San Mateo County Breeding Bird Atlas

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Core Atlas Volunteer Team:
Peter Metropulos*, David Suddjian*, Rick Johnson, Dan Keller, Tristan McKee, Carol Miller, Robin Smith, Judy Spitler, Ronald Thorn, and Francis Toldi.
–Individuals contributing at least 450 observations over multiple years;
* indicates over 2000 observations.

Special recognition:
Peter Metropulos did extensive field work and was instrumental in meeting our coverage goals across the County. He provided ornithological direction and review for the project. Francis Toldi did field work and helped prepare the publication. David Suddjian provided source materials to develop the Atlas procedures, forms and training materials. He also provided extensive field coverage in southern and edge blocks. Steve Schaeffer and Janet Duerr prepared the Atlas block maps used by the volunteers. Rick Johnson was the project coordinator and also did field work, data compilation, and preparation of the publication

Others who contributed observations to the San Mateo County Atlas project:
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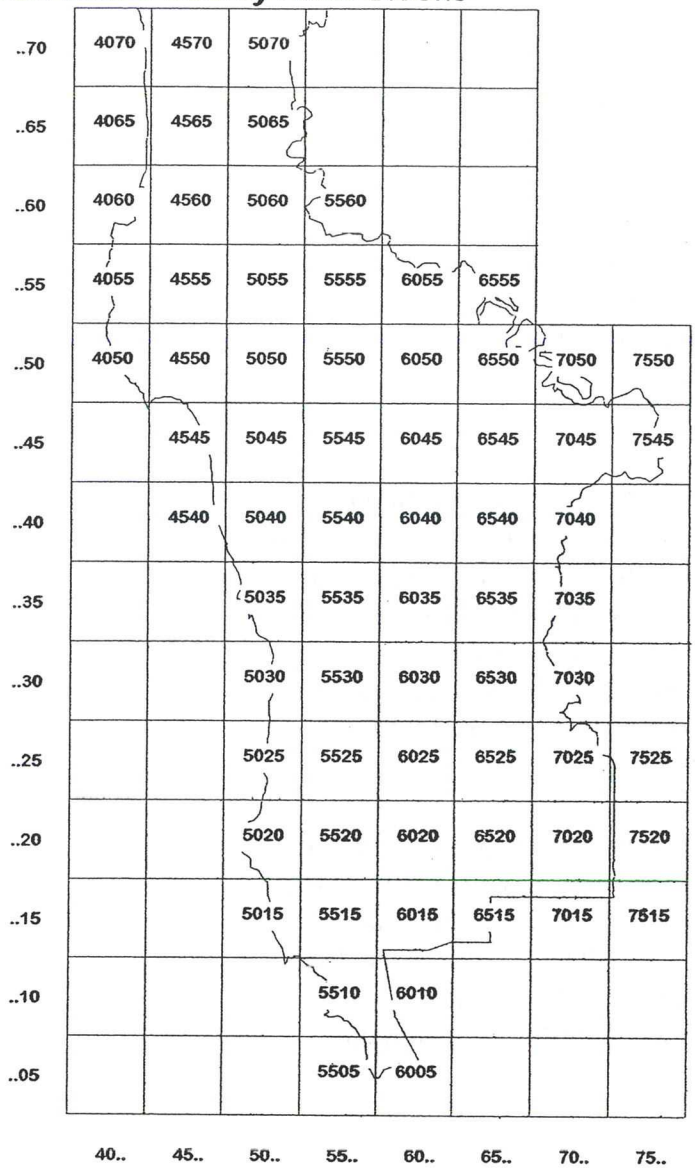
San Mateo County Atlas Blocks



The Atlas Blocks

The San Mateo County Breeding Bird Atlas Project used 5 x 5 kilometer sections defined by the Universal Transverse Mercator (UTM) grid system. UTM marks show on topographic maps for the County. Each of these sections, called Atlas Blocks, is 25 square kilometers.

Each section was given a unique code number composed of a pair of numbers derived from the grid ticks at the border of the topographic maps. The blocks are labeled by the coordinates defining their southwest corner. The vertical axis coordinate (the "easting") is listed first, followed by the horizontal axis coordinate (the "northing"). For example, Block 6045, the Edgewood Park block, has its southwest corner at easting 60 and northing 45.

The map on this page provides a quick reference to the locations for the block codes.

Key to locations

Block	Block Locations
4050	Moss Beach, Point Montara, Pillar Point
4055	Montara North through Devils Slide
4060	Pt. San Pedro, Linda Mar, and Mori Point
4065	Mussel Rock
4070	Ft Funston, west Lake Merced, Thornton Beach
4540	Miramontes Point
4545	Miramar and Half Moon Bay beaches
4550	El Granada, Princeton, Denniston Creek
4555	San Pedro Valley Park and Montara Peaks
4560	Sweeney Ridge, and north San Andreas Lake
4565	Buri Buri, Milagra Ridge, Colma
4570	Westlake, south Lake Merced, west San Bruno Mountain
5015	Pigeon Point to Lake Lucerne
5020	Pescadero Marsh
5025	Pomponio Beach and Creek
5030	San Gregorio and Tunitas Beaches
5035	Verde Road, Martin's Beach, Eel Rock
5040	Higgins Canyon, part of Purisima Creek, & an old railroad grade
5045	Pilarcitos Creek and east Half Moon Bay
5050	Ox Hill, part of Cahill Ridge, Stone Dam
5055	Pilarcitos Lake, Sawyer Camp, Watershed
5060	San Bruno, Millbrae, San Andreas Lake
5065	Oyster Point and South San Francisco
5070	Brisbane, east San Bruno Mountain, McLaren Park
5505	Año Nuevo Island and Point
5510	Franklin Point and lower Gazos Creek
5515	Cloverdale Road, Gazos Creek, Butano State Park
5520	Pescadero Creek and High School
5525	Pomponio Creek
5530	San Gregorio Creek, lower Bear Gulch
5535	Tunitas Creek and Star Hill Road
5540	Purisima Creek Redwoods Open Space
5545	Mills Creek and South West Watershed
5550	Lower Crystal Springs to Cahill Ridge
5555	Burlingame and Hillsborough
5560	Burlingame Shore to Coyote Point
6005	Año Nuevo Bay and Creek to Wadell Creek
6010	Cascade Creek, west Big Basin, Chalk Mountain.
6015	east Butano State Park and Gazos Creek
6020	Butano Creek and Ridge, Dearborn Park
6025	Memorial Park, Jones Gulch, to La Honda
6030	La Honda and lower Harrington Creek
6035	Bear Gulch and upper Harrington Creek
6040	Huddart Park and Woodside
6045	Edgewood Park, Filoli, Pulgas Open Space
6050	Belmont
6055	San Mateo, Seal Slough, west Foster City
6515	North Big Basin
6520	Portola State Park and Pescadero Creek
6525	Alpine Road, Mindego Hill, Russian Ridge
6530	Williams Ranch and Langley Hill
6535	Portola Valley, Windy Hill, Jasper Ridge
6540	Woodside to Jasper Ridge
6545	Redwood City
6550	inner Bair Islands, Sloughs and Redwood City Port
6555	north Redwood Shores to San Mateo Bridge
7015	northeast Big Basin and China Grade
7020	Slate Creek, Ward Road, east Portola State Park
7025	Skyline and Long Ridge Open Space
7030	Los Trancos, Russian Ridge, Foothill Park
7035	Portola Valley, Foothill and Arastradero
7040	West Menlo Park and Stanford
7045	Atherton, Flood Park, Bayfront Park
7050	Greco Island and outer Bair Island
7515	Upper San Lorenzo Watershed
7520	Castle Rock State Park
7525	Hickory Ridge and Stevens Creek
7545	East Palo Alto and Baylands
7550	Ravenswood Point

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Introduction

By Rick Johnson

Imagine a place where a person can ...

> wake before dawn on a spring morning to listen to the "kek, kek, kek, kek" call of a Clapper Rail in a salt marsh, sniff richly productive bay mud flats, watch the sun come up over the bay, and hear scolding calls of a Black-necked Stilt;
>
> later, walk in the resin filled airs of a mountain trail under Douglas Firs, watch a Dark-eyed Junco carry grass to a nest site, and hear the wispy songs of Golden-crowned Kinglets;
>
> still later, inhale fresh air off the Pacific as a Black Oystercatcher, showing salmon-colored bill and legs, banks over surf and inter-tidal rocks;
>
> and then, enjoy the sun set over the ocean.

San Mateo County is such a place. The rich habitats in the county support a diverse set of breeding birds. Some are local residents such as the California Thrasher, Chestnut-backed Chickadee, and Clapper Rail. Other birds such as Barn Swallow, Olive-sided Flycatcher, and Lazuli Bunting migrate regularly to the county to breed. Still others such as Red Crossbill and Lawrence's Goldfinch, are variable in migratory patterns and breed in the county in some years.

The San Mateo County Breeding Bird Atlas shows maps of each species' breeding range, and charts the timing of their nesting cycles. Other Bay Area counties have completed similar Atlases or have them in progress. San Mateo data will contribute to coastal and statewide Atlases for California.

Now, imagine a section of San Mateo County, a 5 X 5 kilometer square, in early June when a person can ..

> listen to a pre-dawn duet of a pair of hooting Great Horned Owls;
>
> watch the sun rise from the top of a hill, fresh with wild flowers and scents of grassland, among singing Grasshopper Sparrows and Western Meadowlarks;
>
> later, see a Brown Creeper fly into its nest in a crevice in the bark of a redwood tree;
>
> then, find a young Western Bluebird poking its head out of an old woodpecker hole in an oak tree, hoping a parent will return with food;
>
> watch Common Yellowthroats foraging in reeds, and if one is very lucky, catch a glimpse of a Wood Duck.

San Mateo County has such a section - one that encompasses Filoli, Edgewood Park, Pulgas Ridge Open Space Preserve, the southern end of Upper Crystal Springs Reservoir, and the Pulgas Water Temple. This area is an example of a survey block for the San Mateo County Breeding Bird Atlas.

In seven years of field work, Atlas volunteers, known as "Atlasers", explored 68 such blocks which span the county, and observed the birds breeding in each area. Not all blocks had as many species as the Edgewood Park block. But most areas had diverse habitats and uneven terrain which is good for birds - and also good for Atlaser leg and breath conditioning.

The Atlas project gathered nearly 17,000 observations of breeding activity. Atlas maps plot the data by block, showing a checker board pattern of the distribution of species across the county. Some species such as the White-crowned Sparrow nested in the blocks east and north of Skyline Ridge where there is heavier coastal fog. Other species such as the Blue-gray Gnatcatcher nested in the hillsides east of Skyline Ridge. Some species such as California Towhee were widespread, with suitable habitat occurring in nearly every block. The most widespread species were:

Species	Number of blocks	Percent of all blocks
Bushtit	67	99%
American Robin	66	97%
Western Scrub-Jay	65	96%
Chestnut-backed Chickadee	65	96%
European Starling	63	93%
Bewick's Wren	62	91%
California Towhee	62	91%
Song Sparrow	59	87%
Dark-eyed Junco	59	87%
Anna's Hummingbird	58	85%
Barn Swallow	58	85%

For the whole county, the total number of breeding species was:

Confirmed breeders	160
Probable breeders	6
Possible breeders	6
Total	172

160 confirmed breeding birds is comparable to other Atlas projects in the Bay Area such as 163 species in Marin County and 178 in Monterey County.

The maps and tables are the enduring product of the Atlas project. Yet, behind the data and statistics, there were real experiences, with the sights, sounds, and smells of nature.
For example, one Atlaser reported:

"I hiked into a small valley tucked behind a ridge. Loud cries overhead woke me from the rhythms of walking, and I looked up to see a screaming Red-tailed Hawk circling overhead. Why me? I turned around and there at the top of a tall Douglas Fir was a large stick nest. On a limb nearby, a young, but full-sized, hawk perched waiting for its next meal. I moved on, hoping to restore peace."

We encourage you to explore, see the birds of the County and extend the knowledge of species' behavior and distribution.

Breeding Bird Atlas Project Description

The Atlas project was a systematic survey of birds in San Mateo County using a pre-defined grid of Atlas blocks. The goal was to find and obtain breeding evidence for all species that nest in each block. Atlasers visited each location multiple times, with most surveys trips occurring from May through mid-July. We classified breeding evidence using standard criteria, and stored the information in a computer database.

Even with many visits to a block it is difficult to confirm every possible species, thus the Atlas project had a coverage goal to determine when a block was sufficiently well covered to declare it complete. The coverage goal was to confirm over 50% of the possible species seen in each block. The objective was met, and the following table shows the level of coverage achieved:

Percent of species confirmed	Number of blocks
Over 80%	6
70-79%	31
60-69%	25
55%-59%	7

Blocks at the county's border include some part of the adjacent county. Atlasers surveyed the land on both sides of the county border, adhering to the block boundaries, rather than the county line. Because of this policy, some of the observations reported in the Atlas are outside of the San Mateo County line. The San Mateo project cooperated with Atlas projects in Santa Cruz, San Francisco, and Santa Clara to share data since the blocks along the common borders are exactly the same for neighboring projects.

Field work for the San Mateo County Atlas project began in 1991 and continued through 1997. Seven years were necessary in order to meet coverage goals. The neighboring Santa Clara and Santa Cruz projects gathered field data from 1987 through 1991. By including their data for edge blocks, the San Mateo Atlas time period spanned the years 1987 through 1997. In addition to field observations by the project team, the Atlas report has county records of breeding birds from 1987 to 1997 from other sources, including data from government agencies and the San Francisco Bay and Point Reyes Bird Observatories.

From 1987 to 1992, San Mateo County was in a drought period; subsequent years were wetter. Bear this in mind when reviewing the detail reports, as some species such as Lawrence's Goldfinch were seen most often after the drought period.

The Atlas project compiled a sizable database on the breeding birds of the county. However, as with any survey there were limitations. Some species were uncommon or difficult to confirm which means the Atlas report may show "none", "possible" or "probable" occurrence in a block where breeding actually occurred. For example, birds active at night such as owls and calling Poorwills were hard to confirm. Also, coverage of privately owned lands was limited. In each block, the team tried to survey representative areas of all habitats, but this was not always possible. Another bias was the concentration of effort in the peak breeding season so that early breeders may be under-represented.

The project team verified all entries to prevent data entry errors and also did a quality assurance check based on the expertise of the most experienced county birders.

Volunteer time and energy produced the San Mateo County Breeding Bird Atlas. The project was a grassroots effort by 31 Atlasers. In addition numerous public and private organizations aided the effort, including

Project sponsors:

- Sequoia Audubon Society
- Golden Gate Audubon Society
- San Francisco Bay Bird Observatory

Access to land:

- San Francisco Public Utilities Commission for access to the San Francisco Watershed
- California State Parks
- San Mateo County Parks
- Redtree Properties
- Big Creek Lumber Company
- Peninsula Open Space Trust

Provided documentation of breeding bird observations:

- San Francisco Bay Bird Observatory
- Point Reyes Bird Observatory
- San Francisco Bay National Wildlife Refuge
- California Department of Fish and Game
- California State Parks
- Jasper Ridge docent bird survey data

A Steering Committee established the plan, policies and training for the project. The members were: Mary Bressler, Janet Duerr, Rick Johnson, Dan Keller, and Steve Schafer from Sequoia Audubon Society, David Suddjian from the Santa Cruz Bird Club, Paul Noble from San

Francisco Bay Bird Observatory, and Steve Bailey, then from the California Academy of Sciences. A letter from David Suddjian stimulated the start up of the project; thanks, David. From 1994 onward, Peter Metropulos played a key role in directing the survey effort to get as complete coverage of the County as possible.

Standard Breeding Criteria and Codes

The San Mateo County Atlas used standard criteria and codes recommended by the North American Ornithological Atlas committee of 1987, with minor modifications determined by the Steering Committee. The Breeding Criteria Codes are divided into four categories: Observed, Possible, Probable and Confirmed:

> O for observed species -- means a species was seen in a block, but not in suitable breeding habitat.
>
> PO for possible breeding species -- means a species was observed in suitable habitat with an indication of possible breeding.
>
> PR for probable breeding species -- means the evidence points to breeding activity but was not conclusive.
>
> CO for confirmed breeding species -- means sufficient evidence was observed to conclude that the species breeds in the block.

The following table shows the specific criteria and breeding codes used for each category:

Status category	Code	Evidence
Observed	O	Species (male or female) observed in a block during its breeding season, but no evidence of breeding. Not in suitable nesting habitat. Includes wide ranging species such as vultures, raptors or colonial nesting species not at a nesting colony.
Possible	Y	Species (male or female) observed in suitable nesting habitat during its breeding season. (Note: The data form used a check mark for this code, but it was entered into the database using the code "Y")
	X	Singing male present in suitable nesting habitat during its breeding season.
Probable	P	Pair observed in suitable nesting habitat during its breeding season.
	S	Permanent territory presumed through song at the same location on at least two occasions 7 or more days apart.
	T	Permanent territory presumed through defense of territory (chasing individuals of the same species)..
	C	Courtship behavior or copulation.
	N	Visiting probable nest site. No conclusive evidence of a nest

		observed.
	A	Agitated behavior or anxiety calls from an adult.
	B	Nest building by Marsh Wren or House Wren or excavation of holes by woodpeckers.
Confirmed	CN	Carrying nesting material, such as sticks or other material. Should be applied with caution near the edge of an atlas block.
	NB	Nest building at the actual nest-site. (Not applicable to Marsh Wren or House wren or woodpeckers)
	PE	Physiological evidence of breeding (i.e. highly vascularized brood patch or egg in oviduct based on bird in hand. To be used by experienced bird banders on local birds during the nesting season.)
	DD	Distraction display or injury feigning.
	UN	Used nest or eggshells found. Caution: these must be carefully identified, if they are to be accepted.
	PY	Precocial young. Flightless young of precocial species (ducks, shorebirds and quail) restricted to the natal area by dependence on adults or limited mobility.
	FL	Recently fledged young (either precocial or altricial) incapable of sustained flight, restricted to natal area by dependence on adults or limited mobility. Should be applied with caution near the edges of Atlas Blocks and for species that wander widely after fledging.
	ON	Occupied nest: adults entering or leaving a nest site in circumstances indicating an occupied nest. To be used for nests which are too high (i.e. the tops of trees) or enclosed (i.e. tree or cliff cavities) for the contents to be seen.
	CF	Carrying food: adult carrying food for the young. Should be applied with caution at the edges of Atlas Blocks. Apply with caution for raptors, kingfishers, ravens or crows.
	FY	Adult feeding recently fledged young. *
	FS	Adult carrying fecal sac.
	NE	Nest with egg(s).*
	NY	Nest with young seen or heard.*
		* Presence of Cowbird eggs or young is confirmation of both Cowbird and host species.

The Atlas Blocks

The San Mateo County Breeding Bird Atlas Project used 5 x 5 kilometer (25 square kilometer) Atlas Blocks defined by the Universal Transverse Mercator (UTM) grid system. We used this grid because UTM marks show on all of the topographic maps for San Mateo County and the grid is used by many other atlas projects, including adjacent counties (i.e. , the blocks straddling the county borders are exactly the same for neighboring projects). The squares can be easily reproduced by any subsequent studies examining part or all of San Mateo County.

All of the land in San Mateo County is within 74 of these blocks. Six of the blocks contain very small land areas and were combined with adjacent blocks to arrive at 68 study blocks.

Each section was given a unique code number composed of two pairs of numbers derived from the grid ticks at the border of the topographic maps. The blocks are labeled by the coordinates defining their southwest corner. The vertical axis coordinate (the "easting") is listed first, followed by the horizontal axis coordinate (the "northing"). For example, Block 6045, the Edgewood Park block, has its southwest corner at easting 60 and northing 45.

A sample square with its UTM code and those of the bordering blocks is shown below:

5550 Lower Crystal Springs	6050 Belmont	6550 Inner Bair Islands
5545 Southwest Watershed	**6045** **Edgewood Park**	6545 Redwood City
5540 Purisima Creek	6040 Huddart Park	6540 Woodside & no. Jasper Ridge

A BRIEF OVERVIEW OF THE PHYSICAL ENVIRONMENT OF SAN MATEO COUNTY

By Francis Toldi

San Mateo County has a remarkably large and diverse population of breeding birds, considering the county's relatively small size and degree of urbanization. This diversity is caused largely by the range of different habitats within the county. Topography, geology, climate, rainfall and urban land use are all major contributors to the county's diverse physical landscape.

This brief essay provides an overview of the physical environment of San Mateo County. Additional detail on the subject can be found in the references noted at the end of this discussion, in the accompanying descriptive charts, in the general references noted at the end of the book.

Physical Setting. San Mateo County straddles the San Francisco Peninsula immediately south of the City and County of San Francisco, extending south to Santa Clara and Santa Cruz Counties, and west from the Pacific Coast east to San Francisco Bay. The southernmost communities on the bayside are East Palo Alto, Menlo Park and Portola Valley, while on the coast the county extends further south, to just south of Point Año Nuevo.

Land Forms. The coastal slope varies from rocky cliffs up to hundreds of feet above the pounding Pacific surf, to more gentle marine terraces rising step-like above sea level, and sandy shoreline. A number of streams, both permanent and intermittent flow to the sea, in a few cases with small estuaries at the stream mouth. One coastside estuary is large and protected, Pescadero Marsh and Lagoon.

The Santa Cruz Mountains dominate the central portion of the county, with elevations up to 2,500 feet, with considerably higher elevations just south of San Mateo County in Santa Clara and Santa Cruz Counties. The summit ridge runs from north to south, with gradually increasing elevation in the southern regions. Typical summit elevations from north to south are: San Bruno Mountain 1,314 feet, Montara Mountain 1,813 feet, Scarper Peak 1,944 feet, King's Mountain 2,080 feet, Mindego Hill 2,143 feet, Borel Hill (Russian Ridge) 2,572 feet. Further east the mountains give way to interior hills, valleys and plateaus at lower elevations, such as Crystal Springs 284 feet, Edgewood Park 630 feet, Portola Valley 455 feet.

There are fewer major streams that make their way to the San Francisco Bay than flow to the outer coast. One of these is San Francisquito Creek, for much of its length the dividing line between San Mateo and Santa Clara Counties. What were once mudflats and bayside plain are now largely given over to housing, industry and transportation. On the fringes of the bay are a few remnant tidal marshes, the largest and most important being Bair Island and Ravenswood.

The central backbone of San Mateo County, the Santa Cruz Mountains, display a geological history as complex as the vegetation. Nearly every geological period from the late Cretaceous to the recent Quaternary is represented, but all fractured and twisted by millennia of earthquakes and other tectonic activity. The most notable product of these forces is the famed San Andreas

Fault, which slices the country from the Southeast to the Northwest. The Crystal Springs Lakes sit in the middle of this impressive fault system. The mountains are rich in minerals, some of which have been mined or quarried over the years continuing to the present day. The various mineral formations greatly influence the topography and soil characteristics, which in turn strongly affect the vegetation. One particularly important example is Serpentine, with chemical properties that make it difficult for many species of plant to grow, resulting in a unique plant association.

Climate. The overall climate is semi-arid "Mediterranean" type: mild, dry summers and moist, cool winters, with at least three times as much rainfall in the wettest winter month as in the driest summer month, and average temperatures for the coolest month ranging from 32-64 degrees (F). Notwithstanding that overall climatalogical definition, there is considerable variation in specific locales. The mid to higher elevation, wet, coastal slopes have annual rainfall of over 50 inches, while the dry areas in the rain shadow of the central mountains may be as low as 16 inches annually. The mountain regions often experience a hard freeze for some portion of the coldest months in most years. Within those extremes are innumerable microclimates, with resulting impact on the vegetation and bird life.

Another key element is the pattern of wind and fog. Prevailing westerly winds have an impact on the vegetal distribution. Fog forms over the upwelling cool ocean currents, and flows east over and around portions of the central mountains. The areas subject to frequent fog cover are usually moister and cooler, and support a different range of plants and animals than the regions that remain dry and hot most of the summer.

Plant Communities/Bird Habitat. The diversity in topography, soil types, hydrology and climate creates a number of distinct plant communities which support a wide array of habitat for breeding birds. Although some natural communities defy easy classification, and transition zones may have more complex plant combinations, the natural communities listed below are generally recognized as well-established in the county. Some breeding birds have particularly narrow habitat requirements even more specific than the general descriptions that follow. For example, in this county Rufous-crowned Sparrows require open grassland with rock outcroppings, also with adjacent chaparral or sage scrub, and all on a south-facing slope!

In migration, birds may be found in a wider range of habitats. In the breeding season bird species seem to be more—though certainly not universally—faithful to "their" habitat.

While every reference on plant communities seems to offer its own individual twist to defining the complex plant associations in the San Mateo County region, most agree with the basic categories described below.

> **COASTAL SHORELINE.** This consists of the Pacific Ocean shoreline, including rocky coastline, sandstone bluffs, sandy shoreline and the lower marine terraces, and the immediately adjacent vegetation. It includes both "coastal strand" and "cliff" habitats.
>
> - **Representative Locations**: Pescadero Beach (sandy shore, rocky shore), Pebble Beach (rocky shore), Devil's Slide (cliffs)

- **Typical Plant Species**: dunes and beach: lizard tail, yellow sand verbena, lupine; old dunes, coastal cliffs: coast Eriogonum, California sagebrush, monkeyflower
- **Representative Breeding Bird Species**: sandy shore: Killdeer, Snowy Plover; cliffs: Pelagic Cormorant, Pigeon Guillemot, Western Gull

SALT MARSH. Plants in this habitat are adapted to high salinity and tidal action. There is limited salt marsh habitat along the coastside, and remnants on the bayside. This is one of the most threatened habitats in the county.

- **Representative Locations**: coastside: Pescadero Marsh, Princeton Marsh; bayside: Bair Island, Ravenswood
- **Typical Plant Species**: cord grass, pickleweed, saltgrass
- **Representative Breeding Bird Species**: Clapper Rail, American Avocet, Marsh Wren, Common Yellowthroat, Savannah Sparrow

FRESH WATER MARSH. Another uncommon habitat in San Mateo County, fresh water marsh is mostly found at the edges of lakes and reservoirs, at creek mouths and in a very few wet bottomlands.

- **Representative Locations**: Interior Pescadero Marsh, Pilarcitos Lake, San Andreas Lake, Searsville Lake
- **Typical Plant Species**: California bulrush, cattail, buttercup, common monkeyflower
- **Representative Breeding Bird Species**: Pied-billed Grebe, American Coot, Black Phoebe, Red-winged Blackbird

COASTAL SCRUB. Many of the same breeding birds prefer this and the next habitat type. Nevertheless, there are sufficient differences to merit separate mention. Coastal Scrub is often broken down into two sub-categories. Northern Coastal Scrub is generally found along the coastal slope, below 500 feet in elevation, with woody shrubs growing densely up to approximately 6 feet in height. Coastal Sage Scrub is found on drier and more exposed locations, and includes higher elevation areas, often more inland.

- **Representative Locations**: above Devil's Slide (Coastal Scrub), Montara Mountain (Coastal Sage Scrub), Butano Ridge
- **Typical Plant Species**: coastal scrub: coyote brush, ceanothus; coastal sage scrub: California sagebrush, California buckwheat; both: poison oak, bush monkeyflower
- **Representative Breeding Bird Species**: Bewick's Wren, Wrentit, Bushtit, Orange-crowned Warbler, White-crowned Sparrow

CHAPARRAL. Another dry country habitat, chaparral is found mostly on eastern ridges and steep, south-facing slopes. The soil is usually rocky or sandy, and the plant cover dense and durable with tough foliage.

- **Representative Locations**: Jasper Ridge, Pulgas Ridge
- **Typical Plant Species**: chamise, Ceanothus, manzanita, California coffeeberry, shrub-sized oak, toyon, wild rose, morning glory

- **Representative Breeding Bird Species**: Bewick's Wren, Wrentit, Western Scrub-Jay, California Thrasher, Spotted Towhee

GRASSLAND. Grassland is found at scattered locations in the county, primarily along ridges and adjacent to or interspersed with scrub or chaparral. Much of the original grassland habitat has been replaced by agriculture or built over. The original native grasses have been almost completely replaced by fast-growing annual alien grasses. Some native grasslands with their associated wildflowers and other plants persist in serpentine soil areas. This also includes "coastal prairie" grassland

- **Representative Locations**: Cloverdale Ranch Plateau, Windy Hill, Edgewood Park (serpentine)
- **Typical Plant Species**: various annual and bunch grasses, bracken fern, Douglas iris, common checkerbloom, blue-eyed grass; extensive field annuals in the serpentine grasslands, such as lupine, creamcups, California goldfields, Delphinium, California poppy
- **Representative Breeding Bird Species**: House Finch, Savannah Sparrow, Grasshopper Sparrow, Western Meadowlark

WOODLAND SAVANNA. Woodland Savanna is characterized by a mix of open or dense groves of trees, with adjacent brush or grassland. Most trees are 15 to 70 feet tall, primarily consisting of oaks. This habitat is of limited occurrence in San Mateo County, becoming much more common in Santa Clara County to the south and east.

- **Representative Locations**: Edgewood Park, Jasper Ridge, Filoli Estate
- **Typical Plant Species**: Coast, interior and canyon live oak, valley oak (deciduous), poison oak, grasses
- **Representative Breeding Bird Species**: Acorn Woodpecker, Nuttall's Woodpecker, White-breasted Nuthatch, Oak Titmouse, House Finch, Lesser Goldfinch

MIXED EVERGREEN. This forest type consists of tall (100 feet or higher) trees growing in dense stands, with brush understory. Patches of grassland may be interspersed. Mixed Evergreen forest is found along the drier inland margins of the coniferous forests. The trees in this plant community are often restricted to broadleaf species, but at other times are mixed broadleaf and coniferous species. In the wetter bottomlands an additional set of trees occurs, overlapping in classification with the trees associated with the riparian zone. The diversity of plant and bird species in this plant community is particularly high in our region.

- **Representative Locations**: San Francisco Watershed, Huddart Park, Windy Hill (Hamm's Gulch)
- **Typical Plant Species**: California bay, madrone, coast and canyon live oak, California buckeye, Douglas fir, willow, big leaf maple, alder (last three in wetter areas)
- **Representative Breeding Bird Species**: Hairy Woodpecker, Common Flicker, Western Wood-Pewee, Black-throated Gray Warbler, Purple Finch

CONIFEROUS FOREST. Coniferous forests form dense stands with a number of variations in their specific characteristics. All are characterized by tall trees (up to 350 feet tall), although in the more wind-exposed areas the height is lower and the trees more stunted. The drier slopes and more exposed ridges are dominated by Douglas Fir, while the setter slopes and more protected stream valleys contain Coast Redwood. The understory is generally minimal. Extensive introduced Monterey Pine groves might be considered under this habitat type, or under Suburban/Introduced habitats, discussed below.

- **Representative Locations**: La Honda, Purisima Redwoods, Portola State Park, San Francisco Watershed
- **Typical Plant Species**: Douglas fir, coast redwood, tanbark oak, poison oak, California huckleberry, western sword fern, redwood sorrel, western trillium
- **Representative Breeding Bird Species**: Common Flicker, Steller's Jay, Winter Wren, Pygmy Nuthatch (especially in Monterey Pine), Brown Creeper, Chestnut-backed Chickadee, Golden-crowned Kinglet, Wilson's Warbler

RIPARIAN. Riparian vegetation grows alongside streams and creeks throughout the county. Often riparian areas are little more than more profuse growth of the surrounding habitat. The riparian zones alongside smaller creeks may be quite narrow, consisting primarily of willow species and other low-lying scrub plants which quickly give way to coastal scrub, grassland or other habitats. The larger streams permit more complex and larger growth, including Sycamores, Alders and Big Leaf Maple. Riparian zones are usually well watered and relatively level, and so are favored and significantly altered by human land use, including homes, farms and ranches.

- **Representative Locations**: Pescadero Creek, San Francisquito Creek, Tunitas Creek
- **Typical Plant Species**: willow, western sycamore, black cottonwood, white alder
- **Representative Breeding Bird Species**: Swainson's Thrush, Warbling Vireo, Song Sparrow

AGRICULTURAL. Much of the low lying, well-watered lands of the county were converted from their native habitat to agricultural use in the 18th and 19th centuries. Much of that land has since been overtaken by the explosive population growth in the county. The few remaining agricultural locations are mostly on the coastside, with a few remnant patches on the bayside. Fields in active cultivation consist of whatever crop is being grown and contain little breeding habitat (though often provide foraging); fallow fields may resemble grassland or sparse scrubland.

- **Representative Locations**: fields south of Half Moon Bay, Pescadero Valley (at Cloverdale Road), South San Francisco/Colma along Hillside Boulevard
- **Typical Plant Species**: various crop plants; weedy edges and fallow fields may include California blackberry, California mustard, wild radish, poison hemlock
- **Representative Breeding Bird Species**: House Finch, Lesser Goldfinch, American Goldfinch, Song Sparrow

SUBURBAN/INTRODUCED. While this area, a large percentage of the county (especially on the bayside) is not exactly a plant community, it is a distinct habitat for birds. The nature of the vegetation varies widely, but includes dense urban areas, gardens, tree-lined streets and small parks with both native and non-native ornamental plants.

- **Representative Locations**: Half Moon Bay, all bayside cities and towns
- **Typical Plant Species**: various
- **Representative Breeding Bird Species**: Mourning Dove, Anna's Hummingbird, Bewick's Wren, American Robin, Chestnut-backed Chickadee, Bushtit, California Towhee, Hooded Oriole (palms)

People. As of the 1990 census approximately 650,000 people live within the 446 square mile political boundaries of San Mateo County. The vast majority live in the many towns and cities east of the Santa Cruz Mountains along the bayshore. Population on the coastside is rapidly increasing, with a corresponding pressure on both agricultural and natural lands.

Protected Areas. Fortunately for the county's natural communities, there are extensive protected and undeveloped lands. Due to the foresight and commitment of many community leaders a high percentage of these lands are in parks, preserves, land banks, and other protected areas. Governmental organizations such as the Federal Fish and Wildlife Service, State and County Parks, The San Francisco Water Department and the Midpeninsula Open Space Preserve own and manage extensive public lands encompassing many different habitats. In addition private organizations such as the Peninsula Open Space Trust, Sempervirens Fund, and others have acquired and deeded to others thousands of acres of important habitat. These and other private advocacy organizations are working hard to ensure that existing and additional natural areas are preserved.

There are many other natural lands encompassing vital habitat that remain in private hands. Some are slated for "development" or harvest, while others are being maintained, actively or passively, in a natural state.

Historical Patterns. Although descriptions of habitat types and general weather patterns are applicable to both old and new times (allowing for some cyclical weather changes), the distribution of those habitats and human impact on them is not. The indigenous human population of the region had an effect on the natural environment, mostly benign. There is evidence that they burned chaparral to encourage formation of grassland, with its attending large herbivores. Early accounts and reconstructions of the natural setting of San Mateo County prior to the arrival of European culture describe vast wetlands along the bay, teeming with wildlife, and a human population living in balance with the environment. The water table was much higher and the unrestrained creeks and streams crated large, swampy floodplains. The higher elevation areas contained oak woodland with open grassland. The montane forest remained uncut, with extensive stands of old growth. We can only imagine the bird life that thrived in this setting. European settlers brought more technology and an ethic devoted to "using" and

transforming natural landscapes. Even our word for this transformation, "development" reveals the cultural bias in favor of altering the natural environment.

As the years went by, population increased, wetlands were drained, the bay filled, trees were cut, grazing increased, the ground was paved. The initial transformation of native habitats consisted of extensive grazing and conversion to agricultural use, which in turn gave way to our current residential and industrial activities. The changing landscape had a strong impact on habitats and their associated bird populations. Many species that were dependent on a particular habitat that disappeared followed suit. No longer do we find Greater Roadrunner in the hills or massive concentrations of geese, let alone Grizzly Bear and herds of Tule Elk and Pronghorn Antelope, along the San Francisco Bay, nor do Sea Otters abound in the twisting tidal channels. One of our most notable extirpated birds, the California Condor, which was "not uncommon" in the years prior to 1900, is now gone from the county and virtually extinct due primarily to habitat destruction.

Other species, however, benefited from the creation of new agricultural and urban habitat. Diked salt ponds made it possible for the appearance of Black-necked Stilt, previously unknown from the area. Species such as American Robin that occurred in moderate numbers in the edges of forested areas found the new suburban habitat to be one giant "edge" and thrived. On the whole, it is safe to say that bird diversity diminished as human presence in the county increased, but we must not ignore the contrary examples. Growing awareness of our negative impact and the diminishing wildlife spurred the many worthy organizations and individuals, some noted above, to preserve large tracts of natural land.

The future will bring even more dramatic impacts. As more and more people crowd into a limited space, natural landscapes inevitably suffer. More industry and increasing pollution also negatively affect the health of existing wild areas and our flora and fauna. Even our own enjoyment of the outdoors can have a deleterious impact, be it garden pesticides, the cars that take us to trailheads, motorized watercraft, or even kayaks, pedestrians and our lovable dogs and cats.

We hope that this book will contribute to the effort to preserve and protect our precious wild lands, and to allow us all to do a better job as stewards of the land we occupy, be it primeval forest or settled suburbia.

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