 1930, management actions have focused on protecting birds and wildlife and reducing depredation of adjacent private croplands by ducks and geese. As private agricultural development in the Imperial Valley increased and the amount of farmable land available to the Refuge between the Sea and the private lands decreased, Refuge staff increasingly focused on improving the productivity of the lands that were available to provide forage for wintering waterfowl. Considerable effort also went into identifying suitable farmland that could be acquired in fee title by the Refuge, although for the most part, these efforts were unsuccessful.

With the enactment of the ESA, management activities on the Refuge were expanded to include the protection of listed species known to occur on the Refuge, as well as on restoration and enhancement of habitats to support listed species. The mid 1990s brought added responsibilities related to avian disease monitoring throughout the Salton Sea. Table 4-1 identifies important events related to the management of the Sonny Bono Salton Sea NWR. A more complete discussion of the history of the Refuge is provided in Chapter 1.

<b>Event</b>	<b>Timeframe</b>	<b>Additional Details</b>
Refuge established (32,410 acres)	11/25/1930	Executive Order 5498 signed by President Hoover
Original Refuge lands gradually inundated by the Salton Sea	Late 1930s to early 1940s	Raised need for the Refuge to identify farmable uplands for producing winter forage for waterfowl
Leased lands between the Salton Sea shoreline and private agricultural lands from IID	1945, 1949	Acquired areas were farmed to produce grain crops and green forage for ducks and geese
Salton Sea water levels unstable	1940s through 1970s	Sea levels rising; flooding made it difficult to produce winter forage for waterfowl
Sea wall constructed along the south end of the Salton Sea	1980	This wall was intended to protect farm land from rising Salton Sea levels
Habitat management for the endangered Yuma clapper rail emphasized	1980s to present	Impoundment areas on the Refuge are managed to support freshwater cattail marsh to support the Yuma clapper rail
Headquarters office building constructed	1984	Consolidated Refuge administration and operations
Original observation deck/tower constructed at the Refuge headquarters	1986	Constructed to support wildlife observation; it was later replaced with an accessible deck
Sampling of irrigation drain waters to identify contaminant levels	1986	Joint effort of the Service, Bureau of Reclamation, and USGS to address potential health concerns to humans and wildlife

**Table 4-1  
Timetable of Past Events Associated with the Sonny Bono Salton Sea NWR**

<b>Event</b>	<b>Timeframe</b>	<b>Additional Details</b>
Observation deck erected at Unit 1	1990	Enhanced wildlife viewing opportunities
Farming program includes Sudan and rye grass, wheat, barley, and alfalfa	1990s	Over the years, various crops were planted in an effort to optimize foraging opportunities for waterfowl
Salton Sea water elevation “peaks”	1995	Between April and June 1995, the water level in the Salton Sea reached -226.6 feet MSL
Most significant disease outbreak among birds on the Salton Sea	1996	Smaller outbreaks of Type C botulism have occurred repeatedly at the Salton Sea
Refuge expands its role in monitoring bird and fish health on the Salton Sea	1997	Based on the Service’s migratory bird responsibilities, the Refuge took the lead in a multiple agency effort to address disease outbreaks at the Salton Sea
Bird treatment field “hospital” and other facilities constructed to help manage avian disease outbreaks	1997	Enabled more thorough treatment of sick birds for eventual release to the wild
Airboats and other equipment acquired for enhanced management of disease outbreaks	1999	Substantially increased Refuge staff and cooperators ability to detect and respond to disease outbreaks in early stages
Salton Sea NWR renamed Sonny Bono Salton Sea NWR	1998	Congressman Sonny Bono played an active role in efforts to restore the health of the Salton Sea
Congressional funds appropriated to help address response to disease outbreaks	1998	Enabled the Refuge to devote more resources to the issue of avian disease outbreaks
Quantification Settlement Agreement results in long term water transfers from the Imperial Valley	2003	Transfers Colorado River water to San Diego and the Coachella Valley, eventually lowering water levels in Salton Sea
Headquarters office expanded to provide visitor contact space	2005	Improved ability of the Refuge staff to interact with Refuge visitors
Farming techniques modified to reduce carbon dioxide emissions, transition to minimum- or no-till farming	2009-2011	Reduces carbon emissions, conserves fuel, reduces soil disturbance to reduce weeds and improve air quality
Photo-voltaic panels installed on Refuge headquarters building	2010	Reduces the Refuge’s carbon footprint
ADA accessible observation deck constructed at Unit 1	2011	Allow enhanced “over-water” wildlife viewing opportunities for all visitors

**4.3.2 Existing Management Plans**

A number of management plans have been prepared for the Refuge over the years, including the Land Use Plan for the Salton Sea NWR, approved in 1963, and the Salton Sea NWR Master Plan, approved in 1972. The primary objectives of the 1963 land use plan were to provide a sanctuary and feeding ground for wintering waterfowl and to minimize depredation of commercial crops in the area by ensuring that waterfowl remain in the Refuge to forage. Existing public use on the Refuge, which included hunting and wildlife observation, were described as limited (USFWS 1963). Although the 1963 land use plan was prepared some 50 years ago, much of its content is still relevant as weather and soil types that dictate habitat management options have not changed significantly over the years.

The objectives presented in the 1972 Master Plan were more extensive than those of the earlier plan. In addition to objectives related to providing feeding and resting areas for migratory waterfowl and preventing crop depredation, this plan also included objectives related to wildlife-oriented public uses (e.g., hunting, fishing, wildlife observation, and conservation education); preservation of endangered and special concern species; preservation of habitat to support wildlife diversity; and preservation of historic and geological features (USFWS 1972). The last management plan prepared for the Refuge was the 1972 Master Plan, although there have been a few updates to the Refuge goals and objectives over the years. Existing habitat management is also guided by the recommendations of a Cropland Management Review conducted in 2001.

A variety of laws, treaties, and executive orders related to the conservation and protection of natural and cultural resources; applicable Service recovery plans; and programs and recommendations associated with ongoing migratory bird planning efforts all influence the management actions implemented on the Sonny Bono Salton Sea NWR. The most important orders and laws affecting the operation and management of NWRs include Executive Orders 12996 (Management and General Public Use of the National Wildlife Refuge System) and 13186 (Responsibilities of Federal Agencies to Protect Migratory Birds), the NWRS Administration Act, as amended, the Refuge Recreation Act, the Endangered Species Act, and the Fish and Wildlife Act of 1956. See Chapter 1, Chapter 3, and Appendix F for more details.

### **4.3.3 Current Refuge Management**

Today, the Refuge continues to implement and improve on the past management actions described above. New management issues such as the protection of nesting seabirds, increasing water use efficiency, and addressing restoration needs associated with a receding Salton Sea are also being addressed. The Refuge manages year-round marsh habitat for the endangered Yuma clapper rail; controls invasive plants; implements year-round avian disease monitoring, control, and recovery on the Salton Sea; conducts waterfowl, marshbird, sandhill crane and seabird surveys; and maintains water distribution systems and visitor and administrative facilities.

The Refuge supports a visitor services program that focuses on wildlife observation, particularly bird watching, waterfowl hunting, environmental education, and photography. Interpretive signage and guided nature walks are also provided for visitors. The bird life on the Sonny Bono Salton Sea NWR attracts local, regional, national, and international visitors throughout the year.

The Refuge Manager is also responsible for ensuring the protection of cultural resources; coordinating issues related to contaminants with the Service's Environmental Contaminants Program; and helping to coordinate off-site activities related to public use. A detailed description of the management activities currently being implemented on the Refuge, as well as the Refuge's current public use program, are described in detail under Alternative A (No Action).

### **4.3.4 Alternatives - Sonny Bono Salton Sea NWR**

The three management alternatives evaluated for the Sonny Bono Salton Sea NWR are summarized in Table 4-2 and described in greater detail in the sections that follow.

<b>Table 4-2                      Summary of Major Management Actions for the Sonny Bono Salton Sea NWR                      under each Alternative</b>			
<b>Refuge Management Activity</b>	<b>Alternative A (No Action)</b>	<b>Alternative B (Proposed Action)</b>	<b>Alternative C</b>
<b>Managed Agricultural Fields</b>	Continue current activities	Implement actions to increase crop yield	Same as Alt. B
<b>Managed Open Water Wetlands</b>	Continue current activities	Same as Alt. A and partner with IID to restore Red Hill Bay	Same as Alt. B
<b>Managed Seasonal Wetlands</b>	Continue current activities	Implement actions to improve efficiency of water use	Same as Alt. B
<b>Managed cattail marsh habitat</b>	Continue current activities	Implement actions to improve habitat quality (e.g., rehabilitation, creation of new habitat)	Same as Alt. B
<b>Salton Sea restoration partnership</b>	Continue to partner with the State to restore Bruchard Bay	Same as Alt. A	Same as Alt. A
<b>Surveys/Monitoring</b>	Continue current bird activities	Same as Alt. A and initiate monitoring of desert pupfish in managed habitat areas	Same as Alt. B
<b>Invasive Plant Control</b>	Continue current invasive plant control	Implement an integrated appropriate to pest management	Same as Alt. B
<b>Predator Management</b>	Maintain electric fencing around nesting sites	Same as Alt. A and control mammalian predators	Same as Alt. B
<b>Monitoring avian disease on the Salton Sea</b>	Continue current activities	Continue current activities per available funding	Same as Alt. B
<b>Waterfowl Hunting</b>	Continue current program	Same as Alt. A	Eliminate Wednesday hunting on Union Tract
<b>Fishing</b>	Continue current program	Same as Alt. A	Same as Alt. A
<b>Wildlife Observation, Photography, Interpretation</b>	Continue current program	Improve current facilities, expand opportunities for wildlife observation in Unit 1 & 2	Improve current facilities, expand wildlife observation opportunities in Unit 1
<b>Environmental Education (EE)</b>	Continue current program	Expand current EE program to connect children with nature	Same as Alt. B
<b>Public Outreach</b>	Continue current efforts	Same as Alt. A	Partner with others to develop an interpretive auto tour route through the Imperial Valley

<b>Table 4-2 Summary of Major Management Actions for the Sonny Bono Salton Sea NWR under each Alternative</b>			
<b>Refuge Management Activity</b>	<b>Alternative A (No Action)</b>	<b>Alternative B (Proposed Action)</b>	<b>Alternative C</b>
<b>Research</b>	Continue current program	Expand opportunities consistent with Refuge purposes	Same as Alt. B
<b>Land Tenure</b>	Retain current fee title and leased/agreement lands	Evaluate the status of currently managed Refuge lands in light of changing conditions in the Salton Sea	Same as Alt. B
<b>Staffing</b>	Maintain current staffing levels	Expand staffing to achieve proposed management	Same as Alt. B
<b>Facilities Maintenance</b>	Continue current activities	Reconstruct or improve various facilities	Same as Alt. B

#### **4.3.4.1 Similarities among the Alternatives for the Sonny Bono Salton Sea NWR**

Although there are differences among the range of alternatives presented for managing the Sonny Bono Salton Sea NWR, the alternatives also include various features and management components that would be part of the CCP regardless of the alternative selected for implementation.

##### **Features Common to All Alternatives**

Features common to all alternatives are summarized below. To reduce repetition in the alternatives descriptions, those features that are common among all of the alternatives are described in detail in the section that follows only under Alternative A – No Action.

- *Managed Agricultural Fields* - Manage agricultural fields on the Refuge to attract wintering geese that would otherwise forage in nearby fields supporting a variety of commercial crops.
- *Managed Habitats to Support Migratory Birds* - Manage existing permanent open water areas and seasonal shallow wetlands to provide resting and foraging habitat for a wide range of migratory, wintering, and summer nesting waterbirds.
- *Managed Cattail Marsh Habitat* - Manage cattail marsh habitat to support the Refuge's year-round population of endangered Yuma clapper rails, as well as other secretive marshbirds.
- *Salton Sea Restoration Partnerships* – Continue to work cooperatively with Federal and State agencies (e.g., USACOE, Bureau of Reclamation, California Natural Resources Agency, CDFW) to develop and implement restoration projects in the Salton Sea that will support a range of migratory birds, including deep-water habitat restoration within Bruchard Bay to support fish-eating birds.

- *Bird Surveys* - Conduct waterfowl surveys and waterbird surveys on and adjacent to the Salton Sea, and sandhill crane and Yuma clapper rail surveys on the Refuge.
- *Invasive Plant Species Control* - Annually control invasive plant species in managed agricultural areas to control broadleaf weeds; and periodically control other invasive weeds (e.g., sesbania, common reed) and shrubs (i.e., salt cedar) in wetland areas.
- *Monitoring Avian Disease on the Salton Sea* - Monitor for the presence of avian disease on the Salton Sea by conducting regular year-round coordinated patrols with CDFW to search for and remove sick and dead birds. Sick birds are provided with rehabilitation, and dead birds are promptly disposed of to reduce the potential for spreading disease.
- *Environmental Contaminants Coordination* - Work with the Service's Environmental Contaminants Program to ensure that trust resources are not being adversely affected by contaminants originating on site, as well as from offsite sources.
- *Protection of Cultural Resources* - Manage recorded and any yet to be discovered cultural resources located within the Refuge in accordance with existing Federal laws and Service policies. Continue to consider the effects of all proposed actions on cultural resources and consult with the Regional Cultural Resources team, and, when appropriate, the SHPO, federally recognized Tribes, and interested parties.
- *Waterfowl Hunting* - Continue to provide opportunities for waterfowl hunting on the Refuge in partnership with CDFW.
- *Wildlife Observation/Photography/Interpretation* - Continue to maintain facilities on the Refuge that support non-consumptive wildlife-dependent recreational uses.
- *Environmental Education* - Continue to assist in the implementation of on- and off-Refuge environmental education programs.
- *Facilitation of Scientific Research* - Encourage scientific research activities on the Refuge that are consistent with Refuge purposes and provide information relevant to Refuge management responsibilities and actions.

#### **Features Common to All Action Alternatives**

- *Managed Agricultural Fields* - Implement management actions intended to increase crop yield and optimize water use in managed agricultural fields, and consider the potential for achieving Refuge purposes through a cooperative farming agreement.
- *Restore Shallow Open Water Habitats to Replace Wetlands Lost to a Receding Salton Sea* - Restore the Red Hill Bay area of the Salton Sea in partnership with others to provide shallow water habitat for a range of migratory birds, including nesting seabirds, while also reducing dust emissions from this exposed area of the Salton Sea.
- *Yuma Clapper Rail Management Plan* - Prepare a step-down habitat management plan that includes specific actions related to the management of the Refuge's population of Yuma clapper rails, as well as the habitat that supports the rails.

- *Desert Pupfish Monitoring* - Actively monitor the presence of the endangered desert pupfish on the Refuge and work with CDFW to relocate populations discovered in managed ponds to appropriate habitat in the Salton Sea or adjacent drainage ditches.
- *Bird Surveys* - Continue to conduct waterfowl surveys and waterbird surveys on and adjacent to the Salton Sea, and sandhill crane and Yuma clapper rail surveys on the Refuge. Funding and partnerships would be sought for the purpose of establishing baseline productivity data for the various managed habitats within the Refuge, as well as for implementing subsequent periodic monitoring to identify trends and variations in species abundance and diversity over time.
- *Integrated Pest Management (IPM)* – Implement an integrated approach to pest management (as described in the IPM Plan provided as Appendix D) that involves a comprehensive, environmentally sensitive approach to managing pests through a combination of strategies, including the aerial application of herbicides, that pose the least hazard to people, property, and the environment.
- *Predator Management Plan* – Implement, per available funding, a predator management program that includes a range of management actions from vegetation control and other nesting habitat enhancements to non-lethal (deterrence) control of avian and mammalian predators and lethal control of individual mammalian predators (e.g., coyotes, raccoons, feral dogs and cats) that pose a threat to ground nesting gull-billed terns and black skimmers.
- *Optimize Water Delivery to Managed Habitat Areas* – Evaluate, and where feasible make improvements to, the Refuge’s current water delivery system to better distribute and conserve water within the various management areas on the Refuge.
- *Improve Opportunities for Wildlife-dependent Recreational Use* – Upgrade existing public use facilities (e.g., sidewalks, trails, interpretive elements) to accommodate all visitors and provide new facilities(e.g., trails, photo blinds) to support wildlife observation and photography.
- *Expand Opportunities of Research* – Research projects that are consistent with Refuge purposes would be identified for implementation on the Refuge to benefit Refuge resources and improve management effectiveness.
- *Address the Refuge’s Long-term Water Needs* – Ensure an adequate supply of water to achieve Refuge purposes and goals by exploring and developing a range of water conservation measures and by coordinating with IID to secure an adequate annual allocation of water for the Refuge.
- *Evaluate Current and Future Upland and Wetlands Needs* - In light of the changing conditions at the Salton Sea, initiate a step-down plan to review the land and water needs of the Refuge into the future; this plan will evaluate the current status and configuration of fee-title and leased properties included within the Refuge, determine which lands are necessary to achieve Refuge purposes and goals either now or into the future, and review the potential for land exchanges, transfers of ownership, and/or removal of some lands from the Refuge to better address Refuge purposes and goals.

- *Monitor Changes Related to Climate Change and Receding Water Levels in the Salton Sea* – Funding and partnerships would be sought to monitor changes in avian and fish species composition and abundance in and around the Salton Sea to better understand and address the effects of receding water levels and climate change on the diversity and abundance of migratory and resident bird species in the region.

#### **4.3.4.2 Detailed Description of the Alternatives for the Sonny Bono Salton Sea NWR**

##### **Alternative A - No Action**

The No Action Alternative (Figures 4-1, 4-2, 4-3, and 4-4) proposes no changes in current management practices or public use activities. This alternative also proposes to continue current coordination with other Federal and State agencies related to restoration within the Salton Sea.

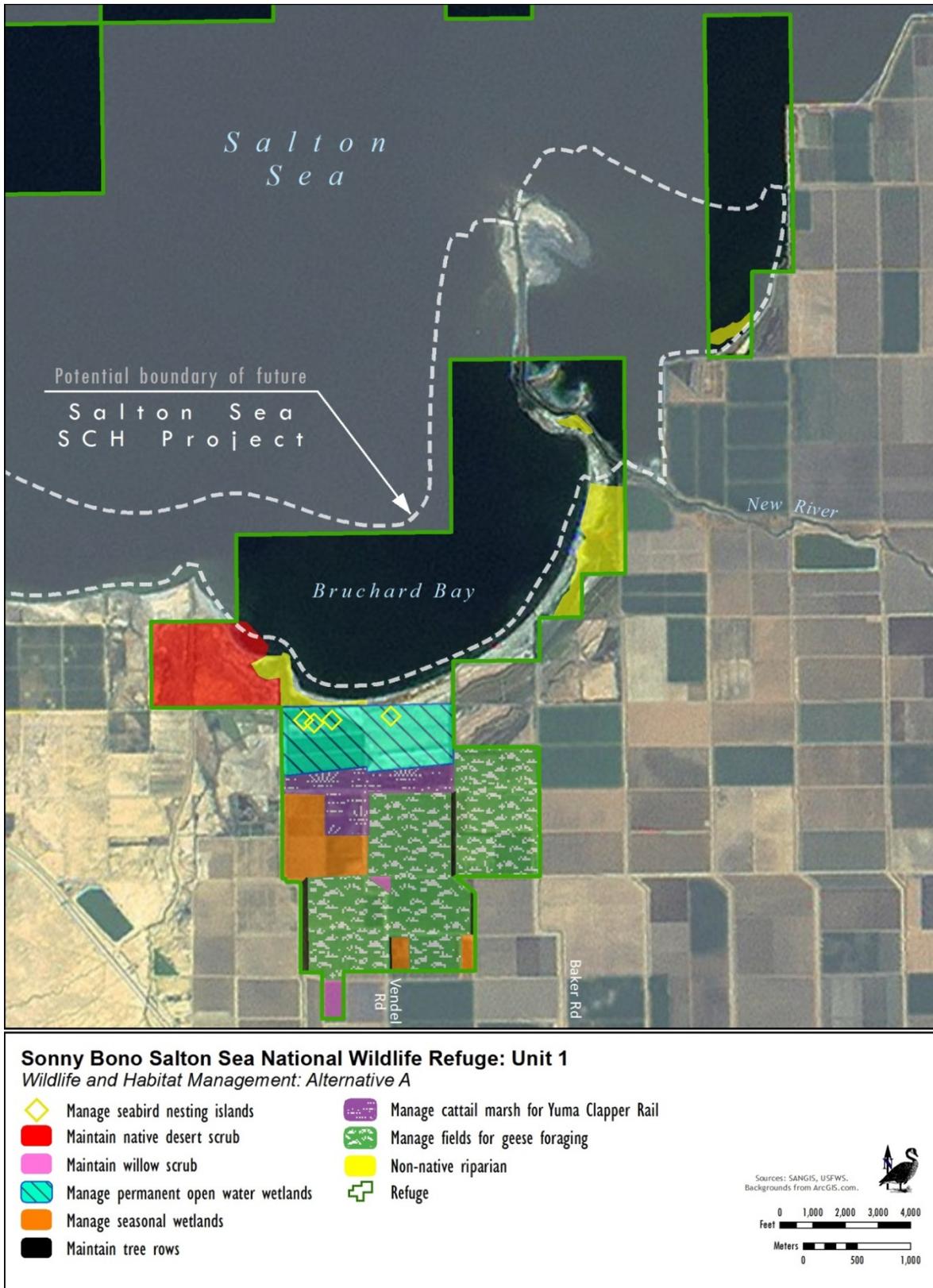
##### **Wildlife and Habitat Management**

The majority of the habitat management actions implemented on the Refuge involve highly managed systems with specific wildlife species and habitat purposes. Managed habitats include agricultural fields maintained for the primary purpose of providing forage for wintering waterfowl; seasonal shallow water wetlands that support alkali bulrush and other vegetation to provide additional forage for waterfowl; freshwater impoundments that support cattails and other freshwater emergent vegetation to provide habitat for the endangered Yuma clapper rail and a number of other secretive marsh birds; and permanent open water areas that provide habitat for shorebirds, seabirds, and other waterbirds, including nesting areas for terns and gulls. Other areas on the Refuge consist of the open waters within the Salton Sea; riparian areas located along the New and Alamo rivers and the various drains and irrigation channels present on the Refuge; tree rows that consist of native and non-native desert trees; and Salton Sea desert scrub habitat.

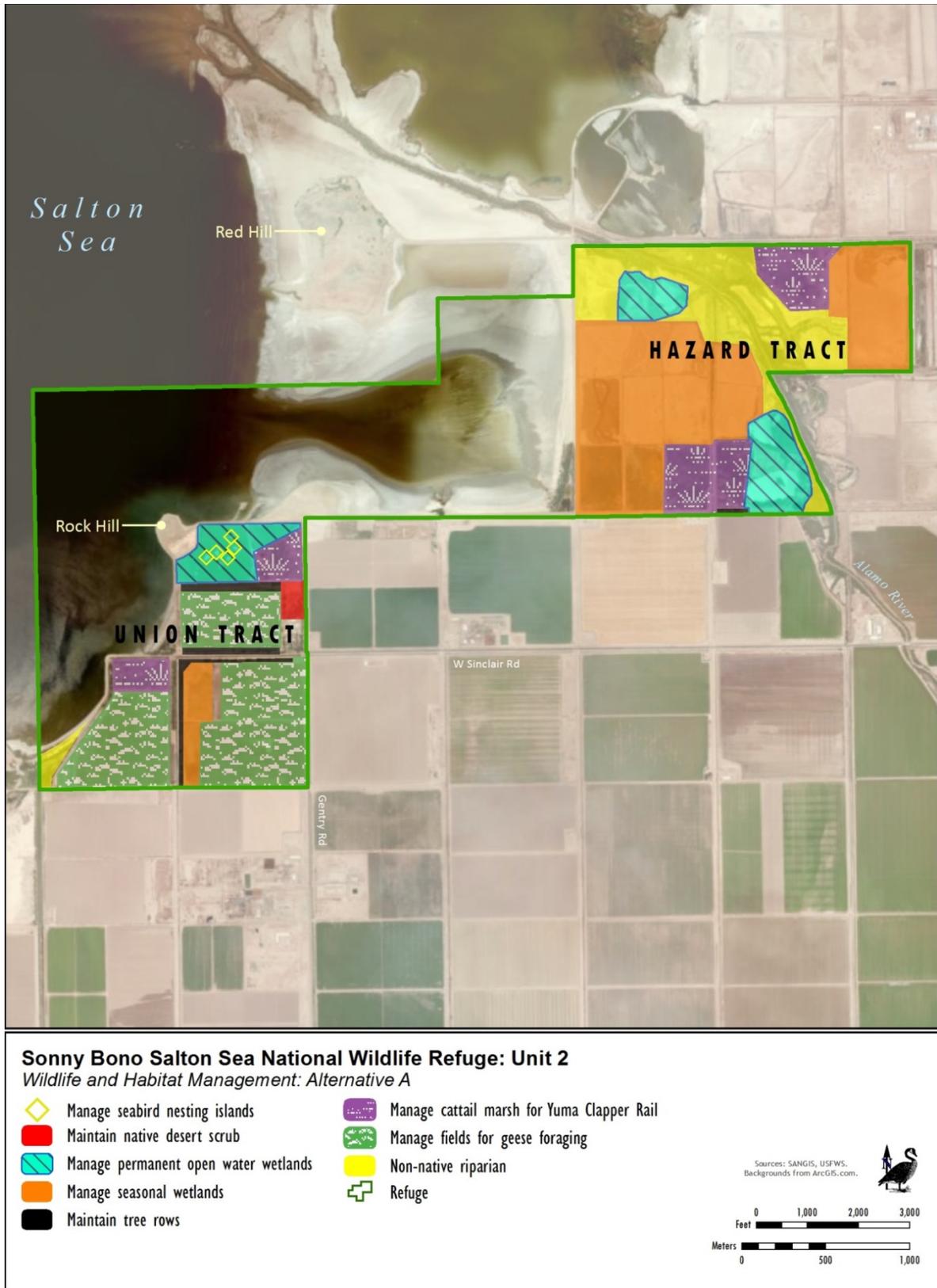
Managed Agricultural Fields. Approximately 850 acres (refer to Figures 4-1 and 4-2), the majority of which are leased from the IID, are farmed annually to provide foraging habitat for wintering geese (e.g., snow geese, Ross's geese). This activity is conducted to achieve the Refuge purpose of reducing depredation of commercial crop land in the Imperial Valley by wintering waterfowl. Over the years, Refuge management practices have been and continue to be effective at enticing most geese and ducks that winter in the northern part of the Imperial Valley away from private farmlands.

Maintaining these agricultural fields is an energy intensive process involving significant labor hours and fuel. Productivity in these fields is also dependent upon an adequate supply of irrigation water. Field management includes disking and seed drilling, the delivery and distribution of irrigation water, and the as needed use of herbicides and fertilizer.

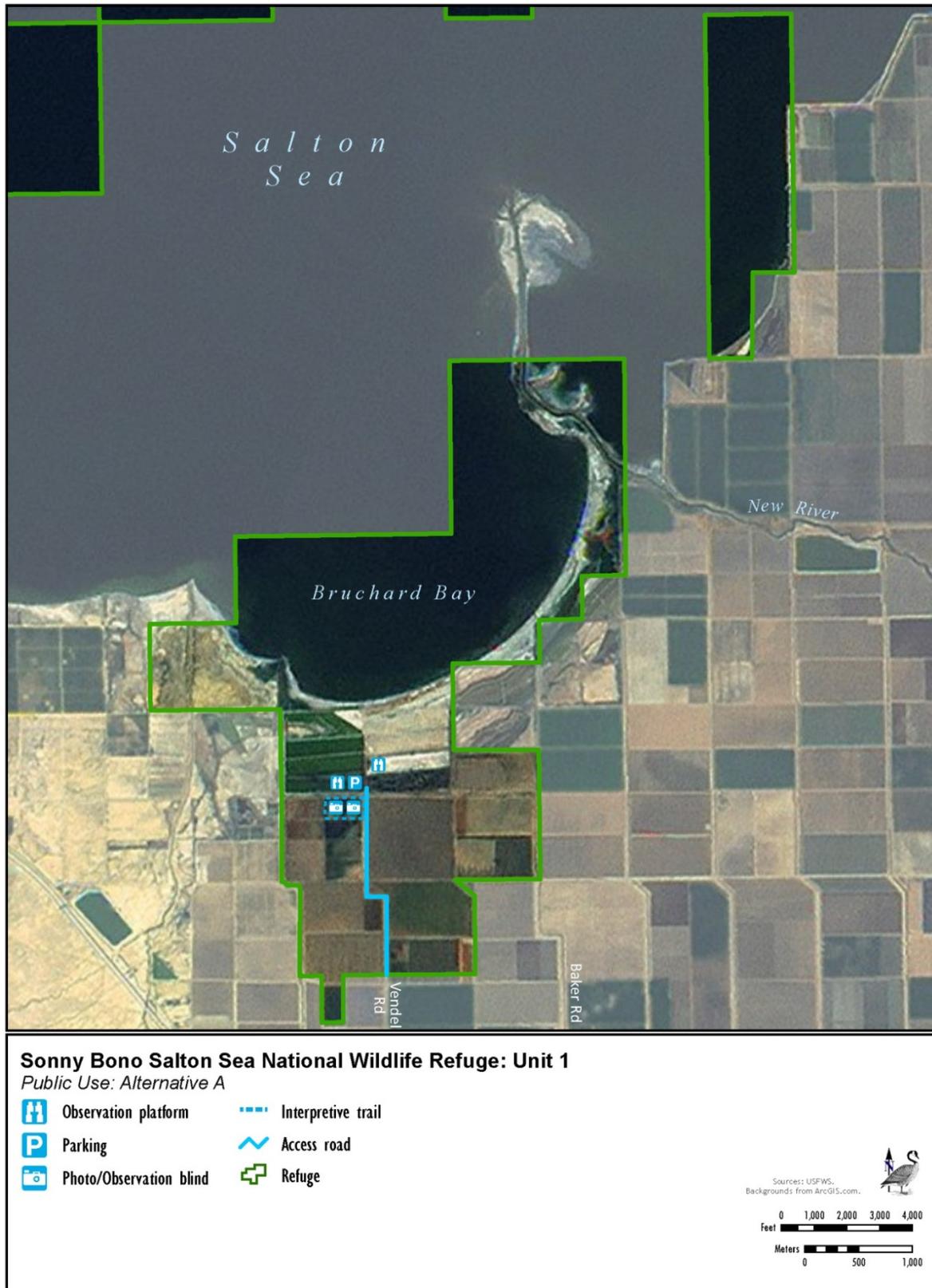
Factors affecting productivity include the presence of heavy clay soils that can become highly compacted, as well as the tendency for salts to accumulate in the soil. Subsurface tile drainage systems, which have been installed under the Refuge's agricultural fields, allow salts that accumulate below the surface to drain away from production areas. These systems, which result in an increase in overall crop productivity, require regular inspection and maintenance to ensure that they continue to function properly.



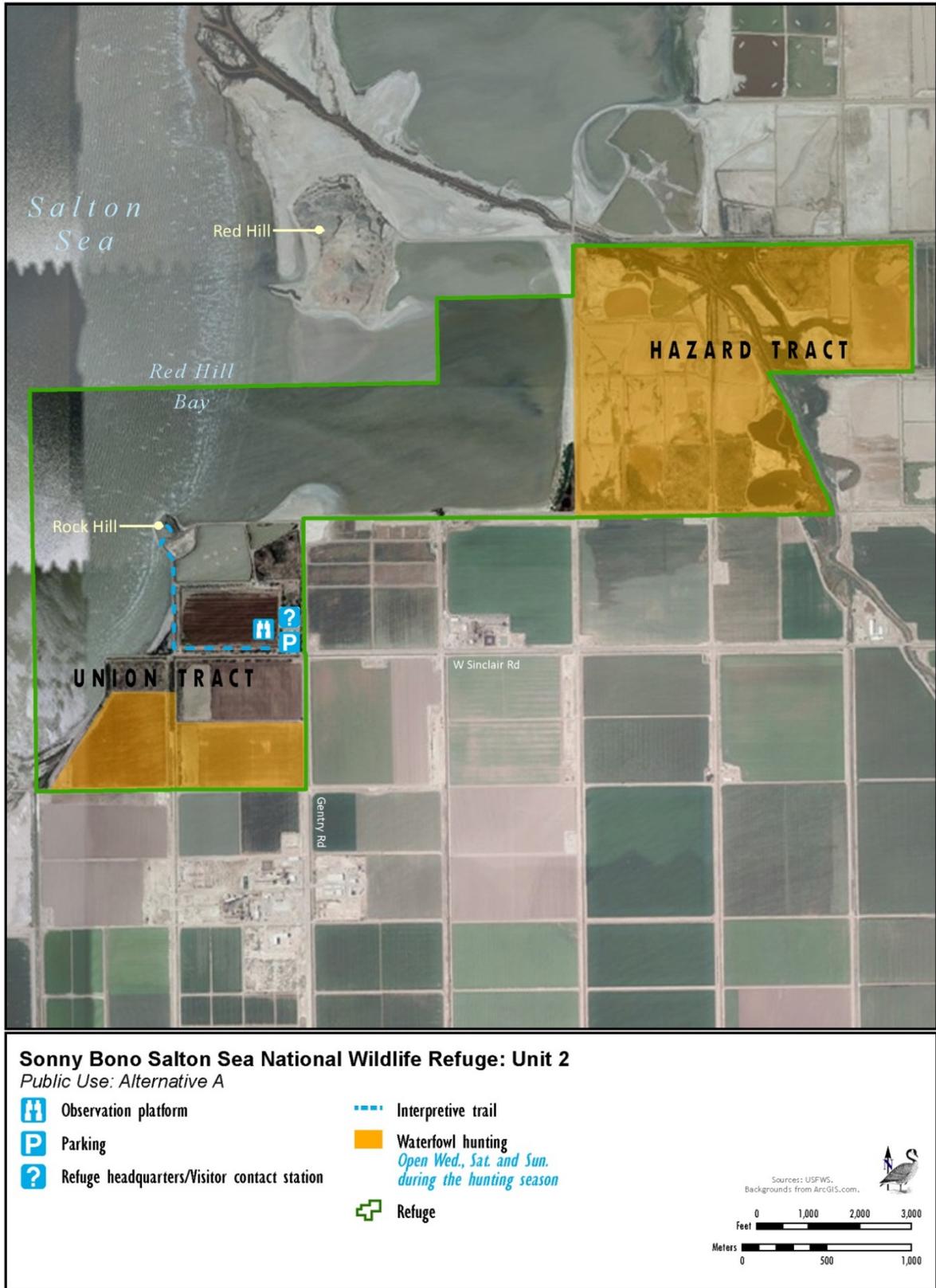
**Figure 4-1. Sonny Bono Salton Sea NWR, Alternative A – No Action (Wildlife and Habitat Management, Unit 1)**



**Figure 4-2. Sonny Bono Salton Sea NWR, Alternative A – No Action (Wildlife and Habitat Management, Unit 2)**



**Figure 4-3. Sonny Bono Salton Sea NWR, Alternative A – No Action (Public Use, Unit 1)**



**Figure 4-4. Sonny Bono Salton Sea NWR, Alternative A – No Action (Public Use, Unit 2)**

As described in Chapter 1, a wide range of crops has been cultivated on the Refuge over the years. Some crops have required greater management than others. In addition, the cultivation of some crops has resulted in concerns by adjacent farmers. For instance, alfalfa is no longer grown on the Refuge because surrounding farmers had concerns that weeds and insect pests in the Refuge fields were impacting their crops. To address these concerns and receive input on how best to optimize forage production on the Refuge, the Refuge conducted a farm review in 2002. This review involved interested farmers, the Imperial County Farm Bureau, and other interested agencies and organizations such as Service staff, CDFW, Ducks Unlimited, and California Waterfowl Association.

Based on the discussions and information obtained during the farm review, the Refuge staff determined that the production of annual rye grass would provide an appropriate level of forage for the geese in combination with wetland foods, while also requiring lower amounts of pesticides, fertilizers, and herbicides than other crops, such as alfalfa. Weed control would also be simplified because herbicides formulated to kill invasive broadleaf species can be applied once a year with no impact to rye grass production.

Agricultural fields are prepared for planting starting in late spring and continuing throughout the summer months. Annual preparations generally include disking fields (usually twice), leveling the fields by tri-planing, and placing borders in the fields to control flood irrigation water. In an effort to optimize annual crop yields, Refuge managers are continually making adjustments in how and when seed, fertilizer, and herbicides are applied to the site. For several years rye grass seed was distributed within the prepared fields at the beginning of September at a rate of 40 to 50 pounds per acre. This was followed by fertilizing the fields with liquid urea ammonium nitrate. The fertilizer was applied by adding it to irrigation water at about 312 pounds per acre to achieve a desired target of 100 pounds of nitrogen per acre (liquid fertilizer contains about 32 percent available nitrogen per pound). In 2012, slight adjustments were made to this practice that resulted in significant improvements in crop yield. These adjustments included reducing the rate of seeding to about 35 pounds per acre and increasing the fertilizer to about 150 pounds of nitrogen per acre. Due to the success of these adjustments, it is likely that these procedures will continue.

Fields are irrigated after seeding at least once a month during the fall and then as needed into the winter, depending on weather. Approximately four acre-feet of water are used to irrigate each acre of farm ground for the duration of the crop. Irrigation usually ends by late February as the geese begin to migrate north.

The use of liquid nitrogen fertilizer enables the Refuge to continue growing green forage during the cool winter months after the geese have consumed the initial growth that began in the warmer months of October and November. Without fertilizer, goose forage would be completely consumed well before the geese were ready to migrate north, thereby putting the nearby commercial crops in jeopardy of depredation.

Broadleaf weeds growing in these fields are currently controlled with herbicides. The primary products used in these fields are WEEDAR 64 (active ingredient: 2,4-D DMA), Milestone VM (active ingredient: aminopyralid), and Clarity (active ingredient: dicamba). These products control noxious and invasive broadleaf species and other problem weeds. WEEDAR 64, which is tank mixed with Clarity, is applied in late fall or early winter. Milestone VM, when used, is usually applied in fields when weeds begin to compete with rye grass after the grass has developed secondary roots and can tolerate the effects of the herbicide. This normally occurs in November. Problem grasses (mainly Bermuda grass) are controlled with glyphosate

herbicide before rye grass is planted. After the geese migrate from the Imperial Valley, these fields will get disked while soil moisture is sufficient to allow easy disking, usually by June.

To reduce fuel consumption, CO<sub>2</sub> emissions, and other pollutants, Refuge staff has been experimenting with the practice of no till or limited till soil preparation. Under the no till or limited till method, the previous crop is left standing and a special high ground pressure no-till seed drill is used to penetrate the soil when seeding is required. This practice, which omits the process of disking the soil, has been performed successfully at other farms in the Imperial Valley. It has proved successful on the Refuge as well, resulting in a significant reduction in diesel fuel consumption (fuel use was reduced from 10,000 gallons per year to 5,000 to 7,000 gallons per year) because far less tractor use is required under no till practices. To date, the practice of no till farming has been expanded to include about half of the Refuge's farm field acreage. Continuous monitoring of the crop is required to ensure that a high level of crop productivity is maintained. Disking or tilling of the soil helps ensure healthy robust root development in otherwise heavy silty clay soils. On the Refuge, alternating disking with a one, two, or three-year cycle of no-till farming for rye grass has maintained a satisfactory productive crop. An additional benefit observed by Refuge staff is the use of residual grass cover in the no-till fields by passerine birds and waterfowl, presumably in association with insect foraging or spring nesting.

The main goal of this management action is to maintain good forage productivity for geese that spend the fall and winter months in the Imperial Valley. This can be a challenge during the late winter months when rye grass growth slows down. With timely management actions, the Refuge has been capable of supporting almost all of the wintering geese population in the area. The total numbers of geese present in the valley have varied considerably over the years and Refuge staff is continually evaluating the capability of the agricultural fields to support the winter goose population.

Seasonal Shallow Wetlands. The provision of seasonal shallow wetlands began in the 1940s when farmable land on the Refuge was limited due to rising water levels in the Salton Sea. These brackish wetlands were established in impoundments created in fields with salinity levels too high to produce green forage for geese. The intent was to provide wetland plant forage such as alkali bulrush for waterfowl to supplement the green forage provided in the agricultural fields. Management of seasonal wetland areas continues today with various wetland plants providing forage for geese and other waterfowl. Approximately 560 acres of the Refuge (refer to Figures 4-1 and 4-2) are managed as seasonal shallow wetlands, however, the types of wetland plants provided throughout this acreage varies depending upon the soil conditions.

These managed wetland areas, which also represent important foraging and resting areas for migratory shorebirds, are flooded in the late summer to provide shallow open water or mixed marsh areas in various locations throughout the Refuge. To keep these wetlands productive from September through March, as well as to ensure the growth of emergent vegetation for food and cover in late spring and early summer, approximately five to six acre-feet of water is required per year per acre of wetland.

Some of the Refuge's seasonal wetland areas require little effort to grow waterfowl food plants. These are generally ponds that have been constructed on previous agricultural land or other land that has been previously tilled to flush salts from the soil profile. In these wetlands, wetland food plants typically germinate after the spring drawdown in March or April. Two or three irrigations are provided afterwards in May and June to promote growth. Usually the

crop in these ponds, which include watergrass (*Echinochloa crusgalli*), Mexican sprangle-top (*Leptochloa uninervia*), and swamp timothy, are mature by the end of June or early July.

Many other seasonal wetlands have not been capable of producing typical wetland plants that grow in other western U.S. wetlands. These wetland impoundments are not located on previous farm land and have not had the benefit of the salt flushing; instead, they consist of heavy clay, saline-sodic soils with significant salt accumulation. As a result, it is difficult to keep the pond soils in a moist condition suitable for wetland plant germination and development. In an effort to overcome these inherent soil conditions, Refuge staff have tested the soils and sought advice of specialists. The current management strategy, which was used and described by former Refuge Manager John Nowak in 1963, has proven productive at growing normal seasonal wetland food and cover vegetation on wetland basins where no plant growth occurred previously. To help provide a “wet edge” for plant germination, dry pond bottoms are disked to break up the extremely hard soil. The ground is then “corrugated” into rows approximately ten inches deep. The furrows that are created are able to hold a pool of water when flooded so that even when hot windy conditions evaporate a half inch of water or more per day, a wet edge is more easily maintained.

Trying to maintain a flat bottomed pond with a quarter to a half inch of water is much harder in the Imperial Valley’s hot environment, so corrugating helps to minimize the effect of evaporation, allowing the soil to remain moist enough to facilitate wetland plant germination. Desirable food plant seeds such as watergrass and/or alkali bulrush (*Scirpus robustus*) are broadcasted on the pond bottom and fall into the crevices of the soil. Based on soil testing results, gypsum has been prescribed to help loosen the hard soil, release salts, and improve soil friability, enabling successful seed germination. A convenient and beneficial substitute for gypsum has been a mix of urea sulfuric acid fertilizer (15-0-0 16S). When introduced into the first application of irrigation water, the diluted sulfuric acid combines with excessive calcium ( $\text{CaCO}_3$  = limestone) to form a diluted solution of calcium sulfate, or gypsum. The result is a deep, thorough, penetrating application of gypsum to positively affect soil development and productivity. The added urea provides a boost of nitrogen to promote growth of newly sprouted plants. The liquid fertilizer is introduced into the irrigation water which flows down the furrows melting the clods of dirt over the seeds. In about ten days, plants become visible and water is kept in the furrows to promote growth. It is expected that over time sufficient soil improvements will be accomplished so that periodic irrigations can be provided in between drying periods until a mature crop with full seed heads have developed, similar to practices described for the areas with high quality soil conditions.

A third seasonal wetland strategy currently implemented on the Refuge involves growth of alkali bulrush, a preferred food plant of snow geese. Pond soils of adequate quality that are kept very wet can produce nearly pure stands of alkali bulrush. This strategy involves keeping the ponds flooded with a skim of water in early summer until residual tubers in the soil sprout and develop mature plants. The longer the crop is kept wet, the more each plant can multiply by root. These ponds can be allowed to dry for the remainder of summer, and then be flooded again in the fall. As the ponds slowly flood, new plants sprout from each existing stalk, adding to the available foraging crop. Geese prefer the green plants and if at all possible, the Refuge attempts to grow the crop so that a mature green crop is available for geese when they arrive in late October. This crop uses more water than a typical seasonal wetland, although not as much as a permanent wetland.

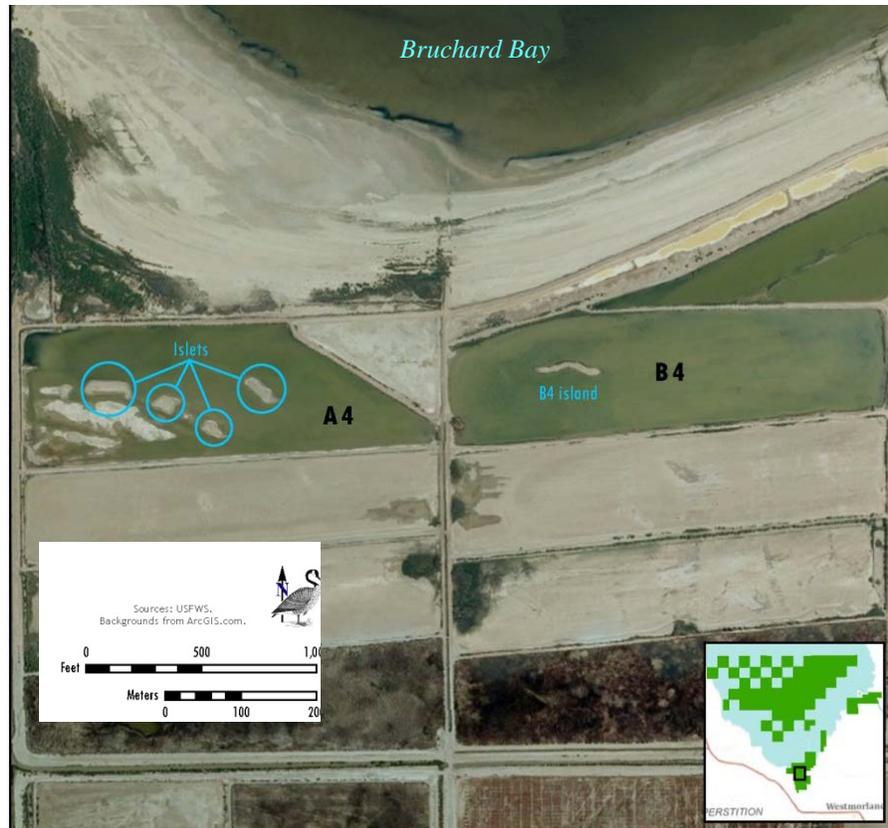
Permanent Cattail Marsh. Approximately 200 acres of permanent cattail marsh are managed on the Refuge. These freshwater marsh areas, which support a variety of secretive marsh birds (e.g., endangered Yuma clapper rail, black rail, Virginia rail, sora, least bittern), are located in portions of Unit 1 and Unit 2 (refer to Figures 4-1 and 4-2). Management of these areas involves periodic irrigation to maintain optimum water levels for the clapper rail and control of invasive plants around the perimeter of the marsh areas.

The primary management action in these areas is providing adequate water to support the vegetation. Approximately 12 acre-feet of water per acre are needed to maintain these wetlands throughout the year. Periodic water control structure maintenance is required, as well as levee maintenance. Invasive plant control focuses on salt cedar and common reed, but also involves attempts to reduce the coverage of a variety of other weedy species. Water flows into and out of the ponds by way of concrete water control structures. Maintenance involving the clearing of vegetation within a radius of approximately five feet around the structure is necessary to ensure free water flow and safe working conditions for employees who might otherwise encounter snakes, spiders, and ants. Vegetation in these areas is mechanically cleared using a backhoe or eliminated as a result of glyphosate application. Each structure is cleared approximately two times each year.

As these wetlands age and the cattails no longer regenerate, the structure and productivity of the marsh begins to decline. For rails, this means a decrease in food and shelter. This excessive accumulation of vegetation typically occurs about five to seven years after the marsh is initially developed. To re-establish good habitat quality in the marsh it is necessary to let the marsh dry out following the end of the breeding season. As the marsh dries out, rails and other marsh birds and wildlife will move to an adjacent marsh area. Once dried out and abandoned, the overgrown vegetation can be burned off in accordance with the requirements of a prescribed burn or mechanically removed.

Planning for a prescribed burn requires consideration of various issues including potential effects to clapper rails and other wildlife, and impacts to air quality. Past actions demonstrate that as the marsh dries out, clapper rails and other species in response to these dry pond conditions relocate into adjacent wet pond areas. Burning off the old-dead cattail structure renews the marsh, giving the still viable root stalks an opportunity to regenerate without competing with decayed old growth. A marsh that is burned in December or January will regenerate a new crop of cattails by the summer, at which time the marsh is repopulated with birds and other wildlife.

Permanent Open Water Wetlands. The permanent open water wetlands maintained on the Refuge are located just to the south of Bruchard Bay in Unit 1 (refer to Figure 4-1) and to the north of the Refuge headquarters and in two locations on the Hazard Tract in Unit 2 (refer to Figure 4-2). Approximately 143 acres are maintained on the Refuge as permanent open water for wildlife. About 105 acres of these permanent open water areas include earthen islands of various shapes and sizes that are maintained specifically to support nesting seabirds. The locations of nesting areas within Ponds A4 and B4 in Unit 1 are illustrated in Figures 4-5.



**Figure 4-5. Nesting Islands in Unit 1**

Gull-billed terns and black skimmers have been nesting on small islands in the open water wetlands located to the north of the Refuge headquarters since the early 1990s. Originally, this 30-acre “D” pond (Figure 4-6) was managed as a seasonal waterfowl pond. In 1995, the decision was made to maintain this pond as a year-round open water area for the primary purpose of replacing nesting areas for seabirds such as gull-billed terns, black skimmers, and Caspian terns that were being lost to rising water levels in the Salton Sea. Water levels in these ponds are maintained with water collected from the outflow of an adjacent permanent cattail marsh. Water from the cattail ponds has been subject to evaporation; therefore the outflow water has a relatively high mineral and salt content. Once distributed into the ponds, the water has salinity levels high enough to discourage the growth of emergent vegetation such as cattails and rushes. Some site management is however required to control salt cedar around the perimeters of the nesting islands.

Five of the earthen islands located in “D” pond were colonized by seabirds during the first nesting season following permanent inundation of the pond. The same seabird species continued to successfully fledge young for several subsequent years. Black-necked stilts and American avocets also nested on the islands during that first year and in subsequent years. In 2005, electric fencing was installed around the perimeter of “D” pond to deter mammalian predators, primarily raccoons and coyotes, from entering the ponds and accessing the nesting islands. This fencing continues to be maintained today, although its effectiveness appears to be limited.



**Figure 4-6. Nesting Islands in D-Pond, Unit 2**

Because of the conservation status of the gull-billed tern and black skimmer (identified by the Service as Birds of Conservation Concern), the Refuge developed new nesting islands in Unit 1, including a single large island in pond B4 in 2001 (refer to Figure 4-5) and several small islets in pond A4 in 2006, with the intent of increasing available nesting habitat during the summer months. The primary management action, which continues today, simply involves maintaining adequate water levels in these areas during the hot summer months. The water in these ponds is provided from the outflow of upstream permanent cattail marshes. Other management needs include annual removal of salt cedar from island perimeters and maintaining the electric fence installed around pond A4 to discourage mammalian predators from entering the pond. Islands need to be cleared of large vegetative growth to facilitate seabird nesting and without electric fences to limit access; mammalian predators would have easy access to islands, where they could prey on bird eggs and chicks.

The remaining 22 acres of permanent open water wetlands are located on the Hazard Unit, adjacent to the Alamo River. These two wetlands (Oxbow Lake and Hazard Lake) receive water from the Alamo River. Hazard Lake also receives freshwater outflow from Hazard pond 7. As the Salton Sea recedes and the subsequent lowering of the Alamo River follows, input from the Alamo River may be completely eliminated, requiring water flow from Hazard pond 7 to serve both Oxbow Lake and Hazard Lake if they are to be maintained as permanent open water wetlands.

**Native Salton Sea Scrub.** The 92 acres of native Salton Sea Scrub present on the Refuge occurs in three general locations, at the western edge of the Salton Sea on one of the original Refuge parcels (refer to Figure 3-20a), in the northwestern corner of Unit 1 (refer to Figure 4-1), and to the north of the Refuge headquarters in Unit 2 (refer to Figure 4-2). Management of these areas involves limited monitoring of habitat quality and surveillance for invasive species of concern.

**Riparian Areas.** The 15 acres of riparian habitat on the Refuge occur along existing waterways and along portions of the Salton Sea shoreline (refer to Figures 4-1 and 4-2). Some areas support native vegetation (e.g., black willow, mesquite), while other areas are dominated by invasive shrubs and other invasive perennials (e.g., tamarisk, common reed). As staffing and funding permits, efforts are continuing to remove invasive riparian plants both mechanically and with the use of herbicides. Once removed, the treated areas are planted with appropriate native shrubs.

**Tree Rows.** The 62 acres of tree rows on the Refuge are distributed in various locations throughout Units 1 and 2 (refer to Figures 4-1 and 4-2). Maintenance of these tree rows requires minimal effort and generally only involves periodic watering. Under Alternative A, no changes in current management of these areas would occur.

### **Salton Sea Restoration Partnerships**

The Refuge is working cooperatively with various agencies, including the USACOE, Bureau of Reclamation, California Natural Resources Agency, CDFW, and IID, in the development and evaluation of restoration proposals intended to address the effects of the receding Salton Sea on fish, migratory birds, and other wildlife. One of these projects is the Salton Sea Species Conservation Habitat (SCH) Project. As described here, a portion of one of the restoration alternatives under consideration for this project would occur within an area currently managed by the Refuge. Should this alternative be selected for implementation, the Service, which is a cooperating agency for the EIS/EIR, would use the EIS/EIR to authorize construction activities on Refuge-managed land.

### **Salton Sea SCH Project**

**Overview.** The USACOE, California Natural Resources Agency, and CDFW are proposing to restore up to 3,770 acres of wetland habitat at the south end of the Salton Sea. This restoration project is being proposed to address the loss of important fish and wildlife habitat in the Salton Sea as a result of ever-increasing hypersalinity and receding water levels. The goals, objectives, and basic components of the proposal are summarized here. For a complete description of the project alternatives, as well as an analysis of the potential environmental effects of implementing this restoration project, refer to the draft Salton Sea SCH Project Environmental Impact Statement/ Environmental Impact Report (EIS/EIR) (USACOE and California Natural Resources Agency 2011), available at <http://www.water.ca.gov/saltonsea/>. The draft EIS/EIR was released for public review and comment on August 17, 2011. The comment period ended October 17, 2011. Because the project boundary for several of the alternatives includes lands included within the Sonny Bono Salton Sea NWR, the Service is participating in the NEPA process as a cooperating agency in accordance with CEQ regulations. As a result, the Final EIS/EIR will serve as the Refuge's NEPA document for those portions of the project that occur within the Refuge boundary.

Salton Sea SCH Project Purpose and Goals. The purpose of the project under NEPA is to develop a range of aquatic habitats that will support fish and wildlife species dependent on the Salton Sea. The project was initiated in response to the anticipated loss of fishery resources in the Salton Sea that support piscivorous (fish-eating) birds. In recognition of the importance of the Salton Sea ecosystem, the California Legislature enacted legislation in 2003 that directed the California Resources Agency (now the Natural Resources Agency) to prepare a restoration study and a programmatic environmental document to explore ways to restore important ecological functions of the Salton Sea and to develop a preferred alternative. Funding for restoration planning and implementation is to be provided through the Salton Sea Restoration Fund, which was established with enactment of the Salton Sea Restoration Act (Chapter 13 of Division 3 of the Fish and Game Code commencing with Section 2930) and funded in part by Proposition 84 (The Safe Drinking Water, Water Quality and Supply, Flood Control, River and Coastal Protection Bond Act of 2006).

The current Salton Sea SCH Project, which is the next step in the restoration planning process, is designed as a “proof-of-concept” project in which several project features, characteristics, and operations could be tested under an adaptive management framework. The project goals are two-fold: 1) develop a range of aquatic habitats that will support fish and wildlife species dependent on the Salton Sea; and 2) develop and refine information needed to successfully manage the restored habitat (adaptive management).

To achieve the first goal, the project proposes to provide in-kind replacement for near-term habitat losses. The project’s target species are piscivorous bird species that forage within the Sea’s shallow saline habitat. Project objectives related to this goal include:

- Provide sufficient prey necessary to support piscivorous bird species;
- Develop appropriate physical structure and microhabitat elements to support life-history needs of target piscivorous bird species;
- Support a sustainable, productive aquatic community;
- Provide suitable water quality for fish;
- Minimize adverse effects on desert pupfish;
- Minimize the risk to birds of selenium bioaccumulation; and
- Minimize the potential for disease/toxicity impacts to birds.

Under the second goal, the project would incorporate an adaptive management framework to guide evaluation and improved management of the newly created habitat as well as to inform future restoration. The objectives associated with this goal include:

- Develop and implement a monitoring plan to measure key indicators of SCH Project performance;
- Develop a decision-making framework for evaluating data, adjusting management, and refining operations and monitoring as appropriate; and
- Provide proof of concept for future restoration to verify that the core ideas for the larger Salton Sea restoration proposal are functional and feasible.

Project Alternatives. Six alternatives, involving several different locations along the south end of the Sea, are evaluated in the draft EIS/EIR. Alternative 3 was identified in the draft EIS/EIR as the Natural Resources Agency’s preferred alternative. Alternatives 1, 2,

and 3, which include portions of Bruchard Bay, would occur within a portion of Unit 1 of the Sonny Bono Salton Sea NWR. Alternatives 4, 5, and 6 occur to the north of the Refuge along the southeastern edge of the Salton Sea. The six alternatives are listed below, and described in the draft EIS/EIR (USACOE and California Natural Resources Agency 2011).

- Alternative 1 – New River, Gravity Diversion + Cascading Ponds (3,130 acres of ponds constructed on either side of the New River).
- Alternative 2 – New River, Pumped Diversion (2,670 acres of ponds constructed on either side of the New River).
- Alternative 3 – New River, Pumped Diversion + Cascading Ponds (3,770 acres of ponds constructed on either side of the New River).
- Alternative 4 – Alamo River, Gravity Diversion + Cascading Pond (2,290 acres of ponds constructed on the north side of the Alamo River in Morton Bay).
- Alternative 5 – Alamo River, Pumped Diversion (2,080 acres of ponds constructed on the north side of the Alamo River, including Morton Bay and Wister Beach).
- Alternative 6 – Alamo River, Pumped Diversion + Cascading Ponds (2,940 acres of ponds constructed on the north side of the Alamo River, including Morton Bay and Wister Beach).

All alternatives considered for the SCH Project would restore shallow water habitat on land at elevations below -228 feet mean sea level (the former level of the Salton Sea in June 2005). The SCH Project would consist of one or more large ponded units that each contains three to five smaller ponds. The newly created habitat would be contained within low berms. The water supply for the ponds would be a combination of brackish river water and saline water from the Sea, blended to maintain an appropriate salinity range. This “proof-of-concept” project would be monitored for approximately ten years after completion of construction. It is expected that within this ten-year period, managers would have had adequate time to identify those management practices that best meet the larger restoration goals. After the proof-of-concept period, the Project would be operated until the end of the 75-year period covered by the Quantification Settlement Agreement (2078) or until funding were no longer available. The ponds would be constructed and operated by CDFW, on behalf of the California Natural Resources Agency, and where the project overlaps with the Refuge boundary, construction and long-term management and monitoring would be coordinated with Refuge staff.

Permits/Approvals. The following permits and consultations are expected to be required for project implementation:

- 1) NEPA/CEQA (public review of the draft EIS/EIR has ended);
- 2) Section 404 of the Clean Water Act (Standard Individual Permit);
- 3) Section 401 Water Quality Certification from the Colorado River Basin Regional Water Quality Control Board;
- 4) Consultation in compliance with Section 106 of NHPA;
- 5) Compliance with Section 7 of the Federal ESA;
- 6) Compliance with California Fish and Game Code section 1602 or 1605;
- 7) California ESA Section 2081 Incidental Take Permit from CDFW;
- 8) Approval of lease agreements from the State Lands Commission and/or IID;
- 9) Preparation of a Fugitive Dust Control Plan under Regulation VIII, Fugitive Dust Rules (800–806) of the Imperial County APCD; and

- 10) Other necessary haul and/or encroachment permits and easements needed to facilitate construction and operation of the project.

If the restoration alternative ultimately selected for implementation occurs within the Refuge boundary, a Special Use Permit and Memorandum of Understanding involving the Service, California Natural Resources Agency (including CDFW and Department of Water Resources), and USACOE would be prepared that addresses how and by whom project construction, habitat management, and monitoring would be implemented and funded.

### **Endangered and Sensitive Species Management**

The Refuge supports two federally listed species, the endangered Yuma clapper rail and the endangered desert pupfish. The Refuge addresses management of these listed species as needed and the type of management depends on which species is being addressed.

Yuma Clapper Rail. In the case of the Yuma clapper rail, the Refuge is situated in a core area for the species, so it was considered appropriate for the Refuge to manage some portion of the Refuge for this species. Such management is consistent with the overarching goal for the NWRs. Early on, management of this species was implemented opportunistically as areas capable of supporting freshwater marsh habitat were identified. Management began in 1988 when about 60 acres of habitat were set aside for the species.

Today, about 200 acres of permanent cattail marsh are managed on the Refuge in large part to provide habitat for the Yuma clapper rail. The densities of clapper rails supported in these managed marshes are some of the highest throughout its range. These cattail marshes also provide habitat for the State threatened California black rail, as well as the least bittern, a Bird of Conservation Concern.

Annual secretive marsh bird surveys are conducted on the Refuge three times a year between March and May. These surveys are conducted as part of the National Marshbird Monitoring Program. Because of the presence of the endangered Yuma clapper rail within the Refuge marshes, these surveys emphasize monitoring of the existing clapper rail population, and include an annual spring call playback survey, consistent with the recommendations in the Yuma Clapper Rail Recovery Plan (USFWS 2009a). Monitoring data are shared with partners and maintained at the Refuge office for use in comparing population levels from year to year and over extended periods of time.

Desert Pupfish. No specific actions related to the management of the endangered desert pupfish are currently implemented on the Refuge, and management of the species on the Refuge would be very difficult to implement if it were to be proposed. This species currently occurs in the Salton Sea, drainage ditches connected to the Salton Sea, and has been recently found in one of the Refuge managed water areas. Although no management actions are currently implemented to support the desert pupfish, precautions are taken to ensure that those actions implemented by the Refuge do not adversely affect the species.

Nesting Seabirds of Conservation Concern. In recent years, nesting areas, including artificial nesting platforms, within the Refuge's permanent open water areas have been managed to support nesting habitat for seabirds, particularly gull-billed terns and black skimmers, both designated as Birds of Conservation Concern by the Service. In an effort to reduce mammalian predation of gull-billed tern and black skimmer chicks and eggs, the Refuge maintains electric fencing around potential nesting areas. The Refuge currently supports annual monitoring of these nest sites. Data gathering includes species presence and

abundance, number of gull-billed tern and black skimmer nests, chicks, and successful fledges, and any information available regarding adult, chick, and/or egg mortality and/or predation. Gull-billed tern breeding surveys are conducted annually from April through August. These surveys also include incidental counts of associated breeding seabirds.

Chick banding to assist in monitoring tern movements and survival is conducted only when colony disturbance would be minimal. Monitoring and banding data are shared with various partners and maintained at the Refuge office for use in comparing population levels and productivity from year to year and over extended periods of time.

Other Species of Concern. Although a number of management actions implemented on the Refuge are intended to protect and support specific listed or sensitive avian species, many of these and other management actions also provide direct and indirect benefits to a variety of other avian species listed as threatened or endangered by the State and/or identified by the State or Service as species of concern. For instance, the State endangered Gila woodpecker (a rare sighting on the Refuge during migration) and particularly the little willow flycatcher (often observed on the Refuge during spring migration) benefit from the management activities occurring within the Refuge's riparian habitat. Wintering greater sandhill cranes, a State threatened species, derive benefits from the Refuge's efforts to provide winter forage for waterfowl, and a variety of shorebirds identified as Birds of Conservation Concern benefit from the foraging and resting opportunities provided within the seasonal shallow wetlands and permanent open water wetlands that are managed and maintained on the Refuge.

#### **Resident Native Species Management**

The Refuge implements various actions to support native birds, reptiles, and other wildlife. These include maintaining tree rows, providing nest boxes for burrowing owls, and replacing salt cedar with stands of mesquite and black willow. Through a contract with the California Conservation Corps, the phased removal of salt cedar is underway. The project with the goal of restoring 100 acres of native riparian shrub vegetation, including black willows and mesquite, near Bruchard Bay in Unit 1 will support resident birds, as well as visiting Neotropical species.

#### **General Habitat Management**

General management actions implemented on the Refuge to support habitat and species include maintaining the wetland and farm water distribution system, managing water movement through the Refuge to irrigate fields and flood impoundment areas, conducting various bird surveys, controlling invasive plant species, and year-round surveillance for avian disease on the Salton Sea. Occasionally, prescribed burns are conducted to address species habitat management issues.

Bird Surveys. In addition to species monitoring, aerial waterfowl surveys are also conducted by Refuge staff for the Salton Sea and surrounding areas monthly between November and February of each year. Refuge staff also conducts annual sandhill crane surveys monthly between October and March and partners with CDFW to conduct monthly waterbird surveys on the Salton Sea.

Invasive Plant Control. Invasive plant control in the form of mechanical and chemical control is implemented on the Refuge. Glyphosate or imazapyr is used to control woody invasive species that occur adjacent to wetlands and within the water delivery ditches that provide water to the farm fields and managed wetlands. Although the practice of no till in the farm fields is intended to and possibly has reduced the numbers of weeds; some control of broad-

leafed invasive weeds is still required. The herbicide Milestone has been used most often to control broad-leafed weeds in these areas.

All herbicides used on the Refuge must be reviewed and approved as part of the Service's Pesticide Use Proposal System (PUPS). The PUPS identify specific pesticides approved for use on each Refuge, and includes details on target pests, products applied, application dates, rates, methods of use, number of applications, site description, sensitive habitats, and best management practices (BMPs) to avoid impacts to sensitive resources. The herbicides approved for use on the Refuge in 2012 through the PUPS process are listed in Table 4-3. This table also provides information regarding the target weeds and modes of application for each of the approved products.

Pesticide use is regulated at both the Federal and State level (California Department of Pesticide Regulations 2011). The Imperial County Agricultural Commissioner also regulates the use of Restricted Use Materials, including the herbicides used on the Refuge. A user permit is required for lands on which restricted pesticides are to be applied. This permit defines the manner, method and approximate time of the proposed application. All agricultural and commercial pesticide applications are randomly monitored to ensure that pesticides are handled in an environmentally safe manner.

Mechanical methods used to remove invasive plants can include, but are not limited to, digging by hand, a nylon filament trimmer (weed "whacker"), chainsaw, uprooting the plant with a jack or hand pulling, and tilling. Other methods of control may include increasing salinity levels in seasonal ponds to control cattail growth and prescribed burning to remove salt cedar, common reed, and other unwanted vegetation.

Monitoring Avian Disease on the Salton Sea. Until the early 1990s, the Refuge did not provide any management within the Salton Sea. However, in 1992, a disease outbreak effecting eared grebes resulted in 200,000 deaths. There is no confirmed cause for these deaths, although there is some thought that it may have been related to excessive blue-green algal toxins in the Sea. In the mid-1990s, thousands of California brown pelicans and American white pelicans died of avian botulism. As a result of these and other events, the Refuge, CDFW, USEPA, USGS, Bureau of Reclamation, and Salton Sea Authority in the late 1990s developed a plan for avian disease monitoring and response.

The Refuge also established a Site Health and Safety Plan, defined Airboat Operating Procedures specific to avian disease monitoring, entered into a Memorandum of Understanding with the Salton Sea Authority for sustained disease monitoring on the Salton Sea, and set up regular year-round coordinated patrols with CDFW to search for and remove sick and dead birds. Sick birds are provided with rehabilitation, and dead birds are promptly disposed of to reduce the potential for spreading disease. The Refuge maintains various facilities to assist in response and care, including a hospital, recovery cages, and incinerators to properly dispose of carcasses. This active program requires staff time commitments primarily in the summer, but winter work is also necessary. This coordinated effort appears to be working because there have been no major disease outbreaks since it started. The Refuge will to continue to partner with the State in this effort, per available funding.

**Table 4-3  
Pesticides Approved for Use in 2012 on the Sonny Bono Salton Sea NWR**

<b>Active Ingredient</b>	<b>Glyphosate (terrestrial)</b>	<b>Glyphosate (aquatic)</b>	<b>Dicamba</b>	<b>Imazapyr</b>	<b>Triclopyr</b>	<b>2,4-D DMA</b>	<b>Tribenuron-methyl</b>	<b>Halosulfuron-methyl</b>	<b>Aminopyralid</b>
<b>Product Name(s)</b>	Razor Pro	AquaNeat	Clarity	Stalker	Garlon 3A	WEEDAR 64	Express	Sandea	Milestone VM
<b>Target Pests</b>	cheeseweed, Bermuda grass, goosefoot; applied on dry ditch banks and in managed agricultural fields	cattail, salt cedar, Bermuda grass; applied in water ditches and wetland units	broadleaf plants; applied in managed agricultural fields	salt cedar; applied wherever control of salt cedar is required, not used in managed agricultural fields	sesbania; applied in dried seasonal wetlands, except those supporting Yuma clapper rail	broadleaf plants (cheeseweed, lambs-quarter, Sahara mustard); applied in managed agricultural fields	Sahara and black mustard, London rocket; applied in managed agricultural fields	yellow nutsedge; applied in managed agricultural fields	cheeseweed, goosefoot, London rocket, puncturevine; applied in managed agricultural fields
<b>Treatment Site</b>	terrestrial	aquatic	terrestrial	terrestrial, aquatic	terrestrial	terrestrial	terrestrial	terrestrial	terrestrial
<b>Treatment Area</b>	200 ac.	800 ac.	900 ac.	200 ac.	50 ac.	850 ac.	900 ac.	900 ac.	900 ac.
<b>Application Method(s)</b>	foliar	foliar	foliar	foliar	foliar	Boom sprayer	aerial 1 oz./ac. boom sprayer	aerial 1 oz./ac. boom sprayer	aerial
<b>Application Rate(s)</b>	5 qt./ac.	2 qt./ac.	32 oz./ac.	64 oz./ac. boom sprayer	0.67 gal./ac.	2 pints/ac.	ground 1 oz./ac.	ground 1 oz./ac.	7 oz./ac.
<b>Application Equipment(s)</b>	tractor sprayer	backpack sprayer	boom sprayer	cut stump 64 oz./acre hand-held sprayer	boom sprayer		tractor, ATV, backpack sprayer	tractor sprayer	boom sprayer
<b>Applications per year</b>	1	3	2	1	1	1	1	1	1

### **Public Use**

The public use program on the Refuge includes opportunities for hunting, fishing, wildlife observation and photography, environmental education, and interpretation. Facilities that support these uses are present in both Unit 1 and Unit 2 (refer to Figures 4-3 and 4-4).

Public Access. Areas of the Refuge open to the public include the main portion of the Refuge that was inundated by the Salton Sea in the 1940s (this area is only accessible by boat); the visitor area, observation platform, and interpretive trail to Red Hill located adjacent to the Refuge Complex headquarters in Unit 2; approximately 480 acres within the Union Tract and the Hazard Tract, which are accessible during the hunting season for purposes of waterfowl hunting (refer to the discussion of waterfowl hunting); and the main entry road, parking area, observation decks, and interpretive trail in Unit 1.

An estimated 12,000 visitors stop at the visitor contact station each year, but the total number of visitors to the Refuge is likely on the order of 25,000 visits per year, since many birdwatchers visit Unit 1 (which has no counter) and do not stop by the visitor contact station during their stay. Visitors come from the local community, the larger metropolitan areas to the west (San Diego), northwest (Los Angeles), and east (Phoenix/Tucson), and the rest of the country. Identified as one of the top 50 birding hot spots in the nation by WildBirds and one of the top 200 North American Birding Hot Spots by birding.com, this Refuge also attracts a large number of international visitors. Based on the information provided by visitors who sign the Refuge guestbook, individuals from more than 20 countries annually visit the Refuge. Although the majority of the visitors to the Refuge are present during the winter months, because the Refuge is recognized as important birding area year-round, visitors may be present even on the hottest of summer days.

Waterfowl Hunting. Two areas are open seasonally for waterfowl hunting on the Refuge including approximately 350 acres on the Hazard Tract and 130 acres on the Union Tract (refer to Figure 4-4). Within the Union Tract, the primary target is white geese (snow geese and Ross' geese), while a wider range of waterfowl are present within Hazard Tract. Hunting has been occurring in this area since at least 1953 according to Refuge records. The hunting program generally accommodates about 1,000 hunter visits per year. With this level of use, about half of the blinds are not filled during most of the season on the Hazard Tract. The Union Tract hunting blinds are filled more frequently, reaching 100 percent capacity on all open hunt days late in the season.

CDFW administers the Refuge's hunt program and operates the check stations under a cooperative agreement with the Service. Hunting is permitted on Saturdays, Sundays, and Wednesdays during the open season, and only ducks, geese, American coots, and common gallinules (moorhens) may be hunted. Hunters must comply with the State of California's "Waterfowl and Upland Game Hunting & Department Lands Public Use Regulations," which are updated annually, including the specific regulations addressed in the section entitled, *National Wildlife Refuges with DFG Hunting Programs*.

A total of 80 hunters can be accommodated on the Refuge during a hunt day. Hunting blinds are assigned to those holding advance reservations, which are issued by CDFW. Hunters with reservations must present them at the Wister Check Station no later than 1.5 hours before shooting time. Vacancies occurring from no show reservation holders and from hunters leaving the area are filled according to the order established in the previous night's drawing at the Wister Check Station. Hunters must obtain a permit at the Wister Check Station, which is to be in the hunter's possession while hunting on the Refuge. Hunters are permitted to enter

only the assigned blind site for which the permit is issued. A fee is required for all persons 16 years and older. All hunters are required to check out at the Wister Check Station, report hunting results, and return their permits before leaving the area.

Only the use of shotguns and steel or other nontoxic shot, as approved by the Service, may be used on the Refuge, and a hunter may not possess more than 25 shot shells while in the field. Firearms must be unloaded when being transported between parking areas and blind sites. No camping or use of trailers is allowed on the Refuge. As of 2012, Refuge staff did not include a Federal wildlife officer; therefore, monitoring of compliance with Refuge hunting regulations involves limited visiting law enforcement from either the Service or CDFW.

On the Hazard Tract, hunting opportunities are provided at about one hunter party (i.e., up to four hunters per blind) per 20 acres. There are a total of 18 duck hunting blind sites in this area, each consisting of a double set of buried concrete pit blinds capable of hosting up to four hunters per site. Hunters may hunt from within 100 feet of their assigned blind sites or stakes, and can only leave this area to retrieve downed birds. Northern pintail, green-winged teal, and northern shoveler are common species taken at these blind sites. About six inches and no more than one foot of water is retained in the ponds within the Hazard Tract to float decoys.

The Union Tract, which consists of the farm fields located to the south of the Refuge headquarters, provides an opportunity for goose hunting three days a week. In this area, goose hunting usually does not begin until mid-November when rye grass is better established and greater numbers of geese have arrived in the Imperial Valley.

The arrangements for hunting blind sites on this tract are generally the same as those described for the Hazard Tract, although these sites provided more space for hunters to decoy in geese. Four hunt sites are available in these fields and free roam hunting is not permitted. Hunters are required to hunt only from within their blinds, except to retrieve downed birds. Two hunting blind sites on the Hazard Tract and another on the Union Tract are available for use by disabled hunters by priority on Wednesday and Saturday. Accessible parking is provided at this site. If there are no disabled hunters requesting this site, it is open to all requesters. On Sunday, there is no priority on any of these blinds.

Fishing. The only part of the Refuge that is open to fishing is the area of the Refuge located within the Salton Sea, which is considered a navigable water of the U.S. No bank fishing or fishing in water drainage channels is permitted. The sea is closed to fishing during the winter months (October 1 to March 31) to protect waterfowl from disturbance. There are no buoys in the sea to delineate the Refuge boundary. Use of the areas within the Refuge for fishing is limited, and as a result, disturbance to Refuge trust species is low. Refuge waters are patrolled by Refuge staff using an air boat.

Wildlife Observation. The Sonny Bono Salton Sea NWR provides a variety of opportunities for wildlife observation on Unit 1 and Unit 2. In Unit 1, two observation platforms, an interpretive loop trail, and two blinds are provided. The newest observation deck is accessible and provides views of the Refuge's managed seasonal wetland areas and cattail marshes. The other observation tower provides views of adjacent freshwater cattail marsh habitat where the occasional call of a Yuma clapper rail can be heard. Distance views of open water habitat and the Salton Sea are also provided. A range of migratory and resident birds can be observed from these facilities. Secretive marsh birds are more likely to be heard than seen. In addition to waterfowl, shorebirds, and seabirds, there are also seasonal opportunities to see and hear a variety of Neotropical songbirds.

A one-mile interpretive loop trail (Michael Hardenberger Trail) is available for public use in Unit 1. The trail extends around existing freshwater marsh habitat and shallow seasonal wetland areas. Two photo blinds have been constructed along the trail that also serve as birding blinds. This trail begins near a small unpaved parking area at the end of Vendel Road. Additional opportunities for wildlife observation are available from Vendel Road.

Opportunities for wildlife observation are also available in Unit 2, primarily in the vicinity of the Refuge headquarters, located at the intersection of West Sinclair Road and Gentry Road. The two-mile round-trip Rock Hill Trail leads from the Refuge headquarters' visitor parking area to the top of Rock Hill. Along the route, there are opportunities to view wildlife in a variety of managed habitats including farm fields that provide forage for geese; open water habitat that supports shorebirds, seabirds, and other waterbirds; and nesting areas that support tern colonies in the summer. Near the start of this trail is an elevated observation deck that provides views of the farm fields and distant views of the Salton Sea.

Prior to the receding of the Salton Sea, wildlife observation also occurred along the west side of Garst Road in the vicinity of Red Hill Bay. Although some opportunities for wildlife observation continue, they are much more limited than in the past.

Photography. Two photo blinds are present along the interpretive trail in Unit 1. Use is on a first come, first served basis. One blind is situated alongside a pond managed to support shallow seasonal wetland habitat. The opening in the blind faces a small island and tree snag where birds often perch, making for a good photo opportunity. Shorebirds and waterfowl can be observed and photographed from this spot. The other blind is located among the cattails in the middle of freshwater marsh habitat. When the blind was constructed, the surrounding habitat consisted of open water habitat, however, over time this area converted to freshwater marsh habitat. Today, this blind would more likely be used as a listening blind where visitors can hear the calls of Yuma clapper rails and other secretive marsh birds.

Opportunities for wildlife photography are also available along the roadway leading to Unit 1 where during the appropriate season there is a high potential to spot shorebirds, geese, and sandhill cranes.

Environmental Education. Environmental education tours for third through eighth grade students from local schools are conducted annually on the Refuge. Staff from the Refuge also visit local schools to provide information to the students about the resources present in and around the Refuge. In addition, using challenge cost share money to pay for buses and drivers, the Refuge hosts 60 to 70 sixth graders two days a week (about 560 students a year) during the school year. This is a joint project with the Imperial Valley Regional Occupation Program and the Refuge. Special tours for Imperial Valley Community College and other educational institutions are also accommodated. Refuge staff also participate in Earth Day events and school nature curriculum programs.

Interpretation. Interpretive panels are provided along the Rock Hill trail that interpret a variety of issues including the cultural and geologic history of the area, the Refuge's diverse bird life, Refuge management actions, organisms in the Salton Sea, and geothermal and earthquake activity in the area. Interpretive signs that address the bird use in the area are provided along the interpretive trail in Unit 1.

Guided interpretive group tours are provided throughout the year, although more commonly in winter and spring. Arrangements can be made in advance for a group tour by contacting Refuge staff.

**Research.** Over the years, the Refuge has supported various research projects and resource surveys conducted in association with graduate work at various universities and/or implemented by other public (e.g., USGS, CDFW), private, and non-profit researchers. All research conducted on the Refuge is evaluated to ensure that the work being conducted is compatible with Refuge purposes and is likely to result in benefits to Refuge management and/or Refuge resources. Work conducted on the Refuge by outside individuals, organizations, or agencies that is not directly related to Refuge management may only be conducted after a Special Use Permit (SUP) has been issued by the Refuge Manager that documents the purposes of the work to be conducted and includes specific conditions intended to protect trust resources and ensure adherence to applicable Refuge regulations and policies.

### **Refuge Operations**

**Staffing.** In 2012, the Refuge was managed with assistance from 11 permanent full time employees, two full time term employees, and one student participating in the Service's Student Temporary Employment Program. Four additional positions were included on the approved organizational chart, but had not been filled, including Park Ranger (term position), Biological Technician (term position), Irrigation System Operator (term position), and Tractor Operator (term position). Refuge Complex offices are all located in Unit 2 of the Refuge.

**Law Enforcement.** Law enforcement on the Refuge is the primary responsibility of the Service's uniformed Federal wildlife officers, although CDFW wardens also provide assistance, particularly during the hunting season. Federal wildlife officers enforce Federal wildlife laws on Service-owned lands within the National Wildlife Refuge System. They are charged with protecting wildlife and wildlife habitat, protecting Service facilities, and ensuring employee and visitor safety. Duties may include patrols, surveillance, investigations, apprehensions, seizures and arrests, and interaction with the judicial system. Refuge officers often work with other Federal, Tribal, State and local law enforcement agencies that have overlapping jurisdiction within and adjacent to NWRs. Currently, the Refuge Complex organizational chart does not include a Federal wildlife officer, therefore, law enforcement is provided by the Southern California zone officer, who is stationed at the San Diego NWR Complex.

**Refuge Headquarters.** Refuge complex administrative offices (headquarters) include a 2,300-square-foot building with five staff offices, a file/copy area, two staff restrooms, a visitor contact station, and two visitor restrooms with access from outside the building. Refuge visitors enter the headquarters and visitor contact station from the junction of West Sinclair Road and Gentry Road. A paved parking lot with 25 parking stalls is provided for visitors. Adjacent to the parking lot is a 450-square-foot shaded picnic area and a wheelchair accessible observation deck. This area connects to the Rock Hill Trail. From the parking lot, visitors also have access via a concrete walkway to the restrooms and visitor contact station that is part of the administrative offices.

The visitor contact station provides the public with the opportunity to interact with Refuge staff. The Refuge relies on a combination of staff members and volunteers to staff the visitor contact station, with volunteers available from October through April. During that time, the volunteers work Friday, Saturday, Sunday, and Monday. These seasonal volunteers are permitted to stay at the Refuge in their recreational vehicle (RV), which is accommodated

within the Refuge compound at a designated RV pad with full hook-ups. Refuge staff assists at the visitor contact station on Tuesday, Wednesday, and Thursday during the season and on weekdays between May and September.

Also included within the Refuge headquarters compound is a four-bedroom residence built in 1952. Housing a Refuge staff member at this location helps to facilitate visitor and facility security. The Refuge compound also includes two bunkhouses to accommodate researchers and temporary employees. The bunkhouse built in 1999 has five bedrooms and the one built in 2005 has three bedrooms.

A bird recovery and avian disease management area is located at the north end of the compound yard. This facility is intended to provide staff with a place to provide initial treatment of sick birds picked up on the Salton Sea and minimize the spread of contagion in the environment. Included in this part of the facility is a 360-square-foot triage/hospital building. Next to the hospital is a shaded outdoor holding pen where birds can recover and be released back into the wild or be taken to a licensed rehabilitation facility. This area can hold up to 100 pelican-sized birds at any one time. Also part of the facility is a small research building with instrumentation to help visiting researchers study diseases and other organisms of the Salton Sea. As part of the Refuge's role in attempting to contain avian disease agents, two propane fired incinerators capable of burning up to 120 pounds per hour are available to incinerate dead birds and disease organisms they may be carrying. Two storage barns (one five-bay barn and another three-bay barn) provide shelter for air boats and space for a refuge woodshop.

Also located with the compound is a maintenance building that provides work space and tools to help maintain refuge vehicles and equipment. The maintenance building consists of four work bays with roll-up doors and office space for maintenance staff. Fuel storage is provided to accommodate the fuel needs of refuge vehicles and farm equipment.

Attached to the roofs of four buildings and a parking shade structure are approximately 250 photovoltaic solar panels that annually generate up to 80,000 useable kilowatt hours of electricity during daylight hours or the equivalent of about 87 percent of the Refuge compound's electrical needs.

Other Refuge Facilities. Other facilities maintained on the Refuge include roads, primarily unpaved, water pumps, irrigation gates, and other irrigation equipment, drainage channels, and unpaved parking areas to serve hunting and other visitor service purposes. The Refuge also maintains a permanent portable restroom in Unit 1 near the observation tower and temporary restrooms during the hunting season on the Hazard and Union Tracts.

Land Tenure. The vast majority of the area within the Refuge that is owned in fee title by the Service was inundated by the Salton Sea in the 1940s. Only a small portion of this fee title land, approximately 140 acres located along the western edge of the Salton Sea, was never inundated. The only other fee title upland areas within the Refuge, a total of approximately 690 acres, was acquired in the 1970s and 1980s, as described in Chapter 1, for the purpose of providing foraging habitat for wintering geese.

Approximately 2,500 acres of the Refuge to the south of the Salton Sea were leased to the Service by the IID in the 1940s and 1950s. The original leases have expired and the IID is not interested in entering into another long term lease at this time; as a result, the Refuge operates on a year to year lease. The Refuge continues to coordinate with the IID in an effort to once again enter into a long term lease agreement.

Geothermal interests own subsurface geothermal resources in and around the lands leased to the Refuge by IID. The Refuge recognizes IID's need to provide access through these lands for geothermal wells and piping, and as the Salton Sea recedes, there will likely be requests from geothermal interests to place or relocate pipelines and access facilities. Some of the areas affected could include lands currently leased by the Service, requiring potential changes in the current Refuge boundary.

With respect to the Hazard Tract, located in Unit 2, the Service has managed this area under a permit with CDFW for many years. The land covered by the permit, which was originally approved in the 1960s, includes waterfowl hunting areas and several Yuma clapper rail management areas. Although the permit has expired, the Service and State are in the process of renewing the agreement. In the meantime, the Service continues to manage the habitat and the State continues to manage the site's hunting program.

In addition to the fee title lands and IID leased lands, approximately 240 acres (the Caltrans Fields) in Unit 1 is managed under an agreement with the California Department of Transportation (Caltrans), which owns the land. This land has been managed as part of the Refuge for goose forage since 1992. As part of an agreement between Caltrans and the Service's Ecological Services program, these lands were to be deeded to the Refuge as part of a mitigation plan for nearby Caltrans projects. Although the land ownership transfer has not yet occurred, the Refuge continues to manage these lands for goose forage. These fields represent some of the most heavily foraged fields within the Refuge. The Refuge will continue to work with interested parties to either acquire the land or obtain the necessary agreements to manage it on a long-term basis.

### **Fire Management Plan**

The Fire Management Plan prepared for the Sonny Bono Salton Sea NWR in 2001 was prepared as an operational guide for managing the Refuge's wildland fire and prescribed fire programs. It defines levels of protection needed to help ensure safety, protect facilities and resources, and restore and perpetuate natural processes, given current understanding of the Refuge relationships in natural ecosystems.

The Fire Management Plan adheres to the Service's policy and regulations pertaining to fire management activities and supports the enabling legislation of the Sonny Bono Salton Sea NWR. All fire management plans must comply with a Service-wide requirement that Refuges with burnable vegetation develop a fire management plan (620 DM 1). The DOI Manual states the following regarding wildland fires: "Wildfires may result in loss of life, have detrimental impacts upon natural resources, and damage to or destruction of man-made developments. However, the use of fire under carefully defined conditions is to be a valuable tool in wildland management. Therefore, all wildfires within the Department will be classified either as wildfire or as prescribed fires."

The objectives of the Refuge's Fire Management Plan (USFWS 2001) are:

- To protect life, property, and natural resources from unwanted fire;
- Use prescribed fire to accomplish resource management objectives within the context of a natural ecological process;
- Develop and implement a process of collection, analysis, and application of fire management information needed for sound management decisions, and

- Use prescribed fire to manage and enhance the habitat as research and experience demonstrates the need.

The Refuge Fire Management Plan describes the responsibilities of various Refuge personnel for the implementation of the Plan. The Sonny Bono Salton Sea NWR does not have a dedicated fire management staff; therefore, the Project Leader is responsible for planning and implementing the fire management program on the Refuge. The Zone Fire Management Officer (FMO) located in San Diego is responsible for fire management program over-site and coordination. The Project Leader has assigned fire management responsibilities to staff, who possess appropriate training, experience, and incident qualifications. Pre-suppression planning and work is accomplished by Refuge staff in accordance with national and regional fire management direction under guidance from the Zone FMO. Emergency fire management actions are handled by Refuge staff according to training and incident qualifications. The Zone FMO is to be immediately notified of all actions.

Cooperative agreements with various Federal, State, and local agencies generally provide that resources of each agency are available to assist in initial attack efforts. The primary emergency wildland fire management contact for Sonny Bono Salton Sea NWR is the Cleveland National Forest Emergency Command Center (ECC) located in El Cajon, California. The ECC handles wildland fire emergency dispatching for the Refuge under a cooperative agreement. Westmoreland Volunteer Fire Department is the fire department responsible for structural fire protection on the Refuge. The BLM's California Desert District is also considered a cooperator due to their proximity to the Refuge and their ability to provide resources. Additional information about these cooperating agencies, and additional information and direction related to fire response, are provided in the Refuge Emergency Fire Plan, which is included in the Complex's Fire Management Plan.

Historically, wildfires on the Refuge have been very rare. When they have occurred, they usually involve stands of salt cedar. Due to the limited value of salt cedar as wildlife habitat, most of these fires are extinguished only when initial attack will be most effective, such as along breaks or clearings in stands of vegetation. However, the fire may be more aggressively attacked if it threatens higher value habitat or resources such as private property, croplands, or cattail ponds during nesting season, where important species could be adversely affected.

The Sonny Bono Salton Sea NWR has been conducting prescribed burns for at least 12 years. As of 2001, on average, two prescribed fires covering 100 acres were conducting on the Refuge annually. In recent years, the use of prescribed fire on the Refuge has been limited to once every few years, as needed to improve habitat in cattail marshes. When a prescribed fire is conducted on the Refuge, it is managed by the Service fire crew based out of the San Diego NWR Complex.

All prescribed burns are conducted in accordance with the approved Fire Management Plan and applicable County and air basin regulations. In past years, fire has been used to improve habitat quality by creating open areas within dense cattail stands. This action has been conducted most often to improve conditions for the Yuma clapper rail. Prescribed fire has also been implemented in the past to remove stubble vegetation in managed agricultural fields in an effort to return nutrients to the soil and remove decadent grassland cover. This activity improves the vigor and quality of foraging crops cultivated to attract geese to the site.

Prescribed burns may also be used to treat and remove exotic vegetation (e.g., salt cedar, common reed). Such burns are typically carried out as a “pile” burn and are generally located in dry, open ponds or disced agricultural fields where there is very little risk of unwanted fire spread.

Prescribed burns involve the use of fire as a tool to achieve management objectives. Research burning may be conducted when determined necessary for accomplishing research project objectives. Actions included in the prescribed burn program include: the selection and prioritization of prescribed burns to be carried out during the year, prescribed burn plans, burn prescriptions, burn operations, documentation and reporting, and burn critiques. Measures to ensure the successful implementation of the prescribed fire program include:

- Conducting a vigorous prescribed fire program with the highest professional and technological standards;
- Identifying the prescribed burn type most appropriate to specific situations and areas;
- Efficiently accomplishing resource management objectives through the application of prescribed fire;
- Continually evaluating the prescribed fire program to better meet program goals by refining prescriptions treatments and monitoring methods, and by integrating applicable technical and scientific advancements;
- Preparing prescribed burn plans with a review by a qualified Prescribed Fire Manager/ Prescribed Burn Boss, and approval by the Project Leader; and
- Conducting prescribed burns with an adequate number of qualified personnel to conduct the burn as well as to mop-up.

All prescribed fire activity is implemented in compliance with applicable Federal, State, and local air quality laws and regulations. The Imperial Valley Agricultural Commission, which regulates the prescribe burn program for the Imperial Valley APCD, approves annual burn permits for the Refuge and specific requests for a prescribed burn on the day of the burn.

The management actions that would be implemented under the No Action Alternative would be consistent with the implementation direction in the currently approved Fire Management Plan for the San Diego National Wildlife Refuge Complex (USFWS 2004) or any updated Fire Management Plans prepared for the Refuge Complex in accordance with Service policies and regulations.

### **Mosquito Management**

As of 2013, mosquito monitoring and control was not conducted on the Sonny Bono Salton Sea NWR.

### **Cultural Resource Management**

It is the policy of the NWRs to identify, protect, and manage cultural resources located on Service lands and affected by Service undertakings for the benefit of present and future generations and in accordance with applicable laws and regulations. Cultural resources, including both archaeological and historic sites, are known to occur in the vicinity of the Refuge. Some of the known archaeological sites have been previously evaluated to determine if they are eligible for inclusion on the National Register of Historic Places (NRHP), while others have not yet been evaluated. It is also likely that sites occur on the Refuge that have not yet been detected and/or recorded. Because cultural resources are known to be present in the

area, any Refuge project that would result in subsurface disturbance of previously undisturbed soil or disturbance that would extend below the depth of previous disturbance (e.g., below soils historically disturbed by agricultural activities), or would impact a structure that is considered more than 50 years old must be reviewed by the Service's Cultural Resources Program for compliance with Section 106 of the Historic Preservation Act. The review process involves the preparation of a Request for Cultural Resources Compliance which is submitted to the Regional Cultural Resources Office for review. With information about the project location and extent of the proposed ground-disturbing activity, the Cultural Resources Office will determine the potential effect of the proposal on cultural resources. Those projects that are not likely to affect subsurface materials could fall under the Service's programmatic agreement with the State Historic Preservation Office (SHPO), while other projects requiring greater ground disturbance could require SHPO review and concurrence. When there is a potential for disturbance to cultural resources, consultation with federally recognized Tribes, interested parties, and SHPO is required. Review and consultation requirements are applicable to all of the alternatives evaluated in the CCP.

#### **Environmental Contaminants Coordination**

The Service's Environmental Contaminants Program assists the Refuge Manager in issues related to contaminants, including seeking funds to conduct contaminant assessments, monitoring, and other studies related to the effects of contamination on Refuge trust resources. The Carlsbad Fish and Wildlife Office's Contaminants Program has assisted in addressing potential contaminants issues on the Sonny Bono Salton Sea NWR on several occasions, including on issues related to selenium. The accumulation of selenium in Salton Sea sediments and water where prey items occur represent a potential threat to nesting and foraging waterbirds. Monitoring efforts have been implemented in the past and will likely continue. Under all of the alternatives, the Contaminants Program would continue to work with the Refuge on this and other contaminant issues.

#### **Volunteers/Partners/Public Outreach**

The Refuge has a small, but active volunteer program. Volunteers staff the visitor center contact station on Fridays, Saturdays, Sundays, and Mondays from October through April. They are paid a small stipend and are allowed to live on the Refuge at a designated RV pad during the period in which they provide volunteer services. These and other volunteers go through a volunteer training program conducted by Refuge staff that enables the volunteers to orient visitors and answer questions related to birding. The Refuge also received assistance from members of the Anza-Borrego Foundation.

The Refuge also has a variety of Federal, State, and local partners that assist in conducting environmental education programs, managing the hunting program, and managing Refuge resources. These partners include CDFW, State Resources Agency, IID, Imperial County Regional Occupational Program, Desert Protective Council, Friends of Wister, Anza Borrego Natural History Association, Imperial County Farm Bureau, Coachella Valley Association of Governments, Center for Natural Lands Management, Imperial County Airport, and the Brawley Chamber of Commerce.

Over the years, Refuge staff have been active in both on-Refuge and off-Refuge events and activities that help increase the visibility of the Refuge within the surrounding communities. Such activities include participation in the Imperial County Fair, the Brawley Cattle Call Parade, Calipatria Christmas Parade, Westmorland Honey Festival, Riverside County Fair, and the Salton Sea Bird Festival.

### **Alternative B (Proposed Action) - Restore and Enhance Habitat Quality; Expand Opportunities for Wildlife Observation, Environmental Education, and Interpretation**

All of the management activities described in Alternative A would also be implemented under Alternative B; in addition, Alternative B includes a variety of additional actions such as habitat restoration and expansion of existing public use facilities. The proposals included in Alternative B are illustrated in Figure 4-7 through 4-10.

#### **Wildlife and Habitat Management**

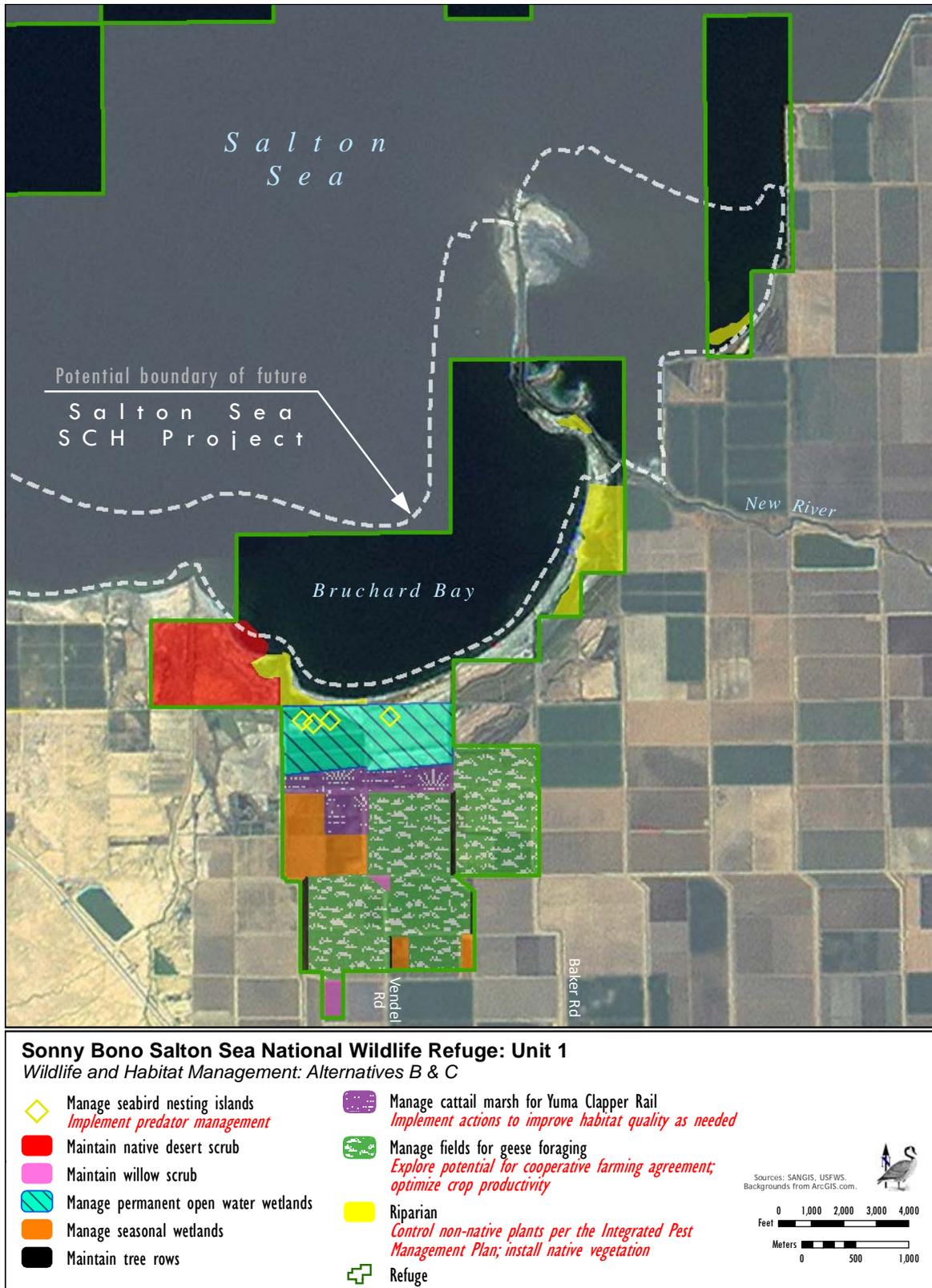
The range of management actions described under Alternative A would continue under Alternative B, but in some cases, current management practices would be expanded to enhance habitat quality for specific target species.

The majority of the management practices conducted on the Refuge, as described here, require the use of irrigation water to maintain appropriate levels of habitat quality. To ensure the efficient use of irrigation water within the Refuge, Alternative B includes measures intended to conserve water use without compromising habitat quality. Although the Refuge has been receiving water from IID since it was created in 1930, reliable water delivery to meet the Refuge's needs in the future is uncertain. In years when the expected water consumption within the entire IID is above its legal allocation, an Equitable Distribution policy will be implemented which will limit IID customers, including the Refuge, to approximately 5.25 acre-feet per acre, which is less than the Refuge needs to optimize habitat quality for listed and sensitive species. As the Salton Sea continues to recede, the wetland habitats on the Refuge will become increasingly more important to resident and migratory birds. To provide better assurance that the Refuge will be able to achieve its wildlife purposes, an objective of this alternative is to reach an agreement with IID that would ensure adequate water to support the Refuge's managed wildlife habitats.

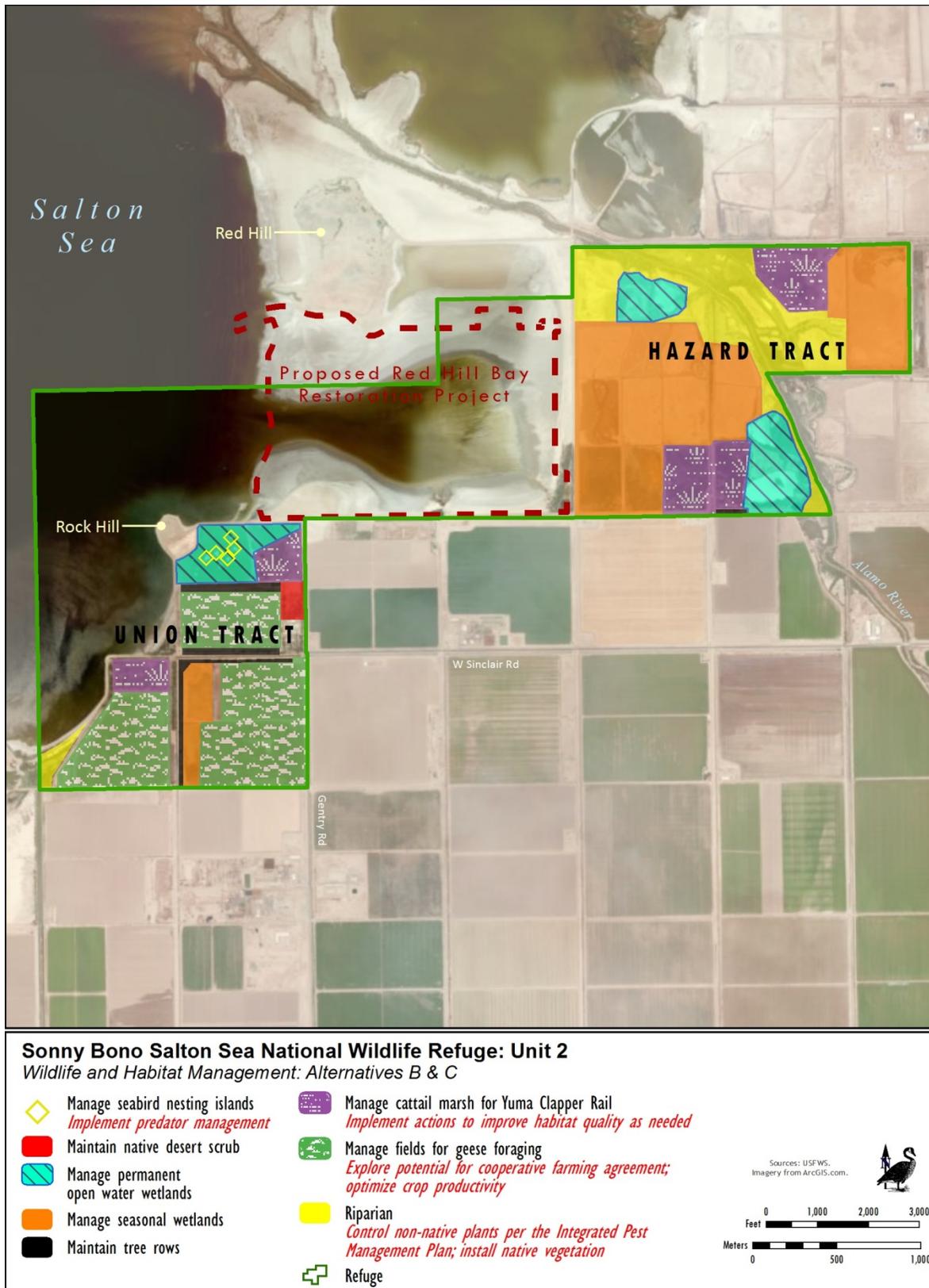
Managed Agricultural Fields. No changes in the current acreage of managed agricultural fields is proposed under this alternative, however, Alternative B does include new and expanded practices intended to increase the total crop yield within these fields to support wintering geese. One such proposal is to laser level these fields, which would allow for more uniform water coverage during irrigation, as well as increased water use efficiency. Better water coverage is expected to improve plant forage production throughout the fields. Another benefit of level farm fields is the need for less surface manipulation with tractor-pulled implements thereby reducing both dust generation and carbon emissions.

The Refuge would also continue to evaluate the effectiveness of the current no till practices and if deemed appropriate, this practice would be expanded over time to include more of the Refuge's managed farm fields.

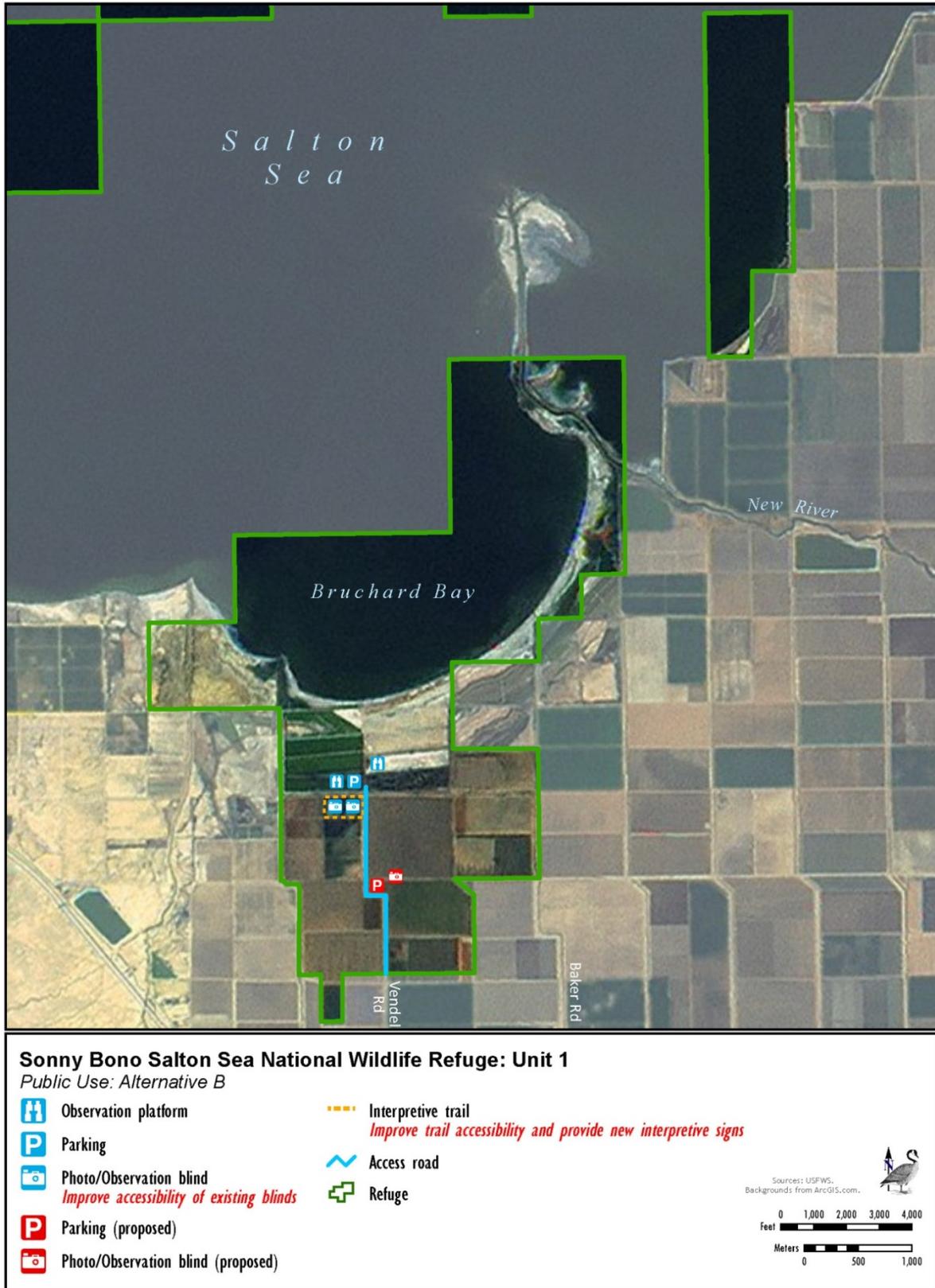
Under this alternative, the Refuge also proposes to evaluate the potential for future cooperative farming opportunities on the Refuge. Various forms of cooperative farming have been implemented in the past, including double cropping in the Refuge's farm fields. Under this scenario, in exchange for the use of some or all of the farm fields for cultivating a crop that could be planted in the spring for harvest in mid-summer, a farmer would plant annual rye grass in the fields immediately upon harvesting the summer crop. The timing of the summer planting of rye grass would have to ensure that adequate forage was available for the geese upon their arrival in the Imperial Valley.



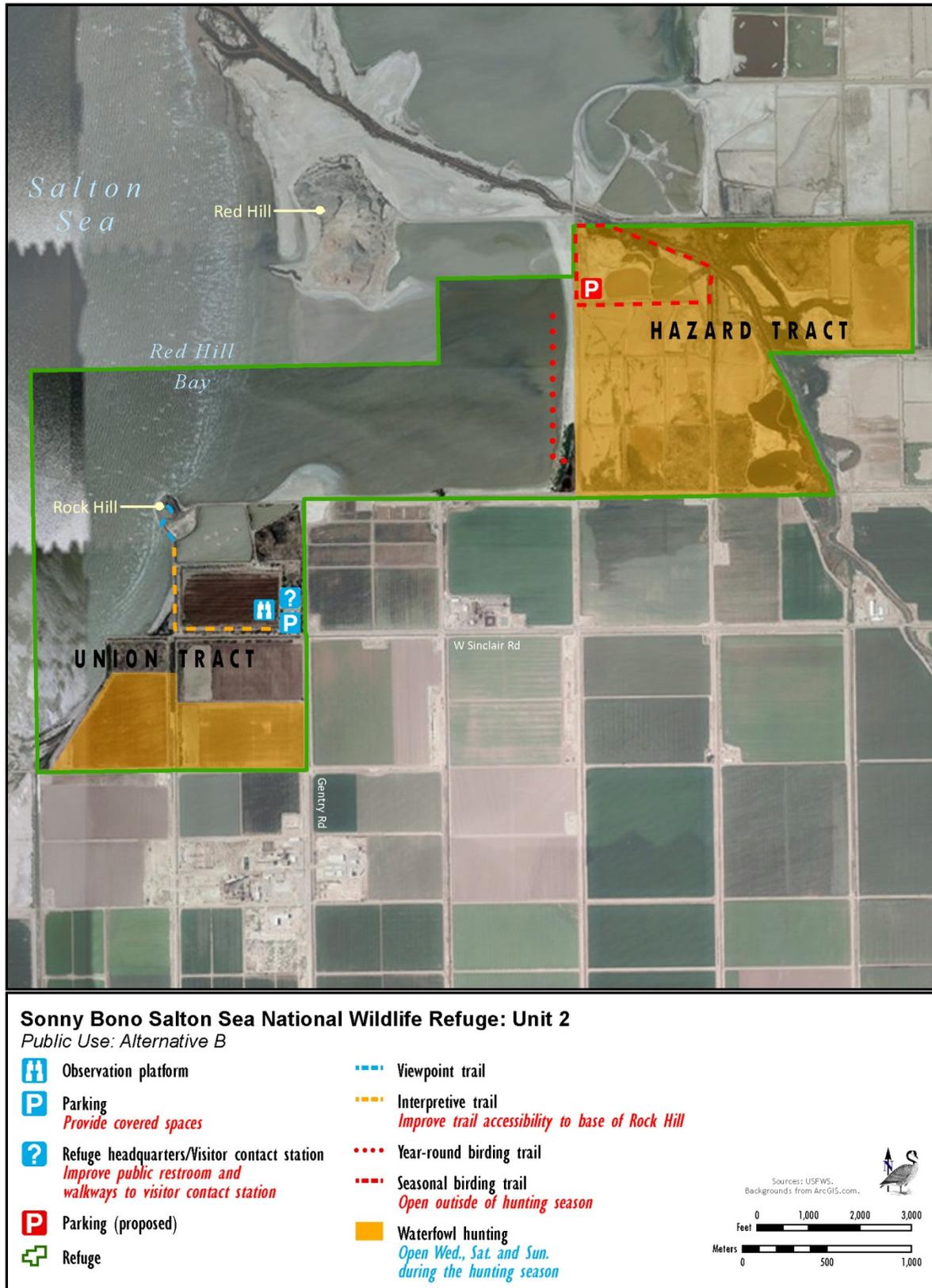
**Figure 4-7. Sonny Bono Salton Sea NWR, Alternative B (Proposed Action) and Alternative C – Habitat and Wildlife Management, Unit 1**



**Figure 4-8. Sonny Bono Salton Sea NWR, Alternative B (Proposed Action) and Alternative C – Habitat and Wildlife Management, Unit 2**



**Figure 4-9. Sonny Bono Salton Sea NWR, Alternative B (Proposed Action) – Public Use, Unit 1**



**Figure 4-10. Sonny Bono Salton Sea NWR, Alternative B (Proposed Action) – Public Use, Unit 2**

Another potential arrangement that could be permitted under a cooperative farming agreement might allow sheep or cattle grazing in the fields once the geese have migrated north for the summer. Grazing in the fields would assist in reducing the remaining grass stubble and any broadleaf weeds that germinate following the winter rains.

Prior to implementing a cooperative farming program on the Refuge, an analysis of the water needs and the environmental and financial costs and benefits to the Refuge of implementing such a program would be conducted.

Seasonal Shallow Wetlands. No changes in the current management of the shallow seasonal wetland areas on the Refuge are proposed. However, Alternative B does include a proposal to monitor waterfowl numbers in both the Hazard Tract and Unit 1 in an effort to identify trends and variables in overall abundance and species diversity over time.

Permanent Cattail Marsh. As vegetation in the Refuge's cattail marshes becomes denser, the habitat quality for Yuma clapper rails and other secretive birds decreases. As a result, this alternative proposes to periodically rotate managed cattail marsh habitat areas on the Refuge. Such a process could involve allowing a seasonal shallow wetland located adjacent to an existing cattail marsh area to convert to cattail marsh. Once the desired habitat quality has been achieved, the existing cattail marsh would be allowed to dry out at the end of the nesting season. Rails and other marsh birds would slowly migrate to the adjacent cattail habitat. Once the old marsh has adequately dried out, the overgrown marsh area would be cleared through the mechanical harvesting of vegetation or through the use of a prescribed fire.

A future step-down Yuma clapper rail management plan would evaluate when and how prescribed burns or mechanical harvesting would be implemented. This step-down plan would also identify potential new locations on the Refuge for establishing permanent cattail marsh habitat and replacing existing areas of marsh habitat that have been affected by an accumulation of silt and/or an overgrowth of cattail vegetation with other mixed marsh wetland habitat that supports waterfowl and other waterbirds.

Permanent Open Water Wetlands. Under Alternative B, the existing areas of current open water wetland would continue to be managed to support migratory waterbirds and nesting seabirds. In addition, this alternative proposes the phased restoration of 420 acres of a previously submerged portion of the Salton Sea, Red Hill Bay, to shallow water marine habitat to support resident and migratory waterbirds. These ponds also have the potential to support desert pupfish. The restoration site would extend from west of Garst Road to the south edge of the Salton Sea near the Refuge headquarters seawall. A more detailed description of this phased restoration project follows.

Also proposed under this alternative are actions intended to improve nesting conditions for seabirds that nest on the islands located within the Refuge's permanent open water wetlands. Such actions include seeking funding to study the physical and biological factors that contribute to nest site selection by gull-billed terns and black skimmers at the Salton Sea. Based on the findings of this study, changes to the configuration of the islands located in Unit 1 could be implemented, changes the depth or salinity levels of the open water area may be initiated, nesting substrate on the islands may be enhanced, or other improvements may be made in an effort to encourage these species to reestablish nesting colonies on the islands located within Unit 1. In addition, the Refuge will encourage the creation of nesting islands within proposed Salton Sea restoration projects, including the Red Hill Bay restoration and the Salton Sea SCH project.

A related action involves the implementation a predator management plan on the Refuge to control mammalian predators known or suspected to take the chicks and eggs of nesting gull-billed terns and black skimmers. The details of this predator management proposal are provided in the step-down predator management plan that accompanies this CCP/EA as Appendix C.

Native Salton Sea Scrub. Management of native scrub habitat on the Refuge would be the same under this alternative as it is under Alternative A.

Riparian Areas. Management of the Refuge's riparian areas would continue to involve the control of non-native species followed by the restoration of native scrub vegetation. Under Alternative B, approximately 80 acres of invasive salt cedar would be removed from the area around Bruchard Bay by 2018. This area would then be planted with a mixture of native black willow, screwbean mesquite, and blue Palo Verde.

Tree Rows. Management of the tree rows on the Refuge would be the same under this alternative as described under Alternative A.

### **Habitat Restoration**

Included under Alternative B are two wetland restoration proposals that the Refuge would implement in partnership with one or more other agencies. Both projects are intended to restore permanent open water areas along the southern edge of the Salton Sea to provide foraging and loafing habitat for shorebirds, seabirds, waterfowl, and other waterbirds. These projects are described in greater detail below.

#### **Red Hill Bay Restoration Project**

Location. The Red Hill Bay Restoration Project site encompasses approximately 420 acres along the southeastern section of the Salton Sea (portions of Sections 22 and 27, Township 11 South, Range 13 East), immediately west of Garst Road and south of Red Hill Bay Marina Road (Figure 4-11). The site is bordered on the south by a portion of the Salton Sea levee system and adjacent agricultural land and on the west by the Salton Sea. The Refuge headquarters and Rock Hill occur to the southwest.

Project Partners. The project site includes a portion of the Refuge that is leased to the Service from IID, as well as areas located outside the Refuge boundary that are owned and maintained solely by IID. IID is participating in the planning, design, and implementation of this project.

Purpose. The purpose of the Red Hill Bay Restoration Project is twofold: 1) to reestablish the Red Hill Bay area as an important saline shallow water shorebird habitat, and 2) to cover the playa area with saline water and decrease particulate matter that become airborne during wind events. Up until a few years ago, this area was inundated by the Salton Sea and supported a variety of aquatic organisms and migratory birds. As a result of new conservation measures implemented in the Imperial Valley to conserve water for transport to the San Diego region, this portion of the Sea has receded exposing the sea floor and eliminating shallow water habitat.



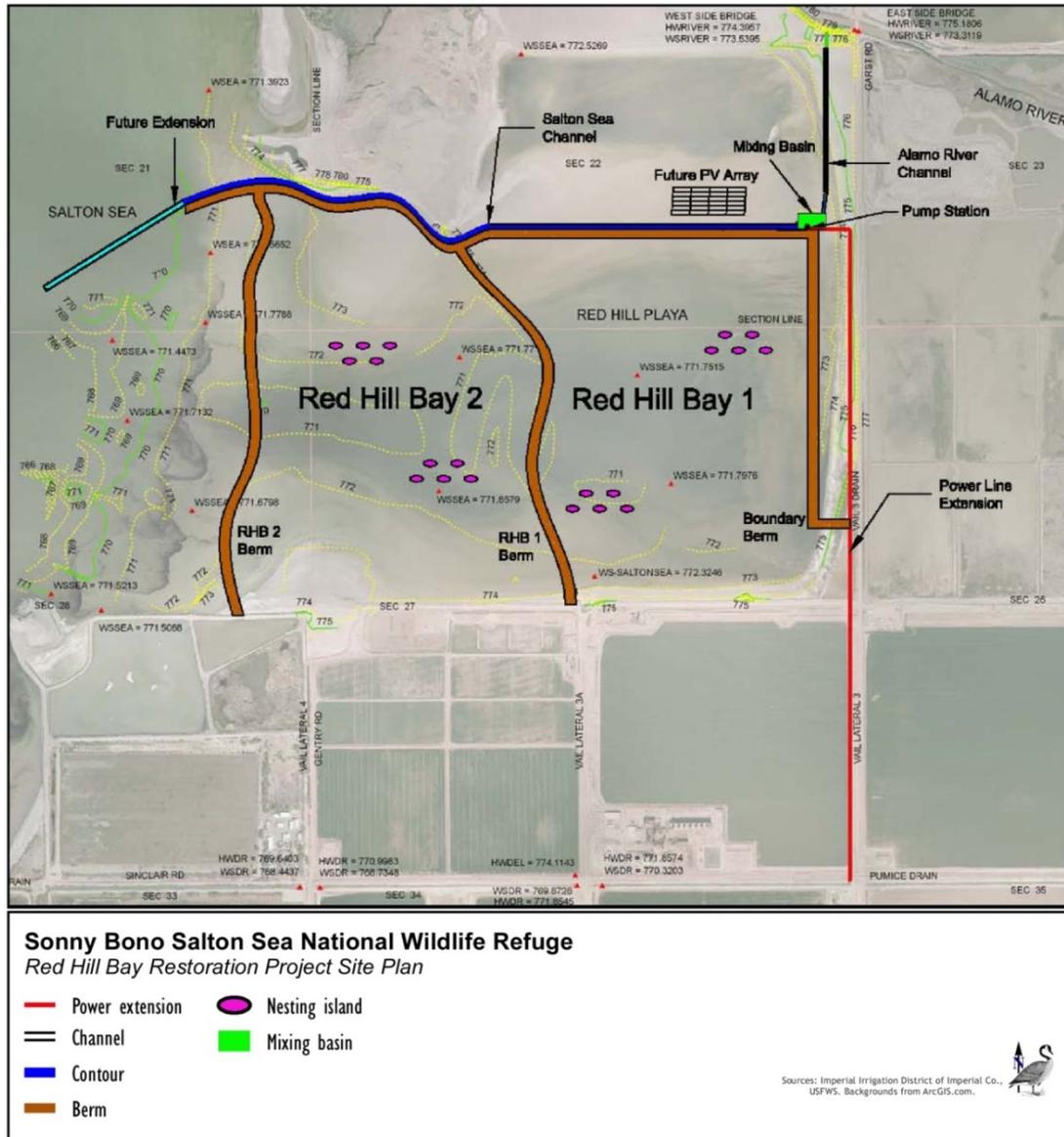
Figure 4-11. Location Map - Red Hill Bay Restoration Project

Project Overview. Implementation of this project would include the construction of a set of low (approximately three feet high) berms across portions of Red Hill Bay to form a pair of cells that would hold impounded shallow saline water at a target salinity of 20,000 mg/l in the first cell and 30,000 mg/l in the second cell. The shallow impoundments would provide habitat for wading birds and shorebirds in the currently exposed playa areas. The berms would be constructed using excavators, a dredge, and/or bulldozers. Additionally, loafing and nesting islands, snags for bird perches, deeper water channels and culverts to support invertebrates (and potentially fish) would be constructed within the project site.

Water would be pumped from the Alamo River and discharged to the eastern-most cell along a gravity fed feeder ditch running north-south along the west side of Garst Road. Saline water would be pumped to this cell via a saline water delivery system that would have an inlet constructed at the Salton Sea edge. It is likely that the project would be completed in phases, with the first phase including the development of the Alamo River water delivery and saline water delivery systems and construction of the berms in the eastern portion of the site. Ultimately the project would include a western berm extending from a site near the existing picnic area at the south edge of Red Hill Marina south toward the Refuge's "D" Pond (Figure 4-12). The western berm would be constructed along the shallow shelf formed at the entrance of Red Hill Bay.

The Refuge would have primary responsibility for identifying funding sources for project implementation, with other agencies such as IID participating as available. Portions of Red Hill Bay are currently considered Waters of the U.S. by the USACOE and waters of the State by CDFW. Preliminary planning for the project is ongoing and construction of Phase 1 is planned for 2013. Completion of Phase 2 (construction of the berm across the bay inlet) would be implemented as the Salton Sea water elevation recedes, making construction access possible.

Water Delivery Infrastructure. The project includes a water delivery system from the Alamo River and a salt water delivery system from the Salton Sea. The water delivery system from the Alamo River includes an approach channel west of the Garst Road bridge that will be excavated perpendicular to the Alamo River, approximately 20 feet wide and 40 feet long. Two pre-cast concrete vault structures and a trash rack will be installed in the approach channel to stabilize flows from the Alamo River. An unlined open channel will convey the water to a siphon under Red Hill Marina Road into a 1,900-foot-long, open channel to Red Hill Bay. The open channel will be approximately 10 feet wide with a water depth of two to three feet. Approximately two functioning 10 cubic feet per second (cfs) vertical centrifugal screw pumps will be installed in a concrete vault structure that will support all pumping facilities at the northeast corner of the Red Hill Bay restoration site (refer to Figure 4-12). One pump will lift Alamo River water and the other will lift Salton Sea water. The Alamo River water discharge will be routed into a mixing basin where it will blend with Salton Sea water. A small sediment basin may be constructed south of the Alamo River after the pump plant to help remove sediment before water flows to the first cell. There are two existing pumps that intermittently discharge water to the Alamo River from the freshwater Refuge ponds east of Red Hill Bay. The discharge from these two pumps will be diverted (via a culvert under Garst Road) and discharged into the Alamo River/Red Hill Bay delivery ditch to help reduce pumping needs at the new main pump location.



**Figure 4-12. Site Plan - Red Hill Bay Restoration Project**

The saline water intake alignment will access the Salton Sea on the north side of the project, near the southern edge of Red Hill and will extend to the edge of the Salton Sea until water flows into the channel. Initially, this channel will be about 15 feet wide at the top and approximately ten feet below existing grade. The saline water inlet will require periodic cleaning and extension as the Sea’s elevation drops. Eventually, the elevation of the saltwater intake pump will be too high to receive saltwater from the Sea. At that point, either the intake channel will need to be excavated deeper and the pump lowered to lift saltwater into the Bay, or a separate lift pump station will have to be constructed near the junction of the current saltwater intake channel at the Salton Sea shoreline to lift water into the original intake channel. This added intake lift pump could be powered by an extension of the grid electricity currently at Garst Road or by a photovoltaic system occupying an adjacent area of approximately 150 feet by 350 feet. Ultimately a longer channel will be needed to access the saltwater source and its function and appearance will be similar to the original intake channel.

Dredge material from the excavation of the intake channel will form drivable berms on either side of the channel. It will extend approximately 5,800 feet east to the northeast corner of the project where the Salton Sea water will be lifted up about three feet with a screw-type pump and blended with the flows from the Alamo River.

The water delivery and drainage infrastructure will be constructed with tracked excavators and bulldozers. Additionally, rubber tire backhoes and/or excavators and haulage trucks may be utilized in the placement of the pumps, inlet and outlet structures, and water control devices. Where necessary, the inlets and outlets of the delivery system will be armored or otherwise protected from erosion.

Cell Development. Four berms would be constructed to create two water cells (water impoundments). The berms are designed to be three feet high and about 20 feet wide on the top. The sides of the berms would be sloped to achieve an 8:1 slope gradient on the water side of the impoundment berm and a 4:1 slope gradient on the outside slope. In Phase 1, a north-south trending berm about 4,800 feet long, would be constructed as shown in Figure 4-12 and another north-south trending berm about 5,000 feet long would be constructed just to the west of Garst Road. The berm that would extend parallel to Garst Road would be made available to the public for bird watching, while the northern berm would be part of the saltwater conveyance system. Finally, a 5,800-foot-long east-west trending berm would be constructed along the northern perimeter of the restoration site, adjacent to the channel that would convey water from the Salton Sea to the project.

Cell berms would be constructed from material obtained onsite. Construction equipment would include D-4 to D-8 bulldozers, tracked excavators, rubber tire excavators, and ancillary support equipment. Where moisture conditions allow, the berms would be pushed into placed with in situ soils. Compaction of the berm material would be accomplished by repeated tracking of equipment across the berm material and, if necessary, the addition of water during compaction. Where the substrate is too wet for repeated equipment movement, tracked excavators would excavate shallow borrow pits adjacent to the berm alignment and place the excavated material along the berm. Once the material is dry enough to access, bulldozers would be used to level and compact it.

In Phase 2, an additional berm would be constructed across the mouth of Red Hill Bay. It is anticipated that this berm would be constructed within 100 feet of the sand bar shelf that has formed at the edge of the bay. This sand bar is currently inundated with about one foot of water and with the steadily declining Salton Sea water elevations will soon be exposed. As this area becomes accessible for construction, the western berm would be constructed using tracked excavators or a dredge. The material to construct the berm would be excavated from either side of the area proposed to support the berm.

Within each cell, deeper pools (about six feet in depth) would be excavated to create invertebrate and potential fish habitat. The spoil would be used elsewhere in the cell to create loafing and nesting islands. Individual pools may be linear or oval, depending on the ease of construction, but would likely not be more than 2,000 square feet in area. About ten islands would be constructed in each cell for bird loafing and nesting. The shape of the islands is expected to be elliptical, similar to islands used by nesting seabirds such as gull-billed terns and black skimmers in other permanent open water habitat within the Refuge.

Electrical Power. There is limited electrical power available for the operation of the required water pumps; therefore, the pump operation at the Alamo River inlet would be

timed to avoid use when the existing pumps to the east of Red Hill Bay in the Hazard Tract are operational. Use of the new waters pumps would require processing an application with IID for the approval of two new electrical hookups. To operate the 20 horsepower screw pump at the Alamo River inlet would require the use of the available single-phase electrical power line located near the site.

The water pump that would move water originating from the Salton Sea would also require electrical power. Based on current estimates of saltwater use, a 15 horsepower pump would likely be required. A three-phase extension from the IID grid at Garst Road would be run from near the Refuge's northern boundary in Red Hill Bay west into the dry eastern edge of Red Hill Bay for a distance of about 400 feet where the saltwater pump would be located. This power supply would be utilized primarily at night and during the day on an as-needed basis. Ultimately, a photovoltaic array (125 feet by 325 feet in size) would be installed immediately to the northwest of the pump station to power the saltwater pump during daylight hours.

Operations and Maintenance. The cells within the project site would be operated as saline impoundments primarily to provide foraging and loafing habitat for migrating waterbirds, but also to eliminate the potential for emissive dust from the exposed playa that would result if the project were not to be implemented. The proposal to create a saline environment, rather than a freshwater environment, would reduce the potential for vegetation growth in the cells, minimizing long-term maintenance costs and reducing the potential for providing habitat suitable for mosquito breeding. The project design calls for salt concentrations within the cells to be approximately 20 ppt to 30 ppt. Water depths would vary depending on the existing topography of the bay substrate. The deepest areas would likely range from one to two feet and would occur along the centerline of the cells and adjacent to the constructed berms. Water depths would decrease along the eastern edge of the cells. In addition, deeper areas will be scattered within the cell in locations where borrow material was excavated for the construction of the berms.

The cells would be constructed as a flow through design in which outlets would discharge water from the cells into the Salton Sea. In Phase 1, outlets constructed in the western berm of the Phase 1 cell would allow water to sheet flow onto the exposed playa areas to the west, ultimately discharging into the Salton Sea. Once Phase 2 is implemented, the western cell would receive water from the Phase 1 outlets.

The ponds will be operated and maintained by the Sonny Bono Salton Sea NWR staff unless it is determined later that a contract operator is preferred.

Monitoring. To better understand the many uncertainties associated with blending Alamo River water and Salton Sea water to create wildlife habitat, the Red Hill Bay restoration project includes a multiple year monitoring program. This monitoring program, which would include input from the Service's Environmental Contaminants Program, is intended to provide additional data to supplement and expand upon the results of research conducted at the USGS Reclamation Saline Habitat Ponds between 2006 and 2009 (Miles et al. 2009). This effort would provide an opportunity to further address areas of uncertainty and ultimately inform adaptive management of this and other similarly created habitats within the receding Salton Sea. In line with the draft Salton Sea Ecosystem Monitoring and Assessment Plan (MAP), monitoring at this site would address the biotic and abiotic functions of the created habitat. Water quality (e.g., pesticides, selenium, nutrient levels), bird use, and fish and invertebrate colonization would be monitored during the initial two

years of operation, and this monitoring effort would follow survey protocols identified in the draft MAP document ([http://www.water.ca.gov/saltonsea/docs/Draft\\_SaltonSeaMAP.pdf](http://www.water.ca.gov/saltonsea/docs/Draft_SaltonSeaMAP.pdf)).

As part of this monitoring plan, USGS would be contracted to investigate selenium and pesticide exposure risk. Twenty sediment samples from the project site would be analyzed by the USGS Pesticide Fate Research Group (PFRG) in Sacramento, California for current-use and legacy pesticides. This data would inform Refuge staff of potential hazards that may be exposed with different construction methods and allow staff to make adjustments in the construction design or methods, if necessary. Water samples collected from the Alamo River every two weeks for a full year would be sent to PFRG for current-use pesticide analysis. This sampling effort is intended to provide a snapshot of variations in concentration of 90 current-use pesticides and may identify potentially dangerous spikes or seasonal patterns of pesticide presence in the Alamo River water and suspended sediments within the river. To address selenium, USGS Western Ecological Research Center (WERC) would conduct sample collection and selenium analysis in water, sediments, and invertebrates on a bi-annual basis for at least two years. During the breeding season, additional selenium monitoring to include bird eggs and nesting success would be implemented. As sufficient selenium data is collected a risk assessment would be made and used to advise future management and continued monitoring needs.

Comprehensive bird surveys would be conducted at least three times per season; the seasons being identified as late winter, spring migration, breeding season, and early fall to best capture bird use/phenology of the site during key periods of the year. Surveys of colonial nesting birds (i.e., gull-billed terns, black skimmers) would be conducted weekly throughout the breeding season to identify numbers of breeding pairs, fledgling success, and evaluate nesting island design. Monthly fish surveys would be similar to those conducted by Saiki et al. (2011), using 1/8 inch minnow traps, placed strategically throughout the site and at inlets and outlets to provide an index of fish abundance and diversity with approximately 10 percent of each species measured for size class distribution. Benthic and water column invertebrates would be sampled quarterly for two years by WERC and enumerated by lowest practical taxonomic group. The data provided from this monitoring program would be used to inform current and future management decisions.

Permits/Approvals. Implementation of this project will require compliance with the variety of Federal, State, and local regulations, as described below.

- 1) NEPA - Because the proposed project is a component of the larger CCP planning process for the Sonny Bono Salton Sea NWR, the Service proposes to comply with NEPA through the processing of this CCP and accompanying EA.
- 2) Compliance with Section 7 of the Federal Endangered Species Act - Evaluate the potential effects, if any, on the endangered Yuma clapper rail and endangered desert pupfish.
- 3) Section 404 of the Clean Water Act - Based on the USACOE determination that the Section 404 Ordinary High Water Mark is the average elevation of the Salton Sea from the previous year, the proposed project is located within the ACOE jurisdictional boundaries and requires a Section 404 permit to allow the discharge of dredged material into Waters of the U.S.

- 4) Section 401 Water Quality Certification - A Water Quality Certification in accordance with Section 401 of the Clean Water Act is required from the Colorado River Basin RWQCB.
- 5) Section 106 of the NHPA - Compliance with Section 106 has been completed.
- 6) California Fish and Game Code Section 1602 Lakebed Alteration Agreement - The CDFW would be requested to issue a Section 1602 Lakebed Alteration Agreement because proposed work would take place in the footprint of the lakebed.
- 7) Compliance with air quality standards as regulated by the Imperial County Air Pollution Control District.
- 8) Encroachment Permit - An encroachment permit would need to be acquired from Imperial County to place culverts under Garst Road and Red Hill Marina Road. In addition, permission is needed from Red Hill Marina County Park to construct a saltwater intake channel on the park's southern property boundary.
- 9) Lease Agreement - A long-term lease with IID is required for the project area prior to construction to assure the project's long-term viability.
- 10) Electrical Connection Permits - Two new electrical connection permits must be obtained from IID to operate the Alamo River and saltwater delivery pumps.

**Salton Sea Species Conservation Habitat (SCH) Project**

The Refuge would continue to partner with other Federal and State agencies on the implementation of this project, as described in Alternative A.

**Endangered and Sensitive Species Management**

The species management actions described under Alternative A would also be implemented under Alternative B. In addition, a number of new actions are proposed under Alternative B to ensure the long term protection of the Refuge's listed and sensitive species.

Step-Down Habitat Management Plan. Prepare a step-down habitat management plan for the Refuge that addresses the range of species supported on the Refuge. As part of the management plan, or as a separate plan, address habitat development, maintenance of suitable habitat conditions, and protection of habitat from human disturbances for the Yuma clapper rail. Management planning for the rail should include an assessment of the degree of threat to adult rails and recruitment of young rails from existing and predicted selenium levels in current and future rail habitat areas on the Refuge, and, if necessary, present recommendations for actions to be implemented to control this threat.

Secure Adequate Long-Term Water Supplies. Work with IID to protect and secure for the long-term an adequate water supply to support the on-going management of all water-dependent habitats on the Refuge, including Yuma clapper rail habitat, at current levels, as well as to support current proposals to restore shallow water habitat within the Refuge where foraging and loafing areas have been lost due to a receding Salton Sea.

Yuma Clapper Rail Monitoring and Research. Under Alternative B, annual Yuma clapper rail surveys to tract population size within the Refuge's two units would continue. In addition, the

Refuge would seek funding to study clapper rail movement among established cattail marsh areas on the Refuge, the effect that prescribed burns may have on rail movement and productivity, and the effects, if any, of hunting-related disturbance on rail populations in marshes located adjacent to waterfowl hunting areas. The results of this work would be incorporated into a refuge-wide habitat management plan, and/or a step-down Yuma clapper rail management plan.

Desert Pupfish Monitoring. Actively monitor the presence of desert pupfish on the Refuge and working with CDFW relocate populations discovered in managed ponds to appropriate habitat in the Salton Sea or adjacent drainage ditches.

Enhanced Seabird Nesting Site Management. Maintain water levels in managed permanent open water ponds that support seabird nesting islands at a depth of at least 18 inches throughout the breeding season; to identify predators and causes of disturbance to nesting colonies especially during nocturnal periods, install motion-activated cameras in nesting areas during the breeding season; evaluate the benefits of modifying nest site substrates on selected islands to discourage competing Caspian terns and California gulls from establishing nesting colonies in nesting areas favored by gull-billed terns and black skimmers; develop a monitoring program to evaluate the extent of predation and/or disturbance from California gulls on nesting gull-billed terns and black skimmers; and implement a predator management plan (described below) to improve gull-billed tern and black skimmer productivity.

The Refuge would also work to establish partnerships with other land management agencies (e.g., IID, CDFW Imperial Wildlife Area - Wister) to increase or enhance seabird nesting habitat around the Salton Sea in an effort to improve nesting success for various species of concern.

Predator Management Plan. Consistent with the purposes of the Sonny Bono Salton Sea NWR, Alternative B includes a proposal to implement, per available funding, a comprehensive and integrated predator management program that includes a range of management actions from vegetation control and other nesting habitat enhancements to implement non-lethal (deterrence) control of avian and mammalian predators and lethal control of individual mammalian predators (e.g., coyotes, raccoons, feral dogs and cats) that pose a threat to ground nesting birds. The primary purpose of this predator management plan is to improve productivity for two ground nesting seabird species, the western gull-billed tern and black skimmer, both of which annually nest on the Refuge. Both species are identified by the Service as Birds of Conservation Concern (USFWS 2008a) and by the Service's Migratory Bird Program as Birds of Management Concern (USFWS 2011a). In addition, the gull-billed tern is included on the Migratory Bird Program's list of focal species (USFWS 2011a). Focal species, a subset of the Birds of Management Concern, are those species that the Migratory Bird Program believes need additional investment of resources to address pertinent conservation or management issues.

The most effective, selective, and humane techniques available to deter or remove individual predators that threaten nesting gull-billed terns and black skimmers would be implemented under this plan. The direct control of individual problem mammalian predators would be implemented as necessary to protect gull-billed tern and black skimmer breeding adults, chicks, and eggs. The primary measure to be used to deter predators would include maintenance of electrical fencing around nesting areas. The program is described in detail in the Predator Management Plan step-down plan, which is provided as Appendix C of the CCP.

Habitat Protection. Installation of new gates, fences, signs, and other forms of traffic and access control to direct visitors through the Refuge to appropriate public use areas and to minimize unauthorized vehicular and pedestrian travel along the Refuge's many unpaved farm roads, as well as through sensitive habitat areas.

### **Resident Native Species Management**

The management actions described under Alternative A to support resident native species would also be implemented under Alternative B. In addition, under Alternative B, the Refuge would work with IID to identify appropriate actions for reducing the incidence of bird strikes on existing power lines.

### **General Habitat Management**

The management actions related to general habitat management, as described under Alternative A, would also be implemented under Alternative B. In addition, under Alternative B, the Refuge would seek funding and/or partners to develop a robust program for monitoring species abundance and diversity within the Refuge's various managed habitats. The results could then be used to identify trends and variations overtime that may be attributable to changing conditions in the Salton Sea, climate change, and/or modified management practices.

Integrated Pest Management. Under Alternative B, an Integrated Pest Management (IPM) Plan would be implemented for the Refuge. The IPM step-down plan is provided as Appendix D of this CCP. In accordance with 517 DM 1 and 569 FW 1, an IPM approach would be utilized, where practicable, to eradicate, control, or contain pest and invasive species (herein collectively referred to as pests) on the Refuge. Implementing the IPM Plan would involve using methods based upon effectiveness, cost, and minimal ecological disruption, which considers minimum potential effects to non-target species and the refuge environment.

Under the IPM Plan, pesticides may be used where physical, cultural, and biological methods or combinations thereof, are impractical or incapable of providing adequate control, eradication, or containment. If a pesticide is necessary for use on the Refuge, the most specific (selective) chemical available for the target species would be used unless considerations of persistence or other environmental and/or biotic hazards would preclude it. In accordance with 517 DM 1, pesticide usage would be further restricted because only pesticides registered with the USEPA in full compliance with the Federal Insecticide, Fungicide, and Rodenticide Act (FIFRA) and as provided in regulations, orders, or permits issued by USEPA may be applied on lands and waters under refuge jurisdiction. The types of pesticides that can be used on the Sonny Bono Salton Sea NWR are also limited to those products available for sale in the State of California. Before a pesticide product can be sold or offered for sale in California, it must be approved and registered by the State's Department of Pesticide Regulation.

The IPM Plan, which is provided in Appendix D, provides a detailed discussion of IPM techniques, including the selective use of pesticides for pest management on the Refuge, when deemed necessary. Throughout the life of the CCP, all pesticides proposed for use on the Refuge, with the exception of mosquito-related pesticides which are addressed through a separate process, would be evaluated by the IPM Regional Coordinator for potential effects to refuge biological resources and environmental quality. The results of this evaluation, including the potential effects of each product, would be documented in "Chemical Profiles." Chemical profiles have already been completed for those pesticides that are currently approved for use on the Refuge and are available for review in Attachment B of Appendix D. Only those

pesticides that are likely to result in only minor, temporary, and/or localized effects to species and environmental quality based upon non-exceedance of threshold values in Chemical Profiles would be approved for use on the Refuge. In all cases, BMPs would be implemented during the handling and application of pesticides, and in some cases, non-exceedance of threshold values may be achieved through the implementation of additional BMPs that further define how, when, where, and to what extent a specific pesticide may be applied.

Control of pest species is necessary when these pests are resulting in environmental harm. Environmental harm by pest species refers to a biologically substantial decrease in environmental quality as indicated by a variety of potential factors including declines in native species populations or communities, degraded habitat quality or long-term habitat loss, and/or altered ecological processes. In the case of this Refuge, environmental harm may be a result from direct effects to cultivated foraging plants or managed habitats that are managed to meet specific Refuge purposes (i.e., reducing depredation by foraging geese of surrounding commercial agricultural fields, protection of habitat to support listed species and migratory birds).

Environmental harm may involve detrimental changes in ecological processes. For example, invasive nonnative plant species such as salt cedar and common reed can outcompete and ultimately replace native species such as willows and mesquite, altering the function of the historic plant community. Environmental harm may also cause or be associated with economic losses and damage to human, plant, and animal health. For example, invasions by fire-promoting, non-native grasses that alter entire plant and animal communities can increase the frequency and intensity of wildland fires, which in turn increases fire-fighting costs and threats to adjacent development.

One or more methods may be employed to meet the objectives of the IPM Plan, including cultural, physical/mechanical, biological, and/or chemical control. These methods are summarized below and presented in detail in Appendix D.

Cultural control can involve the management and manipulation of competitive interactions so that weeds are placed at a disadvantage. This type of cultural control includes a broad range of normal management practices that can be modified or manipulated to manage one or more pest problems, either by minimizing the conditions those pests need to live (e.g., water, shelter, food), or minimizing opportunities for introduction. Cultural control can also mean modifying human behavior or activities in an effort to avoid invasive seed transport and the improper disposal of non-native and pest plant debris.

Physical control involves the removal, destruction, disruption of growth, interference with pest reproduction using treatments that can be accomplished by hand and hand tools (manual), power tools (mechanical), and the physical removal of plants by pulling, grubbing, digging out root systems, cutting plants at the ground level, and removing individual competing plants around desired species. Other methods may include “topping” annual weeds prior to seed set, placing mulch around desired vegetation to limit competitive growth, tilling/disking, cutting, swathing, grinding, sheering, girdling, mowing, or mulching of the pest plants. Other types of physical control could include solarization, prescribed fire, and the use of flamers, where permitted.

Classical biological control involves the deliberate introduction and management of natural enemies (e.g., parasites, predators, pathogens) to reduce pest populations. The Service strongly supports the development, and legal and responsible use of appropriate, safe, and

effective biological control agents for nuisance and non-indigenous or pest species. To date, the intentional use of biological control agents has not been implemented on this Refuge.

Under the IPM, pesticides may be used where physical, cultural, and biological methods or combinations thereof, are impractical or incapable of providing adequate control, eradication, or containment. If a determination is made that the most appropriate control for a particular pest or group of pests on the Refuge is the use of a pesticide, the most specific (selective) chemical available for the target species(s) would be used unless considerations of persistence or other environmental and/or biotic hazards would preclude its use.

Throughout the life of the CCP, pesticides proposed for use on the Refuge would be evaluated by the IPM Regional Coordinator for potential effects to refuge biological resources and environmental quality and the results of this evaluation, including the potential effects of each product, would be documented in "Chemical Profiles." The product would also require approval through the PUPS process, which is described under Alternative A.

When addressing the use of herbicide, it is also important to consider the method of application to be used. Liquid or powder pesticide formulations are normally applied to the target site in a mixture of water, pesticide active ingredient, other ingredients that make up the pesticide formulation, and adjuvants such as wetting agents, surfactants, and drift control agents. Water frequently constitutes 97 percent or more of the total mixture on a volume for volume or weight basis. Liquid formulations can be delivered or applied to a target site by many different application tools. They may be applied from the air by helicopters or on the ground by hydraulic sprayers mounted to tractors, trucks or ATVs, or with hand-held sprayers. The application method chosen depends upon the treatment objective (removal or reduction); the accessibility, topography, and size of the treatment area; the characteristics of the target species and the desired vegetation; the location of sensitive areas and potential environmental impacts in the immediate vicinity; the anticipated costs and equipment limitations; and the meteorological and vegetative conditions of the treatment area at the time of treatment.

The IPM also addresses a proposal to conduct aerial applications of certain herbicides. The products most likely to be applied aurally include Milestone VM (active ingredient: aminopyralid), WEEDAR 64 (active ingredient: 2,4-D DMA) Clarity (active ingredient: dicamba), and Stalker or Habitat (active ingredient: imazapyr). Other products may be considered for use in the future and would require updated Chemical Profiles. Application would most likely be conducted via helicopter, but could involve fixed-wing aircraft as well. All aerial applications would be conducted by a licensed aerial applicator. Helicopter applications are generally made using a boom sprayer. All aerial spraying is regulated by the USEPA, the State of California, and the Imperial Valley Agricultural Commission. Applications must be conducted in accordance with the specifications provided on the herbicide product label, which generally address under what conditions (e.g., wind speed, temperature, air inversion, precipitation) applications are permitted to occur, as well as all applicable Federal, State, and local regulations.

Approximately 870 acres of managed agricultural fields (refer to Figures 4-7 and 4-8), as well as areas supporting large infestations of salt cedar, such as adjacent to the Alamo River, along the Salton Sea shoreline, and within irrigation drains, could be aurally treated. Aminopyralid and dicamba would be used to control broadleaf weeds such as cheeseweed, goosefoot, puncture vine, and London rocket (*Sisymbrium irio*) in agricultural fields and imazapyr would be used to control salt cedar. A mixture of the approved herbicide, as well as a surfactant and water conditioner (buffer) would be applied. In the case of Milestone VM, a surfactant (e.g.,

Agridex, Mor-Act) and a water conditioner (a combination of ammonium sulfate and Quest) would be included in the application mixture to enable the herbicide to stick to and penetrate the broadleaf weeds. Surfactants and water conditioners would also be used in aerial applications of imazapyr. A 100-foot buffer zone would be required between treatment areas and existing tree rows or wetland areas. The required buffer zone between treated areas and adjacent commercial cropland is generally a quarter mile, although larger buffers may be required when sensitive non-target crops are located in proximity to treatment areas. Aerial applications, which would occur between November and February, would be conducted once a year at each treatment site.

The location of pesticide handling and mixing operations prior to application varies according to the method of application. Mixing and handling operations for ground and aerial applications would occur on the Refuge. Helicopters and hydraulic sprayers would be accompanied by nurse trucks which supply bulk water for mixing with the pesticides and adjuvants on site (Technical Learning College 2011). The pesticides would either be mixed directly with water in a bulk tank, or poured into a small vessel connected to an injection system that automatically mixes the pesticide(s) with bulk water as the water flows through the application equipment to the spray nozzles. Cleaning aerial application equipment and disposal of any chemical residues would occur at the contract applicators primary mixing, handling and storage facilities which would be located off-refuge. For ground application equipment, cleaning and disposal of residues occurs within the Refuge headquarters area.

There are several drawbacks and limitations to herbicide use. Herbicides have the potential to injure or kill non-target plants even when the herbicide is not applied directly to the plant, through drift, runoff, and possibly through root leakage. The herbicides considered for use on the Sonny Bono Salton Sea NWR are regarded as posing relatively low risk for use in natural areas because they are not likely to contaminate groundwater if used properly and are of low toxicity to animals.

Restricted use herbicides must be applied by someone with a California Restricted Use License, or by a person under their direct supervision. Federal law states all herbicides must be applied according to the label. Herbicide treatments on the Refuge would be combined with other control methods, and may use any of the application methods listed above, depending on the situation. All applications would be conducted in accordance with the specifications described in the chemical profile and/or PUPS approval, and would adhere to any special BMPs listed in the chemical profile.

Due to differences in species tolerance and the variety of habitats within the Refuge, the ability to use a number of different herbicides is necessary in order to choose the one that is most effective for a particular species in a particular environment. The potential for weeds to develop a resistance to a particular herbicide over time is another reason for developing a variety of herbicide options, as rotating herbicides with different biochemical pathways (from different herbicide groups) can help delay the development of herbicide resistance.

Compounds referred to as adjuvants are often added to the herbicide formulation or tank mix to facilitate the mixing, application, or effectiveness of that herbicide. Spray adjuvants often improve spray retention and absorption by reducing the surface tension of the spray solution, allowing the spray droplet to spread more evenly over the leaf surface. Herbicide absorption may be further enhanced by interacting with the waxy cuticle on the leaf surface. They are sometimes included in the formulations of herbicides (e.g., RoundUp), or they may be purchased separately and added into a tank mix prior to use (Tu et al. 2001).

Adjuvants are chemically and biologically active compounds. Some adjuvants have the potential to be mobile and pollute water. The Material Safety Data Sheet for an adjuvant and the herbicide label (if the adjuvant is included in the formulation) should be checked for conditions in which the adjuvant should not be applied. If such conditions exist, the application of the product would be adjusted accordingly (e.g., by incorporating the appropriate buffers).

An essential element of the IPM Plan is monitoring the results of all activities implemented under the IPM Plan. Ongoing monitoring of invasive species' response to IPM treatment is critical in order to evaluate the effectiveness of different treatment methods and to apply adaptive management practices when deemed necessary.

Wildlife Monitoring. Under this alternative, funding and partnerships would be sought for the purpose of establishing baseline productivity data for the various managed habitats within the Refuge, as well as for implementing subsequent periodic monitoring to identify trends and variations in species abundance and diversity over time. Included would be a monitoring plan designed to document bird use and fish/invertebrate colonization at the Red Hill Bay restoration project. This effort would allow for adaptive management of the restored shallow water habitat. In addition, the Refuge would seek partners to monitor changes in avian and fish species composition and abundance in and around the Salton Sea to better understand and address the effects of receding water levels and climate change on the diversity and abundance of migratory and resident bird species in the region.

Monitoring Avian Disease on the Salton Sea. With respect to the Refuge's Wildlife Disease Program, the current activities described under Alternative A would continue under Alternative B. However, as the water levels in the Salton Sea have receded, adequate sites for launching the boats used in avian disease surveillance have been lost. Under Alternative B, the Refuge will coordinate with other agencies to identify and construct a sustainable site for launching boats used in avian disease surveillance.

Water Delivery System. Under this alternative, the Refuge would evaluate and where feasible construct independent water delivery and drainage ditch systems for various managed habitat areas in the Refuge to better distribute and conserve water within these management areas. Such a system would be particularly beneficial in Unit 2's Hazard Tract, where water for the pond complex is currently distributed by delivering water to the uppermost pond where it is then distributed via gravity flow from one pond to the next. With an independent water delivery system, water would be provided to each pond, resulting in a more efficient use of the water needed to support the desired habitats in each management area. More efficient use of water could also be accomplished in Unit 1's A and B ponds, where an independent drainage system would allow excess water from one pond to be fed into a downstream pond as needed, reducing the need to add new irrigation water into the downstream pond.

This proposal would identify those existing irrigation and drainage ditches providing water to ponds or between ponds that could be converted to pipelines to reduce erosion and water loss due to seepage and evaporation, as well as reduce overall ditch maintenance costs in terms of staff time and money. New pipelines would typically be buried no deeper than the existing ditches and would be placed in the same footprint as the previous infrastructure. The cost associated with the installation of these pipelines in 2012 was approximately \$34 per linear foot for a 24-inch polyvinyl chloride (PVC) pipe.

Other water conservation measures that may be evaluated in the future include exploring the potential for using groundwater to provide water for some management areas; adding drainage

boxes in the fields to allow tailwater to flow from one field to the next and/or to facilitate the pumping of tailwater back into the fields; using drain water from the managed ponds to irrigate farm fields; and blending Colorado River water with adequate quality drain water to increase the quantity of water available on the Refuge for habitat management.

### **Public Use**

The opportunities for hunting, fishing, wildlife observation, photography, environmental education, and interpretation, described under Alternative A, would also be provided under Alternative B. Alternative B includes a number of proposals for improving existing public use facilities and adding new facilities to expand opportunities for wildlife observation.

Improved Trail Accessibility. Funds will be sought to improve accessibility along the existing interpretive trails in Units 1 and 2. The trail in Unit 1 is relatively flat but would benefit from resurfacing to ensure a firm and stable surface. The same is true for the interpretive trail in Unit 2 that leads from the visitor parking lot to the base of Rock Hill. Alternative B proposes to resurface both of these trails with a five to six-foot-wide stabilized soil trail tread. The improvements would be implemented using appropriately sized tractors and trucks that can travel along the existing trail alignment. Minor grading to smooth the existing trail surface may be necessary in some locations. This would be followed by the placement and compaction of four to six inches of stabilized soil over the existing trail alignment in a manner that results in a trail tread that is outsloped at 1.5 to 3.0 percent to allow for sheet flow across the trail.

Updated Interpretive Panels in Unit 1. Funds will be sought to design, manufacture, and install four new interpretive panels and two bird identification panels for the interpretive trail in Unit 1, as well as two interpretive panels for the recently constructed accessible observation deck in Unit 1. The proposed interpretive signs would address topics such as the purpose of the managed habitats in Unit 1, the importance of the Salton Sea to birds migrating along the Pacific Flyway, endangered species, the changes occurring within the Salton Sea, resident species, and foraging opportunities for birds within the managed habitats.

Seek funding to update the interpretive signs provided along the trail in Unit 1. The new signs should address issues related to the past and anticipated future conditions within the Salton Sea, the effect to migratory birds of these changes, and the role the Refuge can play in ensuring the availability of habitat essential to these species.

New Seasonal Birding Trail in Unit 2. A route for a 1.4-mile seasonal birding loop trail will be established within the Hazard Tract utilizing existing dirt roads. The trail alignment would then be improved to provide a firm and stable surface with an appropriate cross slope to ensure a sustainable trail. Other associated improvements include a four to six-car, unpaved parking area along Garst Road and a small kiosk for posting trail regulations, birding tips, and other information.

The trail would be open for use between March 1 and September 30 of each year. The closure period will ensure that any potential conflicts between trail use and hunting activities are avoided, and would provide wildlife using the area with a month of no disturbance immediately following the close of the hunting season.

Bird Watching Opportunities at the Red Hill Bay Restoration Site. The design for the Red Hill Bay Restoration project would incorporate an opportunity for bird watchers to observe birds in the restored habitat to the west of Garst Road. As currently proposed, the berm to be constructed along the eastern edge of the project (approximately 400 feet to the west of Garst

Road) would be designed to accommodate bird watching. An all-weather surface would be provided on the top of the berm and two interpretive panels would be installed to address the purpose of the restoration project and its relationship to the receding Salton Sea. The parking area proposed for the new Hazard Tract seasonal birding trail would also be available to accommodate bird watchers in this new birding area.

Bird Watching Opportunities in Unit 1. To provide bird watchers with an opportunity to observe native and migratory songbirds utilizing a recently restored three-acre willow grove along Vendel Road in Unit 1, Alternative B proposes to construct a small public parking area adjacent to Vendel Road. From this location, visitors would have the opportunity to observe wintering geese and sandhill cranes in the adjacent managed farm field. Funding would also be sought to construct a bird observation blind in this location.

Expanded Environmental Education and Interpretive Programs for Kids. Under this alternative, the current environmental education programs provided by Refuge staff would be formalized and expanded. This would require assistance from an Outdoor Recreation Planner, who would be responsible for developing and implementing a volunteer training program to assist in environmental and interpretive programs. Topics to be addressed through these programs would include a variety of topics, including migratory birds, endangered species, climate change, and the changing conditions in the Salton Sea. In addition, volunteers would be recruited to help facilitate programs focusing on connecting children with nature.

Research. Under Alternative B, the Refuge would continue to develop research partnerships with academic institutions, and other public (e.g., USGS), private, and non-profit researchers to conduct research on the Refuge that would benefit Refuge management and/or Refuge resources. Potential research topics include but are not limited to: the effects of climate change and the receding Salton Sea on the diversity of avian species present at the Salton Sea over time; Yuma clapper rail response to habitat modifications within managed cattail habitat; and nesting site selection by gull-billed terns and black skimmers. Other potential cooperative research projects may include working with researchers at USGS and/or CDFW to facilitate genetic studies of desert pupfish and the migration patterns of secretive marshbirds, and selenium monitoring in Refuge habitats including the restored Red Hill Bay.

### **Refuge Operations**

Staffing. Based on the current and anticipated future level of management required to implement Alternative B and achieve Refuge purposes, Alternative B includes a proposal to expand the existing Refuge staff, per available funding, to include the following positions, several of which are existing positions that are not currently filled:

- **Irrigation Systems Operator** (1 FTE) - Needed to implement the responsibilities related to irrigation and water movement throughout the Refuge to achieve Refuge purposes related to waterfowl management, as well as to implement the new water management requirements associated with the Red Hill Bay Restoration Project (under this proposal, the temporary full time irrigation system operator [GS 5/6] position on the Refuge Complex organization chart would be filled, per available funding, as a permanent full time position).
- **Biological Technician** (1FTE) - Needed to meet current wildlife disease outbreak monitoring and response requirements (under this proposal, a temporary full time biological technician [GS 5/7] position on the Refuge Complex organization chart would be filled, per available funding, as a permanent full time position).

- **Outdoor Recreation Planner** (1FTE) - Needed to develop a formalized expanded interpretive and environmental education program for the Refuge, to assist with visitor contact, and expand the Refuge volunteer and public outreach programs (this is a new permanent full-time position that would be added to the Refuge Complex organization chart and filled per available funding).
- **Facilities Manager** (1 FTE) - Needed to manage and ensure appropriate maintenance of the Refuge headquarters facilities and other infrastructure throughout the Refuge (this is a new permanent full-time position that would be added to the Refuge Complex organization chart and filled per available funding).

Refuge Headquarters Compound. Management of the facilities within the Refuge headquarters compound would continue generally as described in Alternative A, although a number of improvements to existing facilities to address Refuge management and visitor services needs would be provided under Alternative B per available funding. These proposals are described below.

- **New Storage Facility** - The Refuge would seek funding for new prefabricated, stand-alone, steel chemical and flammable liquids storage buildings to improve storage and insure compliance with health and safety and environmental compliance requirements.
- **Carport Replacement** - Funds would be sought to replace the Refuge's existing Service vehicle carport to better protect vehicles from sun, heat, and wind damage.
- **Improved Security** - Measures such as improved lighting, fencing, and installation of security cameras will be implemented to improve security at the Refuge headquarters compound and within the visitor parking area. In addition, construct a secure, fenced area in Unit 1 that can be used to store tractors and other farm equipment.
- **New Public Restroom(s)** - Under Alternative B, the Refuge would seek funding to expand and/or refurbish the one-room public restroom at the visitor contact station.
- **Replace/Repair Public Walkway** - The walkway that extends from the visitor parking lot to the visitor contact station and around to the public restroom requires repair or replacement. Under Alternative B, funds would be sought to implement necessary improvements.
- **Shaded Visitor Parking** - Seek funds to design, purchase, and install a shade structure in the visitor contact station parking lot to provide shade for five visitor parking spaces.

Land Tenure. Alternative B proposes the preparation of a future step-down plan to evaluate current and future land and water needs for the Refuge in light of the changing circumstances in and around the Salton Sea (e.g., receding water levels, increased salinity levels, potential reductions in water availability) related to the implementation of the Quantification Settlement Agreement. Issues that would be explored in this step-down plan include potential land transfers and/or the removal of some lands from the Refuge boundary due the inability of these lands to support Refuge purposes.

Lands that might be considered for transfer to the Refuge would be those located between Refuge's submerged lands and the lands leased by the Refuge from IID. These are the areas that are slowly being exposed as the Sea recedes. As the sediments on the sea floor are exposed, the potential for air quality impacts are expected to rise. The creation of shallow water wetlands in these areas would reduce the potential for air quality impacts, while also providing important habitat for shorebirds and other waterbirds that would be displaced as the waters of the Salton Sea continue to recede.

Also under this alternative, Refuge staff would continue to work to resolve outstanding land status issues such as renewal of a long term lease with IID; renewal of the lease with CDFW for the Hazard Tract; extension of the lease agreement or acquisition of the Caltrans properties in Unit 1; and potential elimination of some IID land from future leases.

### **Fire Management Plan**

This alternative proposes no changes to the Refuge's current Fire Management Plan.

### **Mosquito Management**

No mosquito management is proposed under Alternative B.

### **Cultural Resource Management**

Cultural resource management under Alternative B would include all of the actions described under Alternative A. Prior to implementing a new ground-disturbing project on the Refuge (ongoing disturbance related to site preparation in managed habitat areas do not fall into this category), Refuge staff would coordinate with the Service's Regional Cultural Resources team and the appropriate Tribal governments when deemed necessary in accordance with Service policy and other Federal regulations. The Sonny Bono Salton Sea NWR Complex would also work with the Regional Archaeologist to develop procedures (that would be formalized through a Memorandum of Understanding with the appropriate tribal representatives) to be implemented in the event of a NAGPRA-related discovery on the Refuge.

### **Environmental Contaminants Coordination**

Under Alternative B, Refuge staff would continue to coordinate with the Service's Environmental Contaminants Program as described under Alternative A, but would also work with the Contaminants Program and other partners to seek funding for developing and implementing a water quality monitoring program for the managed wetlands located to the south of Bruchard Bay, as well as the restored open water habitat in Red Hill Bay; monitor selenium levels within restored habitat areas; and should monitoring indicate a need, develop measures that can be implemented to reduce selenium levels.

### **Volunteers/Partners/Public Outreach**

Under Alternative B, the Refuge would continue to work with partners and volunteers, as described under Alternative A, in an effort to address Refuge specific and region-wide issues and needs. Partnerships may be expanded to implement wetland restoration projects, including restoration of Red Hill Bay and implementation of a Salton Sea SCH project.

Per available staffing, a public outreach program would be developed to identify and recruit surrounding residents interested in volunteering once or twice a month a range of refuge enhancement projects, as well as assisting staff with environmental education programs, conducting bird walks, and implementing programs related to connecting children with nature.

## **Alternative C – Restore and Enhance Habitat Quality; Improve the Quality of Existing Public Uses**

Alternative C includes all of the proposals included in Alternative B that relate to wildlife and habitat management, habitat restoration, and general refuge operations. However, Alternative C proposes different public use proposals. The wildlife and habitat management actions proposed under Alternative C, which are the same as those proposed under Alternative B, are illustrated in Figures 4-7 and 4-8, while the public uses proposed for Alternative C are illustrated in Figure 4-13 and 4-14.

### **Wildlife and Habitat Management**

Wildlife and habitat management would be implemented as described in Alternative B.

### **Habitat Restoration**

Habitat restoration would be implemented as described in Alternative B.

### **Endangered and Sensitive Species Management**

The actions proposed in Alternative B to address endangered and sensitive species would also be implemented under Alternative C.

### **Resident Native Species Management**

The actions proposed in Alternative B to address resident native species would also be implemented under Alternative C.

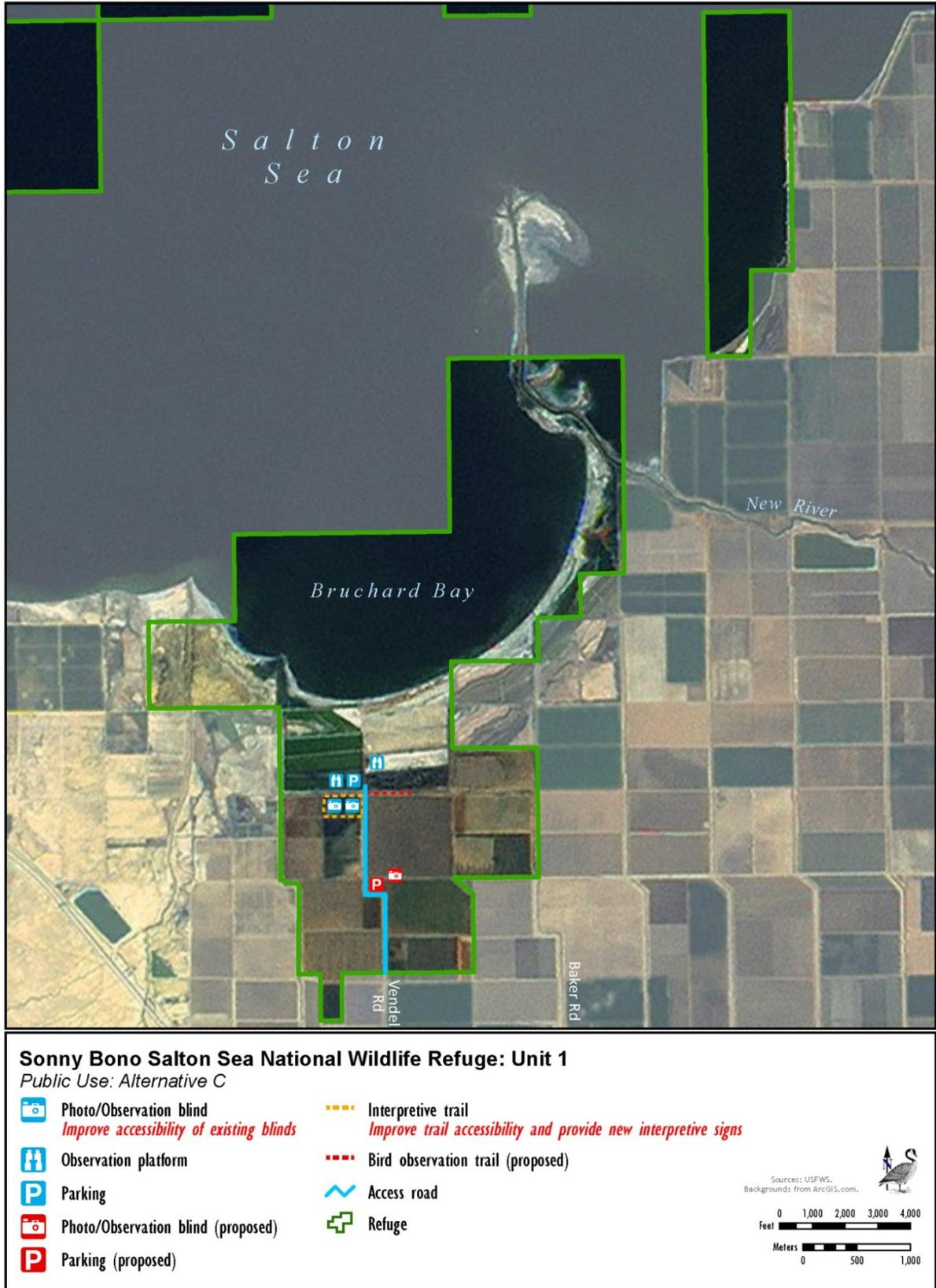
### **General Habitat Management**

The general habitat management actions proposed in Alternative B would also be implemented under Alternative C.

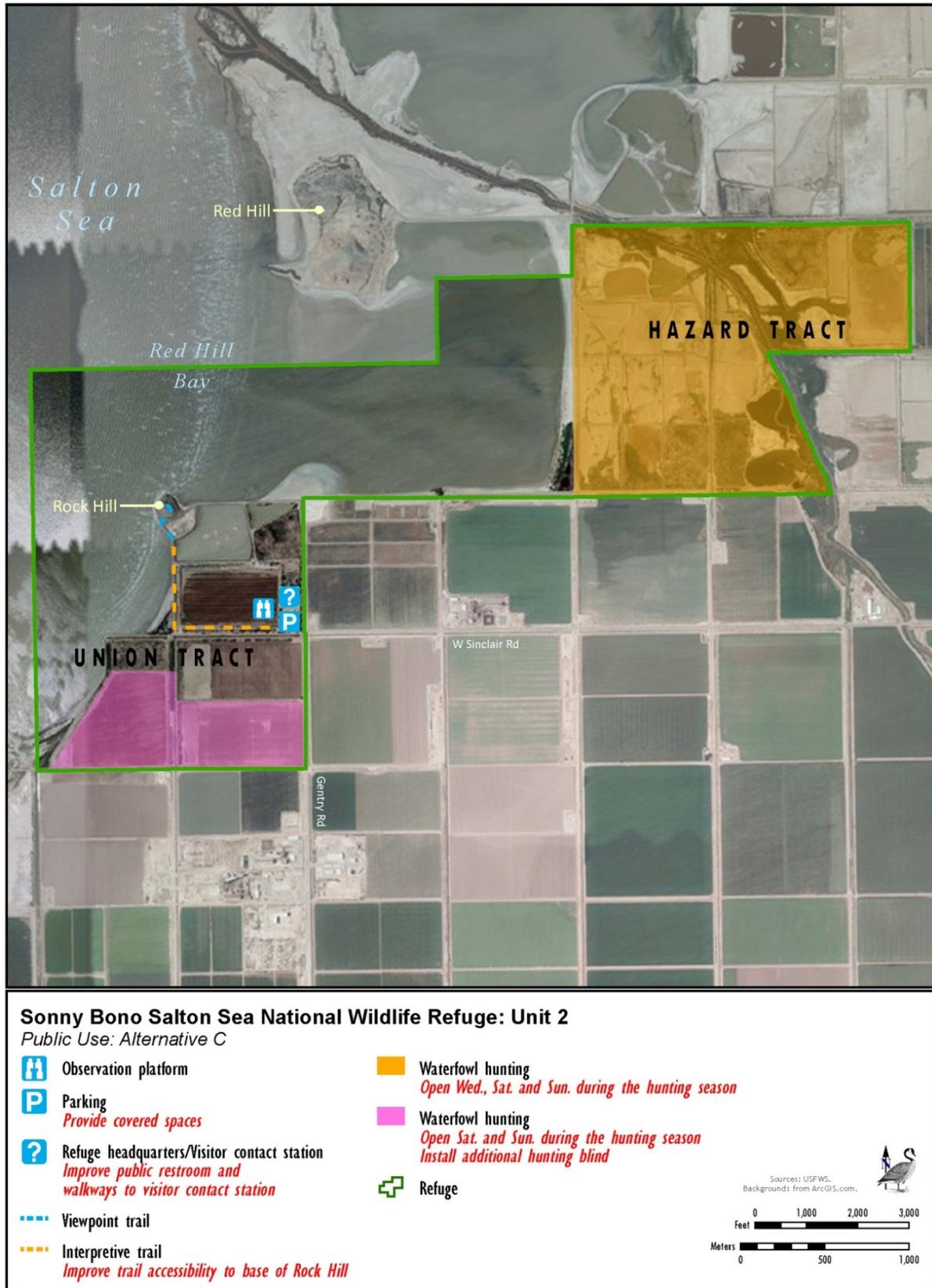
### **Public Use Program**

The public use proposals in Alternative C include those uses described in Alternative A, as well as the improvements proposed for the interpretive trails in Units 1 and 2, as described in Alternative B. The seasonal birding trail proposed for the Hazard Tract and the bird watching area proposed as part of the Red Hill Bay restoration project, described in Alternative B, would not be provided under this alternative.

This alternative also proposes to modify the Refuge's current hunt program by reducing the number of days open to hunting on the Union Tract and adding an additional hunting blind within the area to accommodate up to four additional hunters on approved hunt days. Under this proposal, hunting would be permitted on Saturdays and Sundays, giving the geese five days of undisturbed foraging. The intent of this proposal is to support a larger number of geese in area during the hunting season, thus improving the quality of the hunt. The restoration of Red Hill Bay is also expected to improve the current quality of the hunt within both the Hazard Tract and the Union Tract.



**Figure 4-13. Sonny Bono Salton Sea NWR, Alternative C – Public Use, Unit 1**



**Figure 4-14. Sonny Bono Salton Sea NWR, Alternative C – Public Use, Unit 2**

To improve wildlife viewing opportunities in Unit 1, this alternative proposes to extend the existing interpretive trail to the east of the parking lot to create a short trail segment that would provide goose and sandhill crane viewing opportunities along the northern edge of a managed agricultural field.

Finally, this alternative includes a proposal to work with other partners to develop an auto tour route in the area south of the Salton Sea that guides visitors through the northern portion of the Imperial Valley where there are opportunities to interpret the resources on the Refuge, the importance of agriculture in the Valley, water management, geothermal development, and history and future of the Salton Sea.

### **Refuge Operations**

Refuge operations would be conducted as described in Alternative B.

### **Fire Management Plan**

Fire management under Alternative C would be conducted consistent with the actions described in Alternative B.

### **Mosquito Management**

No mosquito management is proposed on the Sonny Bono Salton Sea NWR under Alternative C.

### **Cultural Resource Management**

Cultural resource management would be implemented as described in Alternative B.

### **Environmental Contaminants Coordination**

Environmental contaminants coordination would be implemented as described under Alternative B.

### **Volunteers/Partners/Public Outreach**

The proposals described in Alternative B for expanding the Refuge's volunteer program and public outreach effort, as well as the proposal to continue to develop partnerships to address refuge and region wide issues, as would also be implemented under Alternative C.

#### ***4.3.4.3 Alternatives Considered but Eliminated from Detailed Analysis***

The development of alternatives is designed to allow consideration of the widest possible range of issues and potential management approaches. During this process, several strategies or alternative methods for achieving the goals for the Sonny Bono Salton Sea NWR were considered but not selected for detailed study. Those alternatives that were eliminated from detailed study are presented below.

Increase the Acreage of Agricultural Fields within the Refuge. During the public scoping meetings, it was suggested that the exposed playa of the Salton Sea be converted to agricultural fields rather than left exposed or restored to shallow water habitat. Refuge staff considered this idea, but ultimately rejected it from further consideration because of excessive salinity levels present within the exposed playa. A significant volume of irrigation water would be required to reduce soil salinities to levels that would make cultivation feasible. In addition, cultivated fields would require the continued availability of irrigation water, whereas the restoration of shallow water habitat could rely on the drainage waters within the Alamo River. Finally, restoring the

playa to shallow water habitat better meets the wildlife goals and purposes of the Refuge, particularly as the shallow waters of the Salton Sea continue to recede.

Expand Opportunities for Hunting on the Refuge. A number of commenters suggested expanding hunting opportunities on the Refuge to include goose hunting in Unit 1. Based on observations within the existing hunting areas in Unit 2 that support wintering geese, when hunting occurs within Unit 2, the geese tend to relocate to other areas of the Refuge to forage, including Unit 1 and adjacent privately-owned parcels. One of the purposes of the Sonny Bono Salton Sea NWR is to provide adequate foraging opportunities on the Refuge so as to minimize crop depredation of commercial crops in the Valley. If Unit 1 were to be opened to hunting, it is likely that foraging geese would move to other areas of the valley seeking refuge from disturbance. The consequences of which would likely involve the depredation of commercial crops. As a result, expanding the hunting program into Unit 1 would interfere with the Refuge's ability to achieve Refuge purposes.

#### **4.3.4.4 Comparison of the Alternatives for the Sonny Bono Salton Sea NWR by Issue**

Table 4-4 presents an issue-by-issue comparison of the three management alternatives described for the Sonny Bono Salton Sea NWR.

**Table 4-4  
Comparison of Alternatives for the Sonny Bono Salton Sea NWR by Issue**

Issues Raised During Scoping	Alternative A No Action - Maintain Current Management Practices and Public Use Program	Alternative B (Proposed Action) Restore and Enhance Habitat Quality; Expand Opportunities for Wildlife Observation, Environmental Education, and Interpretation	Alternative C Restore and Enhance Habitat Quality; Improve the Quality of Existing Public Uses
<b>Wildlife and Habitat Management</b>			
<i>Ensure adequate foraging opportunities on the Refuge for wintering geese by optimizing crop productivity in the Refuge's managed agricultural fields</i>	Continue to cultivate annual rye grass on about 850 acres of designated farm fields using no till methods on approximately half of the total farm field acreage.	Laser level existing farm fields to improve irrigation coverage and increase crop yields; continue to evaluate no till methods and expand this practice to other fields as appropriate; and adaptively manage the fields to optimize crop productivity.	Same as Alternative B.
<i>Identify and implement strategies to offset the adverse physical and biological effects of the receding Salton Sea</i>	Continue monitoring the effects of the receding Salton Sea on Refuge resources and work with the State to address some of these effects through the implementation of the Salton Sea Species Conservation Habitat (SCH) project, which proposes the restoration of deep water habitat to support fish and fish-eating birds along the southern end of the Salton Sea.	Continue to implement the actions in Alternative A and initiate the phased restoration of 420 acres of shallow water habitat in Red Hill Bay, an area previously covered by the Salton Sea, to restore foraging and roosting habitat for waterfowl and shorebirds.	Same as Alternative B.
<i>Ensure the continued availability of quality habitat to support the Yuma clapper rail</i>	Continue to maintain approximately 140 acres of existing permanent cattail marsh habitat on the Refuge; conduct annual monitoring for clapper rails and other secretive marsh birds.	Same as Alternative A; in addition, prepare a step-down Yuma Clapper Rail Management Plan that addresses the long term management of cattail habitat on the Refuge to ensure the continued availability of high quality habitat for Yuma clapper rails.	Same as Alternative B.

**Table 4-4  
Comparison of Alternatives for the Sonny Bono Salton Sea NWR by Issue**

Issues Raised During Scoping	Alternative A	Alternative B (Proposed Action)	Alternative C
<b>Wildlife and Habitat Management</b>			
<i>Improve reproductive success in the Refuge's gull-billed tern and black skimmer nesting colonies</i>	Continue to maintain electrified fencing around the nesting area in the Headquarters D-pond (Unit 2) to minimize the loss of seabird chicks and eggs due to mammalian predation; maintain the two existing seabird nesting areas on the Refuge, including the nesting islands in D-pond, which has historically supported significant numbers of nesting gull-billed terns; and the nesting areas in the northern portion of Unit 1.	Implement the predator management plan prepared in association with the CCP to control individual coyotes and raccoons that prey on chicks and eggs, and as necessary haze gulls that impact gull-billed tern and black skimmer nesting colonies; expand available new nesting sites within the Refuge to reduce over-crowding through the construction of seabird nesting islands as part of the Red Hill Bay restoration proposal and work with the State to explore incorporating one or more seabird nesting islands into the Salton Sea SCH project.	Same as Alternative B.
<i>Refuge management should be consistent with ongoing Salton Sea restoration planning</i>	Continue to coordinate with the State in their effort to implement the Salton Sea SCH Project.	Expand agency coordination in implementing measures to offset the impacts of a receding Salton Sea.	Same as Alternative B.
<i>Initiate active management of desert pupfish on the Refuge</i>	Continue CDFW monitoring of desert pupfish on the Refuge.	Actively monitor the presence of desert pupfish on the Refuge; and working with CDFW and the Palm Springs Fish and Wildlife Office, relocate populations of pupfish discovered in Refuge-managed ponds to more appropriate habitat off or on the Refuge.	Same as Alternative B.

<p align="center"><b>Table 4-4</b>  <b>Comparison of Alternatives for the Sonny Bono Salton Sea NWR by Issue</b></p>			
Issues Raised During Scoping	Alternative A	Alternative B (Proposed Action)	Alternative C
<p><b>Air Quality</b></p>			
<p><i>Address air quality impacts associated with newly exposed areas of Salton Sea sediments (seabed) located within the Refuge boundary</i></p>	<p>Continue to cooperate with the Imperial County Air Pollution Control District by maintaining an air quality monitoring station on the Refuge; one of the six monitoring stations that make up the Salton Sea Air Quality Monitoring Network.</p>	<p>Same as Alternative A and implement restoration in the Red Hill Bay area, which would reduce the potential for dust emissions associated with the exposure of seabed sediments in this portion of the Salton Sea.</p>	<p>Same as Alternative B.</p>
<p><b>Water Availability</b></p>			
<p><i>Evaluate long-term water needs and availability to support ongoing management practices on the Refuge</i></p>	<p>Continue to coordinate with IID on water needs issues for the Refuge and to ensure adequate availability of water to support migratory and resident birds; keep current on new technologies to manage selenium in drain water as a potential supplemental water source; and consider water contracts with IID, as necessary.</p>	<p>Implement the actions described under Alternative A and further evaluate the long-term water needs and future availability of water to support the management practices proposed under Alternative B; explore and develop appropriate and cost effective alternative sources of water and/or water conservation measures that will ensure adequate water availability to achieve Refuge purposes and goals.</p>	<p>Same as Alternative B.</p>

**Table 4-4  
Comparison of Alternatives for the Sonny Bono Salton Sea NWR by Issue**

Issues Raised During Scoping	Alternative A	Alternative B (Proposed Action)	Alternative C
<b>Public Use</b>			
<i>Continue to provide opportunities of waterfowl hunting on the Refuge</i>	Continue to provide waterfowl and goose hunting opportunities within the Hazard and Union Tracts (Unit 2) of the Refuge.	Same as Alternative A.	Continue the current hunt program on the Hazard Tract; on the Union Tract, eliminate Wednesday hunting and construct an additional hunting blind for use on Saturdays and Sundays during the hunting season.
<i>Upgrade existing public use facilities to better serve Refuge visitors</i>	Continue general maintenance of existing public use facilities.	Per available funding, improve accessibility on the Refuge's two interpretive trails by providing a firm and stable trail surface and ensuring that the trail meets minimum trail width and slope recommendations for accessibility; upgrade the existing interpretive elements; refurbish the existing public restroom and sidewalk located adjacent to the Refuge headquarters.	Same as Alternative B.
<i>Provide additional opportunities for visitors to participate in wildlife-dependent recreational uses</i>	Maintain the current public use program which includes hunting, fishing, wildlife observation, interpretation, photography, and a limited environmental education program.	Provide additional opportunities for wildlife observation, photography, and interpretation in Unit 1 by adding a photo blind along Vendel Road and providing new birding trails in Unit 2 (one overlooking the restored Red Hill Bay; the other a seasonal trail in the upper portion of the Hazard Tract).	Provide additional opportunities for wildlife observation, photography, and interpretation in Unit 1 by adding a photo blind along Vendel Road and a new trail segment that will offer views of wintering geese and sandhill cranes.

<p align="center"><b>Table 4-4</b>  <b>Comparison of Alternatives for the Sonny Bono Salton Sea NWR by Issue</b></p>			
Issues Raised During Scoping	Alternative A	Alternative B (Proposed Action)	Alternative C
<p>Refuge Operations</p>			
<p><i>Determine if the current configuration of leased and fee title lands that constitute the Refuge will adequately serve the future needs of migratory and resident birds protected within the Refuge</i></p>	<p>Maintain the current Refuge boundary and continue to work with IID to secure long term leases for the management areas located to the south of the Salton Sea that are currently leased to and managed by the Refuge.</p>	<p>Following completion of the CCP, initiate a step-down planning process to evaluate current and future upland and wetland needs for the Refuge in light of changing circumstances at the Salton Sea. The step-down plan should address the potential for land exchanges, transfers of ownership, and/or removal of some leased lands from the Refuge.</p>	<p>Same as Alternative B</p>
<p><i>Consider the potential for achieving Refuge purposes through the implementation of cooperative farming agreements</i></p>	<p>Although implemented in the past, cooperative farming is not currently being implemented on the Refuge.</p>	<p>Include consideration of cooperative farming agreements as a potential strategy for achieving Refuge purposes related to providing forage for wintering geese.</p>	<p>Same as Alternative B</p>

## 4.4 Coachella Valley NWR

### 4.4.1 Past Refuge Management Activities

Following Refuge establishment in 1985, Refuge staff implemented actions in partnership with other entities to protect the newly acquired lands from disturbance. BLM provided important law enforcement support, significantly reducing illegal off-road vehicle activity on the dunes. Efforts were also undertaken to address sand loss from the site, including the installation of sand fences. Refuge and other Service staff also coordinated with other entities over a number of years to develop various habitat planning and habitat management documents for the preserved lands within the Coachella Valley. Table 4-5 identifies important events related to the management of the Coachella Valley NWR. Additional details regarding Refuge history is provided in Chapter 1.

<b>Event</b>	<b>Date</b>	<b>Additional Details</b>
Refuge established	1985	Defined lands managed by Service as a NWR
Federal Fish and Wildlife Permit issued to local counties	1986	Allowed incidental take of the Coachella Valley fringe-toed lizard outside of Preserve areas
Coachella Valley Preserve Public Equestrian/Hiking Trail System approved	1990	Provides for an equestrian trail on the northern and western edge of the Refuge
Sand corridor emerges as resource needing protection	1990s	Blowing sand replenishes sand dune habitat for the Coachella Valley fringe-toed lizard
Memorandum of Understanding for planning of the Coachella Valley MSHCP	1996	Initiates the planning effort for the Coachella Valley MSHCP that will address current and potential future Federal and State Endangered Species issues
Agencies continue to acquire land for the Coachella Valley Preserve	1997	To protect habitat for Coachella Valley fringe-toed lizard and multiple species habitat values
Corps of Engineers initiates public scoping process for future flood control	1999	Flood control project proposed near Refuge that could impact habitat values (as of 2012, the project has not proceeded beyond the scoping process)
Final Recirculated Coachella Valley MSHCP completed	2007	The Plan "...will balance the demands of the growth of western Riverside County over the next decades with the need to preserve open space and protect species of plants and animals that are threatened with extinction."
Interim Management Agreement Memorandum of Understanding	2007	Provides guidance related to Reserve Management Unit Plans for the immediate future to ensure conservation of covered species and natural communities
Coachella Valley MSHCP Implementing Agreement	2008	Provides legal agreement among all responsible parties for plan implementation
Reserve Management Unit Plan for Reserve Management Unit 1 (Valley Floor Reserve Management Unit) approved	2012	Provides a framework for facilitating collaborative management to provide effective and efficient use of available combined management resources

### 4.4.2 Existing Management Plans

Prior to the completion of this CCP, management on the Coachella Valley NWR was guided by the goals and objectives of various management plans including the 1986 Management Plan for the Coachella Valley Preserve System, which was superseded by the 1995 Management Plan for the Coachella Valley Preserve System. In 2008, the Coachella Valley MSHCP superseded all previous planning documents for the Preserve System, although the overall management objectives remain

generally the same. Most recently, the Reserve Management Unit Plan for the Valley Floor Reserve Management Unit was approved (2012), which provides more detailed direction for addressing the threats, stressors, and other management issues affecting the habitats within the Refuge and other preserved areas within the Coachella Valley floor.

**4.4.3 Current Refuge Management**

The Coachella Valley NWR continues to be managed essentially as it has been managed since its establishment. The primary actions include protecting the sensitive habitats within the Refuge from human disturbance with significant assistance from other land management agencies in the area; addressing sand transport issues at the local level in partnership with others; and hand pulling of invasive weedy plants, particularly Sahara mustard, in sensitive sand dune habitat. The possible control of invasive weeds became a more significant reality beginning in about 2010 after research indicated proper timing of the use of herbicides on the Refuge could help control invasive plants while avoiding impacts to sensitive native species.

**4.4.4 Alternatives for the Coachella Valley NWR**

The three management alternatives evaluated for the Coachella Valley NWR are summarized in Table 4-7 and described in greater detail in the sections that follow.

<b>Table 4-6 Summary of Major Management Actions for the Coachella Valley NWR under each Alternative</b>			
<b>Refuge Management Activity</b>	<b>Alternative A (No Action)</b>	<b>Alternative B (Proposed Action)</b>	<b>Alternative C</b>
<b>Habitat Protection</b>	Continue current activities	Hire a dual function refuge manager/Federal wildlife officer to enforce regulations and manage Refuge resources	Same as Alt. B
<b>Habitat Enhancement or Restoration</b>	Implement occasional invasive plant control	Implement the phased control of invasive weeds on the old vineyard and reseed controlled areas with native species; restore mesquite hummocks	Implement a phased 400-acre restoration plan for the old vineyard site involving recontouring and planting of native vegetation; restore mesquite hummocks
<b>Listed Species Monitoring</b>	Continue current program	Expand Refuge staff involvement in monitoring activities	Same as Alt. B
<b>Invasive Plant Control</b>	Continue current invasive plant control	Implement an integrated appropriate to pest management	Same as Alt. B
<b>Environmental Education</b>	Continue current program	Same as Alt. A	Same as Alt. B
<b>Interpretation</b>	On-site interpretive signs are not provided	Same as Alt. A	Provide interpretive signs along the trail corridor

<b>Table 4-6 Summary of Major Management Actions for the Coachella Valley NWR under each Alternative</b>			
<b>Equestrian/Hiking Trail</b>	Continue current use	Same as Alt. A	Same as Alt. A
<b>Refuge Management Activity</b>	<b>Alternative A (No Action)</b>	<b>Alternative B (Proposed Action)</b>	<b>Alternative C</b>
<b>Public Outreach</b>	Continue current efforts	Develop an interpretive element for permanent display off-site, as well as a traveling interpretive display	Same as Alt. B
<b>Research</b>	Continue current program	Expand opportunities consistent with Refuge purposes	Same as Alt. B
<b>Staffing</b>	Maintain current staffing levels	Expand staffing to achieve proposed management	Same as Alt. B

#### **4.4.4.1 Similarities among the Alternatives for the Coachella Valley NWR**

Although there are differences among the range of alternatives presented for managing the Coachella Valley NWR, the alternatives also include features and management components that would be part of the CCP regardless of the alternative selected for implementation.

##### **Features Common to All Alternatives**

Features common to all alternatives are summarized here. To reduce repetition, those features that are common among all of the alternatives are described in detail only under Alternative A – No Action.

- *Habitat Protection* – Patrol and enforce access restrictions on the Refuge, opportunistically hand pull invasive Sahara mustard, and in partnership with others address issues related to sand transport, all to protect sensitive sand dune and sand field habitats.
- *Listed Species Monitoring* – Conduct listed species monitoring per the requirements of the Coachella Valley MSHCP.
- *Limited Public Access* – Restrict public access on the Refuge to the approved equestrian and hiking trail located along the western and within the northern portion of the Refuge and to specific guided tours.
- *Protection of Cultural Resources* – Manage recorded and any yet to be discovered cultural resources located within the Refuge in accordance with existing Federal laws and Service policies. Continue to consider the effects of all proposed actions on cultural resources and consult with the Regional Cultural Resources team, and, when appropriate, the SHPO, federally recognized Tribes, and interested parties.

- *Environmental Contaminants Coordination* – Work with the Service’s Environmental Contaminants Program to ensure that trust resources are not adversely affected by contaminants originating from on- or off-site sources.

**Features Common to All Action Alternatives**

Features common to all action alternatives (Alternatives B and C) are summarized here.

- *Integrated Pest Management (IPM)* – Control invasive plants on the Refuge through the implementation of an integrated pest management approach.
- *Listed and Covered Species Monitoring* – Expand Refuge staff involvement in annual protocol monitoring of listed and other Coachella Valley MSHCP covered species known to occur on the Refuge, while continuing to work in partnership with other agencies and organizations in these regional monitoring efforts.
- *Sand Transport* – Work in partnership with others to develop and jointly implement a long-term sand transport monitoring plan for the Thousand Palms Conservation Area.
- *Monitor Changes Related to Climate Change* – In partnership with others, identify funding for developing and implementing a monitoring program that focuses on the effects of climate change on species population trends and habitat conditions within the Coachella Valley MSHCP planning area.

**4.4.4.2 Detailed Description of the Alternatives for the Coachella Valley NWR**

**Alternative A - No Action**

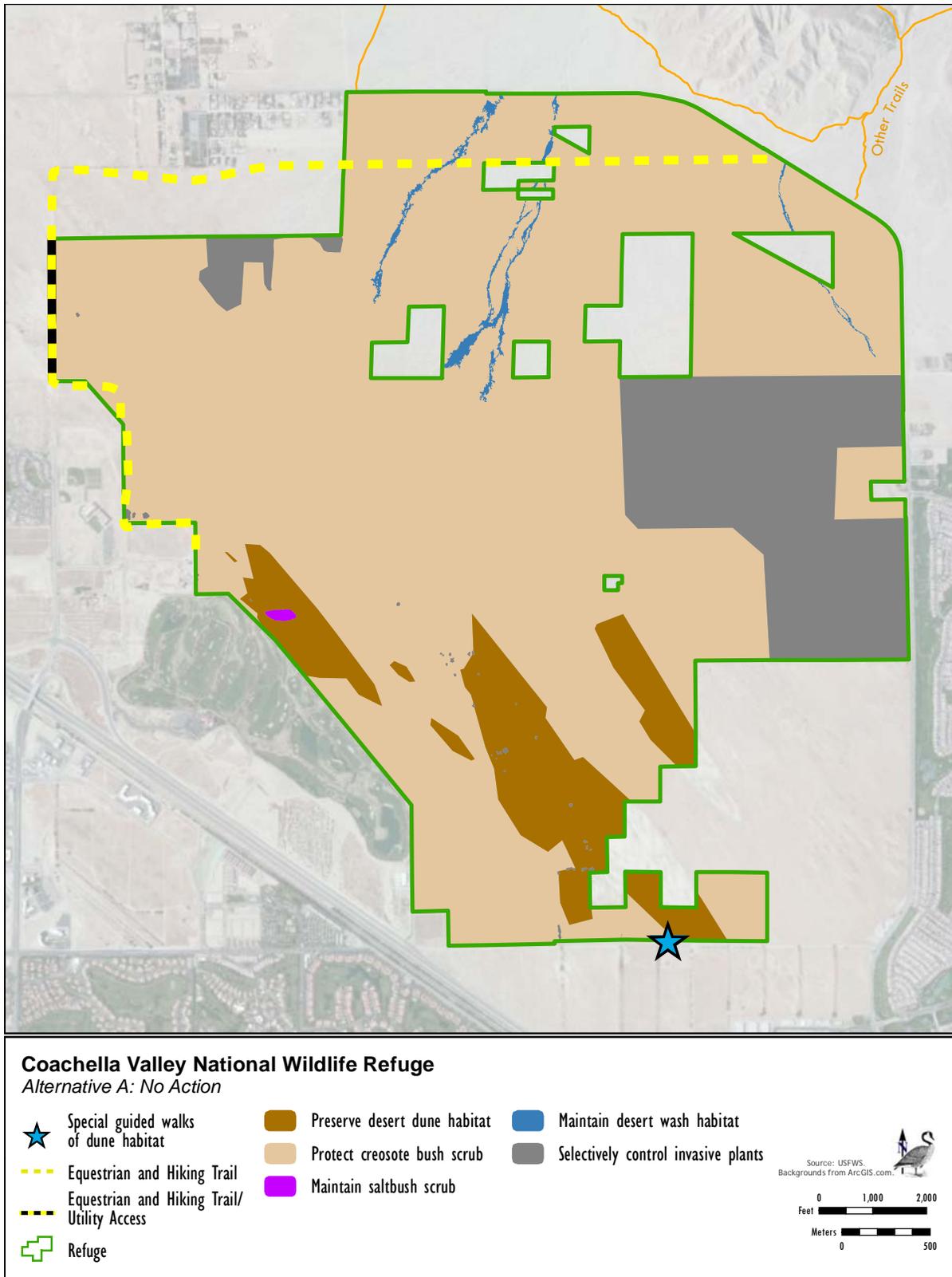
The No Action Alternative (Figure 4-15) proposes no changes to the present management or public use activities occurring on the Refuge.

**Wildlife and Habitat Management**

For the most part, the actions carried out on the Coachella Valley NWR are conducted by Refuge personnel stationed at the Sonny Bono Salton Sea NWR, although the Refuge currently employs a part-time worker (a college student through the student temporary employment program) to help implement some of the management actions on the Refuge, including maintenance of signs and fencing and assisting University of California, Riverside (UCR) researchers with species monitoring. The Refuge also receives management support from the Center for Natural Lands Management staff and volunteers who work out of the Thousand Palms Oasis Preserve site.

Habitat Protection. In contrast to the intensely managed habitats within Sonny Bono Salton Sea NWR, the management of the Coachella Valley NWR is significantly more passive. Of the actions implemented on this Refuge, protection of the sensitive sand dune and sand field habitats on the Refuge is critical to achieving Refuge purposes.

Surveillance, which is conducted in partnership with other agencies, is conducted to deter unauthorized access onto sensitive habitat areas and fencing and signs are maintained to deter off-highway vehicle activity.



**Figure 4-15. Coachella Valley NWR, Alternative A – No Action**

Sand fences have been installed on the Refuge by CVAG over the years to help keep sand on the Refuge and enhance active dune formation to support the fringe-toed lizard, Coachella Valley milk-vetch, and other endemic dune species. These fences have not required any maintenance; those that are working as intended simply become covered by sand to form new dune habitat and slow the loss of sand from the Refuge.

Until recently, the County of Riverside Transportation Department (County DOT) assisted in sand management by disposing of accumulated sand from the Preserve on the Refuge. Specially, when sand accumulated on Washington Street and 38<sup>th</sup> Avenue, County DOT through an informal agreement with the Refuge would remove the sand from roadways adjacent to the Refuge and deposit it back onto the north end of the Refuge. This practice supported the blowsand habitats on the Refuge, while significantly reducing the driving time required by the County to dispose of the sand. In 2012, County DOT indicated that they were no longer interested in participating in this agreement.

Invasive Species Control. Sporadic, very local control of Sahara mustard by hand removal of plants has been implemented within the dune habitat and mechanical and chemical control of salt cedar has occurred at various times over the years. In 2011, a research investigation into the use of glyphosate to control Sahara mustard was conducted on the Refuge.

Endangered Species Monitoring. Fringe-toed lizard monitoring is conducted annually on the Refuge by Dr. Cameron Barrows from UCR, who uses a passive monitoring method that involves track surveys. The Service's Ecological Services (ES) Program had been collecting data to assist in the development of monitoring protocols that involved an active monitoring program. The data collection part of the project was completed, but the associated analysis has yet to be completed. ES field data indicate that the track survey data collected by Dr. Barrows provides a good index of actual population, but additional analysis is required. As of 2012, monitoring protocols for this species had not yet been approved.

Coachella Valley milk-vetch counts are conducted by UCR staff within the Refuge's active sand dune habitat in association with their fringe-toed lizard surveys. A summary report of the results of these surveys is provided annually to the Coachella Valley Conservation Commission. Plant densities are low enough that total number of plants can be counted and converted to densities per 0.1 hectare for comparison with other habitats.

Coachella Valley MSHCP Reserve Management Unit Plan. In January 2012, a Reserve Management Unit Plan was approved for Reserve Management Unit 1 (Valley Floor). The Thousand Palms Conservation Area, of which the Refuge is a part, is included within this Management Unit. The purpose of the Reserve Management Unit Plan is to provide a framework for facilitating collaborative management by all of the involved management entities (i.e., Federal, State, local, non-profit organizations) within the Management Unit to provide for effective, efficient, and cooperative use of available resources. The management goals presented in the Reserve Management Plan include:

- Prevent the establishment of new infestations of invasive plants and animals and reduce or control current infestations;
- Maintain essential hydrological processes to support the species and natural communities addressed by the Coachella Valley MSHCP, with the primary targets of maintaining adequate ground water levels and sand source/transport mechanisms;
- Ensure that species have the ability to shift their range in response to the effects of climate change on habitat and the distribution of natural communities;

- Avoid or minimize the potential for and effect of habitat fragmentation from causes including infrastructure and other development in the Conservation Areas, and edge effects from adjacent development;
- Prevent damaging wildfires that reduce the ability of the Reserve Management Unit to support the species and natural communities addressed by the Coachella Valley MSHCP and evaluate and use prescribed fire in specified areas if determined appropriate;
- Minimize the impacts of existing and potential new power and gas lines in the Reserve Management Unit;
- Identify, restore, enhance, and protect key sand transport locations and processes;
- Identify, implement, and maintain appropriate habitat enhancement and restoration projects;
- Provide for public access and use of Reserve System lands consistent with the conservation goals and objectives of the Coachella Valley MSHCP and ensuring public safety; and
- Maintain the Reserve Area free of dumping and hazardous materials through prevention and quick clean-up of materials that are dumped on Reserve Lands.

Some of these goals can be addressed at the local preserve level, but several require the implementation of actions at the larger landscape level.

### **Public Use**

At present, public access onto the Refuge is limited to occasional guide tours which are regulated through the Refuge Special Use Permit process, as well as equestrian and hiking trail use on the designated trail routes established in 1990. The guide tours, which are generally conducted by Center for Natural Lands Management staff, facilitate wildlife observation, photography, and interpretation. Trail users have opportunities for wildlife observation and photography from the trail. To avoid adverse effects to listed species, trail users are required to stay on the designated trail at all times and dogs and other pets are prohibited on Refuge trails. Some informal interpretation of the resources protected on the Refuge also occurs at the Center for Natural Lands Management's Thousand Palms Oasis Preserve site.

A few outside research projects and resource surveys have been conducted on the Refuge, most related to listed species. Research projects and surveys conducted on the Refuge by outside individuals, organizations, or agencies that are not directly related to Refuge management may only be conducted after a Special Use Permit (SUP) has been issued by the Refuge Manager that documents the purposes of the work to be conducted and includes specific conditions intended to protect trust resources and ensure adherence to applicable Refuge regulations and policies.

### **Refuge Operations**

The equipment needed to support this Refuge is maintained at the Sonny Bono Salton Sea NWR or at facilities maintained by Center for Natural Lands Management. No buildings, utilities, or parking areas are present on the Refuge. The only structures or facilities present on the Refuge are perimeter fences, sand fences, signs, and the existing equestrian and hiking trail. Sand fences were most recently installed in 2006 by CVAG.

The Sonny Bono Salton Sea NWR Complex does not have a Federal wildlife officer on staff; instead law enforcement on the Refuge is conducted by the Service's Southern California Zone Officer, as well as BLM, California State Parks, and local law enforcement staff under an interagency agreement established through Coachella Valley MSHCP.

### **Fire Management Plan**

The Coachella Valley NWR does not currently have a fire management plan. In 2003, the Service exempted the Refuge from developing a Fire Management Plan due to lack of burnable vegetation, lack of ignition sources, no established fire management program, and no reason or plans to conduct prescribed burning.

### **Mosquito Management**

No mosquito management is conducted on the Refuge.

### **Cultural Resource Management**

As described previously, as part of the CCP process, a Cultural Resources Review was conducted to provide the Refuge Manager with pertinent information about the cultural resources within the Refuge Complex, including the Coachella Valley NWR. Because there is the potential for undiscovered cultural resources to be present within the Refuge, any ground disturbing activities proposed within the Refuge boundary are reviewed by the Service's Cultural Resources Program for compliance with Section 106 of the Historic Preservation Act. The review process involves the preparation of a Request for Cultural Resources Compliance which is submitted to the Regional Cultural Resources Office for review. Those projects that would result in only minor impacts to subsurface materials could fall under the Service's programmatic agreement with SHPO, while other projects requiring greater ground disturbance would require SHPO review and concurrence.

### **Environmental Contaminants Coordination**

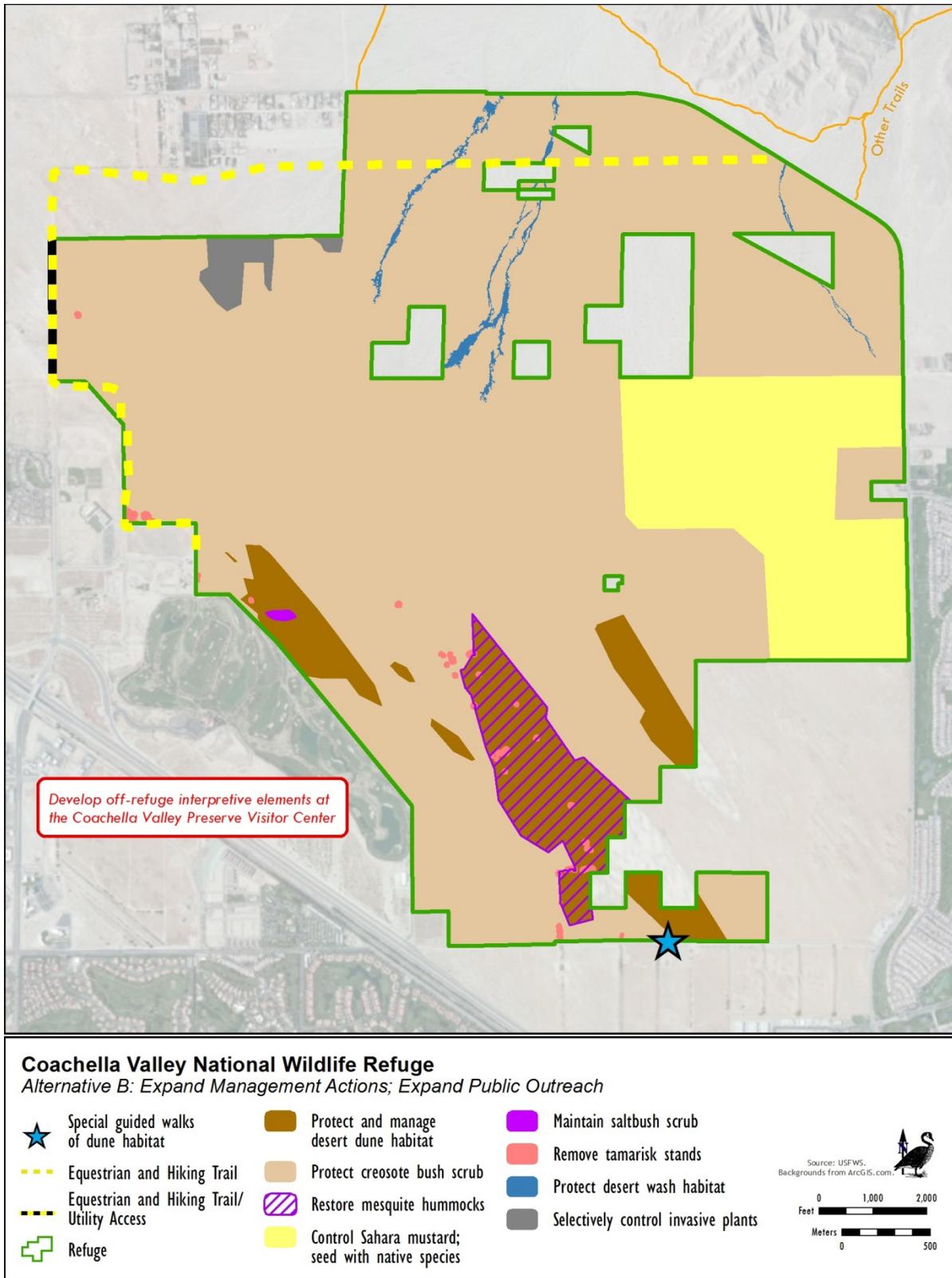
The Service's Environmental Contaminants Program is available to assist the Refuge Manager in issues related to contaminants, as well as to conduct studies related to the effects of contamination on Refuge trust resources. The Service's Environmental Contaminants Program also assists the Refuge on pre-acquisition environmental contaminants surveys.

### **Volunteers/Partners/Public Outreach**

Partnerships play an important role in the management of this Refuge. Over the years, Federal, State, local, and non-profit organizations have assisted in the management and operation of the Refuge. This assistance has ranged from law enforcement assistance from BLM to sand fence installation by CVAG. Staff and volunteers from the Center for Natural Lands Management, and before that from The Nature Conservancy, have assisted with weed control, interpretation, and public outreach.

### **Alternative B (Proposed Action) - Expand Management Actions to Support Listed and Sensitive Species; Expand Public Outreach**

Under Alternative B (Figures 4-16), the wildlife and habitat management activities described in Alternative A would be expanded to include more intensive invasive plant control, increased participation in species monitoring, initiation of habitat enhancement to support the flat-tailed horned lizard, and implementation of applicable management actions included in the 2012 Reserve Management Unit Plan for the Valley Floor Reserve Management Unit. No changes in the types of public uses allowed on the Refuge are proposed.



**Figure 4-16. Coachella Valley NWR, Alternative B (Proposed Action)**

### **Wildlife and Habitat Management**

In addition to implementing the actions described under Alternative A, the following new actions would be initiated under Alternative B.

Integrated Pest Management. Invasive plant species, particularly annual weeds, represent a threat to listed and sensitive species on the Refuge because of the impact they can have on habitat quality and individual native plants. Invasive plants can cause impacts through the physical alteration of the environment, as well as through competition with native plants for water, space, and sunlight. The invasive species of particular concern on the Refuge is Sahara mustard, although other nonnative species including cranesbill (*Erodium cicutarium*) and various nonnative annual grasses are also present and could impact the productivity of the Refuge's native plant species. The nonnative shrub, salt cedar, is also an invasive species of concern within the Refuge's dune habitat.

Alternative B proposes the implementation of an Integrated Pest Management (IPM) Plan to address these invasive species issues. This proposal addresses the Valley Floor Reserve Management Unit Plan's invasive species goal of preventing new invasive species infestations within the larger Reserve and reducing or controlling current infestations.

An IPM Plan, a step-down plan that has been incorporated into the CCP process, has been prepared to address both Refuges within the Sonny Bono Salton Sea NWR Complex. A general summary of the IPM Plan has been previously provided. Those aspects of the IPM Plan that specifically relate to the Coachella Valley NWR are presented here.

Tackling the Sahara mustard infestation on the Refuge requires a long-term approach to control that would require a combination of both physical/mechanical control and chemical control. Physical/mechanical control would involve primarily the hand pulling of weeds, although the use of hand tools and the occasional use of power tools may also occur when deemed appropriate by the Refuge wildlife biologist.

Under this Alternative, hand pulling of Sahara mustard plants would continue, but would be supplemented with the localized use of herbicide. Initially, the Refuge proposes to use glyphosate to provide local control of Sahara mustard in areas most vulnerable to impacts from infestation. Using backpack sprayers, the herbicide would be applied to the leaves and stems of the mustard plants prior to flowering. Because Sahara mustard germinates earlier than the Refuge's native annuals, herbicide application would occur in late winter or early spring depending upon the particular year's rain pattern. Depending upon the rainfall pattern in the spring, additional treatment may be necessary if new mustard plants are found to be germinating.

Outside of the dune habitat, efforts to hand hoe large stands of mustard when the plants are in the rosette or early stages of flowering may be attempted in an effort to reduce the plant's seed bank on the Refuge (Graham et al. no date). Weed whipping and mowing in areas that do not support sensitive habitat would only be considered if it could be implemented in association with the application of a herbicide immediately following mechanical control. Mechanical control would remove flowers before fruit could be produced on the plants, but without chemical control, the mustard plants would continue to grow producing new flowers and fruit stalks. In some cases, this form of mechanical control has been shown to stimulate vigorous regrowth in Sahara mustard. Following control of a particular area, an appropriate native annual seed mix would be distributed over the site.

Research on the most effective control techniques for Sahara mustard without impacting the native plants that occur in the same areas is being conducted by various universities in California, Nevada, and Arizona, as well as by USGS. Appropriate research will be supported on the Refuge and the results of the various research efforts in the region will be considered in developing a long-term control plan of this invasive plant on the Refuge.

Herbicides proposed for use on the Refuge would be evaluated by the IPM Regional Coordinator for potential effects to Refuge biological resources and environmental quality. The results of this evaluation, including the potential effects of each product, would be documented in “Chemical Profiles.” Chemical profiles have already been completed for the herbicides approved for use on the Sonny Bono Salton Sea NWR through the PUP process and are available for review in Attachment B of Appendix D.

Current research indicates that the herbicides glyphosate and triclopyr have varying degrees of effectiveness on the control of Sahara mustard (Graham et al. no date). Additional research may identify new, more effective herbicides in the future. Herbicides are also an effective tool for controlling individual salt cedar shrubs present in sensitive habitat areas. Whenever herbicides are considered for use on the Refuge, only those herbicides likely to result in minor, temporary, and/or localized effects to species and environmental quality based upon non-exceedance of threshold values in Chemical Profiles would be approved for use on the Refuge. In addition, BMPs would be implemented during the handling and application of all pesticides. For some herbicides, non-exceedance of threshold values may be achieved through the implementation of herbicide specific BMPs that further define how, when, where, and to what extent a specific pesticide may be applied. Table 4-7 lists those herbicides that currently have the potential for use on the Refuge. As stated here, additional herbicides may be proposed in the future that would be evaluated through the procedures described in the IPM Plan (Appendix D).

Another form of invasive plant control that would be implemented on the Refuge involves surveillance and prevention. Early identification and control of new invaders can prevent the establishment of nonnative species within the Refuge. New invaders identified during surveillance should be removed well before they flower and produce seed. To reduce the potential for invasion, soil disturbance by vehicles, equipment, or other activities would be minimized, and movement of vehicles, people, and soil between infested and uninfested areas would be avoided.

<b>Active Ingredient</b>	<b>Common Product Name(s)</b>	<b>Target Pests</b>	<b>Habitat Type</b>	<b>Application Method(s)</b>	<b>Application Equipment(s)</b>
<b>Glyphosate</b>	Roundup, Roundup Pro	Sahara mustard, cranesbill	sand dune, sand field	foliar	backpack sprayer
<b>Imazapyr</b>	Stalker	salt cedar	sand dune, sand field	foliar cut stump	backpack sprayer hand-held sprayer
<b>Triclopyr</b>	Garlon 3A, Remedy	Sahara mustard	sand dune, sand field	foliar	backpack sprayer

Species Monitoring. Under Alternative B, Refuge staff would take a more active role in the annual protocol monitoring of listed and other Coachella Valley MSHCP covered species known to occur on the Refuge, while continuing to work in partnership with other agencies and organizations in these regional monitoring efforts.

Habitat Enhancement of the Old Vineyard Site. The old vineyard site, a disturbed area of approximately 400 acres located in the eastern portion of the Refuge, has been severely impacted by Sahara mustard. This infestation limits the habitat quality of the area for most native species, including the flat-tailed horned lizard. In an effort to restore habitat value in this area, the phased control of mustard, per available funding and staffing, would be implemented using a combination of mechanical and chemical control. Following control of an area, native seeds would be distributed. Individual creosote and mesquite bushes in the area would be protected in place. The specifics of this phased habitat enhancement project would be more fully defined in a step-down Habitat Management Plan (HMP) for the Refuge.

Sand Transport. Under Alternative B, the Refuge would work with other agencies and research partners to develop and jointly implement a long-term sand transport monitoring plan for the Thousand Palms Conservation Area. In addition, the effectiveness of existing sand fences on the Refuge would be evaluated and those fences that were installed some years ago that continue to remain exposed would be considered for removal and possible relocation within the Refuge.

Another proposal that would be explored under Alternative B to address sand transport issues involves the reestablishment of native honey mesquite shrubs on the Refuge to facilitate the creation of mesquite hummocks. Mesquite hummocks, which were historically supported on the Refuge, can reduce the rate at which blowsands are carried off the Refuge. Mesquite vegetation on the Refuge has been lost as a result of the significant lowering of the groundwater table under the Refuge due to groundwater pumping to support development and agriculture in the region. As a result, restoration of mesquite on the Refuge would require some form of irrigation (e.g., extension of water lines, use of a water truck) or an alternative source of water such as DRiWATER or similar time-release water product. The successful reestablishment of honey mesquite on the Refuge would promote the creation of mesquite hummocks, slow sand loss from the site, and assist in preserving blowsand habitat to support the Coachella Valley fringe-toed lizard and a number of other sensitive species.

Climate Change. Under Alternative B, Refuge staff would work in partnership with other land managers and researchers to identify funding for developing and implementing a monitoring program that focuses on the effects of climate change on species population trends and habitat conditions within the Coachella Valley MSHCP planning area.

### **Public Use Program**

No changes to the current public uses provided on the Refuge are proposed under Alternative B; however, Alternative B does propose to seek funding to develop off-refuge interpretative elements that could be displayed at the Coachella Valley Preserve Visitor Center and other public facilities in the area.

The Refuge would continue to develop research partnerships with academic institutions, and other public (e.g., USGS), private, and non-profit researchers to conduct research on the Refuge that would benefit Refuge management and/or Refuge resources. Potential research topics include but are not limited to: the effects of climate change on the Refuge's listed and

sensitive species; the effects of invasive species on the Refuge's listed species populations; and the effects of herbicide use on annual plant production in blowsand habitats.

### **Refuge Operations**

To implement the proposal described for Alternative B, as well as to achieve the MSHCP objectives for protecting core habitat areas to support listed and sensitive species, this alternative proposes to expand the staff of the Sonny Bono Salton Sea NWR Complex to include a dual function refuge manager/Federal wildlife officer, who would dedicate a minimum of 25 percent of the time to law enforcement activities on both the Coachella Valley and Sonny Bono Salton Sea NWRs. The remaining time would be dedicated to management activities on the Coachella Valley NWR, including habitat and species management, species surveys and monitoring, general site maintenance and protection, managing and expanding current partnerships, and coordinating with the Valley Floor Resource Management Committee and Coachella Valley Conservation Commission.

### **Fire Management Plan**

As described under Alternative A, a fire management plan is not currently required for this Refuge.

### **Mosquito Management**

No mosquito management is proposed under Alternative B.

### **Cultural Resource Management**

Cultural resource management under Alternative B would include all of the actions described under Alternative A. Prior to implementing any project on the Refuge that would involve a new ground disturbing activity, Refuge staff would coordinate with the Service's Regional Cultural Resources team and the appropriate Tribal governments when deemed necessary in accordance with Service policy and other Federal regulations and policies. Also under Alternative B, the Sonny Bono Salton Sea NWR Complex would work with the Regional Archaeologist to develop procedures (that would be formalized through a Memorandum of Understanding with the appropriate tribal representatives) to be implemented in the event of a NAGPRA-related discovery during the implementation of a Refuge-related project.

### **Environmental Contaminants Coordination**

Under Alternative B, Refuge staff would continue to coordinate with the Service's Environmental Contaminants Program as described under Alternative A.

### **Volunteers/Partners/Public Outreach**

Under Alternative B, the Refuge would continue to work with existing partners and volunteers, as described under Alternative A, in an effort to address Refuge specific and region-wide issues and needs. When staff is available, a public outreach program would be developed to identify surrounding residents interested in volunteering for activities related to weed control and habitat enhancement. Additionally, volunteers would be sought to assist the Refuge in disseminating information at various off-refuge locations that addresses the importance of the Refuge in preserving the area's listed species and sensitive blowsand habitats.

## **Alternative C - Expand Management Actions to Include Restoring Creosote Bush Scrub; Expand Environmental Interpretation**

### **Wildlife and Habitat Management**

The wildlife and habitat management actions proposed under Alternative C would be the same as those proposed for Alternative B, with the exception of the action proposed for the old vineyard site on the Refuge (Figure 4-17). Under Alternative C, rather than simply reseeding the site following the control of invasive plants, as proposed under Alternative B, this alternative proposes the comprehensive restoration of the site. This restoration would involve the reestablishment of site's natural contours and drainage pattern; actions to reduce site's invasive species seed bank; and revegetation of the prepared area with annual and perennial plant species native to the historical creosote bush scrub habitat that once occupied the site. This restoration project would be more fully defined in a step-down Habitat Management Plan (HMP) for the Refuge.

### **Public Use Program**

The public use proposals included in Alternative B would also be implemented under Alternative C. In addition, Alternative C proposes to design and install interpretive signage at an appropriate location along the existing trail corridor within the Refuge. This signage would interpret the species and habitats present in the Refuge and the importance of protecting these resources and the other resources preserved within the larger Coachella Valley MSHCP planning area. Opportunities for research would be the same as those described under Alternative B.

### **Refuge Operations**

Refuge operations under Alternative C would be the same as those described under Alternative B.

### **Fire Management Plan**

As described under Alternative A, a fire management plan is not currently required for this Refuge.

### **Mosquito Management**

No mosquito management is proposed under Alternative C.

### **Cultural Resource Management**

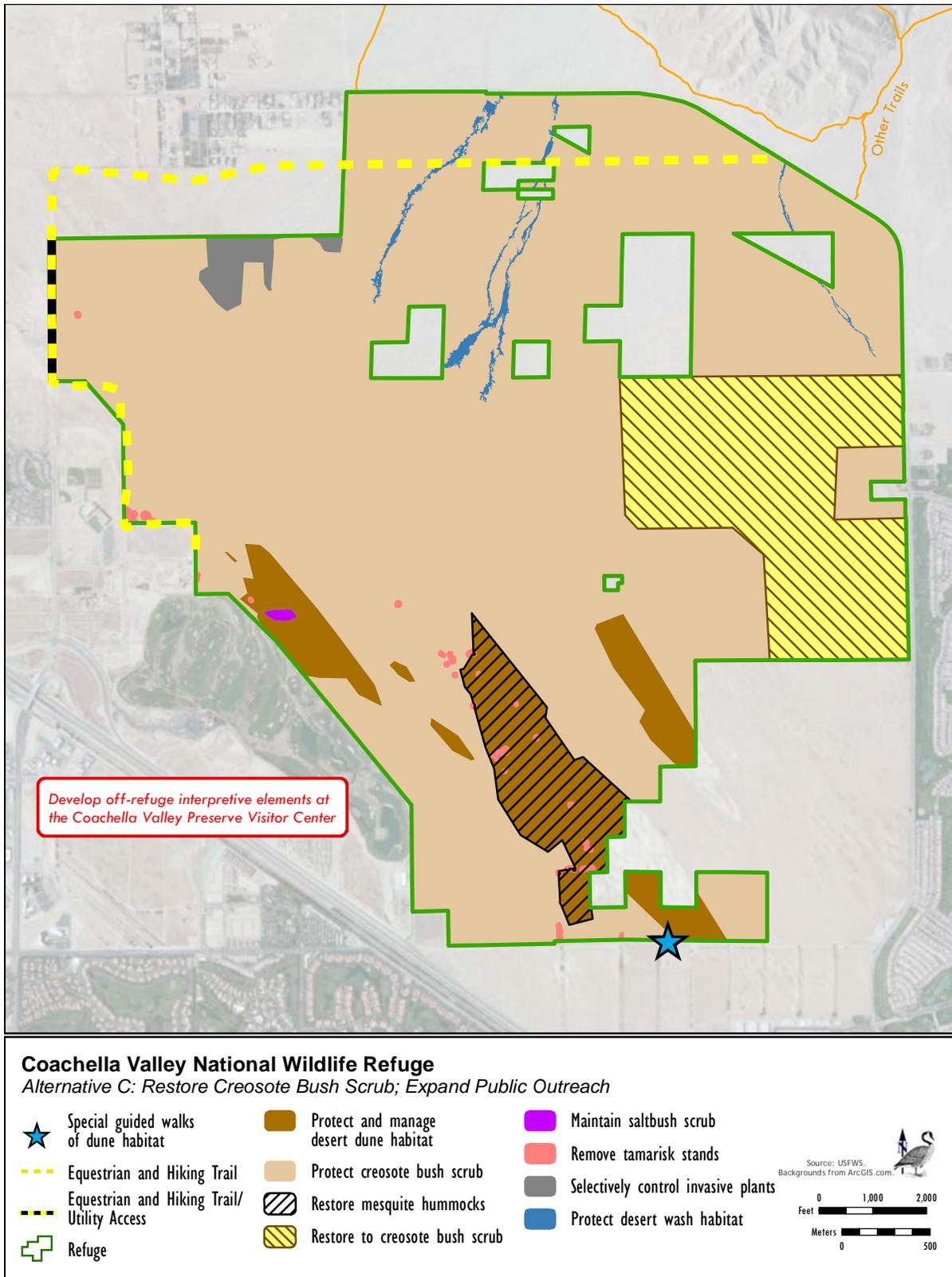
Cultural resource management under Alternative C would include all of the actions described under Alternative B.

### **Environmental Contaminants Coordination**

Under Alternative C, Refuge staff would continue to coordinate with the Service's Environmental Contaminants Program as described under Alternative A.

### **Volunteers/Partners/Public Outreach**

Proposals involving volunteers and public outreach, as described in Alternative B, would also be implemented in Alternative C. Existing partnerships would continue to be an importance aspect of Refuge management, as described in Alternatives A and B.



**Figure 4-17. Coachella Valley NWR, Alternative C**

#### **4.4.4.3 Alternatives Considered but Eliminated from Detailed Analysis**

The alternatives development process is designed to allow consideration of the widest possible range of issues and potential management approaches. During this process, various objectives and strategies for achieving the goals for the Coachella Valley NWR were considered but not selected for detailed study. Those alternatives that were eliminated from detailed study are presented below.

Expand the Opportunities for Public Use. There were several suggestions provided during public scoping for expanding public use on the Refuge, including providing opportunities for wildlife observation and upland bird hunting. These proposals were considered but eliminated from detailed analysis for a variety of reasons, including the lack of any facilities on this Refuge to accommodate public use, the limited availability of Refuge personnel to manage public use at this Refuge, the scarcity and fragile nature of the habitat protected on the Refuge, and the requirements of the Coachella Valley MSHCP to protect core habitat areas for Coachella Valley fringe-toed lizard, Coachella Valley milk-vetch listed, and other covered species in order to accommodate development elsewhere within the MSHCP planning area.

#### **4.4.4.4 Comparison of the Alternatives for the Coachella Valley NWR by Issue**

Table 4-8 presents an issue-by-issue comparison of the three management alternatives described in this chapter for the Coachella Valley NWR.

**Table 4-8  
Comparison of Alternatives for the Coachella Valley NWR by Issue**

Issues Raised During Scoping	<b>Alternative A</b> Maintain Current Management Practices and Limited Public Uses	<b>Alternative B (Proposed Action)</b> Expand Management Actions to Support Listed and Sensitive Species, Expand Public Outreach	<b>Alternative C</b> Expand Management Actions to Include Restoring Creosote Bush Scrub, Expand Public Outreach
<b>Wildlife and Habitat Management</b>			
<i>Annual monitoring on the Refuge of listed and sensitive species should be implemented in accordance with the monitoring protocols and/or guidance provided in the Coachella Valley Multiple Species Habitat Conservation Plan (CVMSHCP).</i>	Continue to permit monitoring of the Refuge’s fringe-toed lizard population by researchers; continue to allow periodic surveys of other listed and sensitive species by partner agencies and organizations.	Involve Refuge staff in annual protocol monitoring of listed and other CVMSHCP covered species known to occur on the Refuge, while continuing to work in partnership with other agencies, researchers, and organizations in regional species monitoring efforts.	Same as Alternative B.
<i>Identify and implement actions to effectively address the increasing presence of invasive plants on the Refuge in order to reduce their adverse effects on native species and habitats</i>	Continue to opportunistically remove invasive weedy plants found in the Refuge’s sand dune habitat.	Design and implement a long-term program to control Sahara mustard and other aggressive invasive plants on the Refuge using an integrated approach to pest management; per available funding and staffing, initiate an invasive plant surveillance program to identify and remove new invasive species before they become established.	Same as Alternative B.
<i>Analyze current and future conditions affecting sand transport onto and off of Refuge land</i>	No coordinated effort to analyze current and future sand transport onto and off of the Refuge is currently being conducted.	Work with other agencies and research partners to develop and jointly implement a long-term sand transport monitoring plan for the Thousand Palms Conservation area; continue to evaluate strategies for retaining sand on the Refuge (e.g., maintaining sand fences, restoring honey mesquite hummocks).	Same as Alternative B.

<p align="center"><b>Table 4-8</b>  <b>Comparison of Alternatives for the Coachella Valley NWR by Issue</b></p>			
<p align="center">Issues Raised During Scoping</p>	<p align="center"><b>Alternative A</b></p>	<p align="center"><b>Alternative B (Proposed Action)</b></p>	<p align="center"><b>Alternative C</b></p>
<p><b>Wildlife and Habitat Management</b></p>			
<p><i>Improve the overall habitat quality on the Refuge to support listed and sensitive species</i></p>	<p>Continue current land management practices including opportunistically removing invasive weedy plants, primarily from active sand dune habitat, maintaining sand fences, and working with partner agencies to control unauthorized access onto sensitive habitat areas.</p>	<p>Per available funding and staffing, actively control invasive plants, as described above; reestablish honey mesquite hummocks on the Refuge to control sand loss; and reseed disturbed desert habitat on the old vineyard site with native species following invasive weed control to minimize reinvasion of nonnative species.</p>	<p>Control invasive weeds and reestablish honey mesquite hummocks, as described in Alternative B, and also design and implement as part of a step-down Habitat Management Plan, a comprehensive restoration plan for the old vineyard site that will provide habitat for sensitive species and minimize the presence of invasive weeds on the Refuge.</p>
<p><i>Eliminate unauthorized access on Refuge lands to protect sensitive species and habitats</i></p>	<p>Law enforcement on the Refuge is limited to periodic inspections by the Southern California Zone Federal wildlife officer and occasional surveillance by other partner agencies.</p>	<p>Increase monitoring and enforcement by hiring a full-time Federal wildlife officer for the Complex per available funding.</p>	<p>Same as Alternative B.</p>
<p><i>Evaluate the effects of climate change on Refuge resources and management</i></p>	<p>No coordinated efforts to evaluate the effects of climate change on Refuge resources and management are currently being conducted.</p>	<p>In partnership with others, design and implement a long-term monitoring plan that tracks changes in climatic conditions overtime, as well as changes in habitat quality and species composition and diversity.</p>	<p>Same as Alternative B.</p>

<p align="center"><b>Table 4-8</b>  <b>Comparison of Alternatives for the Coachella Valley NWR by Issue</b></p>			
<p align="center">Issues Raised During Scoping</p>	<p align="center"><b>Alternative A</b></p>	<p align="center"><b>Alternative B (Proposed Action)</b></p>	<p align="center"><b>Alternative C</b></p>
<p>Flood Control</p>			
<p><i>Coordinate with the Coachella Valley Water District (CVWD) on future flood control projects that could affect Refuge lands</i></p>	<p>Continue to contact CVWD for updates on their current flood control plans in the area.</p>	<p>Proactively work with CVWD to ensure that future flood control projects will not impact sensitive habitats protected on the Refuge.</p>	<p>Same as Alternative B.</p>
<p>Public Use</p>			
<p><i>Evaluate the potential for expanding the types of wildlife-dependent recreational uses permitted on the Refuge</i></p>	<p>Continue limited access onto the Refuge, including continued use of an existing equestrian trail on the northern edge of the Refuge, which was designated for trail use as part of Refuge establishment. Also continue to allow special guided interpretive tours on the Refuge.</p>	<p>No new or expanded public uses are proposed for the Refuge under Alternative B; however, this alternative does propose to seek funding for the development of interpretive panels or other displays that inform the public about the importance of protecting the habitats and species supported on the Refuge. This interpretation would be displayed at appropriate off-refuge sites open to the public, such as the Coachella Valley Preserve Visitor Center.</p>	<p>Same as Alternative B and provide interpretive signage along the existing trail corridor to describe the importance of the species and habitats protected within the Refuge.</p>