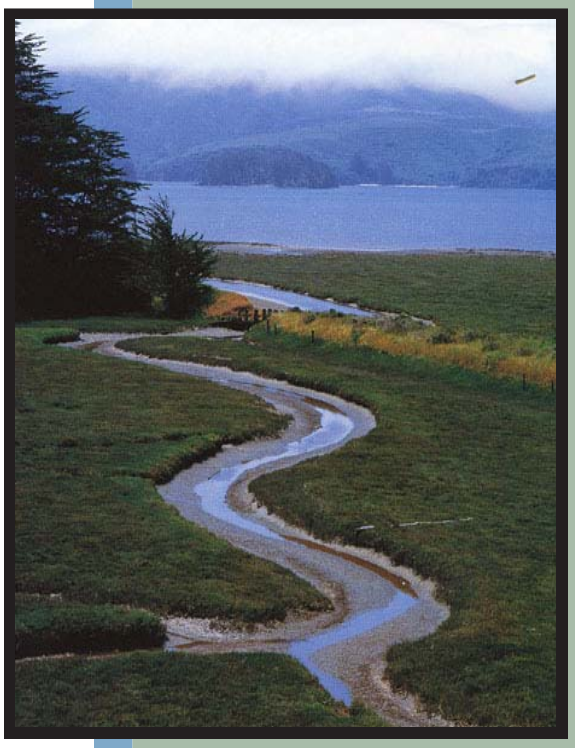


Natural Systems

II. Natural Systems

Environmental conditions strongly affect not only our lives but the ability of many plant and animal species to thrive and reproduce. From the quality of the air we breathe to our enjoyment of outdoor recreation, we depend on nature to provide for us. Partnerships between humans and the environment provide many of the necessities of our daily lives. We depend on natural systems for food, minerals, and renewable energy, all essential to our high quality of life.

Planning areas that are based on watershed boundaries are already a part of the Marin Countywide Plan. Reinforcing the critical role of watershed planning and providing for "fish friendly" land use policies is an overarching objective of this Countywide Plan update. Although streams, creeks and other waterbodies are addressed principally in the Natural Systems section of this report, it is important to recognize and honor the whole that is a watershed.

A watershed is the region draining into a river or body of water. It is an area of land in which creeks, streams, swales and underground fractures in rock carry water from ridgetop to valley, from creek and river to the sea. Also called a drainage basin, a watershed is a concept that farmers and rural landowners have planned and lived by for centuries. The boundaries of large, rural tracts of land are sometimes defined by watershed boundaries.

In cities it can be harder to recognize a watershed. Buildings may shield the view of ridgetops. Soil may be covered with concrete and asphalt which increases runoff. Waterways may be replaced with pipes, culverts and concrete-lined channels, obscuring natural drainage patterns. When it is so difficult to recognize a watershed it can be hard to see the connection between daily human activities and the health of downstream creeks, fish, marshes and bays. But all of the modern conveniences of urban living profoundly affect watershed health and function. The fact is, a watershed is affected by all the organisms and activities within it. For that reason, watershed concerns also apply to the Built Environment and other sections of this report.

This chapter covers topics linked to the natural environment. Key issues related to native species and habitat protection, the quality of our air and water, noise levels, mineral resources, and renewable energy are presented. Hazards to people and the environment, such as flooding, seismic activity, landslides, fire, hazardous materials, and global warming are addressed, along with strategies for protecting the environment and minimizing hazards to it and its residents.

Although the chapter is organized into four main sections—Environmental Quality; Environmental Hazards; Open Space and Trails, and Parks and Recreation; and Food and Agriculture—many of the trends, issues and strategies posed here are interrelated, as are the elements of natural systems. Issues that threaten Marin County's biodiversity, such as weed invasion, land fragmentation, and development, are also threats to agriculture and food production. Protecting open space raises issues for recreation, agriculture, and habitat protection. How we treat streams and wetlands not only affects the creatures that live in them but also impacts flooding in low-lying areas.

A. ENVIRONMENTAL QUALITY

➢ Background and trends

From the high percentage of public land to relatively clean air and water, environmental quality in Marin County is high overall. Of Marin's 332,800 acres, park lands comprise 33 percent, while open space and watershed lands are 15 percent, resulting in nearly half of the county's land area being protected open space land. With Marin's having the largest amount of protected open space in the nine-county Bay Area, residents and visitors enjoy exceptional recreational opportunities and unparalleled scenic views. In addition to the human benefits that these public lands afford, they also provide habitat for myriad native species and communities. Marin County's rich biodiversity is illustrated by the fact that

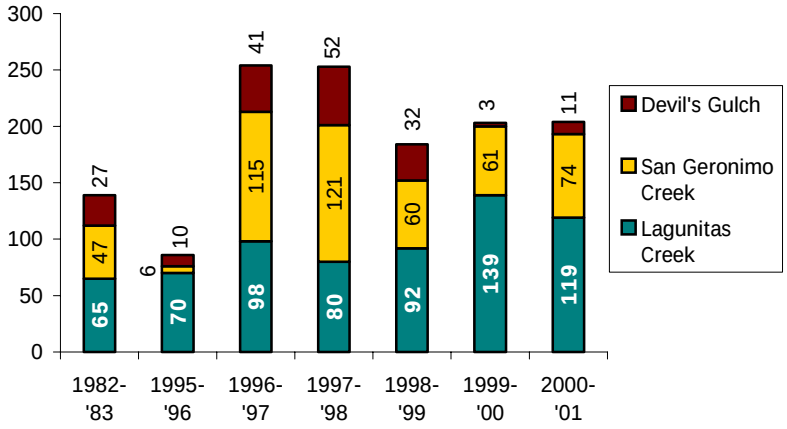
it ranked 17th out of 58 counties in California in the number of special status species documented in 2001—an amazing fact considering that Marin is among the smallest counties in California. Forty-one animal and 52 plant special status species are known to occur in Marin (California Natural Diversity Database) (Map II-1).

With the acquisition of these public lands by federal, state, and local agencies, habitat protection for many species was ensured. Point Reyes National Seashore, encompassing 70,000 acres—approximately 20 percent of the land area of Marin—includes coastal beaches, headlands, estuaries, and uplands. It is home to critical habitats that support nearly 15 percent of California's plant species, 30 percent of the world's marine mammal species, and 45 percent of the North American bird species. Coastal waters offshore of Marin County also support important marine habitats. The Gulf of the Farallones waters offshore of Marin County are the center of one of the most productive eastern-boundary coastal upwelling marine ecosystems in the world (Bakun).

Marin County holds 7 of the 13 units of the Golden Gate Biosphere Reserve. The Biosphere Reserve is a partnership of 13 units, established in 1988, which include a highly diverse complex of terrestrial, coastal, and marine ecosystems representing the Californian terrestrial and Californian-Temperate North Pacific coastal-marine biogeographic provinces. Marin's seven units include Audubon Canyon Ranch, the Golden Gate National Recreation Area, the Marin Municipal Water District, Mount Tamalpais State Park, Point Reyes National Seashore, Samuel P. Taylor State Park, and Tomales Bay State Park. There are presently only 337 reserves in 87 countries, 47 of which are in the United States (United States Man and the Biosphere).

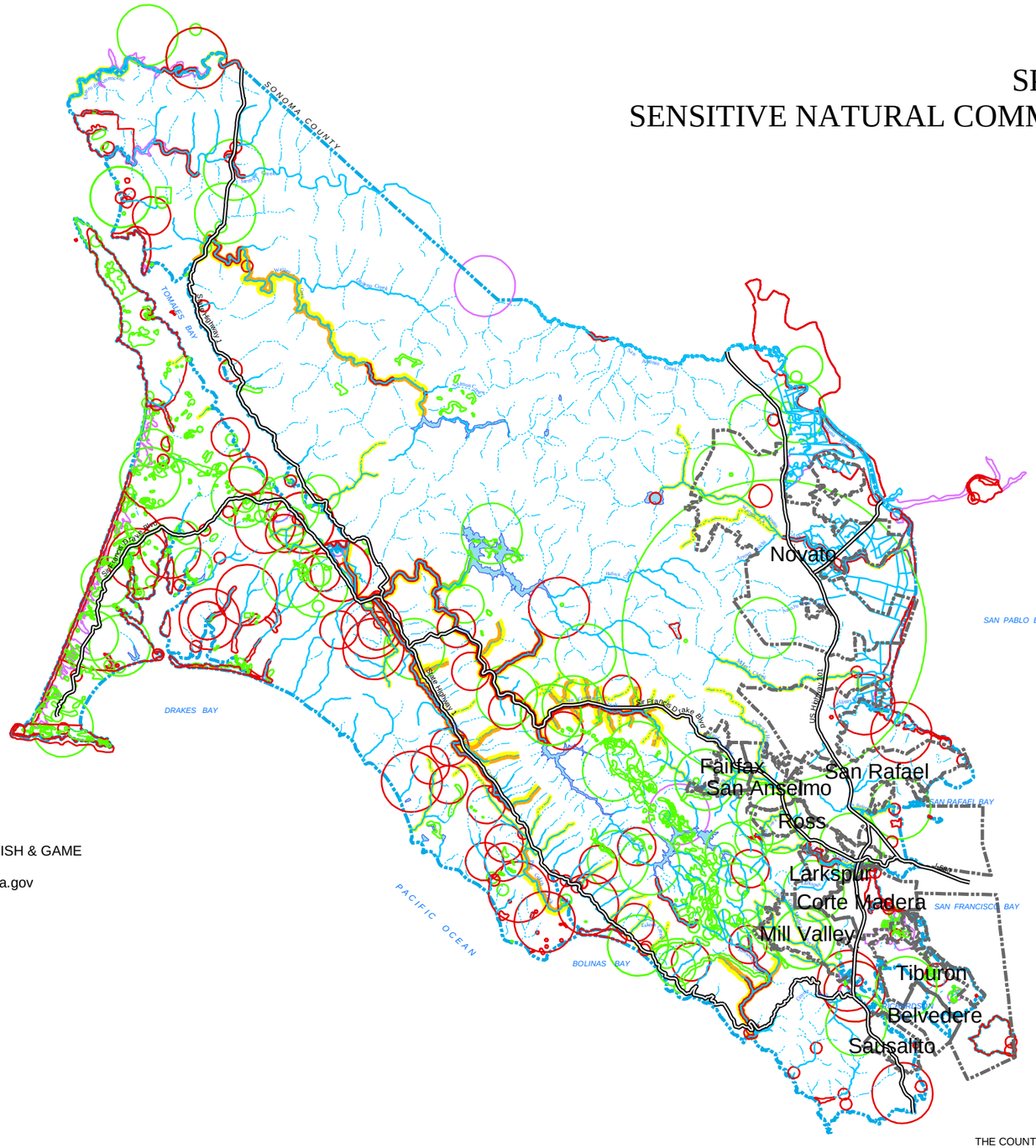
Despite the fact that stream alterations and land uses have had a significant impact on natural stream and drainage patterns (Clearwater Hydrology), the Lagunitas Creek watershed, which includes both public and private lands, supports the most important population of federally threatened coho salmon in California. Of the approximate 5,000 coho population in California, approximately 500 to 800 spawning adult coho salmon have been known to occur in the Lagunitas Creek watershed consistently since 1995 (Andrew). Recently, both species have shown modest signs of recovery in Marin in response to efforts aimed at restoring Marin's streams and riparian habitat. Approximately 80 to 250 coho salmon redds (spawning nests where the salmon deposit their eggs in the stream) have been observed in the Lagunitas Creek watershed since 1982 (Figure II-1). Juvenile population estimates for coho salmon and steelhead trout in the main stream of Lagunitas Creek have been stable historically (Figure II-2 & Map II-2).

Figure II-1
Coho Salmon Redds Observed in Lagunitas Creek Drainage



Source: 2001 Marin Municipal Water District

MAP II-1
SPECIAL-STATUS SPECIES AND SENSITIVE NATURAL COMMUNITIES OF MARIN COUNTY



Legend

- County Boundary
- City Boundary
- Highways and Major Roads

Streams

- Perennial
- Intermittent

Water Bodies

- Lakes

Special-Status Fish Occurrences *

- Steelhead
- Coho

Special-Status Species Occurrences **

- Plant
- Animal

Sensitive Natural Community Occurrences **

- Terrestrial Communities

*** BASED ON COUNTY RECORDS**

**** BASED ON RECORDS OF THE CALIFORNIA NATURAL DIVERSITY DATA BASE**

Mapped locations vary from accurate areas to areas that extend several miles and include potential habitat.

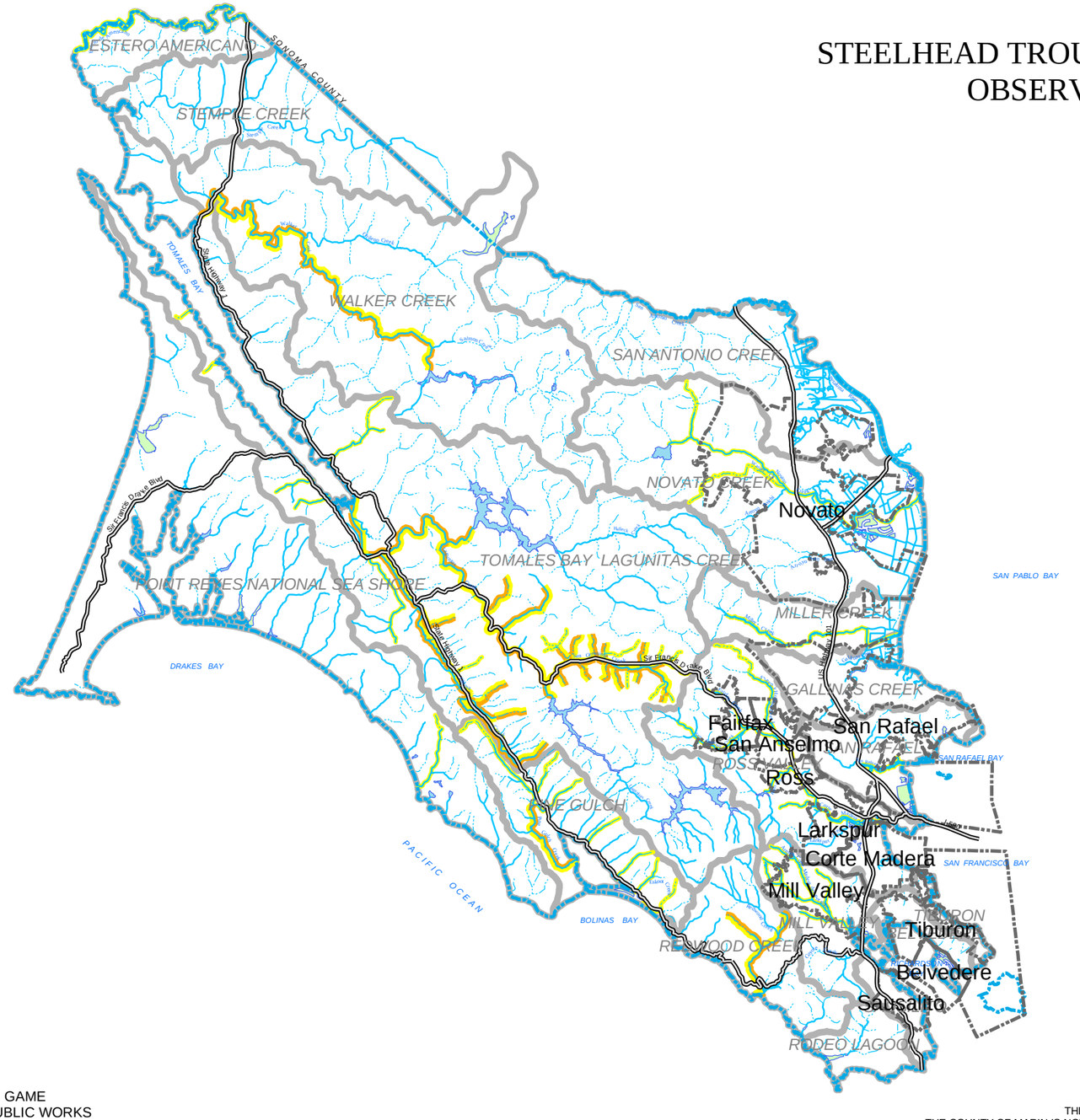
SOURCE: MODIFIED FROM CALIFORNIA DEPARTMENT OF FISH & GAME
CALIFORNIA NATURAL DIVERSITY DATA BASE
ADDITIONAL INFORMATION AVAILABLE AT www.dfg.ca.gov

The California Natural Diversity Data Base (CNDDB) is a digital inventory of the locations of the state's rare, threatened and sensitive plants, animals and natural communities that is continually refined and updated. CNDDB provides information on locations, condition, dates of observation, accuracy of sightings and comments regarding habitat associations, threats, population sizes, and state and federal listings, and more. CNDDB is a positive sighting database available at the time of the request and should not be regarded as complete data on the elements or areas being considered.

N

0 1 2 4 6 8 Miles

MAP II-2
STEELHEAD TROUT AND COHO SALMON OBSERVED IN MARIN COUNTY



Legend

- County Boundary
- City Boundary
- Highways and Major Roads

Streams

- Perennial
- Intermittent

Water Bodies

- Lakes
- Lagoons

Special-Status Fish

- Steelhead
- Coho

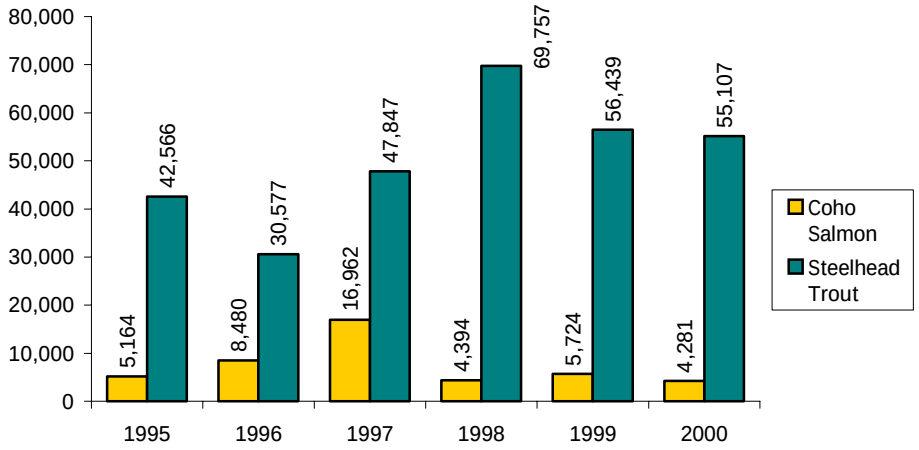
- Major Watersheds
- *MILLER CREEK* Watershed Names

N

0 1 2 4 6 8 Miles

SOURCE: BILL COX, CALIFORNIA DEPARTMENT OF FISH AND GAME
JOHN O'CONNER, SPAWN AND MARIN COUNTY DEPARTMENT OF PUBLIC WORKS

Figure II-2
Juvenile Population Estimates for Coho Salmon and Steelhead Trout in the Main Stem of Lagunitas Creek



Source: 2001 Marin Municipal Water District

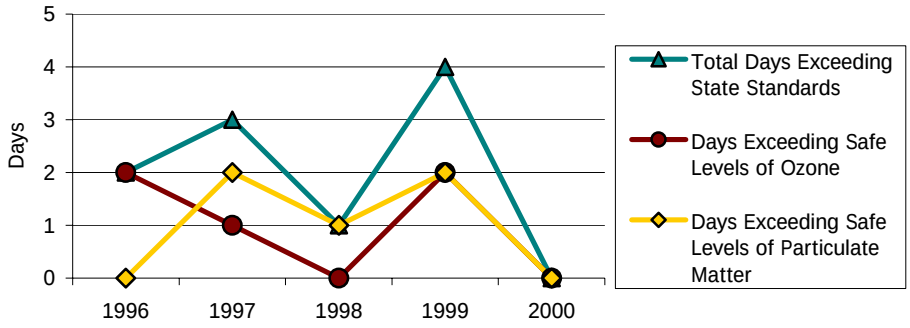
Steelhead trout are present in approximately 80 to 90 percent of perennial creeks in Marin County. Other significant streams in the Coastal Recreation Corridor that support coho salmon and the federally endangered steelhead trout include San Geronimo Creek, Walker Creek, Olema Creek, and Redwood Creek. In the City-Centered Corridor, the designated critical streams for both coho salmon and steelhead trout include Miller Creek, Corte Madera Creek, Arroyo Corte Madera del Presidio, and Novato Creek. Coho salmon population counts in Marin are stable yet tenuous (Andrew).

Urban influences on riparian habitat quality are illustrated by Marin County Macroinvertebrate Survey data of local watersheds and streams for fall 1999 through spring 2001 (Sustainable Land Stewardship for the Marin County Stormwater Pollution Prevention Program). These data showed an increase in sensitive taxa at higher elevations, which suggests that urban development, which is concentrated in the lower reaches of stream habitats in east Marin, has contributed to deterioration of environmental quality.

Although pesticide use is relatively low in Marin—it ranked 45th out of 58 California counties for pesticide use in 2000—all urban streams in the urban City-Centered Corridor are listed as impaired by the State Water Resources Control Board for the pesticide diazanon. Other chemical pollutants documented in central San Francisco Bay and San Pablo Bay include polychlorinated biphenyls (PCBs); pesticides such as DDT and dieldrin; and the trace metals copper, nickel, lead, mercury, and chromium (Clearwater Hydrology). In rural West Marin, the primary water pollutants include sediment, nutrients, pathogens, and heavy metals. Despite the fact that Tomales Bay and two of its main tributaries—Walker Creek and Lagunitas Creek—are listed as impaired for these four pollutants, the bay is often described as "pristine."

Marin has experienced a drop both in the total number of days exceeding State Ambient Air Quality Standards and in the number of days exceeding safe levels of ozone since 1996. Similarly, Marin has had an improvement in the number of days that the county has exceeded safe levels of particulate matter since 1996 (Figure II-3).

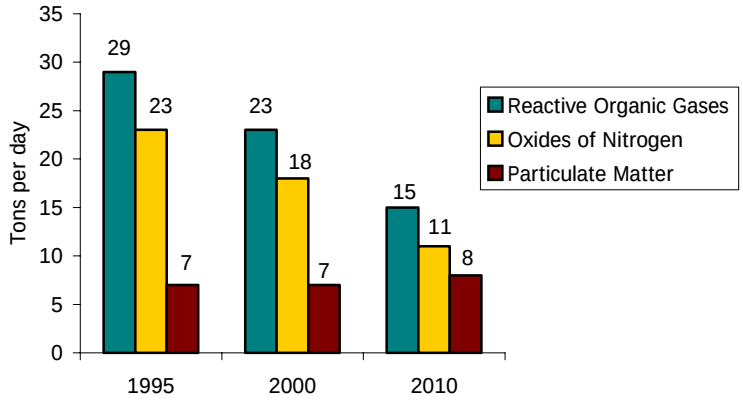
Figure II-3
Air Quality in Marin, 1996–2000



Source: 2001 Healthy Marin Partnership

Ozone precursor pollutants have decreased. An emissions inventory of ozone precursor pollutants, including reactive organic gases (ROG), oxides of nitrogen (NOx), and particulate matter (PM-10), for Marin County shows that ozone precursor pollutants have decreased. This trend is expected to continue through 2010. Meanwhile, PM-10 emissions are expected to remain relatively flat through 2010. Some reductions in PM-10 concentrations are expected (Figure II-4).

Figure II-4
Total Pollutant Emissions Inventory in Tons per Day for Ozone Precursors and PM-10



Source: 2001 Air Quality Technical Background Report

Noise levels have remained steady. Noise levels have not increased significantly in the last 14 years, although there has been a trend toward increased noise levels during the early morning hours because of changes in commuting patterns. Noise measurement for the existing Countywide Plan was conducted in 1987 at six locations. Those same six locations were measured in 2001, and only one location showed a difference in noise levels of 5 dB, namely at St. Vincent's Road (Illingworth & Rodkin).

1. Native Species and Habitat Protection

➢ Issues

Riparian habitats are impacted by development and agriculture.

a) Development projects can impact sensitive fish habitat and need to be reviewed in light of their proximity to such habitat.

b) The proximity of residential development to streams often contributes to invasive nonnative residential landscaping encroaching into riparian areas.

c) Riparian systems are essential to many species of wildlife, and the condition of riparian areas affects water quality. Efforts to protect riparian areas from damage by intensive agricultural uses need to be pursued.

Important wetland habitats are threatened by filling and other alterations.

a) Wetlands, which provide habitat for many plant and animal species and aid in flood control, and groundwater recharge have been altered over the years by filling, diking, draining, and other types of alteration. More than 95 percent of the nation's wetlands have been altered so that they no longer perform their important functions.

b) Much of the salt marsh ringing San Pablo Bay, which provides important habitat for several special status species, historically has been diked and drained for farming and other uses.

Marine environments are threatened by pollutants, sonar, and overfishing.

a) A five-year exemption from the Mammal Protection Act has been granted to the U.S. Navy to use a low frequency active sonar to identify enemy submarines, potentially resulting in seriously confusing, injuring, and eventually killing noise-sensitive marine animals, including whales (Hikida).

b) Any potentially significant changes to the chemistry and biology of natural streams, lagoons, or bays as a result of sewage outfalls, increased output from existing outfalls, and/or discharges from desalination plants should be subject to environmental review.

c) Point Reyes National Seashore's coastal ecosystem and its shoreline may be jeopardized by the impairment of Tomales Bay by mercury, offshore oil spills, and overfishing (Prado).

Marin's oak trees, oak woodlands and oak savannahs are seriously threatened by Sudden Oak Death.

a) *Phytophthora ramorum* is a funguslike microbe that is causing thousands of coast live oak and tanoak trees to die in Marin. More than 15 species in Marin County have been found to be susceptible since the disease was first discovered on a tanoak in Mill Valley in 1995. It is common in east Marin and spreading into West Marin (Map II-3).

b) Animals that rely on acorns and other vegetation may suffer because their food supply will be reduced.

c) Funding is limited for SOD research, removal of dead trees, fire protection, and quarantine enforcement.

Improved oak woodland conservation criteria are needed to ensure adequate protection.

a) Oak woodland conservation criteria in the Countywide Plan must factor in forest composition and structure, including site-specific data. Imagery generated data (such as GIS data) are incapable of accurately mapping oak woodland composition and structure (California Oak Foundation).

b) Oak woodland habitat suitability for wildlife can only be confirmed by a ground forest survey (California Oak Foundation).

c) Planning documents should specify measurable performance standards that will maintain existing oak woodland habitat adjacency and connectivity (California Oak Foundation).

Marin County's biodiversity is threatened by loss of habitat, habitat fragmentation, and invasion of exotic species.

a) Developments and land conversions at the edge of natural systems may cause habitat fragmentation through "edge effects," including increased predation by domestic animals, escaped exotic plants moving into wild areas, changes to fire regimes due to human intrusion into wild areas which can increase fire frequency, and artificial lighting. Loss of rare plants and wildlife from a fire is a very real threat. After the Mount Vision fire, mountain beavers were almost eliminated from the Point Reyes National Seashore.

b) Contiguous wildlife corridors are being incrementally lost by fragmentation resulting from developments, road construction, and other land use changes.

c) Loss of wildlife corridors that can support large predators such as coyotes and mountain lions may cause populations of smaller predators such as raccoons and domestic cats to balloon, in turn causing the decline of nesting bird populations.

d) Nonnative species are increasing in number, competing with native species and threatening biodiversity. Problem species include eucalyptus, broom, acacia, Monterey pine, numerous grassland species, starling, exotic deer species, domestic cats, nearly 100 exotic marine invertebrates, and an unknown number of terrestrial vertebrates.

e) The need to manage exotic plants with pesticides for protection of biodiversity conflicts with increasing community resistance to the use of chemicals.

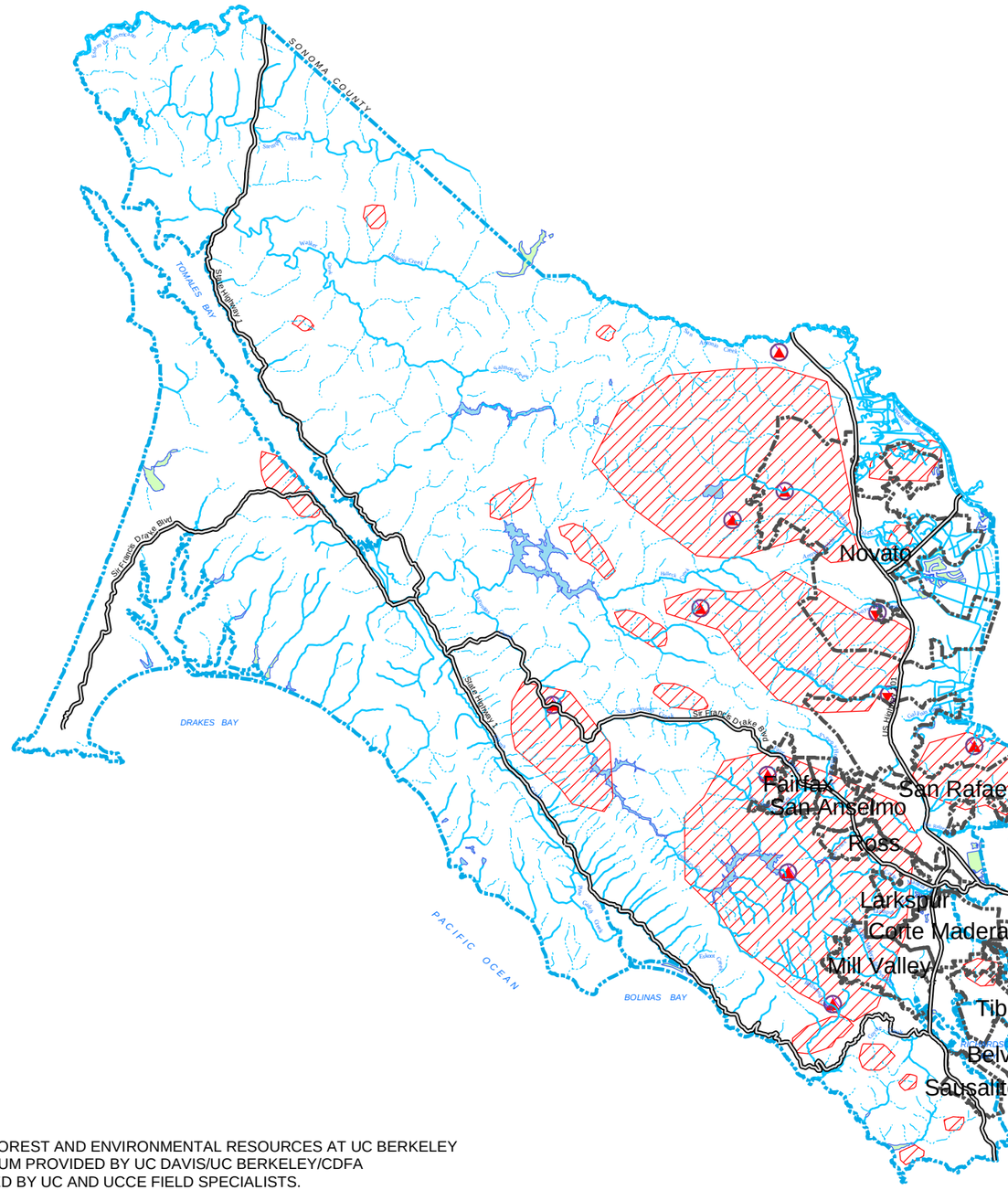
f) The reproductive capacity of flowering plants is harmed when movement corridors for species-specific pollinators are not retained.

Mitigation intended to replace habitat lost to development is not always adequate or successful.

a) There is growing uncertainty about the success of mitigation measures used to offset the impact of development, and growing pressure to evaluate whether mitigation measures are successful.

b) The applicability of mitigation banking policies for various types of species and habitats should be evaluated in Marin County.

MAP II-3
SUDDEN OAK DEATH



Legend

- County Boundary
- City Boundary
- Highways and Major Roads

Streams

- Perennial
- Intermittent

Water Bodies

- Lakes
- Lagoons

- Confirmed isolations of Phytophthora ramorum (data from CDFA)
- Confirmed isolations of Phytophthora ramorum (data from UC Davis/UC Berkeley)
- 1/4 mile buffer around confirmed SOD
- Areas suspected of having SOD

N

0 1 2 4 6 8 Miles

SOURCE: CENTER FOR THE ASSESSMENT AND MONITORING OF FOREST AND ENVIRONMENTAL RESOURCES AT UC BERKELEY
CONFIRMED ISOLATIONS OF PHYTOPHTHORA RAMORUM PROVIDED BY UC DAVIS/UC BERKELEY/CDFA
AREAS SUSPECTED OF HAVING SOD PROVIDED BY UC AND UCCE FIELD SPECIALISTS.

➢ Strategies

Strengthen policies to protect riparian habitats.

(See also 2. Water Quality.)

a) Consider the inclusion of floodplains as part of the creek and riparian corridor when setting environmental protection policies.

b) Consider specific regulatory provisions prohibiting or further restricting inappropriate development in the flood basins and flood zones including mandatory setbacks.

c) Require new developments to follow best management practices protecting riparian and aquatic habitats. Aspects of the policy could include technical assistance, education, incentives, and effective regulation via the development code.

d) Propose the enactment of stronger County protection policies for all streams, including ephemeral and intermittent streams and encourage other Marin towns and cities to enact similar policies. Such policies should require streams to be retained above ground (prohibit culverting), provide for adequate buffers, and prohibit diversions unless they can be done without adverse impacts to stream habitat.

e) Propose policies to the Countywide Plan that require, not just encourage, the retention of native vegetation and replacement of native streamside vegetation in denuded areas.

f) Propose making inland and coastal policies for riparian vegetation more uniform.

Review and refine Stream Conservation Areas to protect riparian habitats.

a) Change the Countywide Plan and zoning to make projects within an SCA subject to discretionary approval.

b) Adopt an implementation ordinance to carry out the protection of SCAs.

c) Review prohibited land uses in SCAs and ensure that they are adequate for protection.

d) Require new trails to be either located outside or carefully sited within SCAs to minimize disturbance to sensitive wildlife habitat.

e) Provide clear and consistent definitions in SCAs—define intermittent and ephemeral streams and riparian and riparian vegetation as terms in SCAs. Compare SCA definitions with other agency definitions to ensure consistency.

f) Require that restoration of damaged portions of SCAs accommodate flood flow capacity.

g) Require flood control improvements within the SCA to be designed with sufficient capacity to allow for retention of native vegetation in the channel, thereby improving habitat and minimizing need for routine maintenance.

h) Require revegetation with native plants in SCAs as part of new developments in a CWP policy or ordinance.

i) Require restoration monitoring to ensure reestablishment of the natural vegetation where removal is necessary in the SCA.

j) Explore development of setback standards for riparian areas that fall outside the SCA. Require that a qualified vegetation ecologist conduct a biological assessment to determine the riparian boundary.

k) Document and analyze cumulative impacts on SCAs and wildlife corridors.

Support positive management strategies that protect and restore riparian areas.

(See also 2. Water Quality.)

a) Support County, Natural Resource Conservation Service, Marin Resource Conservation District, and University of California Cooperative Extension efforts to provide education for farmers to participate in riparian and watershed restoration and planning efforts.

b) Seek funding to pay the cost of fencing sensitive streamside areas on private property that could be impacted by cattle grazing. Support existing riparian protection programs operated by the Marin County Resource Conservation District, Students Restoring a Watershed, and other groups.

c) Implement fish-friendly best management practices by providing technical assistance for bank stabilization, and educate homeowners and roadway maintenance crews.

d) Include monitoring for sensitive species and measuring habitat values in stream management programs.

e) Determine stream hot spots for stream preservation and restoration.

f) Pursue restoring the geomorphic stability and hydrologic function of degraded channels.

Maintain and improve in-stream conditions to protect and enhance fish habitat.

(See also 2. Water Quality.)

a) Prohibit development projects that impede fish passage. Encourage construction of bridges or arched culverts instead of culverts.

b) Implement measures to reduce the effects of County land use policies and management practices on salmonids and their habitats.

c) Require review of fish migration impacts caused by maintenance or emergency replacement of culverts.

d) Require new development and impoundments to be contingent on availability of stream water for fish.

e) Allow alteration of stream flow, beds, or banks only as part of stream habitat enhancement or removal of fish barriers.

f) Enact strategies for reducing in-stream temperatures to acceptable levels for fish.

g) Identify concrete channels and culverted creeks that could be daylighted and restore them to their natural channels where feasible.

h) Develop policies for public channel maintenance and bank stabilization projects.

Propose establishment of a Baylands Protection Corridor to protect San Pablo Bay wetland habitats.

a) Propose establishment of a Baylands Protection Corridor that would designate important habitat adjacent to San Pablo Bay primarily for resource conservation, wildlife habitat, and other natural resources.

b) Encourage the cities of San Rafael and Novato to consider amending their general plans to include a Baylands Protection Corridor and to amend plan maps and policies appropriate to this designation.

c) Consider policies that call for lower densities and other land use restrictions in the baylands. Consider applying protective land use designations and densities already utilized in the Coastal Recreation and Inland Rural Corridors.

d) Consider revisions to agricultural preserve boundaries to include lands currently in agricultural use where appropriate.

Modify the Bayfront Conservation Zone to better protect Bay habitats.

a) Clarify the definition of minor redevelopment that may be excluded from policies that apply to the Bayfront Conservation Zone (BCZ).

b) Consider redefining the BCZ to include low elevation grasslands and oak woodlands.

Seek public support to acquire and restore key Baylands parcels to protect important Bay wetland habitats.

a) Seek support of the acquisition of important bayland properties for public or protective nonprofit ownership.

b) Add diked historic salt marsh to the Countywide Plan priority list for acquisition with Open Space District funds because diked baylands are resources of regional value, are significant habitats, and function as open space and community separators. Once acquired, plan and implement salt marsh enhancements and restorations as part of Marin County Parks and Open Space management.

c) Continue to protect diked historic salt marsh remaining in the cities of Novato, San Rafael, Corte Madera, Larkspur, and Mill Valley.

d) Ensure that diked wetlands, unless currently in agriculture, are allowed to remain as seasonal wildlife habitat, with the ultimate goal of restoring them to tidal salt marsh.

Strengthen protections for wetlands.

a) Clarify the definition of wetlands in the Countywide Plan.

b) Protect existing wetlands rather than creating artificial wetlands or “restoring” damaged wetlands whenever possible.

c) Provide strong Countywide Plan protections and environmental review procedures for all wetlands, including those outside the proposed Baylands Protection Corridor.

d) Protect wetlands and associated transition zones—containing a mix of wetland and nonwetland plants—from development impacts. All wetlands and transition zones should be protected by adequate buffer areas as determined by a qualified ecologist.

e) Protect wetlands from damage due to public access by strictly limiting it. Other protective measures, such as fencing and plantings or moats, may also be needed.

f) Develop an overall policy on wetlands outside the SCA and the Bayfront Conservation Area (BCA), including polices for seasonal wetlands, freshwater seeps, freshwater springs, and vernal pools.

g) Prohibit grading changes to the banks of ponds or lagoons to ensure the integrity of these ecosystems.

h) Prevent the removal of pond vegetation to ensure the continued survival of animals dependent on them. Work with the Mosquito Abatement District on methods of vector control that are not destructive.

i) Enhance riparian and wetland function by increasing water infiltration throughout the watershed

j) Improve drainage patterns to decrease concentrated runoff and to allow natural infiltration

Increase water infiltration starting in the upper reaches of watersheds so that groundwater recharge, natural springs, wetlands and stream flow is enhanced throughout the watershed. Identify important, threatened marine environments and establish cooperative programs to protect them.

a) Identify areas of high diversity and sensitivity in the coastal zone of the county (extending three miles offshore).

b) Cooperate with CDFG in its planning process for designation of a network of Marine Protected Areas (MPAs) in the state.

c) Cooperate with CDFG in developing a strategy for sustainable fisheries in the county.

d) Pursue collaborative enforcement agreements for protecting areas with other state and federal agencies.

e) Develop an educational campaign on conserving marine resources of Marin County, including sustainable fisheries.

f) Develop a phased designation of use including a core area of high sensitivity with full protective status, surrounded by areas with reduced sensitivity and various levels of activities.

g) Establish a long term monitoring program of resources in the marine waters adjacent to Marin County. Monitoring programs should be designated to test the impacts of newly established MPAs on biodiversity, biomass, and spawning biomass both within and adjacent to MPAs.

Protect marine environments by establishing a Marine Corridor or including them in the Coastal Recreational Corridor.

a) Keep waters within a Marine Corridor or expanded Coastal Recreational Corridor free of low frequency sonar to protect marine mammals relying on sound for communication, feeding, and migration.

Support Sudden Oak Death prevention and treatment programs to protect oaks and other susceptible species.

a) Train employees in all aspects of County government so they are under compliance with the *P. ramorum* quarantine. Train staff so they don't spread the disease.

b) Manage hazardous trees affected by SOD, and leave trees in place if they are not hazardous until spreading effects are known.

c) Monitor the spread and impact of the disease by cooperating with ongoing efforts by the California Oak Mortality Task Force.

d) Offer financial support, staff, and educational support to prevent the spread of SOD.

e) Identify sensitive biological resources that could be affected by fuel reduction efforts and long term changes resulting from SOD, including exotic weed invasions.

Enact stronger conservation criteria to protect oak trees, oak woodlands and oak savannahs.

a) Specify measurable performance standards that will maintain existing oak trees and oak woodland and savannah habitat adjacency and connectivity. Measurable performance standards include defining oak woodlands and savannahs, scientifically based criteria for determining oak woodland and savannah ecological significance, and credible oak woodland and savannah habitat mitigation measures to reduce impacts to oak resources.

Protect native trees from damage due to construction.

a) Avoid soil compaction and siting of structures and impervious surfaces of soil near native trees.

b) Prohibit removal of portions of redwood and other types of native forest that might expose the remaining trees to wind throw.

Protect dune habitats.

a) Strengthen policies for protection of the dunes in Tomales.

Protect grasslands for their habitat, agricultural, and watershed protection values.

a) Promote recognition that grasslands are not “vacant” areas where nothing will be destroyed if development or crop agriculture takes place. Grasslands are among California’s most endangered habitats and are critical to effective watershed management.

b) Emphasize the importance of preserving not only agriculture but also the grassland ecosystem on which much of it is based in County planning practice.

c) Do not consider serpentine grassland to be “vacant” because of the lack of trees and scarcity of vegetation. Recognize that although it may not be a biologically productive community, it may be habitat for threatened or endangered species and thus requires a thorough biological assessment before any change is considered.

d) Encourage grazing methods that increase the cover of native perennial grasses and forbs (herbaceous plants), and discourage those that increase the cover of introduced and annual grasses.

Protect important shrublands for their habitat and watershed protection values.

a) Recognize in planning policies the importance of chaparral and coastal scrub vegetation for both wildlife habitat and watershed protection.

Minimize habitat fragmentation to preserve biodiversity.

a) Develop a plan to decrease habitat fragmentation by identifying and protecting important wildlife corridors and minimizing development at the edge of natural systems.

b) Minimize development at the edge of natural systems.

c) Retain intact, connected habitats.

d) Use wildlife corridor policies and programs to provide adequate protection and identify key areas for acquisition and restoration. Address both terrestrial and aquatic species, using the Stream Conservation Areas (SCAs) and upland wildlife corridors as mechanisms to provide habitat connectivity.

e) Propose standards for development and protection of both terrestrial and aquatic wildlife movement corridors to provide habitat connectivity throughout Marin.

f) Promote wildlife corridors in all jurisdictions throughout Marin County.

g) Include a watershed assessment in a proposed project analysis that covers an area that addresses cumulative impacts beyond the project site.

h) Develop pollinator corridors and work with other organizations to interconnect pollinator corridors for biological diversity.

Control exotic species to preserve biodiversity.

(See also 2. Water Quality.)

a) Adopt and implement policies that promote removal of invasive exotic plant species using Integrated Pest Management (IPM).

b) Support weed management and removal programs.

c) Develop policies and programs disallowing invasive exotics for both aquatic and terrestrial habitats, and identify target species for removal and control using IPM practices.

d) Remove and control invasive plant and animal exotics in any development over which the County has review authority. Establish requirements for removal as part of development approval and ongoing management, and identify target species for terrestrial and marine environments. Recommendation for removal or control of blue gum eucalyptus must recognize its importance as habitat for nesting raptors and monarch butterflies.

e) Promote the uses and benefits of seed-free hay.

f) Encourage farmers to compost farm and animal waste to decrease weed seeds. Publicize and promote the benefits of composting.

Prepare a habitat-based conservation plan to preserve biodiversity.

a) Prepare a plan that takes into consideration the overlapping habitat requirements of multiple species within the context of a functioning community or ecosystem. Thus, the functions and processes of communities and ecosystems are considered along with the needs of species.

b) Gather baseline data, including species inventories, and develop mapping of habitat types and wildlife movement corridors as the basis for biodiversity planning.

c) Prepare a master plan and governance structure for managing biodiversity with input from citizens, community-based organizations, and governments.

d) Protect essential habitat buffers.

e) Map the highest quality fish and wildlife habitats, vegetation, and Significant Natural Areas as defined by the California Department of Fish and Game to identify areas in need of protection.

Establish and implement habitat and species protection standards, policies, and programs.

a) Regularly review and update programs and standards for species protection because of possible listing or delisting of additional species as threatened or endangered.

b) Require development in Significant Natural Areas (as defined by the California Department of Fish and Game [CDFG]) to include an environmental assessment, which should identify special status species, sensitive natural communities, and wetlands.

c) Ensure that shoreline erosion protections, such as the building of revetments, sea walls, and groins, do not result in loss of biodiversity.

d) Plan for stream protection on a watershed basis (rather than according to jurisdictional boundaries) so that Marin streams receive the same level of protections countywide.

Improve the success of habitat mitigation by establishing and improving guidelines, standards, policies, and programs.

a) Establish standards for development conditions or mitigation measures that ensure that edge habitats are not destroyed or significantly altered. Integrate such standards with other relevant policies, such as the BCA and SCA.

b) Ensure that wetland mitigation results in an increase in habitat acreage and values.

c) Off-site wetland mitigation is preferable where on-site wetlands are of low value and are isolated from other habitat.

d) Require the use of native plants for mitigation, buffering, and habitat enhancement and restoration.

e) Require posting of bonds prior to development to ensure adequate funding for mitigation.

f) Evaluate whether or not tree planting is a viable method of mitigating oak woodland loss. Many important habitat elements, such as cavities, acorns, snags, and woody debris, will not be mitigated through a tree planting strategy alone (California Oak Foundation).

g) Require that development in the upper reaches of a watershed effectively mitigate water quality and riparian habitat impacts to ensure that watershed health is retained and restored.

Improve the success of habitat restoration by establishing and improving guidelines, standards, policies, and programs.

a) Encourage restoration of existing wetlands over artificial creation of new wetlands.

b) Establish site specific qualitative and quantitative goals for habitat restoration and the creation of habitat buffers.

c) Require monitoring of habitat restoration projects to measure success.

d) Develop an urban outreach program that provides technical assistance and funding sources for creek habitats and creek restoration.

➢ Sample indicators

a) Measure the degree of habitat fragmentation in various areas of Marin County.

b) Measure and map populations of exotic weed species that threaten biodiversity on open space lands.

c) Collect population counts for coho salmon and steelhead trout in creeks throughout Marin (Marin Municipal Water District and San Francisco Estuary Institute).

d) Measure the number of linear feet of creek habitat restored for anadromous fish on public open space lands.

e) Measure the distribution and quantities of the various classes of macroinvertebrates that are used to assess urban stream habitat health and water quality (Marin County Aquatic Macroinvertebrate Sampling Program).

f) Measure the number of trees or acres of land affected by SOD (California Oak Mortality Task Force).

g) Account for local, state, and federal funding for SOD (California Oak Mortality Task Force).

➢ Sample targets

a) Restore at least 500 linear feet of creek habitat annually for anadromous fish on public open space lands.

2. Water Quality

➢ Issues

Nonpoint source pollution is a primary source of sediment, pathogens, nutrients, and other chemical pollutants.

a) The use of automobiles, the largest source of water and air pollution, results in runoff as winter rains wash pollutants from automobiles through the higher reaches of the watershed, where the impact is the smallest, into urban areas, where the impact is greater, and the pollution ultimately runs into the bay.

b) Stormwater runoff affects the biotic health of both inland waterways and the downstream receiving waters of San Rafael and San Pablo bays.

c) Runoff from conventionally treated golf courses is an example of a pesticide source that needs to be addressed.

d) Residential landscaping choices combined with herbicide use are leading to increased groundwater pollution.

e) Livestock manure can negatively impact water quality.

Improperly functioning septic systems can cause water pollution and health risks.

a) Research on graywater systems and/or composting toilets as alternatives to, or additions to, septic use needs to be done.

b) Cumulative impacts of on-site septic systems on groundwater or surface water need to be evaluated.

c) A carrying capacity for on-site septic systems in a given area needs to be determined.

d) High risk or sensitive areas for on-site septic systems should continue to be established and mapped.

e) Growth considerations associated with on-site and innovative septic systems need to be evaluated.

Local water bodies are listed as impaired by sediments, nutrients, and pathogens.

a) Tomales Bay, Lagunitas Creek, and Walker Creek are listed as impaired by the following pollutants by the San Francisco Bay Regional Water Quality Control Board: Tomales Bay—heavy metals, nutrients, pathogens, and sedimentation; Lagunitas Creek—nutrients, pathogens, and sedimentation; and Walker Creek—metals, nutrients, and sedimentation.

b) San Pablo Bay is listed as impaired by the metal nickel. This water quality is strongly influenced by the runoff exiting the tributary channels from the City-Centered Corridor of Marin County (Clearwater Hydrology).

Increased runoff from development exacerbates flooding, erosion, and sedimentation.

a) Studies evaluating stream and wetland health consistently show that significant water quality impacts begin at impervious land coverage levels of as little as 10 percent. At impervious land coverage levels over 30 percent, impacts on streams and wetlands become more severe and degradation, is almost unavoidable without special measures (Bay Area Stormwater Management Agencies Association).

b) There is a need to reduce structured and engineered channelization of stormwater, and increase the use of more natural soft paths (vegetated pathways) throughout the watershed.

c) The County needs to require development and redevelopment projects to be designed to minimize stormwater runoff and migration of contaminants from the project site.

➢ Strategies

Reduce sediment, nutrient, and chemical sources of nonpoint source pollution.

a) Improve road maintenance to reduce erosion and sedimentation: Follow the Bay Area Stormwater Management Agencies Association best management practices for road maintenance. Utilize youth groups like the Marin Conservation Corps to work on unpaved road maintenance efforts to decrease runoff and sedimentation. Utilize the National Resource Conservation District and the National Park Service as resources for education and funding for maintaining unpaved roads and minimizing sedimentation. Require open space land management agencies to adopt a formal inspection and maintenance program for culverts draining from open space to roadways or private or public property.

b) Integrate the best management practices developed by the Natural Resources Conservation Service and the Marin Coastal Watershed Enhancement Project for nonpoint source pollution related to ranching.

c) Educate homeowners about toxicity issues related to pesticide use. Educate the public on pesticides—that contaminated runoff is generated and concentrated over impervious surfaces in the urbanized portions of the watersheds and enters storm drains, eventually reaching creeks in San Rafael and San Pablo Bay.

d) Train County staff about new designs for the prevention of nonpoint source pollution runoff.

e) Implement “watershed management approaches” to manage nonpoint source pollution, including pesticides.

f) Where appropriate, encourage materials such as Road Oyl Resin Modified Emulsion as a nontoxic, biodegradable, impervious alternative to driveways and pathways that should be used in conjunction with design features that divert water for irrigating landscaping or gardens on site.

g) Develop policies prohibiting use of hazardous chemicals in or near stream channels.

Improve location, installation, and maintenance of septic systems to reduce pathogen contamination of water bodies.

a) To ensure appropriate protection of public health, water quality, and the environment, locate septic systems at a safe distance from drinking water wells, surface and groundwater sources, and mariculture areas.

b) Locate septic tanks as far away as possible from wetlands and creeks.

c) Design and repair septic systems so as to avoid adverse impacts to wetlands, creeks (including seasonal, intermittent, and ephemeral), and their associated floodplains.

d) Improve management and maintenance of septic systems. The highest priority should be given to improving the management and maintenance of septic systems that have the greatest potential for impact to public health, water quality, and the environment.

e) Promote local and community involvement in the community outreach, technical assistance, and management and maintenance programs for septic systems.

f) Use existing monitoring data to determine if septic systems may be contributing pollution to a creek or water body. Additional monitoring should be conducted to evaluate surface water and groundwater impacts associated with septics. Track appropriate Health Department surveillance data for waterborne diseases.

g) Measure fecal coliform counts from humans and animals to determine impact on water quality.

h) Research and, if feasible, develop strategies for composting sewage.

Research alternative waste systems to help reduce the pressure on existing septic systems.

a) Conduct further studies on allowing alternative wastewater systems such as graywater systems and/or composting toilets.

b) Support application of septic bio-solids on agricultural lands where it is demonstrated that no additional growth or adverse environmental impacts will arise from such application and where they are demonstrated to have a neutral or beneficial effect on operation of agricultural lands.

c) Promote use of alternative technologies and community systems, where consistent with local zoning and public health protection, to improve operation of septic systems.

d) Experiment with the use of new wastewater technologies to understand feasibility and incrementally develop wastewater regulations as appropriate.

Work with the State and Regional Water Quality Control boards to address Total Maximum Daily Load issues in impaired watersheds.

a) Develop policies that are congruent with the state's standards for Total Maximum Daily Loads (TMDLs). Identify sources of pollution and develop strategies for best management.

b) Conduct a community-based water sampling program for recreational waters where creeks meet recreational swimming areas to determine the level of pollution and to meet state standards.

Improve regulations regarding runoff from new developments.

a) Better regulate runoff from new developments: Require development projects to minimize stormwater runoff and migration of contaminants from the project site. Integrate Start at the Source stormwater control principles into the County Development Code. Require 50 percent or greater of stormwater runoff to be diverted for new developments.

b) Where appropriate, encourage the use of natural soft paths (vegetated pathways) throughout the watershed to help restore natural stream and drainage patterns.

c) Develop policies to limit the amount of paved parking areas to reduce runoff into Tomales Bay.

➢ Sample indicators

a) Measure the performance rates of septic systems (Environmental Health Services).

b) Measure TMDLs for targeted pollutants in Marin County waterways (Environmental Protection Agency and the Regional Water Quality Control Board).

c) Measure the number of linear miles of erosion control efforts applied on unneeded fire protection roads or trails annually.

➢ Sample targets

a) Ensure that 95 percent of septic systems function at a high performance level by 2010.

b) Meet TMDL targets set by the State and Regional Water Quality Control boards in Marin County within established timeframes.

c) Apply erosion control efforts on at least three linear miles of unneeded fire protection roads or trails annually.

3. Air Quality

(See also III. The Built Environment, A. Transportation.)

➢ Issues

On-road motor vehicles, heating fuels, and exhaust fumes from businesses are the leading causes of air pollution in Marin.

a) Seventy-three percent of carbon monoxide, 66 percent of nitrogen dioxide, and 49 percent of reactive organic sources (smog) are produced by motor vehicles.

b) Forty percent of vehicle trips in Marin are two miles or less, which creates condensed pockets of air pollution.

c) Eighty-six percent of particulate matter comes from areawide sources, such as the combustion of wood and other nonclean fuels, and is also due to the absence of catalytic converters or other emission-control devices on residential chimneys or exhaust fumes from businesses.

d) Housing located close to highways and transit is also close to sources of air pollution.

Odors pose an air quality problem.

a) Odors are a harmful form of air pollution for people with environmental illnesses.

➢ Strategies

Develop cleaner alternative sources of energy.

a) Develop solar, wind, geothermal, vegetable biodiesel, and mini-hydroelectric production, with support from local, regional, and federal agencies.

Reduce air pollutants from heating sources and vehicles.

a) Adopt an ordinance limiting the installation of wood-burning appliances in new homes, or in renovations of existing homes that involve a fireplace, to pellet stoves, EPA-certified woodstoves, fireplace inserts, or natural gas fireplaces. Research how European wood burning stoves have internal baffles that reduce pollutants.

b) Replace retiring County fleet vehicles with low emission and alternative fuel vehicles.

Address odors through policy development.

a) Adopt policies and implementation measures addressing odors as an air quality problem.

➢ Sample indicators

a) Measure levels of ozone, particulate matter, carbon monoxide, nitrogen dioxide, reactive organic sources, and particulate matter (PM-10) (California Air Resources Board).

b) Measure the number of County fleet low emission vehicles (Department of Public Works).

➢ Sample targets

a) Reduce levels of ozone, particulate matter, carbon monoxide, nitrogen dioxide, reactive organic sources, and particulate matter (PM-10) by 10 percent by 2020 over 2000 levels.

b) Increase the number of low emission vehicles in the Marin County fleet by 20 percent by 2010 over 2000 levels.

4. Noise

➢ Issues

Vehicle traffic is the primary source of noise in Marin County.

a) Highest noise levels continue to be located along highways and major streets.

b) Noise will continue to be an important factor in the planning process as pressure increases to develop properties exposed to high noise levels and noisy activities occur near noise-sensitive receptors.

c) Truck traffic from the San Rafael Rock Quarry produces significant stationary noise for residences on San Pedro Road, which can reach 70 decibels at the A-weighted sound level (dBA). The day/night average noise level is about 49 dBA (Illingworth & Rodkin).

Flyover noise from aircraft is disturbing to some Marin residents.

a) The noise information for Gnoss Field and the Sausalito heliport needs to be updated.

b) Commercial aircraft overflight noise over Marin County exceeds the allowed 65 decibels (dB) community noise equivalent levels (CNEL) and reaches 70 dBA in Tiburon, Bolinas, and Point Reyes (Illingworth & Rodkin).

➢ Strategies

Develop guidelines, policies, and ordinances, to address noise issues.

a) Determine whether a "quiet areas" policy is needed for certain community areas (such as near sensitive animal species or retreats).

b) Define and designate quiet areas in the county and develop guidelines for implementation.

c) Consider adopting a quantitative noise ordinance, which would apply to existing noise sources in the county.

d) Develop an aircraft flyover policy to be used as a basis for discussion with the Airport Land Use Commission.

Research methods to reduce noise pollution.

a) Examine the effectiveness of sound walls, since it is not clear whether they increase or decrease noise. The County lacks an ordinance to set parameters for sound walls.

b) Continue to work with federal agencies on the issue of noise from the overflights of jet aircraft taking off and landing at the Oakland and San Francisco airports.

c) Continue to protect residential areas from excessive noise impacts from quarries and mobile noise sources.

d) Research any jurisdictions that address noise control of boom boxes, car stereos, and motorcycle use and determine applicability to Marin.

➢ Sample indicators

a) Measure noise levels that account for automobile commuting, aircraft overflight, and rock quarry truck traffic along high traffic areas and in sensitive noise receptor areas.

➢ Sample targets

a) Improve noise levels by 2 dBA in at least one sensitive noise receptor area annually.

5. Mineral Resources

➢ Issues

Evaluation of Marin County quarries is needed.

a) The quantity of rock remaining in quarries is unknown.

b) The adequacy of reclamation plans and acceptable land uses around quarries need to be evaluated.

c) Four of the six potential mineral resource sites in the county are located in unincorporated areas (Snyder and Smith Associates).

➢ Strategies

Evaluate Marin County quarries and potential quarry sites.

a) Evaluate the amount of the resource left in quarries, and evaluate the adequacy of reclamation plans and acceptable land use around quarries.

b) Establish a new overlay zoning designation for mineral resource sites to prohibit new land uses that would preclude eventual extraction of the mineral resource. Evaluate land uses around quarries for acceptable use.

c) Evaluate quarry locations and their effect on surrounding land uses to determine if current operations are appropriately located.

➢ Sample indicators

a) Measure the amount of mined lands reclaimed for other purposes (Marin County Department of Public Works).

➢ Sample targets

a) All quarry operations will be in compliance with reclamation plan requirements by 2005.

6. Energy

(See also III. The Built Environment, B. Energy, and IV. The Economy, Equity, and Culture, B. Energy.)

➢ Issues

Obstacles to development of nonpolluting renewable energy sources need to be overcome.

a) Height, noise, and neighbor perceptions have limited the installation of wind energy systems in many communities, especially urban ones. Improvements have been made to reduce noise and reduce the size needed to generate significant power. However, public perception of wind turbine aesthetics and concerns regarding bird collisions still remain issues.

b) There is a need for wind data within Marin to determine the feasibility of wind energy.

c) Cost, impacts on wildlife (especially salmon), and generation capacity are issues that need to be researched by the Marin Municipal Water District (MMWD) to determine the feasibility of using hydroelectric turbines at the lakes of Marin.

d) Opportunities for geothermal heating of buildings exist in Marin County. Geothermal issues include possible groundwater contamination, site disturbance, and high initial cost.

e) Data on solar insulation in Marin microclimates is needed to determine feasibility of harnessing in different locations.

➢ Strategies

Research nonpolluting renewable energy sources and educate the public about their application.

a) Map high wind velocity areas and investigate the feasibility of using wind to generate energy.

b) Research and map the various microclimates of Marin to determine the feasibility of solar energy in various locations. Target the best microclimates for publicity to encourage the use of solar energy.

c) Consider using existing dams on lakes to generate hydroelectric energy.

d) Encourage the use of methane digesters for agricultural energy needs through education, publicity, and subsidies.

e) Investigate the feasibility of using geothermal heating for buildings in Marin by preparing estimates for installation and operating expenses of such systems.

f) Encourage continued energy and water conservation programs by the water companies.

g) Encourage efficient farming techniques by providing information to farmers on the latest technological advances that enhance energy efficiency.

Increase the use of renewable energy to decrease fossil fuel dependence.

a) Increase the use of renewable energy, such as methane-powered processing facilities, solar energy, and wind energy, which are cost effective as well as reliable energy sources.

b) Use state and federal incentives to install solar, wind, and methane energy generation systems.

➢ Sample indicators

a) Measure the number and output of photovoltaic (solar electric) and solar thermal systems (Marin County Community Development Agency and other Marin cities' building divisions).

b) Measure the size and number of Wind Energy Conversion Systems (Marin County Community Development Agency and other Marin cities' Building Divisions).

➢ Sample targets

a) 2.5 MW of solar power are in use by 2010.

b) 200 KW of wind energy are in use by 2010.

B. ENVIRONMENTAL HAZARDS

➢ Background and trends

Environmental hazards in Marin County include flooding, seismic hazards, geologic hazards, fire, hazardous materials, and global warming. While some of these hazards occur naturally, human effects on the environment have affected their frequency and severity.

Flooding, which generally occurs when rainfall exceeds the capacity of a storm drain, stream, or watershed to move water downstream, can be exacerbated when high tides coincide with high rainfall events. Increases in impermeable surfaces, building in floodplains, and alteration of natural drainage patterns have increased the frequency and severity of flood events. Coupled with increases in sea level due to global warming, flooding is predicted to increase in the future.

The San Andreas and Hayward-Rodgers Creek fault systems are the two faults in the county with the greatest likelihood of seismic activity. The Working Group of California Probabilities (WG99) has predicted 21 percent and 32 percent probabilities, respectively, for an earthquake of magnitude 6.7 or greater on the Richter scale to occur by 2003 (Snyder and Smith Associates).

Landslide and slope stability hazards are prevalent throughout Marin County because of existing adverse geologic conditions. Collapsible soils are generally located in the low-lying flatland deposits in valley basins and along bays, while expansive soils are responsible for a large amount of slope failure in upland areas (Snyder and Smith Associates). In the western part of the County, surface deposits in and adjacent to the San Andreas Fault zone pose significant geologic hazards, including liquefaction potential, shaking amplification potential, subsidence and differential settlement, and shallow slope failures. Ongoing active erosion processes cause bluff erosion and landsliding along the coast (Snyder and Smith Associates).

Fire has become a greater hazard in Marin County as fuel loads have increased due to suppression of natural fires and as residential development has encroached on the edge of wildlands. The City-Centered Corridor is a high-risk area because there is a strong correlation between population density, travel corridors, and ignition density. This Corridor had the most fires reported between 1990 and 1997. However, the response times in these areas are good—primarily five minutes or less, with some areas eight minutes or less (Marin County Fire Department).

Risks from hazardous materials are greatest in the Inland Rural Corridor due to transportation through this area and because of a higher concentration of regulated hazardous material businesses than in more rural parts of the county. Although pesticide pollution has recently been detected in local water bodies, the quantity of pesticides used in Marin County has decreased over the past decade.

Increased temperatures due to global warming pose a worldwide threat to many species and environments.

Sea level is rising. The Bay Conservation and Development Commission has studied the global sea level rise caused by global warming along the San Francisco Bay. It is estimated that along the City-Centered Corridor at the Point Orient gauging station, the water level will increase from a 1986 elevation of +0.40 feet to +0.86 feet National Geodetic Vertical Datum (NGVD) in 2036. Similarly, the mean sea level at the Sausalito gauging station is estimated to rise from +0.30 feet to +0.48 feet NGVD in 2036. For the Presidio gauge, the mean sea level is predicted to increase from +0.29 feet to +0.65 feet NGVD in 2036 (Clearwater Hydrology).

Fire fuel loads are increasing. Vegetation is the fuel that feeds a wildfire. Due to the aggressive fire suppression policies during the last 50 years in America, fuel loads have been allowed to accumulate to dangerous proportions (Marin County Fire Department). This situation is exacerbated by the effects of Sudden Oak Death which has created a large amount of dead and dying vegetation that could increase the number and intensity of wild fires.

Global warming is increasing. Human-related activities such as transportation and energy production are increasing the amounts and concentrations of greenhouse gases (carbon dioxide, methane, nitrous oxide) contributing to global warming. Global surface temperatures have increased about 1.1°F since the late 19th century, and about 0.5°F over the past 25 years. The 20th century's 10 warmest years all occurred in the last 15 years of the century. Of these, 1998 was the warmest year on record. Scientists expect that the average global surface temperature could rise 1 to 4.5°F in the next 50 years, and 2.2 to 10°F in the next century, with significant regional variation. The difference in temperature between 1995 and the ice ages is 5 to 8°F.

1. Flooding

➢ Issues

Flooding in low-lying areas causes property damage and poses safety risks.

a) Significant flooding has occurred in portions of Corte Madera, Larkspur, Greenbrae, Ross, San Anselmo, San Rafael, and Novato over the last 30 years (Clearwater Hydrology). Flooding has also occurred in Mill Valley, Fairfax, and Muir Beach.

b) The risk of loss of life and extensive property damage is significant in inundated valleys downstream from major dam/reservoir complexes.

c) Significant, even catastrophic flooding can occur in valley areas downstream of major dams in the event of a complete or partial dam failure (Map II-4).

d) The rise in sea level due to global warming is expected to increase the frequency and severity of flooding.

e) The National Oceanic and Atmospheric Administration's Climate Prediction Center forecasts that El Niño conditions are likely to continue through the end of 2002 and into early 2003, resulting in an increased probability of flooding in relation to other non–El Niño/La Niña weather pattern years.

f) In some cases, the master plan level of flood protection does not equal that of the 100-year flood (Clearwater Hydrology).

g) Funding for levee reconstruction in the Santa Venetia area and financing options for the County Flood Control Zone are needed.

Traditional flood control practices can degrade biotic resources.

a) A nonstructural watershed-wide approach to stormwater and flood control management needs to occur in Marin County. This approach allows increased infiltration and groundwater recharge to occur and provides benefits to the ecosystem.

➢ Strategies

Address development impacts to reduce flooding.

a) Strengthen policies to discourage development in secondary floodplains.

b) Further consider impacts on 100-year floodplains in making land use development decisions.

c) Consider pursuing federal funding for levee reconstruction in the Santa Venetia area and a revenue-sharing program or other financing options for the County Flood Control Zone.

Improve water infiltration to reduce flooding.

a) Decrease the amount of non-permeable surfaces in new developments.

b) Improve drainage patterns by using contour ditches and other techniques to spread water flow and decrease velocity.

c) Increase water infiltration starting in the upper reaches of watersheds so that groundwater recharge is enhanced throughout the watershed.

Bioengineering and nonstructural techniques should be used whenever possible to minimize damage to streams and riparian habitats.

a) Examine the County's traditional engineering design and maintenance programs for flood control of streams, and develop and implement alternatives that involve hydrologic restoration of streams and their associated biotic habitats.

b) Implement nonstructural techniques to complete the flood control project for Corte Madera Creek.

Use mapping as a tool to assess potential flooding.

a) Conduct and review dam inundation mapping for the most significant dam/reservoir complexes where downstream valleys are inhabited and the risk of loss of life and extensive property damage is significant.

b) Conduct GIS mapping on the estimates for mean sea level rise due to global warming using the range of 0.005 to 0.05 feet per year and cross-referenced to zoning maps to ensure that future development will consider the water rise. This may require flood modeling based on an updated survey of watershed channel conditions and levee elevations to quantify the effects of sea level rise.

c) Address techniques used to generate all Office of Emergency Services and Community Development Agency threat maps to ensure that maps are updated using the most current data.

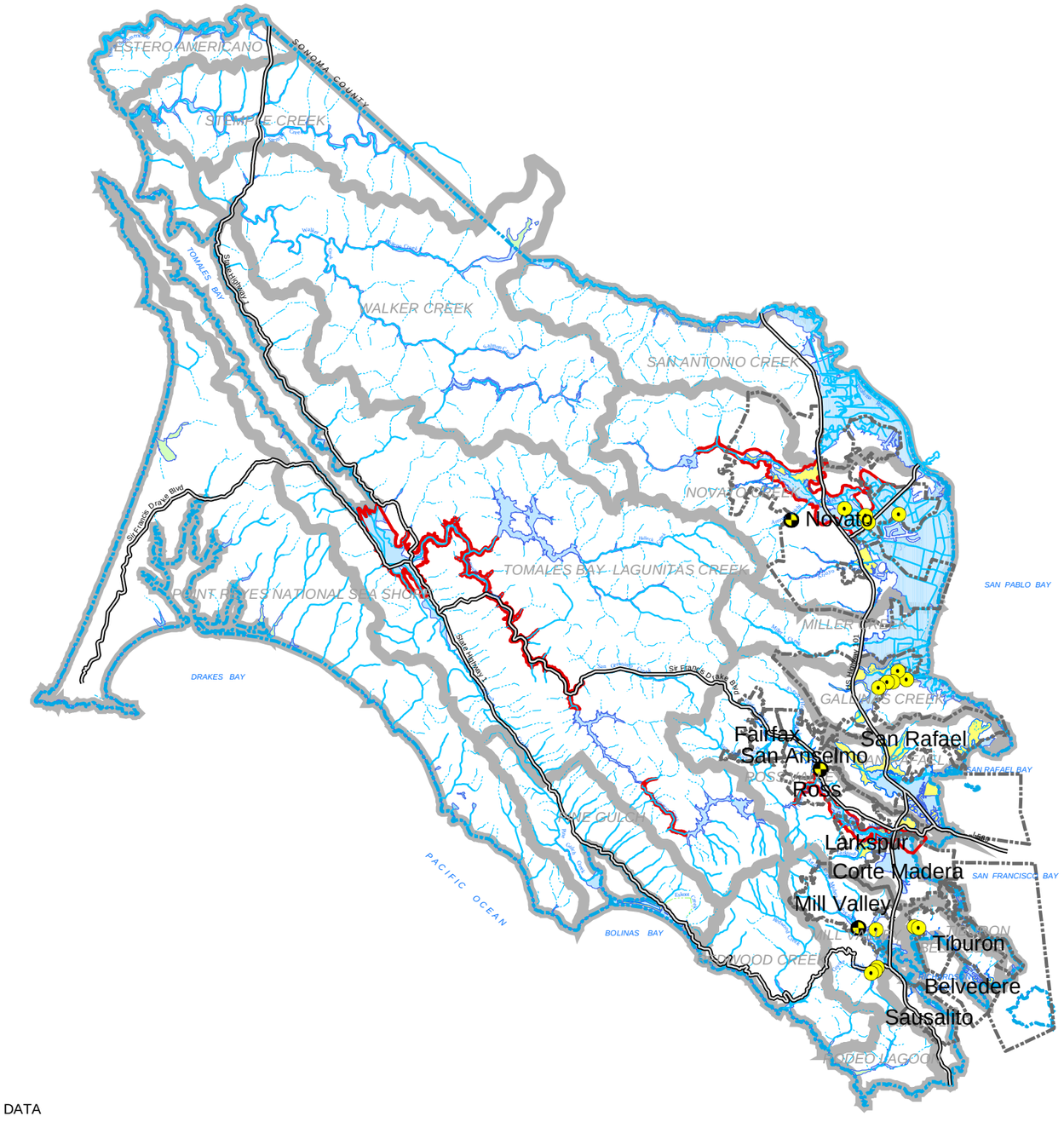
➢ Sample indicators

a) Measure the number and severity of property damage and personal injury incidents due to flooding.

➢ Sample targets

a) Incidences of property damage and personal injuries due to flooding are decreased by 10 percent by 2020.

MAP II-4
FLOODING



Legend

- County Boundary
- City Boundary
- Highways and Major Roads

Streams

- Perennial
- Intermittent
- Ephemeral

Water Bodies

- Lakes
- Lagoons

- Dam Inundation
- Major Watersheds
- MILLER CREEK Watershed Names
- Stream Gauge
- Stormwater Pump Station

Floodplain Zones

- Area of 100 Year Flood
- Areas Between Limits of the 100 Year and the 500 Year Flood

N

0 1 2 4 6 8 Miles

SOURCE: NATIONAL FLOOD INSURANCE PROGRAM Q3 FLOOD DATA

2. Seismic Hazards

(See also A. Environmental Quality, 1. Native Species and Habitat Protection.)

➢ Issues

Marin coastlines are located in the active San Andreas Fault "A", an active tsunami-producing region of the world.

a) Use maps of "Known Active Fault Near-Source Zones" prepared by the California Department of Conservation in coastal planning and development to avoid high-risk areas.

b) Use tsunami wave run-up and inundation maps in coastal planning and development to avoid high-risk areas.

Building code standards and FEMA guidelines for seismic safety need to be reviewed.

a) Standards in the California Building Code and FEMA guidelines related to seismic safety related to seismic safety need to be addressed in the design of new buildings and seismic retrofits of existing structures.

➢ Strategies

Increase public awareness to reduce the risk of damage or injury from seismic hazards.

a) Conduct a public safety outreach program before and after a seismic event and provide evaluation forms to collect public input.

b) Develop local initiatives for earthquake preparedness.

c) Install and test communication systems for tsunami warnings.

Upgrade structures to reduce the risk of damage or injury from seismic hazards.

a) A risk reduction program would encourage upgrading of seismically vulnerable buildings located in geologically hazardous areas. Encourage upgrading of seismically vulnerable buildings located in geologically hazardous areas by using a risk reduction program.

b) Establish a residential seismic retrofitting incentive program similar to the City of Berkeley's.

c) Conduct a study to evaluate seismic stability of the County's key structures.

d) Require seismic retrofits and strapping down of water heaters when remodeling existing structures.

e) Require seismic retrofits for any non-reinforced masonry buildings and chimneys.

f) Require automatic natural gas shut-off valves at time of sale or major remodel.

g) Encourage the North Marin Water District to do seismic upgrades.

h) Use disaster mitigation measures such as fire resistant roofs, fire resistant landscaping within a minimum of 30 feet from the structure, emergency vehicle access, and earthquake retrofit.

Improve land use planning to reduce the risk of damage or injury from seismic hazards.

a) Strengthen land use policies to prevent development in tsunami zones.

b) Map and utilize tsunami zone maps in land use planning decisions.

c) Base policies for addressing development near geologically sensitive areas on the Fault Hazards map (Map II-5).

d) Focus on disaster prevention within the development and building code—require geotechnical studies for all new projects near earthquake faults and liquefaction zones.

e) Waive building permit fees and property taxes for seismic retrofits.

➢ Sample indicators

a) Measure the number of public events or initiatives conducted to increase public awareness to reduce the risk of damage or injury from seismic hazards.

b) Measure the number of County buildings that have been assessed for seismic stability.

c) Measure the number of natural gas shut-off valves installed at time of sale or major remodel.

d) Assess the number of measures taken to reduce the risk of damage or injury from seismic hazards.

➢ Sample targets

a) Increase the number of public events or initiatives conducted to build public awareness to reduce the risk of damage or injury from seismic hazards by 20 percent by 2020.

b) Increase the number of measures taken to reduce the risk of damage or injury from seismic hazards by 20 percent by 2020.

3. Geologic Hazards and Landslides

➢ Issues

Landslide and slope stability hazards are prevalent throughout Marin County because of existing adverse geologic conditions.

a) Because much of Marin's easily developable land is either already developed or protected from development, sites with development constraints such as landslide and slope stability issues are increasingly being proposed for development.

b) A hillside safety and hazard mitigation program is needed for the hilly "marginal" areas within the county.

c) The potential threat of a significant number of failures occurring at the same time is great during strong seismic shaking or during intense rainfall events.

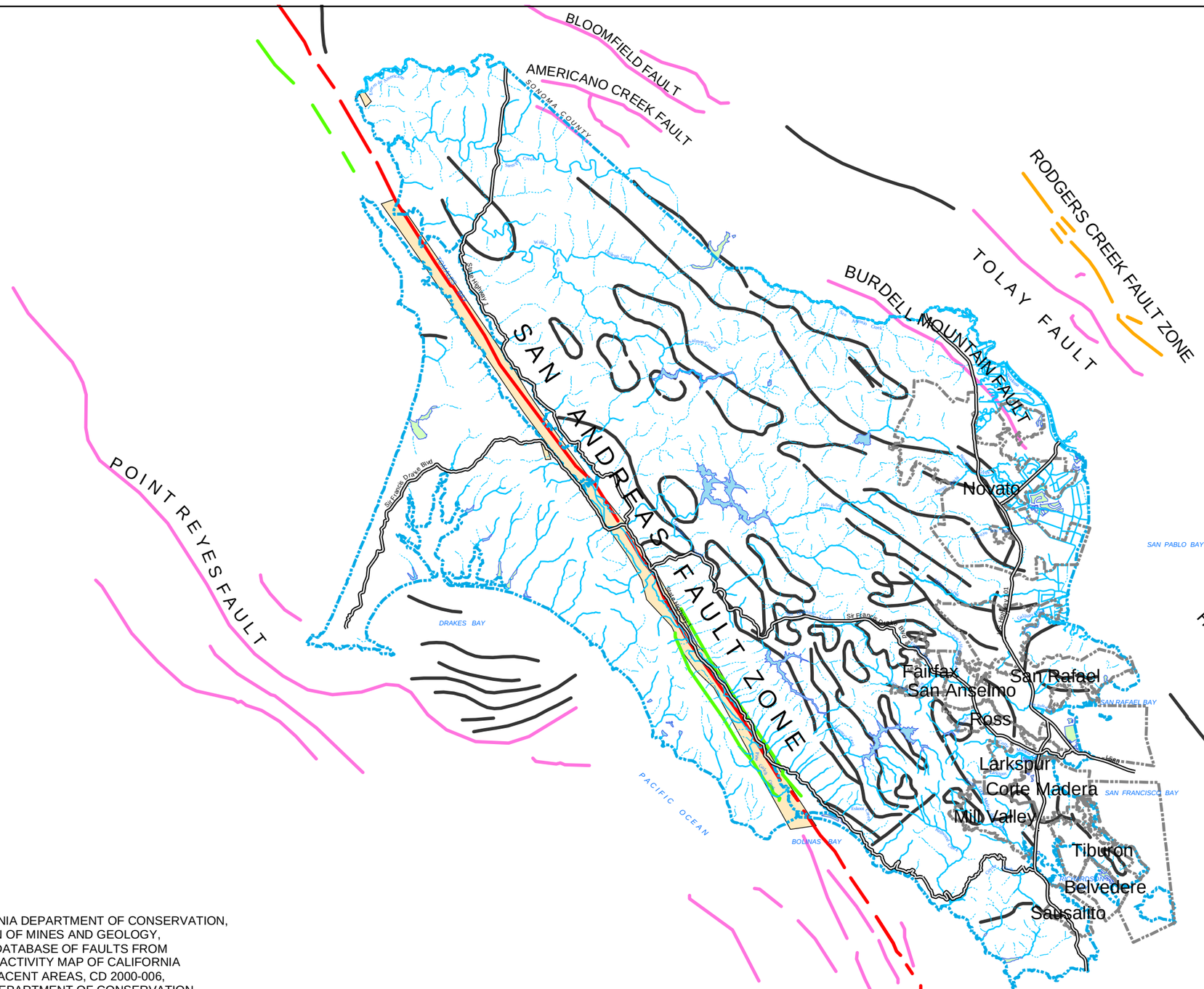
Landslide and slope stability building standards need to be reviewed.

a) The County should modify existing policies and programs to address expansive soils which are responsible for a large amount of superficial creep and slope failure in upland areas.

b) Coastal bluff erosion and coastal landslide hazards need to be addressed.

c) The County does not require both a geotechnical engineer and a certified engineering geologist to perform slope stability investigation, analysis, and monitoring of construction activities.

MAP II-5
FAULT HAZARDS



Legend

- County Boundary
- City Boundary
- Highways and Major Roads

Streams

- Perennial
- Intermittent

Water Bodies

- Lakes
- Lagoons

- Alquist Priolo Zone
- Historic (200 yrs to today)
- Holocene (10,000 yrs to today)
- Late Quaternary (700,000 yrs to today)
- Quaternary (1,600,000 yrs to today)
- Pre-Quaternary (4.5 billion to 1,600,000 yrs ago)

N

0 1 2 4 6 8 Miles

SOURCE: CALIFORNIA DEPARTMENT OF CONSERVATION,
DIVISION OF MINES AND GEOLOGY,
DIGITAL DATABASE OF FAULTS FROM
THE FAULT ACTIVITY MAP OF CALIFORNIA
AND ADJACENT AREAS, CD 2000-006,
CALIFORNIA DEPARTMENT OF CONSERVATION,
DIVISION OF MINES AND GEOLOGY, 2000

➢ Strategies

Carefully review new development in geologically hazardous areas.

a) Use current data to reevaluate the landslide hazard area definition and to update information and policies as necessary.

b) Include in Marin County's geographic information system (GIS) database new, additional, or updated information on geology and geologic hazards. Plotting historical and future landslide and slope stability areas would help determine if there is a trend for future policy decisions.

c) Use U.S. Geological Survey (USGS) landslide maps and slope stability maps to determine locations of future development.

d) Allow only structurally sound redevelopment or additions on liquefaction zones, and prohibit new development on liquefaction zones (Map II-6).

e) Recognize the possible incompetence of the underlying serpentine rock to support structures, and require a thorough geologic and soils analysis of any serpentine site proposed for development.

Improve building standards and policies to reduce risks from geologic hazards.

a) Review the County's grading policies, regulations, and enforcement to ensure that they are properly mitigating hazards. These policies and procedures are the core of hillside safety and a hazard mitigation program.

b) Reevaluate hillside policies regarding geology as necessary to improve hillside safety and hazard prevention measures.

c) Strengthen polices that discourage building on extreme slopes. Have County staff review regulations to ensure that the spirit or intent of state and federal regulations is being implemented.

d) Apply coastal zone steep slope protection policies countywide.

➢ Sample indicators

a) Measure the number of incidents and severity of property damage and personal injuries resulting from landslides.

➢ Sample targets

a) Incidences of property damage and personal injury resulting from landslides are reduced by 10 percent by 2020.

4. Fire Hazards

(See also A. Environmental Quality, 1. Native Species and Habitat Protection, and 2. Water Quality.)

➢ Issues

Development at the wildland-urban interface introduces fire to areas with high fuel loading.

a) Marin County has numerous structures located within the wildland-urban interface. Homes with wood siding, wood decks, and wood shingled roofs are at extreme risk from a wildland fire.

b) The primary causes of fire between 1990 and 1997 were equipment use, arson, playing with fire, smoking, and burning of debris.

c) Steep slopes and narrow roads pose hazards to fighting fires at the wildland-urban interface.

d) Homes surrounded by trees and brush increase the threat of ignition and difficulty fighting fires.

e) Coast live oaks and tanbark oaks that have died from SOD increase the fuel load.

Wildfires can cause severe economic losses.

a) Fire costs can soar to millions of dollars a day from suppression cost, destruction of homes, loss of home-based businesses, damage to utilities, and impacts on recreation areas.

➢ Strategies

Undertake cooperative fire preparedness and prevention planning.

a) Develop a cooperative wildland fire evacuation plan for residents involving cities, County Office of Emergency Services, State and Federal agencies, and special districts. This plan should also recognize the potential for catastrophic landslides in years following a fire due to soil instability.

b) Organize stakeholders through FIRESafe Marin to identify the hazards, design mitigation strategies, and seek funding from unconventional sources for fire prevention.

c) Determine critical fire areas so that prevention efforts can be focused.

d) Increase fire preparedness in the Mount Tamalpais area. Support fire engineering, code enforcement, staff training, and public education as the main components of fire prevention.

e) Encourage the Community Development Agency to collaborate with the County Fire Department to educate the public on the causes of fire and provide prevention information.

f) Prepare a countywide tactical plan that would divide the county into pre-identified zones in conjunction with the existing County Master Mutual Aid Plan. The zones need to be mapped, and firefighting considerations need to be identified. Considerations such as water sources, safety zones, access, and assets at risk need to be included for each zone. Suppression strategies need to be addressed based on assets protected and resource management goals.

g) Support and implement the California Fire Plan.

Implement the Marin County Fire Management Plan.

a) Reduce the frequency, severity, and size of wildfires through fuel reduction and fuel breaks, ignition management, and fire safe engineering activities.

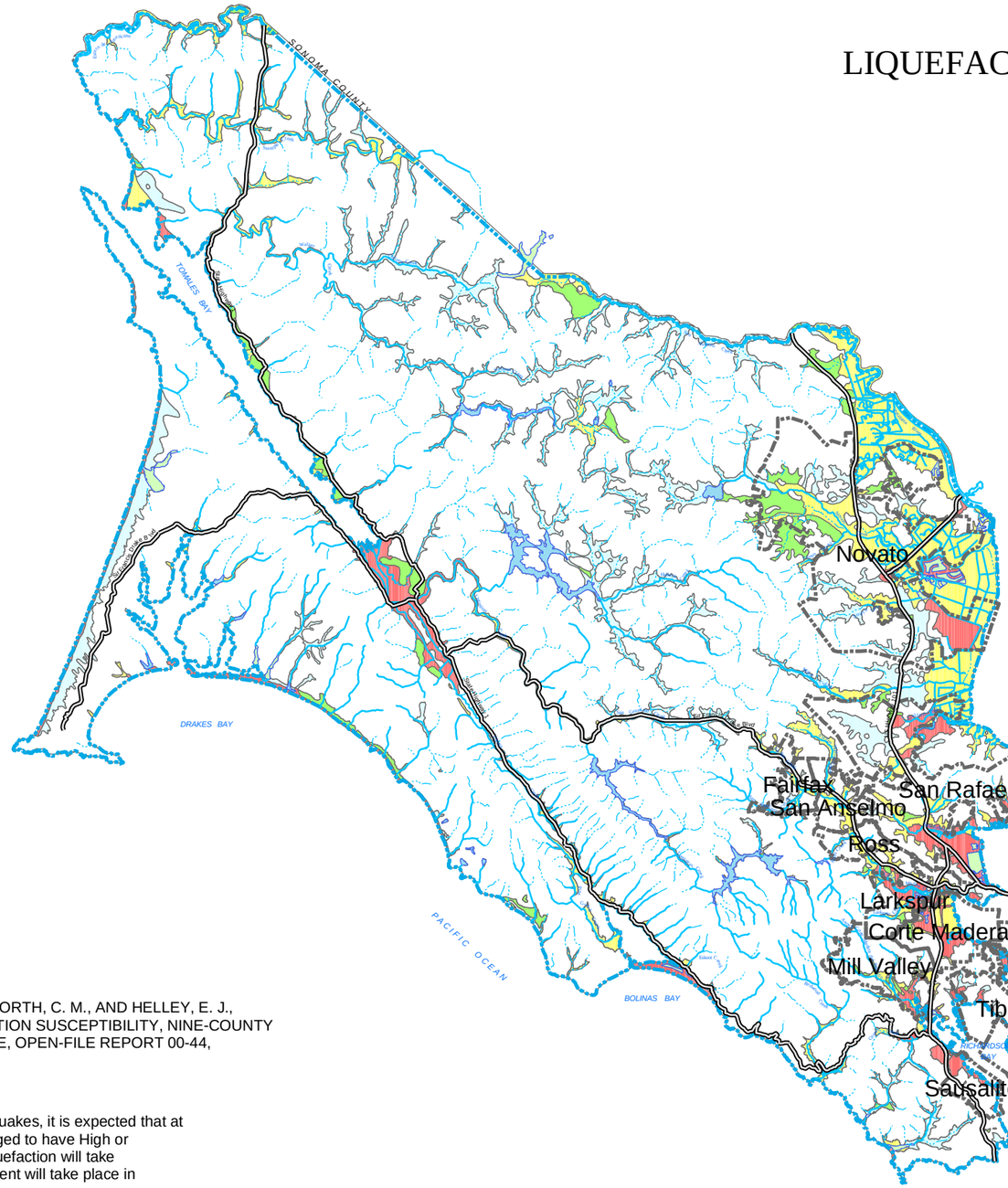
Reduce fire fuels through vegetation management.

a) Undertake cooperative vegetation management planning on both public and private lands involving cities, County, state, and federal agencies, and special districts.

b) Support controlled burns to reduce fire risk.

c) Update the Strategic Vegetation Management Plan. Expand this plan with a list of prioritized projects and an implementation plan.

MAP II-6
LIQUEFACTION SUSCEPTIBILITY HAZARDS



Legend

- County Boundary
- City Boundary
- Highways and Major Roads

Streams

- Perennial
- Intermittent

Water Bodies

- Lakes
- Lagoons

Level of Liquefaction Susceptibility*

- Very High
- High
- Moderate
- Low
- Very Low

N

0 1 2 4 6 8 Miles

SOURCE: KNUDSON, K. L., SOWERS, J. M., WITTER, R. C., WENTWORTH, C. M., AND HELLEY, E. J., PRELIMINARY MAPS OF QUATERNARY DEPOSITS AND LIQUEFACTION SUSCEPTIBILITY, NINE-COUNTY SAN FRANCISCO BAY REGION, CALIFORNIA: A DIGITAL DATABASE, OPEN-FILE REPORT 00-44, ONLINE VERSION 1.0, U.S. GEOLOGICAL SURVEY, 2000.

*On the basis of the liquefaction failures that occurred during past earthquakes, it is expected that at least 80 percent of future liquefaction failures will take place in areas judged to have High or Very High susceptibilites. We expect that 20 percent or less of future liquefaction will take place in areas judged to be Moderate and Low, and that less than 1 percent will take place in areas judged Very Low (Knudson et al., 2000).

d) Promote manual brush removal and grazing to reduce fuel load. Encourage vegetation reduction programs for buildings adjacent to heavily vegetated property.

Limit and/or condition development at the urban-wildland interface to reduce fire risk.

a) In view of the high potential for wildfire at the urban-wildland interface, restrict the introduction of further development into areas of chaparral, for the safety of present and future residents.

b) Encourage use of fire-resistant landscaping.

c) Create defensible space around structures on the urban interface.

d) Promote replacement and educate the public about the purposes of fire safe roofing.

Improve infrastructure for firefighting.

a) Create escape routes, widen roads, and develop better infrastructure for firefighting.

➢ Sample indicators

a) Measure the number of buildings damaged by structural fire (Marin County Fire Department).

b) Account for acres of land that have had controlled burns (Marin County Fire Department).

➢ Sample targets

a) Decrease structural fire damage by 10 percent by 2010 over 2000 levels.

b) Increase controlled burns for fuel load reduction and habitat enhancement by 20 percent by 2010 over 2000 levels.

5. Hazardous Materials

➢ Issues

Hazardous materials are concentrated in populous areas where they pose the greatest risk to human health.

a) The City-Centered Corridor is considered most susceptible to public health concerns and environmental degradation caused by long-term conditions and by secondary disasters. This corridor has the greatest concentration of people and industry in the county.

b) The Inland Rural Corridor has one of the greatest risks for hazardous material releases in Marin County from transportation of hazardous materials because response times would be great, sensitive environmental receptors are abundant, and many roads are narrow and twisting.

c) More than 500 Marin County businesses are regulated hazardous material businesses (Snyder and Smith Associates).

d) Coordination with the cities is needed to prevent placement of hazardous materials near sensitive receptors, such as schools, hospitals, high occupancy buildings, or nursing homes, particularly as mixed-use development increases.

e) Specific regulations are needed for development of land on or adjacent to a known solid or hazardous waste site.

f) There needs to be planning for a major multirelease of hazardous materials and how this emergency will be safely addressed.

➢ Strategies

Reduce human exposure to hazardous materials.

a) Adopt a precautionary principle ordinance like one adopted in the city of San Francisco.

b) Develop and implement a policy to reduce or eliminate the use of hazardous materials in County buildings, on County property, and in County operations that contain hazardous components.

c) Provide incentives to use ecologically friendly products.

d) Review proposed developments for their proximity to hazards including but not limited to high levels of electromagnetic radiation (EMR) and to electromagnetic frequency (EMF) rays, and information about EMR and EMF levels should be provided on request.

e) Develop a hazardous materials subsection for the Countywide Plan that includes policies and programs for reducing or eliminating hazardous and toxic materials.

➢ Sample indicators

a) Measure the number of toxic spills in Marin (CUPA).

b) Account for the number of businesses that use regulated hazardous materials (CUPA).

➢ Sample targets

a) Reduce toxic spills by 20 percent between 2002 and 2010.

b) Reduce the number of businesses that use regulated hazardous materials by 10 percent by 2010 over 2000 levels.

6. Global Warming

➢ Issues

Increased temperatures from global warming are expected to increase flooding and fire and to decrease air quality.

a) The EPA estimates that in 2100, with the absence of emission control policies, carbon dioxide concentrations are projected to be 30 to 150 percent higher than today's levels.

b) The EPA estimates that the sea level is likely to rise two feet along most of the U.S. coast by 2100. Sea level rise and higher evaporation rates will increase storm activity.

c) Wildland fires are increasing due to increased temperatures and droughts caused by global warming.

Global warming may have serious financial ramifications.

a) The global cost of natural disasters is anticipated to top $300 billion annually by the year 2050 if the likely impacts of climate change are not countered with aggressive disaster reduction measures.

Increased temperatures from global warming are expected to negatively affect biological resources.

a) Desalinization of the world's oceans due to the melting of polar ice caps could cause much sea life to die. Phytoplankton, the foundation of the ocean's food chain, is in jeopardy of mass die-off due to the decrease in salinity.

b) Accelerated desertification is associated with higher temperatures.

c) The Delta – an important food production area – may flood in the future due to global warming. This would seriously affect our food supply.

➢ Strategies

Recognize global warming as a serious issue for Marin County.

a) Recognize global warming as a trend in the Countywide Plan.

Become a national model for promoting positive climate change.

a) Set aggressive reduction targets for vehicle emissions

Increase public awareness and participation on the causes and impacts of global warming.

a) Set reduction targets for greenhouse gas emissions and implement a program to reduce emissions.

b) Use the International Council of Local Environmental Initiatives' Cities for Climate Protection Campaign to develop programs for reduction of the county's greenhouse gas emissions.

c) Develop and disseminate information on opportunities to reduce greenhouse gas emissions.

d) Continue gathering data from the United Nations and the EPA to determine the impact of global warming.

➢ Sample indicators

a) Monitor greenhouse gas emissions from energy, transportation, and waste (Marin County Community Development Agency).

➢ Sample targets

a) Reduce greenhouse gas emissions by 20 percent by 2020 over 2000 levels.

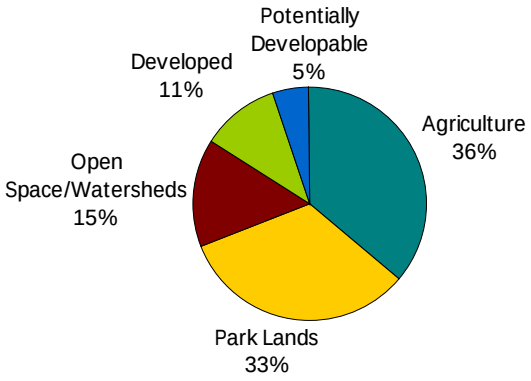
C. OPEN SPACE AND TRAILS, AND PARKS AND RECREATION

➢ Background and trends

Marin's public parks, open space and watershed lands provide recreational and scenic opportunities for the Bay Area and beyond. Marin County residents and visitors are fortunate to have access to nearly half of the county's land base as parks and open space. While parks allow for high intensity recreational uses, the primary function of open space lands is protection of natural resources with low intensity recreation as a secondary purpose. With the largest amount of public land in the nine-county Bay Area, Marin's 109,824 acres of park and open space and comprise 33 percent of the County's land base, while open space and watershed lands comprise another 15 percent (Figure II-5). Approximately 500 miles of trails allow access through much of this land (1994 Marin County Community Development Agency). City, county, state, and national parks offer varied recreational opportunities, from hiking through oak woodlands and redwood forests to playing soccer, golf, or baseball. In addition, open space lands protect important habitat from development and protect scenic viewsheds.

The ample and varied recreational opportunities available in Marin draw visitors from around the world, with more than 2.5 million annual visitors to Point Reyes National Seashore alone. These visitors support a $500 million per year tourism industry that includes 100 bed and breakfast inns just in West Marin (Point Reyes National Seashore).

Figure II-5
Marin County Land Uses



Source: 2001 Marin County Assessor

Travel spending in Marin has doubled in the past eight years. In 1992, travelers spent $275 million in Marin. This figure increased to $532 million by 2000. In addition, the number of jobs generated by travel during this period increased from 5,010 to 7,760, and related tax revenues nearly doubled from $18.7 million to $35 million.

1. Open Space and Trails

➢ Issues

A regional approach to open space management is needed.

a) As far as their respective missions and purposes allow, all public land management agencies in Marin should work toward a common vision for open space and trails.

b) There is increasing cooperation among agencies to manage open space. Policies should be encouraged and Memorandums of Understanding (MOUs) developed that strengthen this collaboration.

c) There is a need for a systems approach to land management decision making. For example, if a resource manager makes a decision for the Point Reyes National Seashore, the decision affects other surrounding areas and systems, and these consequences need to be considered.

Funding is needed for open space acquisitions.

a) Of all public land management agencies in Marin, the Open Space District is the most actively involved in land acquisition. In contrast to its earlier years in which the District could apply most of its locally generated annual property tax revenues toward land purchases, the Open Space District must now use nearly all of these funds for administering and maintaining its 14,000-acre open space system. Less than ten percent of the District's annual property tax revenues for each of the past ten years have been allocated for land purchases. Consequently, the Open Space District must rely heavily on grants or other sources to purchase open space. Many grants are available only on a competitive basis.

b) Increased land acquisition is needed to protect ecologically significant corridors, as well as unprotected ridge and upland greenbelt and community separator lands.

c) There are targeted open space lands identified in the 1994 Countywide Plan that still need to be acquired.

d) There should be an effort to preserve lands adjacent to water, particularly San Francisco Bay, the Pacific Ocean, and streams.

Stewardship is needed to ensure proper management of open space and trails.

a) Land stewardship activities need to have a high priority.

b) For many land management agencies including the Open Space District, annual budgets, even without allocating money for land purchases, cannot accommodate increased expenditures for stewardship. Grants for general land maintenance do not exist. Additional sources of funding are needed to ensure adequate stewardship of open space lands.

c) There is high use of open space in some areas and low use in other areas. Monitoring of high use areas, as well as maintenance and restoration plans, are needed to ensure ecological protection. A clear vision of environmental quality needs to be established for open space lands.

d) There is a need to develop data that indicates the performance of erosion control measures and vegetation management measures that are being used on open space, including fire management, invasive species management, and ecological restoration.

User conflicts on open space lands have increased.

a) There is a conflict between quality of experience and quantity of visitors.

b) Bicyclists want access to narrow trails, which some equestrians and hikers oppose because of concerns related to trail safety, trail user experience, and resource protection.

c) An increase in the number of commercial uses (such as organized hiking, kayaking groups, dog walking, and interpretive walks) raises concerns related to resource protection and the experience of other users.

d) There is an increased demand for "extreme" or individual sports, such as downhill skateboarding, BMX biking, and scooter riding on open space lands. These uses are generally incompatible.

e) Proposed land acquisitions and land management actions are increasingly scrutinized by neighbors concerned about parking, the number of people passing through neighborhoods, and user conflicts.

f) Open space areas, which were originally intended to serve local communities, are increasingly serving regional park needs, in part due to increased public awareness. Information about Marin's open space land is much more easily accessible by regional users due to technology and popular printed materials.

g) Increased user demand and community pressure are requiring increased land stewardship and enforcement of safety and resource protection. The role of open space ranger staff, historically education focused, is increasingly focused on enforcement.

Trail assessment and planning is needed to optimize public use.

a) Assess and prioritize each trail in the system for its potential use by persons with disabilities, and remove barriers where possible.

b) As the demand for trails-related recreation increases, there should be an effort to complete the trails network set forth in the Trails Element of the 1994 Countywide Plan.

c) Legal issues concerning easements and prescriptive rights need to be evaluated and clarified.

d) The present Countywide Plan Trails Element has not been merged with the Parks and Recreation Element.

e) There is a need to develop long-distance trail connections (San Francisco Bay Trail, Bay Area Ridge Trail).

Planning for tourism is needed.

a) Tourism master planning needs to occur to assess accommodation demands and environmental impact.

b) Marin serves as a regional greenbelt with recreational areas for the Bay Area and beyond, which contributes to road and user congestion.

➢ Strategies

Develop a regional approach to open space management.

a) Continue to improve land management decision making and activities through regular and ongoing communication among Marin County's public land management agencies and with similar agencies throughout the Bay Area.

b) Continue to identify and address open space–related issues that cross jurisdictional or agency boundaries, such as availability of public transit to public open space, fire hazard reduction, and Sudden Oak Death, through communication and cooperation with public transportation, fire protection, planning, or other agencies as necessary.

Develop public and private partnerships to fund acquisition of key parcels.

a) Continue cooperative efforts with other Bay Area land management agencies and conservation organizations to propose, support, and monitor state and federal open space and park funding legislation.

b) Establish partnerships with other public agencies and private conservation organizations to obtain funding and/or public support as necessary.

c) Close key gaps in the countywide system of public lands. Continue efforts to acquire or otherwise protect such lands for wildlife corridors and habitat, rare and endangered species protection, public recreation, and the completion of upland greenbelt/community separator areas. Continue efforts to preserve baylands, coastal lands, and stream corridors.

d) Pursue Board of Supervisors endorsements of state and federal legislation that provides funding for habitat conservation and enhancement activities.

Enhance open space stewardship by identifying and treating threats to natural resources.

a) Continue efforts to identify and address erosion, the spread of invasive plant species, and other resource protection problems on public open space.

b) Identify indicators to assess the ecological health of public lands and the sustainability of current uses.

c) Continue to reduce dependence on the use of pesticides and herbicides for parks and open space maintenance purposes.

Minimize user conflicts through education and appropriate levels of use.

a) Continue efforts to inform and educate the citizens of Marin County and open space visitors concerning the county's public open space lands and their appropriate uses. Continue to improve available information (guidebooks, Web sites, maps) to enhance visitor enjoyment of Marin County's public open space and trails.

b) Research the concept of the sustainability of public open space in relationship to the impact of visitors, ranging from parking congestion to open space recreational usage, so that open space can be preserved and maintained for future generations.

Optimize public use of trails through proper planning.

a) Continue to accommodate needs of the physically challenged in trail planning and construction when practicable.

b) Close key gaps in the countywide system of public trails. Continue efforts to create an interconnected system of public open spaces, complete the Bay Area Ridge Trail, complete the San Francisco Bay Trail, and enhance public trail recreation opportunities.

c) Address legal issues concerning trail easements and prescriptive rights.

d) Address issues related to maintaining proposed new trails of countywide significance with Marin's cities, towns, and public land management agencies.

e) Address the issue of providing parking at trailheads. Design trails with multiple ingress and egress points and signage to minimize the need for parking at trailheads.

f) Seek methods to establish partnerships and cooperation among trail interest groups to increase and improve trail recreation opportunities.

Plan for the impacts of tourism.

a) Prepare a tourism master plan to assess demand for accommodation and environmental impact.

b) Provide maps and information showing how public recreational lands can be accessed by public transportation, by bicycle, or on foot.

➢ Sample indicators

a) Determine funding needs for highest priority open space acquisitions for the next 10 years (MALT).

b) Measure the percentage of open space land preserved (Marin County Community Development Agency).

c) Measure the percentage of trails accessible to physically challenged persons (Marin County Department of Parks, Open Space and Cultural Services).

➢ Sample targets

a) Obtain funding for targeted open space lands identified in the 1994 Countywide Plan and/or other high priority properties of equivalent size and public value by 2012.

b) Increase the mileage of trails accessible to physically challenged persons by 10 percent over 2002 mileage by 2007.

2. Parks and Recreation

➢ Issues

High user demand and diversity of uses causes competition for parks and recreational facilities.

a) Marin does not have a large number of youth park facilities, such as skate parks.

b) There is an increasing need for soccer and softball fields. Optimizing use of existing school play fields might help alleviate this situation.

c) Adult team sports, such as “over 40” and “over 50” leagues, compete with youth sports for playing field time. In one instance, an “over 50” soccer league considered funding a new field in exchange for an allotment of reserved field time.

d) Users engaged in both team sports as well as individual activities (in-line skating and skateboarding) need space for their activities.

e) There is a growing need for specialized parks, such as dog parks, community gardens, and skateboard parks.

f) There is a need to explore possible locations for overnight camping.

g) Safety on bike paths needs to be improved.

Diversity in population requires diversity in parks.

a) As the average age in Marin increases, the demand for recreational facilities to accommodate a more mature population grows.

b) People with lower incomes may lack access to private recreational facilities and thus rely more on public facilities.

c) Neighbors adjacent to proposed park facilities may object to any such development.

Creative financing may be required for new park facilities.

a) The high cost of land makes acquisition of park sites in Marin difficult. City and County collaboration provides more facilities. For example, the proposed skateboard park at McInnis is a collaboration of the County of Marin, the City of San Rafael, and the Marinwood Community Services District.

Pesticides and other toxins can effect the health of park users.

a) There is a need to evaluate the use of toxins such as pesticides in all parks and determine whether further limitation of use is needed.

➢ Strategies

Develop an assessment of user needs and park and recreation facilities.

a) Develop an updated Master Plan for Marin County Parks to assess current facilities in order to determine appropriate areas for expansion and suitable locations for new facilities, and to explore mechanisms to fund new park development.

b) Develop an updated park facility assessment, including examination of city facilities, other public facilities such as schools, private facilities, and County facilities.

c) Develop an updated user needs assessment to determine current and projected community park and recreation requirements. Include consideration of Marin's aging community, cultural diversity, and economic diversity in developing such an assessment.

d) Study the feasibility of allowing community gardens in some park areas and create a pilot program to implement the study.

e) Explore opportunities for overnight camping in existing parks. Determine other appropriate locations for new facilities that could accommodate overnight camping.

f) Work to ensure that all parks are designed to meet the needs and financial means of the handicapped and senior populations.

g) Ensure that green spaces are integrated into urban areas as urban infill and densification increase.

Ensure that pesticides and other toxins don't pose health risks for park users.

a) Determine the least toxic means of reducing weeds and other pests, if necessary, to acceptable levels.

b) Conduct annual training of all Parks Department crews in the use of Integrated Pest Management practices.

➢ Sample indicators

a) Compare the ratio of park area per person available in Marin County with guidelines outlined in the Quimby Act or by the California Park and Recreation Society (Marin County Community Development Agency).

b) Conduct a user needs assessment for parks and recreational facilities (Marin County Department of Parks, Open Space and Cultural Services).

c) Monitor park reservations and park revenues for consideration as indicators of use (Marin County Department of Parks, Open Space and Cultural Services).

d) Measure the number of annual play field uses and compare with industry guidelines (Marin County Department of Parks, Open Space and Cultural Services).

➢ Sample targets

a) Eighty-five percent of user needs for parks and recreational facilities are being met by 2010.

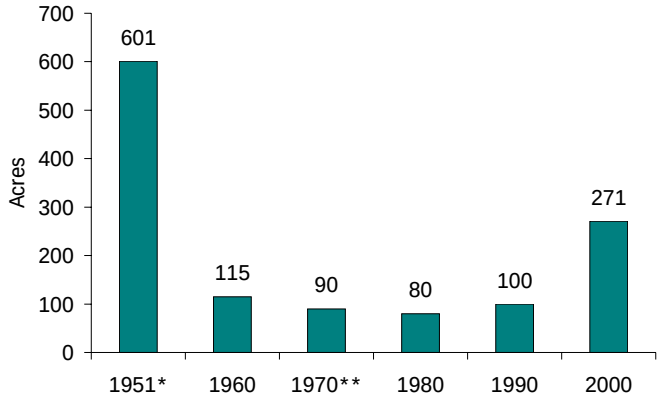
D. FOOD AND AGRICULTURE

➢ Background and trends

Agriculture remains vital to Marin's rural landscape and way of life. Marin County's rural landscape, culture, and economy have depended on a viable agricultural industry to sustain them for the past 150 years. Located on the urban edge in one of the wealthiest localities in America, Marin County still has agriculture as one of its primary land uses. Despite this, the agricultural way of life in Marin is threatened by the increasing difficulty of making a living farming and ranching . At the core of this problem is the fact that agricultural production costs have outpaced agricultural revenues. This state and nationwide trend is exacerbated by especially high land values in Marin.

The diversity and relative proportions of products generated by Marin farmers and ranchers have fluctuated over the years. Livestock-based products have traditionally been the mainstay here, and they still account for a vast majority of Marin County agriculture both in value and acreage, due primarily to the nature of West Marin's rugged topography, soil limitations, and scarcity of water. As of 2001, the value of livestock, livestock products, and livestock feed crops in Marin County was $47,268,410, or 93 percent of the $50, 900,357 total value of Marin County's agricultural production. Vegetable production, in its heyday in the 1930s and 1940s, has seen an increase during the past decade after years of decline. In 1935, more than 1,800 acres of vegetables and nearly 1,000 acres of fruits and nuts were raised in Marin. In the 1930s and early 1940s, artichokes and peas were important crops in coastal areas, with 2,000 acres of peas alone at the peak of production. By 1951, fruit, nut, and vegetable production had declined to 601 acres and continued declining until the 1980s, when row crops began a slight upward trend. The acreage of fruit and vegetable crops had more than doubled to 271 acres by 2000, due in part to 95 acres of vineyards (Figure II-6).

Figure II-6
Marin County Vegetable, Fruit, and Nut Acreages



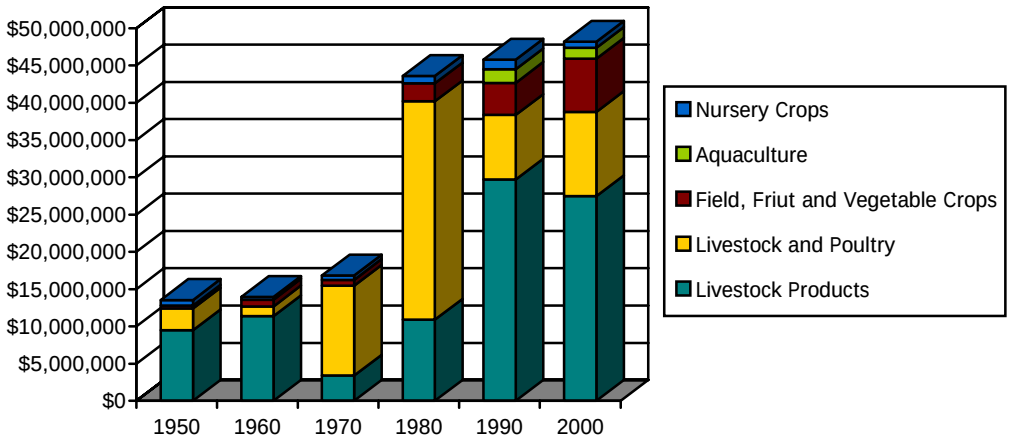
* 1950 data not available.
** In 1970, vegetables were not listed in the Crop Report; this figure is presumed to include only fruits and nuts.

Source: 1935-2001 Marin County Department of Agriculture

Of the 133,444 acres of land used for agriculture in Marin County (U.S. Department of Agriculture), as of 2000, approximately 177 acres were in vegetable and nongrape fruit production, 94 acres supported vineyards, 6,065 acres were used for livestock feed crops, including hay and silage, and the remaining acreage was used as pasture for livestock grazing.

Recent increases in organic food production, creation of specialty products and markets, and on-farm diversification offer promise of increased revenues and more stable income streams to ranchers and farmers. Local food production enhances a community's food security by ensuring that food is available to local people regardless of transportation or trade issues that can affect food supplies. Because of Marin County's proximity to population centers in other Bay Area counties, Marin food products also offer greater food security to this population. Opportunities for Marin farmers and ranchers to market food locally abound. The majority of products sold at Marin's well-developed farmers market system continue to come from out-of-county sources. Diversification of local farm products has the potential to increase revenues for farmers and contribute to the viability of local agriculture, as well as providing more locally sold food. The recent interest in locally grown, natural grass-fed beef, farmstead cheeses, high value organic strawberries, and olive oil are examples of agricultural diversification that offer locally produced food choices (Figure II-7).

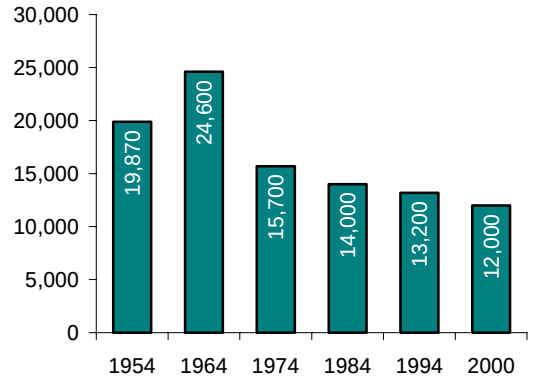
Figure II-7
Crop Values for 50 Years



Source: 1935-2001 Marin County Department of Agriculture

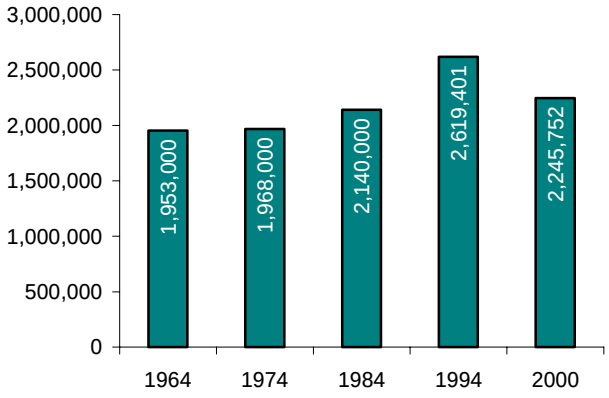
While the number of dairies has declined, dairy herd size has increased and milk production has remained fairly constant. In 1862, Marin ranked first among California counties for milk production. Since that time, a steady decline has marked Marin County's dairy industry, and Marin is now ranked 12th in the state (out of 58 counties) in terms of milk production. Between 1950 and 2000, the number of dairies decreased from 200 to 31, and the number of head of dairy cattle in the county decreased from approximately 20,000 to about 12,000 (Figure II-8). Despite this downward trend in dairies and animal numbers, countywide milk production has increased slightly due to increased milk production per cow and other improvements in farming practices.

Figure II-8
Number of Dairy Cattle (Head) in Marin County



Source: 1935-2001 Marin County Department of Agriculture

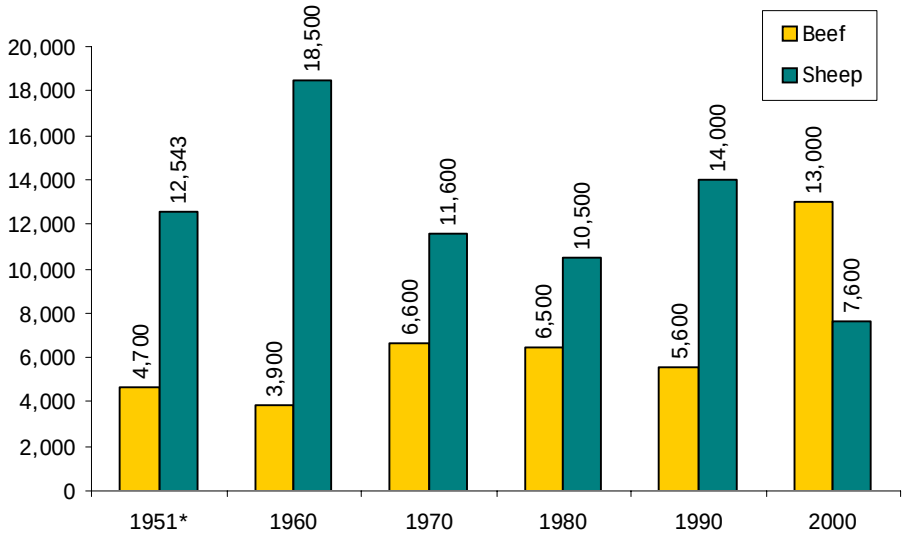
Figure II-9
Milk Production in Pounds, Marin County



Source: 1935-2001 Marin County Department of Agriculture

Beef production has replaced dairies and sheep ranches. As dairy operators have sold their herds, they have either leased their ranches out to other producers or have switched to raising beef, dairy replacement heifers, or a combination of the two (Figure II-9). This pattern—as well as a steep decline in the number of sheep ranches—have resulted in an increase in the number of beef producers and head of beef cattle produced in the county, despite the fact that beef producers are struggling financially (Figure II-10).

Figure II-10
Marin County Cattle and Sheep Numbers



* 1950 data not available.

Source: 1935-2001 Marin County Department of Agriculture

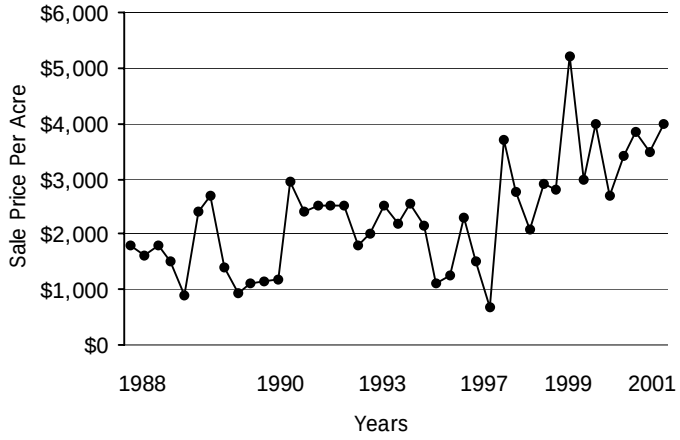
Recent increases in organic acreage and number of certified organic growers show promise. The past 10 years have seen an increasing interest in organic farming, with 28 certified organic growers registered in the county in 2000, compared with 4 in 1990—a seven-fold increase. Organic acreage has also increased from 67 acres in 1990 to 1,017 acres in 2000, with approximately 170 acres attributed to vegetables and fruits and the remaining 800-plus acres in organic dairying and livestock feed production. Nationwide, organic food production is the faster growing sector in agriculture, at a rate of 20 percent per year (Dimitri and Greene).

Product diversification and direct marketing are on the rise. Direct marketing to consumers by local agricultural producers, as well as development of niche markets, are gaining interest and appear to be essential to the economic survival of some farms and ranches. Direct sales of Marin-grown organic produce, farmstead cheese, and beef products have gained market shares at local farmers markets and are being sold through a popular farm box subscription program, and a successful farmstand operation.

The average age of Marin County agricultural landowners has increased. The question of who will succeed or take over ranches and farms is a serious concern. The number of California farmers under the age of 35 declined by 51 percent between 1987 and 1997. California farmers age 65 and older outnumber farmers 25 years old and younger by 60:1 (California Farmlink).

Agricultural land prices have risen sharply due in part to residential "estates." Agricultural land values in Marin have increased dramatically in recent years. While the sales price of agricultural land zoned A-60, APR-60, and CAPZ-60 has greatly fluctuated over the years, it remained fairly stable at around $2,000 per acre through most of the 1990s, and then rose dramatically between 1998 and 2001 to $5,000 per acre. During these three years, the average price of agricultural land in parcels of 150 acres or greater with 60-acre zoning increased from $2,200 per acre to $3,780 per acre (Figure II-11). Although many of Marin's ranches have been in family ownership for several generations, recent purchases by nonagricultural landowners account for the recent dramatic sales price increases.

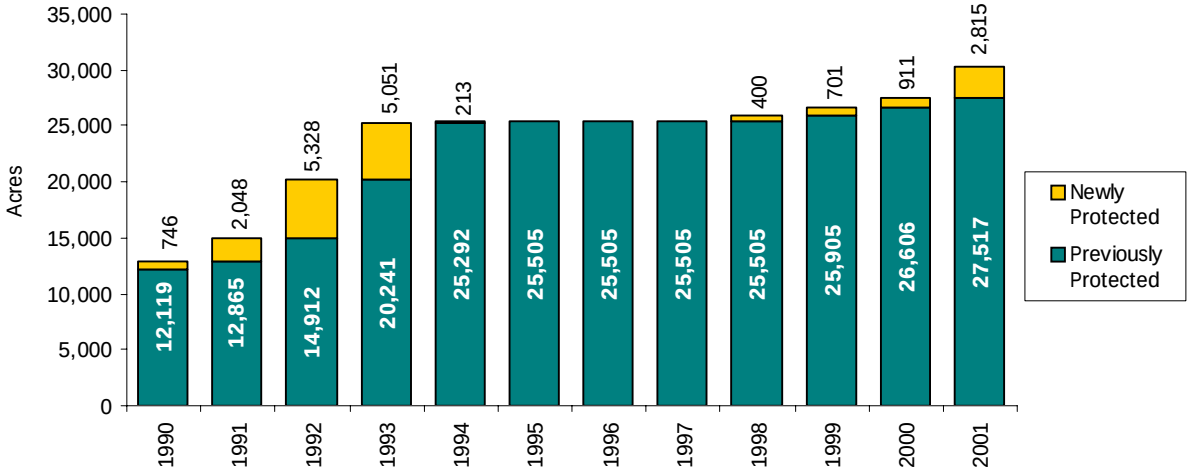
Figure II-11
Marin Agricultural Land Sales
for Properties Zoned as A-60, APR-60, and CAPZ-60
1988–2001



Source: 2002 Marin Agricultural Land Trust

The tradition of land protection continues. Marin Agricultural Land Trust (MALT) is continuing to help farmers and ranchers protect their land from development through purchase of agricultural conservation easements. Since MALT acquired its first conservation easement in 1983, 32,000 acres—25 percent of the privately owned ranches over 150 acres in size—have been protected in this manner (Figure II-12).

Figure II-12
Agricultural Conservation Easements in Marin County
Acquired by MALT



Source: 2002 Marin Agricultural Land Trust

The value of organic food produced in Marin has increased. Organic food production rose from $2.4 million in 1995 to $3.2 million in 2000—a 33 percent increase. Most of this increase is attributed to organic dairy products.

1. Agricultural Viability

➢ Issues

Increasing economic pressure on ranchers and farmers is a threat to the viability of agriculture in Marin.

a) The long term viability of agriculture is important to a balanced economy in Marin.

b) Agricultural profit margins need to be retained or improved for agriculture to be economically viable.

c) Many ranchers and farmers are being forced to sell their operations or change their products to be economically viable, or to sell their operations. A decrease in the number of farms impacts the farm support system of business related to agriculture. A critical mass is needed to maintain an agricultural economy.

d) Financial incentives are needed for appropriate agricultural uses, agricultural sustainability and innovation, and growing of organic products.

e) Regulatory restrictions make traditional agricultural production and development of new crops and products difficult.

f) International and global policies affect feed prices and revenues, and make the market more volatile.

g) Agricultural pest management with pesticides toxic to non-target organisms conflicts with increasing community resistance to the use of chemicals.

Diversification of agricultural products is needed for long term viability of agriculture.

a) Some traditional farming and ranching operations are threatened, due to increased regulations. For example, sheep ranching is at stake due to tighter predator control restrictions.

b) Alternatives are needed to help make agriculture in Marin more financially viable. Potential alternatives could include production of olives and cheeses, “you pick” farms, farm-stay operations, and roadside stands.

c) Allowing bed and breakfast operations and second units for income generation is important as long as these uses don’t result in the unintended consequence of conversion to primarily nonagricultural uses.

d) Agricultural diversification would guard against development of a monoculture, such as the widespread conversion to vineyards.

e) The feasibility of supplying an adequate supply of water at a reasonable cost to farmers needs to be examined. Water supply is essential to increased production of vegetables and other crops important to diversification, and economic stability cost needs to be examined.

Preservation of family farms is threatened by the advancing age of farm owners and a decline in young farmers and ranchers.

a) High land values make it virtually impossible for young farmers and ranchers to acquire land unless they inherit it or marry into a land-owning family.

b) Long hours, hard work, and low pay discourage young people from choosing farming and ranching as an occupation.

➢ Strategies

Support diversification of products and services to strengthen agricultural viability.

a) Support agricultural diversification through development of local markets and education.

b) Promote biological diversity in the agricultural gene pool through seed saving and exchange, livestock breeding, and non-GMO (genetically modified organism) plant propagation.

c) Diversify agricultural products and related services such as organics, grass-fed beef, value-added dairy products, and small-scale agricultural tourism.

d) Assist farmers with development of water sources for conversion to organic row crop farming. Analyze opportunities for water conservation and efficiency techniques, and use sustainable water management practices. Encourage water recycling and conservation, including graywater use and on-site rainwater harvesting, storage in catchment ponds, and treatment with constructed wetland systems.

Develop marketing opportunities for local products to strengthen agricultural viability.

a) Assist in the development, promotion, and funding of marketing campaigns and an advertising campaign to promote organic agriculture in Marin.

b) Develop a cooperative marketing program.

c) Increase direct marketing opportunities. Selling agricultural products to local restaurants, stores, and farmers markets allows farmers and ranchers to market their products directly to customers and to receive a fair price for their food.

d) Explore a distribution and warehousing model that would provide the infrastructure needed for small farmers to more easily make their farm products available to schools, specialty supermarkets, and restaurants.

Support educational programs to enhance agricultural viability.

a) Provide educational programs to farmers and ranchers that encourage and promote diversification, such as organics, grass-fed beef, value-added dairy products, and small-scale agricultural tourism. Continue to support the University of California Cooperative Extension (UCCE) program that offers these programs.

b) Support educational programs that help young farmers and ranchers become established (such as 4-H and Future Farmers of America).

Support intergenerational transfer of family farms.

a) Support programs and organizations that encourage the transfer of farms from generation to generation, such as California Farmlink, the purchase of agricultural conservation easements by MALT, and other programs.

Continue to address livestock predation to reduce economic losses to ranchers.

a) Work with the Agricultural Commissioner's office to support a program that addresses the predation of farm animals by coyotes and other predators.

Research methods for strengthening agricultural viability.

a) Explore a financial incentive program (similar to the European direct payment) for on-farm conversion of small (5–10 acres), suitable pasture to organic row crop farming, or financial incentives for the leasing of those lands to organic farmers.

b) Study the economic viability of Marin Agricultural operations, and develop strategies for strengthening it.

c) Include a vision of a tactical plan for long term viability of agriculture in the Countywide Plan update.

➢ Sample indicators

a) Inventory farms and ranches by number, size, and net income categories (Marin County Agricultural Commissioner, Marin Community Development Agency, Marin Agricultural Land Trust, USDA National Agricultural Statistics Service).

b) Use the 2002 survey of ranchers and farmers to determine types of support needed to diversify farm operations for greater economic viability (University of California Cooperative Extension).

➢ Sample targets

a) By 2013, the number and size of farms will have remained constant or increased, and the number of farms and ranches in higher income categories will have remained constant or increased.

b) A follow-up survey of ranchers and farmers will show a 50 percent increase in sales of value added products to local markets by 2005.

2. Agricultural Land Use and Land Protection

➢ Issues

Conversion of agricultural land to residential use diminishes the agricultural land base.

a) Development of agricultural land into “rural estates” removes that land from agricultural production when new landowners choose not to lease it to an agricultural operator and/or price it so that existing operators cannot afford to lease it. Often, leased land is an essential part of an agricultural operation, and losing acreage decreases its viability.

b) The minimum parcel size for agricultural zoning is 60 acres. This size allows individuals or families to purchase a parcel and build a large home on it.

c) There is not an exclusive agricultural zoning district prohibiting all incompatible nonagricultural uses.

Regulations and land use policies need improvement.

a) Local, state, and federal regulations often overlap and are not consistent. Changing regulations and land use patterns and policies concern landowners who view regulations as threatening to their property rights and the underlying value of their property.

b) Zoning limitations for housing can be an impediment to family farms that need additional housing to accommodate multigenerational family farming.

c) The County’s permitting process and planning regulations are mostly written for an urban setting and are often incompatible with policies that could better support agriculture.

➢ Strategies

Protect against conversion of agricultural land to residential and other uses.

a) Study the economic impacts of the conversion of agricultural production land to residential estates, and consider regulations that address the size of residences on agricultural lands.

b) Enact policies to ensure that only agricultural uses and related ancillary uses are allowed on agriculturally zoned land.

c) Continue to support land protection programs, including acquisition of agricultural conservation easements by the MALT, agricultural preserves and Farm Security Zone contracts, and transfer of development rights from agriculture/open space land to properties within the city center and village areas.

d) Improve the effectiveness of agricultural management plans so that rural estate properties in agricultural zoning continue to be used for agriculture.

e) Ensure that land zoned for agricultural uses is being utilized even if it is not in production.

f) Explore opportunities to utilize additional public and private land for agricultural leases.

g) Create incentives for residential estates to lease land to organic farmers.

h) Develop a program that simplifies and streamlines the process of obtaining County permits for agricultural endeavors. Assist farmers and ranchers with obtaining permits.

Improve regulations, permitting, and land use policies.

a) Interpret local, state, and federal regulations, and assist landowners in understanding and addressing regulations and obtaining necessary permits.

b) Establish a more uniform, countywide agricultural zoning district that resembles the current Coastal Agricultural Production Zone classification.

c) Develop additional policies that focus on preserving and preventing the development of agricultural land.

d) Develop policies that encourage new, nonagricultural landowners to keep their land in agricultural production through leasing or agricultural diversification.

e) Explore additional measures to protect agricultural zoning in key greenbelt areas.

f) Research ways to accommodate housing for multigenerational family farming where zoning limits it.

g) Expand the current definition of agriculture to include the distinction between “production” and “residential” agriculture.

h) Expedite the processing of seasonal, time-sensitive-production agricultural projects.

➢ Sample indicators

a) Measure the number of acres of agricultural land in active agricultural production, and track changes to this number every two years (Marin County Agricultural Commissioner, Marin Community Development Agency, Marin Agricultural Land Trust, USDA National Agricultural Statistics Service).

b) Measure the acreage of agricultural land protected by conservation easements and Williamson Act contracts (Marin Agricultural Land Trust and Marin County Assessor).

➢ Sample targets

a) In 2013, the number of acres in agricultural production will be at least as high as the number measured in 2003.

b) An additional 20,000 acres of private agricultural land will be protected with conservation easements by 2012 (2,000 acres per year), bringing the total to 52,000.

3. Agricultural Education and Public Awareness

➢ Issues

Increased education about agriculture is needed by the public and government.

a) The urban community knows less and less about agriculture. Educating students about agriculture as well as natural resources needs to be strengthened.

b) County staff needs to develop greater understanding and knowledge about the agricultural industry.

c) The public does not understand the relationships between "open space," environmental appreciation, and farming.

➢ Strategies

Educate the public and government through public awareness and education programs.

a) Enhance County staff support for production agriculture by training Marin County Department of Agriculture staff to serve as agricultural liaisons, and establish an agricultural resource specialist position in the County.

b) Support local nonprofit organizations that are currently conducting public awareness and educational programs.

c) Develop an educational and public awareness campaign to promote the value and benefits of supporting locally grown agriculture and farmers markets by building a coalition of farmers, hospitality businesses, grocery stores, farmers markets, and schools to promote agriculture. Include education about the full costs of production, processing, distribution, and consumption of different agricultural systems. Include costs to human health, the environment, and rural and urban communities.

d) Create an educational and demonstration farm in Marin.

e) Arrange for governmental and public officials to tour farms to better understand the issues and needs of farmers.

f) Encourage school districts to work with local farmers to offer farm tours to children at least once per school year.

g) Support the College of Marin's sustainable agriculture program, which was started in 1999.

h) Promote agriculture's historical and cultural roles in the development of Marin through local media coverage and other methods.

➢ Sample indicators

a) Number of Marin school children participating in the annual Farm Day, Harvest Fair, or farm to school tours offered by MALT, UCCE, Slide Ranch, and the Marin County Office of Education at Walker Creek Ranch (MALT, UCCE, Slide Ranch, and the Marin County Office of Education).

➢ Sample targets

a) Ninety percent of Marin County children will have participated in a farm education event and will understand the connection between agriculture, people, and the environment by 2006.

4. Food and Food Systems

➢ Issues

Marin needs to become more self-reliant in the food it consumes.

a) The majority of food produced locally is exported and is not eaten locally.

b) The County and schools do not buy locally grown organic food for their cafeterias.

c) Economic and environmental contributions need to be measured to formulate and advocate policies.

d) The public needs to understand the value and benefits of local food security

➢ Strategies

Strengthen local food security.

a) Incorporate community food security in the development and planning of communities, transportation programs and in the allocation of County resources.

b) Promote local food processing.

c) Support locally grown organic food by encouraging its purchase and serving by local institutions, businesses and County government; promoting it in Marin's towns and cities; instituting a locally grown organic food buying policy; and promoting farmers markets in each of Marin's communities.

d) Better utilize public spaces for food production: Encourage development of community gardens on vacant or underutilized land; encourage conversion of office space landscaping, greenways, and lawns to community gardens or small farms; and promote edible, drought-resistant landscape on public land to provide food for humans and wildlife.

e) Keep prime soil available for food production.

f) Encourage local towns and cities to produce a certain percentage of their food locally. This is linked to the fact that we don't have enough farmers even to supply our farmers markets. At the Civic Center farmer's market there are 4 Marin farmers to 14 from outside the county. We need more Marin County farmer participation.

g) Include food delivery in the County's disaster preparedness plans.

h) Encourage the distribution of locally grown organic food through food banks by developing a program in which unsold foods from local markets are brought to the Marin food bank; creating an additional food bank.

i) Conduct a countywide nutritional survey to determine areas of the county that need additional nutritional support.

Increase public awareness and education about the importance of local food production and food security.

a) Enact an educational and public awareness campaign to promote the value and benefits of supporting local agriculture and farmers markets.

b) Prepare an inventory of local farms and their products, and make this list available to Marin residents to enhance direct sales to consumers.

c) Conduct celebrations of local organic food and agriculture. Feature local food and agriculture at the Marin County Fair and adopt a "Grown in Marin" day dedicated to locally grown food and products.

d) Prepare a "Grown in Marin" cookbook and map of local farms.

e) Promote programs that support sustainable food systems, including the Marin Food Systems Project, the Marin Food Policy Council and Marin Organic promotional program.

f) Work with the Marin County Office of Education to implement a food policy program similar to those in the Lagunitas and Berkeley school districts and offer a "Grown in Marin" meal at least once a year to local students.

g) Support current school gardening programs offered by the Marin County Stormwater Pollution Prevention Program (MCSTOPP), the Marin Conservation Corps, the Marin Master Gardeners, and the Marin Food Systems Project.

h) Support the Marin Food Systems Project to supply locally grown food to school cafeterias; to include the studies of food and agriculture in school curriculum; to institute a composting program for each school; and to encourage nutrition programs that emphasize the importance of eating local, organic, and seasonal food.

i) Increase education and access opportunities for low income residents and local communities to learn about food production and nutrition.

➢ Sample indicators

a) Measure the number of schools with gardens. Coordinate with Marin Food Systems Project, as data was already gathered in 2001 (Marin County Office of Education).

b) Measure the percentage of food produced in Marin that is distributed locally (University of California Cooperative Extension).

c) Measure the number of farmers able to produce food for local markets (including school programs, restaurants, and so on). Compare that with the number of available market opportunities (UCCE).

➢ Sample targets

a) Fifty percent of all public and private schools have organic gardens by 2010 and 100 percent by 2020.

b) Increase the local distribution of food grown locally by 15 percent by 2010 and 30 percent by 2020.

c) Increase the number of organic and diversified farms by 30 percent by 2020.

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