DESIGNATION OF AREAS WITHIN THE JURISDICTION OF THE SAN FRANCISCO BAY CONSERVATION AND DEVELOPMENT COMMISSION THAT ARE UNSUITABLE FOR POWER PLANTS

San Francisco Bay Conservation
and Development Commission

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I. BACKGROUND

A. Summary

1. Purpose and General Conclusions

The respective roles of the San Francisco Bay Conservation and Development Commission's (BCDC) and the Energy Resources Conservation and Development Commission (Energy Commission) in the siting of power plants have been defined by the Legislature. The Energy Commission is the sole permitting agency for power plants, but it cannot approve a power plant in an area designated by BCDC as unsuitable. Minor ancillary facilities can be approved in those areas designated by BCDC, but only if BCDC first finds that no substantial adverse environmental effects will result and that the primary use of the land will not be interfered with.

The purpose of this study, therefore, is to identify those areas of San Francisco Bay, its salt ponds and managed wetlands, and a 100-foot-wide shoreline band around the Bay that are not suitable for power plants because they would be inconsistent with the San Francisco Bay Plan (Bay Plan) or the Suisun Marsh Protection Plan (Marsh Plan).

It is important to recognize that this study is not intended to identify areas where power plants will be built. It is the prerogative of the Energy Commission to determine what sites are acceptable for power plants. This study is only intended to identify those areas where a power plant would clearly not be suitable under BCDC's policies. Similarly, any specific power plant proposal in an area <u>not</u> designated may still be inconsistent with some

BCDC policy, but it is believed that BCDC can adequately express its views on those proposals by participation in the Energy Commission's permit procedures.

Once an area is designated as being unsuitable, the Energy Commission is prohibited from approving a power plant in that area. Minor ancillary facilities can be approved in such an area by the Energy Commission, but only if BCDC first finds that such a minor facility would not be inconsistent with the primary use of the land and that there would be no substantial adverse environmental effect.

A discussion of the legislation requiring this study is found in Section I-B (page 5). One important part of that legislative scheme is an attempt by the Legislature to concentrate permit processing for power plants in the Energy Commission. To the extent that BCDC must make findings mentioned above for minor ancillary facilities associated with power plants before the Energy Commission can act on the main power plant, a two-step permit process for power plants results. To avoid that to the extent possible, some designations are proposed that only apply to the main power plant and not to minor ancillary facilities that will have few adverse impacts. These are called "partial designations" and are discussed more completely in Section I-D (page 8).

To insure that BCDC does not restrict the development of needed power plants, the Legislature also required BCDC to consider the most recent comprehensive Biennial Report of the Energy Commission in making its designations. A discussion of that Biennial Report is found in Section II-A and B (pages 14 and 15) of this report, and the discussion concludes that sufficient areas are available to satisfy the concerns of the Energy Commission.

BCDC recognizes that power plants are defined as a water-oriented use under the McAteer-Petris Act for which some necessary fill in the Bay may be approved. The Bay Plan policy on power plants states that they "may be located in any area where they do not interfere with and are not incompatible with residential, recreational, or other public uses of the Bay and shoreline, provided that any pollution problems resulting from the discharge of large amounts of heated brine into Bay waters, and water vapor into the atmosphere, can be precluded" (Other Uses of the Bay and Shoreline Policy No. 8, page 29). However, that policy must be read in conjunction with the other policies protecting the resources of the Bay and the requirements of the law that no fill can be permitted in the Bay for any purpose, including power plants, unless it is shown that there is no alternative that requires less fill.

With the very limited number of needed new sites forecasted by the Energy Commission and the very limited geographical jurisdiction of BCDC, it is evident that the need for siting opportunities around the Bay in the near future can be met within the constraints proposed in this study. For example, although the surface area of the Bay is designated to prohibit the large areas of fill that would be needed for a major power plant, most of the Bay is only partially designated, permitting pipelines for cooling systems to be governed solely by the Energy Commission. In addition, most of the designated areas do not extend inland of the salt ponds, managed wetlands, the Suisun Marsh, or the line of highest tidal action. The 100-foot shoreline band is generally designated only in priority use areas, parks, public access areas, and wildlife refuges. Thus, siting opportunities are available on or near the

shoreline and adequate provision has been made for ancillary facilities such as pipelines for cooling systems that must be located in the Bay.

BCDC must also update its designations every two years, and those revisions will permit any changes in technology or need for electric power to be taken into consideration.

2. Contents of Report

A complete description of the legislation mandating this study and a discussion of how that legislative intent has been incorporated into this report are found in Sections I-B (page 5), I-C (page 7) and I-D (page 8).

Section II (page 14) describes the necessity for coordinating power plant siting activities with the work of the Energy Commission. Included is a discussion of the forecasting done by the Energy Commission to estimate the need for new power plant sites that might be needed in the Bay Area. It generally concludes that few new sites for major power plants will be needed in the near term. It also concludes that small co-generation projects (those projects that combine power generation with other industrial processes) are likely and are very desirable because of increases in fuel efficiency and reductions in air emissions. It is necessary, therefore, to insure that the designations of this report do not substantially interfere with the promotion of such projects.

In order to determine which areas are unsuitable for power plants, BCDC must first determine what size and type of power plants are likely to be proposed within the Bay Area. Section III-A (page 21) discusses the types of facilities that are likely to be proposed, and concludes that 1,600 megawatt (MW) coal- or oil-fired plants may be proposed in Suisun Bay, but that smaller

plants (800 MW or less) are likely in San Francisco Bay because of constraints on the size of the cooling systems.

The adverse effects of the major power plants identified are discussed in Section IV (page 27).

The effects of those power plants are of concern because of the impacts on the resources of the Bay. The resources and priority use areas identified by BCDC's legislation and plans as most important to the Bay Area are analyzed in Section V (page 35). The most important areas are designated as unsuitable for power plants where the adverse effects of a major plant would conflict with the policies. These areas include important natural resources such as the surface of the Bay, marshes, public access areas such as parks, and priority use areas such as water-related industrial use areas.

Specific description of the designation process is provided in Section VI (page 57). Definitions of each type of partial designation are provided as well as descriptions of the areas that could not be designated by the terms of the legislation.

Because of time and funding constraints, a complete set of all the resource maps cannot be provided with each copy of the report. A summary map showing the areas designated is provided, however, and Section VII (page 66) provides a written description of each area that was mapped.

B. Legislative Mandate

The legislation containing the Suisun Marsh Preservation Act of 1977 (Marsh Act) also defines the respective roles of BCDC and the Energy Commission in the regulation of power plant siting in the San Francisco Bay Area. Under this legislative scheme (Government Code Section 66645(b)), BCDC

is required to designate those areas within its jurisdiction that are not suitable for power plants. Although the Energy Commission is the sole permitting authority for power plants, it is prohibited from approving any power plant within the areas designated in this report as being unsuitable by BCDC. Ancillary or minor support facilities can be approved by the Energy Commission in BCDC-designated areas, but only if BCDC first finds that the proposed facility would not be inconsistent with the primary use of the land and that there would be no substantial adverse environmental effect.

The specific legislative mandate for designating those areas that are unsuitable for power plants is found in Government Code Section 66645(b):

> After one or more public hearings, and prior to January 1, 1979, the commission shall designate those specific locations within the Suisun Marsh...or the area of jurisdiction of the commission, where the location of a facility, as defined in Section 25110 of the Public Resources Code [includes transmission lines and thermal power plants larger than 50 MW and any appurtenances thereto], would be inconsistent with [the McAteer-Petris Act or the Suisun Marsh Preservation Act]. The following locations, however, shall not be so designated: (1) any property of a utility that is used for such a facility or will be used for the reasonable expansion thereof; (2) any site for which a notice of intention to file an application for certification has been filed pursuant to Section 25502 of the Public Resources Code prior to January 1, 1978, and is subsequently approved pursuant to Section 22516 of the Public Resources Code; and (3) the area east of Collinsville Road that is designated for water-related industrial use on the Suisun Marsh Protection Plan Map. Each designation made pursuant to this section shall include a description of the boundaries of such locations, the provisions of [the McAteer-Petris Act or the Suisun Marsh Preservation Act]...with which they would be inconsistent, and detailed findings concerning the significant adverse impacts that would result from development of a facility in

> the designated area. The commission shall consider the conclusions, if any, reached by the State Energy Resources Conservation and Development Commission in its most recently promulgated comprehensive report issued pursuant to Section 25309 of the Public Resources Code. The commission also shall request the assistance of the State Energy Resources Conservation and Development Commission in carrying out the requirements of this section. The commission shall transmit a copy of its report prepared pursuant to this subdivision to the State Energy Resources Conservation and Development Commission.

C. Major Assumptions of Report

For the purposes of this study, "facility" is used as defined in the Warren-Alquist State Energy Resources Conservation and Development Act (Warren-Alquist Act):

> "Facility" means any electric transmission line or thermal powerplant, or both electric transmission line and thermal powerplant, regulated according to the provisions of this division. (Public Resources Code Section 25110)
>
> "Thermal powerplant" means any stationary or floating electrical generating facility using any source of thermal energy, with a generating capacity of 50 megawatts or more, and any facilities appurtenant thereto. (Public Resources Code Section 25120)

The wide range of types and sizes of power plants and related equipment and structures that are included within the definition of "facility" (e.g., any power plant larger than 50 MW in size and any appurtenance thereto) raises the question of what "facility" should be used in evaluating whether an area should be designated. If the most minor appurtenance that could be a "facility" was used as a standard, then no areas would be designated. If the largest, most destructively designed plant ever conceived was used as the standard, however, then the entire jurisdiction of BCDC would be completely

designated. Clearly, neither of these extremes was intended by the Legislature. The statutory framework assumes that both the Energy Commission and BCDC will have strong, albeit separate, roles in siting decisions around the Bay. To reach that result, the following assumptions should govern the designation process:

-- The type of facility used to determine consistency should be a thermal power plant of the type that can reasonably be anticipated to be proposed in the Bay Area based on the projections and experience of the Energy Commission;

-- Only those areas should be designated that contain such sensitive resources or are of such value for other higher priority uses that one would not anticipate approval of a power plant in that location based on the policies of the Bay Plan and the Marsh Plan. Where it is clear that simple realistic mitigation measures could make such a plant acceptable, the area should not be designated and reliance should be placed on BCDC's participation in the permit process of the Energy Commission. The possible mitigation measures considered, however, do not include relocation of the plant outside of the area designated.

D. Partial Designations

One major purpose of the Warren-Alquist Act was to concentrate all permit processing for power plants in the Energy Commission. To the extent

that BCDC must first find that no substantial adverse environmental effect will take place from a minor ancillary facility in a designated area before the Energy Commission can approve an associated power plant outside the area, a two-agency permit process results.

To avoid this duplication wherever possible a further refinement of the designation process is presented in this report. Referred to as "partial" designations, an area is designated as unsuitable for all power plant facilities, but certain well-defined ancillary or support facilities are not designated. This will only apply to those areas where impacts are easily identifiable and would be limited in nature. It also can apply where simple mitigation measures would eliminate any adverse effects. For example, in some areas it is clear that a power plant would be inconsistent with BCDC's mandate but conduits for the cooling system would be acceptable given sufficient mitigation measures. In such a case, the area would be designated for the purposes of all "facilities" except intake and discharge conduits for the cooling system. It is anticipated that whatever mitigation or control measures will be required for those ancillary facilities would be imposed through BCDC's participation in Energy Commission certification procedures.

A second type of "partial" designation is used where the area is designated not because of the adverse effects of a power plant on the natural resources of the site, but because the site is more valuable for some other similar developed use such as the water-related industrial priority use areas. In these situations, designation is only needed to protect the primary use of the land for that priority use and not to avoid adverse effects on resources. In those places, partial designations have been used to permit

those "facilities" that will not interfere substantially with the primary use of the site, such as cooling system conduits and co-generation facilities.

Although this partial designation procedure is not required (i.e., the purpose of the exception procedure in Public Resources Code Section 25526(b) is to permit just such facilities), it will further the Legislature's intent by retaining the Energy Commission as the sole permitting authority for power plants. In this first round of designations, the partial designation system is not very sophisticated and only those ancillary or minor facilities that could easily be defined were excluded from the designations. It is anticipated that these partial designations will be expanded during future revisions of the designations to further reduce any possible duplication of permit functions with the Energy Commission.

E. BCDC Biennial Revisions

Government Code Section 66645(c) requires the Commission to revise and update its designations every two years. These biennial revisions will give the Commission an opportunity to update the designations as more resource data becomes available, as technology is improved, as greater sophistication is achieved in defining ancillary facilities that may be the subject of partial designations, and as the Energy Commission revises its energy forecasts and site planning activities.

F. Summary of Designations

A complete discussion of the resource areas designated as unsuitable for power plants or "partially designated" is found in Part IV. Below is a listing of those resource areas that have been fully designated. Ancillary facilities may still be approved in such areas, but only if BCDC first makes the findings required by Public Resources Code Section 25526(b):

- Existing and Proposed Parks
- Existing and Proposed Wildlife Areas
- Public Access Areas
- Areas Designated for Wildlife Area Priority Use in the Bay Plan
- Areas Designated for Waterfront Park or Beach Priority Use in the Bay Plan including marinas, fishing piers, and boat launching ramps.
- Primary Management Area of the Suisun Marsh
- Tidal Marshes
- Riparian Vegetation
- Rare and Endangered Species Habitat
- Shellfish Beds
- Marine Mammal Haul-Out Areas
- Anadromous Fish Streams
- Fish Spawning Areas
- Juvenile Fish Nursery Areas

Below is a list of those areas that have been partially designated and the ancillary facilities that have been specifically excluded from the designation. BCDC approval is not needed for any of the ancillary facilities listed, but it is anticipated that BCDC policies concerning the development of such facilities will be incorporated into the decisions of the Energy Commission.

- <u>Areas Designated for Water-Related Industrial and Port Priority Use in the Bay Plan</u>. Electric transmission lines, intake and discharge lines for

cooling systems, fuel pipelines, steam pipelines, and co-generation facilities.

-- Areas Designated for Airport Priority Use in the Bay Plan. Intake and discharge lines for cooling systems, underground electric transmission lines, fuel pipelines, and steam pipelines.

-- Water-Related Industry Site in the Secondary Management Area of the Susiun Marsh Protection Plan. Electric transmission lines, intake and discharge lines for cooling systems, fuel pipelines, steam pipelines, co-generation facilities.

-- Surface Waters of the Bay, Secondary Management Areas in the Suisun Marsh Except for the Water-Related Industry Site, Lowland Grasslands in the Suisun Marsh, Salt Ponds, and Shell Deposits. Underground or underwater electric transmission lines, intake or discharge lines for cooling systems, underground or underwater fuel pipelines, underground or underwater steam pipelines.

-- Mudflats, and Areas Precluded by Water Quality Control Plan. Underground or underwater electric transmission lines, intake or discharge lines for cooling systems that pass completely through the area, underground or underwater fuel pipelines, underground or underwater pipelines.

— Migratory Fish Routes. Electric transmission lines, intake or discharge lines for cooling systems that pass completely through the area, underground or underwater fuel pipelines, underground or underwater steam pipelines.

II. COORDINATION WITH THE ENERGY COMMISSION

A. Energy Commission's 1983 Biennial Report.

The San Francisco Bay Conservation and Development Commission is required to coordinate its designations with the forecasts developed by the Energy Commission defining the need for new power plants. Government Code Section 66645(d) requires BCDC to "consider the conclusions, if any, reached by the State Energy Resources Conservation and Development Commission in its most recently promulgated comprehensive report...."

The most recent comprehensive report issued by the Energy Commission is the 1983 Biennial Report. Although that report does not give BCDC specific guidance concerning the number or types of power plants that will be needed within BCDC's jurisdiction it does contain the energy Commission's adopted forecasts, policies and priorities. It should be noted that PGandE prepares its own long-term forecasting.

The Energy Commission has recently held hearings on revised forecasts of peak electric demands, which largely determine the need for generating capacity. The proposed forecast for the PGandE and Sacramento Municipal Utility District (SMUD) service areas, for inclusion in the 1985 Biennial Report, shows the following peak demands:

1989 - 17,374 Megawatts

1996 - 19,423 Megawatts

2004 - 21,698 Megawatts

To meet these peak load demands, the Energy Commission anticipates that about 8,300 megawatts of new generating capacity will have to be provided

between 1983 and 1996 to account for reserve margins, demand growth, displacement of oil and gas-fired units, retirement of older units, and reductions in transfers of electricity from other systems. The 1983 Biennial Report does not specifiy how these capacity increases will be met by PGandE and SMUD because the Energy Commission is prohibited from mandating the way in which a utility will meet demands. Nevertheless, the text and aggregate forecasts for the entire state of expected types of power plants in the year 1996 indicate that new sites for major new power plants within BCDC's jurisdiction in the reasonable future are not expected beyond those already being processed by the Energy Commission. The most likely increased generating capacity within BCDC jurisdiction other than those already being processed, would included wind generation, co-generation facilities, and the repowering of existing obsolete facilities.

The Energy Commission's 1983 Biennial Report also encourages the development of alternate energy sources such as wind generation. The Commission recognizes the desirability of such projects but has not included them within this report. They are not thermal power plants and therefore are not a part of the statutory scheme for thermal power plant siting, of which this report is part.

B. Continuing Coordination with Energy Commission

Since BCDC adopted its first designations in 1978, the staff has continued to work with the staff of the Energy Commission. During that period the staff of the Energy Commission has prepared a study entitled "Opportunities

to Expand Coastal Power Plants in California," 1981. The focus of these studies was to determine whether the designations of BCDC or the Coastal Commission prohibited the reasonable expansion of existing power plants or the siting of new plants. The reports concluded that the BCDC designations did neither.

One result of the studies, however, was the adoption of a joint resolution in 1982 by the Energy Commission, the Coastal Commission, and BCDC concerning the priorities for the development of power plant sites along the coast of the State. The following priorities were established in order of preference:

"1. Expand Facilities Within Existing Power Plant Sites. This option should be considered first because, in most cases, expansion would minimize adverse environmental impacts to coastal and Bay resources and increase the efficient use of existing energy facilities.

"2. Develop New Sites Adjacent to Existing Sites. This option is similar to Priority No One, although it may result in more environmental impacts. It also encourages consolidation of new energy facilities with existing facilities.

"3. Develop New Sites in Undeveloped Areas. Development of opportunities in this priority option will generally result in greater environmental impacts than Priority Nos. One and

Two. However, to the extent adverse impacts can be adequately mitigated, development of opportunities in this priority could be an acceptable, although less preferable, option.

"4. Develop New Sites in Undesignated Areas Which Require Ancillary Facilities in Designated Areas. Power plant development of any type should be avoided in designated areas. However, ancillary facilities could be allowed through designated areas if coastal resources are protected according to the requirements of Public Resources Code Sections 25526 and 30413, and Government Code Section 66645.

"5. Develop New Sites in Designated Areas. The California Coastal Commission and the San Francisco Bay Conservation and Development Commission have designated certain coastal and bay areas as unsuitable for power plant siting because thermal power plants cannot be sited in these areas consistent with the Coastal Act or McAteer-Petris Act coastal resource protection policies (Public Resources Code Section 30413(b)), Government Code Section 66656(b)). Siting should only be allowed in these areas after:

"a. A determination that the coastal or bay site has greater relative merit than available inland sites, as required by Public Resources Code Section 25516.1, or Government Code Section 66646;

"b. A determination that the requirements of Public Resources Code Section 25526, requiring that the proposed development be consistent with the primary use of the land, that there will be no substantial adverse environmental effects, and approval of any public agency having ownership or control of the land is obtained, can be met; and

"c. A determination that development of opportunities in coastal and Bay siting Priorities Nos. One, Two, Three, or Four are not feasible (as defined by Public Resources Code Section 30108)."

C. Co-generation

Given the potential significance of co-generation projects in the industrialized portions of the Bay Area, additional consideration should be given to encouraging such projects. Co-generation is a broad term that covers a number of technologies that allow the recapture of waste heat from electrical generation or industrial processes for useful purposes. "Topping cycle" technology involves using the waste heat from the turbines of an electrical

generating unit for industrial process steam and the space heating needs of buildings near the generating unit. "Bottoming cycle" technology involves using recovery of high temperature waste heat from an industrial process to produce steam and run turbines to generate electricity (Source: California Energy Trends and Choices, Vol. I, p. 114, Energy Commission, 1977).

The fuel needed to "co-generate" the electric and thermal loads is generally less than would have been required to generate these products separately, thereby conserving energy and reducing overall air emissions. It should be noted that co-generation projects using a topping cycle involve increased fuel usage at the project site over that required for the generation of the electricity alone and, therefore, may have increased difficulty meeting new source air pollution review standards. The overall improvements in both emissions and energy conservation, however, make such technologies desirable, and the Energy Commission's Biennial Report encourages such projects. It is therefore incumbent upon BCDC to ensure that its designations do not unduly hinder or interfere with the development of such projects.

Few conflicts should arise because of BCDC's limited shoreline jurisdiction; most potential co-generation projects that are large enough to be classified as facilities will be outside of the geographical area of this study or on developed areas of the shoreline that are not designated at all. Those portions that would be within areas of concern to BCDC are most likely to be minor ancillary facilities such as pipelines for the cooling system. Most of these would be covered by partial designations permitting exclusive control by the Energy Commission or would be subject to the exception procedure of Public Resources Code Section 25526(b). That section permits

minor ancillary facilities to be approved in designated areas if BCDC first finds that they are not inconsistent with the primary use of the land and that there will be no substantial adverse environmental effects. Unnecessary duplication of Energy Commission permit functions is possible, however, in the priority use areas reserved for water-related industries and to a lesser degree in ports. To avoid such duplication, those areas have only been partially designated; permitting co-generation projects to be evaluated exclusively through the Energy Commission's procedures although designated as unsuitable for major power plants. The rationale for such a partial designation is that legitimate co-generation projects are unlikely to significantly pre-empt much of the area designated for such an industrialized priority use.

D. Municipal Utilities

None of the municipal utilities in the Bay Area (Alameda, Palo Alto, and Santa Clara) have indicated any plans for any electrical generating capacity within BCDC's jurisdiction that was large enough to fall under the definition of "facility". Therefore, none of the designations proposed herein should directly affect those utility operations within the near future. In addition, it is anticipated that such utilities would be most interested in co-generation facilities. As noted above, these designations should not hinder such projects.

III. TYPES OF FACILITIES ANTICIPATED

A. Present Proposals

In order to determine what areas are unsuitable for power plants, it is first necessary to determine what size and type of power plants are likely to be proposed in the Bay Area. To determine what types of facilities might reasonably be proposed, it is instructive to review what is currently being proposed by PG&E. At the present time, the Energy Commission is reviewing four PG&E proposals for energy generating facilities. A 1,600 MW coal-fired plant covering about 330 acres of a 1,150-acre site at Collinsville (the solid waste disposal area associated with that plant is not within BCDC's jurisdiction but covers another 800 acres of a 3-square-mile site) is the largest being proposed. A 1,600 MW combined cycle power plant covering about 200 acres is being proposed at Pittsburg. In addition, a 400 MW combined cycle project is proposed for San Francisco (alternative locations for that plant are in north San Jose and Brisbane), and 300 MW of gas turbine capacity is proposed for Oakland. The 400 MW combined cycle project would require between 10 and 20 acres of land depending upon the cooling system used.

1. Cooling System

Of the projects proposed by PG&E, only the 400 MW combined cycle project proposed at the Potrero site in San Francisco would use a once-through cooling system. The other plants that use water for cooling have evaporative cooling towers and would use either brackish water from Suisun Bay (Pittsburg and Collinsville) or effluent from waste water treatment plants (San Jose and Brisbane).

It is apparent from the above that power plants of at least 1,600 MW are foreseeable in the Suisun Bay area. Cooling towers are proposed because of the higher cost of meeting water quality standards for once-through cooling systems. In San Francisco Bay, power plant generating capacity would depend primarily on constraints on the cooling systems (i.e., it is assumed that air quality problems can be overcome by purchasing and eliminating other sources of emissions; an expensive but feasible alternative).

Traditional once-through cooling systems using San Francisco Bay water are technically feasible, but can probably only be expected for power plants of less than about 800 MW (if at all) because of the cost and difficulty of meeting water quality standards and the difficulty of avoiding recirculation of the cooling waters through the system (the 800 MW figure is approximate and was arrived at in discussions with PG&E siting personnel).

Evaporative cooling towers using San Francisco Bay waters could be used for much larger plants, but in addition to the problems of meeting water quality standards, other operating and environmental problems will be encountered because of the salinity of Bay waters. Corrosion of the towers will require more maintentance or the addition of chemicals to control it. Such chemicals and the salt that is concentrated in the water circulated through the tower is emitted from the tower in small airborne droplets of water called drift. Depending upon the volume emitted and the constitutents of the drift, it can have significant effects on surrounding vegetation. The effects of entrainment on larval marine organisms may also be substantial, depending upon the location of the plant, because the high salinity of San Francisco Bay water reduces the number of times it can be recirculated through

the cooling tower before corrosion problems become serious. The fewer times the water can be recirculated increases the amount of water needed, and consequently increases environmental impacts. There are few cooling towers using water with ocean-level salinities, however, so little information is available on technical problems that may be encountered. Given this limited information, it appears reasonable at this time to assume that 800 MW represents about the maximum size of plant that can be anticipated within San Francisco Bay.

Other types of electric generating technology, of course, do not require use of Bay water for cooling and therefore the problems discussed above would not represent a constraint. Cooling systems that use effluent from waste water treatment plants have also been proposed. These would eliminate the need for intake lines in the Bay and consequently entrainment impacts as well. The use of dry cooling towers is being considered in other parts of the country. These technologies, however, either have their own constraints (e.g., availability of waste water, high costs, etc.), or do not require a location near the Bay because they do not require Bay water for cooling. Only power plants that require large amounts of Bay water for cooling are considered a priority use under the McAteer-Petris Act; any other type of power plant would not be granted special status under that legislation. Such plants are therefore not considered further.

The relatively small amount of fresh water needed for the boilers and other miscellaneous plant processes are assumed to be available from freshwater suppliers such as municipal utilities.

2. Fuels and Solid Wastes

It has been assumed that the power plants proposed within BCDC's jurisdiction would utilize combined cycle units or oil- or coal-fired steam turbines. Seismic and population constraints, as well as existing state legislation, are assumed to exclude nuclear power plants from BCDC's jurisdiction.

Fuel supplies are assumed to arrive by land; coal to arrive by rail; and oil and other distillate fuels by pipeline from existing refineries or petroleum terminals. There is the possibility that at some time in the future it may be necessary to transport some fuels directly to a power plant site by ship or barge (e.g., Alaskan coal); thereby permitting the power plant to locate in a water-related industrial priority use area. However, the availability of existing marine terminal, rail and pipeline systems in the Bay Area appears adequate to supply such fuels for a reasonable period of time. Consequently, new power plants should not require water frontage for transportation. If the Energy Commission determines that such supply routes are necessary in the future, it would be appropriate to modify this report accordingly in one of the biennial revisions.

Fuel storage is assumed to take place at the site, but it is assumed that solid waste disposal for coal-fired plants would take place outside the jurisdiction of BCDC. The 1,600 MW coal-fired plant proposed at Collinsville, for example, would produce about 20,000 acre-feet of solid wastes over its lifetime and it is assumed that disposal of such a quantity along the Bay shoreline would be excessively costly, and environmentally prohibitive.

B. Anticipated Power Plant Characteristics

Given these assumptions, the following range of characteristics for potential power plants within BCDC's jurisdiction is used in this report. The numbers are very rough approximations and only indicate the general magnitude of characteristics noted. The size of a plant site, for example, can be expanded to over 1,000 acres to provide parking lots, buffer zones, etc., and water requirements can be changed substantially depending upon the concentration factors used in operating the cooling towers.

Suisun Bay

Size: 1,600 MW

Type of Generating Unit: Coal- or oil-fired steam turbine, or combined cycle

Cooling System: Evaporative cooling towers

Size of Site: 200 - 400+ acres

Cooling System Water Requirements: Intake 30 - 50,000 acre-feet/year; Discharge 20 - 30,000 acre-feet/year

San Francisco Bay

Size: 800 MW

Type of Generating Unit: Coal- or oil-fired steam turbine, or combined cycle

Cooling System: Once-through or evaporative cooling towers

Size of Site: 50 - 150+ acres

Cooling System Water Requirements:

Once-through: 500 - 700 cubic feet/second

Cooling Towers: Intake 15 - 25,000 acre-feet/year
Discharge 10 - 15,000 acre-feet/year

San Pablo Bay

Given the salinity gradient that occurs across San Pablo Bay, cooling system constraints would vary depending on location and plant characteristics would fall between those noted for Suisun and San Francisco Bays.

IV. ENVIRONMENTAL EFFECTS OF POWER PLANTS

Although there are an incredibly vast range of environmental effects caused by power plants (an Energy Commission table listing environmental impacts and mitigation measures runs for over 300 pages), the purposes of this study and the nature of BCDC's legislative mandates limit the effects that need to be considered to those that are likely to be substantial.

The resources that are protected under the terms of the McAteer-Petris Act, the Marsh Act, the Bay Plan and the Marsh Plan, fall generally into the following categories: fish and wildlife resources; public access; and industrial and otherwise highly developed priority use areas. The primary impacts of a power plant on those resources result from (A) destruction of the resource by placing the power plant facilities on top of them; (B) construction activities required to build a power plant often involving the use of heavy equipment on an area greater than that required for the plant itself; (C) operation of the cooling system; and (D) visual effects of such a major industrial facility. There are obviously other impacts of major concern with respect to particular resources, but the discussion focuses on the direct effects listed above.

A. Conversion of Land to Power Plant Site

The direct effect of converting a given number of acres of a resource into a power plant site is the most obvious of adverse environmental effects. The primary purpose of establishing BCDC was to stop indiscriminate filling of San Francisco Bay, including its marshes and mudflats. That mandate was

extended to include protection of the critical habitat areas of the Suisun Marsh by the Suisun Marsh Preservation Act of 1977. Such a mandate was necessary because 40 percent of the original surface area of the Bay has been diked off or filled.

At the same time, the Legislature in the McAteer-Petris Act recognized that the economy of the region demanded additional industrial growth and permitted limited fill for the development of water-oriented industrial activities. Particular emphasis was placed on ports, water-related industrial uses, airports, recreation and wildlife areas; uses that were considered so significant that areas of the Bay shoreline were to be set aside for those uses. These priority use areas were identified in the Bay Plan and cannot be used for any purpose that would effectively preempt that land area for any use other than the designated use. The construction of a power plant would convert between 50 and 400 acres of priority use areas or other resource areas recognized by the policies governing BCDC, to a use not contemplated by the Bay Plan or the Marsh Plan.

B. Construction Impacts

Effects on natural resource areas are also caused by the construction activity itself. Although such temporary impacts would not be inconsistent with the primary use of industrial areas, their effects may be permanent in sensitive areas such as marshes and parks. The area affected by construction activities is ordinarily much larger than the size of the resulting facilities. Construction laydown areas, storage areas, and parking areas for the large numbers of construction workers, as well as the roads, rail lines and utility corridors needed to construct any large-scale power generating

facility will directly, and, in many cases, permanently affect substantial land areas. The effects can be reduced by careful site planning and mitigation techniques, but they cannot be eliminated. The effects of operating heavy equipment on sensitive areas such as marshes, is such that those areas may never recover completely, or take such a long time to recover that the effects are similar for all practical purposes.

Even where such effects are temporary, the construction period may be of such a length that the disruption is not acceptable given the importance of the resources identified by the Bay Plan and the Marsh Plan. For example, a "temporary" disruption lasting several years would have substantial adverse impacts to a heavily-used public access area given the importance of those areas around the densely-populated Bay.

C. Impacts of Cooling System

The once-through cooling systems traditionally proposed for power plants along the coast and within enclosed bays, such as San Francisco Bay, have been among the most environmentally destructive aspects of power generating facilities. Once-through cooling systems created enormous impacts from both the entrainment and mortality of much of the aquatic life in the large volumes of water needed to cool the plants and the discharge of thermal wastes. Although these impacts have been significantly reduced by recent state and federal water quality standards, impacts on important resources may still be substantial depending upon the specific location of the power plant and its intake and discharge lines.

The main adverse effects that are caused by the construction and operation of the cooling systems include: (1) habitat destruction and

turbidity caused by construction and associated dredging for the intake and outfall pipelines; (2) entrainment of marine organisms; (3) discharges of thermal waste; (4) discharge of the concentrated blowdown from cooling towers; and (5) salt drift from cooling towers. The magnitude of these effects depends to a great extent on the type of system proposed, its location and the volume of water used. The effects of a cooling system would be significant in the areas that have been designated.

Once-through cooling systems will have entrainment and thermal discharge impacts that are orders of magnitude greater than systems using cooling towers. The impacts of entrainment on adult fish have been reduced by the construction of traveling screens, fish diversion systems, and better design of intake structures, but the entrainment and mortality of larval and juvenile forms is still substantial. This is particularly true in enclosed bays that are part of a major estuarine system. Water quality standards have also reduced the impacts caused by thermal discharges by limiting the maximum difference in temperature between the discharged water and the receiving waters, but such effects can still be significant depending upon the sensitivity of the specific area. Construction impacts of building the intake and discharge lines are also likely to be substantially greater because of the size of the conduits themselves and the extensive diffusers needed to disperse the thermal wastes.

Evaporative cooling towers have less impacts than once-through systems, but they may still be substantial. Entrainment of larval and juvenile forms of marine organisms and their mortality will be substantial if, for example, the intake is located near sloughs, marshes, or spawning areas.

The discharge of blowdown from cooling towers (salts and other chemicals are concentrated in the water circulated through cooling towers and some water must be discharged or "blowndown" when the concentrations get too high) into a water body is less likely to cause major thermal problems because most of the heat is lost through evaporation. Problems may arise, however, depending upon the exact location of the discharge system. The blowdown is likely to be somewhat more toxic because of the higher concentration of salts and the chemicals that are used to reduce corrosion and scale buildup in the towers. Any significant diversion of water, such as occurs through evaporation in large cooling towers, may also affect the salinity of areas around Suisun Bay and the Sacramento River Delta, especially during periods of low flow.

Salt drift from cooling towers using water of ocean-level salinity may be one of the most significant environmental problems if entrainment problems are reduced by careful location. Manufacturers of cooling towers are now guaranteeing a drift rate of .002 percent and tests at some operating towers have shown slightly lower rates (.001 percent and .0005 percent). Given the differences in salinity between the waters of Suisun Bay, San Pablo Bay, and the remainder of San Francisco Bay (maximum surface salinities vary generally from about 1,500 ppm at the east end of Suisun Bay, 20,500 ppm at the west end of the Carquinez Straits, 26,000 ppm in the middle of San Pablo Bay, to 32,500 ppm at the Golden Gate), salt drift rates can vary substantially. Salt burns on vegetation and corrosion problems may result downwind of cooling towers using salt waters. The magnitude of these drift problems has not been well documented because experience with brackish and ocean water cooling towers has been limited.

The water droplets that carry salt from cooling towers also carry other chemicals. Various types of chemicals are used for controlling corrosion, controlling bacterial growth, reducing salt deposition, preventing scaling, corrosion and cracking in boilers, etc., and these can be found in the cooling water. When emitted in the drift from cooling towers and deposited on the surrounding land, such chemicals can have an adverse effect on vegetation depending upon the types of chemicals used and their quantities.

D. Air Pollution

Air pollutants emitted from power plants are obviously one of the major adverse impacts of such facilities. The adverse effects on health and property caused by air pollution has been extensively documented. The effects of power plants on the air quality of the air basin have not been included within this report, however, for two main reasons: (1) the McAteer-Petris Act and the Bay Plan have few specific policies dealing with air pollution, presumably on the assumption that the Air Resources Board and the Bay Area Air Pollution Control District were in a better position to comprehensively regulate air emissions; and (2) the Air Resources Board's current policy regarding air quality tradeoffs, makes it virtually impossible in the absence of a specific proposal to determine whether a power plant at any given location would violate air quality standards.

Power plant emissions can also have adverse effects on specific resources located near the plant. Marsh vegetation or other sensitive wildlife habitat, resources specifically protected by the McAteer-Petris Act, can be adversely affected by air pollutants. With the exception of the constituents of drift from cooling towers, however, these adverse impacts have

not been used in designating areas as unsuitable for power plants. The reasons for this are two-fold: (1) The criteria chosen for designating unsuitable areas in this study were those which could be readily mapped, and time and staff constraints were such that the sophisticated study necessary could not be completed in time to take these factors into account; and (2) the emissions tradeoff policy of the Air Resources Board makes such determinations virtually impossible unless a specific proposal is made. The effects of cooling tower drift is in a somewhat different category because the effects are more localized and there are few existing industrial facilities that utilize cooling towers in the same magnitude. Because of the difficulties of mapping, however, even in the case of cooling tower drift, only the actual boundaries of the resources that would be adversely effected are designated. The biennial revisions to this report may permit a more sophisticated evaluation of these effects.

E. Visual Impacts

The visual impact of power plants can be substantial even within industrial settings. Anyone who has traveled in the Suisun Bay area has noted how much the existing power plants at Pittsburg and Antioch dominate the shoreline, even among the other industrial facilities of the Contra Costa waterfront. The main buildings themselves are extremely large, and the transmission lines and the tall stacks (usually necessary to meet air quality standards near the plant site) create an impact greater than most shoreline facilities, with the possible exception of oil refineries. Such visual impacts can be reduced through careful siting, architectural treatment and

landscaping, but the impacts cannot be eliminated. In any setting that is not heavily industrialized, especially in a flat, expansive landscape, the effects will be substantial.

V. CRITERIA AND POLICIES USED FOR DESIGNATIONS

A. Procedure

Given the types of power plants that can be anticipated and their impacts, it is necessary to analyze BCDC's plans and legislative mandates to determine where such power plants would not be suitable. The policies can be divided into two groups. The first group is made up of critical habitat and natural resources such as marshes and spawning areas. The second group consists of priority use areas such as water-related industrial use areas and public access areas. All of the relevant areas were analyzed to determine which would be suitable for partial designations, permitting minor support facilities associated with power plants. After the areas protected by the policies were mapped, the results were evaluated with respect to the need for power plants identified by the Energy Commission. As sufficient areas remained to provide siting options, all of the policies identified below were used in the designation process.

The designation program was limited by two main factors. The criteria chosen had to represent mappable information and the information had to be readily available and reasonably accurate.

As noted above, no attempt has been made to evaluate the quality of individual resource areas or to prioritize the various policies contained in the Bay Plan. The shoreline areas available for siting power plants and the options available for ancillary facilities, either through the exception procedure contained in Public Resources Code Section 25526 or through the

partial designation process, allow sufficient siting options for the range of power plant sites forecast by the Energy Commission at this time. However, in the even that the Energy Commission determines that additional siting opportunities must be made available, BCDC will re-evaluate both the significance of the various policies and the quality of individual resource areas in the biennial revisions to this report.

Three sets of maps were drawn showing the important resources and priority areas protected by BCDC's plans and legislative mandates. The first set contains wildlife areas, parks and public access areas obtained through BCDC's permit process. The second set includes priority use areas identified on the Bay Plan, areas identified for protection in the Marsh Plan, and areas precluded by water quality objectives. The third set covers natural resources protected by the policies in BCDC's plans and legislative mandates. A fourth, summary, set of maps shows all designated and partially designated areas, based upon the three sets of resource maps.

B. Commission Jurisdiction

The inland boundary of the Commission's jurisdiction is not mapped in some areas. The boundary can be determined by referring to the description of the Commission's jurisdiction as defined in the McAteer-Petris Act:

> (a) San Francisco Bay, being all areas that are subject to tidal action from the south end of the bay to the Golden Gate (Point Bonita-Point Lobos) and to the Sacramento River line (a line between Stake Point and Simmons Point, extended north- easterly to the mouth of Marshall Cut), including all sloughs, and specifically, the marshlands lying between mean high tide and five feet above mean sea level; tidelands (land lying between mean high tide and mean low tide); and submerged lands (land lying below mean low tide).
>
> (b) A shoreline band consisting of all territory located between the shoreline of San Francisco Bay as defined in sub-

division (a) of this section and a line 100 feet landward of and parallel with that line, but excluding any portions of such ter- ritory which are included in subdivisions (a), (c) and (d) of this section; provided that the commission may, by resolution, exclude from its area of jurisdiction any area within the shoreline band that it finds and declares is of no regional importance to the bay.

(c) Saltponds consisting of all areas which have been diked off from the bay and have been used during the three years imme- diately preceding the effective date of the amendment of this section during the 1969 Regular Session of the Legislature for the solar evaporation of bay water in the course of salt production.

(d) Managed wetlands consisting of all areas which have been diked off from the bay and have been maintained during the three years immediately preceding the effective date of the amendment of this section during the 1969 Regular Session of the Legislature as a duck hunting preserve, game refuge or for agriculture.

(e) Certain waterways (in addition to areas included within subdivision (a)), consisting of all areas that are subject to tidal action, including submerged lands, tidelands, and marsh- lands up to five feet above mean sea level, on, or tributary to, the listed portions of the following waterways:

(1) Plummer Creek in Alameda County, to the eastern limit of the salt ponds.

(2) Coyote Creek (and branches) in Alameda and Santa Clara Counties, to the easternmost point of Newby Island.

(3) Redwood Creek in San Mateo County, to its confluence with Smith Slough.

(4) Tolay Creek in Sonoma County, to the northerly line of Sears Point Road (State Highway 37).

(5) Petaluma River in Marin and Sonoma Counties to its confluence with Adobe Creek, and San Antonio Creek to the easterly line of the Northwestern Pacific Railroad right-of-way.

(6) Napa River, to the northernmost point of Bull Island.

(7) Sonoma Creek, to its confluence with Second Napa Slough.

(8) Corte Madera Creek in Marin County to the downstream end of the concrete channel on Corte Madera Creek which is located at the United States Army Corps of Engineers Station No. 318 + 50 on the Corte Madera Creek Flood Control Project.

The areas under the Commission's jurisdiction by virtue of the Marsh Act have been mapped in the Marsh Plan.

The resource areas identified and mapped outside of the Commission's jurisdiction or within federal lands are for informational purposes only and are not intended to expand the jurisdiction of the Commission beyond that established by present law.

C. Map Set One: Wildlife Areas, Parks, and Public Access Areas

This set of maps includes: (1) existing national, state, and private wildlife areas (refuges and reserves); (2) existing national, state, regional, and local parks; (3) areas funded for acquisition as parks or wildlife areas; and (4) public access areas made available through the BCDC permit process.

1. Wildlife Areas

Areas managed by the California Department of Fish and Game include wildlife management areas and ecological reserves. These areas have been set up to "maintain sufficient population of all species of wildlife and the habitat necessary to achieve the beneficial use and enjoyment of wildlife by all citizens of the state, to perpetuate all species of wildlife for their intrinsic and ecological values, as well as for their direct benefits to man, and to provide for aesthetic, educational, and non-appropriative uses of the various wildlife species." (Fish and Game Code, 1977.)

The national wildlife refuges, administered by the United States Fish and Wildlife Service, were created to aid in the preservation of natural

resources, to provide educational opportunities, and to protect an important open space resource and other wildlife-oriented recreation opportunities.

These areas are protected by provisions in the Bay Plan and the McAteer-Petris Act. The latter states that "the nature, location and extent of any fill should be such that it will minimize harmful effects to the bay area, such as, the reduction or impairment of the volume, surface area or circulation of water, water quality, fertility of marshes or fish or wildlife resources..." (Chapter 1, 66605(d)). The Act also finds that wildlife refuges are one of the water-oriented land uses along the Bay that are essential to the public welfare (Government Code Section 66602).

The Bay Plan contains the following applicable policies:

> The benefits of fish and wildlife in the Bay should be insured for present and future generations of Californians. Therefore, to the greatest extent feasible, the remaining marshes and mudflats around the Bay, the remaining water volume and surface area of the Bay, and adequate fresh water inflow into the Bay should be maintained.
>
> Specific habitats that are needed to prevent the extinction of any species or to maintain or increase any species that would provide substantial public benefits, should be protected, whether in the Bay or on the shoreline behind dikes. Such areas on the shoreline are designated as Wildlife Areas on the Plan maps. (Fish and Wildlife Policies 1 and 2.)

Along with the state and national wildlife areas, the Audubon Society's Richardson Bay Wildlife Sanctuary has also been designated, because its resource value is similar to government-owned refuges.

2. Parks

Also designated in the first set of maps are all existing national, state, regional, county and city parks. The McAteer-Petris Act

defines "water-oriented recreation and public assembly" as one of the land uses along the Bay shoreline that are essential to the public welfare of the Bay Area. (Government Code Section 66602.)

The Bay Plan Policy on Recreation states:

> For parks, there is no practical estimate of the acreage that should be provided on the shoreline of the Bay, but it is assumed the largest possible portion of the total regional requirement should be provided adjacent to the Bay. (Recreation Policy No. 1.)

3. Funded Acquisitions

Proposed funded acquisitions for parks and refuges are also designated. Their value is essentially equivalent to existing parks and refuges as only those areas for which funding is reasonably assured have been designated.

4. Public Access Areas

Public access areas have been included in Map Set One. These are areas where public access has been obtained as a condition of a BCDC permit. The McAteer-Petris Act calls for "maximum feasible public access (to the Bay)..." (Government Code Section 66607.) The Bay Plan policies state:

> In addition to the public access to the Bay that will be provided by waterfront parks, beaches, marinas, and fishing piers, maximum feasible opportunity for pedestrian access to the waterfront should be included in every new development in the Bay or on the shoreline, whether it be for housing, industry, port, airport, public facility, or other use....Whenever public access to the Bay is provided as a condition of development, on fill or on the shoreline, the access should be permanently guaranteed." (Bay Plan Policies on Public Access Nos. 1 and 4.)

D. Map Set Two: Bay Plan, Marsh Plan, and Water Quality Control Plan Maps

The second set of maps contains designations based upon "high-priority uses of the Bay and shoreline" as mapped in the Bay Plan and the management areas of the Suisun Marsh as mapped in the Marsh Plan. It also contains areas under the San Francisco Bay Regional Water Quality Control Board's jurisdiction within the San Francisco Bay system where a power plant discharge would be precluded by water quality objectives.

1. San Francisco Bay Plan

Priority use designations (PUD's) in the San Francisco Bay Plan (Bay Plan) include ports, water-related industry, airports, wildlife areas, waterfront parks and beaches, marinas, fishing piers, and boat launching ramps. The Bay Plan recognizes that the Bay is a unit and must be treated as such in terms of the development of these facilities.

— PORTS AND WATER-RELATED INDUSTRIES: Shipping is a major factor in the economy of the Bay Area, and port planning must be coordinatred with developing adequate water-side sites for industries that require access to maritime transportation.

The Bay Plan states that land reserved for water-related industries should only be used by industries that use water for transportation and thereby gain significant economic benefits by fronting on navigable water (Bay Plan Policy on Water-Related Industry No. 1 and Finding a).

Both the Bay Plan and the McAteer-Petris Act make a clear distinction between the power plants anticipated for a reasonable period of time that only require access to water for cooling and water-related industries. The Bay Plan notes that both types of uses compete for waterfront sites, but concludes that industries requiring water only for cooling purposes should be located in adjacent upland areas. Pipeline corridors serving such facilities may be permitted within water-related industrial priority use areas provided that there is no conflict with present or future water-related transportation use of the site (Bay Plan Policy on Water-Related Industry No. 2).

- AIRPORTS: Airports favor a location close to the Bay so that planes may make takeoffs and landings away from populated areas, while still being close to centers of heavy population.
- WILDLIFE AREAS: Wildlife areas designated on the plan maps are specific shoreline habitats essential to wildlife considered valuable, either because the species is near extinction or it provides "substantial public benefits."

— WATERFRONT PARKS, BEACHES AND RECREATION FACILITIES: The need for recreational use of the Bay and shoreline is increasing as population and leisure time increase. The Bay Plan states that land near the Bay that may be needed for recreation in the future should be set aside now. In addition to parks, beaches, and trails this category includes marinas, fishing piers, and boat launching ramps.

2. Suisun Marsh Protection Plan

The Suisun Marsh Protection Plan (Marsh Plan) identifies "a primary management area encompassing the 89,000 acres of tidal marsh, managed wetlands, adjacent grasslands, and waterways...and a secondary management area of approximately 22,500 acres of significant buffer lands." (Letter of transmittal of Suisun Marsh Protection Plan, December 17, 1976.) Primary and secondary management areas are designated as unsuitable for power plants.

a. Primary Management Areas

The primary management area consists of bays, sloughs, tidal marsh, diked-off wetlands, seasonal marsh, and lowland grassland.

-- SLOUGHS: The sloughs are the most vulnerable aquatic habitat type in the Marsh. Disruption of either salinity, temperature, or turbidity could greatly change the character of the flora and fauna in the sloughs. While the whole

Marsh and Suisun Bay have a large population of Neomysis, a tiny bay shrimp, it is mostly concentrated in sloughs. Neomysis is the main food item for many species, including striped bass. Suisun Marsh is the chief nursery of striped bass in the state. Several other species of fish are found in the Marsh sloughs, including salmon, steelhead, catfish, sturgeon, shad, smelt, and crappies.

-- TIDAL MARSH: Tidal marsh includes the narrow strand outside the levees as well as other undiked areas. The dominant plant species, tule and bulrush, provide cover for nesting waterfowl. Because these plants grow along the tidal edge of the dikes and levees, they protect the levees from erosion. Fat hen, which occurs in some tidal areas, is an important food for ducks.

-- DIKED MANAGED WETLANDS: Eighty-nine percent of the Suisun Marsh consists of diked managed wetlands, which are mainly hunting preserves. Managed wetlands

provide habitat for many, if not all, forms of wildlife found in the tidal marsh. Alkali bulrush, fat hen, and brass buttons, all grown in abundance in managed wetlands, are three plants that are the primary food source for ducks attracted to the Suisun Marsh.

-- SEASONAL MARSHES: Seasonal marshes are the low-lying grasslands which are flooded by rains for three or four months per year. Small temporary ponds support seasonal marsh vegetation of the same types found in managed wetlands and tidal marshes, and have high habitat value for marsh-related wildlife. During the wet season, the ponds provide resting areas for migratory waterfowl.

-- LOWLAND GRASSLANDS: Lowland grasslands lie adjacent to the wetlands, between the five- and ten-foot contour level, and form an ecologically vital transition zone between the Marsh and the uplands. They are utilized by a variety of wildlife common to the marshes and upland grasslands. Many marshland species,

including the endangered Suisun shrew and Salt Marsh Harvest Mouse, move to the upland areas during high tides and the flooding of the managed wetlands. More plant species occur in the lowland grassland area than in the upland grasslands and the wetlands combined. Vernal pools, which exhibit unique species of plants during the spring months, are found in lowland grasslands as well as in other areas.

b. Secondary Management Area

The secondary management area consists of upland grasslands, cultivated lands, low-lying areas adjacent to the primary management area and one area reserved for water-related industry. Its function is to act as a buffer area insulating the primary management area from adverse impacts of urban development and other land uses incompatible with preservation of the Marsh.

-- UPLAND GRASSLANDS: Upland grasslands extend from the ten-foot contour level, where the land has not been disturbed, up to the wooded hill areas. They provide habitat for upland species as well as species who use both marsh and upland areas. Golden eagles and other

birds of prey, as well as several species of migratory waterfowl and shorebirds, are found in the upland grasslands. The main agricultural use of the area is for cattle grazing.

-- CULTIVATED LANDS: The cultivated areas in the secondary management area are some upper grasslands and higher portions of the managed wetlands. These areas still have significant wildlife value when grains are grown that provide food for wildlife, particularly birds. They act as a buffer in a way similar to the upland grasslands.

-- LOW-LYING ADJACENT "BUFFER" AREAS: In some cases, low-lying areas adjacent to the Marsh have been included because of special environmental conditions that could have significant adverse effects on the Marsh, or because there are important marsh-related habitats in the area.

-- WATER-RELATED INDUSTRY SITE: The Collinsville site, on the southeastern side of the Marsh, is reserved for

water-related industry. The PG&E site east of Collinsville Road is excluded from designation in this study by the terms of AB 1717.

3. Water Quality Control Plan

There are certain areas under the San Francisco Bay Regional Water Quality Control Board's jurisdiction where a power plant discharge would be precluded by water quality objectives. These are the Suisun Marsh, Richardson Bay, and all streams tributary to the Bay system, excluding the Sacramento and San Joaquin Rivers.

The Water Quality Control Plan for the San Francisco Bay Basin specifically prohibits discharge of wastewater to Suisun Marsh in the summer, and to Richardson Bay between Sausalito Point and Peninsula Point all year-round. Both of these areas are characterized by poor dispersion capabilities and low assimilative capacities.

Other areas where power plant discharges should not be allowed are the sloughs and predominantly freshwater rivers and creeks which flow into the Bay system, excluding the Sacramento and San Joaquin Rivers. In general these streams are too small to be able to assimilate any wastewater discharges.

As it is not practical to map all of the sloughs and small streams in BCDC's jurisdiction where the Water Quality Control Plan would prohibit discharges from power plants, only Richardson Bay is so mapped. However, all of the areas noted above that are within BCDC jurisdiction are designated, as indicated on page 61, for the purposes of this study to ensure that no dis- charges take place that may violate the provisions of the Water Quality Control Plan for the San Francisco Basin.

E. Map Set Three: Natural Resource Maps

The third set of maps shows designations made on the basis of eleven natural resources of such importance and sensitivity that they are protected by the policies of the Bay Plan or the McAteer-Petris Act. Included are surface waters of the Bay, marshes, salt ponds, mudflats, lowland grasslands, riparian vegetation, rare and endangered species habitat, shellfish beds, marine mammal haul-out areas, shell deposits, and important fish habitat.

— SURFACE WATERS OF THE BAY: The surface waters of the Bay (up to the line of highest tidal action) are designated as unsuitable for major power generating facilities, but intake and outfall lines for cooling systems, underwater electric transmission lines, and fuel and steam pipelines are permitted in those less sensitive portions of the Bay through partial designations. It is clear that there is sufficient land area surrounding the Bay that the only fill necessary for the construction of power plants is for such ancillary facilities. Under the McAteer-Petris Act, fill for any purpose (even for priority uses) cannot take place unless it is the minimum necessary for the project and there are no alternative locations. The Bay Plan states: "The surface area of the Bay and the total volume of water should be kept as large as possible in order to

maximize active oxygen interchange, vigorous circulation, and effective tidal action." (Water Surface Area and Volume Policy No. 1)

— MARSHES: Marshes have been divided into three sub-groups: Tidal marshes; seasonal marshes; and managed wetlands. The value of these habitats has been described in the previous section on the Suisun Marsh. The McAteer-Petris Act finds "That the nature, location and extent of any fill should be such that it will minimize harmful effects to the bay area, such as, the reduction or impairment of the volume surface area or circulation of water, water quality, fertility of marshes or fish or wildlife resources..." (Government Code Section 66605(d)) The Bay Plan contains several policies calling for the remaining marshes and mudflats around the Bay to be maintained (Fish and Wildlife Policies No. 1 and 2, Water Pollution Policy No. 1, Marshes and Mudflats Policy No. 1, Salt Ponds and Managed Wetlands Policy No. 2).

-- SALT PONDS: Salt ponds provide 14 percent of the total Bay water surface, and are an economically important use of the Bay. They are used as a habitat by shorebirds, and, along with other managed wetlands, moderate the climate and help

prevent smog. The Bay Plan states that salt ponds should be maintained in salt production as long as it is economically feasible, and if the owners of the salt ponds wish to withdraw them from production, the public should make every effort to purchase the ponds and reopen the area to the Bay (Salt Ponds and Other Managed Wetlands Policies No. 1 and 2).

- MUDFLATS: Mudflats are used heavily for feeding, either directly or through the food chain, by most marine life in the Bay. They are an important source of oxygen and help control air and water pollution (Marshes and Mudflats Policy No. 1).
- LOWLAND GRASSLANDS: Lowland grasslands, as described in the previous section on the Suisun Marsh, are an important transition zone between the Marsh and the uplands. They form a habitat for a variety of wildlife, including some endangered species, and are therefore designated under the McAteer-Petris Act (Government Code Section 66605(d)).
- RIPARIAN VEGETATION: Riparian vegetation is an important habitat for wildlife, particularly birds, who use it as a cover and for nesting. The plant canopy over the streams also serves as a

cover for aquatic species, and as a habitat for plant and animal species that form significant links in the food chain. The removal of the riparian vegetation would also result in a rise in water temperature, reducing the biological productivity of the water (Marsh Plan, Environment Policies No. 1 and 2).

-- RARE AND ENDANGERED SPECIES HABITAT: Rare and endangered species habitat are designated under the McAteer-Petris Act: "...the nature, location and extent of any fill should be such that it will minimize harmful effects to the bay area, such as, the reduction or impairment of the volume surface area or circulation of water, water quality, fertility of marshes, or fish or wildlife resources..." (Government Code Section 66605(d)).

-- SHELLFISH BEDS AND MARINE MAMMAL HAUL-OUT AREAS: Shellfish beds and marine mammal haul-out areas are designated by geographically-specific policies printed on the Bay Plan maps. These areas would also be protected under the McAteer-Petris Act which states: "...the nature, location and extent of any fill should be such that it will minimize harmful effects to the bay area, such as, the reduction or impairment of the volume surface area

or circulation of water, water quality, fertility of marshes, or fish or wildlife resources..." (Government Code Section 66605(d))

Policies of the Bay Plan are also applicable. "The benefits of fish and wildlife in the Bay should be insured for present and future generations of Californians...Specific habitats that are needed to prevent the extinction of any species, or to maintain or increase any species that would provide substantial public benefits, should be protected, whether in the Bay or on the shoreline behind dikes" (Fish and Wildlife Policies No. 1 and 2).

— SHELL DEPOSITS: Oyster shell deposits are dredged from the Bay floor primarily for use as lime in the production of cement. The Bay Plan finds: "Cement is expensive to transport over great distances, so a nearby source of lime is important to the Bay Area economy" (Shell Deposits Finding No. 2).

The shell deposits are also used as soil conditioner, cattle feed, and poultry grit.

According to the Bay Plan, "Filling or diking that adversely affect known shell deposits...should be

allowed only for purposes providing more public benefit than the availability of shells" (Shell Deposits Policy No. 1).

- IMPORTANT FISH HABITAT: For purposes of this study, important fish habitat is defined as follows:

  1. A one-half-mile arc around the mouth of an anadromous fish stream.
  2. Migratory fish routes. Only the Carquinez Strait has been designated as a critical passage for anadromous fish. While the boundaries of such routes are not easily definable, in the Carquinez Strait the channel is so narrow that the boundaries are clear.
  3. Spawning areas. The only information available is for herring, so only herring spawning areas have been designated in this study. As more information becomes available, this designation can be revised.
  4. Juvenile fish nursery areas. This includes the Napa River, sloughs of the Suisun Marsh, and shoreline areas as designated by Theodore Wooster in a Department of Fish and Game

report entitled Occurrence of Juvenile Forage and Game Fishes Over the Intertidal Mudflats of the San Francisco Bay Complex.

Important fish habitat is designated for the same policy reasons as rare and endangered species habitat, shellfish beds, and haul-out areas for marine mammals (see above).

F. Map Set Four: Composite Summary Maps

The fourth set of maps is an overlay of the first three sets and shows all of the areas completely or partially designated.

G. Criteria Not Mapped

There were many criteria covered by the policies in the Bay Plan, the McAteer-Petris Act, the Marsh Act and the Marsh Plan that were considered for mapping and for various reasons were not included.

Scenic views (Bay Plan, page 33) may be included in a future revision. While this criteria has great importance to the quality of public access, there was not sufficient time to do an adequate mapping of scenic views throughout BCDC's jurisdiction.

Fault zones (Bay Plan, page 15) were not mapped because it was assumed that the adverse effects could be successfully mitigated and that BCDC could rely on its participation in the procedures of the Energy Commission to assure that such mitigation is carried out.

Residential areas (Bay Plan, page 29) that would be incompatible with power plants were not mapped because insufficient time was available to determine standards that would form the basis for such maps. Until such time as

all of the factors necessary for confident designations can be established, a case-by-case determination will have to be made and implemented through participation in the siting procedures of the Energy Commission.

VI. DESIGNATIONS

A. General Designations

The resources protected by Bay Plan and Marsh Plan policies fall into two general categories: (1) those areas that possess natural resources that should not be disrupted by major industrial uses such as a power plant; and (2) those areas that have a higher priority for other forms of industrial or similar uses. The former category includes such areas as marshes, mudflats, wildlife refuges and parks. The latter category includes such areas as water-related industrial use and port priority use areas. As the primary purpose of protecting the latter areas is not to protect the natural character of the land or water, but to preserve it for other, more important, high-intensity uses, the approach of the designation process is different.

Where an area has more than one type of designation, due to the presence of more than one resource, the most stringent designation will take precedence.

B. Designations in Developed Priority Use Areas

Designations in water-related industrial use or similar priority areas are primarily intended to apply only to those "facilities" that are likely to significantly pre-empt or interfere with the use of the land for its primary purpose, such as a major power plant. Thus, where no other resource is identified within any of the following priority use areas, designation does not refer to the types of ancillary facilities noted:

- Water-related industrial priority use area: Electric transmission lines, intake and discharge lines for cooling systems, fuel pipelines, steam pipelines, and co-generation facilities.
- Port priority use areas: Same as water-related industrial use areas.
- Airport priority use areas: Intake and discharge lines for cooling systems, underground electric transmission lines, fuel pipelines, and steam pipelines.

C. Designations in Natural Resource and Recreation Areas

1. Full Designations

Most areas that possess natural resources protected by Plan policies are sufficiently sensitive that no significant industrial construction would be permitted. Hence, the designation of those areas is intended to prohibit all "facilities" unless they are ancillary to the main power plant and conform to the statutory language contained in Public Resources Code Section 25526(b) (i.e. "...such use is not inconsistent with the primary use of the land and that there will be no substantial adverse environmental effects..."). Given the sensitivity of most of these resources, it is not possible to make such findings in the absence of a specific proposal that must be evaluated on a case-by-case basis.

The areas designated in this category are:

- Existing and proposed parks
- Existing and proposed wildlife areas

- Public access areas
- Wildlife area priority use designation
- Waterfront park or beach priority use designation, including marinas, fishing piers, and boat launching ramps
- Primary management areas under the Suisun Marsh Preservation Plan
- Marshes
- Riparian vegetation
- Rare and endangered species habitat
- Shellfish beds
- Marine mammal haul-out areas
- Anadromous fish streams
- Spawning areas
- Juvenile fish nursery areas

2. Partial Designations

In some natural resource areas, however, it can be assumed with some degree of confidence what the extent of the impact is likely to be from certain well-defined ancillary facilities, such as the construction of the intake and discharge lines from the cooling system. Where such impacts can be reasonably well identified and are not of such substantial magnitude that they deserve designation, exclusions of those facilities from the designation have been made. Thus, where the following resource is identified, designation does not refer to the types of ancillary facilities noted because the primary impacts are generally limited to the construction period, the area affected is limited in size, and the area is likely to recover quickly.

- Water-related industry site in the Secondary Management Area of the Suisun Marsh Protection Plan: Electric transmission lines, intake and discharge lines for cooling systems, fuel pipelines, steam pipelines, co-generation facilities.
- Surface waters of the Bay: Underground or underwater electric transmission lines, intake or discharge lines for cooling systems, underground or underwater fuel pipelines, underground or underwater steam pipelines.
- Secondary Management Areas in the Suisun Marsh Protection Plan except for the water-related industry site: Same as surface waters of the Bay.
- Salt ponds: Same as surface waters of the Bay.
- Lowland grasslands: Same as surface waters of the Bay.
- Shell deposits: Same as surface waters of the Bay.
- Mudflats: Underground or underwater electric transmission lines, intake or discharge lines for cooling systems that pass completely through the area, underground or underwater fuel pipelines, underground or underwater steam pipelines.
- Areas precluded by Water Quality Control Plan: Same as mudflats.

— Migratory fish routes: Electric transmission lines, intake or discharge lines for cooling systems that pass completely through the area, underground or underwater fuel pipelines, underground or underwater steam pipelines.

D. Co-generation in Industrial Area

Co-generation projects are excluded from the designation of water-related industrial and port-priority use areas on the assumption that they will not pre-empt much land and to avoid establishing any barriers to the development of such projects.

The Commission recognizes that it is the policy of the Legislature as well as the Energy Commission to encourage the development of co-generation capacity. The Legislature has determined that "co-generation technology is a potential energy resource and should be an important element of the state's energy supply mix. The Legislature further finds that co-generation technology can assist meeting the state's energy needs while reducing the long-term use of conventional fuels, is readily available for immediate application, and reduces negative environmental impacts. The Legislature further finds that co-generation technology is important with respect to the providing of a reliable and clean source of energy within the state and that co-generation technology should receive immediate support and commitment from state government." (Public Resources Code Section 25004.2)

The Legislature has also established expedited siting procedures for co-generation projects of less than 300 MW. The Notice of Intention stage of the Energy Commission's siting process is eliminated and a final decision on

each project is required within twelve months of filing an application. The Energy Commission's has also stated in its 1979 Biennial Report: "Under the Commission's expedited siting regulations, we will certify any co-generation facility that can be demonstrated to have reasonably mitigable environmental impacts, can meet existing air, water, and other health and safety standards, and will result in net fuel savings. Any proposal that meets these criteria will be deemed needed."

The Commission accepts this emphasis on the desirability of co-generation projects and believes that the partial designation system included herein is consistent with it. Most co-generation projects are likely to involve capacities of less than 50 MW and therefore will not come under the definition of "facility" that is applicable to this report. A few larger projects may be affected, but, because of the system of partial designations contained herein, virtually all will be under the exclusive, expedited siting procedures of the Energy Commission. Only those areas where the impacts may not, in fact, be "reasonably mitigable" do the designations apply. And even in those areas, approval can be made on a case-by-case basis for ancillary facilities if there are no substantial adverse environmental effects. A PG&E review of proposed co-generation projects confirms that few, if any, conflicts are anticipated. It should also be noted that the Commission's ordinary permit procedures require a final decision by the Commission within 90 days of filing an application, so there should be little or no conflict with the Energy Commission's 12-month expedited siting procedures.

In the Commission's first report, adopted in 1978, the Commission also noted the potential problems associated with the definition of co-generation

(i.e., it would be possible to combine a very small industrial project with a power plant to allow it to be defined as, and receive the expedited treatment of, a co-generation project). Nevertheless, the Commission adopted a broad definition of co-generation. No problems have resulted from such a broad definition, and there is no indication that any such problems will materialize. The Legislature has since defined "co-generation technology" to mean: "the use for the generation of electricity of exhaust steam, waste steam, heat or resultant energy from an industrial, commercial, or manufacturing plant or process, or the use of exhaust steam, waste steam, or heat from a thermal power plant for an industrial, commercial, or manufacturing plant or process. For purposes of this division, the industrial, commercial, or manufacturing plant or process shall not be considered a thermal power plant or portion thereof. Co-generation technology shall not include steam or heat developed solely for electrical power generation." For the purpose of this report, the Commission determines that this is an appropriate definition of co-generation.

E. Exclusion of Existing Facilities and Reasonable Expansion Areas

1. General

Government Code Section 66645(b) provides that "any property of a utility that is used for such a facility or will be used for the reasonable expansion thereof..." shall not be designated as unsuitable. PG&E has stated that it does not intend to expand any of its existing power plants beyond the boundaries of their existing sites. With the possible exception of the Pittsburg site, which is discussed more fully below, the sites of existing PG&E power plants have not been designated as unsuitable. Care has also been

taken to avoid designating any area around existing intake and discharge lines for cooling systems associated with such plants in the event that the cooling systems have to be modified at some future time.

2. Electric Transmission Lines

The definition of "electric transmission line" in the Warren-Alquist Act that brings it within the definition of "facility" applies only to "...any electric powerline carrying electric power from a thermal powerplant located within the state to a point of junction with any interconnected transmission system" (Public Resources Code Section 25106). Determining whether any particular transmission line may be a facility, however, is difficult and has been the subject of much debate before the Energy Commission. The definition was also the subject of several pieces of legislation that were directed at clarifying those issues and it is likely that some changes will be made in the future. The scale of the maps used in this study also makes it difficult to precisely define expansion areas around existing electric transmission lines that may at some time be classified as a "facility". Therefore, given the difficulty of precisely locating transmission corridors on maps of the scale used in this study, and the uncertainties concerning what electric transmission lines constitute "facilities", those areas are not shown on the maps. The statutory mandate applies, however, and where areas are designated within existing transmission line corridors on the maps such designations shall not apply to the addition to, or the expansion or modification of, the transmission lines within that corridor.

3. Pittsburg

PG&E owns about 3.5 miles of shoreline property at its Pittsburg power plant. Most of this property is east of BCDC's jurisdiction. The existing power generating units at Pittsburg are at the far eastern end of the property, outside of BCDC's jurisdiction. The portion of PG&E-owned property that is within BCDC's jurisdiction is about 1.5 miles from the nearest existing power plant-related facility on the remainder of the property (the spray pond that was intended to cool Unit 7, but does not function) and over 2 miles from the transmission lines that serve the existing Pittsburg units. The generating units at Pittsburg are even farther from BCDC's jurisdiction. Given this large distance, the portion of PG&E's property within BCDC's jurisdiction is not excluded from the designation process as an expansion area for an existing facility, and is evaluated using the criteria applied to all areas in BCDC jurisdiction. See Section VII, beginning on page 66, describing the resources and designation on the site.

4. Collinsville

The Collinsville site has not been designated pursuant to the provisions of Government Code Section 66645(b). Although the location of the intake and discharge lines for the cooling system are not known at this time, a large area of water was left partially undesignated in front of the Collinsville site in recognition of the legislative mandate.

VII. MAPS - DETAILED DESCRIPTIONS

Map #1 "San Francisco North" (San Francisco & Marin Counties)

Set 1

Public access at Warm Water Cove.

The area of the shoreline from south of the beginning of BCDC's jurisdiction at Pt. Lobos to the eastern edge of Aquatic Park, Alcatraz Island, the area in Marin County from west of Pt. Diablo going east and north along the shoreline to the Sausalito City line, and Angel Island are all within the legislated boundary of the Golden Gate National Recreation area.

Public access and boat launching ramp south of 855 China Basin Street.

Two areas of public access at Central Basin.

Several areas of public access along Mission Creek inland of China Basin.

Public access and boat launching ramp on China Basin Street near Pier 52.

Public access south of the Ferry Building.

Public access at the Embarcadero Bart platform.

Public access at Pier 7, foot of Broadway.

Public access at Pier 39 and Pier 41 at North Point.

Public access at Pier 43-1/2 at Fisherman's Wharf.

Tiffany Beach, Princess Park, Gabrielson Park and Earl F. Dunphy Park in Sausalito.

Public access at boardwalk & plaza area in Sausalito.

Bicycle path runs along the Bay for 3.2 miles from Sausalito to Mill Valley.

Public access at Peninsula Point on Belvedere Island.

Public access along Paradise Drive at Pt. Tiburon.

Public access along the Boardwalk on Main St. in Tiburon.

Set 2

The area of the shoreline from south of the beginning of BCDC's jurisdiction at Pt. Lobos to the east edge of Aquatic Park, Alcatraz Island, the area in Marin County from west of Pt. Diablo going east and north along the shoreline to the Sausalito City line, and Angel Island are all designated in the San Francisco Bay Plan as priority use areas for waterfront parks or beaches.

The San Francisco area includes a marina and fishing pier. There is a marina in Horseshoe Bay and a proposed fishing pier at Cavallo Point. Five marinas and a launching ramp are shown along the Sausalito waterfront. Belvedere and Tiburon both have marinas and there is a proposed fishing pier at Pt. Tiburon.

The surface area of Richardson Bay to a line drawn between Sausalito Point and Peninsula Point is designated because discharges would violate water quality standards.

The southern San Francisco shoreline from the China Basin Channel to the extension of Cargo Way into India Basin is designated for port-priority uses except the site of the Potrero Power Plant is excluded.

Set 3

There are marine mammal haul-out areas around Pt. Lobos, Peninsula Pt. (Belvedere), and Blunt Point (Angel Island).

Horseshoe Bay has mudflats.

There are shellfish beds around Yellow Bluff and in three areas on the southeastern section of Angel Island.

All of the Marin shoreline on this map, including Angel Island and excluding the area west of Pt. Diablo, is a spawning area for herring.

Map #2 "San Rafael" (Marin County)

Set 1

Bicycle path runs along the Bay for 3.2 miles from Sausalito to Mill Valley.

Public access at Yacht Harbor in Sausalito.

Public access at Mill Valley Community Recreation Center on Corte Madera Road.

Public access beyond the end of Sycamore Ave. in Mill Valley

Public access at Enchanted Knolls Park in Mill Valley.

Two areas of public access west of Highway 101 and north of Richardson Bay in Mill Valley.

Public access on the edge of De Silva Pond.

Public access at a series of parks along Richardson Bay.

Public access at Strawberry Park near Strawberry Point School.

Public access at pier south of Strawberry Point School.

Public access at Richardson Bay east of Strawberry Point School.

The furthest eastern section of Richardson Bay shown on this map is part of the Audubon Society's Richardson Bay Wildlife Sanctuary.

Public access on levee top at Muzzi Marsh south of Corte Madera Creek.

Corte Madera Creek Ecological Reserve is just south of the mouth of Corte Madera Creek.

Public access at Piper Park in Larkspur.

Public access along Corte Madera Creek in Kentfield.

Public access around the Larkspur Ferry Terminal.

Public access at Beach Park, San Rafael.

Public access at Marin County Civic Center Park, San Rafael.

China Camp State Park is east of Marin County Civic Center.

Set 2

There is a marina in Richardson Bay and a proposed fishing pier and boat launching ramp to the northwest, nearer the Richardson Bay Bridge.

Near the mouth of Corte Madera Creek there are proposals for a marina and boat launching ramp.

There is an existing marina on San Rafael Creek near Highway 101.

The surface area of Richardson Bay to a line drawn between Sausalito Point and Peninsula Point is designated because discharges would violate water quality standards.

Set 3

There are mudflats in Richardson Bay and east of Corte Madera.

Both of these areas have adjacent tidal marsh, which is also found up Corte Madera Creek, and on San Rafael Creek.

Shellfish beds are found in two areas of Richardson Bay on this map.

The Corte Madera Marsh is the habitat for two endangered species, the Salt Marsh Harvest Mouse and the Clapper Rail.

There is a marine mammal haul-out area in Richardson Bay at Strawberry Point.

Map #3 "San Quentin" (Marin and Contra Costa Counties)

Set 1

Public access at Strawberry Point and on the shore of the inlet north of Strawberry Point.

Public access on Richardson Bay northwest of the Richardson Bay Wildlife Sanctuary.

The Audubon Society's Richardson Bay Wildlife Sanctuary is south of Tiburon Boulevard off Greenwood Beach Road.

Shoreline Park runs for more than 5,000 feet along the Tiburon shoreline and then into the center of Tiburon. Shoreline path continues in the City of Belevedere.

San Francisco State Univsersity Tiburon Center for Environmental Studies and Paradise Beach County Park are located on the north of Tiburon Peninsula.

Public access on the shoreline east of Corte Madera City boundary.

Public access on a levee between Pt. San Quentin and the mouth of San Rafael Creek.

Pickleweed and Schoen Parks near the mouth of San Rafael Creek.

Shoreline Strip at Main Street and San Pedro Road in San Rafael.

McNear's Beach County Park and China Camp State Park form a continuous strip along the shoreline starting about 2,000' north of Pt. San Pedro.

Pt. Molate Beach Park is located south of the point in Richmond.

There are two public access areas at Castro Point.

There is public access on both sides of the long wharf in the town of Point Richmond.

Two areas of public access in Point Richmond north of Cypress Point.

George Miller, Jr. Regional Shoreline is between Cypress Point and Point Richmond.

The Municipal Pier at Point Richmond has public access.

Set 2

There is a wildlife area priority use designation on the shore of Richardson Bay near Bel Aire. East of this designation is a Waterfront Park that extends for about a mile along the shoreline.

On the northeastern edge of the Tiburon Peninsula are three separate areas (Bluff Pt., Pt. Chauncey, and Paradise Cove) that are designated as Waterfront Parks.

At Paradise Cove there is a fishing pier and at Paradise Cay a marina.

A fishing pier is shown at Pt. San Quentin.

A proposed and existing marina are shown near the mouth of San Rafael Creek. There is an additional existing marina on San Rafael Bay south of San Pedro Road, and a proposed fishing pier to the northwest. Another marina is located at McNears Beach.

An area is designated for waterfront park or beach use from south of Pt. San Pedro north to Gallinas Creek (past the area mapped).

Marin Islands, The Sisters, and Red Rock should be preserved for their wildlife value, as should Castro Rocks, which are a harbor seal hauling ground.

A stretch of the Richmond shoreline, from just south of San Pablo Creek, is designated for use as a waterfront park.

Four other areas in the vicinity are designated for parks (1) a small area along the shoreline at the northern end of Pt. San Pablo; (2) a small area near the Pt. San Pablo Yacht Harbor; (3) The Brothers Islands; and (4) a strip along the shoreline extending south from north of Pt. Orient and including a large area from the Naval Supply Depot north of Pt. Molate to Castro Pt. The inland portion of Pt. San Pablo and the shoreline from the Terminal Four Wharf south to the park priority use area is designated for port priority use.

Terminal No. One at Pt. Richmond is designated for port priority uses.

There are marinas at Pt. San Pablo Yacht Harbor and Castro Point. The latter area also has a fishing pier.

The rest of this area, from San Pablo Creek to the Long Wharf south of the Richmond-San Rafael Bridge, excluding tidal marsh areas, is designated for water-related industry.

Two parks designations are mapped north of Pt. Richmond, near the Atchison, Topeka and Santa Fe railroad.

Southeast of Pt. Richmond are an existing and proposed marina.

The surface area of Richardson Bay to a lion drawn between Sausalito Point and Peninsula Point is designated because discharges would violate water quality standards.

Set 3

The edge of Richardson Bay is lined with mudflats, as are Keil Cove, the shore southeast of Paradise Cay, and a large area off the Corte Madera Marsh and San Quentin. Mudflats also extend north of Pt. San Quentin, around the mouth of San Rafael Creek, southeast of San Pedro Road, and around the Marin Islands. In the East Bay there are mudflats off the north shore of Richmond and around The Brothers Islands.

There are shellfish beds around Strawberry Point. More shellfish beds are found south and north of Paradise Cay, west of San Quentin, southeast of San Pedro Road, and north of McNears Beach. In the East Bay they are found on both sides of Pt. San Pablo and on both sides of Cypress Pt. in Pt. Richmond.

Tidal marshes appear around San Clemente Creek in Corte Madera, at the mouth of San Rafael Creek, and in north Richmond in the East Bay, including one small area near the Pt. San Pablo Yacht Harbor.

Harbor seal haul-outs are north of Strawberry Pt. and on Castro Rocks in the East Bay.

The eastern and northern shores of the Tiburon Peninsula are spawning areas for herring, as are several areas on the western Richmond shoreline. Other important fish habitat are found over the mudflats off northern Richmond, south of Pt. San Pablo, and south of the Brooks Island breakwater.

The Clapper Rail has been found near the mouths of Corte Madera and San Rafael Creeks.

The Marin Islands are a heron and egret breeding area.

Map #4 "Point Bonita" (San Francisco and Marin Counties)

Set 1

GGNRA extends east on both sides of the Golden Gate from the edge of BCDC jurisdiction.

A bike path extends along the Richardson Bay shoreline.

Set 2

The shoreline from south of the beginning of BCDC's jurisdiction at Pt. Lobos east to the edge of the section mapped is designated as a priority use area for waterfront parks or beaches.

In Marin County the area from Pt. Bonita, where BCDC jurisdiction begins, east to the edge of the area mapped is similarly designated.

Set 3

There are marine mammal haul-outs around Pt. Lobos and Pt. Bonita.

Map #5 "Petaluma River" (Marin and Sonoma Counties)

Set 1

An area from Donahue Slough north along the west shore of the Petaluma River to Schultz Slough has been recently purchased by the Wildlife Conservation Board and the Dept. of Fish and Game is working on a management study.

The Board has proposed the acquisition of the land to the northwest (Neil's Island).

The Black John Slough area is leased by State Lands Commission to the Dept. of Fish and Game.

Set 2

Neils Island, in the Petaluma Marsh, is designated as a Park. Proposed marinas are located near the mouths of San Antonio Creek and Black John Slough.

Set 3

All of the area on the west shore of the Petaluma River, with two small exceptions near Highway 101, is marsh. Much of it is also habitat for the Clapper Rail and the Salt Marsh Harvest Mouse.

On the east shore of the Petaluma River there are intermittant stretches of marsh. The whole shoreline up to an area near Highway 101 is habitat for the Clapper Rail and the Salt Marsh Harvest Mouse.

Map #6 "Novato" (Marin and Sonoma Counties)

Set 1

Marin County Civic Center Park and Fairgrounds covers 80 acres just east of Highway 101.

China Camp State Park lies to the east of the Civic Center and south of Gallinas Beach.

North of Gallinas Creek is Dept. of Fish and Game's San Pablo Bay Wildlife Area. Adjacent and west of this holding is McInnis County Park.

Two public access areas are found on either side of the Petaluma River at Black Point.

Set 2

The area south of Gallinas beach is designated for park use. To the north of Gallinas Beach the area surrounded on three sides by the levee is also mapped as park PUD.

There is an existing boat launch ramp and a proposed marina on Gallinas Creek.

Hamilton Air Force Base is designated as an airport priority use area.

South of Highway 37 on the Petaluma River is a proposed marina and an existing boat launch ramp. Just north of the highway in Sonoma County is an existing marina.

The area south of the highway in Sonoma County, excluding tidal marsh, is designated for water-related industry.

Set 3

Gallinas Creek has large areas of tidal marsh. Near the mouth is Clapper Rail and Salt Marsh Harvest Mouse habitat.

On the Petaluma River there are tidal marshes, as well as Clapper Rail and Salt Marsh Harvest Mouse habitat, on both sides of the river.

Map #7 "Petaluma Point" (Marin and Sonoma Counties)

Set 1

China Camp State Park includes the area from south of China Camp northwest to Gallinas Creek.

From Gallinas Creek north to Novato Creek, the shoreline is part of the San Pablo Bay Wildlife Refuge (Dept. of Fish and Game.)

The San Pablo Bay National Wildlife Refuge extends from the mouth of the Petaluma River east into Solano County, and includes lower Tubbs Island.

Set 2

From south of China Camp north-west to Gallinas Creek, excluding tidal marsh, the area is designated for park use.

Hamilton Air Force Base is designated as an airport priority use area.

In Sonoma County the area south of Highway 37 and east of the Petaluma River is mapped water-related industry PUD. Tubbs Island is a wildlife PUD.

Set 3

Mudflats and tidal marshes extend virtually along the entire shoreline shown on this map. Nearly all the marsh area corresponds to the Clapper Rail and Salt Marsh Harvest Mouse habitat. This habitat extends up the Novato Creek, outside of BCDC jurisdiction.

There are three small shellfish beds northwest of China Camp.

The mouth of the Petaluma River is designated as an anadromous fish stream.

Map #8 "Sears Point" (Sonoma, Napa, and Solano Counties)

Set 1

Tolay Creek north to the Sears Point Road and the shoreline of San Pablo Bay to the levee are included in the San Pablo Bay National Wildlife Refuge.

All of Upper Tubbs Island is under negotiation for acquisition by United States Fish & Wildlife Service.

Set 2

South of Highway 37, extending east to Lakeville Road, is water-related industry PUD.

On the west side of the mouth of Sonoma Creek are a proposed marina and fishing pier.

There is another proposed marina on Hudeman Slough, south of the Southern Pacific Railroad tracks.

Lower Tubbs Island and Skagg Island are designated as wildlife areas.

The western diked section of Island No. 1, between Napa Slough and the Bay, is designated as a saltpond-managed wetland.

Set 3

There is tidal marsh along Tolay Creek.

There are tidal marshes along the shore of San Pablo Bay with adjoining mudflats.

Sonoma Creek is an anadromous fish stream and therefore a one-half-mile arc around its mouth has been designated.

Tidal marshes extend up Sonoma Creek, the Napa Sloughs, Hudeman Slough, and Steamboat Slough.

Clapper Rail and Salt Marsh Harvest Mouse habitat are found in southern Tolay Creek area, along the shore of San Pablo Bay, up Sonoma Creek, the Napa Sloughs, Steamboat Slough, part way up Hudeman Slough, and Schell Slough. The last area has the densest population of Clapper Rails in the Napa Marsh, and perhaps in the entire San Francisco Bay Area.

Map #9 "Cuttings Wharf" (Sonoma, Napa, and Solano Counties)

Set 1

The shoreline of San Pablo Bay up to the levee is included in the San Pablo Bay National Wildlife Refuge.

There is public access along the south shore of Dutchman Slough.

A boat launching ramp and fishing platform are located on Hudeman Slough at Skaggs Island Road.

The area around Hudeman Slough is a proposed acquisition by the Wildlife Conservation Board, as is the area on both sides of the Napa River by Fagan Slough.

Coon Island is an ecological reserve.

The Napa Marshes Wildlife Area is owned by Leslie Salt Co. but is leased for hunting by the Dept. of Fish and Game. It includes Knight Island, eastern Russ Island, Banty Island, Cross Island, Little Russ Island, and the area north of Appleby Bay.

The area between Sonoma Boulevard and the Napa River and south from near Collins is proposed for acquisition by the Wildlife Conservation Board. An area south of Dutchman Slough is also proposed for acquisition by the Board.

Set 2

Hudeman Slough contains a boat launching ramp and a fishing pier.

Skagg island is designated as a wildlife area.

North of Cuttings Wharf, on the Napa River, is a fishing pier and boat launching ramp.

Most of the area from the Napa County line east to the Napa River (and some areas to the east of the Napa River) and from the Bay north to above Bull Island are salt ponds/managed wetlands. Not included in this designation are tidal marsh areas or the eastern section of Island No. 1, south of Dutchman Slough.

Set 3

Tidal marshes extend along the edge of San Pablo Bay, with adjoining mudflats.

Little Island, Russ Island, Island No. 2, part of Island No. 1, and Knight Island are salt ponds, as is the area north and east of Good Luck Point.

Two areas of managed wetlands are on either side of Napa Slough near Hudeman Slough and Appleby Bay, and another smaller managed wetland is on Russ Island.

Mudflats are found on much of the Napa River, which is an important juvenile fish habitat.

Tidal marshes are found throughout the sloughs of the Napa Marsh.

Coon Island is a heron breeding area.

In several tidal marshes in this area there are Salt Marsh Harvest Mouse and Clapper Rail habitat.

Map #10 "Mare Island" (Contra Costa and Solano Counties)

Set 1

The San Pablo Bay National Wildlife Refuge extends to the northern boundary of the Mare Island Naval Reservation.

The land adjacent to this area north to Dutchman Slough is a proposed acquisition area by the Wildlife Conservation Board. The Board also proposes to acquire the land north of Highway 37 on the east side of the Napa River.

There are four areas of public access on the eastern shore of Mare Island Strait.

There is also public access on the shoreline in Oleum.

East Bay Regional Park District has waterfront property at Lone Tree Point in Rodeo and in Hercules. Two areas of shoreline public access are located in Pinole, just southwest of the latter site. There is a linear park along Pinole Creek. Montara Bay Park and Montalvin Manor Park are east of Point Pinole Regional Park, which extends four miles along the Bay shoreline.

Set 2

North of Dutchman Slough is a salt pond/managed wetland designation.

There is an existing fishing pier and marina on the Napa River by the Highway 37 crossing.

Three marinas, a fishing pier, and two boat ramps are currently located in Mare Island Strait.

The Mare Island Naval Reservation is designated for water-related industry.

On the eastern side of Mare Island Strait, the area from Highway 37 south along the shore for over 2 miles is mapped for waterfront park or beach PUD. South of this area the designation is for water-related industry.

In Contra Costa County, the area from the eastern edge of the map west to the sewage disposal plant in Oleum is mapped water-related industry PUD.

There is an existing marina at Lone Tree Point in Rodeo. At the Hercules City Line the water-related industry PUD starts again and continues south nearly to the southern city limit of Hercules.

In Pinole, east of Wilson Point, a boat launching ramp and marina are proposed.

A park is proposed around Wilson Point.

Pinole Pt. is designated waterfront park or beach PUD, excluding tidal marsh areas.

Set 3

Tidal marshes and adjoining mudflats extend north along the shore of San Pablo Bay from the Mare Island breakwater. There are also scattered tidal marshes and mudflats on Mare Island Strait and at the mouth of the Napa River. Tidal marshes extend up the south bank of Dutchman Slough. On the south side of Carquinez Strait there are only scatterd tidal marshes, but extensive mudflats.

A salt pond is located north of Dutchman Slough.

The Napa River is an important juvenile fish habitat.

Salt Marsh Harvest Mouse and Clapper Rail habitat are found in Vallejo north of Highway 37 and south of this location, on the Mare Island Strait. The southwestern portion of the Mare Island Naval Reservation is also habitat for these two endangered species.

There are shellfish beds at Lone Tree Pt., near the Hercules-Pinole city boundary, around Wilson Pt., southwest of Wilson Pt., and around Pinole Pt.

Map #11 "Cordelia" (Napa and Solano Counties)

Set 1

(Nothing mapped)

Set 2

The Secondary Management Area (SMPA) begins on the east side of Interstate 680 and extends south from Cordelia. The uphill boundary of the Primary Management Area is the 10-foot contour. At the Benicia Hills the Secondary Management Area extends west of Interstate 680 from one to two miles.

Set 3

There is a lowland grassland area east of Highway 680. Just to the north of this is a seasonal marsh, and north of the marsh are three managed wetlands. Between Highway 680 and the managed wetlands are two riparian vegetation corridors.

Map #12 "Benicia" (Solano and Contra Costa Counties)

Set 1

Public Access at Glen Cove Marina in Elliot Cove.

The Benicia State Recreation Area extends north from Dillon Pt. in Benicia.

There are several areas of public access on the western shoreline of Benicia.

Public access at City of Benicia Marina at Benicia Point.

There is a large area of public access around the Martinez marina which includes a 300-acre property recently acquired by East Bay Regional Parks.

There are two public access areas in Crockett west of the Carquinez Bridge.

Set 2

Mare Island and the eastern shore of Mare Island Strait to Carquinez Heights are designated for water-related industry.

From Carquinez Heights east to and including the east shore of Southampton Bay, the area has been designated for waterfront park or beaches.

There is an existing marina at Elliot Cove and one proposed at Glen Cove.

North of Benicia Point is a proposed marina and an existing launching ramp. A fishing pier is proposed at the Point. Approximately 3000 feet east of Benicia Point a water-related industry PUD extends east past the Benicia-Martinez bridge. East of the bridge the water is designated a Primary Management Area under the SMPA.

In Contra Costa County a water-related industry PUD extends west from the edge of the area mapped to the boundary of the Martinez Waterfront Regional Shoreline. Included is this park is a marina, a launching ramp, and a proposed fishing pier.

The western shoreline of Crockett to the Carquinez Bridge is designated for water-related industry. To the west of the bridge are a marina and a boat launching ramp.

From Selby west to the edge of the area mapped is a water-related industry PUD.

Set 3

The mouth of the Napa River (Mare Island Strait) is designated as an anadromous fish stream.

There are marshes near the river's mouth and a shellfish bed near Carquinez Heights in Vallejo.

Glen Cove, Southampton Bay, and several other small inlets on the northern shore of Carquinez Strait have mudflats. North of Southampton Bay and east of Benicia Pt. there are tidal marshes.

There are two small areas of managed wetlands north of the Southampton Bay marsh and two other small managed wetlands east of Highway 680.

The Southampton Bay marsh is a habitat for Clapper Rail and Salt Marsh Harvest Mouse.

The Carquinez Strait is critical habitat for migrating fish, especially salmon and steelhead. It is designated from Selby east to the Benicia-Martinez Bridge.

On the south shore of the Strait, mudflats extend from Martinez west to Ozol, with one small marsh appearing west of Ozol. There are tidal marshes inland of the Martinez mudflats.

Map #13 "Fairfield South" (Solano County)

Set 1

Public access at marina in Suisun City.

Peytonia Slough Ecological Reserve; Hill Slough Wildlife Area; Grizzly Island Wildlife Area (Joice Island unit) are administered by the Department of Fish and Game.

Set 2

The area from Thomasson south to Peltier Slough is a Secondary Management Area under the SMPA.

Potrero Hills, a small area above the 10 foot contour adjacent to Highway 12, and an area for the most part west of Interstate 680 are also Secondary Management areas.

The rest of the area roughly south of the Southern Pacific Tracks and Highway 12, with the exception of the areas south of Subeet and Suisun City, are Primary Management areas.

Set 3

Mudflats extend along the shore of Grizzly Bay. Tidal marshes lie between the mudflats and the levees, both along the Bay and up the sloughs. Three large tidal marsh areas are found north of Cutoff Slough, north of Peytonia Slough, and around Hill Slough. A seasonal marsh is located north of the latter tidal marsh.

The sloughs are an important juvenile fish habitat.

Lowland grasslands extend around much of the southern and western edges of Potrero Hills. Two other areas of lowland grasslands are east of Highway 680. To the north of the most northern of these grasslands is a small seasonal marsh.

There is a small habitat area for the Salt Marsh Harvest Mouse on Joice Island.

Most of the rest of this area is managed wetlands.

Map #14 "Port Chicago" (Solano and Contra Costa Counties)

Set 1

There is a public access area southeast of Bulls Head Point.

Set 2

All of the water area and islands in Solano County east of the Benicia-Martinez Bridge is a Primary Management Area.

The Benicia Hills east of Interstate 680 are a Secondary Management Area.

The Benicia Arsenal area, plus an area east of Interstate 680, is designated for water-related industry.

Southeast of the Southern Pacific Railroad tracks, including all of Morrow Island, is a Primary Management Area under the SMPA.

A marina and fishing pier are proposed for the mouth of Suisun Slough.

In Contra Costa County from the eastern edge of the area mapped west, past the Benicia-Martinez Bridge, to the western edge of the mapped area, the PUD is water-related industry. (Tidal marshes are excluded from this area.)

Set 3

West of the Benicia-Martinez Bridge is an important migratory fish route.

Tidal marshes line most of the shore on both sides of the Bay and on the islands. There are mudflats in the Bay, along much of the northwestern edge of the islands, on the tip of Joice Island, and from the Pt. Edith area west to Martinez.

There are managed wetlands on Simmons Island, Ryer Island, and Morrow Island on the northern shore.

Two lowland grasslands are on the eastern side of Highway 680.

The sloughs are an important juvenile fish habitat.

East of Pacheco Creek are two areas of Salt Marsh Harvest Mouse habitat.

Map 15 "Denverton" (Solano County)

Set 1

Laughing Mallard Unit and Grizzly Island Wildlife Area (Joice and Grizzly Island Units) are managed by Department of Fish and Game.

Set 2

The northern edge of the Primary Management Area is bounded by Highway 12 until shortly east of Denverton, where the boundary heads south along Shiloh Road. The Sacramento Northern Railroad tracks eventually become the boundary which then runs southeast.

There are five Secondary Management Areas on Map #15: A small area near Tolenas; Potrero Hills; a small area near Denverton; Bradmoor Island; and the entire eastern edge of the area, including Kirby Hill. The rest of the area within the mapped boundaries is a Primary Management Area.

Set 3

Tidal marshes and mudflats line the shore of Grizzly Bay. The sloughs are generally lined with tidal marshes and there is a large marsh in the Hill Slough area.

Much of the area is managed wetlands.

There are lowland grassland areas around the Potrero and Montezuma Hills, around Denverton, and near Molina. The lowland grass areas north of the Potrero Hills and around Denverton and Molina contain seasonal marshes.

In the Potrero Hills area there is a Golden Eagle habitat.

Near Beldons Landing there is a Black Rail habitat. The Canada Goose has a small habitat area on Grizzly Island, and the Salt Marsh Harvest Mouse is found on the shore of Grizzly Bay.

The sloughs are important juvenile fish habitat.

Map 16 "Honker Bay" (Solano & Contra Costa Counties)

Set 1

Grizzly Island Wildlife Area includes Hammond Island and Grizzly Island.

Set 2

A small area in the northeast corner of the map, including the Sacramento Northern Railroad tracks, is reserved for water-related industry and is part of the Secondary Management Area under the SMPA.

All the rest of the mapped area, including the water area, in Solano County is Primary Management Area.

With the exception of tidal marshes and an existing marina at McAvoy Boat Harbor, all of the mapped area in Contra Costa County from Stake Point west is water-related industry PUD.

The site proposed for the Pittsburg Units 8 and 9 power plant is designated to the five-foot contour line because it is tidal marsh. It is also partially designated to the 5.5-foot contour because that is the estimated line of highest tidal action and is therefore considered part of the surface area of the Bay. The remainder of the site within BCDC's jurisdiction is partially designated as an area reserved for water-related industry.

PG&E is in the process of evaluating different plant configurations on different locations which will qualify under the Warren-Alquist Act in the Pittsburg 8 and 9 proceedings. If PG&E can demonstrate that the site is superior to all others available for the purpose, BCDC should consider changing the water-related industrial priority use designation in the Bay Plan.

Set 3

There are mudflats in Grizzly Bay, on the western shores of Van Sickle and Chipps Islands, and near Middle Ground Island. Virtually all the shoreline in this area is tidal marsh.

The site proposed for the Pittsburg Units 8 and 9 power plant is designated to the five-foot contour line because it is tidal marsh. It is also partially designated to the 5.5-foot contour because that is the estimated line of highest tidal action and is therefore considered part of the surface area of the Bay. The remainder of the site within BCDC's jurisdiction is partially designated as an area reserved for water-related industry.

East of Montezuma Slough are lowland grassland areas and seasonal marshes.

Most of the area in Solano County is managed wetlands.

The sloughs are important juvenile fish habitat.

Two areas of Salt Marsh Harvest Mouse habitat are found near the shores of Grizzly Bay.

Map 16A "Antioch North" (Solano County)

Set 1

(Nothing mapped.)

Set 2

From the east side of Marshall Cut to an area east of the mouth of Montezuma Slough, the land has been reserved for water-related industry and is part of the Secondary Management Area under the SMPA.

A little over a mile from the river, the eastern boundary of the Secondary Management Area turns west and then follows the Collinsville Road north. The western boundary of the area runs northwest from a point east of the mouth of Montezuma Slough.

All of the land and water areas in Solano County south and west of this Secondary Management Area are Primary Management Areas.

Set 3

Under the provisions of AB 1717, the Montezuma-Collinsville area cannot be designated in this study.

There are several seasonal marshes in the Montezuma-Collinsville area, with some surrounding lowland grasslands in the north. There is a Salt Marsh Harvest Mouse habitat in the Collinsville area.

To the southwest of the area that cannot be designated is a seasonal marsh and some managed wetlands.

Map 17 "Richmond" (Contra Costa and Alameda Counties)

Set 1

Montalvin Manor Park is east of Point Pinole Regional Park, which runs along the shoreline for four miles.

East Bay Regional Parks also has the eastern end of Brooks Island and an area at Pt. Isabel.

Set 2

An area in North Richmond is water-related industrial PUD.

The City of Richmond has a boat launch ramp on Santa Fe Channel at Cutting Boulevard.

The area from west of Pt. Potrero to the western edge of the Inner Harbor Basin is designated for use as a water-related industry area.

The area between the western edge of Inner Harbor Basin and the southeastern border of the City of Richmond is reserved for residential, recreational, commercial and industrial use under the South Richmond Shoreline Special Area Plan approved by the City of Richmond and BCDC.

Brooks Island, Pt. Isabel Regional Shoreline, and all of the Albany shoreline are designated waterfront park or beach use.

Set 3

The area of San Pablo Bay on this map is rimmed with mudflats and scattered tidal marshes. A shellfish bed continues from Pinole Pt. to the north.

Mudflats are also found around the western part of Brooks Island, Richmond Inner Harbor, along the Richmond-Albany city boundary, and at Fleming Point. Tidal marshes are on the north of Brooks Island and in the Richmond Inner Harbor.

The perimeter of Brooks Island, the eastern edge of Richmond Inner Harbor, the Albany shoreline, and Fleming Pt. all contain shellfish beds.

There is important fish habitat in the Richmond Inner Harbor, Bird Island and Albany mudflats.

Map 18 "Oakland West" (Alameda and San Francisco Counties)

Set 1

There is public access at the Berkeley Marina, the Emeryville Marina, the Emeryville peninsula near Highway 17, and an area near the Bay Bridge toll plaza.

At the Port of Oakland's Seventh Street Terminal there is a public park, and there is public access at the Outer and Inner Harbor.

Several parks and public access areas extend along the Oakland Inner Harbor shoreline from Jack London Square east and along the Lake Merritt estuary.

Another public access area is on Brooklyn Basin.

Public access on Alameda shoreline across from Jack London Square and on Fortmann Basin.

On the southern Alameda shoreline there is public access at Bellena Bay Yacht Harbor and Robert W. Crown Memorial State Beach, which extends southeast along Shoreline Drive.

Set 2

Yerba Buena Island is designated for future use as a park.

A strip of land running north along the shoreline from the Berkeley Marina is also designated for park use.

The Berkeley Yacht Harbor has an existing boat launching ramp, marina, and fishing pier, as well as an additional proposed marina. The whole western portion of the Berkeley marina and a shoreline strip from the marina south to the Emeryville peninsula are a waterfront park or beach PUD.

The Emeryville Marina contains a marina and a proposed fishing pier. All of the western and most of the southern area of the Emeryville peninsula is designated for waterfront park or beach use.

The Emeryville Crescent is designated a wildlife area.

South of the entrance to the Bay Bridge, the present Oakland Outer Harbor, Inner Harbor, the Alameda Naval Air Station, the Naval Supply Center and Reserve Shipyard, and the area around Clinton Basin are all mapped port PUD. The port priority use designation extends to the western-most point of the fill placed for the Bay Bridge approach.

Encinal Terminals in Alameda is designated port priority use.

The Oakland Outer Harbor contains a proposed fishing pier and there is an existing fishing pier at Port View Park, Port of Oakland.

The Jack London Square area contains three marinas and a proposed fishing pier. The southern edge is designated for future use as a park, as is Government Island.

A proposed marina is located in the north of Brooklyn Basin and an existing marina is west of the Basin mouth in Alameda.

Most of the Alameda Bay shoreline is mapped for waterfront park or beach PUD. Ballena Bay has an existing and proposed marina and a proposed fishing pier.

Set 3

Mudflats extend along the Berkeley-Emeryville shoreline, along the northern side of Yerba Buena Island, and in southern Alameda.

The Emeryville Crescent is rimmed with tidal marsh and there is a tiny tidal marsh on the tip of the Alameda Naval Air Station.

Shellfish beds are found around the Berkeley Marina, the Emeryville Marina and Crescent, in the Oakland Inner Harbor southeast of Jack London Square, and on the southern Alameda shore.

There are important fish habitats along the Berkeley-Emeryville shoreline and in the Emeryville Crescent.

Map 19 "Oakland East" (Alameda County)

Set 1

Crown Memorial Beach extends along the southern Alameda shoreline.

Public access at southeastern tip of Alameda.

Public access in two places in Alameda on Tidal Canal.

Public access in three places in Oakland on Brooklyn Basin.

West of the Oakland Coliseum Complex is the Bay Park Refuge run by the City of Oakland. This is adjacent to the San Leandro Bay Regional Shoreline (EBRPD).

Set 2

Government Island, the eastern shore of Airport Channel, the southern shore of Alameda, and the shore west of the Oakland Coliseum are reserved for waterfront parks or beaches.

There are proposed fishing piers in Oakland on Brooklyn Basin, near 29th Street, and near High Street. There are existing marinas on Brooklyn Basin in Oakland and near Park Street in Alameda.

There are two existing fishing piers on either side of Fruitvale Bridge and one at Bay Park Refuge.

Set 3

There are mudflats in San Leandro Bay. Two small tidal marshes are also found on the Bay, one on the southern Alameda shore and one west of the Oakland Coliseum.

Shellfish beds extend along the southern Alameda shoreline, and a Clapper Rail habitat is also located in that area.

Map 20 "San Leandro" (Alameda County)

Set 1

Public access extends along the shoreline of Bay Farm Island.

San Leandro Bay Regional Park is on both sides of Airport Channel. A small strip of the City of Oakland's Bay Park Refuge runs along the shore of the mainland.

Public access at San Leandro Marina and a shoreline trail south of the marina.

EBRPD has two holdings as part of the Hayward Shoreline; one north of Sulphur Creek and the other north of Johnson Landing.

Set 2

A strip along the northern and eastern shoreline of Bay Farm Island, extending northeast along the Oakland shoreline, is designated for waterfront-park or beach. On the northern shore of Bay Farm Island are a proposed marina and fishing pier. On the eastern edge are an existing boat lauching ramp and marina.

The eastern section of Bay Farm Island is an airport PUD.

An area southeast of the airport is designated for park use, as is a long strip of shoreline from the San Leandro Marina to the southern edge of the mouth of San Leandro Creek.

Mulford Landing contains a marina.

Set 3

Mudflats are found in San Leandro Bay, on the west shore of Alameda, and along the entire San Francisco Bay shoreline from Oakland south.

There are tidal marshes to the east of Airport Channel (San Leandro Bay Regional Park), at Roberts Landing, Hayward Landing, and Johnson Landing.

There is a salt pond south of Johnson Landing.

Shellfish beds are found in San Leandro Bay on the northern Alameda shoreline, in Airport Channel, and around the tip of the marsh east of Airport Channel (San Leandro Bay Regional Park). Further south they are found along the entire Alameda shore, at the Oakland-San Leandro city border, and at Mulford Landing.

There are two Least Tern nesting sites in Alameda. The Clapper Rail has a habitat area in San Leandro Bay Regional Park.

Large shell deposits are found in the Bay in Alameda and San Mateo counties.

Map 20a "Hayward" (Alameda County)

Set 1

(Nothing mapped in set 1.)

Set 2

(Nothing mapped in set 2.)

Set 3

(Nothing mapped in set 3.)

Map 21 "Newark" (Alameda County)

Set 1

Coyote Hills Regional Park (EBRPD) is located mainly south of Coyote Hills Slough with a small addition to the north of the Slough adjacent to Newark Boulevard. The Alameda Creek Regional Trail runs along both sides of Coyote Hill Slough inland from the Bay for 12 miles. West and southeast of the Regional Park are proposed acquisitions.

West and south of Coyote Hills Regional Park is the San Francisco Bay National Wildlife Refuge.

Set 2

Much of the area adjacent to the shoreline is salt ponds and managed wetlands.

The Coyote Hills Regional Park area is designated for park use on both sides of Coyote Hills Slough. On the south side of the slough, a designated strip extends to the Bay. A marina is proposed in the northwest corner of the park designated area.

At the entrance to Dumbarton Bridge, a fishing pier is proposed, and a marina is proposed at Dumbarton Point.

Set 3

Mudflats line most of the edge of San Francisco Bay in this area. Tidal marshes are on the northern shore of Alameda Creek and Coyote Hill Slough, west of Coyote Hills, and around the Newark Slough area.

Much of the area is covered with salt ponds.

Two areas of Salt Marsh Harvest Mouse habitat and four areas of Clapper Rail and Salt Marsh Harvest Mouse habitat are found along the Bay or on sloughs.

There is a Harbor Seal haul-out at the mouth of Plummer Creek and Newark Slough.

Shellfish beds are located at either end of the Dumbarton Bridge.

Map 21a "Niles" (Alameda and Santa Clara Counties)

Sets 1, 2, and 3

(Nothing mapped on sets 1, 2, and 3.)

Map 22 "Milpitas" (Alameda and Santa Clara Counties)

Set 1

The Bay shoreline south to Alviso Slough is part of the San Francisco Bay National Wildlife Refuge.

South of Guadalupe Slough is the Sunnyvale Baylands County Park site.

Set 2

There is an existing marina at Alviso.

There are extensive salt ponds/managed wetlands on both sides of Coyote Creek.

Set 3

There are mudflats near the mouth and extending up Coyote Creek. Tidal marsh is found on several sloughs.

There are large areas of salt ponds.

Several habitat areas for Clapper Rail and Salt Marsh Harvest Mouse are found in Fremont and Alviso.

Map 23 "Mountain View" (Alameda, Santa Clara and San Mateo Counties)

Set 1

The San Francisco Bay National Wildlife Refuge covers the area from north of Dumbarton Point south to Alviso Slough, and includes a peninsula to the west of Alviso Slough. Another small addition to the refuge is between Devils Slough and Jagel Slough.

North of Mathilda Avenue is Sunnyvale Baylands County Park site. West of this facility is a park proposed by the City of Sunnyvale.

The Mountain View Shoreline Regional Park is being developed between Charleston Road and the salt ponds around Mountain View Slough.

East of Bayshore Freeway, between the Charleston Slough and the Santa Clara/San Mateo County line is the Palo Alto Baylands. Included in the Baylands are two proposed park sites (at the dump and the former International Telephone and Telegraph property to the west), the Marshland Preserve (the tidal areas and the flood control basin), a yacht club, a golf course, and several miles of public trails.

The Faber Tract, although it is located in San Mateo County, is owned by the City of Palo Alto and is available for limited public access.

Set 2

Much of the area is salt ponds/managed wetlands.

Moffett Naval Air Station is mapped as an airport PUD.

An area south of the salt ponds and west of Stevens Creek in Mountain View, and another around Mayfield Slough in Palo Alto are designated for waterfront park or beach use.

A marina is proposed for the head of Mountain View Slough and marinas are in operation at the Palo Alto Yacht Club and Cooley Landing in Menlo Park. A fishing pier is proposed at the latter site.

Set 3

The shores of San Francisco Bay and Coyote Creek are lined with mudflats and tidal marshes. The latter extend up numerous sloughs in the area.

With the exception of Palo Alto, salt ponds cover much of the area.

There are two large Harbor Seal haul-outs at the mouth of Mowry Slough and another smaller one between Mowry Slough and Coyote Creek.

Salt Marsh Harvest Mouse and Clapper Rail habitat are found at Dumbarton Point, in the Mowry Slough and Coyote Creek area, on Guadalupe Slough, on the edge of Moffett Field, and along the Palo Alto shoreline.

A shellfish bed is mapped north of Cooley Landing in Menlo Park.

Shell deposits are found offshore in San Mateo, Santa Clara and Alameda Counties.

Map 24 "Redwood Point" (San Mateo and Alameda Counties)

Set 1

The Alameda Creek Regional Trail (EBRPD) extends inland up both sides of Coyote Hills Slough on levee top.

The San Francisco Bay National Wildlife Refuge extends south from the Hayward/Fremont City boundary.

On the west side of the Bay, the Refuge extends north to Belmont Slough. It includes mudflats, salt ponds at Ravenswood Point, tidal marshes on Greco Island, parts of Bair Island and Bird Island.

There is public access at the Redwood City Municipal Marina.

Most of Bair Island is an ecological reserve (DFG).

A levee-top path leads along the shoreline on the north side of Steinberger Slough, heads west along Bay Slough, and then continues on the southern shore of Belmont Slough. The area is within the Redwood Shores Ecological Reserve (DFG) and includes the tidal marshes on the bayward side of the levee.

On the northern edge of Belmont Slough on Brewer Island, there is a shoreline strip running north to the San Mateo Bridge.

Set 2

There are extensive salt ponds/managed wetlands.

A strip on the south shore of Coyote Hills Slough is designated for park use.

The area around Redwood Creek is reserved for port development except that Bair Island and the former Leslie Salt Company wash ponds have been excluded.

The southeast tip of Bair Island is designated wildlife PUD.

The land between Smith Slough and Bayshore Freeway is mapped as a waterfront park or beach PUD, as are both sides of Belmont Slough, extending north along the Bay to the San Mateo Bridge.

There are marinas at the meeting of Smith Slough and Redwood Creek, and at Redwood City Yacht Harbor.

Marinas are proposed for the mouth of Corkscrew Slough near Redwood Creek, Steinberger Slough near Corkscrew Slough, further northeast on Steinberger Slough, and on both sides of Belmont Slough near its mouth.

A boat launching ramp is proposed on Corkscrew Slough near Steinberger Slough.

Set 3

With a small exception at Redwood Point, the entire shoreline on both sides of the Bay in this area is lined with mudflats. Much of the land just landward of the mudflats is tidal marsh or salt ponds.

Shellfish beds are found south of Ravenswood Point, at three locations on Redwood Creek, on the northern tip of Bird Island, and extending north along the shoreline from the mouth of Belmont Slough.

Two Harbor Seal haul-outs are on Greco Island and a very large one is found in Corkscrew Slough.

In the East Bay there is a Clapper Rail habitat and a Least Tern nesting site near the Alameda Creek Flood Control Channel. Around the mouth of Coyote Hills Slough is Salt Marsh Harvest Mouse and Clapper Rail habitat.

In the West Bay there are numerous Salt Marsh Harvest Mouse and Clapper Rail habitat areas. There is a Least Tern nesting site on Bair Island, and at Redwood Point there is a Heron and Egret breeding area.

Large shell deposits are found offshore in Alameda and San Mateo Counties.

Map 25 "Palo Alto" (San Mateo County)

Set 1

The Faber Tract is open space with limited public access owned by the City of Palo Alto in East Palo Alto.

The San Francisco Bay National Wildlife Refuge lies north of Ravenswood Slough and Westpoint Slough.

The City of Menlo Park has proposed a park to the east of Flood Slough.

Set 2

There are extensive salt ponds/managed wetlands along the shoreline.

An area south of Westpoint Slough in Menlo Park is designated for waterfront park or beach use.

There is a marina on the southwest corner of the port designation.

West of this marina and north of Bayshore Freeway is an area reserved for park use.

Set 3

Salt ponds extend across most of the northern edge of this map. Tidal marshes are found south of the Dumbarton Bridge and around the adjoining salt pond, around Flood Slough and Westpoint Slough, and around the salt ponds north of Redwood Creek.

There are shellfish beds by Dumbarton Bridge.

Map 26 "San Mateo" (San Mateo County)

Set 1

There is public access at Marina Park between Belmont Channel and Belmont Slough.

An edge of Redwood Shores Ecological Reserve (DFG) appears on the eastern shore of Belmont Slough.

A shoreline strip provides public access along the northeastern shore of Foster City north to the San Mateo County Fishing Pier at the San Mateo Bridge.

San Mateo has four parks along Seal Slough: Aquatic Park (near the mouth of the slough); Parkside Aquatic Park; Lakeshore Aquatic Park, and an unimproved open space.

There is public access near the northern mouth of Seal Slough, across from Aquatic Park (City of San Mateo). A bicycle and pedestrian trail extends along the Bay from Ryder Court Park off East Third Avenue to Coyote Point County Park.

Two small public access areas lie east of the Anza Airport Park in Burlingame. To the south and west of this facility is Bayside Park run by the City of Burlingame.

Two more public access areas are located near the mouth of Mills Creek.

Set 2

The northern edge of Belmont Slough, extending north to the San Mateo Bridge, is designated for waterfront park or beach use. There is a fishing pier at the northern tip of this designation.

More park designation extends from Seal Slough to the northern edge of Coyote Point County Park, and then again around the Burlingame sewage disposal facility.

A boat launching ramp is proposed for the southeast shore of Seal Slough near its entrance to the Bay. There is a marina at Coyote Point Yacht Harbor.

The San Francisco International Airport is mapped for airport PUD.

Set 3

Much of the edge of the Bay is lined with mudflats. Tidal marshes appear at Belmont Slough, at the mouth of Seal Slough, between Seal Slough and Coyote Point Yacht Harbor, at Coyote Point Yacht Harbor, and landward from the Burlingame sewage disposal facility.

Shellfish beds are located on both sides of the Dumbarton Bridge, near the mouth of Seal Slough, between Seal Slolugh and Coyote Point Yacht Harbor, at the Yacht Harbor, north of Coyote Point and extending around the shoreline up into the inlet south of the Burlingame sewage disposal facility.

Clapper Rail and Salt Marsh Harvest Mouse habitat areas are found on Belmont Slough and O'Neill Slough. Salt Marsh Harvest Mouse habitat is found near the mouth of Seal Slough.

Shell deposits are found offshore in San Mateo County.

Map 27 "Montara Mountain" (San Mateo County)

Set 1

Public access off Old Bayshore Highway just north of Millbrae Avenue.

Set 2

San Francisco International Airport is mapped for airport PUD.

Set 3

San Francisco Garter Snake habitat is found west of San Francisco International Airport.

Map 28 "Hunters Point" (San Mateo, San Francisco and Alameda Counties)

Set 1

Public access at Oyster Point Marina.

Candlestick Point State Recreation Area is located just north of the San Mateo/San Francisco County line.

Public access at Bay Farm Island.

Set 2

The northwestern shore of Bay Farm Island in Alameda is designated for waterfront park or beach use.

San Francisco International Airport is reserved for airport use.

Oyster Point is mapped for waterfront park or beach PUD.

The Hunters Point Area is reserved for port use.

The southern San Francisco shoreline from the China Basin Channel to the extension of Cargo Way into India Basin is designated port priority use but the site of the Potrero Power Plan is excluded.

Set 3

There are mudflats along most of the Bay Farm Island shoreline. A Least Tern nesting site is found on the north shore.

North of Hunter's Point are a few small mudflats.

Shell deposits are found offshore in San Mateo, San Francisco and Alameda counties.

Map 29 "San Francisco South" (San Francisco and San Mateo Counties)

Set 1

Public access at Point San Bruno, Oyster Point Marina, and west of Oyster Point.

There is also public access along the shoreline at the San Francisco/San Mateo County border. From this area Candlestick Point State Recreation Area extends northward along the edge of the shore to the northern edge of South Basin Canal.

There are two small parks on either side of Islais Creek Channel just east of Third Street.

Set 2

San Francisco International Airport and surrounding areas west of Highway 101 and north of the South San Francisco City line are reserved for airport use.

Oyster Point and a strip of shoreline to the south are designated for waterfront park and beach.

Sierra Point north to South Basin is also park designation. This area includes Bayview Park.

Oyster Point has an existing marina and a proposed fishing pier.

There is another proposed fishing pier north of Sierra Point and east of Highway 101.

Another fishing pier and a marina are proposed between Candlestick Point and South Basin.

North of South Basin is port PUD.

Set 3

There are mudflats along most of the South San Francisco shoreline. Mudflats appear again on much of the shore between Sierra Point and Candlestick Point.

Two small tidal marshes appear north of the airport. There is another at Oyster Point, and two more on either side of the San Francisco-San Mateo County border.

The San Francisco Garter Snake is found west of San Francisco International Airport.

Shellfish beds are around Oyster Point and between Sierra Point and Candlestick Point.

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