

Biodiversity

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Introduction

San Francisco is a heavily urbanized city, which nonetheless has a rich variety of plant and animal communities. Among these are coastal scrub, grassland, oak woodlands, marsh, and stream-sides. Some of these habitats hold species found nowhere outside of California. The City also has landscaped areas designed to resemble plant communities not native to San Francisco, such as conifer plantings in Golden Gate Park. By providing food and shelter for migratory and resident birds, they too play a major role in supporting San Francisco's biodiversity.

Harvard professor and Pulitzer-prize winner Edward O. Wilson defines biodiversity as "the variety of organisms considered at all levels, from genetic variants belonging to the same species through arrays of species to arrays of genera, families, and still higher...levels [of organization]." A sustainability plan for maintaining biodiversity must address genetic diversity, the number and variety of species in the City, the variety and quality of the City's ecosystems, and the ecological and evolutionary processes that sustain biodiversity.

Even in the increasingly urbanized San Francisco environment, there are four primary reasons why protecting and maintaining biodiversity are important. As expressed by Wilson:

- Biodiversity maintains the integrity of life known on earth;
- Through medicine, agriculture and economics, biodiversity provides a range of genetic, biochemical, and physical properties of plant and animal life that are advantageous to human welfare;
- Biodiversity is worthy of preservation because it represents human kinship through common living organisms; and
- Biodiversity is a source of national heritage, giving historic importance to place, such as the San Francisco bioregion with its distinctive assemblage of species of plants and animals.

Past and present threats to biodiversity include the introduction of non-native plants that displace indigenous plants; features of urban development that have resulted in loss and fragmentation of habitat; mismanagement of domesticated animals (past grazing practices decimated native grass species and irresponsible pet ownership seriously disturbs habitat integrity); and, more generally, the negative effects of industrial pollution on air, water, and soil.

San Francisco cannot turn back the clock and return to its pre-urban environment, but the City can take actions to preserve its remaining biodiversity and restore some of what has been lost. Fundamental to this mission is promoting public understanding of the City's local plants and animals, and managing San Francisco's natural and landscaped habitats in a way that enhances the City's biodiversity. The strategy for preserving biodiversity is presented in the following matrix. Terms that appear in quotes are defined in the section following the matrix, as are several terms that have appeared in this introduction.

Definitions of Terms Used in The Biodiversity Matrix

Biodiversity. As expressed by Edward O. Wilson:

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Biodiversity is a source of national heritage, giving historic importance to place, such as the San Francisco bioregion with its distinctive assemblage of species of plants and animals.

Integrated pest management. An scientifically based strategy that incorporates ecological factors, such as natural enemies, weather, and crop management to reduce the amount of chemicals used to control pests.

Invasive species. A species that invades natural habitats and reduces biodiversity.

Master Plan Recreation and Open Space Element - Policy 13. A set of objectives and policies in the Open Space Element of the Master Plan of the City and County of San Francisco, which guides current and future city practices and actions. Policy 13 addresses the preservation and protection of significant natural resource areas within the City.

Sensitive species. Plant and animal species or sub-species for which there is a concern for population viability, including plant and animal species that are found on the federal list of threatened and endangered species, the State Department of Fish and Game's list of California listed species, the California Native Plant Society's inventory of plants, species that could become candidates for listing, and locally rare species.

Significant natural areas. Sites that support native species or natural communities, contain high species or habitat richness, are remnants of an original natural landscape, or are adjacent to other natural resource areas.

Significant natural areas management plan. A program adopted by the Recreation and Park Department to protect significant natural areas.

Sustainability Strategy

GOALS	LONG-TERM OBJECTIVES TO REACH SUSTAINABILITY	OBJECTIVES FOR THE YEAR 2001 (5-year plan)	ACTIONS
1. To achieve a greater understanding of biodiversity, its importance, how it is threatened and how to protect and restore it.	1-A. The public, city staff, business community and academic community have become ecologically literate. 1-B. Biodiversity is taught throughout the city. 1-C. Ecology, biodiversity, stewardship concepts and hands-on activities have been more thoroughly integrated into the State's	1-1. Ecology, biodiversity, stewardship concepts and hands-on activities have been integrated into curricula of all grade levels in San Francisco. 1-2. A curriculum for local biodiversity has been developed. 1-3. A hands-on habitat restoration program for students that uses natural	1-a. Create a San Francisco biodiversity event that involves the whole community. 1-b. Educate the public about biodiversity issues: <ul style="list-style-type: none"> • Disseminate environmental information in parks; • Develop Web-sites;

	<p>educational framework and into the city's curriculum.</p>	<p>areas as a framework has been developed.</p> <p>1-4. Teacher-training workshops that introduce ways of integrating local natural areas into curriculum have been made accessible to all San Francisco teachers.</p>	<ul style="list-style-type: none"> • Create booklets and/or distribute a biodiversity newsletter; • Advertise at bus shelters, libraries, and other public locations; and • Use other appropriate advertising media. <p>1-c. Create public forums for discussing biodiversity issues.</p> <p>1-d. Develop extension courses, symposia and lectures about local biodiversity.</p> <p>1-e. Establish volunteer opportunities in which the public, the business community and students can participate.</p> <p>1-f. Provide hands-on activities, including native plant propagation, ecological monitoring, and invasive-plant removal, for resident stewardship on both private and public lands.</p> <p>1-g. Create a network of resident community groups that work toward the protection of local biodiversity.</p> <p>1-h. Expand and publicize a city naturalist program.</p> <p>1-i. Increase the discreet use of interpretive signs that describe natural features in the City's parks and natural areas.</p> <p>1-j. Educate and train in biodiversity protection all city workers involved with land management. Revise civil service tests and job descriptions as necessary to assure that those responsible for open space management are</p>
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			<p>qualified to give adequate consideration to biodiversity.</p> <p>1-k. Develop native plant propagation programs in schools to encourage an early appreciation of native species and their interactions.</p> <p>1-l. Develop biodiversity activity kits and other aids to biodiversity instruction for the use of teachers.</p> <p>1-m. Disseminate information about biodiversity-related education opportunities (such as lectures, classes, workshops, plant sales, education packets, and volunteer opportunities) through the development of a comprehensive resource directory.</p>
<p>2. To protect and restore remnant natural ecosystems.</p>	<p>2-A. Significant natural areas are sustained by natural process and human stewardship as needed.</p> <p>2-B. All watershed lands are protected and enhanced.</p> <p>2-C. All privately owned natural areas within city limits have been publicly acquired or secured by conservation easements.</p> <p>2-D. San Francisco's efforts to protect natural habitat are coordinated with the policies and practices of related organizations (such as the Recreation and Parks Department, National Park Service).</p> <p>2-E. Remnant natural ecosystems are monitored to make sure the appropriate management actions are being implemented for their</p>	<p>2-1. Biologists have been hired by the city, and relevant scientific expertise is brought to bear on projects initiated through city departments with jurisdiction over natural areas (such as the Recreation and Park Department, the Department of Public Works, and the Water Department).</p> <p>2-2. All environment regulations are strictly enforced.</p> <p>2-3. The Significant Natural Resource Areas Management Plan has been implemented.</p> <p>2-4. Regional local stewardship programs for natural areas have been established.</p> <p>2-5. Policy 13 of the Recreation and Open Space Element of the Master Plan has been</p>	<p>2-a. Integrate The Recreation and Park Department's Significant Natural Resource Area plans with other appropriate plans, such as those of the Golden Gate National Recreation Area, the Water Districts and the Department of Public Works.</p> <p>2-b. Create a bioregional council (including San Mateo County) to coordinate the stewardship of populations of organisms in a larger context.</p> <p>2-c. Identify and acquire natural-area properties.</p> <p>2-d. Establish a system of baseline ecological monitoring of the plant and animal species of San Francisco.</p> <p>2-e. Collect scientifically valid information that will allow staff biologists to</p>

	<p>sustainability.</p>	<p>implemented. 2-6. A framework for monitoring management actions has been developed. 2-7. San Francisco Public Utilities Commission watershed lands are managed to protect natural systems. 2-8. Invasive plant species are continually controlled in natural areas. 2-9. All city-owned natural areas are managed by a single management agency. 2-10. Remnant natural areas have been identified, and necessary work on their management and restoration has been prioritized. 2-11. Wildlife corridors have been identified and plans for their enhancement are in place.</p>	<p>evaluate the effects of management actions on biodiversity. 2-f. Establish sources for the propagation of native plants from local genetic stock, for use in agency lands and for resale to individuals. 2-g. Remove the worst invasive plant species from high-priority natural areas. 2-h. Ban the sale and use of the worst invasive plants, such as French broom and pampas grass. 2-i. Begin to enhance wildlife corridors, with for example:</p> <ul style="list-style-type: none"> • Appropriate plantings, • Water, • Removal of barriers, • Installment of grade separations, • Signs such as "Slow - Animal Crossing."
<p>3. To protect sensitive species and their habitats and support their recovery in San Francisco.</p>	<p>3-A. An effective remedial policy for protecting sensitive species has been put in place. 3-B. Sensitive species have achieved viable population levels. 3-C. Some targeted "extirpated" species have been reintroduced. 3-D. Habitat is managed appropriately. City and other actions that may have an impact on sensitive species are continually monitored and negative actions stopped. 3-E. Effective mitigation work is done in a sensitive</p>	<p>3-1. Sensitive species conservation efforts have been coordinated between city and regional groups (including local residents, environmental organizations, schools, universities, and management agencies). 3-2. Sensitive species and their habitats within the city have been identified. 3-3. Extirpated species that are possible candidates for reintroduction have been identified.</p>	<p>3-a. Develop a plan of action to conserve sensitive species. 3-b. Identify extirpated species and consider possible reintroduction. 3-c. [See action 1-f]</p>

	and timely way, so that no habitat destruction is allowed in areas where there are sensitive species.		
4. To maximize habitat value in developed and naturalistic areas, both public and private.	<p>4-A. Habitat corridors and water resources are preserved and enhanced.</p> <p>4-B. Environmental master plans for parks, watershed lands, urban habitat corridors, and various developed urban areas are implemented.</p> <p>4-C. Public education to protect the biodiversity of aquatic systems has resulted in an end to harmful storm drain and sewage discharges.</p>	<p>4-1. Environmental master plans for parks, watershed lands, urban habitat corridors, and various developed urban areas have been developed.</p> <p>4-2. Municipal agencies have developed and begun implementing an integrated pest management and minimal-herbicide-use policy.</p> <p>4-3. A network of wildlife corridors that link significant habitat areas with naturalistic areas has been identified and is being developed with appropriate plantings and other measures.</p> <p>4-4. Habitat areas are protected from inappropriate traffic disturbances.</p> <p>4-5. Wildlife-friendly landscapes are more common on public and private land.</p> <p>4-6. Sales of plants listed by the City as beneficial to wildlife, particularly those indigenous to San Francisco, have increased.</p> <p>4-7. A city program has been developed that mitigates the impact of invasive exotic species and domestic and feral animals on indigenous plants and animals.</p>	<p>4-a. Adopt land management practices beneficial to biodiversity, such as planting vegetation with wildlife value and incorporating the needs of migrating birds.</p> <p>4-b. Lobby adoption of land management practices beneficial to biodiversity by state and federal agencies.</p> <p>4-c. Develop strategies to work with land managers, including private homeowners, to minimize the use of pesticides and herbicides and promote alternative strategies.</p> <p>4-d. Promote the sale and availability of indigenous plants that are beneficial to wildlife.</p> <p>4-e. Develop a public-private partnership to expand the availability of indigenous plants.</p> <p>4-f. Ban the use of invasive plants by city agencies.</p> <p>4-g. Include sensitivity to biodiversity as part of the planning criteria for landscaping of the City's open spaces.</p> <p>4-h. Educate the public about spaying, neutering, and keeping pets indoors.</p> <p>4-i. Provide low-cost neutering. (Suggested for the City and the SPCA)</p> <p>4-j. Take potential impacts of biological control agents into account before their introduction.</p> <p>4-k. Adopt city policies to</p>

			<p>require that no pesticides, herbicides, or other materials be used without testing for safety to humans and other animals.</p> <p>4-I. Eliminate landscape work at times of year in which it might be harmful to nesting birds or other wildlife, or to native-plant reproduction.</p>
<p>5. To collect, organize, develop and utilize current and historic information on habitats and biodiversity.</p>	<p>5-A. All biodiversity information collected is available and accessible.</p> <p>5-B. All biodiversity information collected is used in an ongoing fashion in management decisions.</p>	<p>5-1. The collection and organization of a biological inventory of the city's natural areas and biodiversity has begun.</p> <p>5-2. Partnerships between individuals, community groups, city agencies and institutions to share research and expertise have been developed.</p> <p>5-3. Ecological monitoring has been incorporated into all aspects of biodiversity planning and policy implementation.</p> <p>5-4. Biodiversity and natural-areas data are available to the public via the Internet and at libraries and resource centers.</p>	<p>5-a. Develop incentives for universities, colleges, and other higher-education groups to conduct research on San Francisco biodiversity.</p> <p>5-b. Conduct annual biodiversity audits of the City on a region-by-region basis, taking advantage of organizations already collecting such data (e.g., The Audubon Society and the California Native Plant Society), and including other organizations, such as the schools, universities, city departments and resident community groups.</p> <p>5-c. Establish a mechanism, secure funding and identify a lead agency to ensure that data on the City's natural areas and biodiversity is collected, organized, continually updated and disseminated.</p>