MARIN BIODIVERSITY 2025





Marin Biodiversity Synthesis Group

EXECUTIVE SUMMARY

Marin County is home to globally-significant biodiversity. Yet this is at increasing risk, as is biodiversity worldwide. Fortunately, there is now international consensus on the way forward to preserve biodiversity at all levels. This is the Kunming-Montreal Global Biodiversity Framework (KMGBF or GBF). This report presents the current state of Marin's biodiversity and biodiversity preservation activities and compares them with the recommendations of the GBF. It was compiled at the same time national and subnational Biodiversity Reports and Action Plans were being prepared throughout the world. It shows that Marin can report significant action for most of the targets of the GBF and has much to gain from continuing to use the GBF to report this past progress and to guide future progress.

INTRODUCTION

Marin County, California, is often considered an example of great success in conservation. Separated from San Francisco by a strait of water less than 5 km wide, it resisted the tide of urbanization that swept over much of the surrounding metropolitan area, and today over half its area remains open space. Over more than a century, its lands have been protected through establishment of parks and preserves, designation of watershed areas, enactment of zoning regulations and purchase of conservation and agricultural easements.

These lands support extremely significant biodiversity, representing a local "hotspot" within the larger California "hotspot." Marin's total species richness is not known, but logical calculations can produce estimates. There are 1,096 species of native vascular plants (Howell et al. 2007). If this is about 15% of the total of all named species of all groups, as it is worldwide, then Marin is home to between 7000 and 8000 described species, most of which are insects. Of course, this does not include those still waiting to be discovered.

Despite its small area, Marin has a good sample of the biological diversity of California. With just over 0.3% of California's land area, it has almost a quarter (1096 of 4976) of its native vascular plant species. Although the county does not stand out by itself as a center of plant richness or endemism, it contributes to making the San Francisco Bay Area as a whole such a center (Baldwin et al. 2017). Marin's birds show a similar pattern. 163 avian species probably breed in the county (Shuford 1993, p. 56). When migrants and vagrants are added, the total comes to 485 species of birds that have been sighted in Marin (W. Lenarz 2017, pers. comm.); this is over two-thirds of the 666 reported from all of California.

Yet Marin's biodiversity, is now increasingly at risk, as is biodiversity globally, from factors that know no boundaries, such as habitat fragmentation, invasive species, climate change, sea level rise and pollution. Furthermore, increasing human demand for food, shelter, energy and other resources may be expected to increase pressure on biodiversity here as elsewhere. (County of Marin 2007, IPBES 2019, One Tam 2023). In addition, long neglect of environmental justice needs to be remedied, and an important component of this is equitable access to benefits of biodiversity.

Fortunately, people all over the world have been working for a long time to come up with plans and methods to deal with these threats and to ensure that humans and other species will be able to coexist on the planet for the optimum benefit of all. The original Convention on Biodiversity, (https://www.cbd.int/intro) which entered into force in 1993, outlined basic goals and agreements for reaching those goals. Conferences of Parties (COPs) have taken place at regular intervals since then to guide the implementation of the Convention. The United States is the only United Nations member state that has not ratified the Convention, and thus cannot send official delegations to the COPs. However, many people from the U.S. contributed to the initial draft of the CBD, and subsequently, different organizations and subnational governments from the U.S. have been granted Observer status and have participated in the COPs.

COP15 began in Kunming, China, in 2020 and ended in Montreal, Canada, in 2022, after being interrupted by the COVID19 pandemic, ironically one symptom of the world biodiversity crisis. COP15's theme was "Ecological Civilization," evoking China's long history. After the world's 2020 failure to meet the Aichi Targets (https://www.cbd.int/sp/targets), which had been adopted in 2010, the task of COP15 was to come up with a more effective plan. After much negotiation, delegations from 196 nations reached consensus on the Kunming-Montreal Global Biodiversity Framework (KMGBF or GBF). This has 23 targets in three areas to be reached by 2030, plus additional goals to be reached by 2050 (https://www.cbd.int/gbf/default.shtml). COP15 additionally facilitated the submission and review of

National Biodiversity Strategies and Action Plans (NBSAPs) through an on-line portal (https://www.cbd.int/nbsap). Due to the disruption caused by COVID19, much discussion of the mechanics of meeting the CBD targets was left for COP16, which was held in Cali, Colombia, in 2024. The theme of COP16 was "Making Peace With Nature," echoing the United Nations Environment Programme's report of the same name issued in 2021 (https://www.unep.org/resources/making-peace-nature), as well as the threat that continued warfare poses to the environment.

Recognizing the vacuum left by the inactivity of the U.S. government, people in California, a state that boasts both globally-significant biodiversity and the fifth-largest economy in the world, began to act to fill the gap. The California Biodiversity Network initially joined together people and organizations interested in sharing knowledge and promoting biodiversity in California (https://cabiodiversitynetwork.org/). This was accompanied by the preparation of the Charter to Secure the Future of California's Biodiversity (also known as the California Biodiversity Initiative) in 2017. (https://www.californiabiodiversityinitiative.org/). Formal recognition of the Charter and the importance of biodiversity in California came from Executive Order B-54-18 of Governor Brown in 2018, which also established September 7th as California Biodiversity Day. This was followed by Governor Newsom's Executive Order N-82-20 in October 2020, as well as by subsequent legislation approved by the state legislature and signed by the governor, such as AB 1889 ("Room to Roam" Act) in September 2024.

Meanwhile, the California Global Biodiversity Working Group (CGBWG) (https://storymaps.arcgis.com/stories/cccaf594b32744a4a220e447df2498c8) helped to organize, prepare and co-ordinate the participation of the Extended California Delegations to COP15 and COP16. One of the results of the delegation's participation in COP15 was the international adoption of California's goal to preserve 30% of all lands and waters by 2030 ("30 x 30"). California's delegation grew to over 100 members at COP16, including representatives from the governor's office, the state legislature, local governments, and many educational institutions and environmental organizations. The California delegates to COP16 presented the state's progress toward the GBF targets to the other nations of the world, and also to the other state, provincial and local government representatives who participated in the parallel Eighth Summit of Subnational Governments (https://cbc.iclei.org/8th-summit-for-subnational-governments-and-cities/). After returning to California, delegates have been doing their best to disseminate within the state information about what is happening outside it.

There has also been strong action at the local level in California. Statewide, the City of Los Angeles took the lead with its Biodiversity Resolution of 2015 (https://clkrep.lacity.org/onlinedocs/2015/15-0499_mot_04-22-2015.pdf). This led to the preparation of numerous biodiversity materials (https://sanitation.lacity.gov/san/faces/wcnav_externalId/s-lsh-es-si-bd-par?_adf.ctrl-state=1dr6ahf9tb_78&_afrLoop=12582752440923941#!), including the first adoption and adaptation in the United States of the City Biodiversity Index (https://www.cbd.int/article/2021-singapore-index), launched in 2008 by Singapore at COP9 in Bonn, Germany. Use of the index involves the selection of a set of indicators that will help the city measure progress at intervals in the future. An integral part of the L.A. effort was the modification of the original index to better track improvements in equity across neighborhoods. Close collaboration with faculty and students at UCLA has been an integral part of all of these efforts (https://escholarship.org/uc/item/4c81w4nr),

Marin County has long been home to many biodiversity conservation and restoration efforts. Many of these have been conducted under the auspices of Marin County Parks and/or in conjunction with other government agencies (https://parks.marincounty.gov/sites/g/files/fdkgoe256/files/2024-12/guidingdocuments_vbmp2016.pdf). Non-governmental organizations have also played important roles in these efforts. The Marin Agricultural Land Trust (MALT) has initiated efforts on working farm and ranch lands (https://malt.org/stewardship/small-grants-biodiversity/), and the Marin Biodiversity Corridor Initiative (MBCI) has tried to link some of these in urban and suburban areas (marinbiodiversity.org).

On August 20, 2024, many people involved in diverse projects gathered at the Marin County Civic Center to better inform the public and the Marin County Board of Supervisors about their work. Represented were Marin Parks and its partners in the Tamalpais Lands Collaborative (One Tam) and also the following additional organizations:

--Environmental Action Committee of West Marin (EAC)
--College of Marin Naturalist/Biodiversity Program.
--Marin Audubon
--Turtle Island Restoration Network (TIRN)

--River Otter Ecology Project
--California Native Plant Society (CNPS), Marin Chapter
--Alameda del Prado Biodiversity Project
--Marin Monarch Working Group (MMWG)
--University of California Co-operative Extension, Marin County
--Chileno Valley Newt Brigade
--Marin Biodiversity Corridor Initiative (MBCI)
--350 Marin
--Resource Renewal Institute and Bay Area Power and Nature Regional Group
--California Global Biodiversity Working Group
--Cleaner California Coast
--Federated Indians of Graton Rancheria (through Supervisor Rodoni).

In addition, other organizations such as the Marin Conservation League (MCL), the Marin Group of the Sierra Club, Point Blue Conservation Science, and the California Academy of Sciences (CAS) have contributed greatly to biodiversity efforts in Marin County. A full list of organizations available to share knowledge and recommendations in Marin would likely be comparable in length to that assembled by the City of Los Angeles as it began to organize information on its biodiversity.

At the same August meeting, after the presentations, the Board of Supervisors adopted a resolution recognizing the importance of Marin's biodiversity, proclaiming September 2024 as Biodiversity Month and furthermore resolved that "Marin County Parks and Open Space will embark on research initiatives and forge essential partnerships to send a delegation to a future Conference of Parties Convention on Biodiversity to demonstrate Marin County's dedication to the protection and enhancement of biodiversity on a local and global scale."

Although logistical challenges prevented the County of Marin from sending official representatives to COP16, people from Marin did participate. The College of Marin sent representatives, and several Marin residents attended as representatives of environmental organizations, including one of the members of the California Global Biodiversity Working Group Steering Committee.

Activities continuously taking place on the lands and in the waters of Marin, joined to the formalities celebrated at the Civic Center on August 20, 2024, give Marin a firm basis for work that can put it in the forefront of localities in the California, the United States, and the world. What is needed at this point is to organize its information into a format congruent with the GBF. Implementation of the GBF will be the focus of all future COPs in this decade, and the GBF will increasingly become the point of reference for discussions of biodiversity among people across institutions and localities.

This organizational work can build on the work of other entities. Over forty countries have now completed their Biodiversity Action Plans. One of these is our neighbor to the north. Canada's national biodiversity plan (https://publications.gc.ca/collections/collection_2024/eccc/en4/En4-539-1-2024-eng.pdf) has a concise and clear approach to the 23 targets. Within Canada, both the Province of Quebec (https://biodiversite-quebec.ca/en) and the City of Montreal (https://montreal.ca/en/articles/preserving-biodiversity-collective-approach-13188) have also been world leaders in biodiversity action. (Additional explanation of the targets is also available directly from the CBD: https://www.cbd.int/gbf/targets)

Participants in the Marin Biodiversity 2025 Synthesis Group have begun to organize the publicly-available information on Marin's biodiversity according to the GBF, using the Canadian national plan as a model, particularly the "Current Status," Challenges and Opportunities," and "What We're Doing" sections of Annex 1 (pp. 26 to 121). There is no counterpart to the "Going Further" sections in the Canadian plan, because these are the sections of government policy and action, and the Synthesis Group has taken on only the mission of collecting and organizing information.

AREA 1 – REDUCING THREATS TO BIODIVERSITY

TARGET 1: SPATIAL PLANNING AND EFFECTIVE MANAGEMENT

Plan and Manage all Areas To Reduce Biodiversity Loss

"Ensure that all areas are under participatory, integrated and biodiversity inclusive spatial planning and/or effective management processes addressing land- and sea-use change, to bring the loss of areas of high biodiversity importance, including ecosystems of high ecological integrity, close to zero by 2030, while respecting the rights of indigenous peoples and local communities."

The current Marin Countywide Plan (County of Marin 2007) provided for the people of Marin County, through their elected Board of Supervisors, and through comments to the Marin Community Development Agency, to participate in planning for unincorporated lands not reserved by state or Federal governments. Marin's incorporated cities and towns, as well as state and Federal agencies, also have procedures that allow for public participation in the processes of formulating and implementing plans for lands and waters under their jurisdiction.
However, historically not all groups of people have had equal influence over how lands and waters are managed. Notably, communities composed largely of Native Americans, African-Americans and recent immigrants have had much less input into management decisions. This is the cause of the environmental injustice that still remains today.

While Section 2-2 of the 2007 Countywide Plan mentions biodiversity, and its section 2-4 addresses biological resources, both of these sections acknowledge continuing threats and neither explicitly presents the goal or provides guidance for reaching zero loss of biodiverse areas by 2030.

Some agencies have more recently prioritized areas of high biodiversity for protection. The Marin Municipal Water District has designated "Legacy Zones" and "Ecosystem Protection" zones (https://www.marinwater.org/sites/default/files/2020-09/Biodiversity%2C%20Fire%20and%20Fuels%20Integrated%20Plan.pdf, p. 3-35).

New and exciting innovations have have made the identification of these areas more feasible than ever before. Chief among these is the Fine-Scale Vegetation Mapping project (https://www.nps.gov/articles/vegetation-mapping-projects-underway.htm?utm_source=article&utm_medium=website&utm_campaign=experience_more&utm_content=small) and (https://vegmap.marincounty.org/). This used remote sensing to identify specific units of vegetation. Ground-truthing for some sites, particularly grassland areas, is still needed, but mapping of other vegetation types essentially been completed.

TARGET 2: ECOSYSTEM RESTORATION
https://www.nps.gov/articles/000/marin-county-fine-scale-vegetation-map-complete.htm
Restore 30% of all Degraded Ecosystems

"Ensure that by 2030 at least 30 per cent of areas of degraded terrestrial, inland water, and marine and coastal ecosystems are under effective restoration, in order to enhance biodiversity and ecosystem functions and services, ecological integrity and connectivity."

Although Marin resisted urbanization longer than many other areas of the San Francisco Bay Area, it was integrated economically and politically into this region shortly after the first European contact. The ensuing two hundred years of logging, fire suppression, mining, grazing, cultivation, damming, and construction for military, industrial, residential and recreational purposes have resulted in almost all of its lands and waters becoming degraded to some extent.

Fortunately, recognition of this situation has led to an extraordinary number of restoration projects, although it is difficult to determine what percentage of degraded lands they affect and how effective the restoration has been. These projects have been undertaken by public agencies, non-profit organizations and individuals.

Agency-initiated projects include those at Tomales Bay State Park (https://www.parks.ca.gov/pages/470/files/TomalesBay_Final%20PWP.pdf), Roy's Redwoods Open Space Preserve (https://www.onetam.org/our-work/roys-redwoods), Redwood Creek (https://www.nps.gov/articles/redwood-creek-salmon-habitat-enhancement.htm), Lagunitas Creek (https://www.marinwater.org/node/1213) and Novato Baylands (https://www.pointblue.org/our-work/education/novato-baylands/). Some projects of the Marin Wildfire Prevention Authority (MWPA) may also be characterized as restoration projects, especially those aimed at making it possible to return beneficial fire to landscapes.

Non-governmental organizations leading efforts to restore lands and waters include Marin Audubon (https://marinaudubon.org/stewardship-restoration/), Friends of Corte Madera Creek Watershed (https://friendsofcortemaderacreek.org/new_site/restoration/) and Students and Teachers Restoring a Watershed (https://www.ecoliteracy.org/article/straw-students-and-teachers-restoring-watershed).

Because such a large proportion of un-urbanized Marin is privately-owned ranch land, the initiatives of private landowners to initiate restoration projects are especially important. In Marin, these projects are often undertaken with the collaboration of the Marin Agricultural Land Trust (MALT), and the Marin Resource Conservation District (https://www.marinrcd.org/programs/home2/).

Projects focused on removal and management of invasive species are often classified as restoration projects, but they are here treated in the discussion of Target #6. Also, although some projects aimed at improving biodiversity in urban and suburban areas might qualify as restoration, they are included under Target #12

TARGET 3: PROTECTED AND CONSERVED AREAS (30X30)

Conserve 30% of Land, Waters and Seas

"Ensure and enable that by 2030 at least 30 per cent of terrestrial and inland water areas, and of marine and coastal areas, especially areas of particular importance for biodiversity and ecosystem functions and services, are effectively conserved and managed through ecologically representative, well-connected and equitably governed systems of protected areas and other effective area-based conservation measures, recognizing indigenous and traditional territories, where applicable, and integrated into wider landscapes, seascapes and the ocean, while ensuring that any sustainable use, where appropriate in such areas, is fully consistent with conservation outcomes, recognizing and respecting the rights of indigenous peoples and local communities, including over their traditional territories."

Marin almost certainly met this target many years ago, for most sources agree that at least half of the county's area is protected in some way. Different protected units offer different degrees of protection. Greater specificity in expressing the percentages of areas of different levels of protection could be achieved by applying the International Union for the

Conservation of Nature's criteria classifying these areas (https://portals.iucn.org/library/sites/library/files/documents/pag-021.pdf).

Protected areas managed by the U.S. government include those administered by the National Park Service (Point Reyes National Seashore, Muir Woods National Monument, and the Golden Gate National Recreation Area), the U.S. Fish and Wildlife Service (San Pablo Bay National Wildlife Refuge), and the National Oceanic and Atmospheric Administration (Cordell Bank, Gulf of the Farallones and Monterey National Marine Sanctuaries). Those managed by the state of California include Angel Island, China Camp, Mt. Tamalpais, Olompali, and Tomales Bay State Parks. Marin Parks administers an additional 34 open space preserves.

The Marin Municipal Water District and the North Marin Water District manage their lands primarily for water production, but achieving this requires a high level of protection.

Private organizations that aim to manage lands in natural conditions include Marin Audubon (Audubon Canyon Ranch and the Cypress Grove Research Center), the Boy Scouts of America (Camp Tamarancho).

Because urbanization proceeded generally from east to west and from sea level upwards, low-lying lands in the eastern part of the county are under-represented in the protected areas. Overall, those from Mt. Tamalpais west to the Pacific Ocean form a large contiguous unit, but those in eastern Marin suffer from fragmentation and lack of connectivity.

Unfortunately, as happened throughout the United States, indigenous peoples were not consulted when lands were "protected." Fortunately, there is now a pathway toward remedying at least part of this injustice through co-management agreements. In 2021, a government-to-government agreement was signed by the United States and the Federated Indians of Graton Rancheria (FIGR) to co-manage Point Reyes National Seashore (https://gratonrancheria.com/federated-indians-of-graton-rancheria-and-point-reyes-national-seashore-announce-partnership/).

TARGET 4: SPECIES RECOVERY

Halt Species Extinction, Protect Genetic Diversity, and Manage Human-Wildlife Conflicts

"Ensure urgent management actions to halt human induced extinction of known threatened species and for the recovery and conservation of species, in particular threatened species, to significantly reduce extinction risk, as well as to maintain and restore the genetic diversity within and between populations of native, wild and domesticated species to maintain their adaptive potential, including through in situ and ex situ conservation and sustainable management practices, and effectively manage human-wildlife interactions to minimize human-wildlife conflict for coexistence."

The International Union for the Conservation of Nature (IUCN), composed of governmental and non-governmental members, maintains a worldwide list of threatened species, known as the "Red List". It classifies species into nine categories: extinct (E), extinct in the wild (EW), critically endangered (CR), endangered (EN), vulnerable (V), near threatened (NT), least concern (LC), data deficient (DD) and not evaluated (NE). Together, the CR, EN and VU designations are considered categories of threatened species. The United States government maintains another list of endangered and threatened species protected under the U.S. Endangered Species Act. The California state government maintains another list of species protected under the California Endangered Species Act. Additionally, non-governmental organizations such as the California Native Plant Society maintain their own lists. Because it takes years of study and often advocacy before a species makes it onto even one list, the total number of species on all of the lists most likely represents an under-counting of the true number of species at significant risk of extinction. Also, because populations of the vast majority of species are not monitored, no one really knows how well the monitored species serve as indicators for the rest. One study for one part of Marin (Mt. Tamalpais) concluded that of the major taxonomic groups, fish merited significant concern,

plants, birds, amphibians and reptiles deserved caution, mammals were in good condition, and insufficient information was available for insects (One Tam 2023).

By one count, Marin hosts 19 federally-listed and 13 state-listed endangered species and subspecies (California Department of Fish and Wildlife 2017). 10 are common to both lists, while the state list has 3 not found on the federal list, and the federal list adds 9 that are not on the state list. Thus the total number of officially recognized endangered species in Marin is 22. Of these, 12 are vascular plants, 2 are birds, 2 are insects, 2 are fish, one is a crustacean, and one is a mammal.

Likewise, there are 12 federally-listed and 9 state-listed threatened species. After accounting for the 4 species that are on both lists, there are 17 recognized threatened species. These are 5 fish, 4 vascular plants, 4 birds, 2 amphibians and one mammal. Taking into account the species that are on one list as endangered but on the other as threatened, a total of 30 Marin species are officially listed as threatened or endangered. (This does not include species not seen in over a century and presumed extinct).

Additional species that may be at high risk may be found on the lists maintained by other organizations. The current CNPS Inventory of Rare and Endangered Plants (https://rareplants.cnps.org/search/result?ccl=MRN) has 140 species and subspecies. For birds, in addition to 43 listed species and subspecies, one study proposed that at least 33 more be added as "Breeding Bird species of Special Concern in Marin County" (Shuford 1993, pp. 69-72). A more recent study study of 55 species of birds monitored in Marin from 1996 to 2022 found that populations of 28 (51%) were increasing or stable, 6 (11%) had either uncertain trends or were considered stable, 4 (7%) showed moderate to possible large decreases, and 17 (31%) showed large decreases

There have been historical biases that have favored protection of some species over others on the official lists. Large, "charismatic" species, especially vertebrate animals, tend to attract more attention, and therefore are more likely to be the objects of study and advocacy that help species gain official protection on the state and Federal lists. Originally, although the U.S. Endangered Species Act allowed for protection of insects, the California Endangered Species Act did not, but this was changed in 2022 (Berenbaum 2022).

Furthermore, animals tend to receive more protected than plants, because by law they are the property of the people, who delegate their authority to the U.S. Fish and Wildlife Service on Federal lands, and to the California Department of Fish and Wildlife on all other lands, while plants are the property of the landowner. Exceptions include actions harming plants that may be subject to the California Environmental Quality Act (CEQA) trees subject to state timber harvest plans. However, regardless of the insufficiencies of the lists and the protections they confer, Marin is home to several impressive monitoring and recovery efforts.

Although all species on the Federal lists must have species recovery plans written and critical habitats designated, a particularly notable group of species is that endemic to serpentine habitats, which host a notable concentration of Marin's endangered plants and insects (https://ecos.fws.gov/docs/recovery_plan/980930c_v2.pdf). Several of these species are the targets of special monitoring and protection efforts on the Tiburon Peninsula by Marin Parks, where genetic diversity is a special concern in the Tiburon jewelflower (*Streptanthus glandulosus ssp. niger*) and the Tiburon mariposa lily (*Calochortus tiburonensis*). The wildflowers of Ring Mountain have been the beneficiaries of a special docent program sponsored by Marin parks and the Marin Chapter of the California Native Plant Society. Baker's larkspur (*Delphinium bakeri*) has not been so lucky; its one population is inconspicuous and has been repeatedly at risk from road maintenance activities. Some of Marin's plant species have benefited from ex situ conservation through seed banking and planting at botanical gardens.

Marin is also home to a popular effort to establish, protect and monitor populations of the Federally-listed Mission Blue butterfly (*Icaricia icariodes missionensis*); this work is sponsored by the Golden Gate Parks Conservancy and benefits from the help of many volunteers. (https://www.parksconservancy.org/park-e-ventures-article/mission-blues-oakwood-valley). Another iconic butterfly species is the monarch (*Danaus plexippus*), whose western populations are plummeting. Although it was only recently proposed for Federal listing, local volunteers now organized into the Marin Monarch Working Group (https://www.marinmonarch.com/) have not waited for this action to engage in many actions to benefit it. These include twenty years of monitoring its overwintering populations and protecting and improving its breeding and migratory habitats. Bee monitoring has been a relatively new effort on Mt. Tamalpais (https://www.onetam.org/tamalpais-bee-lab).

Of all the fish of Marin, another migratory species, the endangered local coho salmon *(Oncorhynchus kisutch*) runs have attracted the most attention. These helped to spur the restoration efforts in Redwood and Lagunitas Creeks mentioned under Target #2. These involve many public agencies and the Salmon Protection and Watershed Network (SPAWN), a local nonprofit (https://seaturtles.org/spawn/). Protecting and restoring coho salmon is a particularly difficult challenge because of changes to their two main habitats, the Pacific Ocean and the local streams.

Amphibians that have received special attention in Marin are the foothill yellow-legged frogs (*Rana boylii*) and the California Newt (*Taricha torosa*). The Marin Municipal Water District has been conducting both monitoring programs for the frogs, a California endangered species, and a popular docent program that teaches visitors not to step on frog eggs deposited in places where trails cross creeks (https://www.marinwater.org/node/830). The California newt, a state species of special concern, has inspired the formation of a special local group of volunteers, the Chileno valley Newt Brigade, who rescue newts during the winter migration season and put them out of danger from passing vehicles

A relative success story among the endangered birds of Marin has been the northern spotted owl (*Strix occidentalis caurina*) Although greatly diminished in more northern areas, it seems to be holding its own in Marin, especially at Muir Woods National Monument, although competition and interbreeding with the barred owl (*Strix varia*) is a concern (https://www.nps.gov/pore/learn/nature/birds_spottedowl.htm). The snowy plover (*Charadrius nivosus nivosus*) has been the subject of intensive protection and recovery efforts at Point Reyes National Seashore; these also include a docent program (https://www.nps.gov/pore/learn/nature/birds_snowyplover.htm).

Populations of three bat species considered to be Species of Special Concern by the California Department of Fish and Wildlife, the pallid bat (*Antrozous pallidus*), Townsend's big-eared bat (*Corynnorhinus townsendii*), and the Western red bat (*Lasiurus blossevillii*) have been monitored by One Tam and have found to be reasonably stable. Tule elk (*Cervus canadensis nannodes*), once near extinction, now has numbers in California as a whole that are considered large enough to permit hunting at several sites, but it be at risk of decreased genetic diversity due to the historical bottleneck. Once locally extinct in Marin, it was re-introduced to Point Reyes National Seashore, where its popualtion has been monitored regularly for many years. Another species not at risk globally but of great interest in Marin is the North American River Otter (*Lontra canadensis*). Its sightings are reported regularly by the River Otter Ecology Project (https://riverotterecology.org/).

Although there is no concerted program to maintain diversity of domesticated species, Marin is home to many farmers, ranchers, and gardeners who maintain many varieties and breeds of these plants and animals. Many of these may be seen at the local farmers' markets and the annual Marin County Fair. One local innovative project involves the breeding of buffalo (*Bubalus bubalis*) for milk and cheese production (https://www.raminimozzarella.com/). The Golden Gate Chapter of the California Rare Fruit Growers (https://golden-gate.crfg.org/) has members in Marin, and the Marin Master Gardeners (https://ucanr.edu/site/uc-marin-master-gardeners) and Marin's community gardens (https://ucanr.edu/site/uc-marin-master-gardeners/marin-community-gardens-map) also propagate many traditional varieties of fruits and vegetables each year.

A major human-wildlife conflict in Marin involves the coyote (*Canis latrans*). Once common in Marin, it was greatly diminished by hunting and poisoning campaigns after European settlement. While Marin remained mostly rural, the county agricultural commissioner maintained a lethal control program through contract with the United States Department of Agriculture, mainly to protect sheep. As Marin urbanized and public opinion shifted, pressure grew to adopt a different approach. Project Coyote (https://projectcoyote.org/), founded in Marin, played an important role in these changes. In 2001, the county established a non-lethal program to protect sheep from coyotes. People have reached different conclusions about the success of this program (https://digitalcommons.usu.edu/cgi/viewcontent.cgi?article=1409&context=hwi and https://projectcoyote.org/wp-content/uploads/2015/03/PC-Marin-County-Livestock.pdf). As coyotes have expanded their populations into more urbanized areas, residents have complained about coyotes attacking pets; these concerns have mostly been dealt with by urging people to keep their pets indoors.

TARGET 5: EXPLOITATION OF SPECIES / WILD SPECIES HARVESTING, USE, AND TRADE

Ensure Sustainable, Safe and Legal Harvesting and Trade of Wild Species

"Ensure that the use, harvesting and trade of wild species is sustainable, safe and legal, preventing overexploitation, minimizing impacts on non-target species and ecosystems, and reducing the risk of pathogen spillover, applying the ecosystem approach, while respecting and protecting customary sustainable use by indigenous peoples and local communities."

Harvesting of wild animals in Marin is controlled by the California Department of Fish and Wildlife (CDFW), except on those Federal lands where the U.S. Fish and Wildlife Service has jurisdiction. CDFW establishes licenses, seasons and limits for hunting and fishing based on the best available data. The black-tailed deer (*Odocoileus hemionus columbianus*) has long been hunted in Marin, and deer hunting continues on private land. Duck hunting on tidelands continues to be popular, Although several fish species may be legally taken (https://wildlife.ca.gov/Fishing-in-the-City/SF/Gofish/North), probably the freshwater fish that attract the most public attention are the introduced species of trout stocked in reservoirs. Private clubs such as the Marin Rod and Gun Club (https://mrgc.clubexpress.com/content.aspx?page_id=22&club_id=481941&module_id=181993) have for decades promoted conservation and responsible harvesting of fish and game.

Concern over poaching of intertidal invertebrates at the Duxbury Reef State Marine Conservation Area (SMCA) led to the formation of the Duxbury Docent Program (https://www.eacmarin.org/duxbury-docents). This was spearheaded by a local nonprofit, the Environmental Action Committee of West Marin (EAC), and received the full support of Marin County Parks.

It is more difficult to determine whether wild plants are being harvested sustainably. They are generally legally protected on public lands, but it difficult to know how effective this protection is. A large-scale international poaching ring targeting plants of the genus *Dudleya* hit the California coast in 2018 (https://www.theguardian.com/us-news/2022/mar/20/california-succulent-smuggling-dudleya). This led to new state legislation that established stiff penalties for removal of these plants from their native habitats (https://www.cnps.org/conservation/dudleya-protection).

Mushrooms are also popularly harvested in Marin. Although they are not plants, responsibility for their protection also falls to landowners. The different land management agencies regulate whether mushrooms can be harvested and how many. The local

Amounts of unsustainably harvested wild species being imported into Marin are not known. However, many consumers in Marin increasingly try to buy products certified by organizations such as the Forest Stewardship Council.

The co-management agreement for Point Reyes National Seashore between the U.S. government and the Federated Indians of Graton Rancheria provides for the tribe's involvement in decisions about population regulation of the tule elk. Another concern statewide is about access to traditional plant collecting areas by native peoples who have been excluded from them.

TARGET 6: INVASIVE ALIEN SPECIES

Reduce the Introduction of Invasive Alien Species by 50% and Minimize Their Impact

"Eliminate, minimize, reduce and or mitigate the impacts of invasive alien species on biodiversity and ecosystem services by identifying and managing pathways of the introduction of alien species, preventing the introduction and establishment of priority invasive alien species, reducing the rates of introduction and establishment of other known or potential invasive alien species by at least 50 per cent by 2030, and eradicating or controlling invasive alien species, especially in priority sites, such as islands."

Marin faces special challenges from invasive species. It is close to major hubs of international commerce. It has a highly mobile human population. The national regulations protecting it from introductions have relied on the "black list" (only keep out known harmful species) approach rather than the "white list" (only permit known harmless species) approach. Its protected lands are managed by many different agencies.

As in the case of rare and endangered species, it is difficult to get an exact list of how many invasive alien species there are in Marin. Information on different taxonomic groups of organisms are maintained separately, as are species considered to be problems in wild, agricultural and urban environments.

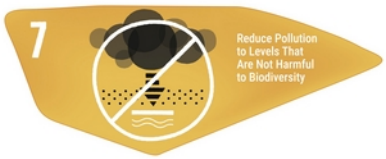
The most complete information is for weeds. The California Department of Food and Agiculture maintains a statewide list of noxious weeds (https://www.cdfa.ca.gov/plant/ipc/encycloweedia/pdf/CaliforniaNoxiousWeeds.pdf) in three classes; these are particularly important in agricultural settings, but may not be invasive in wild settings. The California Invasive Plant Council maintains a statewide list of invasive plant species in natural areas (https://www.cal-ipc.org/plants/inventory/). The latest flora for Marin does have a Marin-specific list of invasive plants; this contains 151 species in several categories (Howell et. al. 2007).
The California Department of Fish and Wildlife maintains a short list of invasive animal species and a site for reporting others (https://wildlife.ca.gov/Conservation/Invasives/Species). However, it is not complete.

Despite the lack of information and the many challenges, Marin has been the site of several promising innovations. The Tamalpais Lands Collaborative (One Tam) has unified invasive species efforts across several different agencies. Use of the Early Detection Rapid Response (EDRR) method has increased efficiency of these efforts (https://www.onetam.org/early-detection-beyond-boundaries). The Marin Wildfire Prevention Authority (https://www.marinwildfire.org/) has incorporated control of invasive species into its plans for maintaining shaded fuelbreaks

Different governmental agencies, NGOs and collaborations have prioritized particular habitats for removal and control of particularly threatening invasive species. Over twenty years of planning and work have successfully defended coastal dunes in Point Reyes National Seashore from European beachgrass (*Ammophila arenaria*) and iceplant (*Carpobrotus* spp.), in an effort that has involved both park personnel and volunteers (https://www.nps.gov/pore/getinvolved/planning_dunerestoration_abbottslagoon.htm). The Invasive Spartina Project (https://spartina.org/) has united multiple agencies and organizations and over many years has almost completed the eradication of invasive introduced cordgrasses (*Spartina* spp.) from San Francisco bay tidal marshes.

These successes may be outweighed by many other cases in which the invaders are clearly expanding. One of these is the very visible French broom (*Cytisus monspessulanus*). Another is the water mold causing Sudden Oak Death, *Phytophora ramorum* (https://www.suddenoakdeath.org/). Lack of more effective methods of preventing introductions as well as shortages of budgets and personnel will make preventing and managing invasive species problems in Marin a continuing enormous problem.

TARGET 7: POLLUTION AND BIODIVERSITY



Reduce Pollution to Levels That Are Not Harmful to Biodiversity

"Reduce pollution risks and the negative impact of pollution from all sources by 2030, to levels that are not harmful to biodiversity and ecosystem functions and services, considering cumulative effects, including: (a) by reducing excess nutrients lost to the environment by at least half, including through more efficient nutrient cycling and use; (b) by reducing the overall risk from pesticides and highly hazardous chemicals by at least half, including through integrated pest management, based on science, taking into account food security and livelihoods; and (c) by preventing, reducing, and working towards eliminating plastic pollution."

These three different kinds of pollution occurring in Marin have prompted very different approaches to control, which in turn have met with different degrees of success. Because of prevailing northwesterly winds, air pollution does not have an appreciable impact on Marin's biodiversity, with the big exception of greenhouse gas emissions, which are covered under Target #8. There may be no good measure of the total amount of the first two kinds, although there is better information on the third.

Pollution by excess nutrients has been addressed differently in urban/suburban and agricultural systems. In urban and suburban areas, efforts have been made to reduce un-permitted or leaking pipes, septic systems and outfalls to creeks and other waterways. Some reduction of excess nutrients from lawns and gardens has been achieved through educational programs and by incentives to remove lawns. In agricultural areas, major efforts have involved spreading manure growing pasture and composting wastes (https://www.rcdprojects.org/Project/Detail/12785) and (https://marincarbonproject.org/compost/)

Marin's large organic farming community makes a big contribution to reducing pesticide use. The County of Marin has an IPM Commission and a plan to use minimal pesticides on its lands. The real unknown in pesticide pollution is how much private homeowners are producing. The Marin Master Gardeners (https://ucanr.edu/site/uc-marin-master-gardeners) and the UC IPM Project (https://ipm.ucanr.edu/) offer information on reducing pesticide use.

Marin was an early leader in recycling (https://marinrecycling.com/), but the sad truth is that little if any plastic gets recycled. California's single-use plastics ban (https://calrecycle.ca.gov/plastics/carryoutbags/) may reduce plastic pollution to some extent, but how much is not yet clear. People from Marin have taken the lead in cleaning up plastic pollution in the Pacific Ocean (https://theoceancleanup.com/great-pacific-garbage-patch/). Zero Waste Marin (https://zerowastemarin.org) encourages repair and re-use of many articles, including plastic ones, and Sustainable Marin Schools (https://www.sustainablemarinschools.org/) attempts to model zero-waste practices for the next generation.

TARGET 8: CLIMATE CHANGE AND BIODIVERSITY

Minimize the Impacts of Climate Change on Biodiversity and Build Resilience

"Minimize the impact of climate change and ocean acidification on biodiversity and increase its resilience through mitigation, adaptation, and disaster risk reduction actions, including through nature-based solutions and/or ecosystem-based approaches, while minimizing negative and fostering positive impacts of climate action on biodiversity."

According to one calculation, Marin County has one of the highest ecological footprints on the planet, approximately five times the world average, and the largest part of it (62%) is the area required to absorb the carbon dioxide it produces (County of Marin 2007, p. 1.3-8). Fortunately, people in Marin have realized this and taken action to find ways and take action to reduce the contributions of its residence to climate change. In December 2020, Marin County produced its most recent Climate Action Plan (https://www.marincounty.gov/departments/cda/sustainability/climate-action-plan/climate-action-plan-2030), which describes the problem very well and proposes measures for its solution.

Unfortunately, as was mentioned repeatedly at the most recent biodiversity COP (COP16-Cali) and in the planning for the next climate COP (COP30-Belém), something strange happened after the 1990 Earth Summit that launched modern global efforts to meet our ongoing environmental crisis. The major international conventions that this conference produced have become isolated from one another, "siloed" so to speak, contradicting the general understanding that our response to the crisis must be holistic.

This is seen in the Marin climate action plan, which although it does include nature-based solutions, particularly carbon farming, does not explicitly mention effects of actions on biodiversity. Fortunately, this problem is now recognized internationally, and suggestions on how to better integrate plans dealing with different aspects of our environmental crisis are being produced by the different COP's. One of these to expand the number of nature-based solutions and another is to increase the emphasis on native species in the nature-based solutions.

Several plans have evaluated the effects of climate change on natural communities and ecosystems. The Peak Health report of One Tam is one of these (https://www.onetam.org/peak-health). Another is Climate Change Vulnerabilty Assessment of the Golden Gate Biosphere Network (https://www.goldengatebiosphere.org/ccva).

AREA 2 – MEETING PEOPLE'S NEEDS THROUGH SUSTAINABLE USE AND BENEFIT-SHARING

TARGET 9: SUSTAINABLE USE AND MANAGEMENT OF WILD SPECIES

Manage Wild Species Sustainably To Benefit People

"Ensure that the management and use of wild species are sustainable, thereby providing social, economic and environmental benefits for people, especially those in vulnerable situations and those most dependent on biodiversity, including through sustainable biodiversity-based activities, products and services that enhance biodiversity, and protecting and encouraging customary sustainable use by indigenous peoples and local communities."

At present, consumptive uses of wild species contribute a small to Marin's economy. Commercial logging ended decades ago, and commercial fishing although locally important, is not as important as it used to be, largely because of declines in fish populations and subsequent restrictions on take. Those fisheries that still provide the basis for the local industries are well-regulated by state and federal agencies.

The main use of wild species is therefore non-consumptive, through tourism and recreation. Although non-consumptive uses have long been thought to pose little harm to wild species, this view has been changing. Data now exist showing that non-consumptive uses can indeed harm populations of wild species (Cole and Landres 1995; Knight and Cole 2012, Baas et al. 2020).

On the other hand, evidence is mounting on the importance of recreation and biodiversity to human and mental health (Louv 2008, Aerts et al. 2018.). This became particularly evident during and after the lockdowns of the COVID19 pandemic, when recreational use of wild lands in Marin skyrocketed, contradicting previous predictions that virtual experiences would greatly supplant real ones.

Interestingly, when the Point Reyes National Seashore and the Golden Gate National Seashore were first established, national park service planners proposed more recreational development than local residents wanted, and ultimately scaled back these plans. Many years later, after regional population increases and the adoption and spread of a Marin invention, the mountain bike, the demand for recreational use has increased

The relatively new discipline of recreational ecology (Marion 2016) is establishing scientifically-based guidelines for sustainable recreation, and this should be able to inform future planning processes. Involvement of larger numbers of people in citizen science projects, discussed under Target #21, may have the effect of reducing the per-person impact of recreation. Involving indigenous peoples more fully in management of wild lands and diffusing more widely traditional beliefs and practices, may have similar effects. Another promising approach to relieving the pressure on existing wild lands is the "re-wilding" of urban and suburban lands, discussed further under Target #12.

In Marin, much of the discussion of how to protect biodiversity while allowing recreation has focused on trails, the main way that the public accesses wild lands. The County of Marin pioneered a collaborative process with the goal of balancing access and protection (https://data.marincounty.org/stories/s/Open-Space-Road-and-Trail-Management/ma2y-6dtz/).

The Golden Gate National Recreation Area was one of the original products of the "parks to the people" concept of the U.S. National Park Service, and it is also a hotspot of biodiversity. It includes both lands in Marin and within the city of San Francisco. It has many innovative programs that connect people to biodiversity (https://www.nps.gov/goga/learn/nature/index.htm).

TARGET 10: SUSTAINABLE MANAGEMENT IN KEY PRODUCTIVE SECTORS

Enhance Biodiversity and Sustainability in Agriculture, Aquaculture, Fisheries, and Forestry

"Ensure that areas under agriculture, aquaculture, fisheries and forestry are managed sustainably, in particular through the sustainable use of biodiversity, including through a substantial increase of the application of biodiversity friendly practices, such as sustainable intensification, agro-ecological and other innovative approaches, contributing to the resilience and long-term efficiency and productivity of these production systems, and to food security, conserving and restoring biodiversity and maintaining nature's contributions to people, including ecosystem functions and services."

Organic farms and gardens in Marin are in the forefront of testing and implementing sustainable practices in Marin In 2023, there were 78 registered organic producers in Marin County, farming approximately 48,900 acres and producing an estimated gross value of $42,000,000. More than 97% of Marin's organically farmed acreage is pastureland (approximately 48,300 acres). Furthermore, Marin has its own local organic certification program, Marin Organic Certified Agriculture (MOCA). In 2023,MOCA certified 46 operations as organic, including 13 dairies, 5 beef and 2 poultry operations, 13 fruit and vegetable operations, and 3 creameries (https://www.marincounty.gov/sites/g/files/fdkgoe241/files/2024-08/2023marincountycropandlivestockreport-final_r.pdf). Horticulture is also important in Marin, and its several native plant nurseries contribute to the sustainability of local gardens and landscapes; some produce their own plants. Community gardens are additional important sites of organic and sustainable agriculture.

Information on sustainable practices is provided by Marin County Co-Operative Extension in many areas, including soils, water and pest and waste management (https://ucanr.edu/sites/default/files/2025-03/2024%20Marin%20County%20Annual%20Report.pdf0). Funding for sustainable practices is provided by the Marin Agricultural Land Trust and the Marin Resource Conservation District.

The Agricultural Institute of Marin (AIM) is an important nonprofit helping to connect local producers and consumers and thus strengthening the local food systems (https://www.agriculturalinstitute.org/). Its most visible activities are local farmers markets, but it also engages in education about local agriculture.

A new program of Marin County is the Food, Agriculture and Resilient Ecosystems program (FARE), which grants funds from a local sales tax to promote community gardens, food access and other local food and agriculture initiatives (https://www.parks.marincounty.gov/projectsplans/fare-grants). One of its priorities is to help such initiatives in historically under-served communities.

Aquaculture is a significant enterprise in Marin, especially oyster production. In general, oyster reefs provide habitat for many other species, thus increasing biodiversity (https://www.fisheries.noaa.gov/national/habitat-conservation/oyster-reef-habitat). Efforts are underway to restore oyster reefs in San Francisco Bay. Although the most commonly farmed oyster is not native, shells from these oysters have been used to build reefs for native oysters.

The crab fishery has experienced significant closures because of the need to avoid entangling migrating whales in the lines connecting the crab pots to the surface. However, the use of new "pop-up" traps may decrease this problem (https://usa.oceana.org/press-releases/california-expands-use-of-innovative-pop-up-fishing-gear-in-dungeness-crab-fishery/).

TARGET 11: ECOSYSTEM SERVICES AND FUNCTIONS

Restore, Maintain and Enhance Nature's Contributions to People

"Restore, maintain and enhance nature's contributions to people, including ecosystem functions and services, such as the regulation of air, water and climate, soil health, pollination and reduction of disease risk, as well as protection from natural hazards and disasters, through nature-based solutions and/or ecosystem-based approaches for the benefit of all people and nature."

Many of the activities mentioned under other targets help to increase the contribution of ecosystem services. Carbon farming increases the ability of soils to store carbon and to retain soil nutrients. Reduction in pesticide use avoids killing off pollinators and predatory and parasitic insects. Urban greening with native species benefits human health and other species that depend on them. Installation of horizontal levees using native species reduces damage from sea-level rise while increasing biodiversity.

A very important set of ecosystem services is threatened by uncontrolled wildfire; alternatively, resilience in the face of mounting wildfire threat may be considered an ecosystem service itself. The Marin Wildfire Prevention Authority (MWPA) in collaboration with several environmental groups in Marin, formed the Ecologically Sound Practices (ESP) Partnership (https://www.espmarin.org/) to formulate a set of practices to harmonize fire prevention efforts with protection of biodiversity. This resulted in the Ecologically Sound Practices for Vegetation Management report, approved in 2022 (https://static1.squarespace.com/static/61fd77d23318da3025673b51/t/62c4c9b2ef7632007440e58e/1657063871642/EcologicallySoundPractices_BoD_June2022_APPROVED.pdf).

An innovative project designed to reduce nutrient pollution of the Civic Center Lagoon involved the construction of several floating islands planted with native plants (https://www.gallinaswatershed.org/civic-center-watershed-restoration) and (https://www.gallinaswatershed.org/do-the-wright-thing-at-the-marin-civic-center-lagoon). This was a collaboration between the County of Marin and the nonprofit Gallinas Watershed Council. The pilot project proved to be a success, and it may be implemented on a larger scale in the future.

TARGET 12: URBAN GREEN AND BLUE SPACES

Enhance Green Spaces and Urban Planning for Human Well-Being and Biodiversity

"Significantly increase the area and quality, and connectivity of, access to, and benefits from green and blue spaces in urban and densely populated areas sustainably, by mainstreaming the conservation and sustainable use of biodiversity, and ensure biodiversity-inclusive urban planning, enhancing native biodiversity, ecological connectivity and integrity, and improving human health and well-being and connection to nature, and contributing to inclusive and sustainable urbanization and to the provision of ecosystem functions and services."

There is growing recognition that urban and suburban spaces contain important relicts of original biodiversity and can play important roles in restoring biodiversity globally. Beginning in 1973, the Marin Countywide Plan (https://www.marincounty.org/~/media/files/departments/cd/planning/currentplanning/publications/county-wide-plan/cwp_1973.pdf) rejected the idea that urbanization and other development would inevitably replace most of the natural areas in the county. This was a revolutionary idea at that time in a large, rapidly-urbanizing region. It specifically designated

"corridors" based on land use, the coastal recreation corridor, the inland agricultural corridor and the eastern urban corridor. However, at that time, the understanding that all of these land use areas could contribute significantly to conservation and restoration was in its infancy and thus was not included in the plan. The only element of the plan that has been updated recently is the Housing Element, including the Form Based Code. This does implicitly recognize the importance of urban biodiversity in its specification for 70% native vegetation to be included in the landscaping of all new developments (https://www.marincounty.org/-/media/files/departments/cd/plans-policies-and-regulations/marin-county-fbc-low-res.pdf.) (p. 61).

Meanwhile, local groups have been working to improve the percentage of native species (less than 1% in many neighborhoods) to at least that same 70% standard. The Marin Chapter of the California Native Plant Society has led many of these efforts (https://cnpsmarin.org/). The Marin Monarch Working Group, the Marin Resource Conservation District, Home Ground Habitats (https://www.homegroundhabitats.org/) and the Marin Master Gardeners have also participated in this effort. An exciting initiative is that of Refugia Marin, an organization dedicated to improving native habitat at local schools (https://www.refugiamarin.org/). The Marin Biodiversity Corridor Initiative (marinbiodiversity.org) is a local effort to build on the Homegrown National Park (https://homegrownnationalpark.org/) idea so that not only the Urban Corridor of Marin can support enhanced biodiversity, but also restored habitats can link existing habitats in all parts of the county. An environmental justice challenge is how to guarantee access to urban biodiversity across all communities.

Many of Marin's rivers and streams flow through urban and suburban habitats. The County of Marin has a Stream Conservation Ordinance (https://www.marincounty.org/-/media/files/departments/cd/planning/sca/draft_sca_ordinance_may_13_pc_hearing.pdf) and the Marin Resource Conservation District has an Urban Stream Program (https://www.marinrcd.org/programs/home2/urban-streams-coordination/). Many watersheds within the county have nonprofit groups that work for their conservation and restoration. A fw notable ones are Friends of Corte Madera Creek Watershed (https://friendsofcortemaderacreek.org/new_site/), Friends of Willow Creek (https://www.friendsofthecreek.org/) and Gallinas Watershed Council (https://www.gallinaswatershed.org/). Significant creek restoration projects planned by these groups may soon become reality.

TARGET 13: SHARING GENETIC RESOURCES

Increase the Sharing of Benefits From Genetic Resources, Digital Sequence Information and Traditional Knowledge

Take effective legal, policy, administrative and capacity-building measures at all levels, as appropriate, to ensure the fair and equitable sharing of benefits that arise from the utilization of genetic resources and from digital sequence information on genetic resources, as well as traditional knowledge associated with genetic resources, and facilitating appropriate access to genetic resources, and by 2030, facilitating a significant increase of the benefits shared, in accordance with applicable international access and benefit-sharing instruments.

This has been one of the intensely-debated issues in most of the recent COPs. At the international level, it has pitted biodiverse nations who are the sources of the genetic information that has led to many commercialized products against less biodiverse nations who profit the most from the these products. If there a local version of the international divide, it is undoubtedly the lack of access of local indigenous communities to their ancestral resources. One way this can be addressed is through negotiation and co-management agreements, as discussed under Target #3.

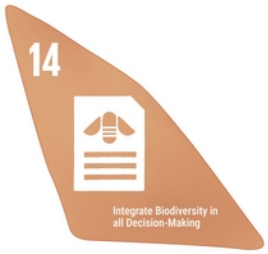
There are additional possibilities for improving equitable sharing of Marin's genetic resources.
Discussion of these possibilities started with the growing need for ecological restoration and the realization that current seed supplies are insufficient for the task (https://www.nationalacademies.org/news/2023/01/supply-of-native-seeds-insufficient-to-meet-the-needs-of-current-and-future-ecological-restoration-projects-says-new-report) and (https://www.nwf.org/Magazines/National-Wildlife/2024/Spring/Conservation/Native-Seed-Supply)..

Because much of Marin is home to diverse native vegetation in diverse microhabitats, the intriguing possibility exists that this vegetation could be the source of diverse seed for more restoration efforts. The Golden Gate National Recreation Area

(GGNRA) has long operated a series of nurseries that use locally-collected propagules for projects within the park (https://www.parksconservancy.org/programs/native-plant-nurseries). More recently, the County of Marin has begun similar efforts at its expanded county nursery (https://www.facebook.com/MarinCountyParks/videos/learn-about-our-native-plant-nursery/1258045985127851/). While these efforts have been very successful, the supply and diversity of native plants for projects outside these parks is limited. Future greater use of local genetic resources for such projects would require permitting and infrastructure beyond what is available now, but the Native Here nursery just across San Francisco Bay provides a good model for what might be done in Marin (https://nativeherenursery.org/).

AREA 3 – TOOLS AND SOLUTIONS FOR IMPLEMENTATION AND MAINSTREAMING

TARGET 14: MAINSTREAMING BIODIVERSITY VALUES



Integrate Biodiversity into Decision-Making at Every Level

"Ensure the full integration of biodiversity and its multiple values into policies, regulations, planning and development processes, poverty eradication strategies, strategic environmental assessments, environmental impact assessments and, as appropriate, national accounting, within and across all levels of government and across all sectors, in particular those with significant impacts on biodiversity, progressively aligning all relevant public and private activities, and fiscal and financial flows with the goals and targets of this framework."

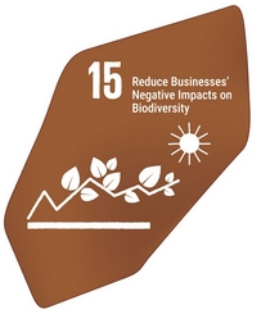
The Marin County Board of Supervisors took a firm step forward with the biodiversity presentations and resolution of August 20, 2024. It elevated the visibility of local actions that were already underway and made a significant commitment to building on this first step. Biodiversity values were already strong among many individual people who work within agencies and organizations in Marin, and the pathway is becoming clearer towards more explicit recognition within the county of the importance of biodiversity. Continuing along this path should result in Marin becoming recognized as a biodiversity leader in California, the United States, and the world.

The 2025 Marin County Fair has decided to focus on insects and other invertebrate animals (https://www.marincounty.gov/news-releases/marin-county-fair-announces-2025-theme-bug-tastic.). Because these are the largest component of biodiversity worldwide, and because the fair attracts a large cross-section of the community, it has the potential to play a unique role in the mainstreaming of biodiversity.

TARGET 15: BUSINESS' ROLE

Businesses Assess, Disclose and Reduce Biodiversity-Related Risks and Negative Impacts

"Take legal, administrative or policy measures to encourage and enable business, and in particular to ensure that large and transnational companies and financial institutions:



(a) Regularly monitor, assess, and transparently disclose their risks, dependencies and impacts on biodiversity, including with requirements for all large as well as transnational companies and financial institutions along their operations, supply and value chains, and portfolios;

(b) Provide information needed to consumers to promote sustainable consumption patterns;

(c) Report on compliance with access and benefit-sharing regulations and measures, as applicable;

in order to progressively reduce negative impacts on biodiversity, increase positive impacts, reduce biodiversity-related risks to business and financial institutions, and promote actions to ensure sustainable patterns of production."

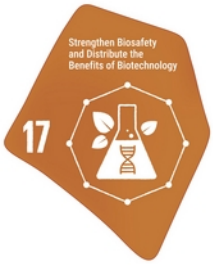
Within Marin County, many businesses have oped to purchase products certified to have smaller negative effects on biodiversity. Some of these certifications include those of the Green Building Council, the Forest Stewardship Council and the different organic food and sustainable seafood organizations.

TARGET 16: SUSTAINABLE CONSUMPTION

Enable Sustainable Consumption Choices To Reduce Waste and Overconsumption

Ensure that people are encouraged and enabled to make sustainable consumption choices, including by establishing supportive policy, legislative or regulatory frameworks, improving education and access to relevant and accurate information and alternatives, and by 2030, reduce the global footprint of consumption in an equitable manner, including through halving global food waste, significantly reducing overconsumption and substantially reducing waste generation, in order for all people to live well in harmony with Mother Earth.

Most relevant policy is enacted at the state rather than the local level, but several local programs and projects have helped to increase access to sustainable consumption choices. One is the Grown in Marin program of Co-Operative Extension (https://ucanr.edu/site/grown-marin), which lets consumers know how to buy locally-grown food. Another is MCE, originally Marin Clean Energy, that allows subscribers to choose a "Deep Green" electricity alternative. Production of compost from local waste (https://westmarincompost.org/) offers another sustainable option for consumers as does recycling of computers and related e-waste (https://renewcomputers.com/). Other programs are discussed under target #7,



TARGET 17: BIOSAFETY/BIOTECHNOLOGY

Strengthen Biosafety and Distribute the Benefits of Biotechnology

"Establish, strengthen capacity for, and implement in all countries, biosafety measures as set out in Article 8(g) of the Convention on Biological Diversity and measures for the handling of biotechnology and distribution of its benefits as set out in Article 19 of the Convention."

Here again, most relevant measures are addressed at higher levels of government.

TARGET 18: NEGATIVE AND POSITIVE INCENTIVES

Reduce Harmful Incentives by at Least $500 Billion per Year, and Scale Up Positive Incentives for Biodiversity

"Identify by 2025, and eliminate, phase out or reform incentives, including subsidies, harmful for biodiversity, in a proportionate, just, fair, effective and equitable way, while substantially and progressively reducing them by at least $500 billion per year by 2030, starting with the most harmful incentives, and scale up positive incentives for the conservation and sustainable use of biodiversity."

This target was also the result of intense international negotiation over several COPs, largely between the same blocs of nations involved in the development of Target #13, because the most biodiverse countries are usually poorer than the countries that profit most from destroying biodiversity. The $500 billion figure was the compromise that was reached.

However, methods of reducing harmful subsidies and increasing positive incentive can be implemented both globally and locally. Local positive incentives include the "cash for grass" programs of the local water districts and the grants available to landowners for implementing conservation measures.

TARGET 19: FINANCIAL RESOURCE MOBILIZATION

Mobilize $200 Billion per Year for Biodiversity From all Sources, Including $30 Billion Through International Finance

"Substantially and progressively increase the level of financial resources from all sources, in an effective, timely and easily accessible manner, including domestic, international, public and private resources, in accordance with Article 20 of the Convention, to implement national biodiversity strategies and action plans, mobilizing at least $200 billion per year by 2030, including by:

(a) Increasing total biodiversity related international financial resources from developed countries, including official development assistance, and from countries that voluntarily assume obligations of developed country Parties, to developing countries, in particular the least developed countries and small island developing States, as well as countries with economies in transition, to at least $20 billion per year by 2025, and to at least $30 billion per year by 2030;

(b) Significantly increasing domestic resource mobilization, facilitated by the preparation and implementation of national biodiversity finance plans or similar instruments according to national needs, priorities and circumstances;

(c) Leveraging private finance, promoting blended finance, implementing strategies for raising new and additional resources, and encouraging the private sector to invest in biodiversity, including through impact funds and other instruments;

(d) Stimulating innovative schemes such as payment for ecosystem services, green bonds, biodiversity offsets and credits, and benefit-sharing mechanisms, with environmental and social safeguards;

(e) Optimizing co-benefits and synergies of finance targeting the biodiversity and climate crises;

(f) Enhancing the role of collective actions, including by indigenous peoples and local communities, Mother Earth centric actions and non-market-based approaches including community based natural resource management and civil society cooperation and solidarity aimed at the conservation of biodiversity;

(g) Enhancing the effectiveness, efficiency and transparency of resource provision and use"

This target was also the result of intense negotiation between blocs of countries, and the $200 billion figurer was an unsatisfactory compromise. At COP16, the figure of $7 trillion was repeatedly mentioned as the amount spent annually on

nature destruction, with the implication that at least an equal amount should be made available for nature protection and restoration.

Government expenditures for nature protection and restoration in Marin are made at Federal, state and local levels. To get some idea of the total, to these would need to be added all of the private donations to the agency partner organizations and nonprofits dedicated to these activities. This is a bookkeeping challenge, but because as has been often said, budgets reflect values, it might be a challenge worth taking on.

A first step might just be to identify those areas of different budgets that deal with biodiversity. The national budget of Canada has been analyzed in this way (https://www.ateliersbiodiversite.org/en/post/federal-budget-2024-and-biodiversity-sectoral-funding-to-the-detriment-of-transformative-actions).

The next step would be to total up the expenditures. The City of Los Angeles did this and found that it dedicates 1.2% of its budget, roughly $110 million, to biodiversity initiatives, encompassing 117 projects and programs, and involving 40+ partners and 5 cooperating agencie (https://sanitation.lacity.gov/cs/groups/public/documents/document/y250/mdi0/~edisp/cnt024743.pdf.) (p. 58)

The next step might be to track these areas to see if they are increasing or decreasing. Given the worsening of our biodiversity crisis, the expectation should be that spending on biodiversity should increase. Because the calculation of its expenditures is part of its Biodiversity Index, Los Angeles plans to repeat the calculation after a number of years.

TARGET 20: CAPACITY BUILDING

Strengthen Capacity-Building, Technology Transfer, and Scientific and Technical Cooperation for Biodiversity

"Strengthen capacity-building and development, access to and transfer of technology, and promote development of and access to innovation and technical and scientific cooperation, including through South-South, North-South and triangular cooperation, to meet the needs for effective implementation, particularly in developing countries, fostering joint technology development and joint scientific research programmes for the conservation and sustainable use of biodiversity and strengthening scientific research and monitoring capacities, commensurate with the ambition of the goals and targets of the Framework."

Marin has a robust formal educational sector that builds capacity in biodiversity knowledge as well as many agencies and organizations that have educational programs producing he same result. At both the College of Marin and Dominican University of California, the two institutions of higher education in Marin, there is special instruction in biodiversity, and several K-12 schools also offer such opportunities. Furthermore, park agencies and nonprofit organizations offer additional educational opportunities.

The College of Marin has long offered a certificate program in Natural History, which offers instruction in identification and biology of all of the major groups of organisms. Furthermore, it operates the Science Museum on its Kentfield campus (https://www1.marin.edu/science-museum), the Organic Farm and Garden at its Indian Valley campus (https://www1.marin.edu/IVOFG) and a Field Station in Bolinas (https://baynature.org/2023/11/09/the-storied-bolinas-marine-laboratory-is-reborn/). Dominican University has a new habitat garden at its campus in San Rafael, which is now the site of biological inventory (https://www.dominican.edu/news/news-listing/ecology-class-focuses-research-local-insect-biodiversity). San Rafael High School's School of Environmental Leadership (https://thesel.org/) occasionally has projects involving biodiversity.

Point Reyes National Seashore is the site of the Clem Miller Environmental Science Center (https://www.nps.gov/pore/learn/education/additional-educational-resources.htm), the Point Reyes Field Institute (https://www.pointreyesnature.com/classes-webinars) and was the original site of the Point Reyes Birding and Nature

Festival (https://www.pointreyesbirdingfestival.org/). Marin Parks has a regular program of guided walks (https://parks.marincounty.gov/discoverlearn/events-calendar).

Many environmental organizations offer field trips and workshops. These include Marin Audubon (https://marinaudubon.org/activities/field-trips/), the Marin Chapter of the California Native Plant Society (ww.cnpsmarin.org), Audubon Canyon Ranch (https://www.egret.org/) and the Mycological Society of Marin (https://www.mycomarin.org/)

TARGET 21: KNOWLEDGE SHARING

Ensure That Knowledge Is Available and Accessible To Guide Biodiversity Action

"Ensure that the best available data, information and knowledge are accessible to decision makers, practitioners and the public to guide effective and equitable governance, integrated and participatory management of biodiversity, and to strengthen communication, awareness-raising, education, monitoring, research and knowledge management and, also in this context, traditional knowledge, innovations, practices and technologies of indigenous peoples and local communities should only be accessed with their free, prior and informed consent, in accordance with national legislation."

Marin and the San Francisco Bay Area have been one center for the development of citizen or community science in the United States (Hannibal 2016). Many different agencies organizations conduct bioblitzes, longer-term monitoring and other similar scientific research activities that are open to the public. One Tam, in particular, sponsors several ongoing community science programs (https://www.onetam.org/volunteer)

TARGET 22: INCLUSIVITY

Ensure Participation in Decision-Making and Access to Justice and Information Related to Biodiversity for all

"Ensure the full, equitable, inclusive, effective and gender-responsive representation and participation in decision-making, and access to justice and information related to biodiversity by indigenous peoples and local communities, respecting their cultures and their rights over lands, territories, resources, and traditional knowledge, as well as by women and girls, children and youth, and persons with disabilities and ensure the full protection of environmental human rights defenders."

A 2020 study that ranked Marin as the most segregated county in the San Francisco Bay Area called attention to this important issue (https://belonging.berkeley.edu/most-segregated-cities-bay-area-2020). The issue of biodiversity was not specifically addressed in the report, but it is likely that the general pattern of disparity documented there also extends to biodiversity.

National data on visitors to parks and preserves many years ago had revealed that they were not representative of the general population. This led to the "parks to the people' idea that led to the establishment of the Golden Gate National Recreation Area in 1972. Noting a similar discrepancy, Marin Parks in 2019 launched a grant program to increase access to parks and preserved by disadvantaged sectors of the population (https://www.marincounty.gov/news-releases/parks-grants-designed-inspire-visitor-diversity). Because the vast majority of Marin's residents live in the eastern Urban Corridor, efforts described under Target #12 should also help to bring biodiversity to more people.

Bringing people from traditionally-underrepresented communities into employment by agencies that manage biodiversity is an important way to include them in decision-making about it. Many agencies that manage or conduct operations on wild lands in Marin have made efforts to diversify their workforces. The Fire Foundry partnership with the College of Marin is one example of such an effort (https://www.firefoundry.org/). Co-management agreements described under Target #3 should help to return decision-making to indigenous people.

TARGET 23: GENDER EQUALITY

Ensure Participation in Decision-Making and Access to Justice and Information Related to Biodiversity for all

"Ensure the full, equitable, inclusive, effective and gender-responsive representation and participation in decision-making, and access to justice and information related to biodiversity by indigenous peoples and local communities, respecting their cultures and their rights over lands, territories, resources, and traditional knowledge, as well as by women and girls, children and youth, and persons with disabilities and ensure the full protection of environmental human rights defenders."

One of the principal environmental organizations in Marin, the Marin Conservation League, was founded by four women (https://marinmagazine.com/community/history/the-inspirational-beginnings-of-the-marin-conservation-league/). Indeed, a unique feature of the conservation history of the San Francisco Bay Area is that women originated and led many of the major campaigns. As eminent regional geographer Richard Walker has put it: "The primary role of women in this history is striking" However, he also quickly added, "Yet women are all but invisible in traditional environmental history (Walker 2007, pp. 8-9). Women in Marin as elsewhere have had to struggle for equality. It would be most useful to have more specific information about the biodiversity aspects of this struggle.

CONCLUSION

This first pass through readily-available sources to find out what could be reported locally for each of the 23 goals of the Kunming-Montreal Biodiversity Framework (GBF) has revealed a wealth of information that deserves further attention, contextualization and divulgation, both within Marin and outside it. Comparison of this information with parallel information from other places should be most instructive. The comments of additional people who have particular experience and expertise in the material treated in each of the targets would be most appreciated.

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