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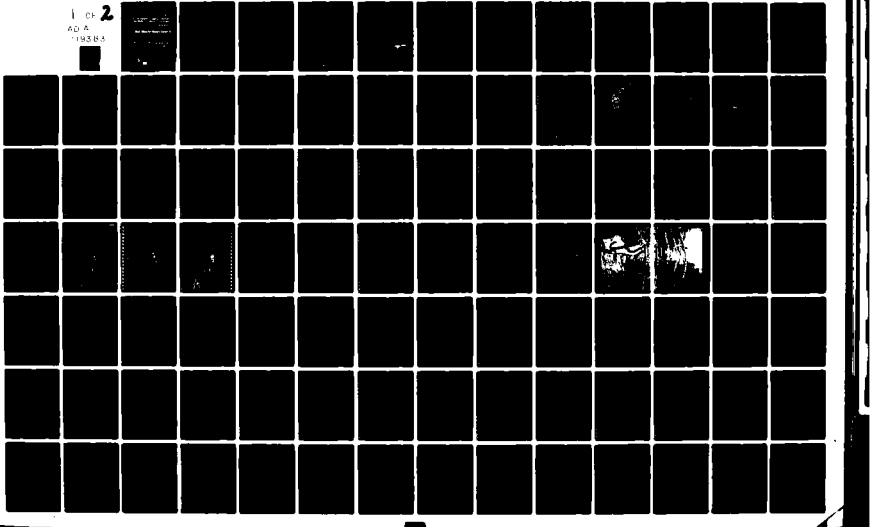


DRAFT

ENVIRONMENTAL IMPACT REPORT/ ENVIRONMENTAL IMPACT STATEMENT

APPENDICES

Bel Marin Keys Unit 5

Marin County Planning Department
U.S. Army Corps of Engineers

September 1982

TORREY & TORREY INC.
environmental/urban planning and design

SECURITY CLASSIFICATION OF THIS PAGE (When Data Entered)

REPORT DOCUMENTATION PAGE

READ INSTRUCTIONS BEFORE COMPLETING FORM

1. REPORT NUMBER	2. GOVT ACCESSION NO. AD-A119383 / 3. RECIPIENT'S CATALOG NUMBER
4. TITLE (and Subtitle) Draft Environmental Impact Report/Environmental Impact Statement, Bel Marin Keys Unit 5	5. TYPE OF REPORT & PERIOD COVERED Draft
	6. PERFORMING ORG. REPORT NUMBER
7. AUTHOR(s) Torrey and Torrey, Inc. San Francisco, CA	8. CONTRACT OR GRANT NUMBER(s)
9. PERFORMING ORGANIZATION NAME AND ADDRESS U.S. Army Corps of Engineers, San Francisco Dist. 211 Main Street San Francisco, CA 94105	10. PROGRAM ELEMENT, PROJECT, TASK AREA & WORK UNIT NUMBERS
11. CONTROLLING OFFICE NAME AND ADDRESS Office of Chief of Engineers U.S. Department of the Army Washington, D.C. 20314	12. REPORT DATE September 1982
	13. NUMBER OF PAGES
14. MONITORING AGENCY NAME & ADDRESS(if different from Controlling Office)	15. SECURITY CLASS. (of this report) Unclassified
	15a. DECLASSIFICATION/DOWNGRADING SCHEDULE

16. DISTRIBUTION STATEMENT (of this Report)

Approved for public release; distribution unlimited

17. DISTRIBUTION STATEMENT (of the abstract entered in Block 20, if different from Report)

18. SUPPLEMENTARY NOTES

- Prepared in cooperation with the Marin County California Planning Department
- Appendices are bound in a separate volume

19. KEY WORDS (Continue on reverse side if necessary and identify by block number)

Environmental Impact
Excavation/Fill
Waterfront residential/commercial development

20. ABSTRACT (Continue on reverse side if necessary and identify by block number)

Joint State/Federal environmental impact document concerning a regulatory permit application by Home Savings & Loan under Section 10 the River and Harbor Act of 1899 and Section 404 of the Clean Water Act. The proposed project involves waterfront residential/commercial development on approximately 735 acres with an additional estimated 875 acres to be committed to open space and environmental enhancement.

DD FORM 1 JAN 73 1473 EDITION OF 1 NOV 65 IS OBSOLETE

unclassified

SECURITY CLASSIFICATION OF THIS PAGE (When Data Entered)

BEL MARIN KEYS UNIT 5 EIR/EIS

APPENDICES

APPENDIX I - LAND USE

B. STREAM CONSERVATION AREAS

Because of varying policies regarding Stream Conservation Areas, it is again noted that the following recommendations apply only in the unincorporated portions of the County. Cities and towns with similar environmentally sensitive areas may elect to prepare their own conservation guidelines, or adopt the County's if appropriate.

General Policies

B-1.1 Riparian systems,streams and their riparian and woodland habitat are irreplaceable, and should be officially recognized and protected as essential environmental resources, because of their values for erosion control, water quality, fisheries production, aesthetics and recreation.

B-1.2 All perennial and intermittent streams, which are defined as natural watercourses shown as solid or dashed blue lines on the most recent appropriate USGS quad sheet, should be subject to these stream and creekside protection policies. A perennial stream is further defined as a watercourse that flows throughout the year (except for infrequent or extended periods of drought), although surface water flow may be temporarily discontinuous in some reaches of the channel such as between pools. An intermittent stream is further defined as a watercourse that flows during the wet season, continus to flow after the period of precipitation, and ceases surface flow during at least part of the dry season. An ephemeral watercourse, which carries only surface runoff and flows during and immediately after periods of precipitation, should be subject ot these policies if it supports riparian vegetation for a length of 100 feet or more.

B-1.3 A Stream Conservation Area (SCA) should be designated along all such streams, to consist of the watercourse itself and surrounding banks on both sides up to the high water mark and a strip of land extending laterally outward from the top of both banks, to a width of 100 feet on each side in the Coastal Recreation and Inland Rural Corridors and to a width of 50 feet on each side in the City-Centered Corridor.Where large tracts of land in the City-Centered Corridor are proposed for development, the 100-foot buffer should be applied, where consistent with legal requirements, and other planning and environmental goals. In the Coastal Recreation and Inland Rural Corridors, the zone should be extended if necessary to include an area 50 feet landward from the edge of riparian vegetation.

B-1.4 The following uses are permitted in the SCA by development permits, provided these uses are allowed by the underlying zoning: all currently existing structures and uses including reconstruction and repairs, necessary water supply projects; flood control projects; developments to improve fish and wildlife habitat; grazing of livestock and other agricultural uses; maintenance of water channels for erosion control and other purposes; road and utility line crossings; water monitoring installations; trails.

B-1.5 The following new uses are prohibited in the SCA: roads and utility lines, except at crossings; confinement of livestock, dumping or disposal of refuse, use of motorized recreational vehicles and any structural improvement (excluding repairs) other than those identified in Policy B-1.4, including residences, barns, and storage buildings, unless allowed by a development permit in Policy B-1.6.

B-1.6 Other uses may be allowed in the SCA by development permits, provided these uses are allowed in the underlying zoning, on existing parcels that fall entirely within the zone or on existing parcels where it can be conclusively demonstrated that development on any other part of the parcel would have a more adverse effect on water quality or other environmental impacts. Such development should conform to all policies for SCA's.

B-1.7 All concerned agencies should take aesthetic, scenic, environmental and recreational benefits into full consideration when computing costs of alternatives for modifications of streams.(It should be noted that State law requires a permit from the Department of Fish and Game for the modification of any stream bed.)

Preservation of Existing and Native Vegetation Policies

B-2.1 The retention of the natural vegetation on a SCA should be encouraged in order to realize many benefits, such as soil erosion prevention, stream, shade, etc. When vegetation must be removed and soil disturbed within the SCA, the area should be reseeded or replanted with native plants of the habitat as soon as possible removing broom and other aggressive exotic plants, so as to restore the vegetative cover.

B-2.2 Minimum disturbance should be made of vegetation within the SCA, especially those trees and shrubs providing shade and stability for the streamcourse. This does not imply that tree growth will not be cleared from the stream channel when it unduly restricts flood flows.

B-2.3 Trees and shrubs to be planted along watercourses should include a variety of species that would naturally grow in or near the creek. Generally, exotic trees should be avoided.

B-2.4 Modification of natural channels within SCA's for flood control, etc., should be done in a manner that retains and protects the vegetation forming ground cover and shade. Special attention should be given to the protection of riparian vegetation.

Fish and Wildlife Protection and Enhancement Policies

B-3.1 SCA's are the most important land areas for wildlife, possessing greater numbers and variety than any other area. The value of SCA's for this purpose is therefore recognized. Fishery resources are directly dependent upon the protection of SCA's to provide quality aquatic habitats. A system of wildlife habitat areas representative of Marin County's floral and faunal streamside communities should therefore, be established and permanently maintained. Human use of these areas should be restricted as necessary to protect these communities. However, designation of SCA's shall not in any manner authorize trespass upon private property, or increase the right of public agencies to gain access to private property.

B-3.2 A system of monitoring SCA's should be established to asure the protection of vegetation, soils and wildlife habitat along streams.

B-3.3 Before any stream alterations are permitted, the minimum water flows necessary to protect fish habitats, water quality, riparian vegetation, groundwater recharge areas, and downstream users should be determined in conjunction with the State Department of Fish and Game and the Division of Water Rights of the State Water Resources Control Board.

B-3.4 When a fish or other wildlife resource may be substantially affected by development in this zone, modifications and mitigations should be required in the project, to be determined in consultation with the State Department of Fish and Game.

B-3.5 Projects and stream management programs which improve the opportunity for fishing and enhance the abundance of sport fish should be encouraged and supported.

Erosion Control Policies

B-4.1 Soil disturbance should be discouraged within the SCA. Where absolutely necessary it should be limited to the smallest surface area and volume of soil practical and for the shortest practical length of time.

B-4.2 Surface runoff rates in excess of pre-development levels should be kept to an absolute minimum. Runoff should be retained on-site and released at pre-development rates, unless to do so creates greater problems than releasing it.

B-4.3 On-site facilities for the retention of sediments produced by development should be provided during construction and if necessary upon project completion, and continuing maintenance of these facilities should be required.

B-4.4 New roads and roadfill slopes should be located outside the SCA, except at stream crossings. No spoil from road construction should be deposited within the SCA. At road crossings in the SCA's, special effort should be taken to stabilize soil surfaces.

B-4.5 Filling, grading, excavating, obstructing the flow, or altering the bed or banks of the stream channel and riparian systesm should be allowed only under emergency conditions or where no reasonable alternative is available, by permit granted by the Environmental Protection Committee, which should include possible mitigation measures.

B-4.6 Development work adjacent to and affecting SCA's should be done during the dry season only, except for emergency repairs. Disturbed surfaces should be stabilized and re-lanted. and areas where woody vegetation has been removed should be replanted with suitable species before the beginning of the rainy season.

Use and Aesthetics Policies

B-5.1 Uses and development within SCA's should serve to enhance the appearance and usability of the creeks by preserving visual access, and coordinating site development. The County should work in close cooperation with the flood control and water districts in the design and choice of materials for the construction and alterations within the SCA's.

B-5.2 Public access to the creeks which run through lands in public ownership should be encouraged and improved where feasible by means of pathways, access points, and bridges. Placement of streamside trails should diverge from the stream course or lead to a viewoint in order to protect streamside wildlife corridors. Additional public lands should be added adjacent to streams where possible to make resources more accessible and usable for passive recreation.

B-5.3 Damaged portions of SCA's should wherever possible be restored to their natural state. Portions of the channels that have been significantly altered for flood control have potential for urban open space uses as landscaped areas and paths.

Management Policies

B-6.1 Water resources should be managed in a systematic manner that is sensitive to natural capacities, ecological impacts, and equitable consideration of the many water-related needs of the County.

B-6.2 High priority should be given to the protection of watersheds, aquifer-recharge areas, and natural drainage systems in any consideration of land use.

B-6.3 The cumulative effect of upstream development on downstream land uses should be considered. Development fees, standards, and other measures to mitigate downstream impact should be considered.

B-6.4 Water impoundment areas should have marginal protection areas and should be protected and maintained for their water supply and for their environmental and recreational values.

B-6.5 Water quality should be maintained or enhanced to allow the continued environmental health of natural waterway habitats.

B-6.6 The use of streams and surrounding lands for educational purposes should be encouraged.

B-6.7 Streams should be incorporated into development plans for sites abutting the waterways instead of being fenced off, except where safety requirements warrant otherwise.

B-6.8 Land divisions should be reviewed for size of parcels and property line locations relative to creeks to allow management of the creek by one property owner, to the greatest extent possible.

B-6.9 Any agency or individual responsible for management of SCA's should undertake the responsibility for implementation of all SCA policies.

Flood Control Policies

B-7.1 An ordinance for floodplain management in compliance with regulations for the Federal Flood Control Insurance Program should be adopted.

B-7.2 The multiple use of flood control channels should be encouraged.

B-7.3 Geologic hazards in locations where dams, ponds, and other water impoundments exist or are proposed should be identified in the environmental review process. Appropriate modifications and mitigation measures should be required.

B-7.4 Flood control measures should retain natural features and conditions as much as possible. Compatible uses (agriculture, wildlife habitat, recreation, etc.) of flood ponding areas and seasonal floodways should be promoted.

B-7.5 Publicly controlled flood ponding areas should be retained; ponding covenants or easements held by the Flood Control District on property should not be transferred to other properties to allow development within floodways.

B-7.6 Filling or other physical alteration in floodways, floodplains, or ponding areas should be limited to the minimum necessary as determined in development permits issued by the County.

C. BAYFRONT CONSERVATION ZONE

Habitat Protection and Restoration Policies

C-1.1 The County shall preserve and enhance the diversity of wildlife and aquatic habitats found in the Marin County bayfront lands, including tidal marshes, seasonal marshes, lagoons, natural wetlands, and low-lying grasslands overlying historical marshlands.

C-1.2 Development should not encroach into sensitive wildlife habitats, limit normal range areas, create barriers which cut off access to food, water, or shelter, or cause damage to fisheries or fish habitats. Buffer zones between development and identified or potential wetland areas should be provided. Access to environmentally sensitive marshland and adjacent habitat should be restricted, especially during spawning and nesting seasons.

C-1.3 The County shall prohibit diking, filling, or dredging in areas subject to tidal action (Tidelands subzone) unless the area is small (less than one-half acre), isolated, or limited in productivity. In tidal areas, only land uses which are water-dependent shall be permitted, as consistent with federal, state, and regional policy (ports, water-related industry and utilities, airports, essential water conveyance, wildlife refuge, water-oriented recreation and public assembly). Exemptions may be granted for emergency or precautionary measures taken in the public interest, e.g., protection from flood or other natural hazard.

C-1.4 The County shall, through its land use and development regulations, foster the enhancement of the wildlife and aquatic habitat value of the diked historic marshlands. Land uses which provide or protect wetland or wildlife habitat, and/or which do not require diking, filling, or dredging, shall be encouraged, specifically: restoration of the land to tidal status, agricultural use, flood basin, wastewater reclamation area. Other land uses which do not require diking, filling, or dredging and/or are less protective of habitat value may be permitted when it can be proven that the resulting public benefit exceeds environmental costs and liabilities. Public benefits to be provided in the diked portions of the Bayfront Conservation Zone shall include but not be limited to: public access and recreational opportunities, educational or scientific opportunities, provision of housing (particularly housing developments which include low and moderate income housing), provision of essential water conveyance, transportation or utility services, and protection from flood or other natural hazards. On parcels greater than one-half acre in size, mitigation and/or compensation for habitat value lost due to diking, filling, or dredging shall be required, the amount to be determined by the County in conjunction with federal and state agencies.

C-1.5 Freshwater habitats in the bayfront areas associated with freshwater streams and small former marshes should be preserved and/or expanded such that the circulation, distribution and flow of the fresh water supply is facilitated.

C-1.6 The County shall promote the retention and formation of large tracts of land within historic marshland areas and contiguous grassland areas as possible landbanks for the protection of wetlands habitats.

C-1.7 Natural or managed flood basins should be utilized to provide seasonal habitat for waterfowl and shorebirds.

C-1.8 The County shall allow the transfer of the development potential of diked historic marshlands which are restored to tidal status or enhanced as wetlands habitat to upland sites, provided that development on the upland site complies with development standards for the protection of adjacent habitat areas.

C-1.9 The County shall review all proposed development within the Bayfront Conservation Zone in accordance with the planned district review procedure in order to ensure maximum possible habitat protection. An assessment of existing environmental conditions (biologic, geologic, hazard, and aesthetic) shall be required prior to submittal of development plans.

C-1.10 The County shall facilitate consultation and coordination with the trustee agencies (Department of Fish and Game, U.S. Fish and Wildlife Service, the Corps of Engineers, and BCDC) during environmental review and during review of other proposals for lands within the Bayfront Conservation Zone.

Protection of Environmental Quality Policies

C-2.1 The County shall ensure that development in the County occurs in a manner which minimizes the impact of earth disturbance, erosion, and water pollution within the Bayfront Conservation Zone.

C-2.2 Disruption or impediment to runoff and stream flow in the watersheds of Marin County marshes should not be permitted if either can be shown to diminish the quality of the water entering the marshes and bay.

C-2.3 The development and siting of industrial (and any other) facilities adjacent to bayfront areas should be planned to eliminate significant adverse environmental impacts on the water quality of the bay and marshes.

C-2.4 The development of jetties, piers, outfalls, etc., should not be allowed to alter the movement patterns of the bay's tides and currents, such that significant adverse impacts would result.

C-2.5 The County shall discourage any bay fill that diverts and retards currents, increases the deposition of sediments, or causes erosion and pollution.

C-2.6 The County shall not permit waste discharge which would contaminate water resources or otherwise adversely affect any intertidal environment. Municipal discharges should move toward partial consolidation and relocation of discharge points.

Agricultural Uses in Bayfront Lands Policies

C-3.1 The County shall protect existing agricultural lands in the Bayfront Conservation Zones. These lands are an important resource for the County: they are a visual and scenic resource; they play an integral role in other agricultural and dairy operations in Marin County; they are a productive economic resource; and they are compatible with water-related wildlife habitat. Such agricultural

activities could consist primarily of grazing operations harmonious with adjoining marshes, wetlands, grasslands, or other sensitive lands.

C-3.2 Agricultural activities should minimize removal of natural vegetation where possible.

C-3.3 Use of pesticides, insecticides, etc., should comply with existing federal and state standards, as implemented by the County Agricultural Commissioner.

Protection from Geologic, Flooding and Other Hazards Policies

C-4.1 Any development proposed for lands within the Bayfront Conservation Zone must be consistent with policies and proposals of the County Seismic Safety Element, including avoidance of areas that pose hazards such as differential settlement, slope instability, liquefaction, ground shaking and rupture, tsunami, and other ground failures.

C-4.2 Those areas underlain by deposits of "young muds" should be reserved for water-related recreational opportunities, habitat, open space, or limited development subject to approval by the Corps of Engineers and other trustee agencies.

C-4.3 Any development (within the watershed areas) proposed for sites that have poor soil conditions for construction or that are seismically active should be designed to minimize earth disturbance, erosion, water pollution, and hazards to public safety.

C-4.4 Areas defined as floodplain should serve the dual purpose of habitat and flood protection. Areas should be evaluated periodically to determine whether increases in the volume and rate of runoff from urbanization or natural forces warrant further flood mitigation measures.

C-4.5 The County's regulatory procedures should reflect 100-year floodplain areas.

Public Access and Bayfront Recreation Policies

C-5.1 Public use of the shoreline areas is desirable and should be encouraged consistent with ecological and safety considerations.

C-5.2 The County shall ensure that public access is provided and protected along the bayfront and significant waterways. The County views public access easements, gained through offers of dedication, as a condition of development plan approval, as the primary means available to increase public access opportunities.

C-5.3 The County will accept, as resources permit, public access easements where the offered easement is in a developed area (density of one unit per acre or greater) and substantial use could be expected by local residents. Where the County accepts an easement, it will be responsible for signing, providing appropriate facilities, and maintaining the easement. If the County does not accept an easement, it shall attempt to find appropriate public or private agencies to do so.

Where the County accepts an easement, it will be responsible for signing, providing appropriate facilities, and maintaining the easement. If the County does not accept an easement, it shall attempt to find appropriate public or private agencies to do so.

C-5.4 The County shall evaluate potential new public access areas in order to determine the feasibility of providing access and the priorities for acquisition, based on the following criteria: desirability of the site, capacity to sustain use without significant adverse impacts on the bayfront habitat and wildlife, potential for hazard to public safety or health, availability of other public access points in the area, and compatibility with adjacent land uses.

C-5.5 Public access should be sited and designed to facilitate public use and enjoyment of the bayfront lands. Public areas should be clearly marked, and continuous ten-foot walkways from the nearest roads to the shoreline and along the shoreline should be provided. Public access areas should be designed to minimize possible conflicts between public and private uses on the properties. Walkways should generally be set back at least ten feet from any proposed structure.

C-5.6 Within the Bayfront Construction Zone, provision should be made for recreational development and access to the shoreline marshes for such uses as fishing, boating, hunting, picnicking, hiking, and nature study. There should be provisions for both separated wildlife preserve and more intensively used recreational uses along the bayfront. Every available appropriate means of providing public education regarding the value of shoreline preservation and the shoreline as an educational laboratory shall be encouraged.

Aesthetic and Scenic Quality Policies

C-6.1 The County shall protect visual access to the bayfront and scenic vistas of water and distinct shorelines through its land use and development review procedures. This viewshed protection is essential for the preservation of Marin County and San Francisco Bay identity, for the enhancement of aesthetic qualities, and for visual and psychological relief from adjacent urban environments.

C-6.2 Existing obtrusive man-made elements, such as##stant views in the bayfront and waters of the bay should be identified, protected and enhanced by improvements (turn outs, benches, etc.) where possible. View corridors and low profile should be maintained on sites adjoining these locations.

C-6.4 Waterfront development in particular should be designed for openness and permit optimal views for public enjoyment of bayfront lands.

APPLICATION FOR A DEPARTMENT OF THE ARMY PERMIT

For use of this form, see EP 1145–2–1

The Department of the Army permit program is authorized by Section 10 of the River and Harbor Act of 1899, Section 404 of P. L. 92–500 and Section 103 of P. L. 92–532. These laws require permits authorizing structures and work in or affecting navigable waters of the United States, the discharge of dredged or fill material into waters of the United States, and the transportation of dredged material for the purpose of dumping it into ocean waters. Information provided in ENG Form 4345 will be used in evaluating the application for a permit. Information in the application is made a matter of public record through issuance of a public notice. Disclosure of the information requested is voluntary; however, the data requested are necessary in order to communicate with the applicant and to evaluate the permit application. If necessary information is not provided, the permit application cannot be processed nor can a permit be issued.

One set of original drawings or good reproducible copies which show the location and character of the proposed activity must be attached to this application (see sample drawings and checklist) and be submitted to the District Engineer having jurisdiction over the location of the proposed activity. An application that is not completed in full will be returned.

1. Application number (To be assigned by Corps)	2. Date 2 (Day) 10 (Mo.) 1981 (Yr.)	3. For Corps use only.

4. Name and address of applicant.

See # 14 for property ownership
Authorized agent is applicant. Can also
contact Home's attorney, Mary L. Walker

Telephone no. during business hours

A/C (213) 626-8484

A/C ( )

5. Name, address and title of authorized agent.

Home Savings and Loan Association
3731 Wilshire Blvd., # 940
Los Angeles, Ca. 90010

Telephone no. during business hours

A/C (213) 385-1900 X 234

A/C (213) 382-9904

6. Describe in detail the proposed activity, its purpose and intended use (private, public, commercial or other) including description of the type of structures, if any to be erected on fills, or pile or float–supported platforms, the type, composition and quantity of materials to be discharged or dumped and means of conveyance, and the source of discharge or fill material. If additional space is needed, use Block 14.

See attached page.

7. Names, addresses and telephone numbers of adjoining property owners, lessees, etc., whose property also adjoins the waterway.

See attached

8. Location where proposed activity exists or will occur.

Address:

South and east of Bel Marin Keys Blvd.
Street, road or other descriptive location

Bel Marin Keys
In or near city or town

Marin (County) CA. (State) 94947 (Zip Code)

Tax Assessors Description: (If known)

Map No. | Subdiv. No. | Lot No.

Sec. | Twp. | Rge.

9. Name of waterway at location of the activity.

Existing Bel Marin Keys lagoons, Novato Creek and San Pablo Bay

ENG Form 4345, 1 OCT 77 Edition of 1 Apr 74 is obsolete.

10. Date activity is proposed to commence. _____

Date activity is expected to be completed June 1983

11. Is any portion of the activity for which authorization is sought now complete? ☐ YES ☒ NO
If answer is "Yes" give reasons in the remark section. Month and year the activity was completed _____. Indicate the existing work on the drawings.

12. List all approvals or certifications required by other federal, interstate, state or local agencies for any structures, construction, discharges, deposits or other activities described in this application.

Issuing Agency	Type Approval	Identification No.	Date of Application	Date of Approval
Marin County	Master plan & zone change Tentative map Subdivision maps		8-13-81	Anticipated Sept. 1982
Calif. Regional Water Quality Control Board				Anticipated Sept. 1982
LAFCO	Annexation			" Jan. 1983

13. Has any agency denied approval for the activity described herein or for any activity directly related to the activity described herein?

☐ Yes ☒ No (If "Yes" explain in remarks)

14. Remarks or additional information.

Property owners:

1. McAlester Construction Finance Corporation
   P. O. Box 907
   McAlester, Okalhoma 74501
   Assessor's parcels No. 157-172-07,08

2. MFT Holding Company
   135 S. Main St.
   Salt Lake City, Utah 84147
   Assessor's parcels No. 157-172-04,10-14,19,20

15. Application is hereby made for a permit or permits to authorize the activities described herein. I certify that I am familiar with the information contained in this application, and that to the best of my knowledge and belief such information is true, complete, and accurate. I further certify that I possess the authority to undertake the proposed activities.

_____
Signature of Applicant or Authorized Agent

The application must be signed by the applicant; however, it may be signed by a duly authorized agent (named in Item 5) if this form is accompanied by a statement by the applicant designating the agent and agreeing to furnish upon request, supplemental information in support of the application.

18 U. S. C. Section 1001 provides that: Whoever, in any manner within the jurisdiction of any department or agency of The United States knowingly and willfully falsifies, conceals, or covers up by any trick, scheme, or device a material fact or makes any false, fictitious or fraudulent statements or representations or makes or uses any false writing or document knowing same to contain any false fictitious or fraudulent statement or entry, shall be fined not more than $10,000 or imprisioned not more than five years, or both. Do not send a permit processing fee with this application. The appropriate fee will be assessed when a permit is issued.

6. Residential and commercial building pads and streets will be constructed by excavating approximately 9,000,000 cubic yards from the lagoon areas and placing the fill as shown on the attached grading plan. A levee will be constructed around the project between the lagoon and mitigation parcel. The levee will be designed to adequately pass storm water as required by Marin County Flood Control District. A water circulation system will be provided as required by the Regional Water Quality Control Board. A marina with a maximum capacity of 602 berths is proposed. A navigational lock is proposed to allow deep water access to San Pablo Bay via Novato Creek. Boat docks are proposed behind each single family lot. Commercial boat docks are proposed near the marina for maintenance, refueling and temporary berthing. Multiple or ganged docks are proposed in the multi-family area (area # 1 on attached master plan).

7. List of property owners adjoining Bel Marin Keys Unit No. 5.

a) Leveroni, Clarence & Alice
3100 Novato Blvd.
Novato, Ca. 94947

b) Green, Rae B.
1605 E. Charleston
Las Vegas, Nevada 89104

c) Marin County Flood Control
Civic Center
San Rafael, Ca.

d) United States of America
Washington, D.C.

e) State of California
Sacramento, Ca.

f) Marin County Sanitary District No. 6
P. O. Box 525
Novato, Ca.

g) Mac Innes, Duncan & Lauriann
1196 Bel Marin Keys Blvd.
Novato, Ca. 94947

h) Berges, Dorothy
168 Bahama Reef
Novato, Ca. 94947

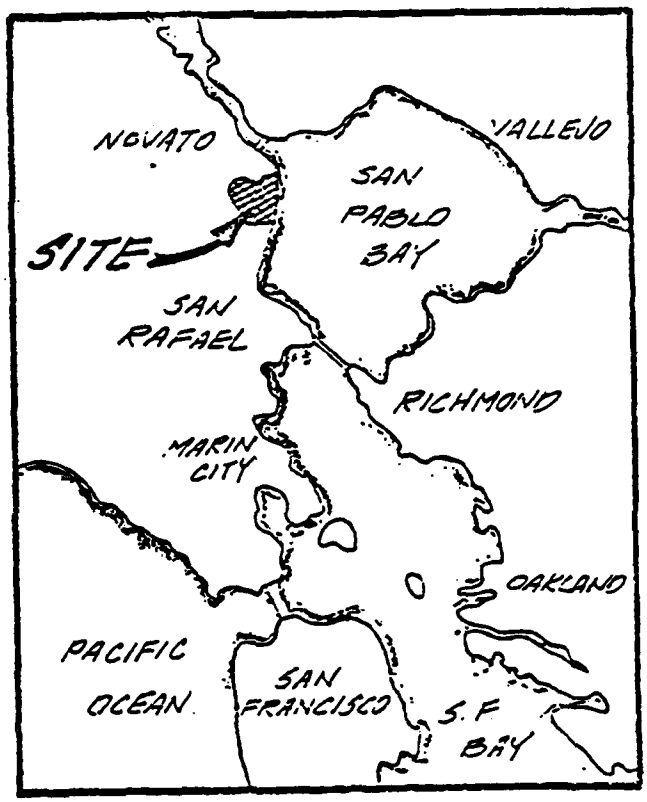
i) Nunes, Rita
165 Bahama Reef
Novato, Ca. 94947

7. List of property owners adjoining Bel Marin Keys Unit No. 5 (cont'd)

j. Bel Marin Keys Community Services District
4 Montego Key
Novato, Ca. 94947

k. West, Jack H. Jr. & Evelyn
800 Bel Marin Keys Blvd.
Novato, Ca. 94947

l. Smith, Gordon
P. O. Box 71
Tiburon, Ca. 94920



VICINITY MAP

1"0 SCALE

PURPOSE BEL MARIN KEYS, UNIT No. 5 IN NOVATO, CALIFORNIA

DATUM U.S.C.&G.S AT

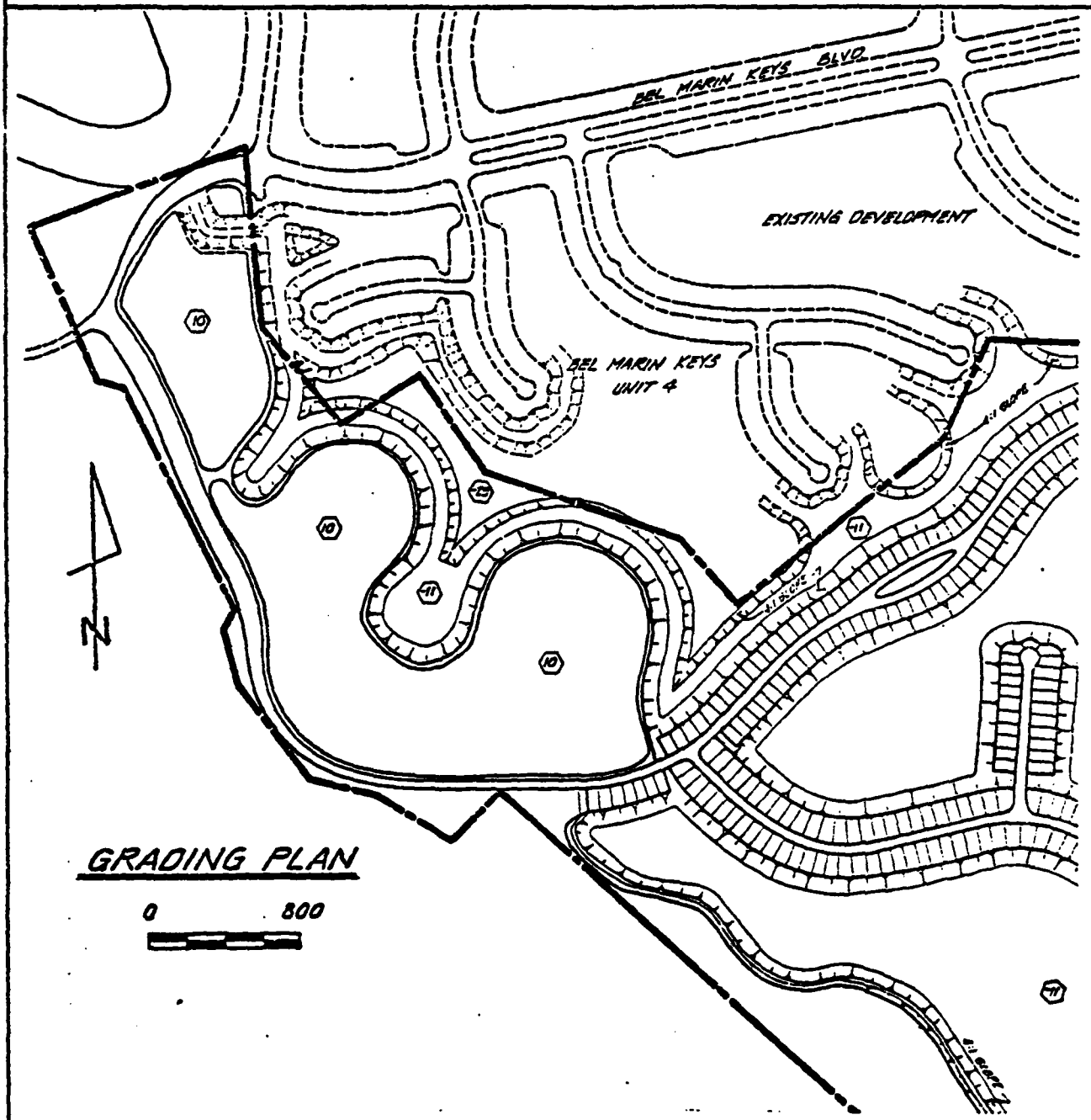
ADJACENT PROPERTY OWNERS

COUNTY OF MARIN STATE CALIF.

① VARIOUS. SEE ATTACHMENT FOR ITEM 7 OF APPLICATION.

② APPLICATION BY HOME SAVINGS & LOAN

SHEET 1 OF 8 DATE OCT. 1981



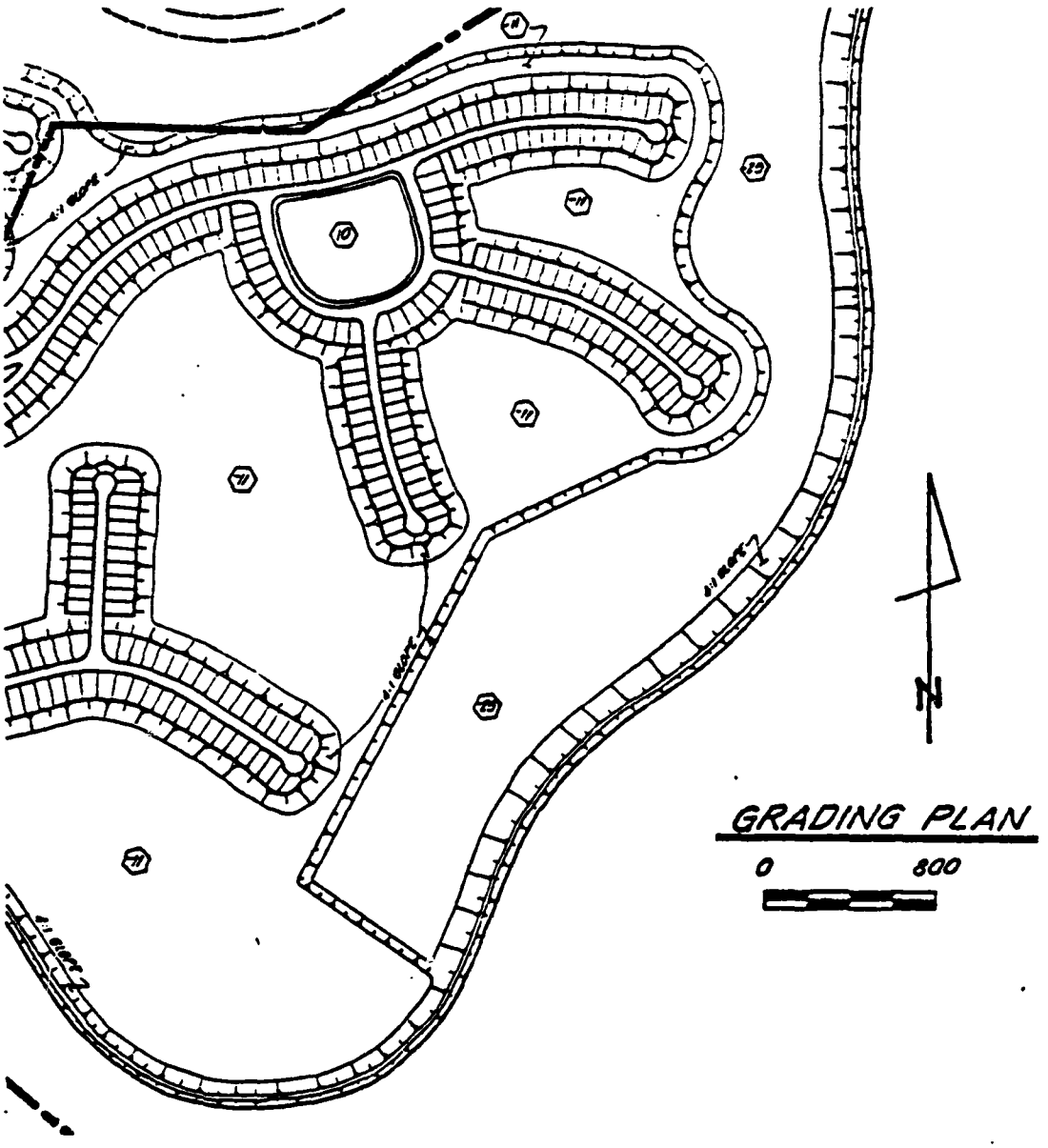
PURPOSE BEL MARIN KEYS, UNIT No 5 IN NOVATO, CALIFORNIA

DATUM U.S.C.&G.S. AT

ADJACENT PROPERTY OWNERS COUNTY OF MARIN STATE CALIF.

① VARIOUS. SEE ATTACHMENT FOR ITEM 7 OF APPLICATION. APPLICATION BY HOME SAVINGS & LOAN

② SHEET 2 OF 8 DATE OCT. 1981



GRADING PLAN

0 800

PURPOSE BEL MARIN KEYS, UNIT No. 5 IN NOVATO, CALIFORNIA

DATUM U.S.C. & G.S. AT

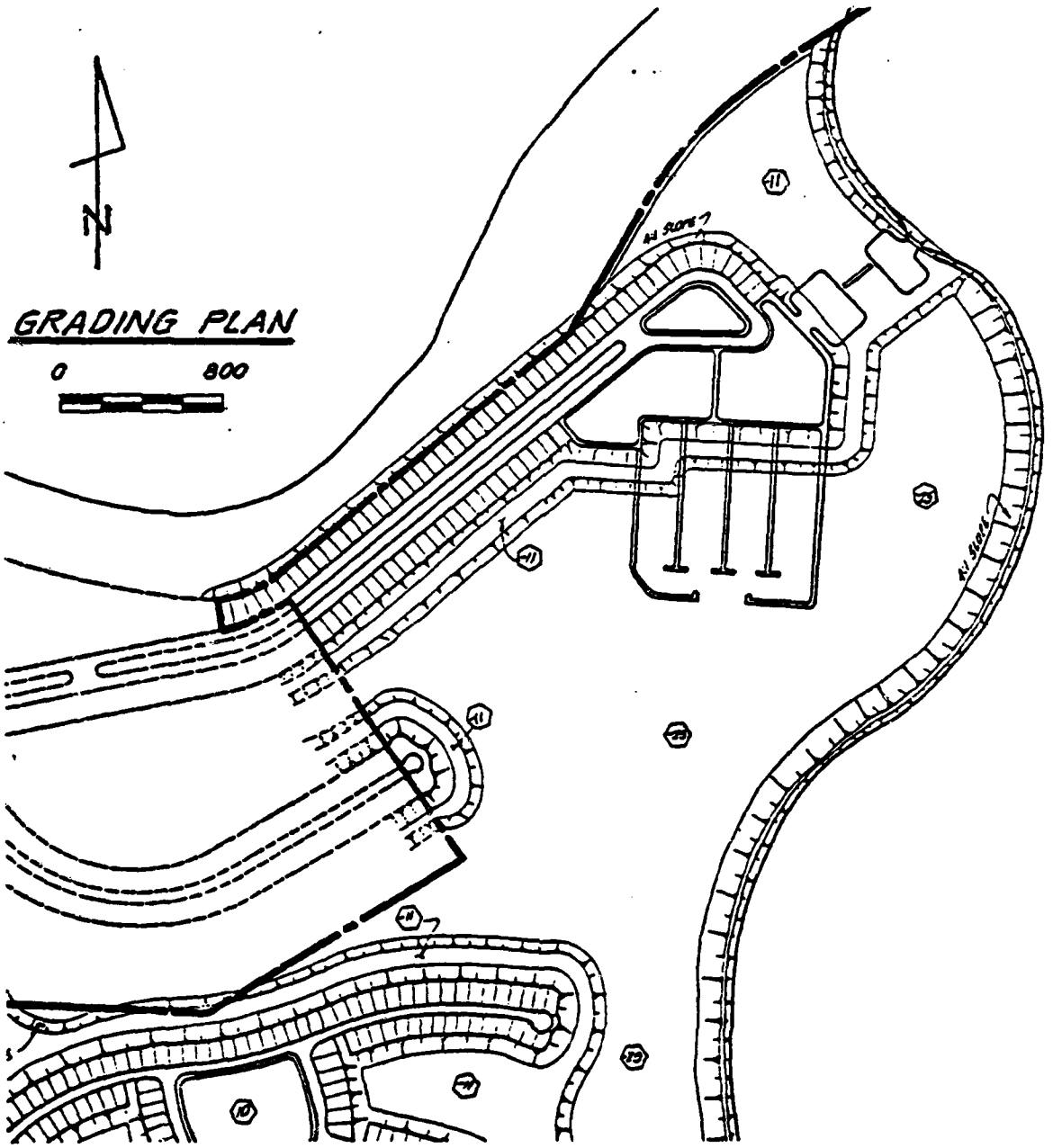
ADJACENT PROPERTY OWNERS

COUNTY OF MARIN STATE CALIF.

① VARIOUS. SEE ATTACHMENT FOR ITEM 7 OF APPLICATION.

② APPLICATION BY HOME SAVINGS & LOAN

SHEET 3 OF 8 DATE OCT. 1981



PURPOSE BEL MARIN KEYS, UNIT No. 5 IN NOVATO, CALIFORNIA

DATUM U.S.C. & G.S. AT

ADJACENT PROPERTY OWNERS COUNTY OF MARIN STATE CALIF.

① VARIOUS. SEE ATTACHMENT FOR ITEM 7 OF APPLICATION. APPLICATION BY HOME SAVINGS & LOAN

② SHEET 4 OF 8 DATE OCT. 1981

BEL MARIN KEYS

MARIN COUNTY CALIFORNIA

MASTER PLAN

SHEET 5 of 8

SCHEMATIC SITE PLAN
AREA 1
SHEET 6 of 8
SITE INFORMATION
BEL MARIN KEYS
MARIN COUNTY
CALIFORNIA

SCHEMATIC SITE PLAN
AREA 2
SHEET 7 of 8
SITE INFORMATION
BEL MARIN KEYS
MARIN COUNTY
CALIFORNIA

SCHEMATIC SITE PLAN
AREA 3
SHEET 8 of 8
SITE INFORMATION
BEL MARIN KEYS
MARIN COUNTY
CALIFORNIA

INITIAL STUDY

ROUTE TO:

- ☐ Comp. Planning Dept.
- ☐ Parks, Rec., Open Space
- ☐ Public Works
- ☐ Environmental Control
- ☐ Other _____

Return by: _____ (date)

Marin County
Division of Environmental Services

I. PROJECT DESCRIPTION

A. Project Name: Bel Marin Keys Unit #5

B. Type of Application: Master Plan

C. Assessor's Parcel No.: 157-172-04, 10 thru 14 + 19 + 20

D. Existing Zoning: RSP-0.5 CWP Desig. Conservation Zone

E. Description: Proposal to develop 1,178 dwellings, commercial marina, neighborhood shopping, lagoons, streets + parks on 735 acres of a 1810 acre holding

F. Location: East of U.S Hwy 101, north of Hamilton AFB, south of Novato Creek + west of San Pablo Bay

G. Environmental Setting: Diked bayfront low lands with intensive + extensive habitat values.

H. Other agencies which require approval: BCDC, CoE, Fish + Game, Fish + Wildlife, State Lands, Cal-Trans, etc.

I. Applicant's Name: Home Savings Phone: 213-385-1900

Address: % Craig A. Page, 3131 Wilshire Blvd, # 300 Los Angeles, Ca.

J. Initiated by: Rick Borgwardt Date: 6/8/81

Department/Agency: Planning Dept.

II. EVALUATION OF ENVIRONMENTAL IMPACTS: Please check the box indicated wherein the proposed project will have or potentially have a significant adverse impact on the environment, either individually or cumulatively with other projects. All phases of project planning, implementation and operation must be considered. All items checked must be discussed as noted in Section III.

A. Geophysical Factors: Will the project or its related activities result in:

☑ 1. Change in topography or unstable soil conditions due to excavating, grading or filling?

☐ 2. The destruction, covering or modification of any unusual or unique geologic or physical features?

☑ 3. Any changes in wind or water erosion of soils or sands or any erosion which may modify the channel of a waterway or other body of water?

☑ 4. Exposure of people or property to geologic hazards such as earthquakes, tsunami, landslides, mudslides, ground failure or similiar hazards?

B. Biotic Community Factors: Will the project or its related activities result in:

☑ 1. Changes in the number or diversity of any plant or animal species or alteration or deterioration of their habitats?

☑ 2. Introduction of new plant or animal species in o an area, or a barrier to normal dispersal or migration of any plant or animal species?

☐ 3. Reduction of the number of any rare or endangered plant or animal species?

☑ 4. Reduction in acreage of any agricultural crop or other agricultural activity? Clapper rail, salt marsh harvest mouse.

☐ 5. Increase in the danger of fire hazard in areas with flammable grass, brush, or trees?

C. Hydrologic and Watershed Factors: Will the project or its related activites result in:

☑ 1. Changes in the course or direction of water movements or configuration of either marine or fresh waters?

☐ 2. Changes in percolation, run-off or drainage patterns including ground water supply and recharge in the watershed?

☑ 3. Exposure of people or property to flood hazard?

☐ 4. Generation of pollutants (human wastes, toxic wastes, fertilizers, dissolved oxygen, etc.) which would affect the water quality of surface or subsurface waters in the watershed?

☐ 5. Effect the quantity or quality of private or public water supplies?

D. Airshed Factors: Will the project or its related activities result in:

☑ 1. Generating pollutants (hydrocarbon, thermal, ordor, dust, smoke, radiation, etc.) which would deteriorate ambient air quality? Traffic related.

☐ 2. Alteration of air movement, moisture or temperature, or any change in climate locally or regionally?

☐ 3. Exposure of people or property to wind hazards?

E. General and Specific Plan Factors: Will the project or its related activites be inconsistent with:

☑ 1. CWP, City or Community Plan policies or land use designations?

☐ 2. CWP population growth rates for its planning area in conjunction with other recently approved developments?

☐ 3. CWP policies for housing or low, moderate and middle income housing mix?

☑ 4. Other Bayfront Conservation Zone Policies
(specify)

F. Community/Cultural Factors: Will the project or its related activities:

- ☐ 1. Result in a substantial conflict with the established character, aesthetics or functioning of the surrounding community?
- ☐ 2. Be a part of a larger project involving a series of cumulative actions?
- ☐ 3. Involve historical buildings, natural or cultural features which are unique?
- ☐ 4. Affect an area of archaeological, paleontologic or other historic importance?
- ☑ 5. Affect an officially designated scenic vista-point, scenic highway or corridor or other unique aesthetic value?
- ☐ 6. Affect an important existing or potential community recreation area?
- ☐ 7. Affect lands preserved under an agricultural, scenic, or open space contract or easement?
- ☐ 8. Present a hazard to people or property from risk of explosion or release of hazardous substances either on site or in transit in the event of accident or otherwise?
- ☑ 9. Result in increases in existing ambient or single event noise levels?
- ☑ 10. Result in significant new light or glare impacts on the site or surrounding area?
- ☐ 11. Result in displacement of people or business activity?
- ☑ 12. Be expected to generate public controversy?

G. Natural Resources: Will the project or its related activites:

- ☐ 1. Affect the use, extraction or conservation of any natural resource?
- ☐ 2. Use substantial amounts of fuel or energy or require the development of new sources of energy?

H. Economic Factors:

- ☑ Will the project or its related activities require expenditure of public funds in excess of public revenues generated by the project?

I. Transportation/Circulation Factors: Will the project or its related activities result in:

- ☑ 1. Alterations to present patterns of circulation or movement of people and/or goods.
- ☑ 2. Alteration of the level of service of streets and highways?
- ☐ 3. Substantial impact on existing or proposed public transit systems including waterborne, rail and air traffic?
- ☐ 4. Effects on existing parking facilities or demand for new parking not provided for by the project?
- ☑ 5. Increase traffic hazards to motor vehicles, bicyclists, pedestrian or other traffic?

J. Public Service Factors: Will the project or its related activities have an effect upon or result in a need for new or altered governmental services in any of the following areas?

- ☑ 1. Fire protection?
- ☑ 2. Police protection?
- ☑ 3. Schools?
- ☑ 4. Parks and Recreation facilities?
- ☑ 5. Maintenance of public facilities, including roads, canals, etc.?
- ☐ 6. Other governmental services: _____

K. Public Utility Factors: Will the project or its related activities have an effect on or result in a need for new systems or substantial alterations to the following utilities:

- [x] 1. Sewer or septic systems?
- [x] 2. Water for domestic use and fire protection?
- [ ] 3. Natural gas or electricity?
- [x] 4. Storm water drainage?
- [x] 5. Solid waste disposal?
- [ ] 6. Communication Systems?
- [x] 7. Plant facilities for any of the above (sewer plants, microwave station, water tanks, etc.)

III. MANDATORY FINDINGS OF SIGNIFICANCE: Pursuant to Section 15032 of the State EIR Guidelines, a project shall be found to have a significant effect on the environment if any of the following are true:

- [x] 1. The project has the potential to degrade the quality of the environment, substantially reduce the habitat of a fish or wildlife species, cause a fish or wildlife population to drop below self sustaining levels, threaten to eliminate a plant or animal community, reduce the number or restrict the range of a rare or endangered plant or animal or eliminate important examples of the major periods of California history or prehistory.
- [x] 2. The project has the potential to achieve short-term to the disadvantage of long-term environmental goals.
- [x] 3. The project has possible environmental effects which are individually limited but cumulatively considerable. (Cumulatively considerable means that the incremental effects of an individual project are considerable when viewed in connection with the effects of past projects, the effects of other current projects, and the effects of probable future projects.
- [ ] 4. The environmental effects of a project will cause substantial adverse affects on human beings, either directly or indirectly.

IV. SIGNIFICANT IMPACTS AND FEASIBLE MITIGATION MEASURES: All significant or potentially significant impacts indicated in Section II above should be described and feasible mitigation measures recommended wherever possible. Any participant of the initial study may also make a recommendation as to whether a Negative Declaration, a Negative Declaration with mitigation measures, more study in a particular area or an EIR should be prepared. Please indicate any source data relied upon and your name and date of comments in the space indicated. Use additional pages if necessary.

Reviewed by ______________________, on ____________ (date), Dept. ____________

Reviewed by ______________________, on ____________ (date), Dept. ____________

Reviewed by ______________________, on ____________ (date), Dept. ____________

Returned to initiating department ____________ (date), rec'd by ______________

V. DETERMINATION: (to be completed by the Environmental Coordinator). Pursuant to Sections 5081 & 5082 of the County's Guidelines and the Initial Study evaluation:

☐ 1. I find that the proposed project will not have a significant effect on the environment, and a NEGATIVE DECLARATION will be prepared.

☐ 2. I find that although the proposed project could have a significant effect on the environment, there will not be a significant effect in this case because the mitigation measures described in Exhibit "A" attached have been added to the project. A NEGATIVE DECLARATION will be prepared.

☑ 3. I find that the proposed project may have a significant effect on the environment and an ENVIRONMENTAL IMPACT REPORT IS required.

[signature]
Environmental Coordinator

Date: Aug. 17, 1981

BCDC DIKED HISTORIC BAYLANDS STUDY - APRIL 1982

Tentative Findings and Policies

Findings

1. Of the 80 square miles of the vast baylands that were once part of San Francisco Bay only 29 square miles retain wetland characteristics that have significant wildlife value. The other 51 square miles consist of areas that have been farmed for many years. In addition, dikes and other upland areas in and adjacent to the wetlands link upland habitat to marsh areas and act as a buffer for the latter.

2. Diked baylands that retain wetland characteristics are closely related to San Francisco Bay. They have many of the same values as the tidal marsh and water areas of the Bay, including wildlife habitat, waste assimilation, flood protection and climate modification. Diked wetlands have diverse characteristics. They support salt marsh, brackish marsh, freshwater marsh, ponds and uplands. Each habitat is important to certain wildlife. All contribute to the diversity and productivity of the entire Bay.

4. Freshwater marshes have been significantly reduced. The remaining freshwater marshes are extremely important for wildlife. Brackish marshes have also been diminished; they provide a diverse habitat for many plants and wildlife species. Salt marsh is the most similar to tidal marshes but is not support as diverse plant and wildlife populations as fresh or brackish marshes. Ponds and other water-covered areas provide habitat for small fish as well as diversity.

5. Many people use diked baylands for recreation to hunt, fish, hike, watch birds and enjoy the open space.

6. Diked baylands used for agriculture are important to the Bay Area economy because feed for the North Bay dairy industry provides 50 percent of the milk and milk products for the Bay region. Jobs are also provided for skilled and non-skilled workers. Agricultural areas also provide habitat, especially during the winter, are important for open space and as buffers between urban areas and marsh. Continued agricultural use is threatened, primarily by encoraching urbanization and increased farming costs. Most local jurisdictions do not have strong policies to preserve baylands used for agriculture.

7. Diked baylands are important for flood control and for waste assimilation. As the area available to hold storm runoff decreases, upland flooding becomes a greater threat. New and rebuilt dikes may have to be constructed at substantial public costs. Recently some wetlands have been used for waste assimilation. These projects are still experimental. Both flood plain and waste assimilation can be compatible with wildlife habitat.

8. Some diked wetlands are not as biologically productive as they could be. Such areas can be enhanced, primarily through between water management and the introduction of tidal action. Enhancement projects must be carefully designed to assure that the result is increased productivity and diversity.

Policies

1. Diked historic baylands with wetland values should be retained to the maximum feasible extent. Upland areas and dikes that provide wildlife corridors between different habitats should also be retained to the maximum feasible extent.

2. Proposed projects in diked historic baylands that have minor impacts on wetland values should be permitted only if all wildlife values lost or threatened due to the project are mitigated. Mitigation should consist of enhancement and preservation of diked historic baylands suitable for those purposes.

3. The remaining freshwater and brackish marshes should be fully protected. No projects that adversely affect such areas should be approved. Efforts should be made to increase the number and area of freshwater and brackish marshes.

4. Wastewater treatment projects that utilize marshes for waste assimilation should be encouraged so long as the structures are located on upland areas and the waste assimilation meets the requirements of the State Water Resources Control Board and is compatible with wildlife use of the area.

5. Flood control projects should be designed to utilize diked baylands for flood basins in a manner that protects and enhances their habitat value.

6. Enhancement or restoration projects in diked baylands should conform to the report entitled "Guidelines for Restoration and Enhancement of Diked Historic Baylands."

7. Strong State legislation should be passed that will ensure the preservation of agricultural uses that occurr on some of the diked baylands.

APPENDIX II - TRAFFIC

DKG

LEVEL OF SERVICE AND CAPACITY INDEX

Intersection analyses are based on Transportation Research Board Circular 212 which is an update of the 1965 "Highway Capacity Manual". In this January, 1980, Circular, the various Levels of Service "A" through "F" are based on the amount of delay experienced by vehicles that pass through an intersection. The average delay is calculated for all vehicles, including both those that stop and those that do not stop at the intersection. For example, if the average delay is 35.0 seconds per vehicle, then the intersection provides Level of Service "D" as shown below.

Level of Service "A" represents the least delay and Level "F" represents the greatest delay. Generally, drivers consider Level of Service "D" to represent the greatest delay acceptable. Thus, Level "D" represents 100% of acceptable capacity in the Capacity Index. The Capacity Index ranges from under 68% of acceptable for Level of Service "A" to over 112% of acceptable for Level of Service "F".

In the table below, "Level of Service", "Average Delay", and "Capacity Index" are compared with the "Sum of Critical Volumes" from Circular 212.

LEVEL OF SERVICE	AVERAGE DELAY (SECONDS PER VEHICLE)	SUM OF CRITICAL VOLUMES	CAPACITY INDEX
A	0.0-16.0	1-825	1-67
B	16.1-22.0	826-965	68-79
C	22.1-28.0	966-1100	80-90
D	28.1-35.0	1101-1225	91-100
E	35.1-40.0	1226-1375	101-112
F	40.1 or greater	1376+	113+

APPENDIX III - NOISE

FUNDAMENTAL CONCEPTS OF ENVIRONMENTAL NOISE

This section provides background information to aid in understanding the technical aspects of this report.

Three dimensions of environmental noise are important in determining subjective response. These are:

a. the intensity or level of the sound;
b. the frequency spectrum of the sound;
c. the time-varying character of the sound.

Airborne sound is a rapid fluctuation of air pressure above and below atmospheric pressure. Sound levels are usually measured and expressed in decibels (dB), with 0 dB corresponding roughly to the threshold of hearing.

The "frequency" of a sound refers to the number of complete pressure fluctuations per second in the sound. The unit of measurement is the cycle per second (cps) or Hertz (Hz). Most of the sounds which we hear in the environment do not consist of a single frequency, but of a broad band of frequencies, differing in level. The quantitative expression of the frequency and level content of a sound is its sound spectrum. A sound spectrum for engineering purposes is typically described in terms of octave bands which separate the audible frequency range (for human beings, from about 20 to 20,000 Hz) into ten segments.

Many rating methods have been devised to permit comparisons of sounds having quite different spectra. Fortunately, the simplest method correlates with human response practically as well as the more complex methods. This method consists of evaluating all of the frequencies of a sound in accordance with a weighting that progressively and severely deemphasizes the importance of frequency components below 1000 Hz, with mild deemphasis above 5000 Hz. This type of frequency weighting reflects the fact that human hearing is less sensitive at low frequencies and extreme high frequencies than in the frequency midrange.

The weighting curve described above is called "A" weighting, and the level so measured is called the "A-weighted sound level", or simply "A-level".

The A-level in decibels is sometimes expressed as "dBA"; the appended letter "A" is a reminder of the particular kind of weighting used for the measurement. In practice, the A-level of a sound source is conveniently measured using a sound level meter that includes an electrical filter corresponding to the A-weighting curve. All U.S. and international standard sound level meters include such a filter. Typical A-levels measured in the environment and in industry are shown in Figure A-1.

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Although the A-level may adequately describe environmental noise at any instant in time, the fact is that the community noise level varies continuously. Most environmental noise includes a conglomeration of distant noise sources which creates a relatively steady background noise in which no particular source is identifiable. These distant sources may include traffic, wind in trees, industrial activities, etc. These noise sources are relatively constant from moment to moment, but vary slowly from hour to hour as natural forces change or as human activity follows its daily cycle. Superimposed on this slowly varying background is a succession of identifiable noisy events of brief duration. These may include nearby activities or single vehicle passages, aircraft flyovers, etc., which cause the environmental noise level to vary from instant to instant.

To describe the time-varying character of environmental noise, the statistical noise descriptors L10, L50, and L90 are commonly used. The L10 is the A-weighted sound level equaled or exceeded during 10 percent of a stated time period. The L10 is considered a good measure of the "average peak" noise. The L50 is the A-weighted sound level that is equaled or exceeded 50 percent of a stated time period. The L50 represents the median sound level. The L90 is the A-weighted sound level equaled or exceeded during 90 percent of a stated time period. The L90 is used to describe the background noise.

As it is often cumbersome to describe the noise environment with these statistical descriptors, a single number descriptor called the Leq is also widely used. The Leq is defined as the equivalent steady-state sound level which in a stated period of time would contain the same acoustic energy as the time-varying sound level during the same time period. The Leq is particularly useful in describing the subjective change in an environment where the source of noise remains the same but there is change in the level of activity. Widening roads and/or increasing traffic are examples of this kind of situation.

In determining the daily measure of environmental noise, it is important to account for the difference in response of people to daytime and nighttime noises.

During the nighttime, exterior background noises are generally lower than the daytime levels. However most household noise also decreases at night and exterior noises become very noticeable. Further most people are sleeping at night and are very sensitive to noise intrusion.

To account for human sensitivity to nighttime noise levels a descriptor, CNEL, (Community Noise Equivalent Level) was developed. The CNEL divides the 24-hour day into the daytime of 7 am to 7 pm, the evening of 7 pm to 10 pm, and the nighttime of 10 pm to 7 am. The evening noise level is weighted 5 dB higher than the daytime noise level and the nighttime noise level is weighted 10 dB higher than the daytime noise level. The CNEL, then, is the A-weighted average sound level in decibels during a 24-hour period with 5 dBA added to the hourly Leqs during the evening and 10 dBA added to the hourly Leqs during the nighttime. For highway noise environments the Leq during the peak traffic hour is approximately equal to the CNEL.

The effects of noise on people can be listed in three general categories:

1) subjective effects of annoyance, nuisance, dissatisfaction;
2) interference with activities such as speech, sleep, learning;
3) physiological effects such as startle, hearing loss.

The sound levels associated with environmental noise, in almost every case, produce effects only in the first two categories. Unfortunately, there is as yet no completely satisfactory measure of the subjective effects of noise, or of the corresponding reactions of annoyance and dissatisfaction. This is primarily because of the wide variation in individual thresholds of annoyance, and habituation to noise over differing individual past experiences with noise.

Thus, an important parameter in determining a person's subjective reaction to a new noise is the existing noise environment to which one has adapted: the so-called "ambient" noise. "Ambient" is defined as "the all-encompassing noise associated with a given environment, being a composite of sounds from many sources, near and far". In general, the more a new noise exceeds the previously existing ambient, the less acceptable the new noise will be judged by the hearers.

With regard to increases in noise level, knowledge of the following relationships will be helpful in understanding the quantitative sections of this report:

a) Except in carefully controlled laboratory experiments, a change of only 1 dBA cannot be perceived.
b) Outside of the laboratory, a 3-dBA change is considered a just-noticeable difference.
c) A change in level of at least 5 dBA is required before any noticeable change in community response would be expected.
d) A 10-dBA change is subjectively heard as approximately a doubling in loudness, and would almost certainly cause an adverse change in community response.

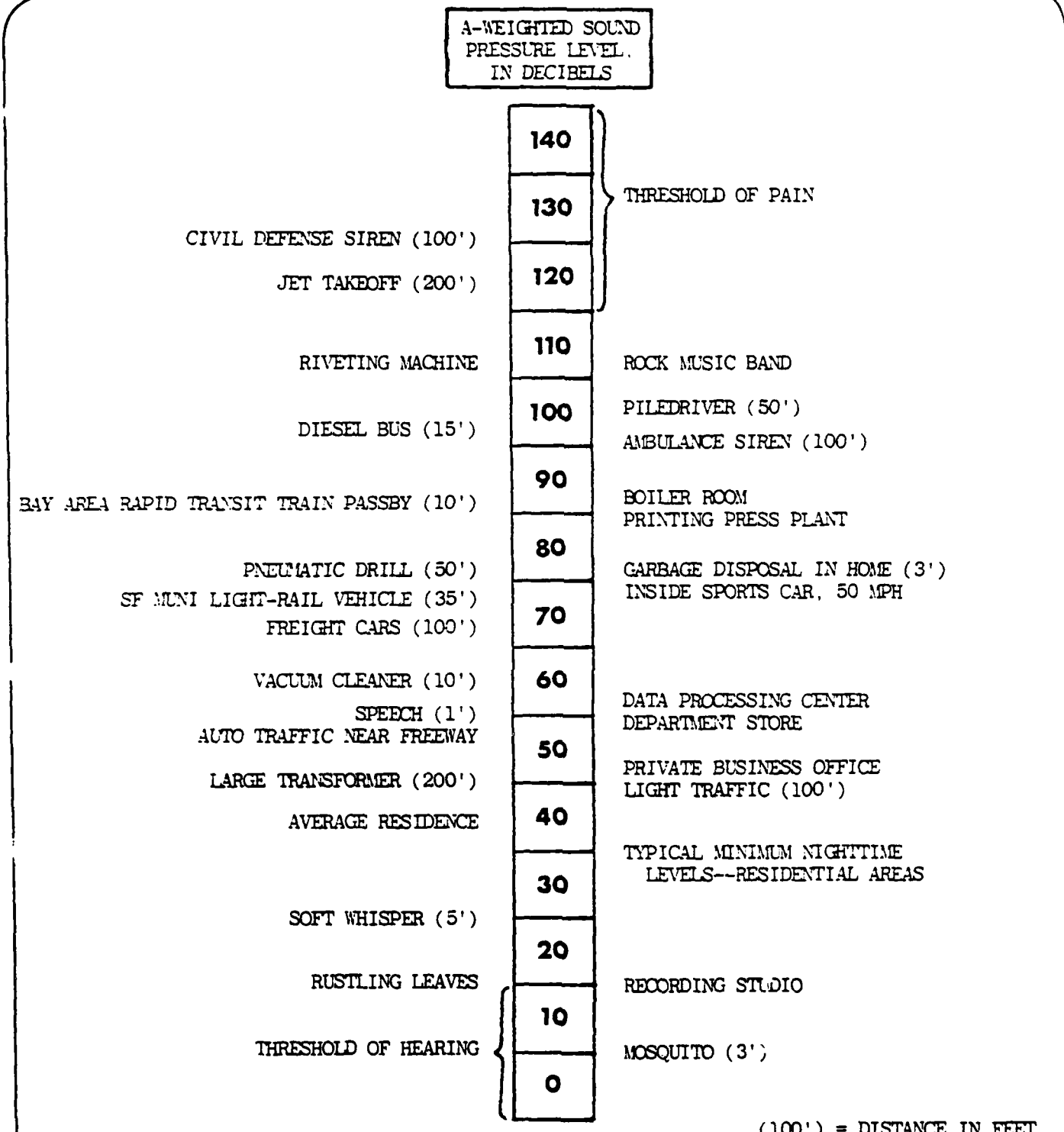

FIGURE A-1: TYPICAL SOUND LEVELS MEASURED IN THE ENVIRONMENT AND INDUSTRY

12/81

Table 1: Existing Noise Levels

Site No.	Location	Day and Time of Measurement	L_1*	L_{10}	L_{50}	L_{90}	L_{eq}**	Comments
1	Approximately 65 feet west of Bel Marin Keys and 500 feet south of Commercial Blvd. opposite the mobile home park	Wed. 3/3/82 8:45 - 9:00 am	75	66	62	58	65	6 trucks and 260 autos on Bel Marin Keys; Hwy 101 dominates background at 55 to 60 dBA
1	" "	Wed. 3/3/82 10:38-10:53 am	75	66	62	57	65	7 trucks and 170 autos on Bel Marin Keys; Hwy 101 dominates background at 54 to 60 dBA
1	" "	Thurs. 3/4/82 7:49 - 8:04 am	74	69	65	61	66	9 trucks and 385 autos on Bel Marin Keys; Hwy 101 dominates background
2	30 feet south of the edge of Bel Marin Keys at Caribe Isle	Wed. 3/3/82 7:47 - 8:02 am	67	59	51	47	57	Major noise source was traffic on Bel Marin Keys (44 autos) typically 52 to 67 dBA; one plane on take-off from Hamilton to 60 dBA
2	" "	Wed. 3/3/82 9:50-10:05 am	68	56	45	41	55	Major noise source was traffic on Bel Marin Keys (24 autos) typically 52 to 71 dBA and three general aviation overflights (not from Hamilton) 48, 51 and 68 dBA
2	" "	Thurs. 3/4/82 8:30 - 8:45 am	65	58	47	41	54	Major noise source was traffic on Bel Marin Keys (34 autos) typically 52 to 69 dBA and three general aviation overflights (not from Hamilton) 52, 53 and 60 dBA

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Table 1: Existing Noise Levels (Continued)

Site No.	Location	Day and Time of Measurement	L_1*	L_{10}	L_{50}	L_{90}	L_{eq}**	Comments
3	At end of Bel Marin Keys	Wed. 3/3/82 8:10 - 8:25 am	60	50	46	45	53	Distant traffic and aircraft dominate noise environment
3	" "	Wed. 3/3/82 10:15-10:30 am	58	51	40	36	47	" "
3	" "	Thurs. 3/4/82 9:00 - 9:15 am	52	49	42	39	45	Distant traffic and aircraft dominate noise environment including one helicopter taking off from Hamilton to 47 dBA

*The sound level in dBA that was equaled or exceeded 1 percent of the time; L_{10}, L_{50} and L_{90} are the levels equaled or exceeded 10, 50 and 90 percent of the time, respectively.
**The L_{eq} is the equivalent steady-state sound level that, in a stated period of time, would contain the same acoustic energy as the time-varying sound level during the same time period.

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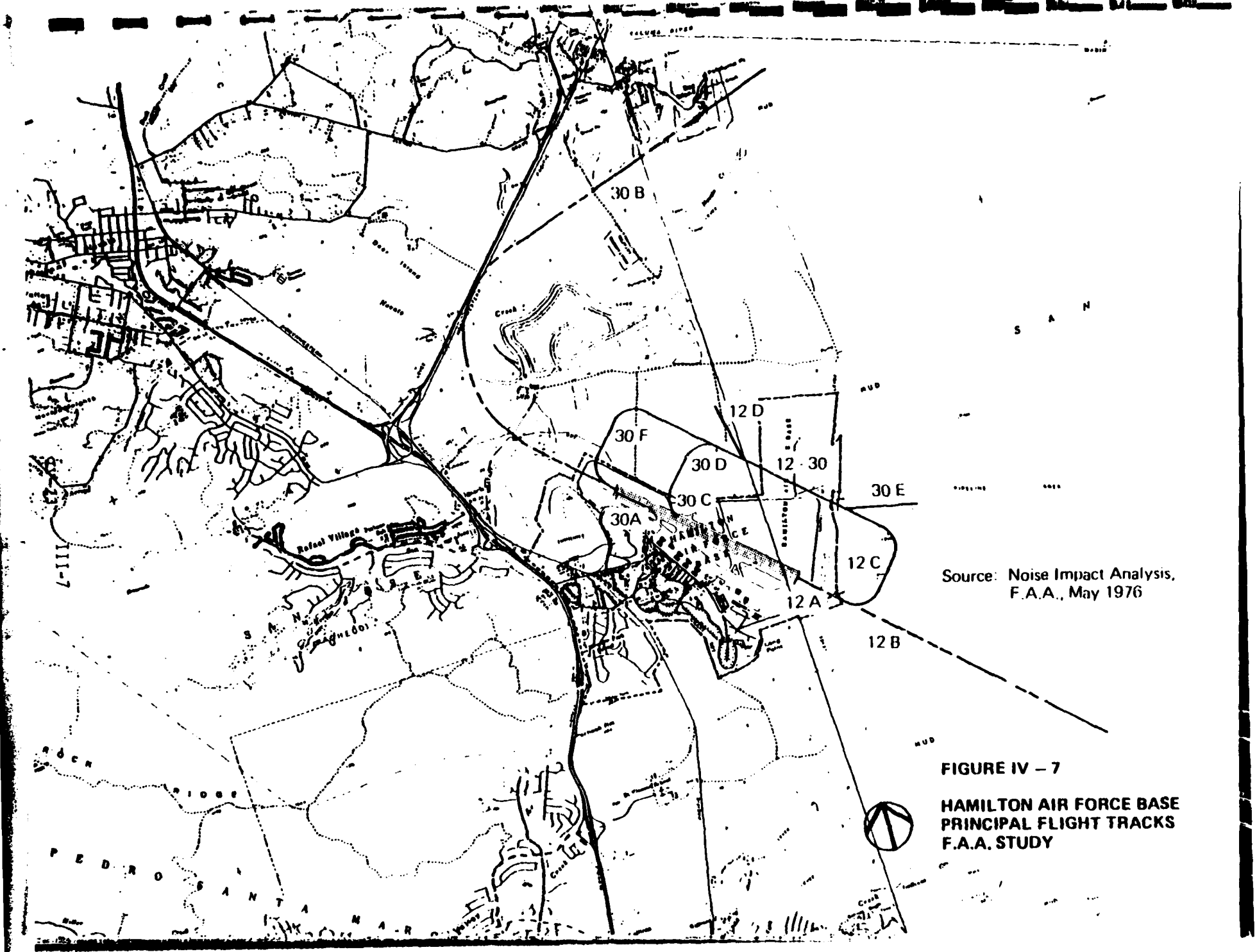


FIGURE IV – 7

HAMILTON AIR FORCE BASE
PRINCIPAL FLIGHT TRACKS
F.A.A. STUDY

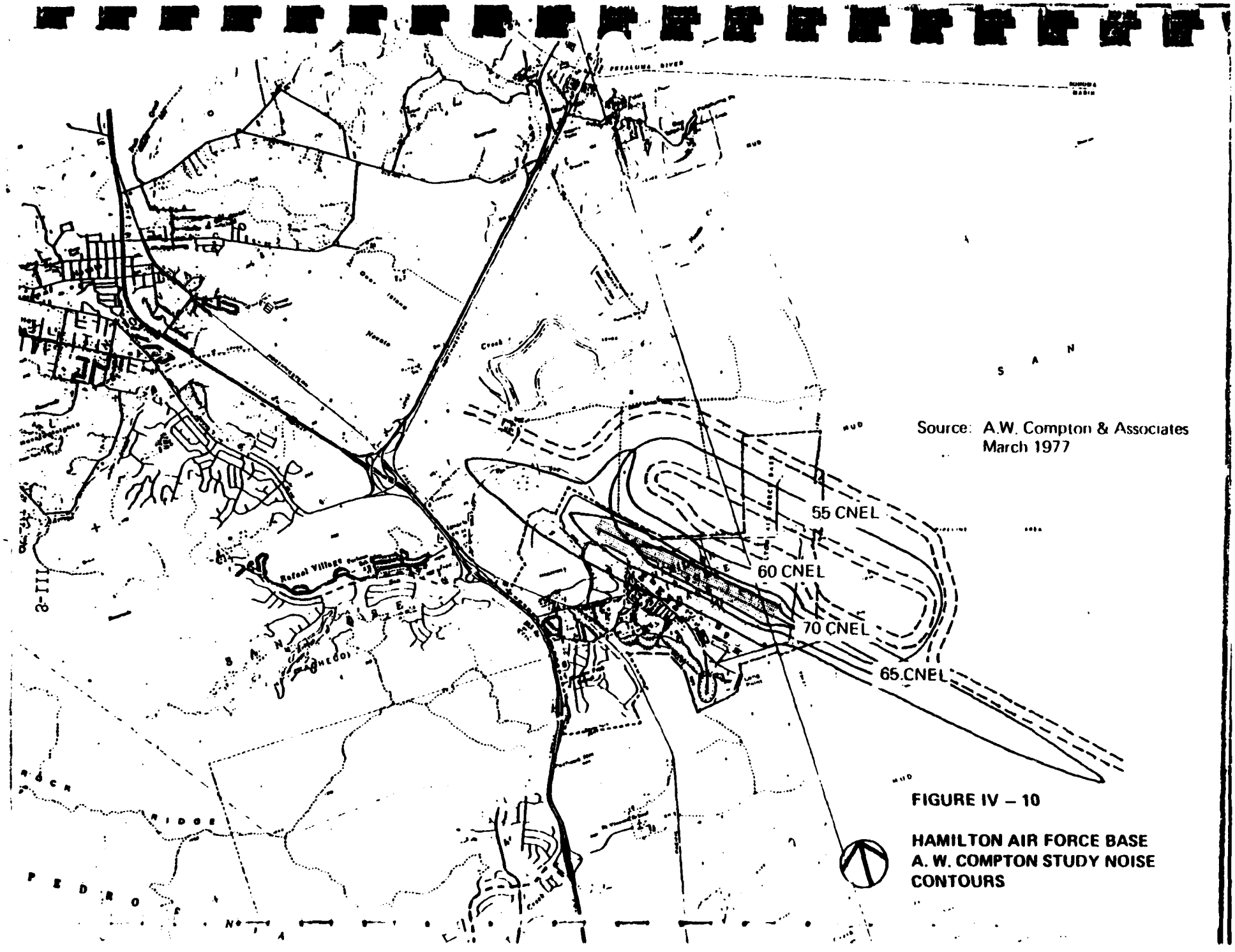


FIGURE IV – 10

**HAMILTON AIR FORCE BASE
A. W. COMPTON STUDY NOISE
CONTOURS**

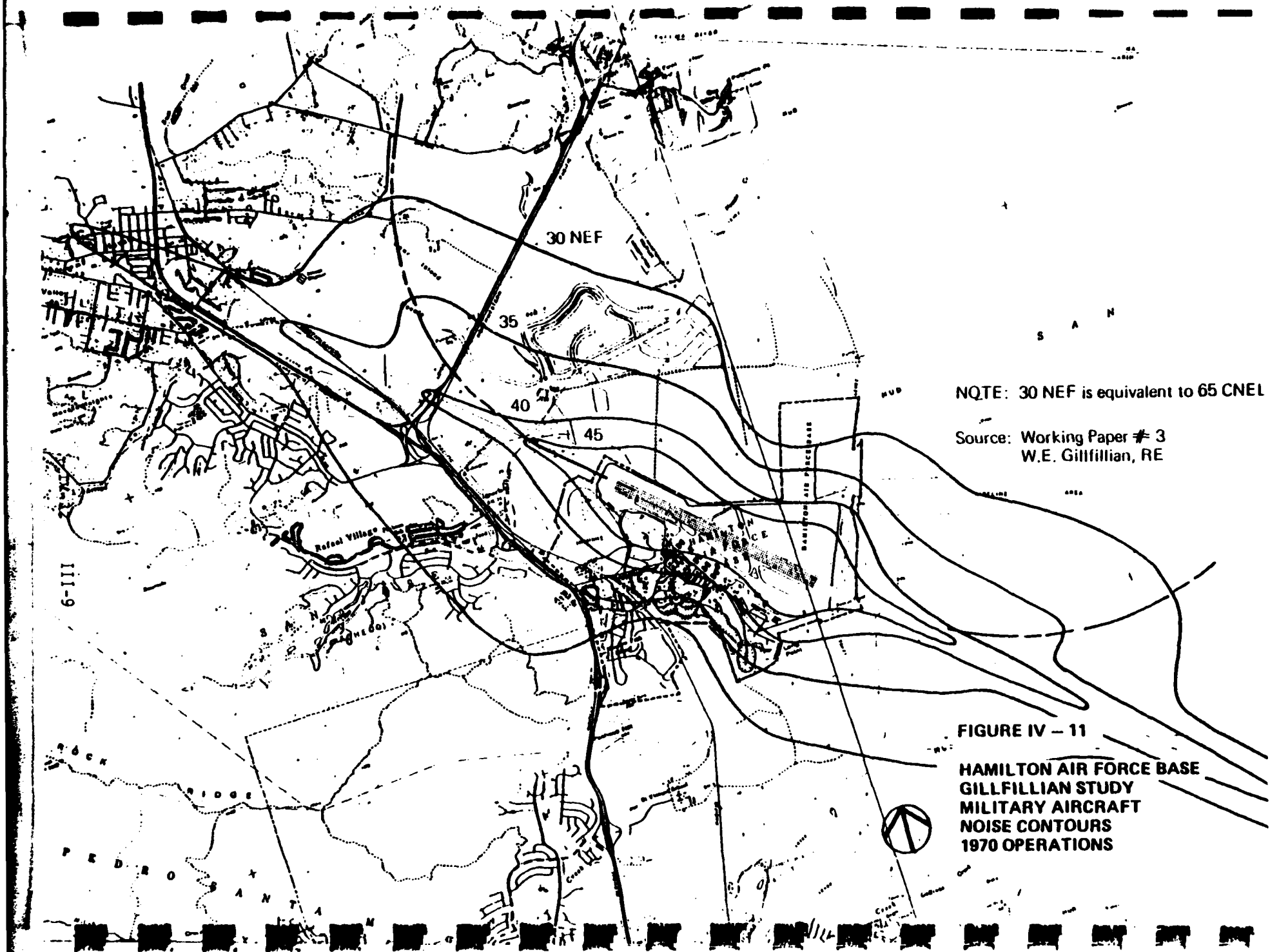


FIGURE IV – 11

HAMILTON AIR FORCE BASE
GILLFILLIAN STUDY
MILITARY AIRCRAFT
NOISE CONTOURS
1970 OPERATIONS

APPENDIX IV - SOILS AND AGRICULTURE

Capability grouping

Capability grouping shows, in a general way, the suitability of soils for most kinds of field crops. The groups are made according to the limitations of the soils when used for field crops, the risk of damage when they are used, and the way they respond to treatment. The grouping does not take into account major and generally expensive landforming that would change slope, depth or other characteristics of the soils; does not take into consideration possible, but unlikely, major reclamation projects; and does not apply to crops requiring special management.

Those familiar with capability classification can infer from it much about the behavior of the soils when used for other purposes, but this classification is not a substitute for interpretations designed to show suitability and limitations of groups of soils for range, for forest trees, for engineering, or for other uses.

In the capability system all kinds of soils are grouped at three levels: the capability class, subclass, and unit. These are discussed in the following paragraphs.

CAPABILITY CLASSES, the broadest groups are designated by Roman numerals I through VIII. The numerals indicate progressively greater limitations and narrower choices for practical uses, defined as follows:

Class I soils have few limitations that restrict their use.

Class II soils have moderate limitations that reduce the choice of plants or that require moderate conservation practices.

Class III soils have severe limitations that reduce the choice of plants, require special conservation practices, or both.

Class IV soils have very severe limitations that reduce the choice of plants, require very careful management, or both.

Class V soils are not likely to erode, but have other limitations, impractical to remove, that limit their use largely to pasture, range, woodland, or wildlife habitat (none in Napa County).

Class VI soils have severe limitations that make them generally unsuited to cultivation and that restrict their use largely to pasture or range, woodland, or wildlife habitat.

Class VII soils have very severe limitations that make them unsuited to cultivation and that restrict their use largely to pasture or range, woodland, or wildlife habitat.

Class VIII soils and landforms have limitations that preclude their use for commercial plants and restrict their use to recreation, wildlife habitat, water supply, or esthetic purposes.

CAPABILITY SUBCLASSES are soil groups within one class; they are designated by adding a small letter *e*, *w*, *s*, or *c* to the class numeral, for example IIe. The letter *e* shows that the main limitation is a risk of erosion unless close growing plant cover is maintained; *w* shows that the water in or on the soil interfers with plant growth and cultivation (in some soils the wetness can be partly corrected by artificial drainage); *s* shows that the soil is limited mainly because it is shallow, clayey, droughty, or stony; and *c*, used only in some parts of the United States, shows that the chief limitation is climate that is too cold or too dry.

In class I there are no subclasses, because the soils of this class have few limitations. Class V can contain, at most, only the subclasses indicated by *w*, *s*, and *c* because the soils in class V are subject to little or no erosion, though they have other limitations that restrict their use largely to pasture, range, woodland, wildlife habitat, or recreation.

CAPABILITY UNITS are soil groups within the subclasses. The soils in one capability unit are enough alike to be suited to the same crops and pasture plants, to require similar management, and to have similar productivity and other responses to management. Thus, the capability unit is a convenient grouping for making many statements about management of soils.

Capability units in California in classes I through IV are given Arabic numbers that suggest the chief kind of limitation responsible for placement of the soil in the capability class and subclass. For this reason, some of the units within the subclass are not numbered consecutively, and their symbols are a partial key to some of the soil features. The numbers used to designate units within the subclasses are these:

0. A problem or limitation caused by sand or gravel in the substratum (not used in this county).
1. An actual or potential erosion hazard.
2. A problem or limitation of wetness by poor drainage or flooding.
3. A problem or limitation caused by slow or very slow permeability of the subsoil or substratum.
4. A problem or limitation caused by coarse soil texture or excessive gravel.
5. A problem or limitation caused by moderately fine or fine texture soil.
6. A problem or limitation caused by salt or alkali (not used in this county).
7. A problem or limitation caused by cobblestones, other stones, or rock outcrop (not used in this county).
8. A problem or limitation caused by a shallow depth of soil over bedrock or hardpan (not used in this county).
9. A problem or limitation caused by low fertility, acidity, or toxicity.

Source: USDA Soil Conservation Service

APPENDIX V - VEGETATION AND WILDLIFE

1. Bel Marin Keys Wildlife Census Status Report, September 9, 1980, by Madrone Associates

2. Habitat Analysis and Mitigation Plan for the Proposed Bel Marin Keys Residential Development, April 27, 1981 by Madrone Associates

3. Addendum to the Habitat Analysis and Mitigation Plan for the Proposed Bel Marin Keys Residential Development: Revised Restoration Plan, September 10, 1981, by Madrone Associates

BEL MARIN KEYS WILDLIFE CENSUS

Prepared for:

Home Savings and Loan

September 9, 1980

Prepared by:

MADRONE ASSOCIATES
Environmental Consultants
23-B Pamaron Way
Novato, California 94947

BEL MARIN KEYS WILDLIFE CENSUS

STATUS REPORT

September 9, 1980

1. INTRODUCTION

Study Area

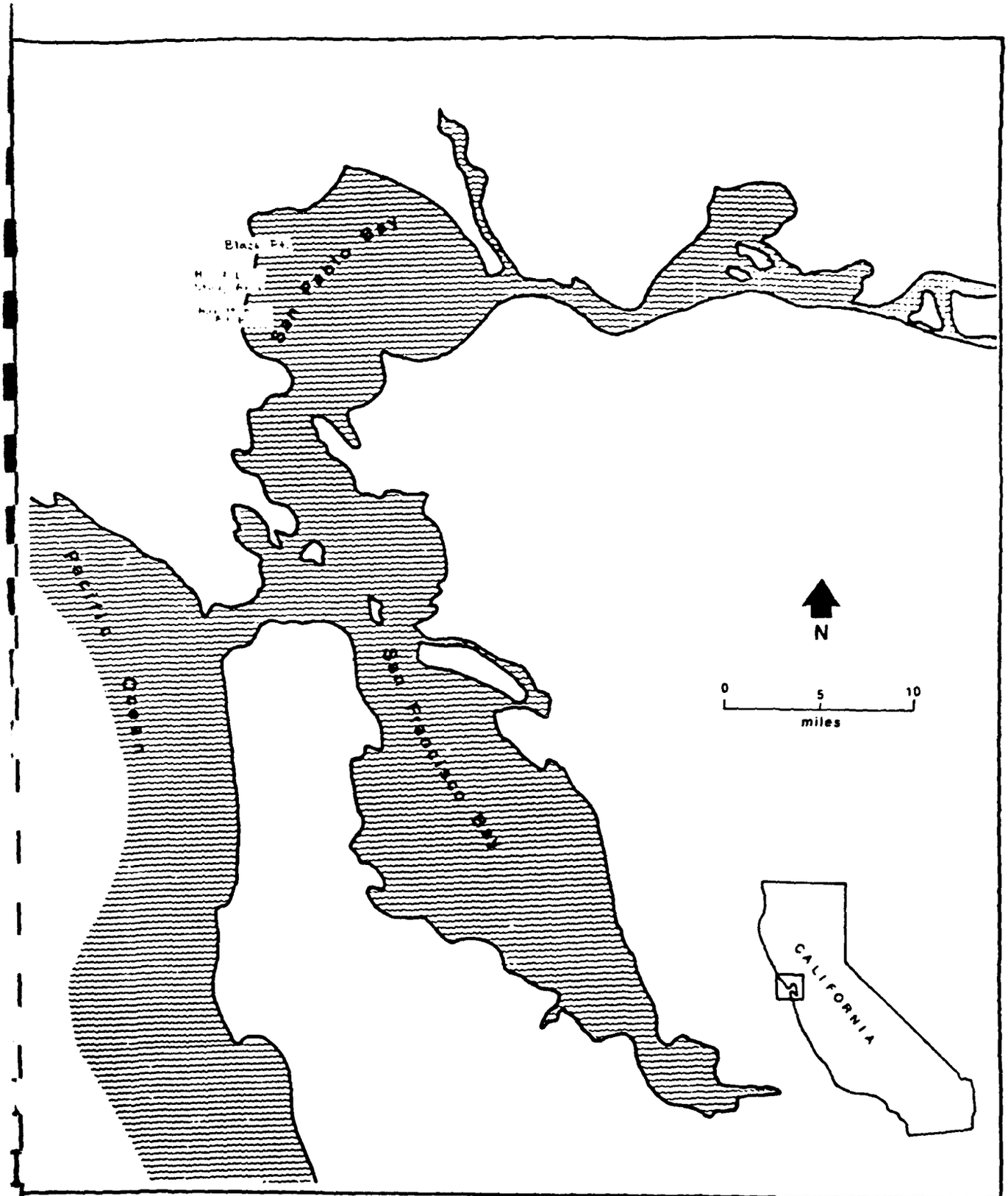
The Home Savings and Loan Study Area occupies approximately 1,610 acres of diked bayfront lands adjacent to San Pablo Bay (Figure 1). Nearly one ninth (170 acres) of the study area was censused to evaluate wildlife use of the area. San Pablo Bay is the northern bay of the San Francisco Bay system. It begins north of San Francisco Bay proper at the opening between Point San Pedro and Point San Pablo and extends to the Carquinez Strait, which separates it from Suisun Bay to the east. The study area is on the northwest corner of the Bay, between Black Point and Hamilton Air Force Base.

The bayward mile or so of the study area was historically part of San Pablo Bay (Nichols and Wright, 1971). The area was reclaimed for agriculture sometime during the last century. The rest of the study area was part of the extensive historic marshlands off the north and west portions of San Pablo Bay.

Bel Marin Keys, a suburban residential development, lies north and west of the study area and Hamilton Air Force Base is south of the study area. Over 1,000 acres of Hamilton Air Force Base are slated for transfer to the San Pablo Bay National Wildlife Area, which at present covers 12,000 acres of marshland and water along the northern tip of the Bay (Tieger, pers. comm.).

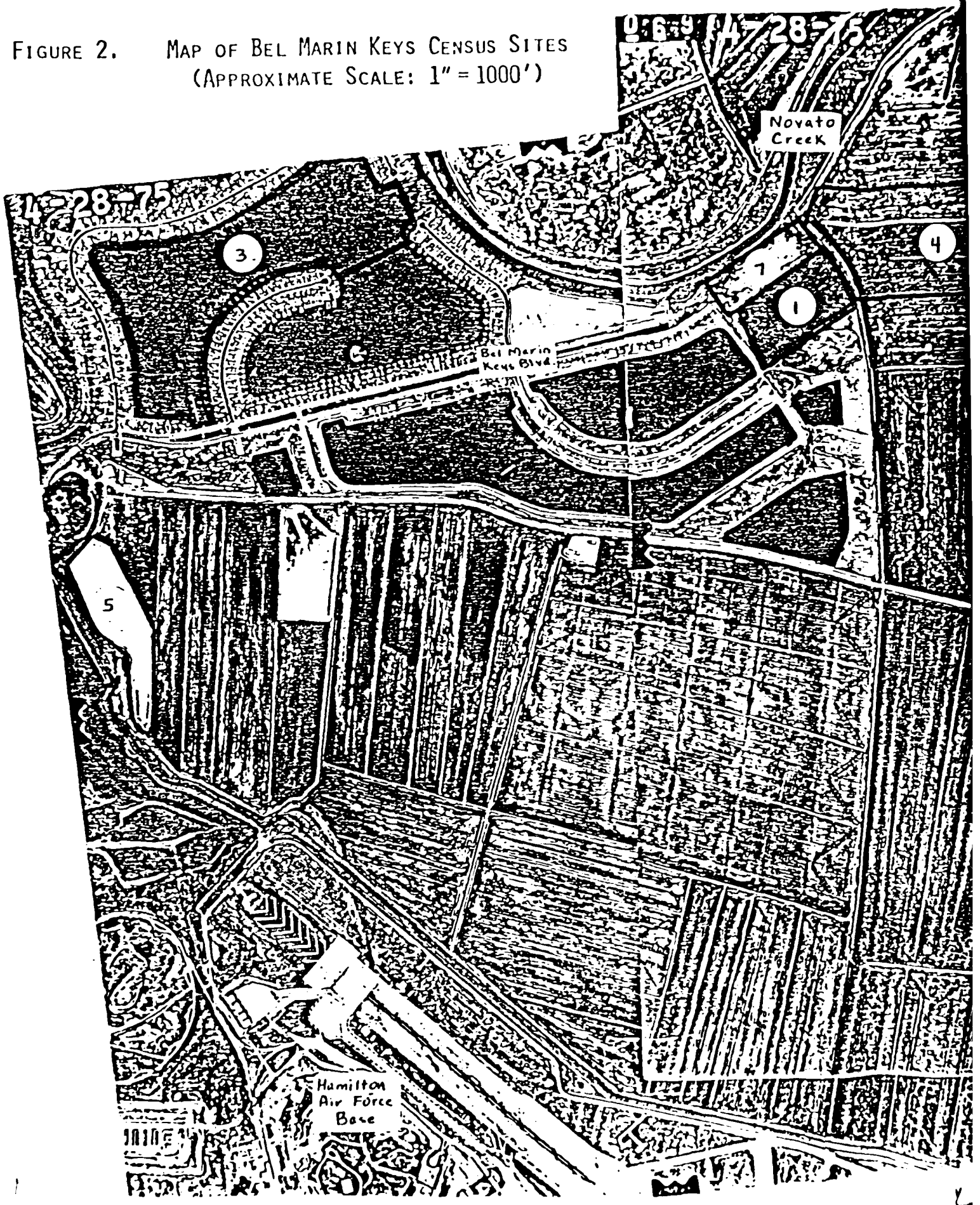
Census

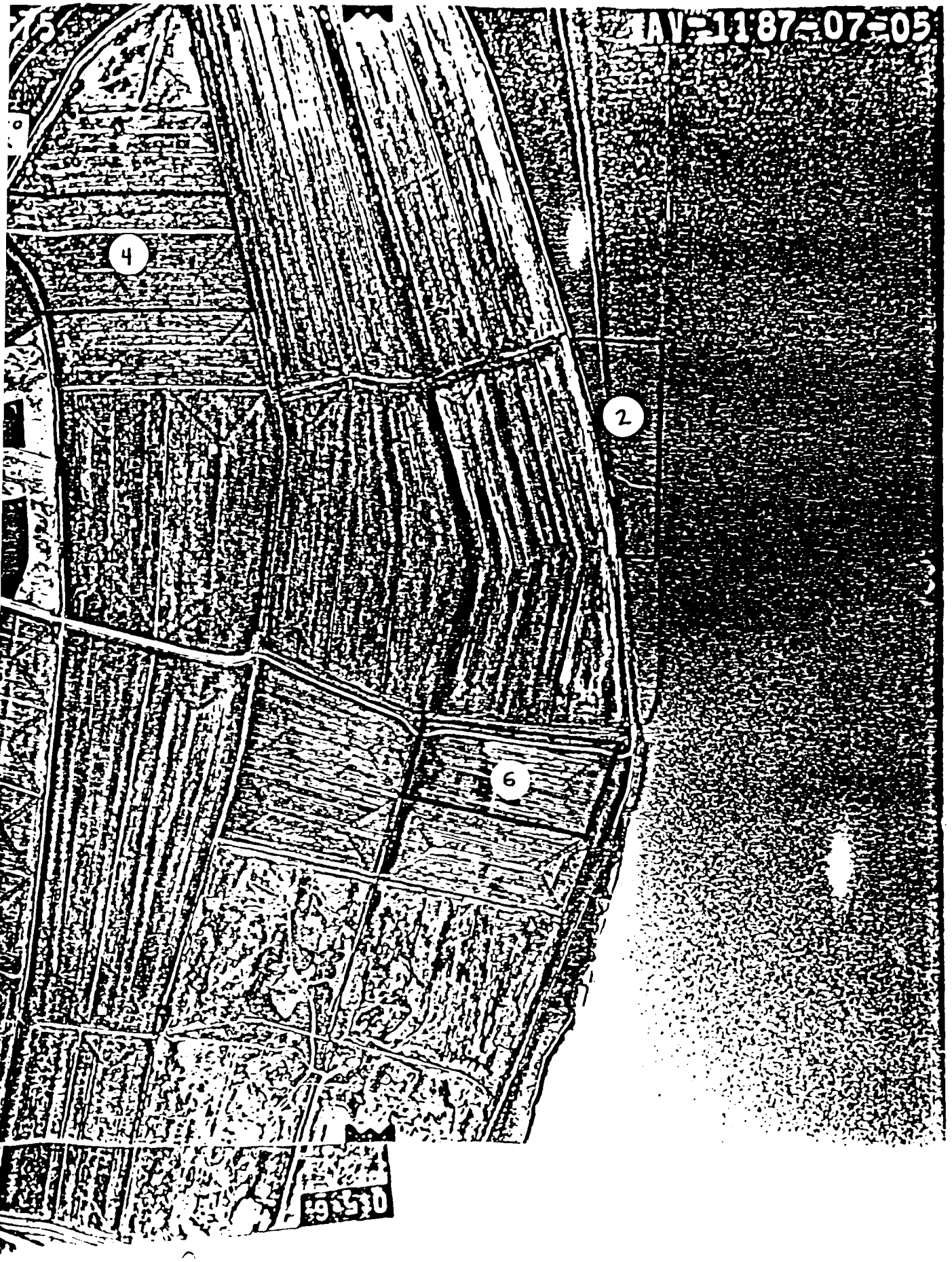
Seven sites in the Bel Marin Keys area were censused to determine the actual use of the area by wildlife, particularly birds (Figure 2). The seven sites, totaling approximately 170 acres, have been censused weekly by the same person since January 30, 1980.



MADRONE ASSOCIATES	APPROXIMATE REGIONAL LOCATION OF HOME SAVINGS AND LOAN STUDY AREA	FIGURE 1

FIGURE 2. MAP OF BEL MARIN KEYS CENSUS SITES
(APPROXIMATE SCALE: 1" = 1000')




AV-1187-07-05
4
2
6
9510

Birds and other wildlife were sighted using binoculars and a spotting scope, and wildlife sign such as scat or pellets was noted. The number, species, and behavior of individuals was recorded as well as the weather conditions and time at each census site. Birds and other wildlife in areas adjacent to the census sites were also noted. An effort was made to census during slack or low tides, when the mudflat area of the Bay site (Site #2) was exposed. Transects were walked to survey land sites, and water sites were censused by scoping the area and counting individuals at several points. Photographs of the sites were taken every two months to document seasonal events such as ponding or changes in vegetational cover.

2. OVERALL SEASONAL TRENDS

Bird use of the San Francisco Bay Area varies greatly from season to season. Thousands of migratory birds spend the winter in the Bay Area and others use the Bay Area briefly as a resting spot during migration. Seasonal use patterns vary in different areas of the San Francisco Bay system and for different species. However, overall use is typically greatest in the early winter months and declines in the spring, as birds begin to fly to northern breeding grounds. In the late summer, bird numbers increase as birds return to the Bay Area and points south following the breeding season.

This use pattern was apparent in the Bel Marin Keys area. The greatest use of the seven census sites was in February, when waterfowl (including ducks, coots, and grebes), shorebirds, and songbirds used the area in roughly equal numbers (Figure 3). Waterfowl use declined from March to June, as birds migrated north (Figure 4). Birds began to return to the area in July. Shorebirds showed a similar pattern except that their numbers rose in April, probably because additional birds flying north from other wintering areas stopped for a few days rest (Figure 5). Songbird use was highest in February, when large flocks of finches moved through the census

area searching for food (Figure 6). Songbirds and dove numbers declined through March and April and then rose in May during the breeding season.

3. WILDLIFE USE OF CENSUS SITES

Site 1

Physical Features

This site is a permanent pond of approximately -8 feet (MSL) elevation. It is roughly ten acres in size. A small ruderal area (Site 7) and cultivated agricultural land lie north, south, and east of the pond; to the west are residences. The pond was excavated at the time of the Bel Marin Keys development, and receives water from rainfall and possibly some lagoon seepage (Oberkamper, pers. comm.).

Vegetation and Habitat Value

Several islands covered with pickleweed run the length of the pond and the pond banks are covered with thick vegetation. Introduced species such as wild radish, red brome grass, Italian rye grass, winter vetch, and brass buttons are common, and native pickleweed, coyote brush, and salt grass grow here as well.[1/] The average height of the banktop vegetation is about one meter but coyote brush may reach up to one meter above this.

The pond water and islands and the surrounding cover provide resting and feeding areas for waterfowl, shorebirds, wading birds, and gulls. Diving ducks, grebes, and coots dive for invertebrates in the shallow water and as the pond edges recede during the summer, shorebirds, wading birds, and gulls feed along the mud margins. Brass buttons, pickleweed, and salt grass are commonly eaten by puddle ducks. The tall vegetation surrounding the pond provides good cover for birds.

[1/] Plant species identified on the census sites are listed in the Appendix.

Census Results

The major use of Site 1 is by waterfowl. Greater numbers of waterfowl used this site than any other during every month of observation except February (Figure 4). The numbers of birds declined steadily from April to June but increased in July as birds returned from northern breeding grounds. Small numbers of shorebirds fed on the site in July as the pond margins began to dry up (Figure 5). Figure 6 shows that songbirds were present in low numbers during spring and early summer. Numbers were highest in May when many swallows hawked for insects over the water. During a recent census (August 4, 1980), over 100 swallows and wading birds fed on the pond.

The site was used by a total of 30 species and ranked the third highest in use by numbers of individuals, averaging 5.8 individuals per acre during a census period (Table 1). A high proportion of the birds observed (89%) fed and more than half (66%) rested on the site (Table 2). Waterfowl, gulls, terns, and songbirds were most likely to be observed feeding, while shorebirds and wading birds more frequently rested than fed here.

From the census it appears that the pond is an important resting and feeding area for waterfowl during the winter and early spring, and it is probably well-used by them in the fall. Its proximity to the Bay and its sourrounding vegetational cover make it an attractive refuge for water-associated birds.

Site 2

Physical Features

Site 2 includes approximately 22.5 acres of tidal marsh and mudflat at an elevation of -2 feet MSL. It is immediately on the shore of San Pablo Bay and high tides regularly cover the mudflat area. Cultivated agricultural land lies behind the levee which runs along the landward side of the marsh.

Vegetation and Habitat Value

Pickleweed and bulrush dominate the marsh area. Cordgrass grows in the lower, regularly submerged areas along the Bay edge; the higher areas near the levee bank are vegetated by gum plant, salt grass, sow-thistle, and wild radish. The plants in the undisturbed marsh area are native species typical of coastal salt marsh. Sow-thistle and wild radish are introduced "weedy" species that frequently grow near levees or in other areas where disturbance has occurred.

The marsh vegetation is good cover for small passerines such as song sparrows. Song sparrows build nests in the higher vegetation of the marsh. Populations of the salt marsh harvest mouse, an endangered species (CDFG, 1978; USFWS, 1979a) which prefers pickleweed areas, are known to exist in the San Pablo Bay salt marshes (Schaub, 1971). The salt marsh harvest mouse is usually found in areas of higher marsh, where it can escape regular innundation by tides. The marsh area of Site 2 is rarely submerged by tides (Ellis, pers. comm.) and may support a salt marsh harvest mouse population. No trapping was done for this species as part of this wildlife census and no individual mice were observed.

Census Results

Overall bird use of the salt marsh/mudflat area was high, particularly during the month of February (Figure 3). More shorebirds used this site than any of the other sites (Figure 4). The seasonal shorebird use of Site 2 follows the pattern typical of other marshes of the San Francisco Bay Area. Shorebird numbers declined greatly in March but increased in April during the peak of the spring migratory season. Few shorebirds were observed in May and June but in July shorebird use increased as the birds began to return. Waterfowl use was greatest in February, when large numbers of canvasbacks and other diving ducks fed over the mudflats when they were covered by tides

(Figure 3). Numbers of songbirds were relatively low and fairly constant throughout the six months (Figure 6). During May more songbirds were recorded, perhaps because breeding males were singing and thus more conspicuous.

Site 2 was used by the highest number of species and the most individuals per acre of any of the sites (Table 1). The number of species observed here was two to three times greater than most of the other sites, and the average number of individuals seen was more than thirty times greater than that of Site 3, which had the lowest average use.

A total of 87% of all individuals observed fed at Site 2 while considerably fewer individuals (15%) rested (Table 2). Most of the feeding birds were shorebirds that probed the exposed mudflats for invertebrates and insects, or wading birds that fed in the shallow water along the mudflat. Waterfowl were as likely to rest as feed on the site. Of all the sites, this site had the most evidence of breeding. Breeding behavior, such as singing by males or birds feeding young, was recorded for 18% of the songbirds observed.

The marsh receives some use by larger mammals. Fox probably hunt the marsh area, as their scat was observed along the levee bordering the marsh, and fox burrows are common on levees to the south of the study area. Feral cats were seen in the marsh.

The salt marsh/mudflat is the most important wildlife habitat of all the sites. Most of the canvasback ducks of the Pacific Flyway (the major migratory route along the Pacific) spend their early winter months in the San Francisco Bay Area (USFWS, 1979b). Large numbers of this species rested and fed over the mudflat during high tides in late January and February. The area provides important feeding habitat for wintering and migrating shorebirds and is also used by many song sparrows for nesting.

Site 3

Physical Features

55 acres of the artificial lagoon and marina which is part of the Bel Marin Keys development were censused to determine wildlife use in an area of residential development, with artificial lagoons, recreational use, and relatively intense human activity. Lagoon elevation ranges from -18 feet in the middle of the lagoon to -8 feet around the edges. The lagoon receives water from the Novato River to which it is connected by a lock. It does not receive tidal action. A marina and residences surround the lagoon.

Vegetation and Wildlife Value

Except for iceplant, which grows in places on the banks, little natural cover exists around the lagoon. Ornamental trees and shrubs are planted on the lawns adjacent to the lagoon. Bird species which have adapted to urbanized areas, such as house finches and robins, are typically the most likely to use this area. Boating is popular in the lagoon, especially on weekends, and this use discourages some species from feeding or resting here.

Census Results

There was little change in overall bird use of the site over the six month census period (Figure 3). A few waterfowl used the lagoon during the first three months, their numbers declining somewhat from February to April (Figure 4). Songbirds and doves were seen only during May and July, again in small numbers (Figure 6), and shorebirds were rarely seen. Gulls and terns used the area in small numbers throughout the six months and a few cormorants fed in lagoon waters in February and March.

Site 3 had the lowest bird use of all the sites, averaging only 0.3 birds per acre during a census period (Table 1). The maximum number of birds seen per acre of site was only 0.9, also considerably

lower than all the other sites. Twenty-five species were seen on the site. Birds were more likely to rest than feed on the lagoon (Table 2). Only 39% of the birds observed here fed, the lowest proportion of all the sites.

The lagoon receives the lowest wildlife use of all the sites censused. Bird use is much lower here than on the pond site (Site 1) because the sparse bank vegetation at Site 3 provides little cover for wildlife, it has no undisturbed islands for birds to rest on, its waters are too deep for most birds to feed, and the area receives much human disturbance.

Site 4

Physical Features

Site 4 includes 37.5 acres of agricultural field on which wheat is grown. The elevation of this area is low, approximately -4.5 MSL. The site is surrounded by similar cultivated land on all sides except on the west, where it abuts the pond and ruderal field sites (Sites 1 and 3). In February and March Site 4 contained many shallow ponds, filled by water buildup from heavy winter rains and a leaking pump in the area (Lange, pers. comm.). Much of the flooding was probably naturally caused, since flooding is a yearly winter occurrence in this area and adjacent land not serviced by the faulty pump was also flooded during the study (Tieger; Ellis, pers. comm.).

Vegetation and Wildlife Habitat

Little vegetation was present on the site until a few weeks after the standing water dried up. In late March and April the site was covered with fiddleneck, a native forb, which mostly died off in May and was replaced on half the site by meter-high, thick stands of rye grass mixed with bristly ox tongue and winter vetch. The remainder of the site was less thickly vegetated with shorter rye grass, mayweed, common knotweed, sand-spurrey, and brass buttons.

The area, when ponded, is excellent feeding habitat for puddle ducks and passerines, that feed on the water-covered germinating seeds. Shorebirds rest and feed in these areas in great numbers when high tide covers the Bay mudflats. Once the fields have dried up, the vegetation serves as cover for a few songbirds; more birds are attracted to feed on seeds if the fields are plowed and sown. Raptor use of the area was steady from late March to mid-June.

Census Results

Bird use of this site was strikingly seasonal (Figure 3). Numbers dropped steadily as the flooded areas disappeared, and by April the numbers of birds were reduced to less than 2.5% of that of February. Waterfowl and shorebirds no longer used the site and only a few passerines were present (Figures 4 - 6).

Over the six months of the survey, the average number of birds seen per acre of site was 3.9, close to the overall average of 4.4 for all sites (Table 1). The second highest number of species was seen on this site, most of them when it was flooded. Feeding was by far the most common activity: it was observed 95% of the time, while only 11% of the birds seen rested (Table 2). Gulls and terns did equal amounts of feeding and resting on the site.

One striped skunk carcass was found on the site and other small mammals undoubtedly inhabit or feed in the area.

Site 4 is unique among the sites for its seasonal value. Agricultural areas which are seasonally flooded are an important food source for waterfowl wintering in the Bay Area (USFWS, 1979b). Most of the natural marshland areas which historically served this purpose have been reclaimed, and ponded cultivated fields such as this site provide critical substitute feeding habitat for waterfowl. Shorebirds use these ponded areas for feeding and resting when high winter tides cover bay mudflats and marshes. Passerines make heavy use of these areas also.

Site 5

Physical Features

Site 5 is a 12.5 acre artificial pond of approximately -4.5 feet MSL elevation. During the survey the pond was usually dry but bottom vegetation suggests it may hold significant water following winter rains. Trees, residences, and farm buildings line the site on the north and west; cultivated land lies to the east.

Vegetation and Habitat Value

The pond was vegetated by mostly introduced species before it was cultivated in the late spring. A large stand of brass buttons was interspersed with barley, mayweed, red brome grass, curly dock, rabbit's-foot grass, and the native coyote brush and pickleweed. The wildlife value of this low, fairly homogeneous vegetation is mainly as cover; although brass buttons is an important waterfowl food plant, few ducks are expected to be attracted to the area unless there is some ponding.

Census Results

Site 5 was used by low numbers of birds throughout the six months of the survey (Figure 1). A few killdeer, a shorebird species found regularly in drier areas, were present in every month except June (Figure 5) and songbirds and doves were seen during all months (Figure 6). Raptors used the site steadily from mid-April. The pond had the lowest species diversity of all the sites; only 18 species were observed (Table 1). Average bird use (1.3 birds per acre during a census period) was the fifth lowest of the seven sites. Most birds (97%) fed on the site; considerably fewer birds (12%) were seen resting (Table 2).

Several species of mammals used the site. Skunk and deer tracks were seen in the mud and black-tailed jackrabbits were twice observed. Several other small mammal species probably are present here.

This area receives relatively low wildlife use. The managed, homogeneous cover and lack of water make it comparatively poor habitat.

If the area were not cultivated for a few years, the decreased level of disturbance and the increased density and diversity of vegetation would make it more attractive to wildlife (as at Site 7).

Site 6

Physical Features

Site 6 is a 25 acre hay field situated adjacent to San Pablo Bay. It is surrounded on all sides by agricultural fields except the Bay side, which is separated from a strip of tidal marsh by a levee. The site is approximately -2 feet MSL.

Vegetation and Habitat Value

The wild oats which vegetate the site are cut in the spring for hay. After mowing, grasses and other introduced species such as star thistle, Italian rye grass, winter and spring vetch, bristly ox tongue, and mayweed grow in stands averaging 0.5 meters high. Wild radish, wild oats, canary grass, thistle, and bindweed cover the levee banks or grow around telephone poles. A stand of eucalyptus trees lines the western border of the site. The site was shallowly ponded in small areas during January and February.

These plants provide some cover for birds and small mammals. Tall eucalyptus in open areas are often used as hunting perches by raptors; the birds may also nest in them.

Census Results

The only bird groups observed using the area were songbirds, doves, upland game birds, and raptors. Songbirds were by far the most numerous, and their numbers were greatest in April, just before the vegetation was mowed (Figure 6). Red-winged blackbirds were present in good numbers then, and might have nested in the field had it not been cut. Doves and upland game birds were occasionally seen and raptors hunted the area in relatively high numbers during all months.

A moderate number of species (23) used the site in low numbers (Table 1). Average site use (1.1 birds per acre per census period) was lower than all sites except Site 3, the lagoon. Birds were observed feeding or resting in roughly equal proportions (Table 2). Owls often perched in the eucalyptus trees and their regurgitated pellets were found beneath the trees. A few pairs of blackbirds were seen feeding young during June, but this was the only observed evidence of breeding.

Because it was not flooded nearly as extensively as Site 4 during the census period, Site 6 received much less wildlife use than this other agricultural site. Ponding on Site 6 was shallow and limited to small areas, and did not attract the large numbers of water-associated birds that the vast flooded areas of Site 4 did. Raptors more frequently hunted over this site than over Site 4, however, probably passing it as they flew along the Bay margin. Blackbirds would probably nest on the site in fair numbers if the vegetation was not cut. There was no direct evidence of mammal use on the site but rabbits and small rodents are likely to be present (rabbit remains were found in owl pellets recovered from the site).

Site 7

Physical Features

This area is a small (5 acre) ruderal field at -3.5 feet MSL elevation. Although the site does not contain standing water during the winter, occasional levee leaks produce small wet areas of lush vegetative growth. The site is bounded on the north by the Novato River, on the east by cultivated agricultural land, and on the west by the Bel Marin Keys development. The pond site (Site 1) is immediately south of it.

Vegetation and Habitat Value

Site 7 is the most vegetatively diverse of all the sites. Many of the plant species are typical of agricultural land which has not

been cultivated for some time. Thick stands of Italian rye grass reaching a height of one meter or more cover much of the area. These stands are mixed with other introduced annual species such as winter vetch, sow-thistle, wild oats, mustard, mayweed, rabbit's-foot grass, and barley. Coyote brush grows in a dispersed stand along the pond margins. Low stands of common knotweed or bristly ox tongue dominate small areas. The wet areas below the levees contain short, dense pickleweed or salt grass. Saltbush and curly dock are also present.

The tall, dense areas of vegetation on this site provide cover for many wildlife species. The large number of plant species and diverse vegetative forms furnish a variety of food sources, perches, nest sites, and cover for many birds and small mammals.

Census Results

Songbirds use this site in greater numbers than any other site. The most birds were present during February, when large flocks of house finches searched for food in the area (Figure 6). Passerine numbers then declined until the May breeding season, when blackbirds and sparrows nested on the site and many swallows which nested elsewhere used the field to hunt for insects. Fewer songbirds used the area in June and July. Raptors also were seen more frequently over Site 6 than any other site. The most individuals hunted the field in February, June, and July, but a few were present from March to May.

Bird use of the ruderal site was high; it was second only to the salt marsh/mudflat site (Site 2) in average number of individuals seen per acre. However, it was used by about only half as many species as used Site 2 (Table 1). Songbirds and doves were about as likely to be seen feeding as resting, while raptors most frequently searched for food over the area (Table 2). Although only a small percentage of the total number of songbirds seen (2%) performed breeding activities, at least eight to ten pairs of songbirds, including song sparrows, red-winged and Brewer's blackbirds, and meadowlarks, nested in this small area.

Mammals also were common on the site. Black-tailed jackrabbits were seen and fox scat containing meadow mice remains was found. The burrows of some large mammal (probably fox) are present on the site.

This ruderal area is important to passerines as a resting and feeding area during the winter, and some birds nest here during the spring. Many songbirds that are attracted to the adjacent pond site to hunt insects may also search this area for food or use it for cover. It is also apparently well-used by mammals.

Summary

The study area provides habitat for at least 86 bird species and a variety of other wildlife species. Wildlife use of the study area varied greatly from site to site. The salt marsh/mudflat site (Site 2) received the heaviest use by the most species, and the vegetatively diverse ruderal area (Site 7) was also well-used, particularly by songbirds. Birds used the pond area (Site 1) in much greater numbers than the lagoon site (Site 3), because its borders are heavily vegetated, it is shallow enough for diving birds to feed in, and it is more removed from human disturbance. The extensive winter flooding of the low agricultural lands of Site 4 and vicinity attracted large numbers of water-associated birds. Higher fields (such as Site 6) collected water only in small areas and bird use here during the same season was much less. The other cultivated site (Site 5), an artificial pond, attracted few wildlife species because it rarely contains water, and the vegetation covering the site is relatively homogeneous.

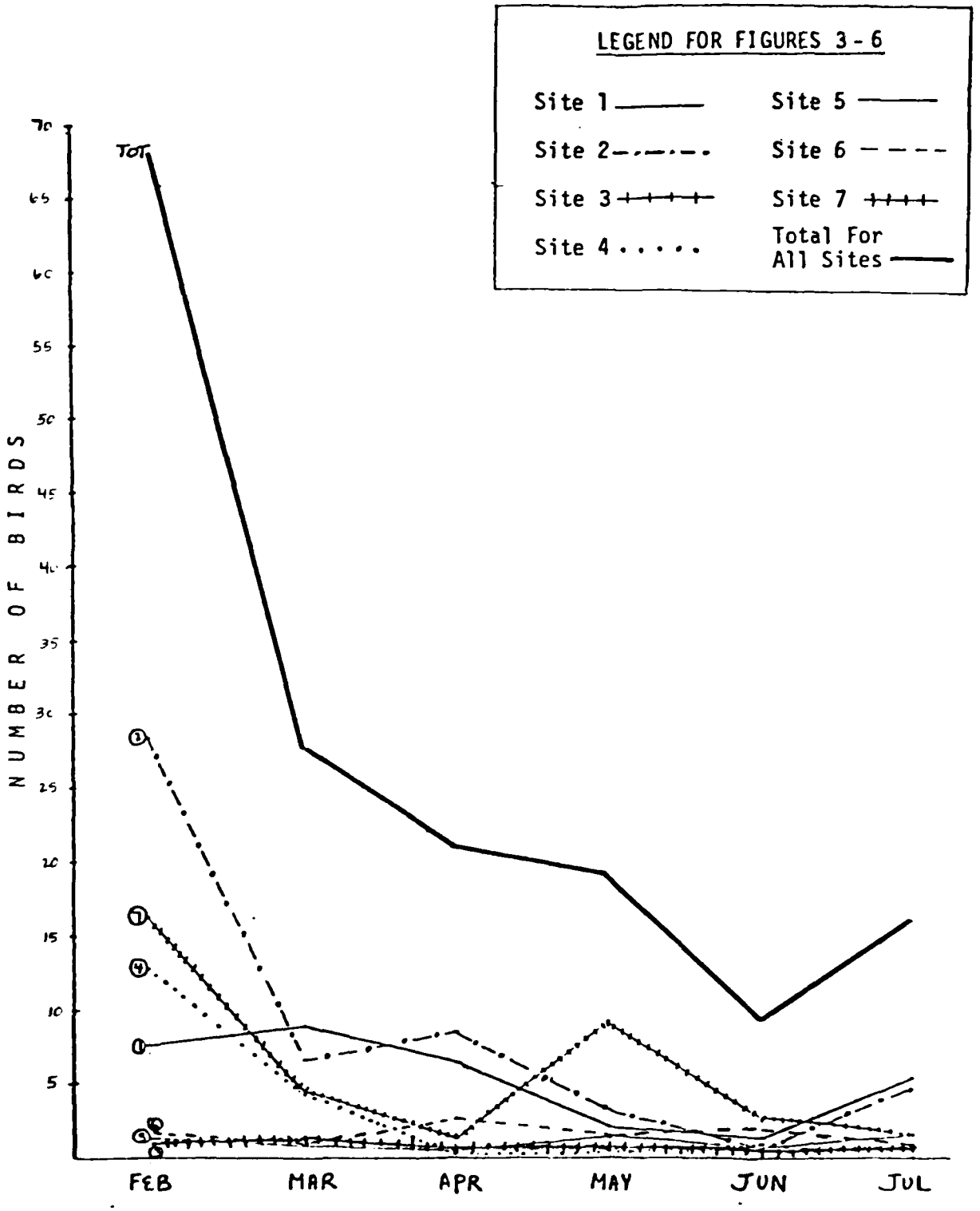


FIGURE 3. AVERAGE NUMBER OF TOTAL BIRDS/ACRE/CENSUS PERIOD ON CENSUS SITES 1 - 7 FROM FEBRUARY TO JULY.

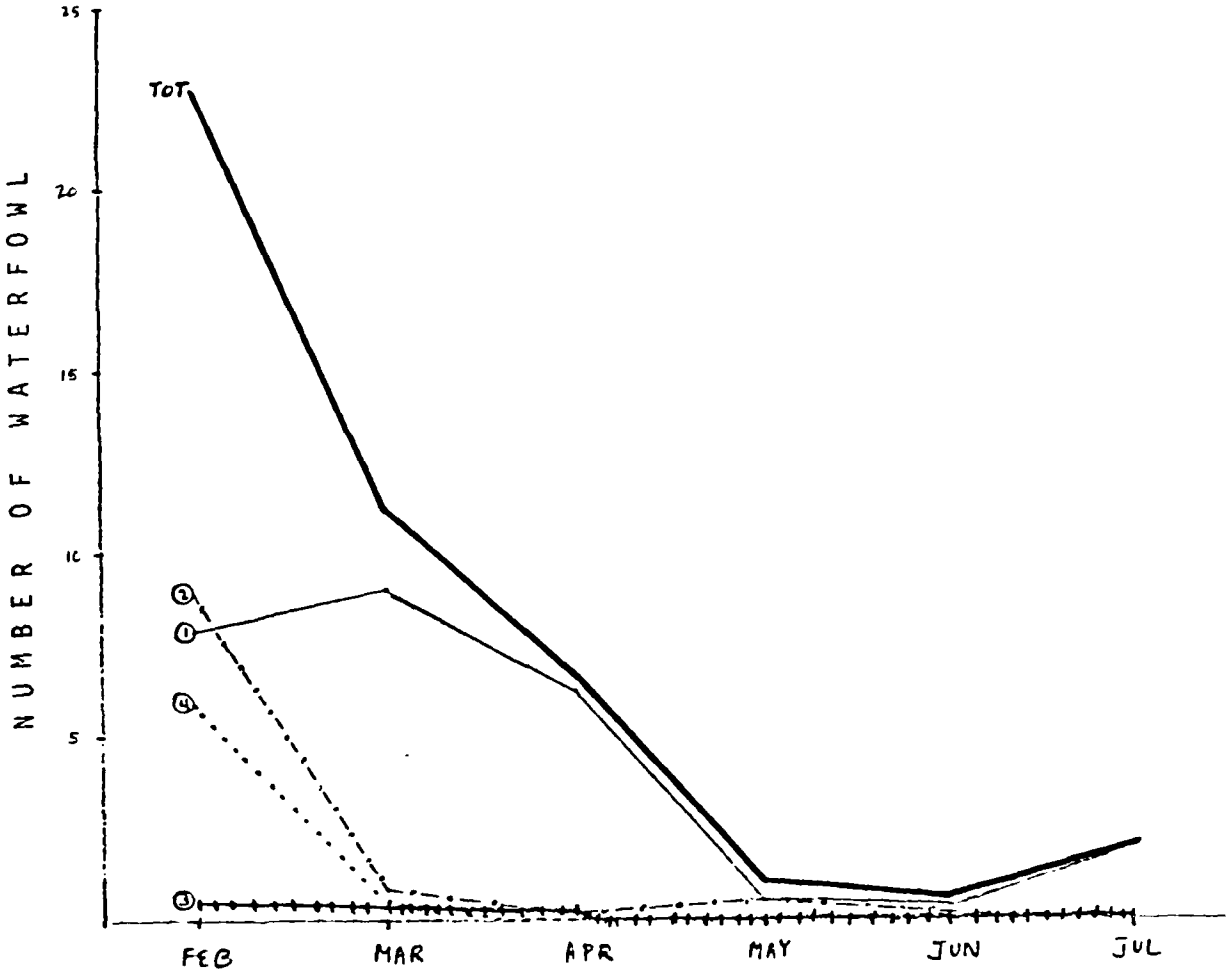


FIGURE 4. AVERAGE NUMBER OF WATERFOWL/ACRE/CENSUS PERIOD ON CENSUS SITES 1 - 4 FROM FEBRUARY TO JULY.

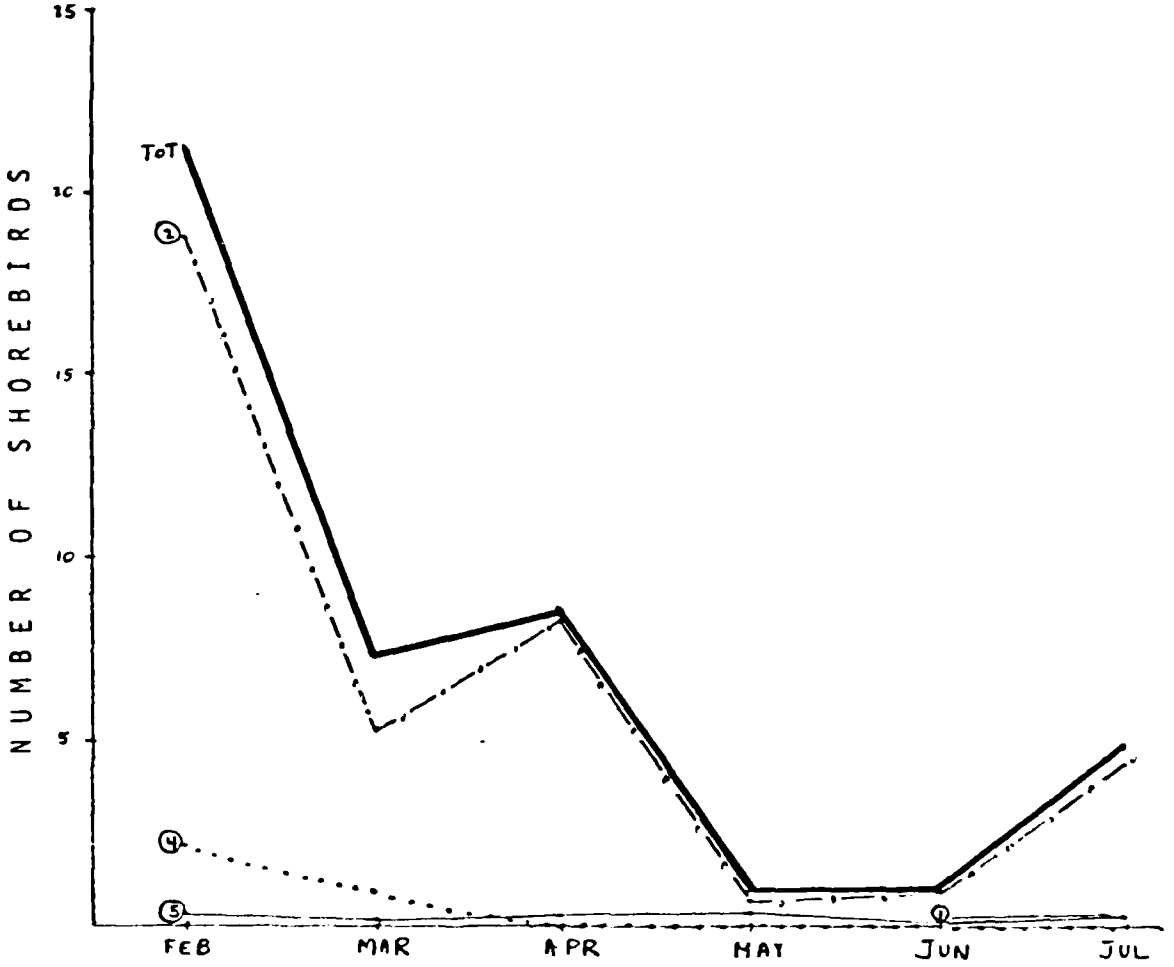


FIGURE 5. AVERAGE NUMBER OF SHOREBIRDS/ACRE/CENSUS PERIOD ON CENSUS SITES 1, 2, 4, and 5 FROM FEBRUARY TO JULY.

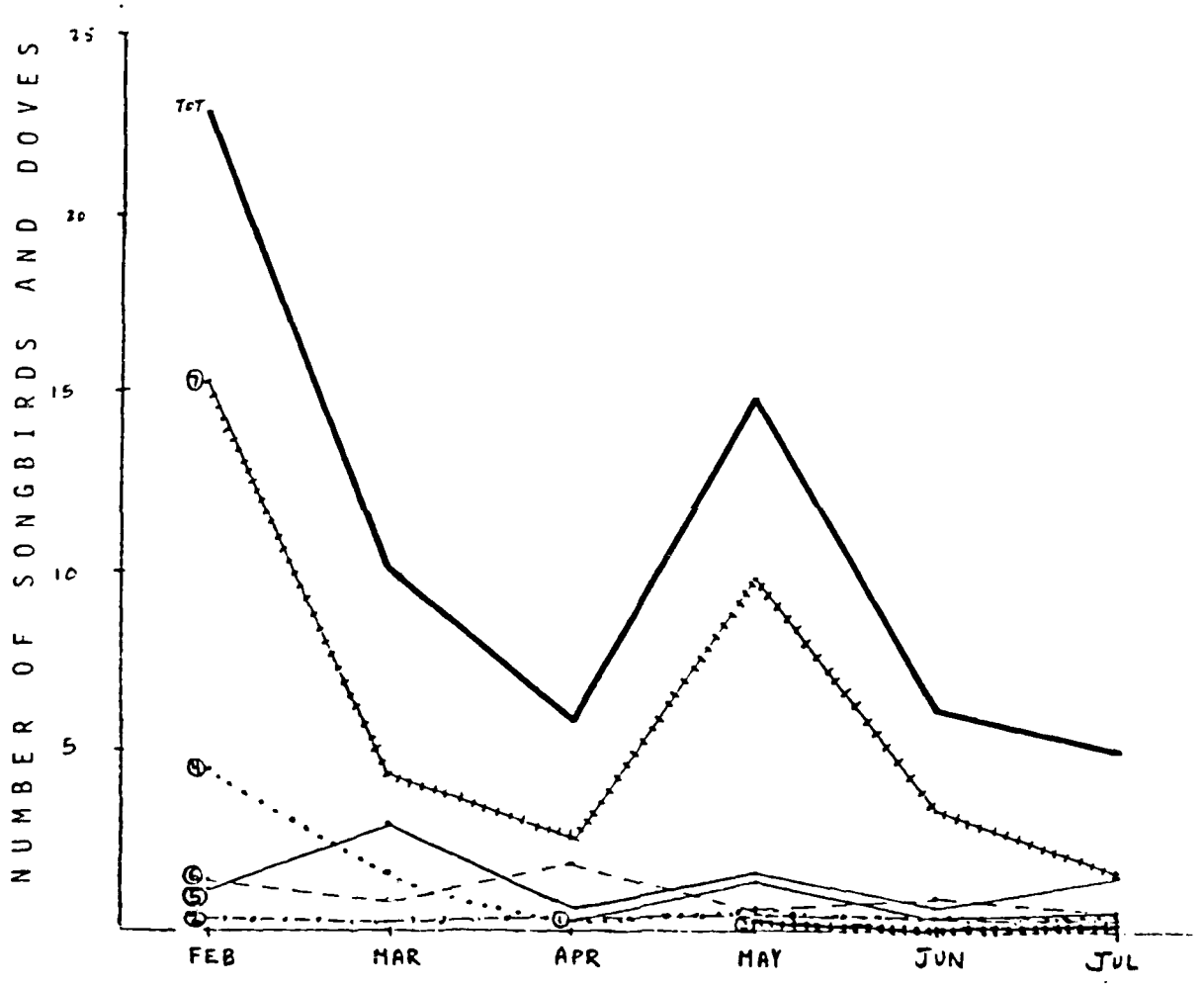


FIGURE 6. AVERAGE NUMBER OF SONGBIRDS AND DOVES/ACRE/CENSUS PERIOD ON CENSUS SITES 1 - 7 FROM FEBRUARY TO JULY.

TABLE 1

BIRD USE OF BEL MARIN KEYS CENSUS SITES

Site	Total Number Species Seen	Number of Individuals Seen Per Acre of Site During One Census Period		
		Maximum	Minimum	Average
1	30	16.5	.5	5.8
2	53	61.7	.9	10.3
3	25	.9	.1	.3
4	39	34.3	.1	3.9
5	18	5.0	0	1.3
6	23	3.3	.3	1.1
7	29	56.8	.6	7.8
Mean	31	25.5	.4	4.4

TABLE 2

PERCENTAGES OF INDIVIDUALS FEEDING (F), RESTING (R), OR CONDUCTING BREEDING ACTIVITIES (Br) AT THE SEVEN CENSUS SITES

Site No.	Waterfowl			Waders			Shorebirds			Gulls and Terns			Raptors			Songbirds and Doves			TOTAL		
	F	R	Br	F	R	Br	F	R	Br	F	R	Br	F	R	Br	F	R	Br	F	R	Br
1	94	77		47	56		60	90		98	85		100			88	1		89	66	
2	57	50		75	34		100	0.8		60	51		83	24	7	27	40	18	87	15	0.6
3	65	99		36	54			100		14	87					38	2		39	60	
4	86	29		100*			100	10		100	100		93	12		98	3		95	11	
5					100*		64	32					94	6		97	10		34	12	
6													58	52		49	45		50	45	
7													81	43		53	66	2	54	64	2

*Only one individual observed.

APPENDIX

PLANT SPECIES LIST

BIRD SPECIES LIST

PLANT SPECIES ON BEL MARIN KEYS CENSUS SITES

COMMON NAME	SCIENTIFIC NAME
Black Mustard	*Brassica nigra*
Wild Radish	*Raphanus sativa*
Sand Spurrey	*Spergularia* sp.
Curly Dock	*Rumex crispus*
Common Knotweed	*Polygonum aviculare*
Saltbush	*Atriplex* sp.
Pickleweed	*Salicornia virginica*
Bindweed	*Convolvulus arvensis*
Fiddleneck	*Amsinckia intermedia*
Bird's Foot Trefoil	*Lotus uliginosus*
Winter Vetch	*Vicia villosa*
Spring Vetch	*Vicia sativa*
Gum Plant	*Grindelia humilis*
Coyote Brush	*Baccharis pilularis* var. *consanguinea*
Mayweed	*Anthemis cotula*
Brass buttons	*Cotula coronopifolia*
Thistle	*Cirsium* sp.
Star Thistle	*Centaurea* sp.
Ox tongue	*Picris echioides*
Sow-thistle	*Sonchus oleraceus*
Bulrush	*Scirpus* sp.
Red Brome	*Bromus rubens*
Salt Grass	*Distichlis spicata*
Barley	*Hordeum stebbinsi*
Italian Rye Grass	*Lolium multiflorum*
Wild Oats	*Avena* sp.
Rabbbit's-foot Grass	*Polypogon monspeliensis*
Cordgrass	*Spartina foliosa*

BIRD SPECIES LIST FOR BEL MARIN KEYS CENSUS SITES

Key to Habitat Types: A-Aerial, C-Dry Ponds, D-Drainage Ditches, F-Fields, H-Residential, L-Poles and Lines, M-Marsh, N-Mudflats, O-Wet Fields, P-Ponds, R-Ruderal Fields, T-Eucalyptus Trees, W-Water.

Species	Habitat Type
Horned Grebe	W, P
Eared Grebe	W, P
Western Grebe	W, P
Pied-billed Grebe	W, P, D
Double-crested Cormorant	W, P
Great Blue Heron	M, N, O, F, D, P
Great Egret	M, N, O, F, D, P
Snowy Egret	M, N, O, F, D, P
Mallard	W, F, M, P, O, N, O
Gadwall	W, M, N
Pintail	W, F, P, D, N, O
Green-winged Teal	W, P, O
Cinnamon Teal	W, M, P, D, N, O
American Wigeon	W, F, M, P, D, N, O
Northern Shoveler	W, P, O
Canvasback	W, P, M, N
Greater Scaup	W, M, P, N, O
Lesser Scaup	W, P, N, O
Common Goldeneye	W, P
Bufflehead	W, P
Surf Scoter	W, N
Turkey Vulture	F, M, A, R, L
White-tailed Kite	F, M, A, R, L
Red-tailed Hawk	F, M, A, R, C, L
Marsh Hawk	F, M, A, D, R, C, L, N, D

Species (continued)	Habitat Type (continued)
Osprey	W, M, A
American Kestrel	F, R, H, C, L
Black-crowned Night Heron	M
American Coot	W, F, M, P, D, R, H, N, O
American Avocet	N
Killdeer	F, H, C, N, O
Black-bellied Plover	O
Marbled Godwit	N, O
Long-billed Curlew	F, N, O
Willet	P, N, O
Common Snipe	O
Dowitcher sp.	N
Western Sandpiper	N, O
Dunlin	N, O
Glaucous-winged Gull	W, N
Western Gull	W, N
Herring Gull	W, N, O
Thayer's Gull	W, N, O
California Gull	W, N
Ring-billed Gull	W, N, O, P
Mew Gull	O
Bonaparte's Gull	P, W
Forster's Tern	W, A, P
Caspian Tern	W, N
Mourning Dove	F, R, H, C, L
Barn Owl	A, T
Great Horned Owl	F
Short-eared Owl	F, M
Vaux's Swift	A (F, W, P, R)
White-throated Swift	A (M, F)
Anna's Hummingbird	F, A, R, H, C, L
Common Flicker	R
Western Kingbird	F

Species (continued)	Habitat Type (continued)
Black Phoebe	W, M, P, D, R, H, C, L
Say's Phoebe	F, C
Horned Lark	F
Violet-green Swallow	A (H, D)
Barn Swallow	A (F, M, W, P, D, R, C, O), H, L
Cliff Swallow	A (F, M, W, P, D, R, C, O), H, L
Purple Martin	A (F, M)
Common Crow	F, L
Long-billed Marsh Wren	M, R
Mockingbird	H, R, L
Water Pipit	F, M, N, O
Loggerhead Shrike	F, M, R, H, C, L
Orange-crowned Warbler	R
Western Meadowlark	F, R, H, C, L, O
Red-winged Blackbird	F, M, D, R, H, C, L, O
Tricolored Blackbird	F, O
Brewer's Blackbird	F, R, H, C, L, O
House Finch	F, R, H, L
American Goldfinch	F, R, H, L
Savannah Sparrow	F, M, R
White-crowned Sparrow	F, R, H, L
Golden-crowned Sparrow	F, R, H, L
Lincoln's Sparrow	F, R
Song Sparrow	F, M, R, H, L
Rock Dove	F, R, H, C, L, O
Ring-necked Pheasant	F, R, C
European Starling	F, R, H, L, O
House Sparrow	R, H, L

Bird Species Seen in Immediate Area of Census Sites

Species	Habitat Type
Greater Scaup/Ring-necked Duck hybrid (possible)	P
Red-breasted Merganser	W, P
Cooper's Hawk	H
Red-shouldered Hawk	F, A, R, H. L
Peregrine Falcon[2]	F, O, A
California Quail	H
Greater Yellowlegs	P, O
Burrowing Owl	R
Allen's Hummingbird	H, L
Belted Kingfisher	W, A, P, D, L
Nuttall's Woodpecker	H
Western Flycatcher	H
Tree Swallow	A (D, F)
Scrub Jay	H
Common Raven	F
Plain Titmouse	H
Bushtit	H
Bewick's Wren	H
American Robin	H, L
Western Bluebird	H, L
Ruby-crowned Kinglet	H
Cedar Waxwing	H
Yellow-rumped Warbler	H
Northern Oriole	H
Brown-headed Cowbird	H
Western Tanager	H
Lesser Goldfinch	F, R, H, L

[2]The Peregrine Falcon is listed as an endangered species by the California Department of Fish and Game and the U.S. Fish and Wildlife Service.

Species (continued)	Habitat Type (continued)
Rufous-sided Towhee	H
Dark-eyed Junco	H

HABITAT ANALYSIS AND MITIGATION PLAN FOR THE PROPOSED BEL MARIN KEYS RESIDENTIAL DEVELOPMENT

PREPARED FOR:

HOME SAVINGS AND LOAN

APRIL 27, 1981

PREPARED BY:

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TABLE OF CONTENTS

INTRODUCTION

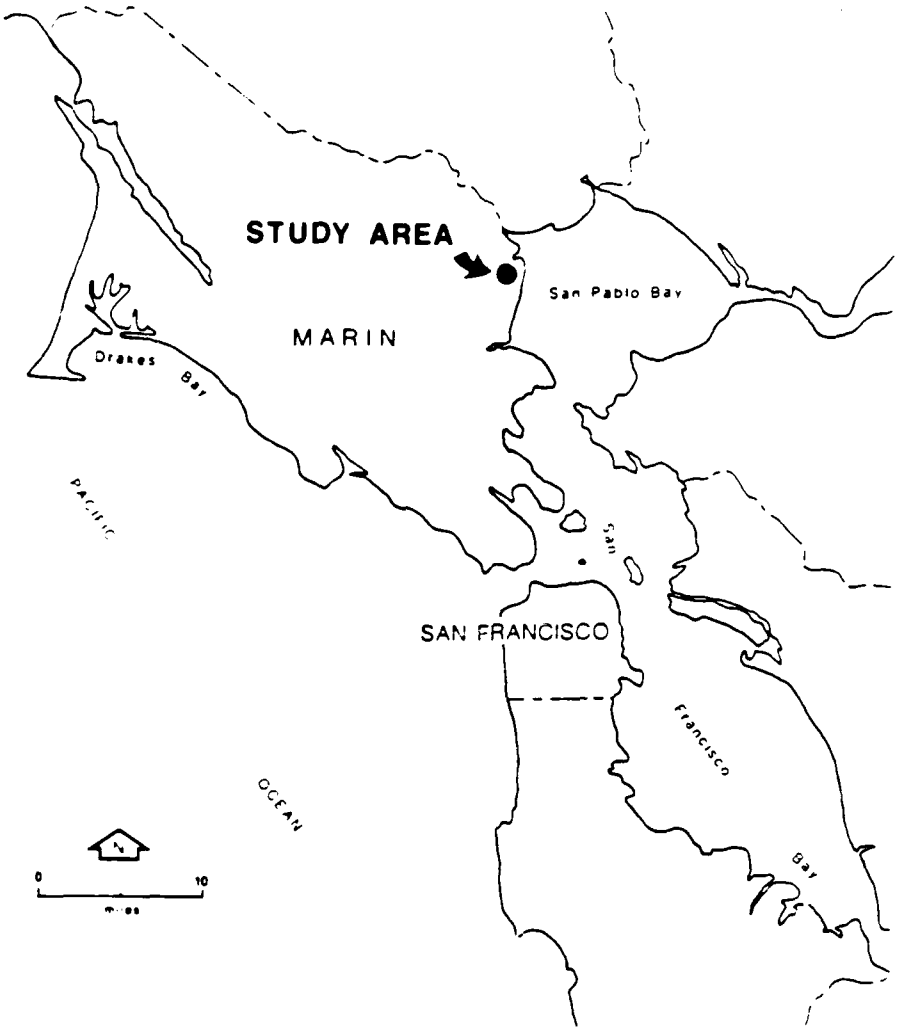
Study Area

The Bel Marin Keys Study Area includes approximately 1,610 acres of diked bayfront lands adjacent to San Pablo Bay, which is the northern bay of the San Francisco Bay system (Figure 1). The study area, on the northwest corner of the Bay, is bounded by the existing Bel Marin Keys residential development on the west and northwest, Black Point on the northeast, and Hamilton Air Force Base on the south. Over 1,000 acres of Hamilton Air Force Base, some of which borders the study area, were recently transferred to the United States Fish and Wildlife Service for inclusion in the San Pablo Bay National Wildlife Refuge (however, BCDC, the State Lands Commission, and others have brought a suit questioning the legality of the transfer).

The bayward mile or so of the study area has filled in the last 100 years from sediment created by extensive hydraulic mining upstream. The rest of the study area historically was part of the extensive marshlands off the north and west portions of San Pablo Bay (Nichols and Wright, 1971).

Habitat Analysis and Mitigation

An eleven month wildlife census was undertaken to determine the type and intensity of wildlife use on the various habitats of the study area. A Habitat Evaluation Procedure analysis (USFWS, 1980) also was conducted to ascertain which areas of the parcel are best suited for development and the amount and type of habitat restoration to be proposed for mitigation. Approximately 10 acres of the study area are residential (see Figure 5); these areas were not included in the census and habitat analysis.



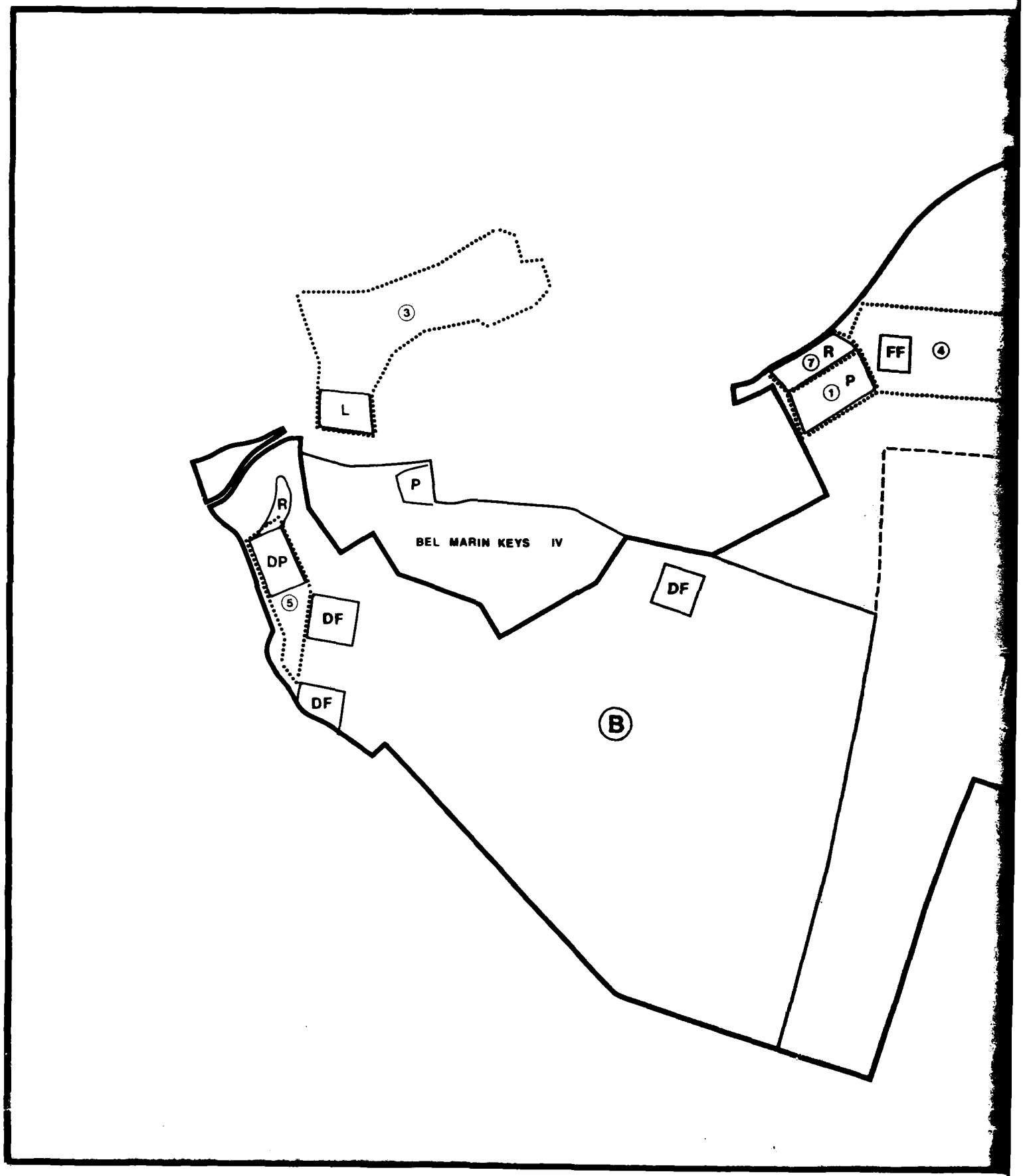
MADRONE ASSOCIATES	BEL MARIN KEYS STUDY AREA	FIGURE 1

I. BEL MARIN KEYS WILDLIFE CENSUS

Overview

Seven sites totalling approximately 180 acres within or adjacent to the Bel Marin Keys parcel were censused weekly over an eight-month period (January 30 - September 22, 1980) (see Figure 2). The sites were chosen to represent the major wildlife habitat types of the Bel Marin Keys area. They include the following habitat types: pond (Site 1), tidal marsh/mudflat (Site 2), artificial lagoon (Site 3), seasonally flooded agricultural field (Site 4), dry pond (Site 5) (a basin flooded for less than three months of the year), dry agricultural field (Site 6), and ruderal field (Site 7).

Census methods, detailed site descriptions, and census results for the seven sites over the period of January 30 - August 4, 1980, were presented in an earlier report (Bel Marin Keys Wildlife Census, Status Report, September 9, 1980). The results of that report document the highly variable wildlife use of adjacent habitat types in this area. In summary, the tidal marsh/mudflat site (Site 2) (outside the project boundary) received the heaviest use by the most species, and the vegetatively diverse ruderal area (Site 7) was also well-used, particularly by songbirds. Birds used the pond area (Site 1) in much greater numbers than the lagoon site (Site 3) (also not within project boundary) because pond borders are heavily vegetated, it is shallow enough for diving birds to feed in, and it is more removed from human disturbance. The extensive winter flooding of the low agricultural lands of Site 4 and vicinity attracted large numbers of water-associated birds. Higher fields (such as Site 6) collected water only in small areas and bird use here during the same season was much less. The other cultirvated site (Site 5), an artificial pond, attracted few wildlife species because it rarely contains water, and the vegetation covering the site is relatively homogeneous.


③
L
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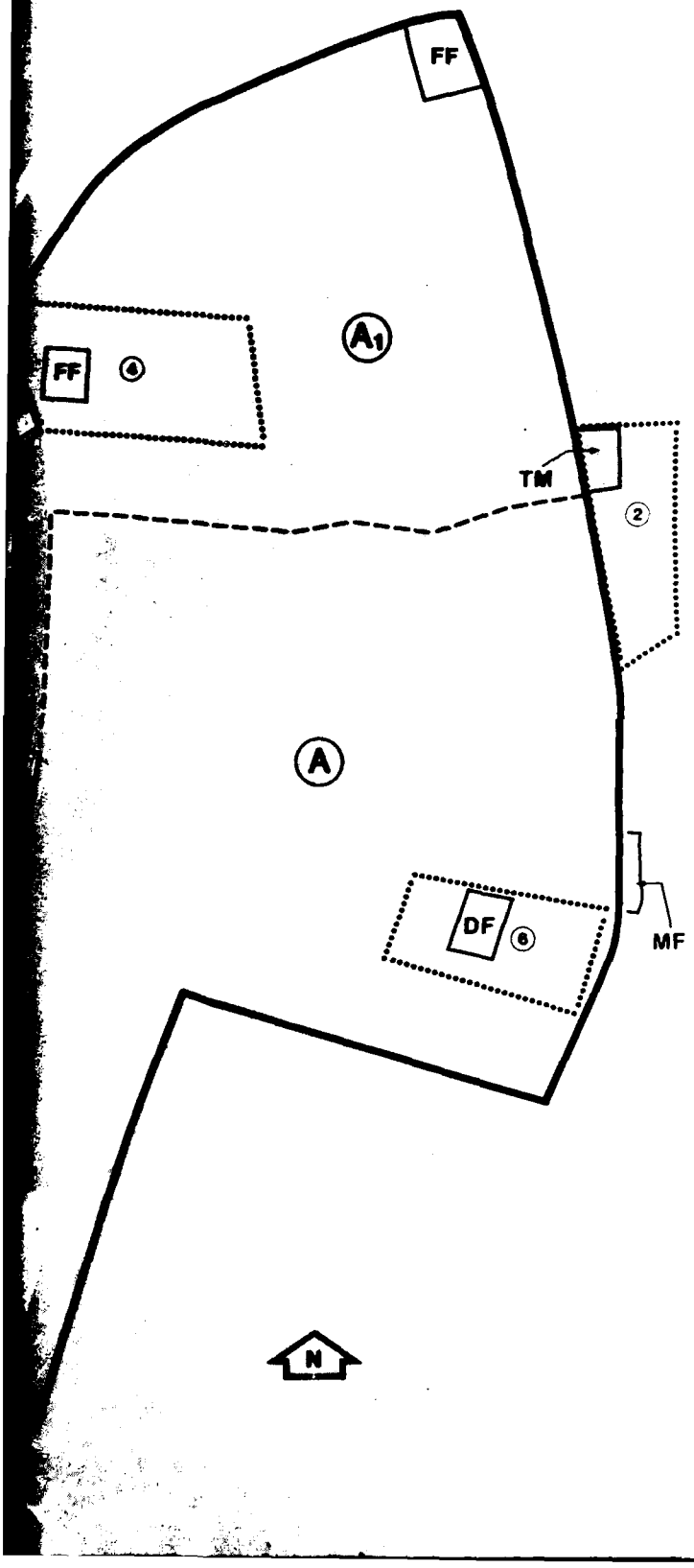
B



DF – DRY FIELD

DP – DRY POND

FF – FLOODED FIELD

MF – MUDFLAT

L – LAGOON

P – POND

R – RUDERAL

TM – TIDAL MARSH

A+B – BEL MARIN KEYS PARCEL

A_1 – ——— SUBAREA

⑤ ..... – WILDLIFE CENSUS SITES

TM – HEP FIELD SITES

FIGURE 2

WILDLIFE CENSUS SITES
AND
HEP FIELD SITES

0 1500 3000 feet

Prepared by: MADRONE ASSOCIATES

After September, only four of the seven sites (Sites 1, 4, 6, and 7) were censused through the remainder of 1980. The tidal marsh/mudflat (Site 2), artificial lagoon (Site 3), and dry pond (Site 5) were no longer surveyed because wildlife use is predictable or already well-established (Sites 2, 3) or because the habitat is not representative of the Bel Marin Keys parcel (Site 5).

Results

Overall bird use of the sites is shown in Table 1 (also see bird species list, Appendix A). The highest average use (7.0 birds/acre/census period) by the greatest number of species (51) was on the pond site (Site 1). Average bird use was approximately 60% of that of Site 1 (4.4 birds/acre/census period) on the dry and ruderal field sites (Sites 6 and 7), while the average was slightly higher (4.8 birds/acre/census period) on Site 4, the seasonally flooded field. The maximum number of birds seen per acre during one census period was greatest on the two agricultural field sites (75 birds/acre - Site 4; 61 birds/acre - Site 6).

Species composition varied among the four sites (see Table 2). The great majority (95%) of individuals using Site 1 were water birds, while on the other three sites, songbirds made up 80 - 96% of the total species seen. Approximately 20% of the birds using Site 4 during the study were water birds which flocked to the site when it was flooded. Raptors made up less than 5% of the total species on all the sites, and represented the smallest portion of the avifauna on the pond site.

There were definite seasonal trends in site use over the study period (see Figures 3 and 4). Many water birds (primarily migratory waterfowl) rested and fed on the pond site durng the winter (Figure 3). Numbers began to drop in spring as individuals left for northern breeding grounds. Hundreds of shorebirds were attracted to the pond in late summer to feed on the mudflats exposed by receding waters. Fewer birds

TABLE 1

BIRD USE OF BEL MARIN KEYS CENSUS SITES*

SITE NUMBER	HABITAT	TOTAL # SPECIES SEEN	NUMBER OF INDIVIDUALS SEEN PER ACRE OF SITE DURING A CENSUS PERIOD	
			Average	Maximum
1	Pond	51	7.0	40
4	Seasonally Flooded Field	46	4.8	75
6	Dry Field	35	4.4	61
7	Ruderal Field	37	4.4	26

*Sites surveyed weekly from January 30 - September 22, 1980, and October 22 - December 31, 1980.

TABLE 2

PERCENTAGES OF INDIVIDUALS
WITHIN THE FOUR MAJOR SPECIES GROUPS
OF THE CENSUS SITES

SPECIES	SITE NUMBER 1	4	6	7
Water Birds*	95.0%	19.0%	1.6%	3.4%
Passerines and Doves	4.9%	80.0%	96.0%	93.0%
Raptors	0.1%	1.0%	2.4%	3.0%
Upland Game Birds			0.1%	0.5%

* Including waterfowl, grebes, coots, wading birds, shorebirds, gulls, and terns.

used the pond during the fall, when it was almost completely dry, but it flooded again in December, drawing shorebirds, geese, and ducks.

Many puddle ducks and shorebirds fed and rested on Site 4 when it was flooded in February and early March (Figure 3). A few shorebirds roosted on Sites 4 and 6 during the fall and small flocks of killdeers (a "shorebird," characteristic of open, dry areas) fed on the ruderal site (Site 7) after it was burned off in November.

Use of the sites by land birds fluctuated greatly throughout the year (see Figure 4). Large numbers of blackbirds fed on the flooded Site 4. After February, land bird use was low and relatively stable on the agricultural field sites (4 and 6) until November, when plowing attracted large feeding flocks of blackbirds and starlings.

Numerous house finches fed on the ruderal site (7) in February. Land bird use then declined until the May breeding season, when blackbirds and sparrows nested on the site and swallows hunted the ruderal field for insects. Flocks of seed-eating meadowlarks and sparrows were drawn to Site 7 after it was burned off in November.

Small numbers of land birds fed over the pond site (Site 1) from March through December. Highest land bird use of this site was in August, when many swallows hawked for insects over the water.

Discussion

The eleven-month census shows that bird use on the Bel Marin Keys parcel varies greatly among the major habitat types and that the amount and type of use is strongly affected by seasonal and agricultural events such as flooding, plowing, and burning.

Most of the Bel Marin Keys parcel is agricultural field (see Figure 5), of value mainly to songbirds and raptors. When the fields are plowed, thousands of songbirds may be drawn to feed on the exposed seeds, but these flocks are relatively homogeneous, consisting primarily of blackbirds, starlings, and crows.

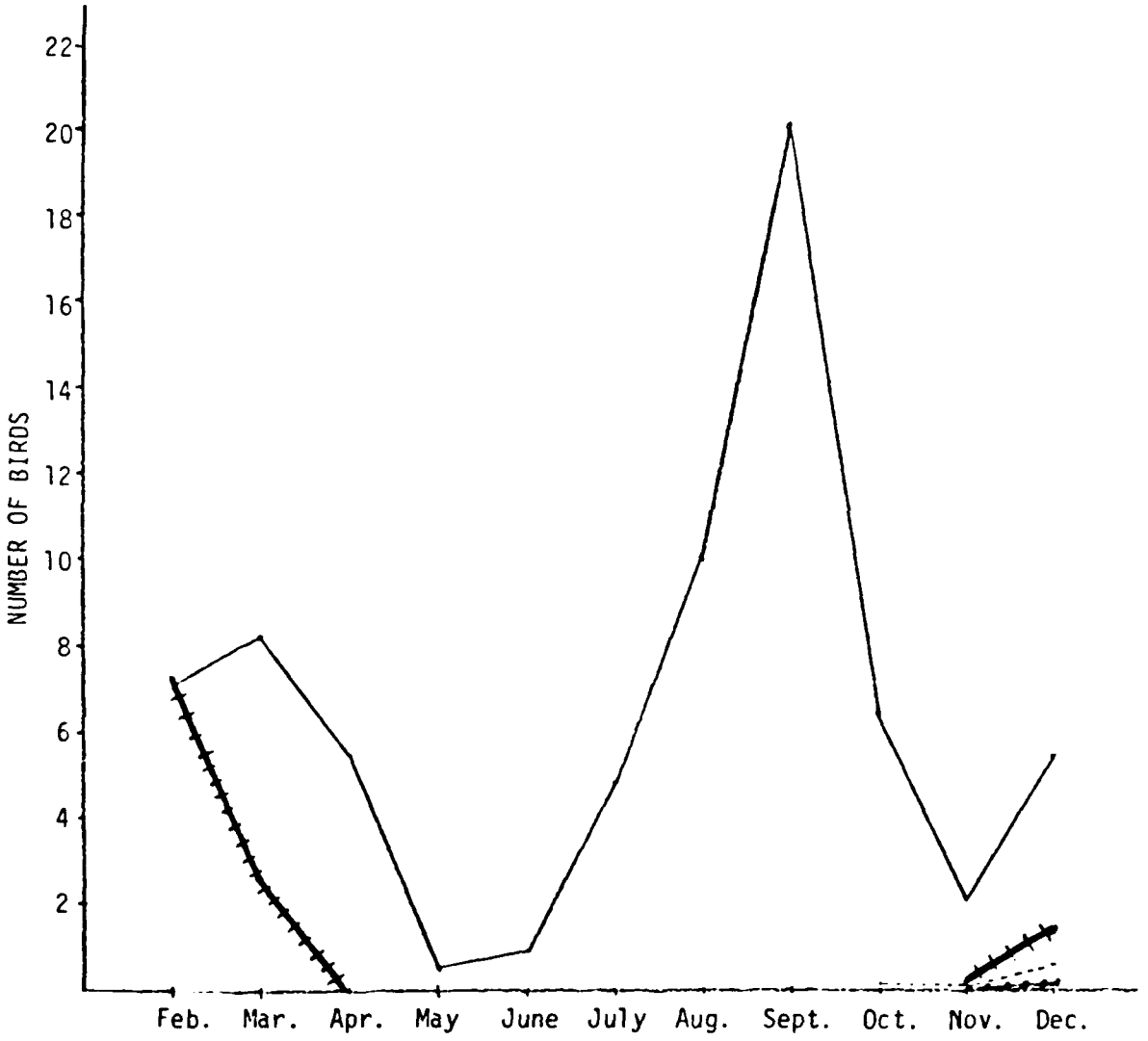


FIGURE 3. Average number of water birds/acre/census site (water birds include waterfowl, grebes, coots, wading birds, shorebirds, gulls, and terns) on sites 1, 4, 6, and 7 from February to December, 1980.

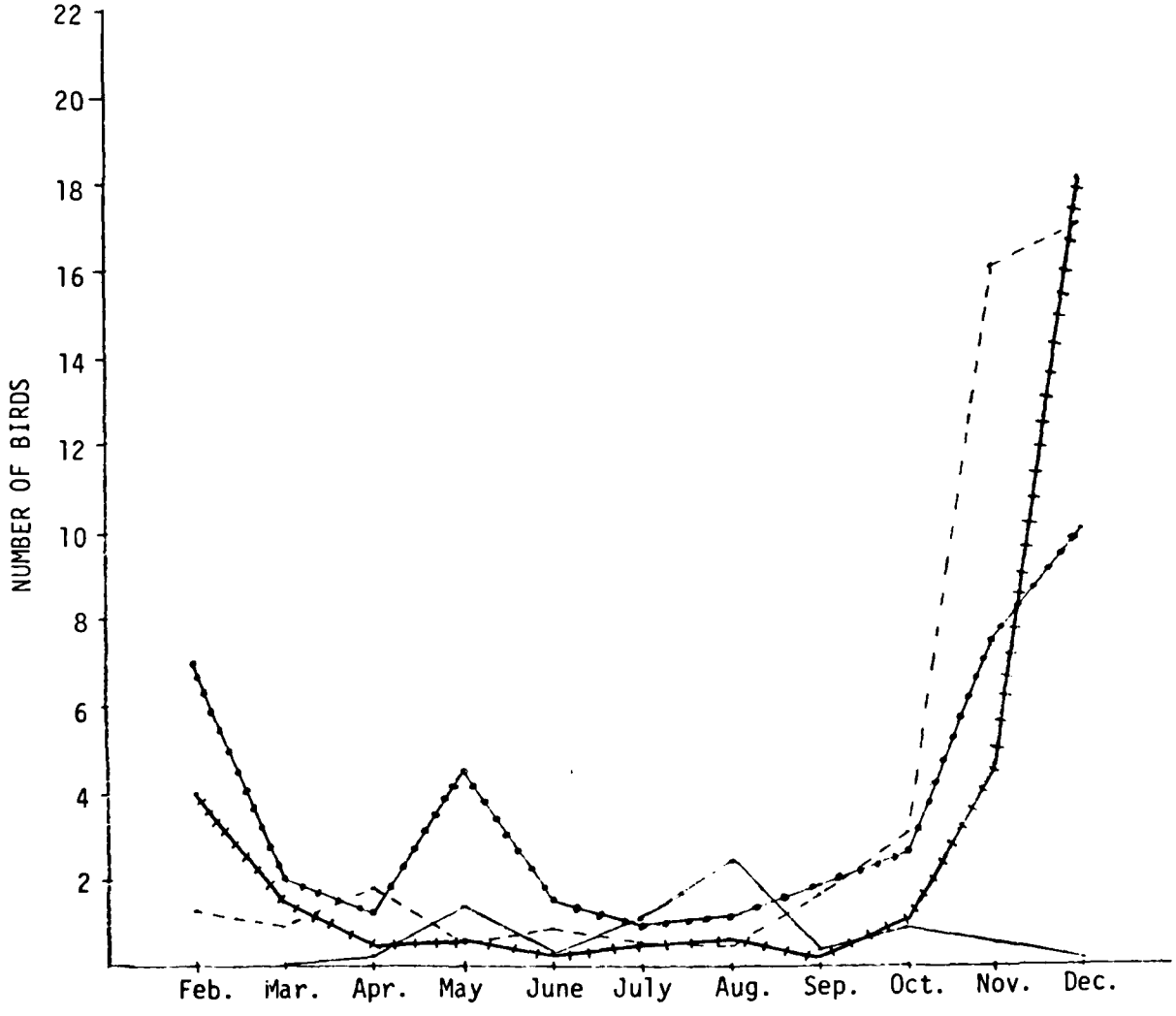
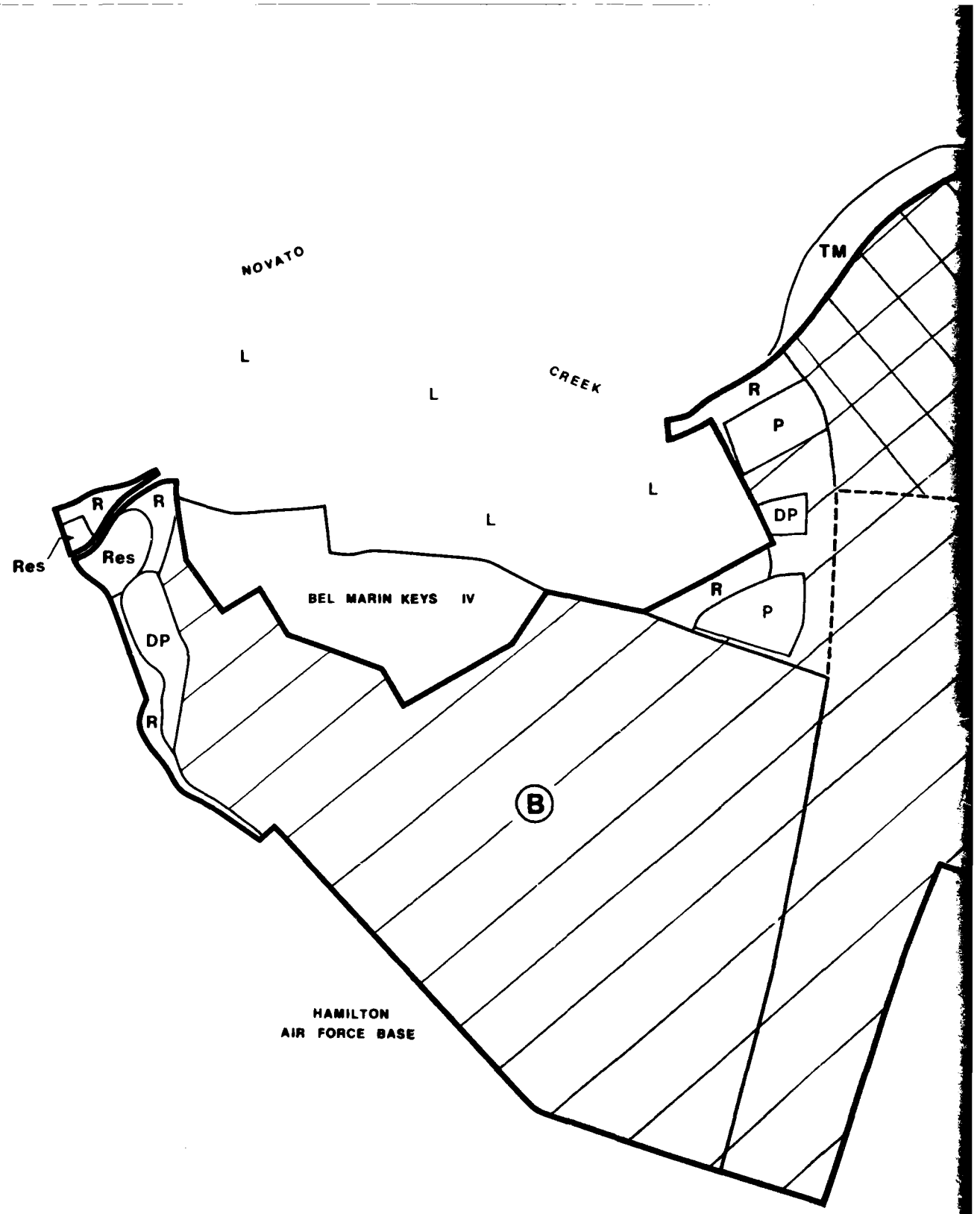


FIGURE 4. Average number of land birds/acre/census site (land birds include songbirds, doves, upland game birds, swifts, woodpeckers, and hummingbirds) on Sites 1, 4, 6, and 7 from February to December, 1980.

Approximately 25% of the agricultural field on the parcel was flooded during February and early March, 1980 (see Figure 5). Flooded fields supported large numbers of songbirds and water birds. Most of the Bay Area marshland which historically served this purpose has been reclaimed, so these seasonally flooded fields are important substitute feeding habitat.

Ruderal fields surround the ponds along the western border of the parcel (Figure 5). Ruderal areas are used by a high diversity of land birds for cover, nesting, and feeding, and by raptors for hunting. Burning of these fields reduces their cover value but exposes seeds and attracts feeding flocks of many species of songbirds.

There are 2 ponds on the parcel (Figure 5), one of which is seasonal and the other year-round. The pond census site supported the greatest number of bird species and the highest average number of individuals over the eleven-month census period. The ponds are excellent habitat for a wide variety of water birds. Puddle ducks and wading birds feed in the shallow water in the fall and winter, and shorebirds probe the exposed mudflats when the waters recede during the summer. Many songbirds feed on insects over pond waters.


NOVATO
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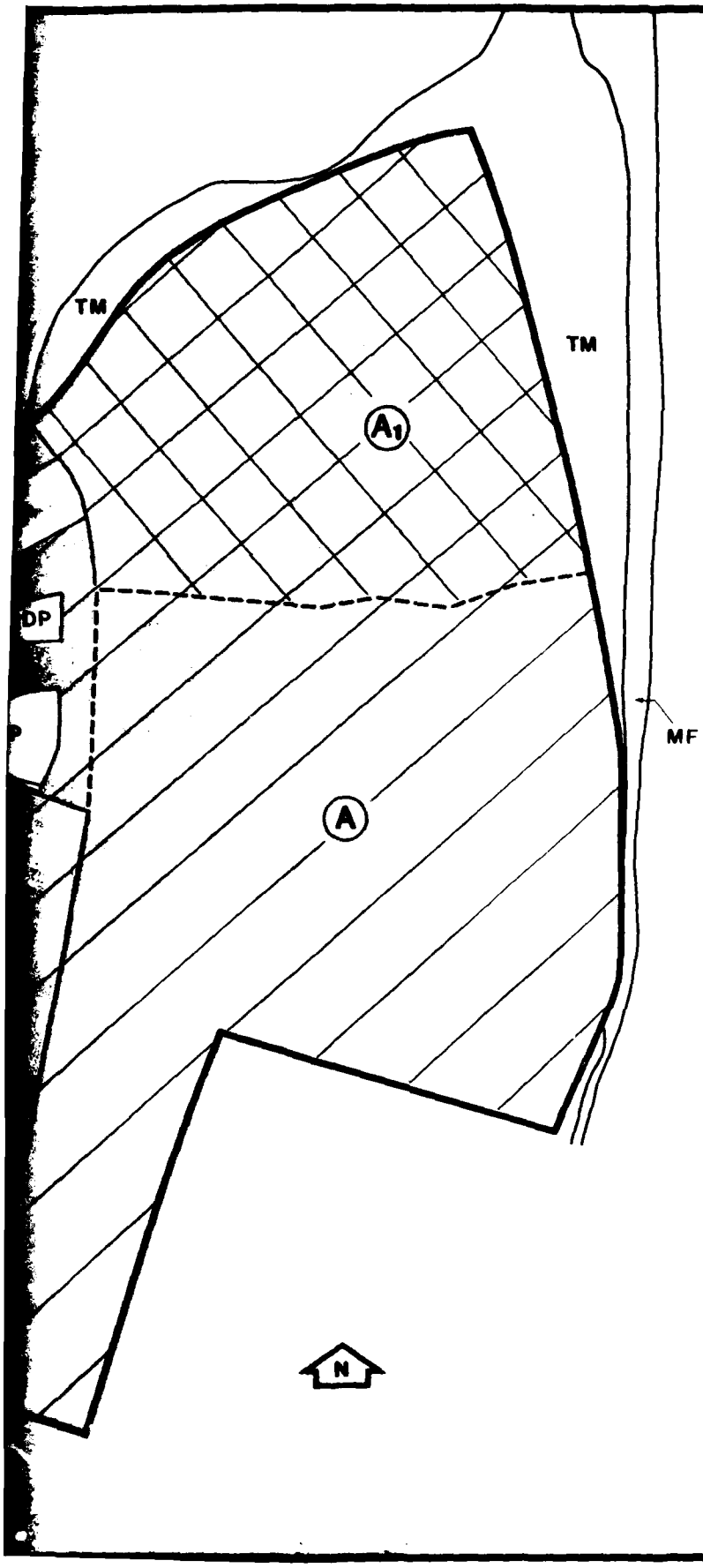

- DRY AGRICULTURAL FIELD
- SEASONALLY FLOODED AGRICULTURAL FIELD

R - RUDERAL

P - POND

DP - DRY POND

L - LAGOON

TM - TIDAL MARSH

MF - MUDFLAT

Res - RESIDENTIAL

A+B - BEL MARIN KEYS PARCEL

A_1 - ——— SUBAREA

FIGURE 5

BEL MARIN KEYS
HABITAT TYPES

0 1500 3000 feet

Prepared by: MADRONE ASSOCIATES

II. HEP ANALYSIS[1/]

Purpose of HEP

A modified Habitat Evaluation Procedure (HEP) analysis was conducted in the study area to determine which portions of the parcel are best suited for habitat enhancement, development, or maintenance in their present state, and to document the size and type of habitat restoration needed to compensate for habitat loss. HEP is used by the U.S. Fish and Wildlife Service to determine the quality and quantity of wildlife habitat in areas proposed for water resources development projects. It is also used for state and federal agency or private planning activities, particularly when the Fish and Wildlife Service is involved as a cooperating agency.

HEP requires estimating the relative carrying capacity of a habitat area for selected wildlife species. A Habitat Suitability Index (HSI) is determined for all habitat in the study area used by the selected species. The HSI is an index which rates the study area habitat conditions relative to optimum regional habitat conditions. Thus, an HSI of 0.5 for a particular species indicates that the study area habitat has only half the carrying capacity of the optimal habitat for that species in the geographic region. Ideally, HSI's are estimated by using models that relate habitat carrying capacity to specific criteria (e.g., the percent of ground cover, distance to water, and water regime on a site may be used to determine an HSI for a rodent species).

The final HSI is a function of the relative habitat value of all cover types within the study area used by the evaluation species. This index is multiplied by the total acres of available habitat to obtain the number of Habitat Units (HU's) for that species within the study area. HU's provide a relative measure of existing habitat value and project impacts can be determined by calculating the changes in HU's expected to occur both with and without the proposed action.

[1/] Habitat Evaluation Procedure

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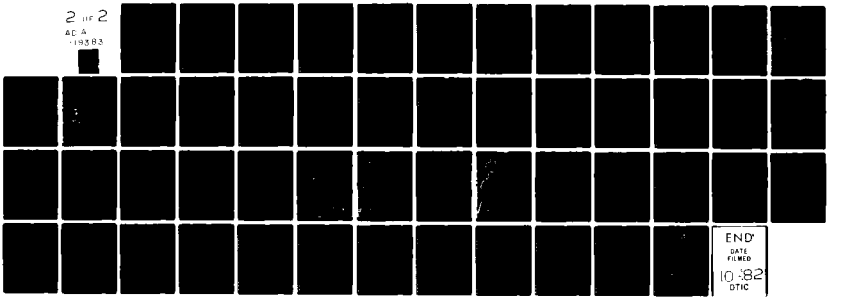

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Methods

Prior to the HEP field survey, the vegetative "cover types" in the study area were mapped, and several species were chosen for evaluation in each cover type. The five cover types mapped in the study area were dry agricultural field, seasonally flooded agricultural field, ruderal field, dry pond (basins containing water for fewer than three months of the year), and pond (Figure 5). Three cover types outside the Bel Marin Keys parcel which were included in the Bel Marin Keys wildlife census were also evaluated (tidal marsh, mudflat, and lagoon). The 16 sites chosen for evaluation were of 3 to 5 acres in size (Figure 2). Five sites were selected for habitat evaluation in the dry agricultural field; two each in the seasonally flooded field, ruderal field, pond, and dry pond cover types; and one each in the tidal marsh, mudflat, and lagoon cover types.

Species known to use the various cover types from census results were chosen for the HEP. Each evaluation group included 4 - 6 species selected to represent a variety of feeding guilds (a group of species similar in terms of feeding mode and location in habitat strata). Species of high public interest or economic value were chosen when possible. For example, the evaluation species selected for the pond cover type were the pintail (herbivore); canvasback and western sandpiper (invertebrate carnivores); snowy egret (carnivore); and ring-billed gull (omnivore). Of these the pintail and canvasback are economically important game species. For the unflooded agricultural field cover type, the species evaluatated were the white-tailed kite, ring-necked pheasant, horned lark, song sparrow, gray fox, and black-tailed jackrabbit. The white-tailed kite is carnivorous, the ring-necked pheasant and black-tailed jackrabbit are herbivorous, and the song sparrow, horned lark, and gray fox omnivorous. The white-tailed kite is of State agency and public interest because its numbers declined sharply a few decades ago (but are recently beginning to recover), and the ring-necked pheasant is an economically important game species.

Three observers (D. Ellis, H. Hill, and D. Renshaw) conducted the HEP on November 19, 1980. No HSI models are currently available from the U.S. Fish and Wildlife Service for estuarine habitats, and time constraints precluded the development of formal models for the study. However, bird and mammal use had been well-documented by the eleven month wildlife census in that weekly surveys were made of census sites representing all the cover types evaluated in the HEP.

Prior to the HEP survey, a brief description of the optimal habitat conditions for each species was prepared. Observers used this information along with the census results to determine the Suitability Index (relative habitat value) of the cover types for each evaluation species during the field survey. Suitability Indices (SI's) were aggregated to obtain a mean HSI for all the available habitat in the study area used by each evaluation species. These HSI's are at least as valid as those generated from HSI models in areas where little or nothing is known of wildlife use.

Existing Habitat Value

The present (baseline) habitat value of the study area is shown for the eleven evaluation species in Table 3. The total HU's in the study area were calculated for each species, and the percentage of the HU's occuring in two areas of the parcel determined (Areas A and B are shown in Figure 2). The great majority of the HU's for both the water-associated species (98 - 100%) and terrestrial species (68 - 76%) are contained in Area A, which makes up approximately 70% (1,150 acres) of the total parcel. Within Area A, Subarea A1 (460 acres) contains all the available habitat for the water-associated species, and thus 98 - 100% of the HU's for these species within the whole parcel.

Since Subarea A1 contains the greatest quantity and quality of habitat for water-associated species, it is the most sensitive area

TABLE 3

BASELINE VALUE OF STUDY AREA TO ELEVEN EVALUATION SPECIES

EVALUATION SPECIES	COVER TYPES USED BY EVALUATION SPECIES[1]					ACRES OF AVAILABLE HABITAT	HSI	BASELINE HU's WITHIN STUDY AREA	% OF TOTAL HU's IN AREAS[3]	
	Flooded Field (360 acres)	Pond (30 acres)	Dry Pond (20 acres)	Dry Field[2] (1,500 acres)	Ruderal (50 acres)				A (1,150 acres)	B (450 acres)
Water-associated Species										
Pintail	X	X	X			410	.68	279	99%	1%
Canvasback		X				30	.56	16.8	100%	--
Snowy Egret	X	X	X			410	.59	242	98%	2%
Western Sandpiper	X	X	X			410	.71	292	99%	1%
Ring-billed Gull	X	X	X			410	.77	316	98%	2%
Terrestrial Species										
White-tailed Kite			X	X	X	1,570	.75	1,180	73%	27%
Ring-necked Pheasant			X	X	X	1,570	.58	911	68%	32%
Horned Lark			X	X	X	1,570	.72	1,130	76%	24%
Song Sparrow			X	X	X	1,570	.37	581	69%	31%
Black-tailed Jackrabbit			X	X	X	1,570	.61	958	70%	30%
Gray Fox			X	X	X	1,570	.57	895	69%	31%

[1] Does not include the 10 acres of residential area on the parcel.

[2] Includes flooded field acreage since that cover type is flooded during winter only.

[3] See Figure 2 for delineation of Areas A and B.

within the study area and will be of greatest concern to the state and federal agencies responsible for wetlands protection. If possible, most of the development should be confined to Area B, which is presently of little value to water-associated species and contains approximately 25 - 30% of the terrestrial species' total HU's.

III. MITIGATION THROUGH HABITAT RESTORATION AND ENHANCEMENT

Restoration Options

Historically about 313 square miles of intertidal marsh made up much of the shoreline of San Francisco Bay (Jones and Stokes, 1979). In the last 100 years 80% of these wetlands have been diked or filled. However, recently some areas have been partially or fully restored to their former wetland status. Different habitat types have been created, using fresh or salt water from various sources.

Tidal salt marsh can be restored in areas close to the Bay or near tributary streams subject to tidal action. Dikes were recently breached on a site near Hayward, restoring tidal action to 200 acres of former salt evaporation ponds (Madrone Associates, 1979). Eventually, some areas within the restoration project will be planted with salt marsh vegetation. In some areas around the Bay, salt marsh has developed naturally on recently deposited sediments. For example, De Silva pond (near Strawberry, Mill Valley) has filled almost completely with sediment in the last few decades, and cordgrass and pickleweed are now well-established.

Wetlands have been created by discharging treated wastewater into shallow basins; such wetlands function as a natural biological filter for the effluent, in addition to providing important freshwater habitat. A small freshwater marsh is maintained with wastewater discharged by the Mountain View Sanitary District secondary treatment plant in Contra Costa County. A similar plan to form a larger marsh for detention of tertiary effluent is being developed for the Fairfield-Suisun Sanitary District.

Similarly, wetlands may serve as a filter for urban or industrial runoff. An Association of Bay Area Governments (ABAG) study (1980) showed that the Palo Alto Flood Basin effectively removes suspended sediments and associated pollutants from stormwater runoff. The

results prompted ABAG to propose the development of a regional wetland restoration plan including the initial creation of a marsh demonstration site in the Coyote Hills area.

Shallow borrow basins which fill with water are valuable habitat for many water birds and their invertebrate prey. The small ponds on the Bel Marin Keys study parcel were formed when fill material was removed for initial site development. Agricultural fields that flood following winter rains are important feeding habitat for wintering waterfowl and shorebirds. Artificial lagoons primarily constructed for boat use (such as at Bel Marin Keys) are of less habitat value, because usually they are steep-sided, devoid of shoreline vegetation, and too deep for most water birds to feed in.

Development and Restoration Plan

Habitat Loss

Home Savings and Loan has proposed to develop 706 acres of the 1,610-acre Bel Marin Keys parcel (Figure 6). (Portions of both Area A and Area B are included in the proposed development site--see Figure 2.) The development will include 187 residential acres surrounded by 494 acres of lagoon and a 25-acre marina. Approximately 482 acres of existing terrestrial habitat* and 224 acres of existing wetlands habitat (174 acres of seasonally flooded field, 30 acres of pond, and 20 acres of dry pond) will be lost to development. The portion of the parcel remaining undeveloped will be partially restored to wetlands and otherwise enhanced to compensate for the habitat losses.

Wetlands Habitat Compensation

A similar acreage of wetlands of equal or greater habitat value than the wetland acres proposed for development must be restored to prevent net loss of wetlands habitat on the parcel. Home Savings and Loan plans to restore 236 acres of wetlands. An HEP compensation

*Habitat which is currently maintained and farmed as dry land.

analysis was conducted to show quantitatively how development impacts will be offset by habitat restoration. To determine the amount of compensation the habitat restoration plan will provide (in terms of HU's), the changes in HU's from the baseline value were calculated and compared for two future conditions: development with habitat restoration and development without habitat restoration (see Table 4).

If the site is developed and no wetlands habitat is restored, the remaining 186 acres of flooded field and the newly created 494 acre lagoon will be used by the first five "baseline" target species listed in Table 4. Thus even with no habitat restoration, there will be a net gain of 103 HU's for these species. However, this gain is due entirely to the habitat value of the large developed lagoon to only two of the target species; the canvasback (a diving duck) and the ring-billed gull. Diving ducks, gulls, and other species that commonly feed in deeper water or scavenge from humans will make some use of the lagoon. Deepwater lagoons are of marginal habitat value to other water-related species.

The propored restoration of a total of 236 acres to wetlands (186 acres to salt marsh or seasonally flooded field and 50 acres to freshwater pond) will provide a net gain of from 270 to 311 HU's for the five baseline species, depending on how much of the seasonally flooded field is converted to salt marsh (which in turn will depend on the amount of dredge spoils material available for disposal, since the salt marsh will be established on dredge materials; see below). The projected maximum marsh restoration shows a lower net gain in HU's for the five species than the minimum marsh restoration because the estimated HSI's for the salt marsh cover type were higher than the flooded field HSI's for only one of the five baseline species (snowy egret). However, the restored salt marsh will provide important habitat for two endangered species not presently found on the parcel; the California clapper rail and the salt marsh harvest mouse (DFG, 1978; USFWS, 1979a).

TABLE 4

CHANGE IN HU'S FROM WETLANDS HABITAT BASELINE VALUE FOR DEVELOPMENT WITH AND WITHOUT HABITAT RESTORATION

	COVER TYPES USED BY TARGET SPECIES								
	Without Habitat Restoration			With Habitat Restoration			Change in HU's[1] from Baseline Value	
TARGET SPECIES	Seasonally Flooded Field (186 acres)	Lagoon (494 acres)	Change in HU's from Baseline Value	Seasonally Flooded Field/Salt Marsh (186 acres)	Freshwater Pond (50 acres)	Lagoon (494 acres)	Minimum Salt Marsh Restoration	Maximum Salt Marsh Restoration
Pintail	X	X	-95	X	X	X	-68	-81
Canvasback		X	+193		X	X	+263	+263
Snowy Egret	X	X	-36	X	X	X	+9	+14
Western Sandpiper	X	X	-117	X	X	X	-88	-102
Ring-billed Gull	X	X	+158	X	X	X	+195	+176
		Net Change from Baseline:	+103			Net Change from Baseline:	+311	+270
*California Clapper Rail				X			+16	+64
*Salt Marsh Harvest Mouse				X			+18	+70
						Net Restoration HU's[2]:	242	301

1/Average Annual HU's (see U.S.F.W.S., 1980) calculated for a 50 year analysis period for projected minimum and maximum dredge spoils disposal regimes (see Table 5). Salt marsh vegetation will be established on the spoils which will be deposited every 7 years.

2/HU's provided to seven target species by restored salt marsh and freshwater pond only (obtained by subtracting the 103 HU's supplied by lagoon and undeveloped flooded field from the total habitat restoration HU's).

*HU's for these species determined from evaluation of salt marsh habitat adjacent to the Bel Marin Keys parcel

The HEP compensation analysis shows that the 236 acre wetlands restoration plan adequately offsets the loss of 224 acres of wetlands habitat. Even without the 103 HU's furnished by the developed lagoon and the flooded field which would remain after development, the restored salt marsh and freshwater ponds would still provide a net total of 242 to 301 HU's for all seven target species (Table 4).

The combination of salt and freshwater habitat types will provide a wide variety of vegetative forms and should attract a higher diversity of wildlife than the present freshwater habitat on the parcel. The previous wildlife census conducted on these habitat types documented their importance to wildlife. The tidal marsh site censused during the initial six months of the survey received the greatest use by the highest number of species, while the freshwater pond site was used by more individuals and species than the other three sites censused during the final five months of the survey. The flooded fields provided excellent winter feeding habitat for puddle ducks, shorebirds, and songbirds.

Salt marsh vegetation will be established on spoils dredged from Novato Creek and deposited sequentially on portions of the seasonally flooded field. It is projected that a minimum of 56,000 yds^3 to a maximum of 231,000 yds^3 of material will need to be dredged from the creek every seven years. The material will be deposited in diked-off cells ranging from 5.5 acres (minimum) to 22 acres (maximum) in size. The cells will be filled to an elevation of +1.0 to +1.5 M.S.L. Table 5 shows the projected acreages of the restoration area habitat types for three target years: year one (prior to any spoils disposal), year 30 (after the 4th disposal) and year 50 (after the 7th disposal). By year 50, from 38.5 to 154 acres of the seasonally flooded field will be converted to salt marsh. Figures 6 and 7 depict the restoration scenarios for years 30 and 50.

The first dredge spoils cells will be diked off on the bayward side of the flooded field. Later cells will be established adjacent to these

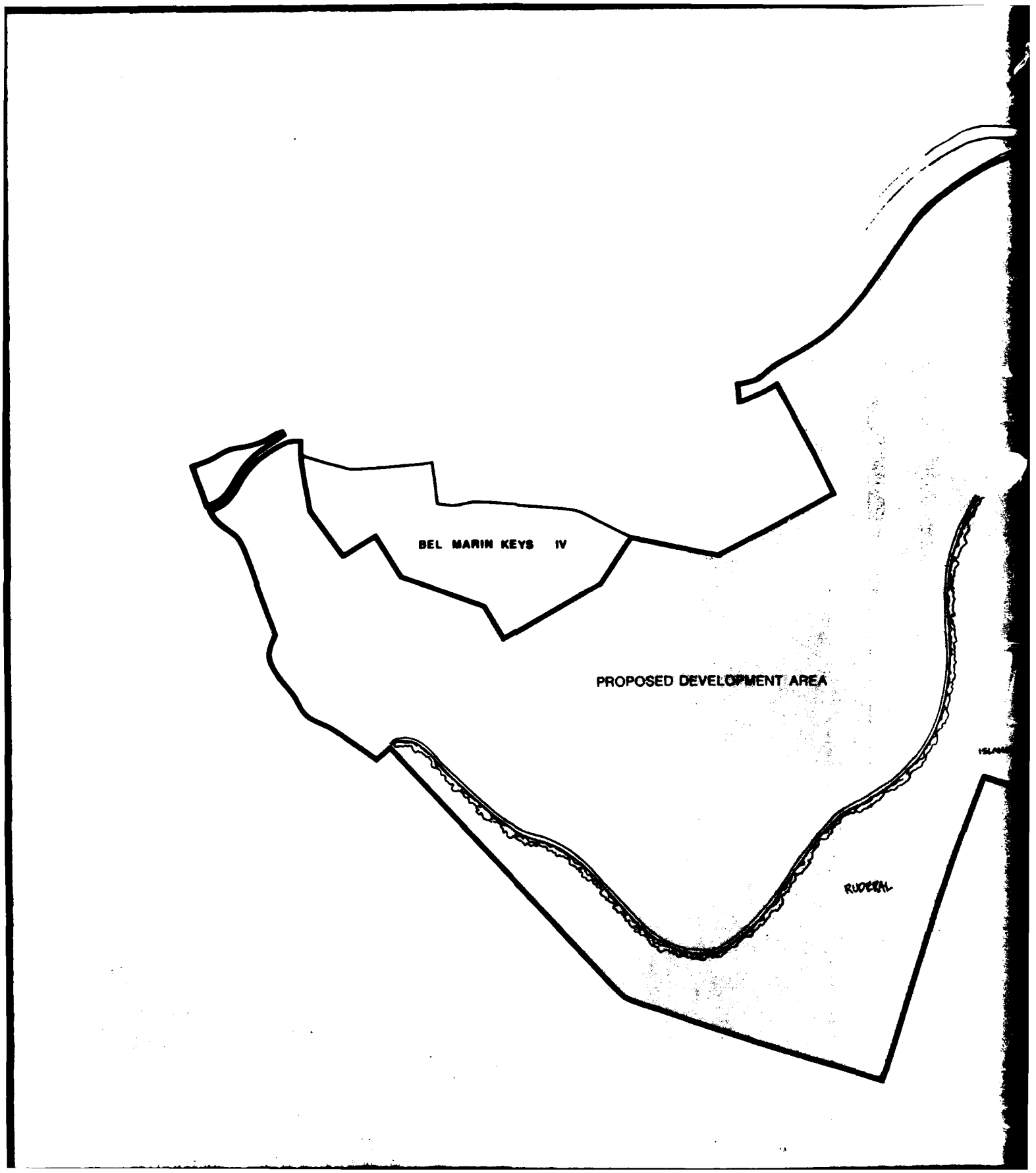
TABLE 5

ACREAGES OF RESTORED HABITAT TYPES AT THREE TARGET YEARS GIVEN MINIMUM AND MAXIMUM PROJECTED AMOUNTS OF DEPOSITED DREDGE SPOILS

	YEAR 1[1]		YEAR 30	YEAR 50
Seasonally Flooded Field[2]	186 a.	Min. Spoils	164 a.	148 a.
		Max. Spoils	98 a.	32 a.
Salt Marsh	0	Min. Spoils	22 a.	38 a.
		Max. Spoils	88 a.	154 a.

1/For Year 1 it is assumed that site development has occurred but dredge spoils disposal has not yet taken place.

2/Some portion of the field will be converted to salt marsh every seven years, following dredge spoils disposal. Salt marsh will be established on the deposited dredge materials.


BEL MARIN KEYS IV
PROPOSED DEVELOPMENT AREA
RUDERAL

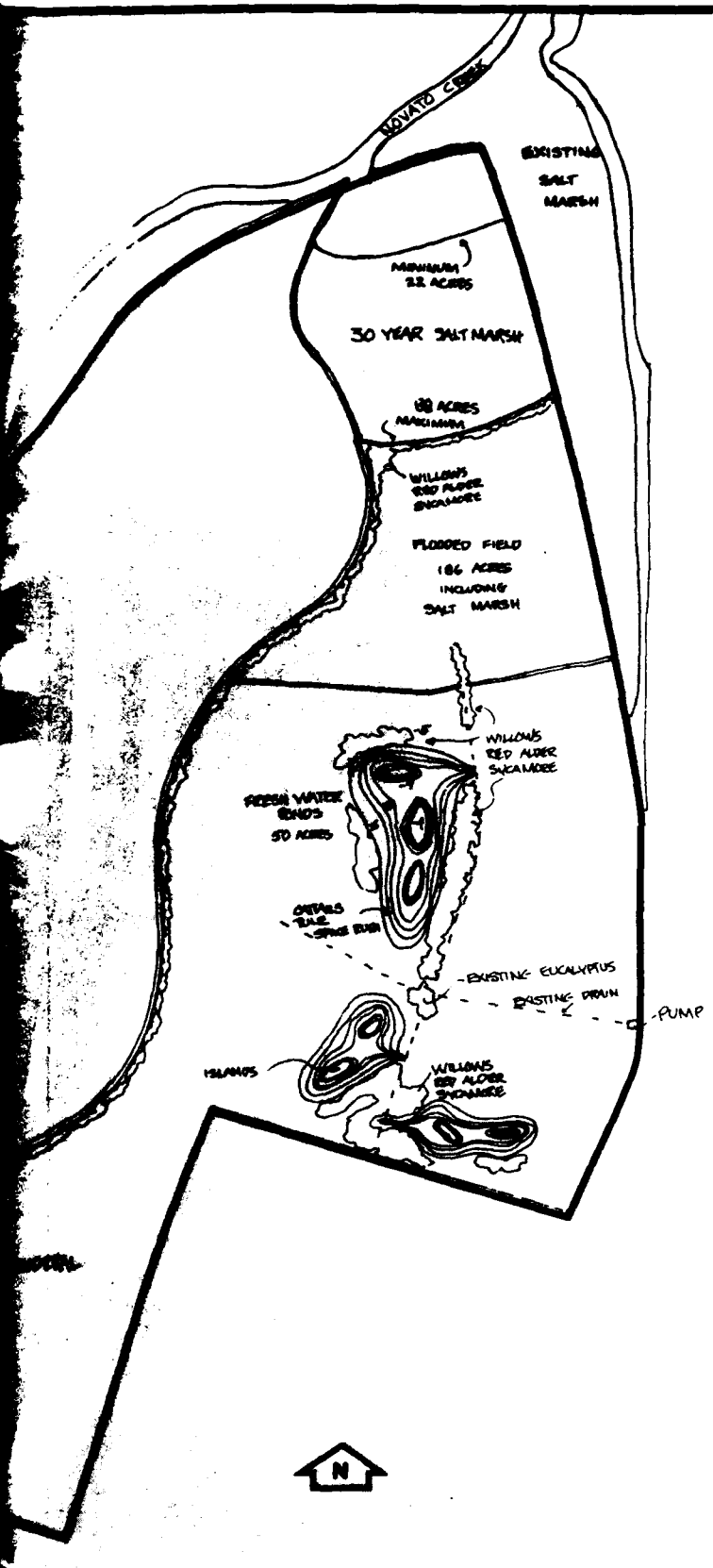


Illustration shows projected salt marsh acreages 30 years after initial dredge spoil disposal given minimum and maximum amount of spoils

BEL MARIN KEYS
STUDY AREA BOUNDARY

FIGURE 6

HABITAT RESTORATION AND ENHANCEMENT SCENARIO: 30 YEAR

0 1500 3000 feet

Prepared by: MADRONE ASSOCIATES

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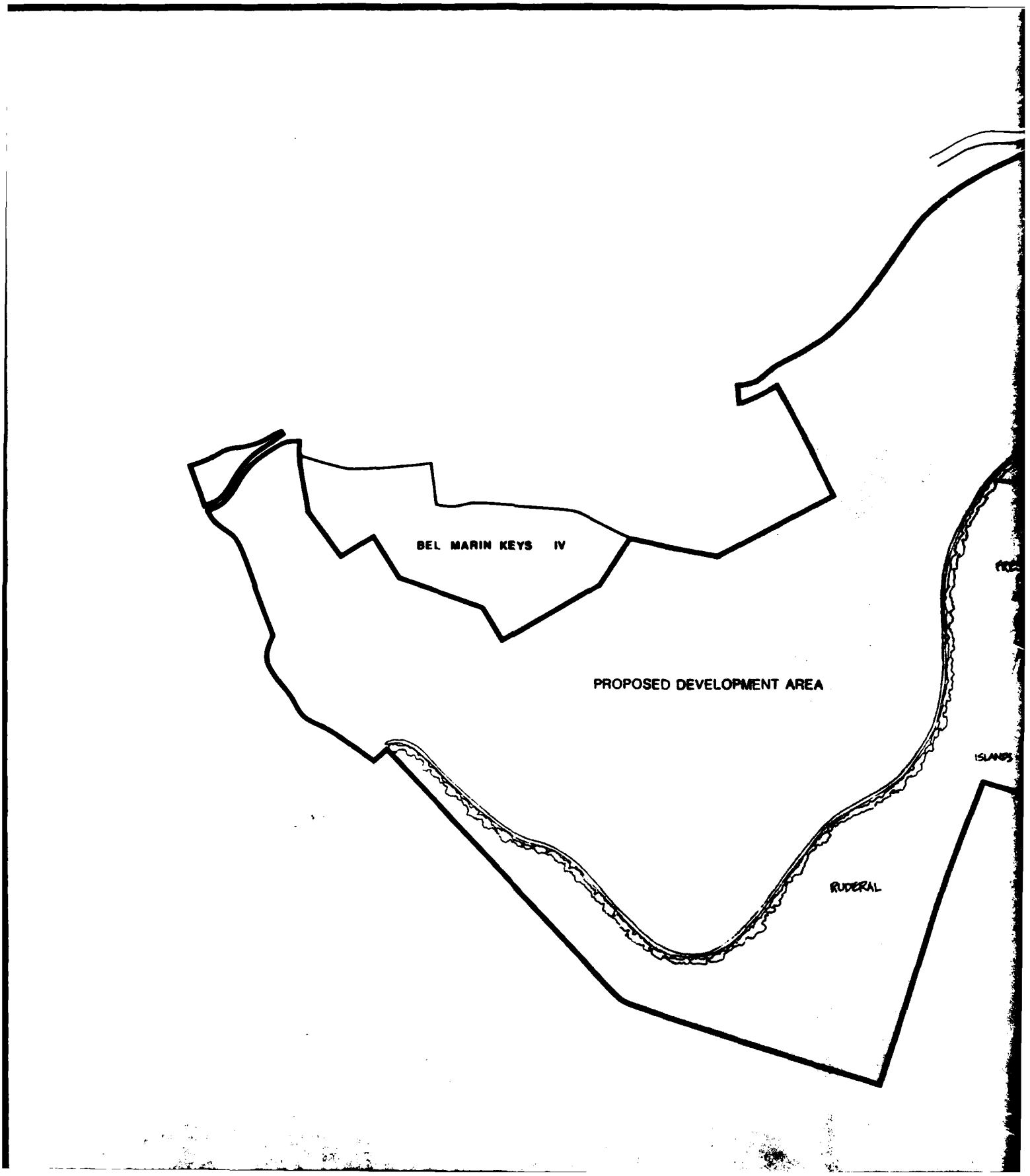
BEL MARIN KEYS IV
PROPOSED DEVELOPMENT AREA
ISLANDS
RUDERAL

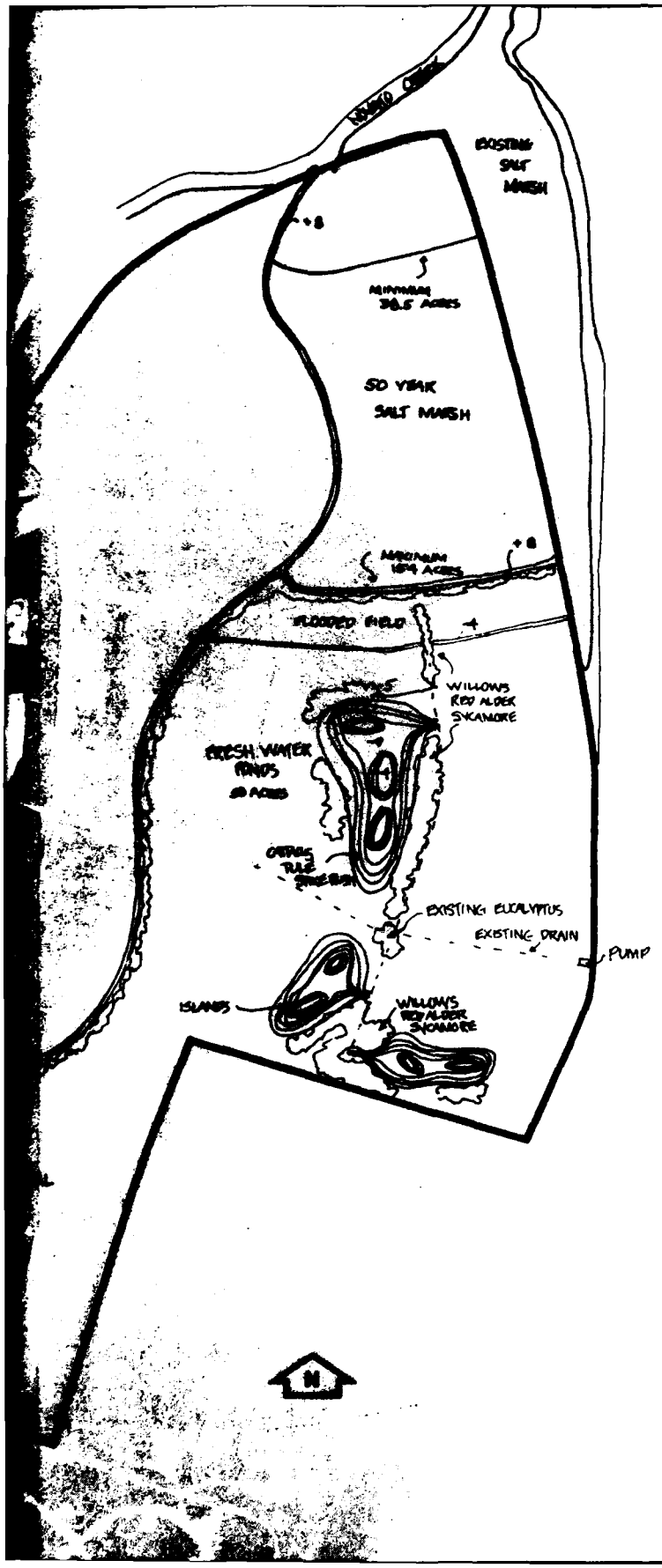

Illustration shows projected salt marsh acreages 50 years after initial dredge spoil disposal given minimum and maximum amount of spoils.

BEL MARIN KEYS
STUDY AREA BOUNDARY

FIGURE 7

HABITAT RESTORATION AND ENHANCEMENT SCENARIO: 50 YEAR

0 1500 3000 feet

Prepared by: MADRONE ASSOCIATES

initial cells producing a honeycomb-like cell network. Spoils will be allowed to dewater in the cell before it is opened to tidal action, when the bayward dike of the cell will be breached. More landward cells will receive tidal water through connections to the bayward cells. After a year of tidal action, cordgrass may volunteer or have to be seeded on the spoils. Siltation will eventually raise elevations to +4.0 to +5.0 feet M.S.L. (M.H.W.) when pickleweed will colonize the spoils.

The flooded field habitat not converted to salt marsh will be planted with marsh timothy; other ruderal species will volunteer. Three basins totalling 50 acres will be excavated in elevation sinks in the southeastern part of the parcel (Figure 6). These areas will quickly pond following winter rains and provide freshwater habitat. Tall emergent vegetation (cattails and hardstem bulrush) will readily appear around the shallow edges of the ponds without planting. Trees (such as willow, red alder, and sycamore) will be planted around the ponds to screen these sensitive areas from disturbance. The islands in the ponds also will provide isolated areas for wildlife and if planted with perennial grasses and shrubs (such as lana vetch and multiflora rose), puddle ducks are likely to nest here.

Terrestrial Habitat Enhancement

Terrestrial species will suffer large habitat losses if the proposed development and wetlands restoration plan is carried out. Approximately 482 acres of terrestrial habitat will be developed and at maximum, 204 acres may be converted to permanent wetlands (154 acres of salt marsh and 50 acres of freshwater pond by year 50; see Table 5).

Enhancement of the remaining terrestrial habitat will partially mitigate these losses. If fields are no longer cultivated, ruderal vegetation will quickly be established. The vegetatively diverse ruderal habitat is used by many terrestrial species for feeding, nesting, and cover (see Wildlife Census - Status Report). The six terrestrial evaluation species would gain a net total of 515 HU's if the remaining cultivated lands were allowed to become ruderal (Table 6). Rows of trees planted

along drainage ditches and dikes (Figure 6) will also enhance terrestrial habitat value by serving as wildlife access corridors and by providing nesting areas and hunting perches for songbirds and raptors.

TABLE 6

TOTAL HU's FOR TERRESTRIAL EVALUATION SPECIES
UNDER TWO MANAGEMENT ALTERNATIVES[1/]

EVALUATION SPECIES	COVER TYPE	
	Cultivated (Dry) Field	Ruderal
White-tailed Kite	693	610
Ring-necked Pheasant	555	739
Horned Lark	675	351
Song Sparrow	342	739
Black-tailed Jackrabbit	554	748
Gray Fox	527	674
TOTAL:	3,346	3,861

1/ HU's calculated for 924 acres of terrestrial habitat remaining following development and wetlands restoration.

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Persons Consulted

Cheney, Michael; Dredging Specialist, Oakland.

Ellis, Doug; Ornithologist, Kenwood.

Lange, Jim; President, Shiloh Resources Inc., Novato.

Oberkamper, Lee; Engineer, Oberkamper & Associates Civil Engineers, Inc., San Rafael.

Tieger, Joe; Biologist, U.S. Fish and Wildlife Service, Sacramento.

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APPENDIX A

PLANT AND BIRD SPECIES LISTS

PLANT SPECIES ON BEL MARIN KEYS CENSUS SITES

COMMON NAME	SCIENTIFIC NAME
Black Mustard	*Brassica nigra*
Wild Radish	*Raphanus sativa*
Sand Spurrey	*Spergularia* sp.
Curly Dock	*Rumex crispus*
Common Knotweed	*Polygonum aviculare*
Saltbush	*Atriplex* sp.
Pickleweed	*Salicornia virginica*
Bindweed	*Convolvulus arvensis*
Fiddleneck	*Amsinckia intermedia*
Bird's Foot Trefoil	*Lotus uliginosus*
Winter Vetch	*Vicia villosa*
Spring Vetch	*Vicia sativa*
Gum Plant	*Grindelia humilis*
Coyote Brush	*Baccharis pilularis* var. *consanguinea*
Mayweed	*Anthemis cotula*
Brass buttons	*Cotula coronopifolia*
Thistle	*Cirsium* sp.
Star Thistle	*Centaurea* sp.
Ox tongue	*Picris echioides*
Sow-thistle	*Sonchus oleraceus*
Bulrush	*Scirpus* sp.
Red Brome	*Bromus rubens*
Salt Grass	*Distichlis spicata*
Barley	*Hordeum stebbinsi*
Italian Rye Grass	*Lolium multiflorum*
Wild Oats	*Avena* sp.
Rabbbit's-foot Grass	*Polypogon monspeliensis*
Cordgrass	*Spartina foliosa*

BIRD SPECIES LIST FOR BEL MARIN KEYS CENSUS SITES

Species	Habitat Type*
Horned Grebe	W, P
Eared Grebe	W, P
Western Grebe	W, P
Pied-billed Grebe	W, P, D
Double-crested Cormorant	W, P
Great Blue Heron	M, N, O, F, D, P
Great Egret	M, N, O, F, D, P
Snowy Egret	M, N, O, F, D, P
Black-crowned Night Heron	M, P
White-fronted Goose	P, F
Snow Goose	P, F
Mallard	W, F, M, P, D, N, O
Gadwall	W, M, N
Pintail	W, F, P, D, N, O
Green-winged Teal	W, P, O
Cinnamon Teal	W, M, P, D, N, O
American Wigeon	W, F, M, P, D, N, O
Northern Shoveler	W, P, O
Canvasback	W, P, M, N
Redhead	W
Greater Scaup	W, M, P, N, O
Lesser Scaup	W, P, N, O
Common Goldeneye	W, P
Bufflehead	W, P

*Key to Habitat Types: A-Aerial, C-Dry Ponds, D-Drainage Ditches, F-Fields, H-Residential, L-Poles and Lines, M-Marsh, N-Mudflats, O-Wet Fields, P-Ponds, R-Ruderal Fields, T-Eucalyptus Trees, W-Water.

BIRD SPECIES LIST FOR
BEL MARIN KEYS CENSUS SITES (Cont'd)

Species	Habitat Type
Surf Scoter	W, N
Turkey Vulture	F, M, A, R, L
White-tailed Kite	F, M, A, R, L
Red-shouldered Hawk	A, F, T
Red-tailed Hawk	F, M, A, R, C, L
Marsh Hawk	F, M, A, D, R, C, L, N, D
Osprey	W, M, A, P
American Kestrel	F, R, H, C, L
American Coot	W, F, M, P, D, R, H, N, O
American Avocet	N, P
Killdeer	F, H, C, N, O, P
Black-bellied Plover	O, P
Marbled Godwit	N, O
Long-billed Curlew	F, N, O
Greater Yellowlegs	P
Lesser Yellowlegs	P
Willet	P, N, O
Northern Phalarope	P
Common Snipe	O, P
Long-billed Dowitcher	N, P
Dowitcher sp.	N
Western Sandpiper	N, O, P
Least Sandpiper	N, P
Dunlin	N, O, P
Glaucous-winged Gull	W, N
Western Gull	W, N
Herring Gull	W, N, O
Thayer's Gull	W, N, O
California Gull	W, N
Ring-billed Gull	W, N, O, P

BIRD SPECIES LIST FOR
BEL MARIN KEYS CENSUS SITES (Cont'd)

Species	Habitat Type
Mew Gull	O
Bonaparte's Gull	P, W
Forster's Tern	W, A, P
Caspian Tern	W, N, P
Mourning Dove	F, R, H, C, L
Barn Owl	A, T
Great Horned Owl	F, T
Short-eared Owl	F, M
Vaux's Swift	A (F, W, P, R)
White-throated Swift	A (M, F)
Anna's Hummingbird	F, A, R, H, C, L
Common Flicker	R
Western Kingbird	F
Black Phoebe	W, M, P, D, R, H, C, L
Say's Phoebe	F, C
Horned Lark	F
Violet-green Swallow	A (H, D)
Rough-winged Swallow	F
Barn Swallow	A (F, M, W, P, D, R, C, O), H, L
Cliff Swallow	A (F, M, W, P, D, R, C, O), H, L
Purple Martin	A (F, M)
Common Raven	F
Common Crow	F, L
Long-billed Marsh Wren	M, R
Mockingbird	H, R, L
Ruby-crowned Kinglet	R
Water Pipit	F, M, N, O
Loggerhead Shrike	F, M, R, H, C, L
Orange-crowned Warbler	R
Western Meadowlark	F, R, H, C, L, O

BIRD SPECIES LIST FOR
BEL MARIN KEYS CENSUS SITES (Cont'd)

Species	Habitat Type
Red-winged Blackbird	F, M, D, R, H, C, L, O
Tricolored Blackbird	F, O
Brewer's Blackbird	F, R, H, C, L, O
House Finch	F, R, H, L
American Goldfinch	F, R, H, L
Savannah Sparrow	F, M, R
White-crowned Sparrow	F, R, H, L
Golden-crowned Sparrow	F, R, H, L
Lincoln's Sparrow	F, R
Song Sparrow	F, M, R, H, L
Rock Dove	F, R, H, C, L, O
Ring-necked Pheasant	F, R, C
European Starling	F, R, H, L, O
House Sparrow	R, H, L

BIRD SPECIES SEEN IN IMMEDIATE AREA OF CENSUS SITES

Species	Habitat Type*
American Bittern	D
Canada Goose	F
Greater Scaup/Ring-necked Duck hybrid (possible)	P
Hooded Merganser	P
Red-breasted Merganser	W, P
Cooper's Hawk	H
Peregrine Falcon[1, 2]	F, O, A
California Quail	H
Clapper Rail[1, 3]	M
Burrowing Owl	R
Allen's Hummingbird	H, L
Belted Kingfisher	W, A, P, D, L
Nuttall's Woodpecker	H
Western Flycatcher	H
Tree Swallow	A (D, F)
Scrub Jay	H
Plain Titmouse	H
Bushtit	H
Bewick's Wren	H
American Robin	H, L

*Key to Habitat Types: A-Aerial, C-Dry Ponds, D-Drainage Ditches, F-Fields, H-Residential, L-Poles and Lines, M-Marsh, N-Mudflats, O-Wet Fields, P-Ponds, R-Ruderal Fields, T-Eucalyptus Trees, W-Water.

1/ Listed as an endangered species by the California Department of Fish and Game and the U.S. Fish and Wildlife Service.

2/ A Peregrine Falcon was observed flying over a field adjacent to Census Site 4.

3/ Clapper Rail calls were heard in salt marsh bordering Novato Creek.

BIRD SPECIES SEEN IN IMMEDIATE AREA OF CENSUS SITES (Cont'd)

Species	Habitat Type
Western Bluebird	H, L
Cedar Waxwing	H
Yellow-rumped Warbler	H
Northern Oriole	H
Brown-headed Cowbird	H, F
Western Tanager	H
Lesser Goldfinch	F, R, H, L
Rufous-sided Towhee	H
Dark-eyed Junco	H

ADDENDUM TO THE

HABITAT ANALYSIS AND MITIGATION PLAN

FOR THE PROPOSED BEL MARIN KEYS RESIDENTIAL DEVELOPMENT:

REVISED RESTORATION PLAN

Prepared for:

HOME SAVINGS AND LOAN

September 10, 1981

Prepared by:

MADRONE ASSOCIATES
Environmental Consultants
23-B Pamaron Way
Novato, California 94947

Job No. 173

Revised Development and Restoration Plan

Habitat Loss

Home Savings and Loan has proposed to develop 735 acres of the 1,610-acre Bel Marin Keys parcel (Figure 6). (Portions of both Area A and Area B are included in the proposed development site--see Figure 2.) The development will include 189 residential acres surrounded by 546 acres of lagoon which will include a marina. Approximately 511 acres of existing terrestrial habitat* and 224 acres of existing wetlands habitat (174 acres of seasonally flooded field, 30 acres of pond, and 20 acres of dry pond) will be lost to development. The majority of the parcel remaining undeveloped will be restored to salt marsh and otherwise enhanced to compensate for the habitat losses (Figure 6).

Wetlands Restoration Plan

Home Savings and Loan plans to restore a total of 825 acres of the undeveloped portion of the site to wetlands. Therefore every acre of wetlands lost to development will be replaced by approximately 3.5 acres of restored wetlands. Most of the area will be restored to salt marsh. Some of the marsh will be created on deposited dredge spoils, but the majority of it will be established following natural siltation once the site is opened to tidal action.

Salt marsh will be established on spoils dredged from Novato Creek and deposited sequentially on 154 acres of seasonally flooded field. It is projected that a minimum of 56,000 yds ^{3} to a maximum of 231,000 yds ^{3} of material will need to be dredged from the creek every seven years. The material will be deposited in diked-off cells ranging from 5.5 acres (minimum) to 22 acres (maximum) in size. The

*Habitat which is currently maintained and farmed as dry land.

BIRD SPECIES SEEN IN IMMEDIATE AREA OF CENSUS SITES

Species	Habitat Type*
American Bittern	D
Canada Goose	F
Greater Scaup/Ring-necked Duck hybrid (possible)	P
Hooded Merganser	P
Red-breasted Merganser	W, P
Cooper's Hawk	H
Peregrine Falcon[1, 2]	F, O, A
California Quail	H
Clapper Rail[1, 3]	M
Burrowing Owl	R
Allen's Hummingbird	H, L
Belted Kingfisher	W, A, P, D, L
Nuttall's Woodpecker	H
Western Flycatcher	H
Tree Swallow	A (D, F)
Scrub Jay	H
Plain Titmouse	H
Bushtit	H
Bewick's Wren	H
American Robin	H, L

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*Key to Habitat Types: A-Aerial, C-Dry Ponds, D-Drainage Ditches, F-Fields, H-Residential, L-Poles and Lines, M-Marsh, N-Mudflats, O-Wet Fields, P-Ponds, R-Ruderal Fields, T-Eucalyptus Trees, W-Water.

1/ Listed as an endangered species by the California Department of Fish and Game and the U.S. Fish and Wildlife Service.

2/ A Peregrine Falcon was observed flying over a field adjacent to Census Site 4.

3/ Clapper Rail calls were heard in salt marsh bordering Novato Creek.

cells will be filled to an elevation of +1.0 to +1.5 Mean Sea Level (M.S.L.) Table 4 shows the projected acreages of the restoration area habitat types for three target years: year seven (after one spoils deposit), year 30 (after the 4th deposit) and year 50 (after the 7th deposit). By year 50, from 38.5 to 154 acres of the seasonally flooded field will be converted to salt marsh (Figures 6 and 7 depict the restoration scenarios for years 30 and 50).

The first dredge spoils cells will be diked off on the bayward side of the flooded field. Later cells will be established adjacent to these initial cells producing a honeycomb-like cell network. Spoils will be allowed to dewater in the cell before it is opened to tidal action, when the bayward dike of the cell will be breached. More landward cells will receive tidal water through connections to the bayward cells. After a year of tidal action, cordgrass may volunteer or have to be seeded on the spoils. Siltation will eventually raise elevations to +4.0 to +5.0 feet M.S.L., when pickleweed will colonize the spoils.

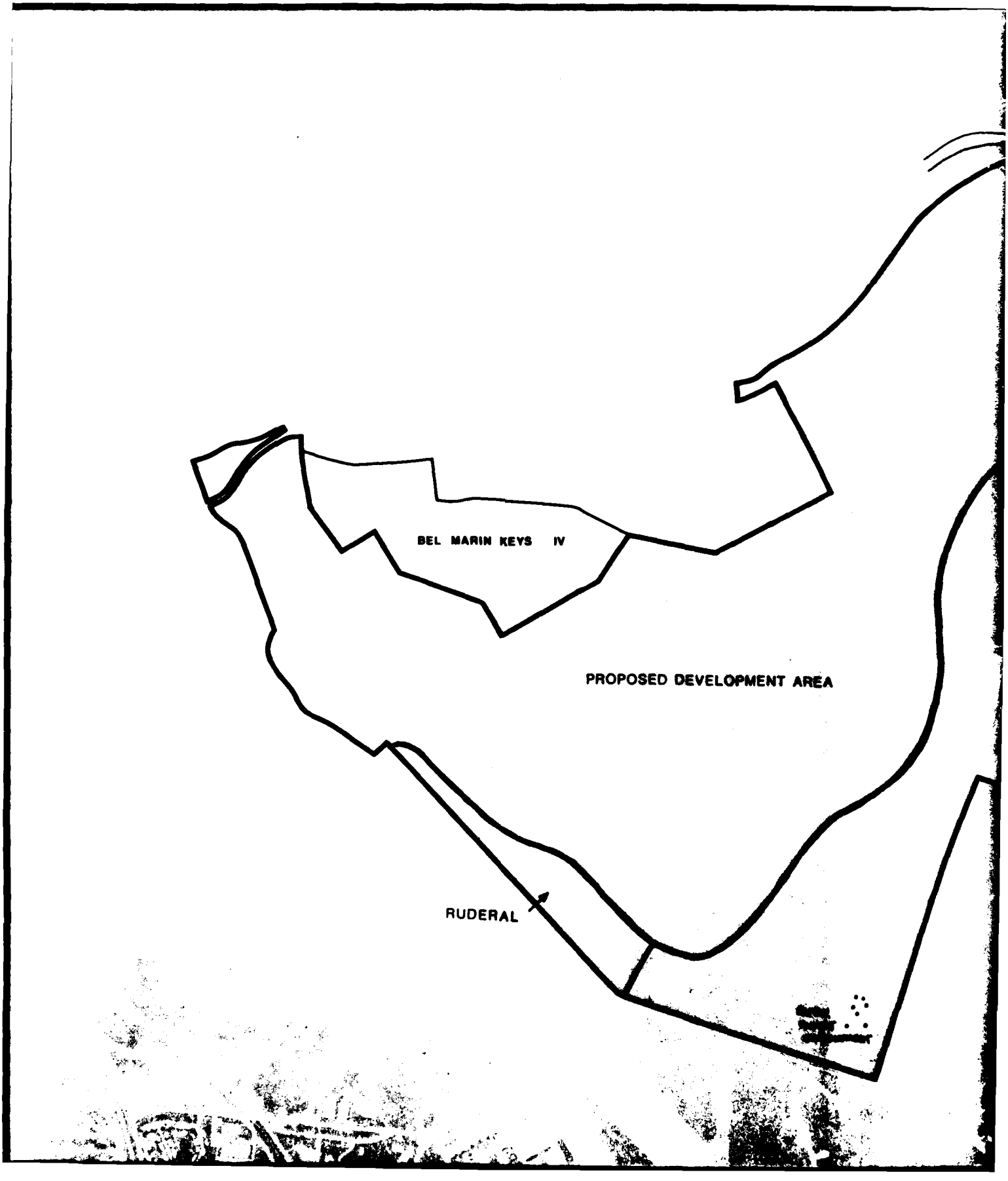
An additional 671 acres of marsh will be created by breaching a bayward dike to flood the area (Figure 6). Detailed hydrological studies will be necessary to determine the exact size and location of the breach. The embayment will eventually silt in, and salt marsh vegetation will colonize. The present elevation of much of the proposed restoration area ranges from -4.0 to -5.0 M.S.L. Once it is opened to tidal action, the siltation rate should be similar to that documented for the formerly tidal Bel Marin Keys Lagoon A (1,114 yds ^{3}/acre; Cheney and Krone 1977). Consequently, the restoration site should reach an elevation of +1.0 to +2.5 feet M.S.L. in approximately 10 years, allowing cordgrass to establish. After 20 years, much of the area should be high enough to support pickleweed.

TABLE 4

ACREAGES OF SALT MARSH CREATED ON DREDGE SPOIL DEPOSITS PROJECTED FOR THREE TARGET YEARS[1/]

	(Initial Deposit) Year 7	Year 30	Year 50
Minimum Spoils Deposit	5.5 a.	22 a.	38 a.
Maximum Spoils Deposit	22 a.	88 a.	154 a.

1/ Salt marsh will be established on dredge spoils deposited approximately every seven years over a 50 year period.


BEL MARIN KEYS IV
PROPOSED DEVELOPMENT AREA
RUDERAL

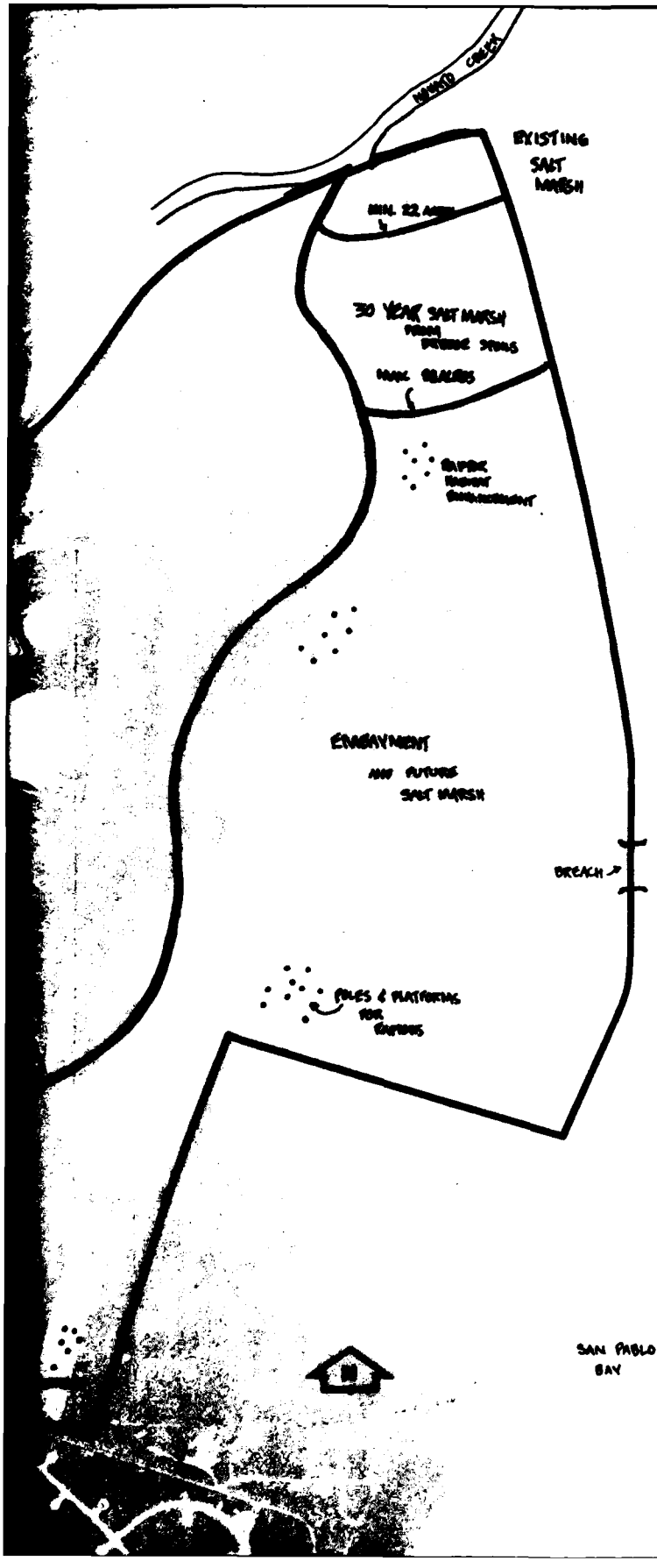


Illustration shows projected salt marsh acreages 30 years after initial dredge spoil disposal given minimum and maximum amount of spoils.

BEL MARIN KEYS
STUDY AREA BOUNDARY

FIGURE 6

HABITAT RESTORATION
AND ENHANCEMENT
SCENARIO: 30 YEAR

0 1500 3000 feet

Prepared by: MADRONE ASSOCIATES


BEL MARIN KEYS IV
PROPOSED DEVELOPMENT AREA
RUDERAL

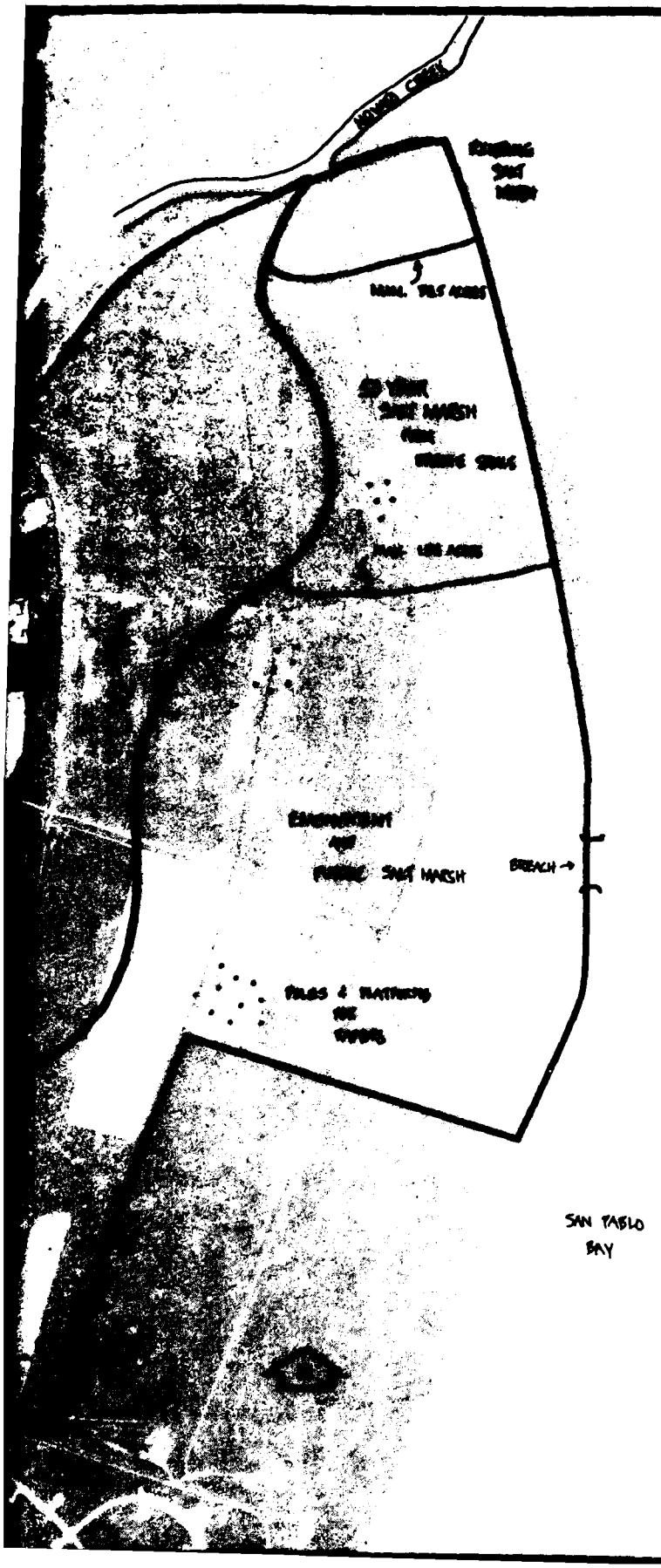


Illustration shows projected salt marsh acreages 50 years after initial dredge spoil disposal given minimum and maximum amount of spoils.

BEL MARIN KEYS
STUDY AREA BOUNDARY

FIGURE 7

HABITAT RESTORATION AND ENHANCEMENT SCENARIO: 50 YEAR

0 1500 3000 feet

Prepared by: MADRONE ASSOCIATES

Habitat Value of Restored Wetlands

A Habitat Evaluation Procedure Analysis (U.S. Fish and Wildlife Services, 1980) was conducted to show quantitatively how development impacts will ofset habitat restoration. To determine the amount of compensation the habitat restoration plan will provide (in terms of Habitat Units or HU's), the changes in HU's from the baseline value were calculated and compared for two future conditions: development with habitat restoration and development without habitat restoration (see Table 5). The changes in HU's were estimated for each of the wetlands evaluation species and two additional species expected to use the restored habitat (California clapper rail and salt marsh harvest mouse).

If the site is developed and no wetlands habitat is restored, the remaining 186 acres of flooded field and the newly created 546-acre lagoon will be used by the first five evaluation species listed in Table 5. Even with no habitat restoration, two of the evaluation species (the canvasback and ring-billed gull) will gain HU's because they will make some use of the large, developed lagoon. Diving ducks, gulls, and other species that commonly feed in deeper water or scavenge from humans may also use the lagoon, but it will be of marginal habitat value to most water-related species. The pintail, snowy egret, and western sandpiper all will lose HU's if no habitat is restored.

The proposed restoration of a total of 825 acres to salt marsh or seasonally flooded field will provide large gains in HU's for seven wetlands species. The projected maximum marsh restoration will provide a somewhat smaller gain in HU's for some of the evaluation species than the minimum marsh restoration because the estimated HSI's for the salt marsh cover type were higher than the flooded field HSI's for only the snowy egret. The restored salt marsh will provide a significant amount of habitat for two endangered species that are largely restricted to this habitat type; the California clapper rail and the salt marsh harvest mouse (Department of Fish and Game, 1978; U.S. Fish and Wildlife Service, 1979a).

TABLE 5

CHANGES IN HU'S FROM BASELINE VALUE FOR WETLANDS EVALUATION SPECIES
FOR PROJECT DEVELOPMENT WITH AND WITHOUT SALT MARSH RESTORATION

	COVER TYPES USED BY WETLAND SPECIES							
	Without Habitat Restoration			With Habitat Restoration			Total HU's[1/] (Change in HU's from Baseline Value)	
SPECIES	Seasonally Flooded Field (186 acres)	Lagoon (546 acres)	Total HU's (Change in HU's from Baseline Value)	Seasonally Flooded Field/Salt Marsh (154 acres)	Embayment/ Salt Marsh (671 acres)	Lagoon (546 acres)	Minimum Salt Marsh Restoration	Maximum Salt Marsh Restoration
Pintail	X	X	190 (-89)	X	X	X	547 (+268)	537 (+258)
Canvasback		X	229 (+212)		X	X	323 (+306)	323 (+306)
Snowy Egret	X	X	220 (-22)	X	X	X	731 (+489)	737 (+495)
Western Sandpiper	X	X	176 (-110)	X	X	X	652 (+360)	643 (+351)
Ring-billed Gull	X	X	512 (+196)	X	X	X	899 (+583)	893 (+577)
*California Clapper Rail				X	X		413 (+413)	464 (+464)
*Salt Marsh Harvest Mouse				X	X		449 (+449)	505 (+505)

1/ Average Annual HU's (see U S.F.W.S., 1980) calculated for a 50 year analysis period, based on the assumptions that some of the flooded field will be converted to salt marsh every 7 years, and that the embayment will silt in to support significant marsh vegetation by year 20 (see text).

*HSI's for these species determined from evaluation of salt marsh habitat adjacent to the Bel Marin Keys parcel.

Terrestrial Habitat Losses

Terrestrial species will suffer large habitat losses if the proposed development and wetlands restoration plan is carried out (Table 6). Approximately 511 acres of terrestrial habitat will be developed and at maximum, 825 acres may be converted to salt marsh.

All of the terrestrial evaluation species except for the song sparrow will be disadvantaged if the proposed salt marsh is created. These five species (white-tailed kite, ring-necked pheasant, horned lark, black-tailed jackrabbit, and gray fox) will lose fewer HU's if the existing terrestrial habitat is maintained and no wetlands are restored. The song sparrow will lose considerably fewer habitat units than the other species under the marsh restoration plan, since it commonly nests in this habitat (many nesting song sparrows were observed in the existing salt marsh adjacent to the parcel during the bird census). The white-tailed kite, gray fox, and other avian and mammalian predators might occasionally hunt the marsh but are expected to use the terrestrial cover types more heavily. Tall poles will be erected in various locations of the marsh to attract raptors (birds of prey) to the area, that will use the poles as hunting perches (see Figure 6).

TABLE 6

CHANGES IN HU'S FROM BASELINE VALUE FOR TERRESTRIAL EVALUATION
SPECIES FOR PROJECT DEVELOPMENT WITH AND WITHOUT SALT MARSH RESTORATION

	COVER TYPES USED BY TERRESTRIAL SPECIES							
	Without Habitat Restoration			With Habitat Restoration			Total HU's[1/] (Change in HU's from Baseline Value)	
SPECIES	Dry Field (825 acres)	Ruderal[2/] 50 acres)	Total HU's (Change in HU's from Baseline Value)	Field/Salt Marsh (154 acres)	Salt Marsh (671 acres)	Ruderal (50 acres)	Minimum Salt Marsh Restoration	Maximum Salt Marsh Restoration
White-tailed Kite	X	X	619 (-561)	X	X	X	128 (-1052)	82 (-1098)
Ring-necked Pheasant	X	X	459 (-452)	X		X	105 (-806)	73 (-838)
Horned Lark	X	X	679 (-451)	X		X	126 (-1004)	75 (-1055)
Song Sparrow	X	X	257 (-324)	X	X	X	498 (-83)	555 (-26)
Black-tailed Jackrabbit	X	X	447 (-431)	X		X	118 (-840)	81 (-877)
Gray Fox	X	X	474 (-421)	X	X	X	107 (-788)	75 (-820)

1/ Average Annual HU's (see U.S.F.W.S., 1980) calculated for a 50 year analysis period, based on the assumption that some of the field will be converted to salt marsh every 7 years.

2/ Will be removed from cultivation and reserved as a possible future site for dewatering dredge spoils.

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APPENDIX VI - GEOLOGY

1. "Preliminary Geotechnical Reconnaissance Bel Marin Keys Unit 5" by R.C. Harlan and Associates, April 15, 1981.

PRELIMINARY GEOTECHNICAL RECONNAISSANCE

BEL MARIN KEYS UNIT V

MARIN COUNTY, CALIFORNIA

PREPARED FOR

HOME SAVINGS AND LOAN ASSOCIATION

3731 WILSHIRE BOULEVARD
LOS ANGELES, CALIFORNIA 90010

PREPARED BY

RICHARD G. TAIT
CIVIL ENGINEER 15303

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PROJECT NO. 322.5

MAY 28, 1981

I. INTRODUCTION

This report presents the results of our preliminary geotechnical reconnaissance for the planned Bel Marin Keys (BMK) Unit V development. As shown on Figure 1, the property is contiguous to existing Bel Marin Keys Units I - III and to Bel Marin Keys IV, which is now under construction.

As depicted on the drawing entitled "Bel Marin Keys Preliminary Grading Plan", prepared by the Spink Corporation, which we received on 4/2/81, the planned development will be generally similar to other Bel Marin Keys Units. BMK V will include a marina, some multiple-residential and commercial structures, and a lock. The planned grading concept for Unit V will is similar to that used on adjacent units, i.e. peninsulas will be constructed using on-site soil, the borrow areas used for fill will then be flooded and become lagoons. About one-half of the 1600-acre property will be developed, the remainder of the parcel will be restored as marsh for wildlife mitigation.

The purpose of this study was to identify geotechnical conditions that should be considered in project planning. Our scope consisted of a site reconnaissance, review of soil investigation reports for the Bel Marin Keys Units I - IV, and other geotehcnical data in our files as listed on the attached bibliography.

II. SITE CONDITIONS

The property is low lying, mostly level farmland adjacent to San Pablo Bay, and is protected from flooding by levees. The ground surface averages about elevation -4 to -5 feet, mean sea level (MSL). It ranges to elevation +41 at a natural hill, "Headquarters Hill", at the west property boundary, and to elevation -10 at borrow sites used for the existing BMK projects at the east end of Bel Marin Keys Boulevard. The site is drained by a series of ditches, and the accumulated runoff is pumped into the bay.

Site improvements include residential and farm buildings, an unpaved access road, and a PG&E power-transmission line. Spoil from maintenance dredging of the existing BMK lagoons has been disposed of at a location south of Headquarters Hill.

III. GEOLOGIC AND SOIL CONDITIONS

Generalized geology of the Bay region is shown on Figure 2, "Regional Geologic Map". Bedrock consists primarily of the Franciscan Formation which includes such rock types as graywacke, sandstone, shale, greenstone, chert, and melange. In most areas the bedrock is masked by overburden including alluvial, colluvial, and residual soils.

Principal recently active faults in the Bay region are shown on Figure 2. The historically active Rodgers Creek and Hayward Fault zones are located about 8 miles northeast and southeast of the site. They are the closest known active faults. The active San Andreas Fault zone is about 15 miles northwest of the site. The Burdell Mountain Fault zone, considered to be a geologically young fault but not classified as active, is located about 6 miles northeast of the site.

Surficial site soil conditions include natural deposits of alluvial soil, residual soil, and dredge spoil. The upper few to over 50 feet of alluvium is typically a soft, compressible clayey silt known as Bay Mud. Inclusive within this deposit are sparse shell and peat lenses or pockets. Based on previous test borings, sand is not present in any significant continuous amount. The surface few feet of Bay Mud is relatively firm as a result of desiccation and consolidation since farming was initiated.

The Bay Mud is underlain by older alluvium inferred to be unconsolidated stream channel deposits. Where encountered in borings, these deposits consist of dense sands and stiff clays.

Colluvial and residual soils are predominantly sands and clays.

Groundwater levels vary seasonally, from the surface of the Bay Mud to depths of about 8 to 10 feet.

IV. DISCUSSION

On the basis of our studies, we conclude that there are no geotechnical conditions that would preclude development of the property in accordance with the planned concept. As with the existing BMK developments, the principal factors to be recognized in design and construction are seismic hazards, slope stability, and settlement.

A. Seismic Hazards

As in other parts of the seismically active Western Coast of California, the site will experience ground shaking from future earthquakes. There are a number of hazards associated with earthquakes; those considered and evaluated during this study are ground shaking, ground rupture from fault displacement, liquefaction, lurching, and tsunami inundation.

- Ground Shaking

  The intensity of shaking will depend upon a number of factors including earthquake magnitude and distance to causative fault. The principal effect of ground shaking will be to induce accelerations (forces) in the planned dwellings and embankments. The minimum requirements of the Uniform Building Code should provide adequate lateral force resistance for properly designed and constructed buildings. Adequate safety against landsliding during seismic conditions can be obtained by properly designed slopes.

- Ground Rupture

  There are no active faults known to traverse the site, consequently the potential for ground rupture from fault displacement is nil.

- Liquefaction

  Liquefaction refers to the sudden total of partial loss of strength of saturated, loose granular soil due to repetitive loading such as can occur from earthquakes. Provided the Bay Mud at the BMK V site is similar to that in existing units, we believe that the potential for liquefaction is nil.

- Lurching

  Lurching refers to ground roll or undulation under seismic shaking. With properly designed and constructed embankments, the potential for lurching, which is high in the Bay Mud, will be reduced.

- Tsunami

  A tsunami is a seismically-induced sea wave. Ritter and Dupre (1972) mapped areas of potential tsunami inundation using a hypothetical 20-foot-high wave run up the Golden Gate. The recurrence interval of this event is estimated at 200 years. The map indicates that the existing dike along San Pablo Bay is high enough to prevent overtopping; the existing dike along Novato Creek is shown to be marginally overtopped. The planned embankments will be at least as high as the existing dikes, elevation +7 feet MSL, during their 30-year design period. Tsunami effects in the lagoons can be negated by closing the locks. Accordingly, considering the recurrence interval of the hypothetical wave, and the project elevation criteria, we judge that the potential for inundation or other damage from a tsunami is nil.

B. Slope Stability

As with existing BMK Units, we judge that stability of the planned embankment slopes can be achieved by use of a combination of flat (4 horizontal to 1 vertical) inclinations combined with intervening bench(s) where slope heights exceed about 25 feet.

C. Settlement

The planned embankments will settle as the Bay Mud compresses under the weight of the new fill, and as the fill compresses under its own weight. This settlement can be compensated for by constructing the embankments higher than necessary to allow for future settlement. At BMK IV, approximately 3 feet has been provided for settlement compensation. With settlements of this magnitude, differential settlement should be expected. The pattern of differential settlement should be tolerable for structures and other improvements.

D. Foundations

Spread footing foundations bottomed at shallow depths should provide satisfactory support for most of the structures under consideration for this project. If heavy, i.e. multi-story/masonry structures are constructed, deep, driven pile foundations will be necessary in areas underlain by Bay Mud.

V. BIBLIOGRAPHY

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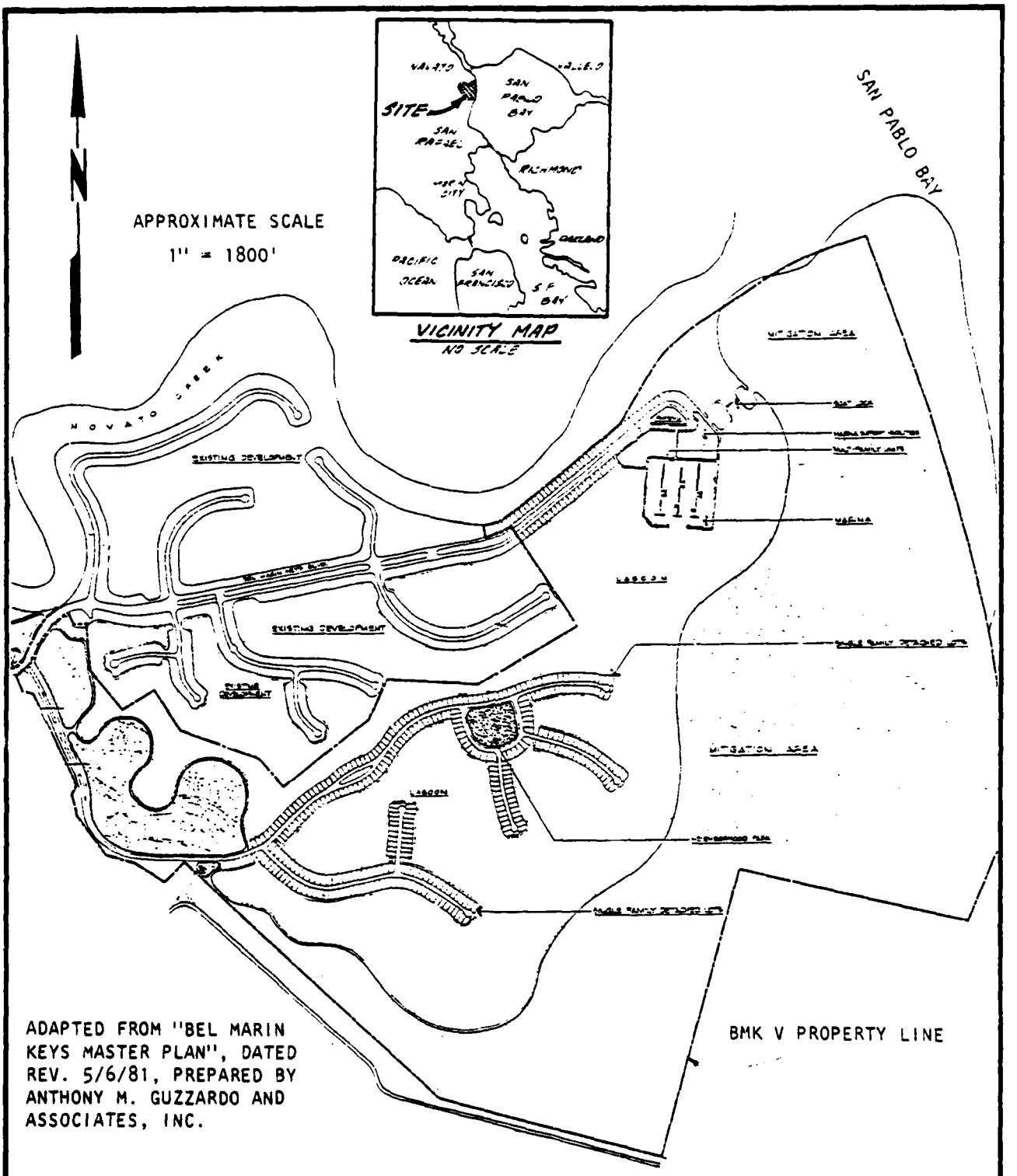
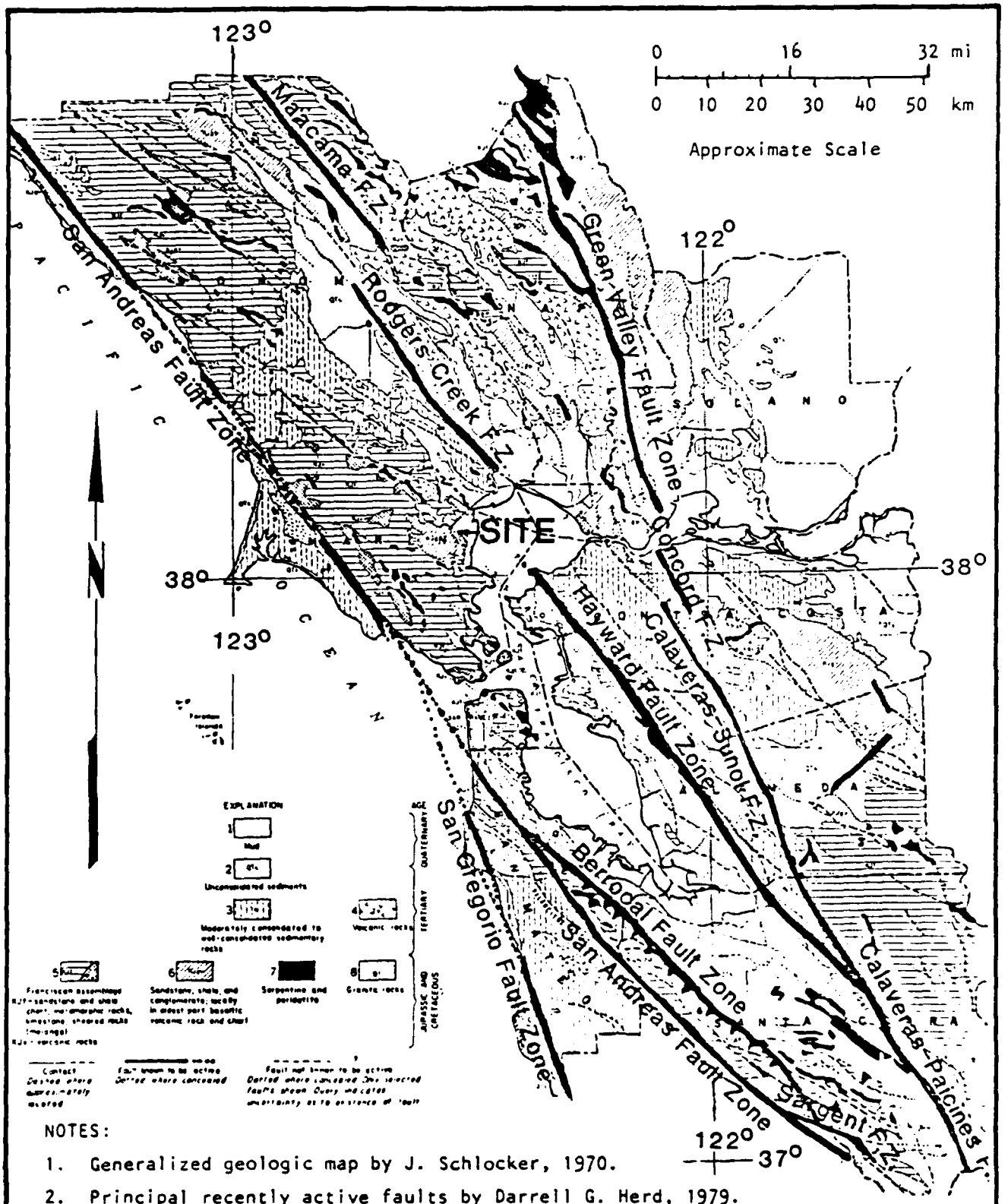


R. C. HARLAN AND ASSOCIATES 88 NEW MONTGOMERY STREET SAN FRANCISCO, CALIFORNIA 94105 Proj. No. 322.5 Appr. RGT Date 5/28/81	SITE PLAN AND VICINITY MAP BEL MARIN KEYS UNIT V Marin County, California	FIGURE 1



NOTES:

1. Generalized geologic map by J. Schlocker, 1970.
2. Principal recently active faults by Darrell G. Herd, 1979.

R. C. HARLAN AND ASSOCIATES 88 NEW MONTGOMERY STREET SAN FRANCISCO, CALIFORNIA 94105	REGIONAL GEOLOGIC MAP BEL MARIN KEYS UNIT V Marin County, California	FIGURE 2
Proj. No. 322.5 Appr. RGT Date 4/15/81