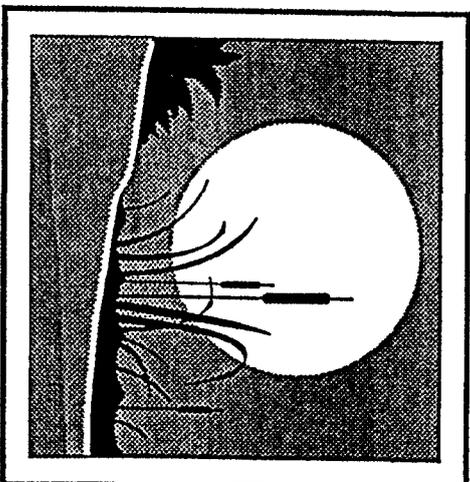


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Rush Ranch Management Plan Summary

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Rush Ranch Management Plan Summary

Solano County Farmlands
and
Open Space Foundation
P. O. Box 115
Fairfield, CA 94533

September 1989

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INTRODUCTION

Rush Ranch is a 2,070 acre site located in Solano County along the northern edge of Suisun Marsh (Figure 1). It consists of approximately 1,050 acres of tidal wetlands; 940 acres of grassland which includes the ranch headquarters, seasonal streams, springs, and ponds; and an 80 acre diked wetland. The Ranch was purchased by the Solano County Farmlands and Open Space Foundation in May 1988 using funds provided by the State Coastal Conservancy. The site is subject to the Suisun Marsh Protection Plan objectives of enhancing marsh and upland habitat, encouraging public recreation and access, and retaining land in agricultural use.

The Solano County Farmlands and Open Space Foundation was established in 1986 to promote the conservation of agricultural lands and open space lands in Solano County. The acquisition of Rush Ranch is seen as an important step in this overall process. Education of the public is an important component of developing political support for conservation activities. The Rush Ranch provides a unique opportunity for the public to experience the contribution that open space and agricultural lands make to the quality of life in our rapidly urbanizing county, and therefore help foster the awareness of land conservation.

Pursuant to the goals of the Suisun Marsh Protection Plan, the property will be managed for purposes of enhancement of wetland and wildlife habitat, public recreational opportunities, and continued agricultural production. The fundamental purpose of the Foundation's management of the property is to demonstrate the overall compatibility of these activities.

This summary report outlines a multiple use enhancement and management plan for the Rush Ranch. The primary objectives of the plan are:

1. To preserve, protect, restore, and enhance existing tidal wetlands, seasonal wetlands, and the transitional area between tidal wetlands and upland grasslands;
2. To enhance upland nesting habitat;
3. To identify areas suitable for wetland restoration or creation;
4. To develop a marsh-related recreational plan;
5. To develop a range management program including a livestock grazing plan that is consistent with the habitat preservation and enhancement activities; and
6. To develop a specific implementation program with cost estimates and project schedule.

The general approach taken was to develop a feasible, cost-effective management plan for the maintenance and enhancement of ranch wildlife habitat and continued agriculture. The plan is based on evaluation of existing conditions and has been developed in concert with an appointed Project Steering Committee. The committee participants included representatives of the Foundation; Conservancy; state,

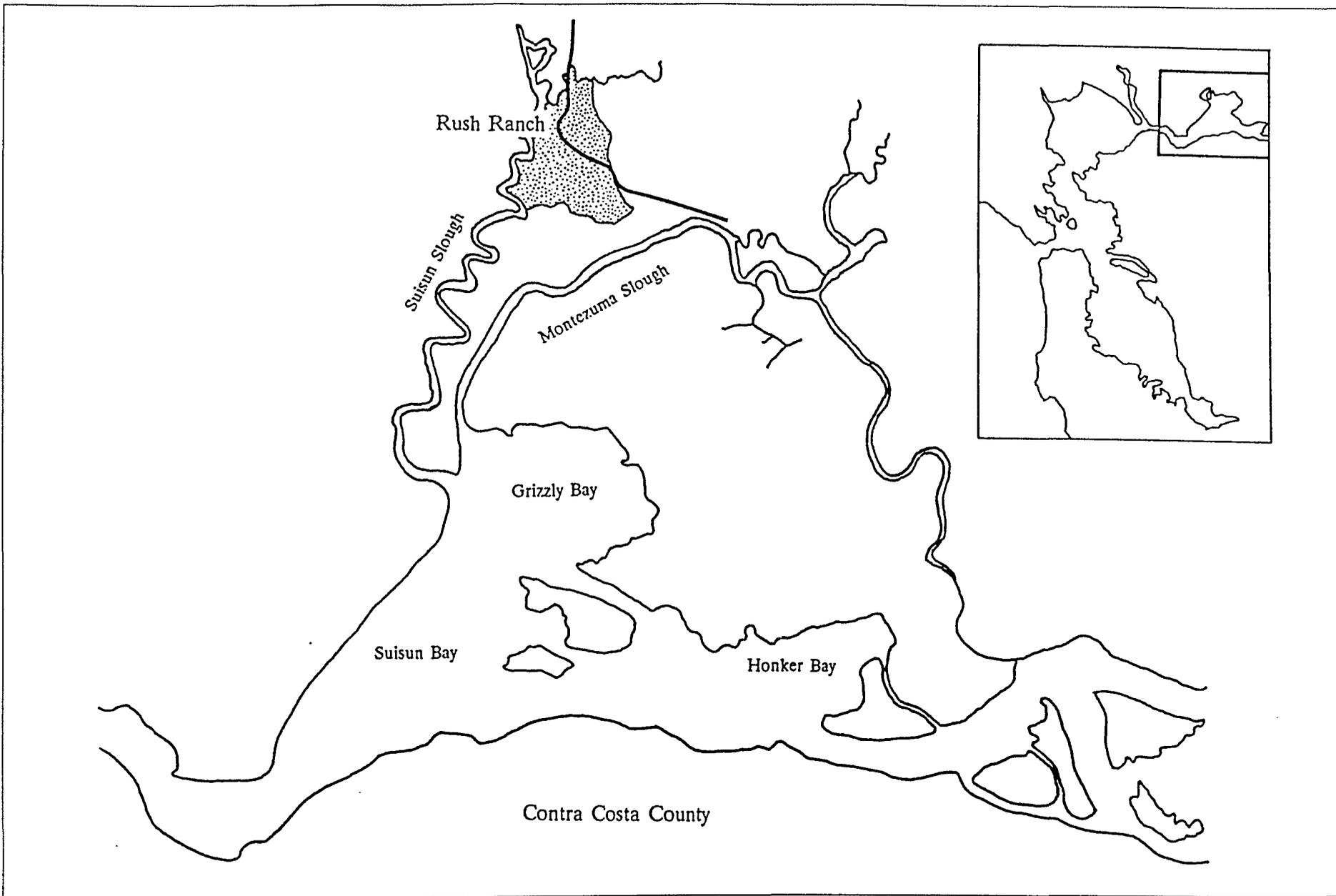
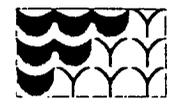


Figure 1. Location of Rush Ranch in the Suisun Marsh, San Francisco Bay Area



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regional, and county agencies with permit and review authority; conservation groups; and interested individuals. The primary challenge of the plan is to balance public access and range enhancement opportunities with the primary objective of protecting and enhancing wildlife habitat values.

SITE DESCRIPTION

The Rush Ranch area (Figure 2) is located within Township 4 North, Range 1 and West, Mt. Diablo Meridian, and contains portions of Section 6, 7, 12, 11 (if extended), and 18 and 18 and un-sectioned land in the Suisun Marsh as shown on the Fairfield South (1949; 1986 and 1980 photo revisions) 7.5 minute USGS topographic quadrangle.

Topography

The topography of the Rush Ranch includes brackish tidal wetlands, a small riparian valley corridor, and rolling upland grasslands. Approximately 1050 acres of brackish tidal wetlands are primarily marsh plain at elevations ranging from approximately +3.4 to +3.9 NGVD (National Geodetic Vertical Datum). The marsh plain is dissected by tidal channels with bottoms down to several feet below mean sea level. The uplands begin abruptly at the edge of the marsh plain and rise to a maximum elevation of 212 feet. Small, rounded hills and higher rolling hills characterize these upland areas. A lower valley containing Spring Branch Creek drains the hills and leads down to the tidal wetland.

An 80 acre managed wetland with marsh plain elevations approximately +1.0 NGVD is separated from Suisun Slough by a man-made levee. Elevations along the levee top range from +4.5 feet to approximately 7.0 feet.

Geology

The Rush Ranch is located on the western edge of the Potrero Hills, which is an anticlinal fold of Tertiary and Quaternary sedimentary marine rocks. The axis of this fold trends east-west. The broken hinge of the fold has worn away and left a shallow, linear valley draining to the west. Spring Branch Creek drains the length of the valley and terminates at First Mallard Slough in the marsh. Tertiary and Quaternary sedimentary deposits have accumulated at the base of the hills. The marsh is a combination of Quaternary estuarine sediments and muck accumulation from wetland vegetation.

Soils

Four main soil types comprise the upland area of Rush Ranch. They are Antioch-San Ysidro complex, Altamont clay, Millsholm loam and Solano loam. These soils are primarily clays or clay loams which are productive, shallow, and with moderate erosion hazard. They have traditionally been used for pasture and dryland farming.

The wetland soils are primarily mucks which have formed from the deposition of partially decomposed marsh vegetation. Closer to sloughs the

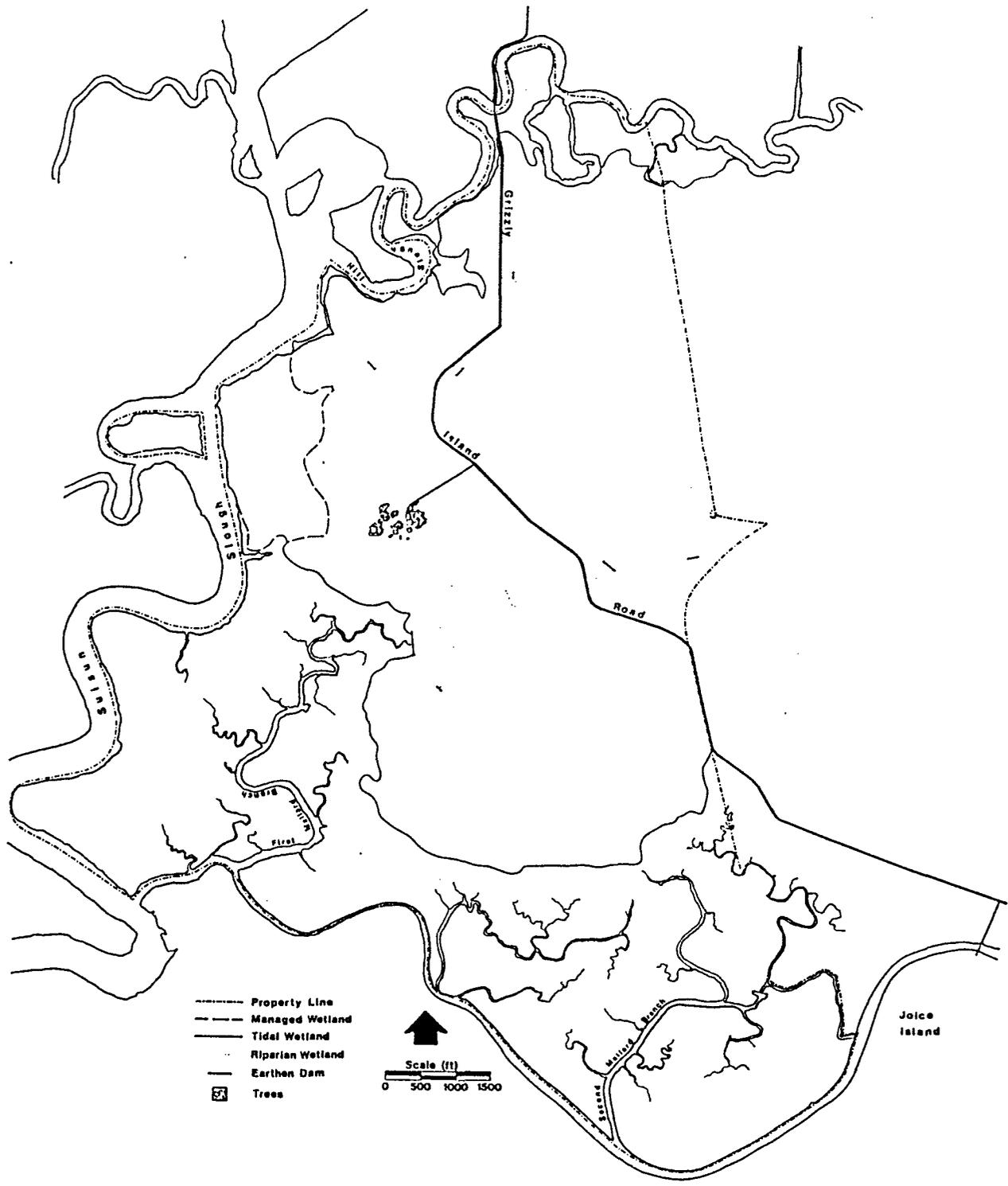


Figure 2. Rush Ranch Area.



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percentage of clay and silt increases as a result of alluvial deposition. The three primary wetland soil types, Joice muck, Tamba mucky clay, and Reyes silty clay are typical of the entire Suisun Marsh system. In Solano County these three soils are distributed in approximately equal proportion, whereas at Rush Ranch Joice muck is dominant, accounting for over half of the wetland soils. This probably reflects the relative upstream character of the ranch's tidal wetlands.

Existing Habitats

There are two general habitat types at at Rush Ranch. Grasslands cover the rolling hills and valleys, and wetlands occur both in the watershed and in the intertidal zone at the base of the hills. The proportion of upland and wetland acreage at Rush Ranch has probably remained relatively constant since the site was settled. However, there have been changes to the habitat quality. The soils of this habitat are fine textured, usually clay soils, which may become waterlogged in winter and very dry in summer. The vegetation was originally dominated by perennial, tussock-forming bunch grasses like needlegrass (*Stipa pulchra*) with native annuals occurring between tussocks. Since settlement the habitat has been altered to a non-native grassland largely due to the introduction of highly competitive annual grass species including brome grasses, wild oats, Italian ryegrass and others. Grazing, road building, crop production, and other construction activities have also contributed to the loss of the native grassland habitat.

Wetlands at Rush Ranch have also been altered since settlement. The riparian systems leading down from the hills have been dammed in many places creating stock ponds or reservoirs. These reservoirs created new wetlands in the watershed. However, the reservoirs were built expressly for providing drinking water water for livestock, and the wetlands were impacted by trampling and other disturbances. There are also erosion problems from livestock and water flowing past spillway areas.

The Rush Ranch tidal wetland is part of the Suisun Marsh, the largest brackish wetland in California providing habitat to endemic flora and fauna and birds of the Pacific flyway. Most of these wetlands are privately owned, have been diked and are managed to attract waterfowl. It has been estimated that over 95% of tidal wetlands in the San Francisco Bay region, including much of Suisun Marsh, have been altered in some way which makes the Rush Ranch tidal wetland a unique habitat within the region in that it remains in a natural condition.

Although the proportion of tidal wetlands at the ranch has remained fairly constant in recent history, there have been various impacts to these areas. Mosquito ditching in the upper marsh has affected the hydrology of the area. Grazing has been allowed in the upper edge of the tidal marsh in the past. This has eliminated some of the small channels and impacted marsh plain geomorphology.

The managed wetland has been isolated by the construction of a levee system which removed 80 acres from tidal circulation. This area has been seasonally flooded and remains a wetland, but its habitat character has been substantially altered. The

managed wetland is dominated by weedy, opportunistic species over much of the central area and cattail(*Typha* spp.) stands at both ends.

The riparian habitat has no trees or shrubs except for one cottonwood tree and is basically a grassland with an assemblage of grass species often associated with wetlands.

Vegetation

Tidal Wetlands. Plant species zonation in a tidal wetland is determined by various physical parameters including submergence time, salinity, and pH, among others. Various species are able to tolerate anaerobic conditions, high soil salinity, or low pH, and have evolved a variety of physiological or anatomical features to deal with these factors. Bulrushes, cattails, tules, and rushes tolerate longer submergence regimes through well developed air passages in their tissues. Salt grass, pickleweed, and jaumea tolerate high soil salinity through special salt excretion glands or by their succulent nature.

Hardstem bulrush (*Scirpus acutus*) and California tule (*Scirpus californicus*) grow in and along deeper channels and sloughs. Olney bulrush (*Scirpus olneyi*) and Baltic rush (*Juncus balticus*) occur between the hardstem bulrush and California tule and the high marsh plain.

The high marsh plain supports salt tolerant species such as salt grass (*Distichlis spicata*), jaumea (*Jaumea carnosa*), and pickleweed (*Salicornia virginica*). In salt marshes of nearby San Pablo Bay pickleweed dominates the marsh plains. But at the ranch it is a sub-dominant, presumably reflecting the relatively lower salinity stress of this brackish marsh. Pickleweed is dominant in the upper marsh edge where infrequent flushing and salt concentration within the soils accounts for the high salinity.

Diked Managed Wetland. The diked wetland has a diversity of cover types. Taller tules, cattails (*Typha* spp.), and common reed (*Phragmites communis*) dominate the most deeply flooded southwestern and northeastern corners. Between are areas dominated by medium height alkali bulrush (*Scirpus robustus*), prickly lettuce (*Lactuca serriola*), perennial peppergrass (*Lepidium latifolium*), and nightshade (*Solanum nigrum*) and areas dominated by short grasses and herbs such as rabbitfoot grass (*Polypogon monspeliensis*), saltbush (*Atriplex patula*), and brass buttons (*Cotula coronopifolia*).

Riparian Habitat. The riparian habitat/drainage depressions are notable for their lack of trees and shrubs, except for one Fremont cottonwood (*Populus fremontii*) on the eastern property line. However, these areas receive enough moisture to give them characteristics different from surrounding uplands. They are dominated by grasses usually associated with saline wetlands including Mediterranean barley (*Hordeum geniculatum*) rabbitfoot grass, and salt grass. Common swamp timothy (*Heleochoa schoenoides*), an obligate wetland species, grows in reservoirs along Spring Creek drainage.

Upland. The upland habitat is dominated by exotic annual grasses and herbs. Soft chess (*Bromus mollis*), Italian ryegrass (*Lolium multiflorum*), and storksbill (*Erodium cicutarium*) dominate most of the upland. However, yellow starthistle (*Centaurea solstitialis*) and purple starthistle (*Centaurea calcitrapa*) occur over wide areas, and are associated with past grazing practices. Exotic trees (*Eucalyptus* sp.) were planted near the ranch buildings.

Special Status plants. Four native plants with special state, federal or California Native Plant Society status have been identified on the ranch and include: Suisun aster (*Aster chilensis* var. *lentus*); Suisun thistle (*Cirsium hydrophilum* var. *hydrophilum*); Delta tule pea (*Lathyrus jepsonii* ssp. *jepsonii*); and Mason's lilaeopsis (*Lilaeopsis masonii*).

Wildlife

Fish and Invertebrates. The Suisun Marsh provides a valuable feeding area and nursery habitat for many species of fish, several of which are important California game fish. Aquatic invertebrates and many native non-game fish, whose range has decreased in recent years due to human influence and competition from non-native species, can also be found in the marsh.

Populations of opossum shrimps (*Neomysis mercedis*), provide an important food source for many fish species. *Neomysis* feeds on decaying plant matter and phytoplankton present in the slough water column. This shrimp, as well as the Bay shrimp, *Crangon franciscorum* and the Korean grass shrimp, *Palaemon macrodactylus* are important components of the marsh food web.

The two dominant molluscs in the marsh, the soft-shelled clam, *Musculus* spp, and the freshwater clam, *Corbicula fluminea* are available to bottom feeding fish, such as white sturgeon. The dominant arthropod, *Corophium spinicorne*, an amphipod, is an important prey of many juvenile fish, such as young striped bass, *Morone saxatilis* and many smaller year round residents. The two polychaetes, *Neanthes succinea* and *Polydora uncata* are also prey items for resident fish.

Results of fish population monitoring in the Suisun Marsh sloughs have shown that while the introduced striped bass is the overall dominant resident, other natives, such as the splittail (*Pogonichthys macrolepidotus*), tule perch (*Hysterothorax traski*), and delta smelt (*Hypomesus transpacificus*) are also important residents of the marsh. Native fish species were found to dominate the upper reaches of dead-end sloughs, while introduced resident species dominate the open water of larger sloughs.

Resident native fish are dependent on habitat provided by vegetated marsh channels such as those found at Rush Ranch. These areas provide spawning habitat for splittail, tule perch, delta smelt, and Sacramento blackfish (*Orthodon microlepidotus*). These and other natives have undergone population declines over the past decade in Suisun Marsh and some species are now being considered for protected status.

Birds and Mammals

Uplands. Although past grazing practices have altered the wildlife habitat value of the upland foothills, this area currently supports numerous bird species. Cliff (*Hirundo pyrrhonota*) and barn swallows (*H. rustica*) were observed foraging in the air space over these fields. Raptors, such as the American kestrel (*Falco sparverius*), turkey vulture (*Cathartes aura*), red-tailed hawk (*Buteo jamaicensis*) northern harrier (*Circus cyaneus*), black-shouldered kite (*Elanus caeruleus*), rough-legged hawk (*Buteo lagopus*), and golden eagle (*Aquila chrysaetos*), were recorded hovering or flying over the upland hills, presumably in pursuit of prey items. Ground-dwelling species such as white-crowned sparrows (*Zonotrichia leucophrys*) and savannah sparrows (*Passerculus sandwichensis*) were observed foraging on seeds. Northern mockingbirds (*Mimus polyglottos*), western meadowlarks (*Sturnella neglecta*), loggerhead shrikes (*Lanius excubitor*) and Say's phoebes (*Sayornis saya*) were observed perched on fence posts.

The only terrestrial mammal observed was the California vole (*Microtus californicus*). Other small rodents such as the deer mouse (*Peromyscus maniculatus*), western harvest mouse (*Reithrodontomys megalotis*), house mouse (*Mus musculus*), black tailed hare (*Lepus californicus*), Beechey ground squirrel (*Spermophilus beecheyi*), and botta pocket gopher (*Thomomys bottae*) may inhabit the ranch, but populations are apparently small. Increased numbers of these species would be expected if greater cover existed.

Tidal Wetland. During field observations the bird use in the salt grass and pickleweed areas was low. Nonetheless birds expected to utilize emergent vegetation would include the savannah sparrow, Suisun song sparrow (*Melospiza melodia maxillaris*) and the more secretive common snipe (*Gallinago gallinago*).

This habitat type is bordered by the tidal Suisun Slough. During winter the open water and adjoining small channels will attract a variety of wintering waterbirds, such a shore birds, waterfowl, herons and egrets. Presumably, these waterbirds would also utilize the habitat type for roosting during high tides.

Managed Wetland. Currently, the managed wetland contains very little open water necessary for attracting large numbers of waterfowl. Most of the waterfowl that have been observed in the pond were located along the shallow edges on the northeastern side. Species recorded in this area include green-winged teal (*Anas crecca*), American widgeon (*A. americana*), northern pintail (*A. acuta*), mallard (*A. platyrhynchos*), cinnamon teal (*A. cyanoptera*) and American coot (*Fulica americana*).

The wet area is dominated by cattails and tules which attract a number of perching birds such as marsh wrens (*Cistothorus platensis*), Suisun song sparrows (*Melospiza melodia maxillaris*), redwinged blackbirds, and possibly the salt marsh yellow throat (*Geothlypis trichas sinuosa*).

Several endangered, threatened, and species of special concern were sighted during this study or are expected to be found using Rush Ranch. These include: California clapper rail, California black rail, Salt marsh harvest mouse, Suisun

shrew, Northern harrier, Short-eared owl, Black-shouldered kite, Burrowing owl, Golden eagle, Suisun song sparrow, and Salt marsh yellow throat.

Cultural History

Archeological investigation revealed two archeological sites on the ranch.

It appears that Rush Ranch was named for Hiram Rush, Patriarch of the Rush family. The family purchased the Potrero Hills in 1852 and raised cattle and horses. Hiram Rush was referred to as Senator Rush by Frost, the author of A Brief Pictorial History of Grizzly Island (1976), but no additional data has been acquired on him. He is said to have moved to Solano County from Sacramento in 1854 and died 1869.

Rush Landing was presumably the primary landing on Suisun Slough associated with historic Rush Ranch. As such it is expected to date to the 1850's, when river traffic was the primary means of moving agricultural products throughout the state. The landing probably passed out of use with the arrival of the railroad to Suisun City.

Existing Range and Recent Management Practices

Site History. Historically, Rush Ranch has been heavily stocked with cattle. The presence of thistle and other plants common to disturbed areas in the upland area of the ranch and the lack of riparian vegetation along Spring Branch Creek are evidence of past heavy stocking. A rotational grazing program will protect and improve natural resources, reduce nuisance plants, promote a compatible livestock-wildlife relationship, and allow agricultural production to continue.

The northern half of the North Hill Pasture showed evidence of dryland farming activity that most likely occurred prior to World War II, perhaps even World War I. A plow line at the southern boundary of the farmed area can still be seen following the contour part way up the northern base of the steep hills in the center of the pasture. In addition, about 25 acres in the northwest corner of the North Hill Pasture showed evidence of more recent farming activity. There is also an old gravel pit of approximately 8 acres located on the northwestern fringe of the hills in the North Hill Pasture. It is located close to Grizzly Island Road and just south of the northwestern most stock pond in that pasture.

Two other old gravel pits are located on the ranch in the Slough Pasture. One pit of approximately 12 acres lies at the very northern tip of the Slough Pasture and is bordered by Grizzly Island Road to the east and Hill Slough to the west. The other old gravel pit is located in the southeast portion of the Slough Pasture is bordered by the Grizzly Island Road to the east and by the North Pasture to the south. It is at the eastern most part of the riparian corridor crossing the Slough Pasture. This pit is approximately 10 acres in size, and is quite deep. Piles of gravel still remain.

Existing Range Conditions. There are several desirable grazing plant species that are found in abundance on Rush Ranch. Soft brome (*Bromus mollis*), redstem filaree (*Erodium cicutarium*), and Italian ryegrass (*Lolium multiflorum*) are three species that occur at a very high frequency and are highly valued as forage species. Harding grass (*Phalaris caroliniana*) and rose clover (*Trifolium hirtum*) are not as frequent in areas on the ranch, but nevertheless, are desirable forage species that are present. Western wheatgrass (*Agropyron smithii*), bur clover (*Medicago hispida*), and red clover (*Trifolium pratense*) occur at frequency levels of less than 5%. Therefore, desirable forage species do occur at differing levels throughout the ranch and at levels that will sustain acceptable levels of livestock.

Most of the detrimental impacts that have occurred on the Rush Ranch due to grazing are attributable to two factors: overstocking and improper timing of grazing. These two factors have helped to reduce wildlife habitat, degrade riparian areas, and promote erosion. Therefore, a grazing schedule should be adopted to eliminate or reduce the existing negative features of the rangeland resource and promote the positive aspects of agriculture at the Rush Ranch.

Locally Available Recreation

The Suisun Marsh is a regional area providing opportunities for fishing, boating, duck hunting and nature study. Existing public lands in the marsh include:

Grizzly Island Wildlife Area (Dept. of Fish & Game). This 8,600 acre site located approximately 4 miles southeast of Rush Ranch offers fishing, hunting, hiking, swimming, boating, sightseeing, nature study and dog training. It is the most heavily used recreation area in the marsh and will be expanding its interpretive program this year.

Joice Island Wildlife Area (Dept. of Fish & Game). A 1,887 acre site adjacent to the southern boundary of Rush Ranch which offers hunting, fishing and nature study.

Peytonia Slough Ecological Reserve (Operated by the Suisun Marsh Natural History Association). Nature study, interpretive hikes and fishing occur on this 206 acre site about one mile northwest of Rush Ranch. An animal rehabilitation facility is also located on the reserve.

Hill Slough Wildlife Area (Dept. of Fish & Game). Currently under development, this 1,112 acre site located just to the northeast of Rush Ranch will offer nature study, including an interpretive display shelter, interpretive nature trails and an auto trail along a levee.

Neighboring cities and Solano County also provide recreational opportunities in the area. The City of Suisun City has one neighborhood park, one community park and a municipal boat launch where fishing also occurs. The City of Fairfield has 10 neighborhood parks, two community parks, one regional park (Rockville Hills Park) which offers walking, hiking, bicycling, horseback riding, picnicking,

group picnicking (100), camping, group camping (500 people), fishing, nature study and scenic enjoyment.

ENHANCEMENT OPPORTUNITIES AND CONSTRAINTS

Rush Ranch offers many opportunities to restore the natural transition that once existed between the tidal wetlands and upland grasslands along the northern edge of Suisun Marsh. Grazing, fencing, levee construction, and water diversion (both local and regional) have greatly changed the native flora and fauna which once existed in this region. Many of these modifications have resulted in major changes to the ecosystem and are not easily reversed. In addition, urbanization of the region forces greater reliance on the remaining open space for the creation of additional fish and wildlife habitat, either through increased management or development of additional habitat elements.

The purpose of this chapter is to review the opportunities for habitat management or creation at Rush Ranch and to examine the constraints that will limit what is practical and achievable, derived from field observations, knowledge of species requirements, literature review, and discussions with knowledgeable parties.

Wildlife Habitat Enhancement Opportunities

A number of opportunities exist to improve overall habitat condition on Rush Ranch. Some of these opportunities are discussed below:

Tidal Wetland Management. The tidal marsh offers an opportunity to develop alternative management schemes to reduce mosquito breeding areas and to limit the survival of larvae. Recent studies conducted by the University of California are examining the most effective ditching techniques that will be self maintaining while providing access for mosquito predators to back marsh areas. These techniques could be implemented at Rush Ranch and incorporated into an overall monitoring plan. These efforts will need to be coordinated with the Solano Mosquito Abatement District. Removal of livestock grazing will eliminate its effects on marsh vegetation and drainage.

Diked Wetland Management. Diked wetlands offer an additional opportunity over the tidal wetlands in that the former can be manipulated through water management to create different types of habitats. The Department of Fish and Game and the Suisun Resource Conservation District have developed a number of management schemes that will result in differing vegetative characteristics. As a result, different waterfowl use can be accommodated.

The 80 acre managed wetland can be managed with tidal water in a variety of ways. The primary limiting factor is elevation and the capacity of the water control structures to move water on and off the site. Cost of management can be relatively inexpensive; however, long-term maintenance of levees and water control structures may be high.

Water management in Suisun Marsh is primarily focused on wintering waterfowl habitat. Over 30,000 acres in the Marsh are devoted to hunting, either within private duck clubs or in publicly-owned areas. Other habitat needs for waterfowl have been identified, including sanctuaries, breeding, nesting, and brood raising. According to data collected by the California Waterfowl Association, a large number of mallards may nest within Suisun Marsh rather than migrating to breeding areas further north. However, water management for wintering waterfowl is not appropriate for brood water and the opportunity exists in areas such as Rush Ranch to provide suitable conditions for brood rearing.

Upland Nesting Habitat. Waterfowl nest in grasslands up to 5 miles from water. Successful nests are usually located with 1 to 1.5 miles from water. Through the efforts of the Department of Fish and Game (DFG) and the California Waterfowl Association, there is a considerable body of information on the appropriate nesting cover needed for mallards and other resident waterfowl. In addition, DFG developed techniques to establish grasslands for nesting habitat.

The proximity of tidal and managed wetlands to the grasslands of Rush Ranch provide an outstanding opportunity to provide waterfowl nesting habitat.

Grazing and Wildlife Management Plan. Agriculture can be an important means by which open space is preserved within urbanizing areas. Significant open space in Solano, Sonoma, Napa, and Marin is devoted to grazing lands for cattle. Proper grazing can help to maintain native plant populations, reduce fuel loads, and generate income for support of other programs. Improper grazing can result in soil erosion, invasion by weedy species, reduction of wildlife habitat value, destruction of riparian vegetation, and stream siltation.

An opportunity exists at Rush Ranch to develop a grazing plan which provides an incentive to maintain lands in agriculture while protecting riparian areas and improving wildlife habitat value.

Increasing Upland Wildlife Diversity. The 940 acres of upland at Rush Ranch range from lowlands surrounding salt and freshwater wetlands to hilltop grasslands. Within the slopes and draws, there are opportunities to create additional diversity through tree and shrub plantings. At present, there is no substantial evidence that trees existed at Rush Ranch. It may also be appropriate to plant eucalyptus given their importance in supporting heron and egret rookeries in other areas near Suisun Marsh and the Delta.

Constraints. A number of constraints may restrict the potential enhancement activities at Rush Ranch. Some of the constraints may be resolved through additional studies, others will involve negotiations with agencies and institutions outside the scope of this study. Some of the constraints are given below:

Topographic Constraints. Certain upland areas of Rush Ranch are steep and prone to erosion. As a result, grazing practices, trail development, and other access facilities must incorporate soil protection measures. In addition, in many areas bordering wetlands, steep topography limits the possibility of wetland expansion.

Runoff and Water Storage. There is only one permanent spring and no permanent fresh water courses on Rush Ranch. All surface water flows are derived from precipitation. Therefore, enhancement measures which rely on surface water flows such as ponds and riparian habitats will be affected by annual variation in rainfall. Regardless of the amount of winter rainfall, the local water courses and ponds dry out during the summer and fall months. As the ponds dry, water quality declines given lack of circulation, warmer temperatures, and accumulation of nutrients.

Soil Characteristics. The soils of Rush Ranch are primarily alkaline and in low lying areas contain salts. This limits the type of vegetation which can be planted in upland areas to create additional habitat diversity. For example, these soils do not appear to support oak woodlands. Riparian woodland species are also lacking at Rush Ranch. The only successful trees are the eucalyptus near the farm buildings.

Thus, the potential to create additional wooded areas, especially in the swales and drainways along the slopes may be limited to planting of non-native species such as eucalyptus. While eucalyptus can provide habitat benefits to some species such as herons and egrets, it can also result in the elimination of other native species.

Any planting of either native or non-native species at Rush Ranch should be preceded by pilot plantings to determine the conditions most suitable to survival and establishment.

Managed Wetland Levee. Currently, the levee around the managed wetland is in need of substantial repairs to avert breaching by tidal waters. Levee maintenance will require dredging from a borrow ditch and placement of material on the levee top. The cost for levee repair and maintenance may be significant if the managed wetland is operated for specific habitat purposes.

On the other hand, if the levee fails, the resulting tidal marsh will still have significant fish and wildlife benefits. Thus, Rush Ranch management must balance the cost of maintaining the levee system with the additional wildlife benefits provided by the managed wetland.

Range Management Opportunities

Certain areas in the upland grass communities contain a good component of native and introduced perennial grasses. Proper grazing management of these grasses will stimulate their growth, vigor, and rate of spread. The resultant improved health of these perennial grasses will allow them to more effectively compete with nuisance plants such as yellow and purple starthistle, and medusahead.

Stock ponds in the upland areas could be enhanced by planting trees, shrubs, and riparian vegetation along the dam and the pond edges. However, the saline/alkaline soils are likely to make tree and shrub establishment difficult. A pilot planting program should be conducted prior to undertaking a major planting program. If these areas were properly fenced to control livestock access and use for drinking water, they could become effective additions to existing riparian habitat.

The primary production of vegetation adjacent to tidal wetlands habitat could be enhanced by inclusion in the grazing rotation in the fall and winter, but removing them from the rotation during spring when they become critical to waterfowl nesting.

A properly planned and executed grazing rotation would be compatible with these enhancements while generating income to the ranch, reducing fine fuel buildup, providing an educational setting, maintaining the agricultural setting of the property, and generating a diverse plant community.

Constraints. The vigor of perennial grasses is often damaged by either undergrazing or overgrazing. If perennial grasses are to thrive, they must be grazed periodically, and be allowed to have an adequate period of regrowth before another period of grazing commences.

Riparian corridors in the upland habitat should be treated as critical areas and grazing activity in these areas should be limited to the fall and winter, when primary production will be stimulated. The saline/alkaline character of the soil in these corridors will make establishment of many common riparian plant species difficult or impractical.

Public Use

From an access/recreation perspective, a diversity of resources provides the basis for recreation management choices. At Rush Ranch these resources can be incorporated for public use in a number of ways. The knolls and uplands provide opportunities for panoramic views of Suisun Marsh. The sloughs are popular for fishing and boating. The dirt roads, trails and levee can accommodate a hiking trail system which follows a variety of terrain, and is inexpensive to develop. The eucalyptus stand provides a visual variety, shade, and a break from the wind; all favorable conditions for a camping or picnic site. The existing gravel road and ranch parking area provide convenient access to the site for vehicles. The different habitat types provide users the opportunity to learn about the ecology of these areas through interpretive signage.

Although these recreational uses can be accommodated, planning and design for them must carefully consider the effects of the presence of humans on the sensitivity of the wetland areas. Trampling and removal of vegetation and disturbance of wildlife are a few of the results from levels of public access which are too intensive for the site.

Additional Opportunities/Constraints

Interpretive Center. An extensive nature interpretive center is in high demand for the Suisun Marsh. None of the existing wildlife areas has an interpretive facility. The existing building at Peytonia Slough Ecological Reserve is primarily an animal rehabilitation facility. The interpretive shelter to be built at the Hill Slough Wildlife Area is a small open air display structure. Grizzly Island Wildlife Area has no plans for an interpretive center.

Potential Mitigation Value. Rush Ranch has some low-lying upland areas that could be converted to tidal wetlands through excavation. Since federal and state policies generally restrict mitigation to conversion of upland sites to wetland, portions of Rush Ranch may offer an opportunity to provide mitigation for public and private projects occurring within wetlands. The amount of mitigation that could be provided is limited by the feasibility and cost of excavating uplands to appropriate elevations, need to provide habitat to other wildlife species, and long-term cost of maintenance and operations.

Grizzly Island Road Limitations. The one way bridge and narrow width of the roadway will limit the number of cars that can access Rush Ranch without causing an significant increase in accidents and traffic congestion. Any proposed visitor facilities must consider how much traffic will be generated and the impact on the maintenance and improvements that will be required on the roadway.

Cost Limitations. The Solano County Farmlands and Open Space Foundation has limited funds available for restoration, enhancement, and operation of the Rush Ranch property. Most activities will need to be funded through grants or institutional agreements. The State Coastal Conservancy, the Environmental License Plate Fund, and other state sources may be tapped for some monies.

ENHANCEMENT AND MANAGEMENT PLAN SUMMARY

The overall objective of the management plan for the **tidal wetland** is to preserve and protect existing habitat values and to enhance and restore values in impacted areas. The marsh and slough channels not only provide endangered species habitat, but are important to a variety of mammals, birds, and fish whose habitats have been seriously impacted by human encroachment throughout the bay and delta areas. These include the California clapper rail, black rail, and salt marsh harvest mouse. There are also species of special concern which have either been sighted in the ranch wetlands and sloughs or are likely to be there. These include mammals such as the Suisun shrew; birds such as the Suisun song sparrow, salt marsh yellow throat, and northern harrier; and fish such as tule perch, splittail, and delta smelt.

Impacts which have been identified include historic grazing in the tidal marsh and adjacent upland transition area, indirect effects of mosquito ditching practices, and isolation or the tidal reach of Spring Branch Creek. To meet habitat objectives, recommendations are made for modifying mosquito control methods, restoring tidal flushing to the mouth of Spring Branch Creek, and restricting grazing in sensitive wildlife areas adjacent to wetlands.

The primary objective of the **managed wetland** is to provide breeding and brood rearing habitat for waterfowl. This objective will require specific management for introducing water during spring and summer to provide pair and brood water.

In conjunction with the management of the wetland, upland nesting habitat will be provided in adjacent grasslands.

To meet the water control levels necessary to meet the habitat objective, the levee will be raised to a uniform elevation of 8.5 feet. Water control structures currently consist of a culvert-slide gate system. No repairs or additions are currently required. The wetland will require initial dredging to create open water areas with depths that restrict the growth of emergent vegetation. Some dredged material can be used to raise the levee. The high cost of the repairs, excavation, and maintenance will require outside funding.

If no repairs are made to the existing levee it is likely to fail and the 80 acres of seasonal wetland will be regularly flooded by tidal water. Since elevations in that area are approximately 1.0 foot (NGVD), the area would develop into a tule marsh.

Wetland expansion can be accommodated on the ranch and this could meet local mitigation needs as well as state and federal objectives for expanding wetland acreage. The high cost of this type of wetland creation at Rush Ranch requires that funding be from an outside source. However, if expansion can be carried out in conjunction with development of the existing wetlands, some cost saving could be realized with benefits to wetlands beyond the expansion area.

One problem associated with establishment of expanded tidal wetlands is the lack of an existing channel in the upper marsh with an adequate capacity. The recommended solution is to incorporate the expansion area into the existing managed wetland.

The creek and spring areas at the ranch are presently in a degraded condition and provide little cover or forage for wildlife. These areas have inherent soil and ground water problems which will probably make enhancement efforts difficult. Past intensive grazing and trampling are primarily responsible for the present degraded conditions, but it appears unlikely that historically these areas supported abundant and diverse stands of vegetation associated with many riparian systems.

The primary objective of the creek and spring enhancement is to increase the diversity and wildlife habitat value of these areas. The overall approach involves excluding grazing over the downstream portion of the creek, modifying existing major water control structures, and carrying out a planting program. Dam modification of Spring Branch Creek and Suisun Hill Creek involve installation of culverts to promote downstream flows and reservoir flushing. Installation of spillways are recommended to minimize dam erosion. A major planting effort is to be carried out only after initial pilot planting results indicate which of the proposed native species are best suited for survival on the ranch.

The grassland habitat value, like the riparian areas, has been reduced by past grazing practices. Intensive grazing has been responsible for establishment in many areas of weeds such as star thistle and medusahead which are poor cattle forage. While it is unlikely that a fully native grassland plant community could be established at the ranch, improved range management practices can be used to

promote the growth of many native grasses and forbs which have been selectively reduced by past intensive grazing.

The primary objectives of the grassland enhancement are to encourage native plant species, promote and increase in plant diversity, and to improve wildlife habitat value. Wildlife objectives include providing enhanced cover and forage for resident grassland bird species such as short-eared owls, California quail, and western blue birds, as well as small mammals.

A waterfowl nesting area is planned for the pasture adjacent to the 80 acre managed wetland which is to be used as brood rearing area. The grazing plan is designed to exclude grazing and allow maximum cover during the nesting season.

Grazing has also reduced cover value of grasses within areas bordering the tidal wetlands. These areas serve as important intermittent refuge throughout the year for marsh wildlife, including endangered species. In these areas fences will be moved landward, away from the marsh periphery, to exclude grazing and increase the cover value for wetland wildlife.

The range management plan is conservative and is specifically designed to allocate forage and cover for wildlife, especially during waterfowl nesting periods. The general approach is to increase the number of pastures to facilitate rotational control. The major changes compared to the existing system include sub-dividing the existing hill pastures, excluding wetland and riparian areas, and moving fence lines landward from the tidal marsh.

Various scenario stocking rates for an eight month grazing period were considered. Based on production data and carrying capacity, a conservative stocking rate of 175 animal units (head) is recommended. The grazing schedule developed is flexible, but is based on a grazing season which runs from October 1 through May 31. Specific recommendations for management of livestock facilities in each pasture have been developed.

Plans for recreation and public access consists of activities and facilities which are consistent with the objectives of wildlife habitat protection while maintaining and enhancing existing ranch activities. Public use of the site is not intended to be intensive, but rather geared toward utilization of the natural environment as an open space, visual, scientific, or educational resource.

Primary features include: Access at the existing ranch headquarters and an ultimate second access point near Hill Slough; establishment of a contact station adjacent to the existing caretaker's residence focusing on marsh resources, use and other information; development of a trail system; fishing areas concentrated along Hill Slough; and permit camping by reservation for small groups.

SPECIFIC PROGRAMS

Tidal Wetland

The tidal marsh at Rush Ranch is currently in a natural condition and supports a variety of native wildlife, including rare and endangered species. The overall objective of the management plan for this area is to preserve and protect existing habitat values and to enhance and restore values in impacted areas.

Grazing Removal and Restriction. By restricting grazing to fenced pastures the tidal wetlands will be protected from direct impacts. However, transitional upland areas used by wetland wildlife during high tide flooding lie within the existing fence line and grazing has reduced the cover value of vegetation. For this reason the fence line in the southern pasture area will be moved approximately 100 feet landward from the marsh to increase the wetland refuge area.

Any modification of existing mosquito control practices will only be carried out with the consent and cooperation of the Solano County Mosquito Abatement District. Proper implementation of a modified mosquito control program should not only reduce impacts to the marsh, but result in decreased ditching costs for the District.

Spring Branch Creek Remnant Marsh. The present ponded remnant marsh area upstream of the farm road and culvert will be returned to tidal action.

Managed Wetland

The primary objective for the managed wetland is to provide breeding and brood rearing habitat for waterfowl. This objective was identified as an important habitat need throughout Suisun Marsh. This objective will require specific management activities to introduce water during the spring and summer to provide pair and brood water. In addition, a mixture of cattails and open water must be maintained to provide cover.

In conjunction with the managed wetland, upland nesting habitat will be provided in adjacent grasslands.

Facilities/Activities Required to meet Objective. The managed wetland is surrounded by a levee that is in need of repair. To meet the water control levels necessary to meet the habitat objective, the levee will need to be raised to a uniform elevation of 8.5 feet. Levee rehabilitation may be accomplished through either repairs at specific locations where it has eroded or subsided or complete refurbishing to a uniform height and width.

The wetland may require initial dredging to create open water ponds necessary to support broods. An optimal habitat mixture of 50% open water to 50% emergent vegetation is recommended. The current elevation of the managed wetland is approximately +1.0 foot. Ponds and channels will need to be excavated to a depth of 0.0 to -1.0 feet. Although some dredged material can be used to repair the levees, additional excavation within the site will be required to achieve an optimal habitat mix.

The relatively high initial cost for levee repair and excavation as well as considerable long term maintenance costs will require an outside funding source. If funds or other resources are made available for initial work by an outside agency/party, these must also be accompanied by along term commitment for maintenance costs.

Ongoing management. The water control facilities will be operated so as to introduce water during February to a depth of 4.0 feet NGVD. Water depths will be maintained throughout the spring until late June. Compensation for water losses due to evaporation will be made by filling the wetland during high tides. Depending upon water salinities within the slough, it may be necessary to circulate the water during the spring to flush salt from the managed wetland. During the late summer and early fall, tidal action will be introduced; however, water levels will be maintained at a minimum level to keep ditches full for support of mosquito fish populations.

Cattail invasion into the open water will be controlled by maintaining water depths within open water ponds to 4 ft. during the early part of the growing season and introducing tidal action in the late summer. However, some degree of long-term maintenance will be required to remove cattails. This may be done on an annual basis through pulling or harvesting new growth or on a longer term basis by regular dredging on a four to six year cycle.

Mosquito control will be provided by introducing mosquito fish to the system. The water control structures will need to be designed to provide for draining of the wetland within a 24 to 48 hour period following notification by the Mosquito Abatement District to minimize pesticide application in this area.

Alternatives. The managed wetland could also be used for waterfowl hunting habitat by introducing water during the winter months and subsequent flushing and drying during the summer. Several water management procedures have been developed by the Department of Fish and Game which will provide for optimal habitat for migratory waterfowl. However, this alternative is constrained by other projected uses of Rush Ranch such as passive recreation and nature interpretation which will be concentrated in this vicinity. In addition, many nearby duck clubs provide suitable wintering habitat; whereas few can afford the additional management or pond area needed to provide brood habitat.

If the levees were not repaired, the managed wetland would revert to tidal action. This alternative would provide habitat for species other than waterfowl. However, the large expanse of tidal marsh already existing at Rush Ranch and the need to provide habitat diversity that can be experienced by both wildlife and the interested public would rule against the natural reversion of this area to tidal conditions.

Wetland Expansion

Additional wetland habitat would meet both site and regional objectives of expanding wetlands acreage. Wetlands have been lost in the southern portion of Solano County due to both agriculture and urbanization. Seasonal wetlands supported by winter precipitation and tidal wetlands are important for the salt marsh harvest mouse, Suisun shrew, and a variety of raptors. Waterfowl breeding/brood rearing habitat, is also a scarce, valued resource. Either type of habitat could be created in low-lying areas of the site. Cost is an important consideration when excavation is necessary and therefore the selection of either habitat type may depend on overall cost effectiveness.

The high cost of this type of wetland creation at Rush Ranch requires that funding be from an outside source. However, if expansion can be carried out in conjunction with development of the existing managed wetland, some cost savings could be realized with benefits to wetlands beyond the expansion areas.

Specific management activities. Expansion of wetland habitat at Rush Ranch will require excavation of adjacent upland areas. The limiting factors to excavation are: amount of overburden to be disposed, the underlying soil characteristics, the resulting slope between the wetland and the uplands, conflicts with other land uses, and the source of water (either tidal or surface runoff). A channel connecting the expanded wetland with the existing slough system will have to be constructed.

Following an examination of feasible localities for expanded wetland habitat, it is recommended to expand habitat in the area between the existing managed wetland, the Rush Ranch headquarters, and Spring Branch Creek. This area is approximately 20 acres in size and is at an elevation ranging from 5 to 20 feet. A grading plan should be developed for this site if funds can be identified to implement the expansion at this location.

Alternatives. The creation of wetlands from upland sites is an accepted means wetland mitigation requirements for development projects in wetlands. Few suitable upland sites are available due to their development potential. Therefore, Rush Ranch could be considered a important site to provide for off-site mitigation.

Several alternatives have been presented for creation of tidal wetlands, seasonal ponds, and freshwater wetlands. Up to 34 acres of newly created wetland have been suggested. Many of the proposed expansion sites are located adjacent to existing water courses, near the managed wetland, and near the mouth of Spring Branch. The limited water supply and high salinity of the ground water limit the creation of freshwater and open water wetlands. In addition, proposed uses of the grasslands adjacent to the managed wetland for waterfowl nesting habitat eliminate this location from further consideration.

A no project alternative is also possible. While the area in question has been stock gathering area for years, it could be planted with annual and perennial grasses and become a suitable upland nesting site.

Creek and Spring Enhancement

The creek and spring areas at Rush Ranch are presently in a degraded condition and provide little cover or forage for wildlife. These areas also have inherent problems which will probably make enhancement efforts difficult. Past intensive grazing and trampling are primarily responsible for the present degraded conditions, but it appears unlikely that historically these areas supported abundant and diverse stands of vegetation usually associated with riparian systems. The saline nature of the soils is expected to limit development of many riparian plants. Nevertheless, there are several steps which can be taken to reduce impacts on the wetlands and enhance them.

Enhancement Objectives. The primary objective of the creek and spring enhancement is to increase the diversity and wildlife habitat value of these areas. The increase in habitat value is dependent, in part, on the elimination of grazing impacts. It is also dependent on successful establishment of a native plant communities appropriate for each area.

Grazing removal. The ranch range management program has been designed to eliminate cattle impacts to wetlands by installing new fence lines to exclude these areas from grazing. The existing fence line in Spring Branch Creek which runs along the center of the drainway will be replaced with fencing along the wetland perimeter.

Dam Modification. There are presently two dams along Spring Branch Creek as it passes through the ranch. One is upstream from Grizzly Island Road and the other is formed by the farm road embankment which crosses the creek where it historically entered the tidal marsh. These were used in the past to store water for cattle, and to create hunting opportunities. The dam above Grizzly Island Road will have a culvert and drop structure installed to permit flushing of the pond and reduce spillway erosion.

Planting Plan. The saline/alkaline nature of the Solano loam soils found in the creek bed and seasonal nature of water availability severely limits the freshwater wetland plants which can be successfully grown. The grasses which are presently found in these areas include Mediterranean barley, rabbitfoot grass, and salt grass are likely to remain the dominant herbaceous species. Brackish water adapted plants, such as alkali bulrush, might survive in wetter areas but would probably undergo early senescence in most areas due to high salinities which will seasonally as the soils dry in the spring.

Suisun Hill Creek Enhancement. This creek has a much smaller watershed than Spring Branch Creek, however, plants and soils in these two areas are similar. The dam which lies near the managed wetland will should be treated as the one on Spring Branch Creek. A culvert and drop structure will be installed to allow flushing and prevent erosion.

Springs. There are several springs on the ranch which have been used as stock watering areas in the past. In most cases, these will continue to supply water for stock, but the wetland areas around the springs will give protected by fencing.

Plantings in the spring areas where water and subsoil salinity/alkalinity are low offer the most favorable conditions for shrub and tree establishment.

Upland Grassland Habitat Enhancement

The natural diversity and wildlife habitat value of uplands at Rush Ranch, like the riparian areas, have been reduced by past grazing practices. In essentially all the grasslands of California, native bunch grasses and forbs have been replaced with introduced grasses and weeds. Intensive grazing of the ranch grasslands has apparently been responsible for the establishment in many areas of weeds such as star thistle and medusahead which are poor cattle forage. While it is unlikely that a truly native grassland plant community could be reestablished at the ranch, improved range management practices can be used to promote the growth of many native grassland forbs which have been selectively reduced by past intensive grazing. In addition to increasing plant diversity, improved range management will also increase the cover value of the grassland habitat for wildlife.

Enhancement Objectives. The primary objectives of the grassland enhancement are to encourage native plant species, promote an increase in plant diversity, and to improve wildlife habitat value. The reduced grazing pressure under the proposed range management plan will be a major factor which will contribute to achieving these objectives. The character of the ranch soils is an important limiting factor, especially relative to the diversity of plants which can establish on the site. In addition to promoting establishment of native forbs, a program to establish shrubs and trees outside of the wetland areas will be undertaken.

Nesting cover and proximity of nest to brood rearing areas are important factors in waterfowl reproductive success. A waterfowl nesting area is planned for the two pastures adjacent to the 80 acre diked wetland which is proposed for brood rearing management.

The grazing plan is designed to allow maximum cover in the two pastures during the nesting season by excluding grazing there after the middle of December. This allows a minimum of two to three months growth prior to the onset of early nesting. Peak nesting numbers will probably occur after four months. The reduced grazing pressure is also important in maintaining sufficient residual cover. Perennial grasses, for example, are especially useful in providing cover for early nesters prior to the development of annuals and new perennial growth.

Wetland Peripheral Zone. Although the uplands adjacent to the tidal marsh are used intermittently by wetland wildlife, protective cover in these areas is critical to their survival. They are particularly vulnerable to predation during periods when flooding in the marsh plain drives them into upland refuge areas.

Grazing has reduced the cover value of grasses within the South Pasture which borders most of the tidal wetlands on the ranch. Unlike the nesting area, which is used seasonally, the tidal wetland periphery is in use as a refuge intermittently throughout the year. Due to this requirement, grazing will be excluded from a band bordering the marsh approximately 100 feet wide by moving the existing fence in South Pasture upslope this distance.

Shrub and Woodland Pilot Planting. Establishment of shrubs and trees in the grassland is intended to serve the same objective as in the riparian areas, which is to improve habitat value by providing increased cover and plant diversity. Primary limiting factors include poor soils, low seasonal moisture, persistent high wind velocities, and potential impacts from livestock.

The following shrubs are probably the best suited to the ranch conditions: coyote brush, mule fat, quail bush, and scrub oak; suitable trees include: buckeye, coast live, blue and valley oak. Pilot planting conducted as outlined above will be carried out and will include both shrub and tree species. The areas most likely to support shrubs and trees are on the north and east facing slopes of the hills and in protected areas.

Range Management Plan

The general approach of the ranch program is to increase the number of pastures to facilitate rotational control. Physical changes include sub-dividing the existing hill pastures, excluding riparian wetland areas, and moving the South Pasture fence landward from the tidal marsh. Timing of grazing use and an overall reduction of livestock numbers will also be done.

The grazing schedule assumes a grazing season from approximately October 1 to approximately May 31. This would be subject to adjustment as a result of variable conditions such as poor rainfall. Pastures may be combined, temporarily removed from livestock use, or given other special treatment depending upon specific needs as the season progresses. However, the overall program is and will remain conservative, and is specifically designed to allocate forage and cover to wildlife and waterfowl, especially during the nesting season and over the summer.

The three pastures of primary concern for nesting habitat, Slough Pasture, North Pasture, and South Hill/Upper Spring Branch Creek Pasture, have only two periods of livestock grazing during the October through May grazing season. This will maintain their special value for wildlife habitat, yet supply grazeable forage as an integral part of the Rush Ranch grazing program.

Recreation and Public Access

The plan for recreation and public access consists of activities and facilities which are consistent with the objectives of wildlife habitat protection while

maintaining existing ranch activities. Each of the recreational opportunities are related to the enjoyment and interpretation of the marsh. They are compatible with the natural resources and habitat enhancement activities at the ranch, and each use is compatible with other public uses. These uses are not intended to be intensive or active; rather, they are geared towards individuals, families and small groups utilizing the natural environment as an open space, visual, scientific or educational resource (see figures 3 and 4).

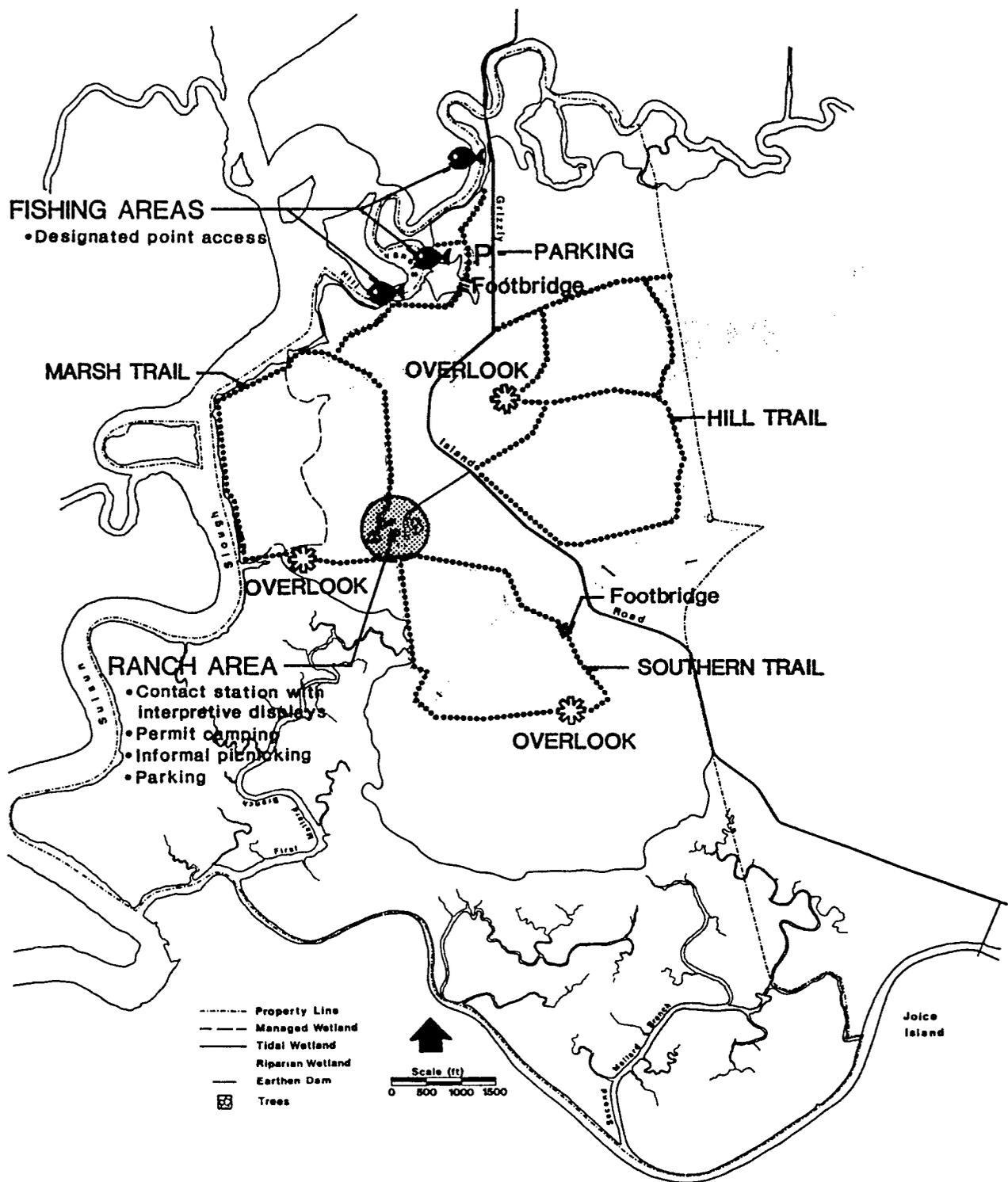
Access and Parking. The main vehicular access to the Ranch will be limited to the existing unpaved entry road. It would be gated and graveled to reduce dust and mud. A gravel parking lot to accommodate vehicles would be located near the headquarters area. The second access point will be located at the north end of the Ranch near Hill Slough if needed. A small gravel parking area for vehicle would be located there to accommodate primarily anglers.

Contact Station. A small cabin adjacent to the caretaker's residence will be converted for use as a contact station. It will provide maps and brochures for visitors and feature displays and exhibits focusing on marsh use and processes, including conservation, restoration, hydrology, ecology, history, natural history of waterfowl and wildlife, and hunting. Interpretive walks would incorporate rustic, low-intensity signage to identify and discuss resources for self-guided tours and to direct pedestrian traffic.

Trails. The trail system will consist of three main loops which originate at the ranch/interpretive area and incorporate the use of existing roads and trails as much as possible. Signage and interpretive displays will be located where appropriate.

Marsh Trail. This approximately 1.8 mile long trail will bring visitors to the edge of the tidal marsh. It would follow the existing dirt path to the levee at the edge of Suisun Slough adjacent to the managed wetland. The trail would follow the levee to a point near Rush Landing, then turn inland far enough away from the proposed nesting area to prevent the disturbance of waterfowl. The levee portion of the trail will need considerable work to eliminate cracks and unevenness.

Hill Trail. This trail utilizes existing dirt roads and stock trails in the hills east of Grizzly Island Road. It will climb Suisun Hill and follow the crest to Hill 222, then drop down the east side of Hill 222 until meeting the existing cattle trail. This trail follows the perimeter of the hills from Spring Branch to Hill Slough. An overlook will be located at either Suisun Hill or Hill 222.



The Planning Collaborative, Inc.

PROPOSED RECREATION/PUBLIC ACCESS PLAN

Figure 3.

RANCH/INTERPRETIVE AREA

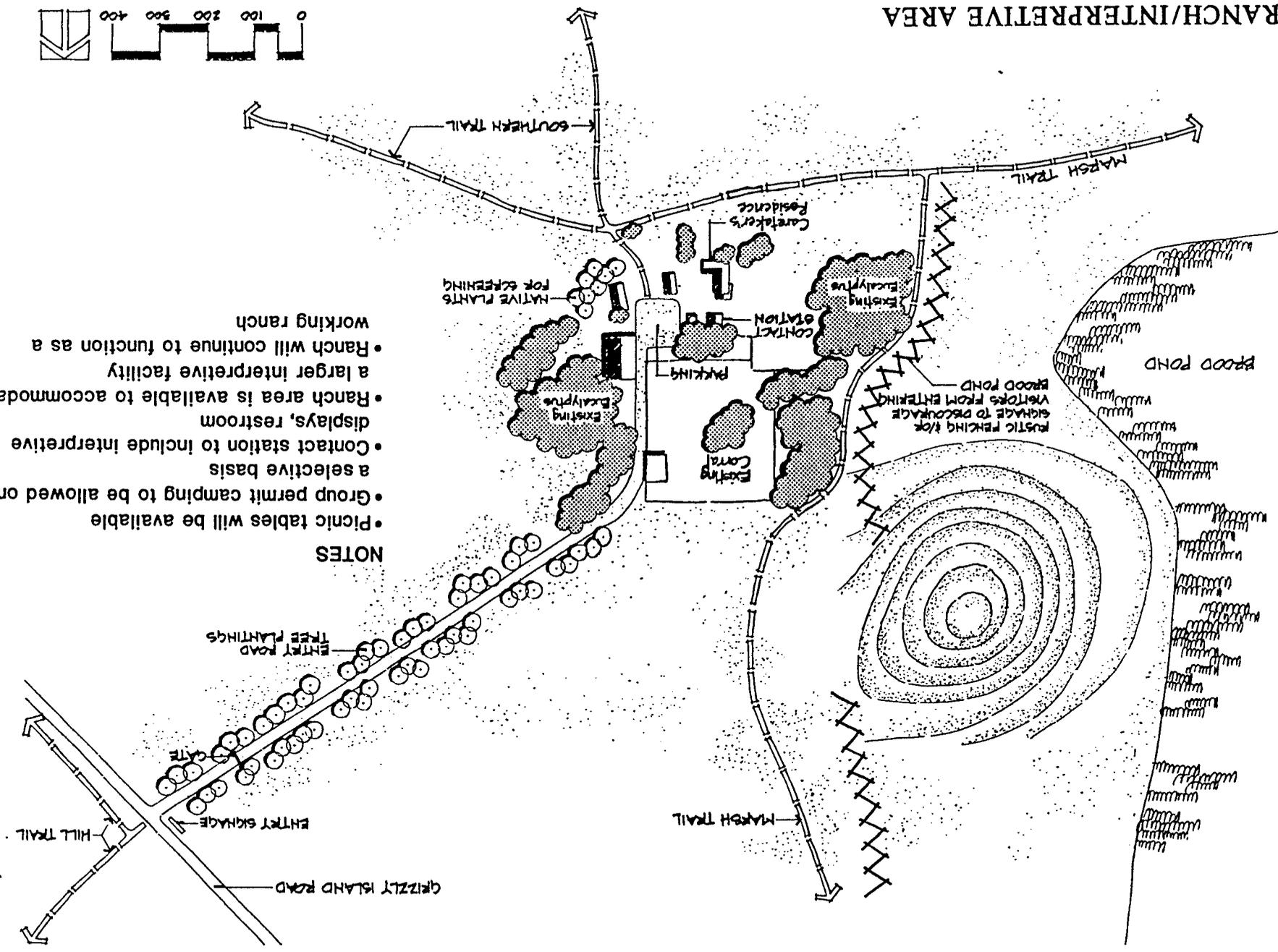


Figure 4.

- NOTES**
- Picnic tables will be available
 - Group permit camping to be allowed on a selective basis
 - Contact station to include interpretive displays, restroom
 - Ranch area is available to accommodate a larger interpretive facility
 - Ranch will continue to function as a working ranch

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Southern Trail. This trail leads to the hill overlooking the tidal marsh at the southern end of the ranch. The exact location will be determined by the extent of habitat restoration activities.

Fishing Areas. Fishing is expected to be concentrated at the northern end of the ranch. Areas along the bank which are susceptible to erosion will be restricted from fishing through the use of physical barriers, (i.e. split rail fencing).

Permit Camping. Reservation camping for small groups visiting the ranch for marsh study will be available. Facilities will include a clear, level area for pitching tents.

Landscaping. Landscaping will be incorporated in and around the headquarters area to enhance the visual quality of the site and to provide screening. Native species should be used where possible, although non-natives, such as eucalyptus can be planted as infill since they already exist there. All species should be planted informally, in natural clusters, and protected during the establishment period from grazing and human activity by enclosures.

Management of Cultural Resources.

Any public facilities that will be associated with hiking or recreational usage in the site archeologic area should be placed at sufficient distance to ensure that no physical encroachment will occur. Relocation of the fence along the South Pasture boundary will exclude the area from the effects of livestock grazing.