Excerpt: *Entire Document Available at the Fitz Wetlands Educational Resource Center*

Habitat Restoration and Enhancement Assessment and Plan for Trails Corridors

City of Watsonville Trails & Bicycle Master Plan

Watsonville Wetlands Watch

The author of this plan is Jonathan Pilch, Director of Restoration Programs, for Watsonville Wetlands Watch. Valuable support for the creation of this document was provided John Moreno, John Pritchard, and Mary K. Paul on the Watsonville Wetlands Watch restoration staff.

We would like to gratefully acknowledge many individuals who provided instrumental assistance with this project, including Bob Geyer, Assistant Director of Public Works for the City of Watsonville, Michelle Templeton, Wetlands Program Coordinator for the City of Watsonville, Rex Boyes and David Rosenow in the City of Watsonville Geographic Information Systems department, as well as a number of individuals who helped with historical and biological information, including Lynn Oliver Gonzales for her countless hours of historical research, the City of Watsonville library and California Agricultural Workers History Center and the Pajaro Valley Historical Society.

Table of Contents

List of Figures

Introduction

The City of Watsonville is currently developing a Trails & Bicycle Master Plan. The goal of this plan is to add an additional 33 miles of new trails to the existing Wetlands Trail System. These trails will cover portions of the City and adjacent high priority recreational areas in southern Santa Cruz County. This expanded plan presents an important opportunity to develop a comprehensive and robust vision for natural lands management and restoration of native habitats and ecosystem functions throughout the network of trail system. With this in mind, an assessment of opportunities for enhancement of existing habitat resources and restoration of new habitats within the trails system corridors was undertaken.

Field work for this project was conducted in the fall of 2011 through the summer of 2012 and included an assessment of each proposed trail segment. Existing habitat conditions were assessed in order to identify opportunities to enhance existing resources and develop opportunities for expanding and restoring habitat areas. Invasive plant species were mapped along the trail alignments as were areas of significant native habitat resources. Because the geographical extent of this project is at the watershed scale, the habitat resource inventory was limited to the trail corridors themselves and focused on management needs within the existing habitat resources.

Environmental Setting

The environmental setting for the Trails Master Plan includes several important river, wetlands, creeks, streams and their associated upland marsh, woodland, riparian, and grassland habitats, including the Watsonville Slough System, the Pajaro River, Salsipuedes Creek, and Corralitos Creek. Through their diverse habitats, these ecosystems support 23 native plant and wildlife species listed as threatened, endangered, or as species of special concern.

The Watsonville Slough System

The Watsonville Sloughs ecosystem is recognized as the largest and most significant wetland habitat between Pescadero Marsh (San Mateo County) and Elkhorn Slough (Monterey County). One of the last remaining large coastal freshwater ecosystems in California, the Watsonville Sloughs includes approximately 800 acres of freshwater marsh, seasonal wetland, and estuarine habitat with six major slough branches, which drain to the Pajaro River. The slough system supports over 249 permanent and migratory bird species, 5 federally listed fish and wildlife species, and 16 species of special concern, including the California red-legged frog (federally listed threatened), tricolored blackbird (California species of special concern), and Santa Cruz tarplant (Federally listed endangered).

The Watsonville slough system and its associated upland habitats are recognized as a critically important ecosystem have been of significant interest to conservation groups and have been a key area of focus for conservation. Several conservation planning efforts have been undertaken to assess conservation opportunities in the slough system, including the California Department of Fish and Game's *Watsonville Wetlands Conceptual Area Protection Plan* (CAPP), 2002 and Santa Cruz County's *Watsonville Sloughs Watershed Resource Conservation and Enhancement*

Plan, 2003, funded by the California Coastal Conservancy and the U.S. EPA. In 2006, the Watsonville Sloughs were established as a Critical Coastal Area by the California Coastal Commission. The sloughs have received priority within the Santa Cruz County Integrated Watershed Restoration Program and the Santa Cruz County Resource Conservation District. Despite these efforts there exists a need to continue current conservation and resource enhancement and restoration efforts. Watsonville Slough is currently listed on the California 303(d) list as an impaired water body for bacteria, nutrients, and pesticides and sediments, and there are significant opportunities for improvement of habitats, and ecosystem functions throughout the slough system.

Pajaro River, Corralitos Creek, and Salsipuedes Creek

The Pajaro River has a 13,000 square mile watershed area and runs 12 miles through the Pajaro Valley. The river is fed by Corralitos Creek and Salsipuedes Creek, two tributary creeks which are fed by smaller creeks, streams, and lakes, including Green Valley Creek, Browns Valley Creek, Casserly Creek, Jesus Creek, Pinto Lake, College Lake, Drew Lake, and Tynan Lake. The Pajaro River supports a diversity of wildlife species, including federally and state listed threatened, endangered and special status species, including important habitat for steelhead trout (federally listed threatened), tidewater goby (federally listed endangered), and the California red-legged frog (federally listed threatened). Much of the lengths of these waterways are characterized by bands of woody riparian forests of cottonwood, willow, alder, elderberry, box elder, and sycamore trees which form an important wildlife corridor throughout the valley. The river and creek habitats are greatly impacted by surrounding urban and agricultural land uses. Flood control practices, in particular on the Pajaro River, have had significant impacts on the river's habitats as early as the levee construction in 1949, and most recently as a result of the flood control efforts after the floods of 1995. The Pajaro River, Corralitos Creek, and Salsipuedes creek waterways form critical habitat areas within the Pajaro Valley and have long standing connections to the historic geologic, biologic, and cultural development of the Valley.

Enhancement and Restoration of Habitat Resources

Opportunities to preserve, enhance, and restore native habitat throughout the trails corridors are numerous, both within the City limits as well as within the parts of the trail system that are less developed outside of the city limits. The benefits of this work are critically important and wide-ranging. They include expanded habitat for native plants and wildlife species including threatened, endangered, and species of special concern, support for ecosystem functions such as groundwater recharge, flood control and filtration of surface waters, urban beautification, and the expansion of a natural lands system that supports passive and active recreation, transportation, and tourism.

There is a vital nexus between ecosystem functions and services and support of human services and industry. Ambitious ecosystem restoration projects will require a comprehensive and robust process to engage stakeholders and meet multiple objectives and outcomes. Stakeholders include: local landowners, public agencies who have jurisdiction over these lands, including the City of Watsonville, Santa Cruz County and the California Coastal Commission, agricultural interests, local, State, and Federal conservation organizations and the general public.

Extensive biological surveying, environmental impact reporting, and other analysis has been done to date on the environmental features within the Master Trails Plan area. These included the Watsonville Sloughs Watershed Conservation and Enhancement Plan, environmental impact reports for the Pajaro River, Corralitos Creek, and Salsipudes Creek, the Sierra Club's *Connections to the Pajaro River* report, and the Watsonville Sloughs Critical Coast Areas report. These documents were consulted through this process and will provide valuable information for future planning efforts for habitat enhancement and restoration within and adjacent to the trails corridors. A detailed reference list appears at the end of this document.

Historical Ecology of the Pajaro Valley's Wetlands

Historical ecology interprets the current and historical natural landscape to understand the past distribution of environmental features, habitats, and ecosystem services. This understanding can provide valuable information for current approaches to habitat restoration and land use planning. It is particularly valuable for use within the Pajaro Valley's wetland environments, as they have been modified greatly over the past two centuries. The historical ecology framework provides an understanding for these changes, lends perspective to the ecosystem services provided and how they have been impacted over time, and provides a lens for understanding and interpreting today's landscape. The study of historical ecology can also provide useful and interesting information for interpretation to the public, such as through interpretive signs within the trails network.

The written historical record for the Pajaro Valley is well documented beginning in the late 1700's and early 1800's with European settlement in the area. Information on culture and life prior to this point is well described and documented by the Pajaro Valley Ohlone Indian Council and others in the field of archeology. Several recent studies have looked at the historical ecology of the Pajaro Valley, including a recent primer written by the San Francisco Estuary Institute on the subject. Pinto Lake has been a focus for this study as well, in an effort to understand sedimentation rates for lakes on the California Central Coast. Early maps, journals, and newspaper articles provide valuable information.

The earliest written references to the Pajaro Valley describe abundant wildlife and wetlands throughout the Valley. An early statement by William Brewer, a surveyor with the U.S. Geological Study, described the conditions in the following way:

> *"More species could be collected in one mile of that coast than in a hundred miles of the Atlantic Coast…Birds scream in the air – gulls, pelicans, birds large and small, in flocks like clouds…. [there are some] enormous birds that would probably weigh fifty or sixty pounds, and I frequently picked up their quills over two feet long… A whale was stranded on the beach, and tracks of grizzlies were thick about it."*
>
> *-William Brewer, Up and Down California, 1860*

Habitat Changes: An Overview

The recent study of Pinto Lake, *Climate and human impact on lowland lake sedimentation in Central Coastal California: the record from c. 650 AD to the present*, 2005 is one of the most comprehensive approaches to interpreting habitat changes within the recent historical landscape. The change of plant communities surrounding the lake was studied through deep soil cores and the pollen buried within these layers of sediment in an effort to describe the short and long term trends of sedimentation in the lake. This study found that while there were slight changes of the marshes and hydro-period of the lake documented between the years 650 and 1750, most likely due to climatic changes, the changes seen in the hydro-period and habitats were greatly amplified beginning in the early 1800's.

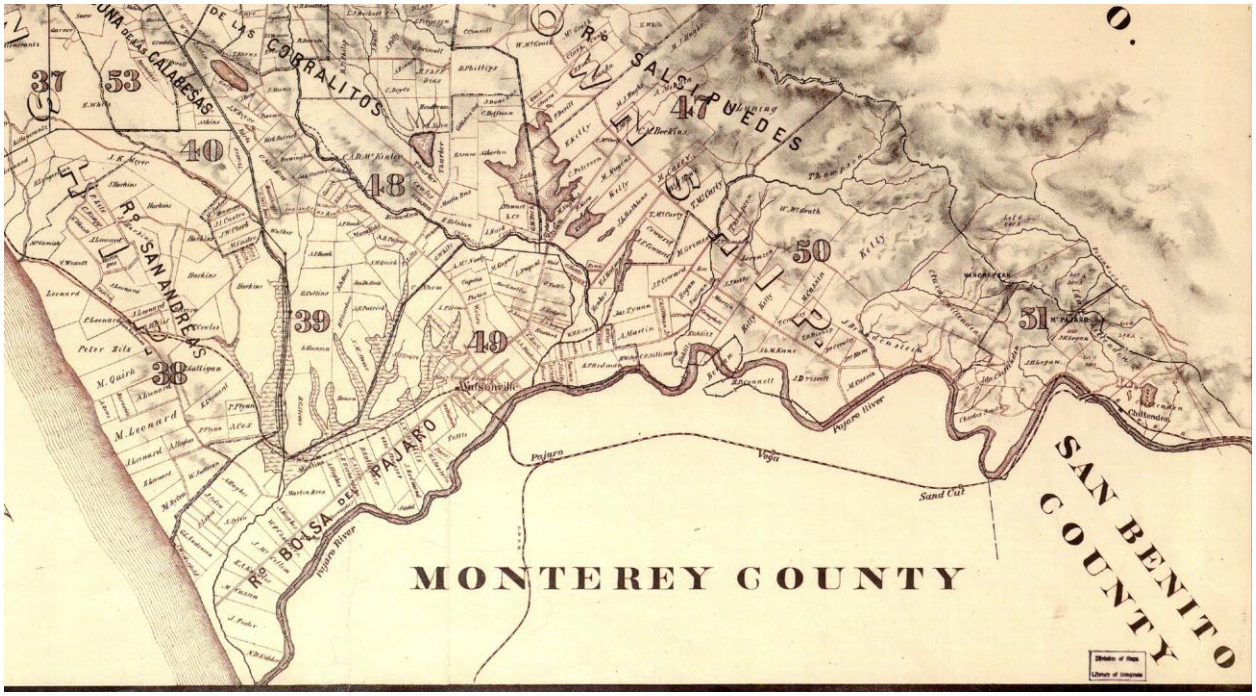
Pinto Lake and Corralitos Lagoon were named the 'land of lakes and hazelnuts' by Juan Crespi in the 1770s because of the abundance of hazelnut trees (Mayers 2001). Pollen analysis showed that between 1844 and 1860, coinciding with the establishment of Rancho Corralitos and the beginning of a large scale logging industry, the plant communities around Pinto Lake shifted from a redwood, hazelnut, willow scrub and oak woodland habitat type to a more open grassland and open range habitat type.

In their study, these authors write:

> *"By the early 1860s, following the decline in gold mining after 1852, the Watsonville area developed as an agricultural center. However, the effects of intense grazing between 1850 and 1863, coupled with the 1862 flood and the 1863–1864 drought (Engstrom 1996), brought with it the search for alternative prospects for land in the form of cereal cultivation (Lantis 1970). This trend of agricultural expansion led to further destruction of woodland, with American settlers clearing trees for firewood and to make the land suitable for arable purposes (Gordon 1996). From the mid-19th century, large- scale farming stretched for miles along the Central Coast valleys, characterized by extensive* plowing*,* channelized *drainage and irrigation. By the end of the century, a diversified agricultural economy had, therefore, replaced grazing as the dominant economy."*

The role of logging and cultivated agriculture, including controlled grazing and plowing, had a dramatic influence on the natural habitats in the Pajaro Valley. Within the slough system, the marshes were drained for the planting of crops through the establishment of a channel drainage system, as reported by the Register Pajaronian.

> *"…the branch drainage ditch through the lands of McLean and Harkins is being made by a party of Watsonvillians, and they are pushing their work along at a good pace. When this branch ditch is opened a fine body of land will be wrested from the swamp and will be soon ready for cultivation."*
>
> *-Register Pajaronian, June 16 1892*



1889 Map of the Pajaro Valley, Source Library of Congress

While significant draining of the sloughs likely did not occur much earlier than 1880s there was likely widespread cattle grazing throughout the slough system as well as cultivation of summer dry cereal crops within the sloughs and surrounding upland terraces. This is reflected in the great history of productive agriculture and crop production in the Pajaro Valley, in which by 1887 over 33,000 acres were in agricultural use. Much of the habitats of the sloughs were likely seasonal marshes or wet meadows and grasslands, which would flood in winter and spring months and dry in summer months, with the exception of small spring fed slough channels. This type of habitat would have been easily converted to land under cultivation. Much of the open-water habitat was likely not changed dramatically during this period due to the use of horse-drawn implements through the 1800s and early 1900s, and their reduced ability to drain or manage deeply inundated marshes and wetlands.

The presence of plants not native to California have been documented in adobe bricks from the earliest missions, such as Red Stem Filaree from the period 1755 – 1760 in the Santa Barbara area. From this period through the early 1800's, cattle ranching and logging were the dominant land use practices that resulted in a change of vegetation communities. The growth of the residential areas of Watsonville and Corralitos would have demanded use of local woods (Oliver-Gonzales pers. comm.) and within the lower Pajaro Valley, the pattern of use of wood likely mirrored building construction patterns. Portions of the slough system were likely once more wooded than they appear today. However, the heavy clay soils found throughout the upland terraces surrounding the sloughs almost certainly predominately supported grasslands and other open range habitats.

By 1931, when the first survey of native marsh and wetlands plants of the Pajaro Valley was

undertaken by Stanford University masters student Ida Hayward, the sloughs had been channelized and their margins had been put into cultivated agriculture. Hayward identified a number of native plant species that are not currently found in the sloughs, including a rare type of wetland rein orchid, and her survey provides the first direct description of the Pajaro Valley's wetland plant communities. Through this study, she describes well the seasonal marshes, springs, drainage canal network, and cultivated terraces, providing a window into a view of the sloughs at that time.

> "Standing on the hill at the back of the nursery of the H.A. Hyde Company one looks out over a series of rolling hills, the sloughs hidden in the troughs and the crests covered with field crops. In the first trough which is the upper end of the Watsonville Slough can be seen the characteristic appearance of the region: in the center a ditch with a luxuriant swamp vegetation along its edges; on either side fields of lettuce, onions, celery, or bulbs; on the outer portions remnants of swampy growth such as ruddy docks and somber green rushes. We will begin our study here taking up each branch of the slough in turn and ending with the salt marsh near the beach. On the north side is a little spring which feeds a horse trough that overflows into a depression which leads south into the upper end of the Watsonville Slough."
>
> -The Marsh and Aquatic Plants of the Pajaro Valley, Ida Hayward, 1931

Historic Wetlands Creeks and Rivers

The historic extent of the slough system is not well documented, though there are some valuable early maps which show old meanders of the lower section of Watsonville Slough, including the Coastal T-sheet, created in 1853, and the 1889 map of the Pajaro Valley and greater Santa Cruz County. Some of these maps appear in the appendix of this document. From a historical perspective, we can be certain that the construction of the tide gates at Shell Road had a significant effect on the estuarine habitats of the Pajaro River and Watsonville Slough west of the City of Watsonville, and that the creation of an extensive drainage system throughout the slough system to support the growing agricultural economy was a large force of change on the landscape of the wetlands and sloughs found in the valley. More recently, urban growth has been its own driver of change.

Within the current city limits, a seasonal creek or slough drainage likely once flowed by what is now Callahan park (personal comm. V. Mattulich), crossing where Saint Patricks Church is now located and entering into Watsonville Slough. There is also remote possibility that Corralitos Creek and the slough system were connected by overland flow during large winter storm events, prior to the residential and commercial developments on the eastern side of Watsonville. Possibly the historic creek or slough near Callahan Park or Watsonville Slough itself would have been connected to Corralitos Creek during these large winter flood events, providing an opportunity for steelhead trout to migrate into the slough system and out to the ocean. At this point, this is speculative, and further study is needed to assess this scenario as very few existing landscape features today support this view, with the exception of the existing wetlands just east of Freedom Boulevard at Atkinson Lane and the historical flooding of Corralitos Creek beyond its banks in high storm events.

Early Trails

The first trails through the Pajaro Valley were from the San Juan Mission to the Santa Cruz Mission. Trails that followed connected the various adobes and ranchsteads. According to F.W. Atkinson, *in 100 Years in the Pajaro Valley from 1769 to 1868*, most of the trails were passable only in summer months as they passed through swampy lands and creek bottoms. Below is the earliest graphic depiction of trails in the Pajaro Valley.

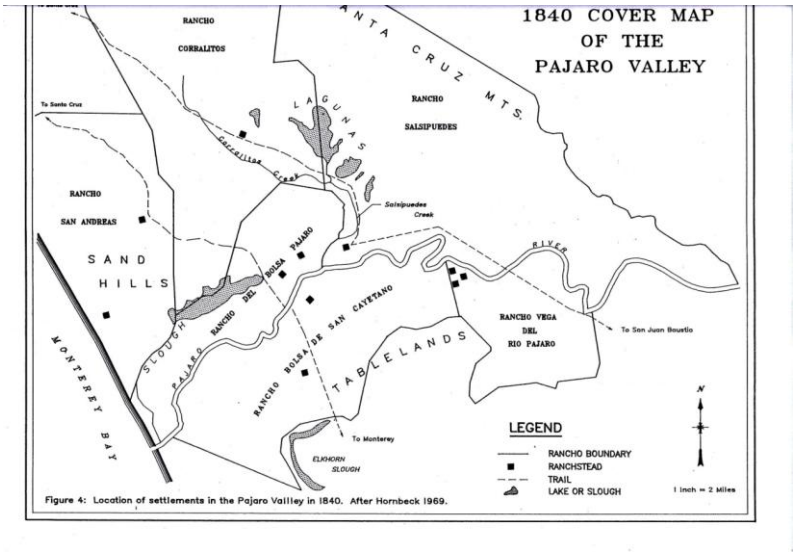


Figure 2. Map of early trails in the Pajaro Valley, from *An Assessment of the Cultural Resources of the Lower Pajaro River Basin, California, with Selected Preliminary Field Study*, Edwards, Farley, 1974

We can be sure that the landscape we see today holds the stories of of geologic and cultural actors and has been shaped by these actors in profound ways on both the geologic and far more recent timeframes. Further work with a focus on the historical ecology and geography of the City of Watsonville and greater Pajaro Valley would be worthwhile for land use and habitat restoration planning, public interpretive signs and education programs, and neighborhood beautification projects. This information should be further developed to support an expanded historical geography walking tour for the City of Watsonville and could be a valuable addition to urban greening efforts.

.

Extending the Watsonville Scenic Trails Network: Habitat Parks and Native Landscaping

A foot path along Corralitos Creek

Throughout the City, in areas adjacent to the wetlands, natural habitats, greenways, and open spaces, there are a variety of places in which the creation of natural landscapes with a place-based design approach could provide additional benefits to the ecological and urban landscape. One way to achieve this is by utilizing native plants in commercial, industrial, and residential landscapes as a part of a low-impact development strategy and urban beautification projects. There are also opportunities to develop nature parks that offer all of the amenities of the City's current park's system but create dynamic habitats and ecosystems.

Native Landscaping

Throughout the City, residential, commercial, and industrial developments are surrounded by the Watsonville Slough System and natural habitats of the Pajaro Valley. Utilizing native plants in landscaping is an important strategy of low impact development and reducing a building's carbon footprint, while creating a landscape that supports the surrounding natural ecosystems. Native plants, used in green-roofs, bio-swales, and storm-water detention ponds can be valuable ways to clean urban storm water runoff before it enters the slough system, reduce energy-use and cost for landscape maintenance, and create drought-tolerant, and aesthetically-pleasing, wildlife friendly landscapes. All factors that are critical in a valley which is in over-draft of its ground water resources. The landscaping at the City's Water Resources Center and several newer developments provide good examples of how this approach to native landscaping can be utilized. These models should be continued with all of the businesses around the wetlands and trails system in order to maximize their benefit.

Backyard landscaping with native plants is another emerging field with great promise for support of the natural landscape and ecology of the area. Backyard landscapes which utilize native plants and other complimentary plants to create habitat gardens can provide critical support to native insects, birds, bats, and other pollinators. A recent study by professor, Gordon Frankie, at the University of California Berkeley, stated that 81 different species of bees were identified in urban gardens located throughout Berkeley, California. Backyard habitat

landscapes in neighborhoods throughout the City is an important strategy to support the natural ecology of the sloughs ecosystems.

Nature Parks

Many Cities throughout the United States and Canada have adopted an approach to urban parks supportive of the natural landscapes in which their cities were founded. Called conservation parks, or nature parks, these parklands are landscaped with native plants and provide an important greenway within what can be a dense residential or urban landscape. The City of Watsonville has an abundant network of parks, which can benefit from further growth in this area. Under-utilized parkland or currently un-used City owned parcels can become natural ecosystems designed for human use. Play structures can be developed to mimic and interpret natural features, such as giant spider webs or local wetland wildlife, where children can play. Landscaping can be designed for aesthetics while complementing the natural landscape by utilizing the diversity of native plants of the Pajaro Valley and supporting the natural ecological system surrounding the park. These park features offer the potential for recreation, inspiration, and interpretation of the natural and historical landscape and tie into neighborhood beautification projects. They also provide new experiences for family outings in neighborhoods, wildlife viewing and bird watching, care and stewardship of the parkland and guided walks on natural ecology, and historical ecology...

Nature parks along the Pajaro River, adjacent to the levee trails, would be one strategy for restoring habitat along the river corridor while developing greater hiking, bird watching, and recreational opportunities. With the exception of the new Pajaro River Park at the City's Water Resources Center, the river levee trails lack access points to the river or any surrounding habitat areas. Larger blocks of restored habitat that are managed for hiking and public access could serve multiple functions, such as recreation and additional flood control capacity. An established network of nature parks in conjunction with habitat restoration projects along the river's waterway might be more easily seen as compatible with surrounding agricultural operations and would provide a positive first step towards restoring larger blocks of habitat within the agricultural landscape west of the city on the river corridor.