

**FINAL REPORT:**

**DISCHARGES INTO STATE  
WATER QUALITY  
PROTECTION AREAS**

**July 2003**

**Southern California Coastal Water Research Project**

**Final Report to the  
State Water Resources Control Board  
Contract 01-187-250**

## Forward

This report is accompanied by a Geographic Information System (GIS) project designed for use in conjunction with ESRI ArcView 3.2a software. The ArcView project allows the user to view photographs of and certain tabular information about each discharge point. The ArcView GIS electronic files are available on three compact disks, one each for the north coast, central coast and south coast. These CDs may be obtained by contacting the State Water Resources Control Board, Division of Water Quality (contact information given below). Those who do not have access to the ArcView 3.2a software will not be able to take advantage of this feature.

For those who do not have access to computers with ArcView 3.2a, the enclosed report will give you a summary of the survey results, and maps of potential and actual discharge points for each of the surveyed SWQPA.

Twelve of the fourteen SWQPAs in southern California were surveyed between March and November of 2001 as a Pilot Project to develop techniques and begin work on this project (Contract # 00-176-250). A Final Report for the Pilot Project Survey, Discharges into Areas of Special Biological Significance in Southern California, was released in September 2002. Those results were modified and incorporated into this report (Contract # 01-187-250) to result in a single statewide account of discharges into SWQPAs.

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**FINAL REPORT -  
DISCHARGES INTO STATE WATER QUALITY PROTECTION AREAS  
IN CALIFORNIA**

**INTRODUCTION**

In the mid-1970 s, thirty-four areas on the coast of California were designated as areas requiring protection by the State Water Resources Control Board, and were called Areas of Special Biological Significance (ASBS). The Public Resources Code states that point source waste and thermal discharges into SWQPAS are prohibited or limited by special conditions, and nonpoint sources discharging into SWQPAs must be controlled to the extent practicable. As of January of 2003, these areas have been re-designated as State Water Quality Protection Areas (SWQPAs). Various individual SWQPAs are being renamed, as are many of the other Marine Managed Areas. Since this process is not complete yet, the previous ASBS names are being used in this report.

Despite the designation of these areas for protection, little is known about the presence and types of discharges that currently occur in these areas. There have been a few discharges into these areas that have been allowed by the State Water Resources Control Board as Ocean Plan exceptions. These exceptions include treated wastewater discharges into the Kings Range, Carmel Bay, and San Clemente Island SWQPAs, as well as a desalination brine discharge into the San Nicolas Island SWQPA. However, no substantial information has existed regarding other point and nonpoint sources that may exist in these areas.

The goal of this survey was to document the number and types of discharges into each of the thirty-four SWQPAs. This is the first time since the creation of these areas that this has been attempted. This is an important step in providing information to the State Water Resources Control Board in its consideration of a course of action relative to discharges into these special areas.

**METHODS**

The SWQPAs were surveyed by foot or boat between March 2001 and February 2003 (Table 1). All discharges or natural outlets within approximately 100 meters of the high tide line were documented. Some drainages near borders of SWQPAs were identified by field surveyors and included in the survey if they were within approximately 100 meters of the northern and southern extents. In many cases land features, such as cliffs, and privately owned property prevented surveying to take place within the 100 meter range, and in these cases the surveyors used best professional judgement in recording those discharges or natural outlets. Some islands were surveyed by vessel, hence, the location of discharges or outlets were recorded as the position of the boat in the water rather than as the position of the discharge on land. Certain areas were inaccessible due to logistical or safety limitations. These inaccessible areas were inventoried via publicly available

aerial photography, map/GIS resources, and targeted literature searches, with outlets or potential discharges identified and mapped.

Table 1. SWQPAs and the date surveyed.

<b>ASBS Name</b>	<b>County</b>	<b>Region Board</b>	<b>ASBS No.</b>	<b>Date(s) Surveyed</b>
Redwoods National Park	Del Norte and Humboldt	1	8	10/29/02-11/01/02
Kelp Beds at Trinidad Head	Humboldt	1	6	08/09/02-08/10/02
Kings Range National Conservation Area	Humboldt and Mendocino	1	7	08/03/02-11/07/02
Pygmy Forest Ecological Staircase	Mendocino	1	1	05/13/03
Kelp Beds at Saunders Reef	Mendocino	1	5	08/08/02
Del Mar Landing Ecological Reserve	Sonoma	1	2	09/05/02
Gerstle Cove	Sonoma	1	3	08/22/02
Bodega Marine Life Refuge	Sonoma	1	4	08/22/02-08/23/02
Bird Rock	Marin	2	14	08/27/02
Point Reyes Headland Reserve and Extension	Marin	2	12	08/29/02-09/06/02
Double Point	Marin	2	13	08/28/02
Duxbury Reef Reserve and Extension	Marin	2	11	08/26/02
Farallon Islands	San Francisco	2	10	01/04/03
James V. Fitzgerald Marine Reserve	San Mateo	2	9	12/18/02
Ano Nuevo Point and Island	San Mateo	3	15	11/12/02
Pacific Grove Marine Gardens Fish Refuge and Hopkins Marine Life Refuge	Monterey	3	19	07/22/02-08/16/02
Carmel Bay	Monterey	3	34	07/23/02-11/15/02
Point Lobos Ecological Reserve	Monterey	3	16	07/24/02-10/14/02
Julia Pfeiffer Burns Underwater Park	Monterey	3	18	01/09/03
Ocean Area Surrounding the Mouth of Salmon Creek	Monterey	3	20	01/31/03
San Miguel, Santa Rosa, and Santa Cruz Islands	Santa Barbara	3	17	10/1/2001, 10/04/01 01/18/03
Santa Barbara Island, Santa Barbara County and Anacapa Island	Santa Barbara and Ventura	4	22	10/01/01, 02/04/03
Mugu Lagoon to Latigo Point	Ventura and Los Angeles	4	24	03/28/01-08/06/01, 02/27/03
San Nicolas Island and Begg Rock	Ventura	4	21	11/20/02
Santa Catalina Island – Subarea One, Isthmus Cove to Catalina Head	Los Angeles	4	25	11/01/01

ASBS Name	County	Region Board	ASBS No.	Date(s) Surveyed
Santa Catalina Island - Subarea Two, North End of Little Harbor to Ben Weston Point	Los Angeles	4	26	11/01/01
Santa Catalina Island - Subarea Three, Farnsworth Bank Ecological Reserve	Los Angeles	4	27	11/01/01
Santa Catalina Island - Subarea Four, Binnacle Rock to Jewfish Point	Los Angeles	4	28	11/01/01
Newport Beach Marine Life Refuge	Orange	8	32	03/07/01-03/19/01
Irvine Coast Marine Life Refuge	Orange	8, 9	33	03/01/01-03/07/01
Heisler Park Ecological Reserve	Orange	9	30	03/07/01
San Clemente Island	Los Angeles	4	23	02/26/03
San Diego Marine Life Refuge	San Diego	9	31	07/10/01
San Diego-La Jolla Ecological Reserve	San Diego	9	29	07/10/01-11/27/01

The position of each discharge was recorded at the downstream end using a Leica® GS50 backpack GPS system (or in a few cases a Magellan® Color Trak handheld GPS). On occasion a laser range finder and compass were used in the event that the surveying crew was not able to directly access the discharge site but could view the discharge site from a distance. A measuring tape was used to measure outlets and discharge widths. For nearly all outlets and discharges a digital camera was used to document each discharge, with the resulting images uniquely identified.

To the extent possible within the logistical constraints of the survey, each discharge and outlet was described according to several characteristics. The following information was electronically recorded in the field for each sample point:

- **SWQPA Name.** The official ASBS/SWQPA name, as stated in Appendix V of the 2001 Ocean Plan.
- **Position.** Both **longitude** and **latitude** was recorded in decimal degrees to five decimal places. Accessible points were generally accurate within a meter. Inaccessible points (e.g., discharges on bluffs) were accurate within 100 meters of the actual discharge. Locations of post-processed points were determined using GIS/Mapping software.
- **Beach Name.** The beach name, or other appropriate geographic place name, was recorded if known.
- **Stream or Canyon Name.** In the event that a discharge was a naturally occurring perennial or ephemeral stream channel, the name of the stream or canyon (if known) was recorded. Streams where no name was found were recorded as un-named.

- **Survey Date and Time.** Date and time the discharge was documented. Time was not recorded for SWQPA surveys in southern California in 2001 (the “pilot” portion of this study). When recorded, 24 hour time based on Pacific Daylight Saving Time or Pacific Standard Time was used.
- **Type.** Descriptors used were: **non-porous** (man-made, non-native material), **earthen** (e.g., either a man-made ditch, a man-made gully, or a naturally occurring gully), **ephemeral stream** (naturally occurring), **perennial stream** (naturally occurring), **marina** (e.g., at Two Harbors and Trinidad), **landslide** (e.g., at Julia Pfeiffer), or **other**.
- **Material.** This refers to the material that comprises the discharge channel or outlet, such as **metal, concrete, clay** (manufactured clay pipe), **asphalt, native earthen material, plastic, pvc, wood, water** (marinas), **NR** (not recorded), or **other**.
- **Shape.** Possible descriptors used were: **round** (e.g., pipe), **rectangular** (e.g., stairways, walkways), **irregular** (e.g., lined ditches, earthen channels), or **NR** (not recorded).
- **Width.** Recorded in meters (for example, a pipe diameter, or a “bank to bank” measurement for a stream channel (maximum width). In cases where accessibility was impossible, estimates were made using best professional judgement. The descriptor “-99” was recorded if a measurement was not made or a good estimate could not be made (e.g., large gullies on islands that were surveyed by boat).
- **Flow.** The following descriptors were used: **when raining, 24 hours after rain, constant, when in use, perennial, ephemeral** (seasonal), **intake line** (for saltwater intakes), **NR** (not recorded), or **unknown**. Streams that were added during post-processing were listed as ephemeral or perennial based on USGS top maps and/or to the best of the knowledge of the surveyors.
- **Location.** This was where the discharge meets the coast, for example: **in water, on beach** (inter-tidal range, as determined on-site by the surveyors), **in bluff, on pier, upstream of beach, unknown, or other** (describe).
- **Upstream Source.** Unless clearly visible from the discharge point, the search for the source was limited to 100 meters inland from the mean high tide line. Additional information from publicly available aerial photos was used to identify some upstream sources during post processing. The following descriptors were used: **agriculture, airfield, bypass and rural watershed, bypass and rural watershed with roads, desalination plant, emergency firefighting, fish cleaning station, fresh water sink, golf course, groundwater, groundwater with possible contamination, industrial, industrial/military storm water, leach field, marina facilities, marine laboratory, military, mining/quarry, ocean, parking lot, pier facilities, rural watershed, rural watershed with highway runoff, rural watershed with roads, sewage**

(untreated), sewage treatment plant, unknown, urban watershed, and urban watershed with highway runoff.

- **Discharges Onto.** This refers to the type of beach substrate that was present at the outfall point such as **rock, water, mixed** (rock and sand), **sand, unknown** (such as when beach not visible from the surveyor's view), **NR** (not recorded), or **other** (describe).
- **Comments.** Any other pertinent comments relating to the particular discharge being documented.
- **Image (Photographs).** The unique photo identification was recorded relative to each discharge or outlet photographed. Some photos were used repetitively for nearly identical discharges.

The data was extracted using Leica® GIS DataPro software and transferred to a Microsoft® Access database format. During post processing, and following an initial review of the sorted data, two additional fields were added as descriptors for each sampling point. These were **Source Type** and **Source Code**. Source Type was used to classify sample points as discharges, potential discharges, outlets, seawater intake lines, springs/seeps, or unknowns. Source Code was used to further classify points under the Source Types. These discharge categories were developed by the authors to classify and organize the various discharges surveyed. No regulatory definitions or suggestions are implied in this report.

For the purposes of this inventory only, a discharge is defined as an anthropogenic source or location of a discernable volume of water that flows or is released directly into or immediately adjacent to the marine environment of a SWQPA. Discharges were classified into the following categories (Source Codes) while post processing the data: 1) wastewater point sources, 2) municipal/industrial storm water point sources, 3) small storm drain point sources, and 4) nonpoint sources.

Municipal/industrial storm water point sources were identified, using best professional judgement, as serving multiple properties and appearing to be operated/maintained by a municipality or other governmental entity. Small storm drain point sources were identified, using best professional judgement, as serving individual residential or commercial properties (or small clusters of those properties), small access/service roads, or developed landscaped areas, including golf courses. The nonpoint sources included a) agricultural discharges, b) piers, c) recreational/commercial vessel mooring fields, d) sheet flow from parking lots, roads, stairways and ramps, e) wastewater leach fields from which runoff could potentially enter marine waters, f) erosion/gully formation, with subsequent downstream sediment deposition, due to roads or trails in parks or wild areas, including bypasses/culverts associated with roads or trails, and g) mining (rock quarries).

An outlet is defined as any naturally occurring water body that drains into or immediately adjacent to a SWQPA. This includes the following Source Codes: perennial streams (or

their estuaries), ephemeral streams, naturally occurring gullies in coastal bluffs and cliffs, and naturally occurring springs or seeps in wild areas (not associated with anthropogenic activities). Some of naturally occurring streams surveyed were modified with bridges, culverts or other road crossings, but the determination was made to still classify these as outlets and not discharges. It should be noted that many of the outlets, while naturally occurring, were known or suspected to be impacted from pollution sources upstream, and therefore may be contributors to pollution in the SWQPAs.

Storm water discharges that occupied what previously were natural drainage channels, but which are now heavily urbanized and modified to carry urban runoff, were not considered natural outlets. Some naturally occurring ephemeral streams on San Nicolas and San Clemente Island are now functioning as industrial storm drains for military installations there, and are listed in the U.S. Navy's storm water plans and reports as such. These were also classified as municipal/industrial storm water point sources, instead of natural outlets.

Some points were identified as intakes (seawater supply) rather than discharge lines. For a small number of sample points, either their characteristics did not fit into the given categories or we did not have adequate information about their status. In these cases the sample points were classified as "Unknown."

After post-processing and checking the data for quality assurance, the data was queried from the MS Access database and mapped in ArcView® 3.2a. Data and attributes collected in the field were plotted against known coastline layers (electronic USGS topo maps) and against USGS LIDAR data (collected by the USGS and NOAA in 1997 and available at [www.usgs.com](http://www.usgs.com)). Each digital image was hot-linked to the specific discharge symbol it represents in ArcView® 3.2a.

## RESULTS

Almost 2500 actual or potential sources of discharge and natural stream outlets (which themselves may be impacted by upstream pollutants) were recorded over all SWQPAs, with approximately two-thirds being discharges (Table 2). The SWQPA at Mugu Lagoon to Latigo Point contained the most outlets and discharges (444), and Double Point had the fewest number of outlets and discharges (3). Farnsworth Bank had no drainages since it was completely submerged with no coastline.

Table 2. Summary of type and number of sources in each SWQPA.

SWQPA Name	Dis- charges	Outlets	Springs/ Seeps	Poten- tials	Un- knowns	Intakes	Total
Redwoods National Park	41	27	5	-	-	-	73
Kelp Beds at Trinidad Head	17	7	29	-	-	-	53
Kings Range National Conservation Area	17	79	76	-	-	1	173
Pygmy Forest Ecological Staircase	1	13	1	-	-	-	15
Kelp Beds at Saunders Reef	13	7	-	-	-	-	20
Del Mar Landing Ecological Reserve	4	8	-	-	-	-	12



SWQPA Name	Dis- charges	Outlets	Springs/ Seeps	Poten- tials	Un- knowns	Intakes	Total
Gerstle Cove	8	6	7	-	-	-	21
Bodega Marine Life Refuge	7	11	2	-	-	1	21
Bird Rock	-	8	-	-	-	-	8
Point Reyes Headland Reserve and Extension	7	13	-	-	-	-	20
Double Point	-	2	1	-	-	-	3
Duxbury Reef Reserve and Extension	10	18	19	-	5	-	52
Farallon Islands	6	-	2	-	-	-	8
James V. Fitzgerald Marine Reserve	28	3	7	-	-	-	38
Ano Nuevo Point and Island	14	17	3	-	-	-	34
Pacific Grove Marine Gardens Fish Refuge and Hopkins Marine Life Refuge	246	4	18	-	-	-	268
Carmel Bay	348	9	10	-	2	-	369
Point Lobos Ecological Reserve	16	39	1	-	-	-	56
Julia Pfeiffer Burns Underwater Park	25	3	-	-	-	-	28
Ocean Area Surrounding the Mouth of Salmon Creek	35	8	1	-	-	-	44
San Miguel, Santa Rosa, and Santa Cruz Islands	-	135	-	1	-	-	136
Santa Barbara Island, Santa Barbara County and Anacapa Island	3	-	-	1	-	-	4
Mugu Lagoon to Latigo Point	410	31	-	3	-	-	444
San Nicolas and Begg Rock	12	35	-	-	-	-	47
Santa Catalina Island - Subarea One, Isthmus Cove to Catalina Head	38	17	-	2	-	1	58
Santa Catalina Island - Subarea Two, North End of Little Harbor to Ben Weston Point	3	5	-	-	-	-	8
Santa Catalina Island - Subarea Three, Farsworth Bank Ecological Reserve	-	-	-	-	-	-	-
Santa Catalina Island - Subarea Four, Binnacle Rock to Jewfish Point	2	3	-	-	-	-	5
Newport Beach Marine Life Reserve	18	3	-	-	-	-	21
Irvine Coast Marine Life Reserve	16	16	-	-	-	-	32
Heisler Park Ecological Reserve	14	1	-	-	-	-	15
San Clemente Island	23	100	-	1	1	-	125
San Diego Marine Life Refuge	92	-	-	-	-	-	92
San Diego-La Jolla Ecological Reserve	184	9	-	2	-	-	195
<b>Total:</b>	<b>1658</b>	<b>637</b>	<b>182</b>	<b>10</b>	<b>8</b>	<b>3</b>	<b>2498</b>

Discharges consisted of small storm drains (41%), which drain individual or small clusters of residential or commercial properties, municipal/industrial storm drains (16%), non-point sources (12%), which were primarily sheet flow runoff (e.g., down stairs, ramps, piers, etc.), and point sources (1%; Table 3). Three intake lines were surveyed, two retrieving seawater for marine laboratories and one for a fish cleaning station. Outlets

varied greatly in size, and consisted of perennial and ephemeral streams and gullies that act to carry runoff during periods of rain. Seeps and springs were considered potential non-point sources if the possibility for contamination existed and outlets (uncontaminated) if they were in rural wilderness areas. Other potential sources of discharge consisted primarily of areas located in urban and agricultural areas, leach fields, manholes, or features that looked to be underground storage. Drainages were placed in the unknown category if there was some obvious structure or drainage but the source could not be determined, or if we could not tell if it was active.

Table 3. Summary of type and number of sources for each source code.

Source Codes	Source Types						Total
	Discharges	Outlets	Springs/ Seeps	Potentials	Unknowns	Intakes	
Small storm drains	1012	-	-	-	-	-	1012
Municipal/Industrial storm drains	391	-	-	-	-	-	391
Non-point sources	224	-	-	2	-	-	226
Non-point seeps/springs	-	-	66	-	-	-	66
Point Sources (wastewater)	31	-	-	-	-	-	31
Gullies	-	520	-	-	-	-	520
Streams (perennial and ephemeral)	-	117	-	-	-	-	117
Outlets (uncontaminated springs/seeps)	-	-	116	-	-	-	116
No discharges	-	-	-	8	-	3	11
Unknown	-	-	-	-	8	-	8
<b>Total:</b>	<b>1658</b>	<b>637</b>	<b>182</b>	<b>10</b>	<b>8</b>	<b>3</b>	<b>2498</b>

## DESCRIPTION OF INDIVIDUAL SWQPAs

### Northern Coast

#### *North Coast Regional Water Quality Control Board (Region 1)*

**Redwoods National Park.** This large SWQPA, extending over approximately 34 miles of rugged coastline, had a total of 73 drainages, which included 41 discharges, 27 stream outlets and 5 springs/seeps (uncontaminated). This SWQPA includes one large river, the Klamath River, and several other perennial streams, including Cushing Creek to the north and Redwood Creek to the south. The Klamath River does not meet water quality standards for nutrients and organic enrichment/low dissolved oxygen from both point source (including storm water) and nonpoint sources, and temperature from non-point sources. Redwood Creek is impaired due to sedimentation/siltation from nonpoint sources (SWRCB 2003 303d List, Resolution 2003-0009). There were many discharges surveyed from Highway 1 (regulated under the Caltrans storm water NPDES permit), where this road parallels the cliffs along much of the coastline. The ex-military base north of Requa, currently operated by the National Park Service, appeared to have a treated wastewater discharge. This point source is not in compliance with the Ocean Plan

prohibition and needs an exception from the State Water Resources Control Board. However, most drainage into the coastal waters is runoff from rural and wilderness watersheds. Rugged cliffs and sparse primitive campgrounds dominate this region and much of the coastline is limited to foot traffic.

**Kelp Beds at Trinidad Head.** This small SWQPA, approximately 2 miles, encompasses both rural and urban watersheds. A total of 53 drainages were recorded for this area, including 17 discharges, 7 stream outlets, and 29 springs/seeps (listed as potential non-point sources due to potential contamination from home septic systems). Few houses line the northern coastline, but Trinidad becomes more populated near the headland, where the Humboldt State University Marine Lab is located. Anthropogenic discharges include the marine laboratory return waste seawater and co-mingled storm water discharges, the Trinidad Municipal storm water discharges, and the small harbor and pier discharges. The discharge from the Humboldt State University Lab is not in compliance with the Ocean Plan in that it does not have a Regional Board National Pollutant Discharge Elimination System (NPDES) permit, or an exception from the State Board. Regarding the storm water discharge from Trinidad, it is anticipated that municipal storm water from Trinidad will be regulated under the new Phase II Municipal Separate Storm Sewer System (MS4) General Permit. Numerous seepages and earthen channels from bluff houses outline the coast near the headland and along its southern region. Streams and seeps draining into the SWQPA have been known to be contaminated with coliform bacteria (California Marine Waters, Areas of Special Biological Significance Reconnaissance Report, Kelp Beds at Trinidad Head, June 1979, SWRCB Monitoring Report 79-19). The residences and commercial structures of Trinidad are currently served by septic systems. The bluffs along the coastline are formed such that the majority of input is from sheet flow. In addition, Trinidad has seasonal marina facilities (mooring field, vessel haulout/launch facilities and pier facilities) that were included in the survey as a nonpoint source. The fish cleaning station on the pier is a source of decomposing fish wastes, and there is an accumulation of discarded metal objects (e.g., engine blocks) near the pier. Annual moving of the mooring field may result in physical disturbance to the marine habitat (California Marine Waters, Areas of Special Biological Significance Reconnaissance Report, Kelp Beds at Trinidad Head, June 1979, SWRCB Monitoring Report 79-19).

**Kings Range National Conservation Area.** This is a large SWQPA, which covers approximately 28.4 miles and had a total of 173 drainages. Most of these drainages were from stream outlets (79) and uncontaminated springs/seeps (76), fewer were from man-made discharges (17), and there was one intake line. Most discharges in the wilderness area include perennial and ephemeral streams and natural groundwater seeps. There was virtually no development along this section of coastline except for a few sporadic cabins with outhouse facilities and some well-established campsites at the larger river mouths, Big Flat Creek being one of the largest. Most urban discharges were found toward the southern end and associated with the town of Shelter Cove. Shelter Cove has approximately 2 miles of developed coastline with houses and parking lots along the shore. The discharges in this section include runoff from a parking lot, a fish cleaning station, a boat launch, and a discharge from sewage treatment facility. It is anticipated that municipal storm water from Shelter Cove will be regulated under the new Phase II

MS4 General Permit. The sewage treatment facility is allowed under an exception issued by the State Water Board. The extremely rugged terrain of the most southerly 0.75 miles prevented surveying by foot, and since there were no urban discharge sources expected along this southern-most section, natural outlets were added during post-processing using USGS quads. The Mattole River, which was not included as an outlet for this SWQPA because it is outside this SWQPA boundary to the north, marks the beginning of a 24-mile stretch known as the Lost Coast Wilderness Area. This river is impaired due to sedimentation/siltation from nonpoint sources (SWRCB 2003 303d List, Resolution 2003-0009) and may impact this SWQPA.

**Pygmy Forest Ecological Staircase.** The Pygmy Forest SWQPA encompasses 1.2 miles and is part of Jug Handle State Reserve. There were a total of 15 drainages, including 13 outlets, 1 uncontaminated spring/seep, and only 1 discharge. Jug Handle Creek is the only perennial outlet, while the others represented ephemeral rural watershed runoff. Pygmy Forest does have a siltation problem in the winter due to past logging operations, and homes in the area have septic systems that may leak and hence reduce water quality (California Marine Waters, Areas of Special Biological Significance Reconnaissance Report, Pygmy Forest Ecological Staircase, June 1981, SWRCB Monitoring Report 81-3). There is also a lumber mill just north of this SWQPA at the east end of Gibney Road.

**Kelp Beds at Saunders Reef.** This short 1 mile SWQPA parallels Highway 1 along a fairly rural part of Northern California. There were 20 discrete drainages within this SWQPA, consisting of 13 discharges, which were primarily highway runoff, and 7 outlets. The numerous highway bypasses (regulated under the Caltrans storm water NPDES permit), discharge rural watershed with highway runoff into the bluffs along the road. The southern end has houses inland of the SWQPA and directly adjacent to the southern boundary point. According to Foster et al (ASBS Reconnaissance Survey, Kelp Beds at Saunders Reef, October 1980, SWRCB Water Quality Monitoring Report 80-3), these houses are served by septic tanks and due to soil conditions, drainage from these septic tanks may escape into the SWQPA. There were also two parking turnouts within the boundaries of Saunders Reef.

**Del Mar Landing Ecological Reserve.** At 0.6 miles, the Del Mar Landing Ecological Reserve is one of the smallest SWQPAs and had only 12 drainages, 8 of which were outlets and 4 were discharges. A walking trail, with only a few public access points, is used primarily by the residents and follows the coastline. The Sea Ranch residential community borders the Reserve and there are small groups of houses, which may be on septic systems, immediately adjacent to the SWQPA. Homeowners in this SWQPA appear to employ ecologically compatible landscaping.

**Gerstle Cove.** This very small SWQPA, 0.3 miles in length, lies within Salt Point State Park. A total of 21 drainages were observed, 8 discharges, 6 outlets, and 7 uncontaminated springs/seeps. A large number of these drainages were from a highly used recreation area. The State Park includes a public restroom and fish cleaning station (both apparently served by a septic tank), campground, multiple parking lots, and visitor's center above the SWQPA. The cove hosts many divers and fishermen.

**Bodega Marine Life Refuge.** This 1 mile long SWQPA encompasses a fairly rural part of the Bodega headland, containing 21 drainages. The Bodega Marine Lab is the only occupant of this SWQPA, which is the origin of the 7 discharges and 1 intake line. Most of the discharges are for storm water runoff, with one being a point source wastewater discharge, releasing waste seawater from the laboratory. This point source is not in compliance with the Ocean Plan prohibition and needs an exception from the State Water Resources Control Board. The waste seawater discharge is however chlorinated and dechlorinated prior to discharge to prevent the introduction of pathogens into the SWQPA. The remainder of this SWQPA includes 11 outlets and 2 springs/seeps (one uncontaminated and one potential non-point source). The regions north and south of the lab have some highly defined earthen channels, but being mostly comprised of sheer cliffs, they are dominated by sheet flow. Much of this SWQPA falls in a managed marine life refuge and there are restoration projects onshore. There is limited access between Horseshoe Cove Beach and the southern boundary, as this area is composed of many study areas from the Marine Lab.

*San Francisco Bay Regional Water Quality Control Board (Region 2)*

**Bird Rock.** This small SWQPA, 0.4 miles in length, was surveyed from the mainland at Tomales Point. Only the northeast and southeast portions of Bird Rock were visible. There were a total of 8 outlets observed in this region, and although distinct coves were seen on the rock, the majority of input appears to be from general sheet flow runoff. The drainage sources on the rock and on the mainland are heavily influenced by animal excrement from birds that inhabit the rock and the Tule Elk that live on Tomales Point.

**Point Reyes Headland Reserve and Extension.** This SWQPA is 3.5 miles in length and had 20 outlets. Topography naturally concentrates the majority of runoff to either end. Thirteen earthen channels (gullies) were found, but the sheer walls result in sheet flow over most of the headland's cliffs. The 7 distinct discharges were at the lighthouse and visitor center. A road follows the entire SWQPA, but the slope of the headland is such that any road run-off flows away from the SWQPA. Public access is limited to walkways at the eastern end and the western end, where the Lighthouse is located. Inland from the lighthouse and visitor's center are 4 small apartments, which are serviced by an enclosed septic system.

**Double Point.** This small SWQPA of 0.7 miles lies in a rural part of the Point Reyes National Seashore. The area surrounding Double Point is accessible only to hikers and has primitive trail camps to the north and east of this SWQPA. Pelican Lake, the main drainage into this area, appears to have little or no access to hikers, highly limiting any anthropogenic influences to this SWQPA. A very steep slope walls off the cove and inhibits access to the beach below. The three drainages (2 outlets and 1 uncontaminated spring/seep) within this SWQPA are supplied primarily by rural, undeveloped watershed runoff. The entire Double Point area is a large natural landslide.

**Duxbury Reef Reserve and Extension.** This long SWQPA of 3.8 miles encompasses an array of land uses. Fifty-two drainages were encountered in this region, 37 of which were outlets and springs/seeps (18 uncontaminated and 1 potential non-point source). The remaining drainages included 10 discharges and 5 unknowns (these may have been supply lines for homes lost in previous landslides). Nine of the ten discharges were located off the town of Bolinas, and one drained the parking lot at Agate Beach. Urban runoff from the houses near the southern end dominates the anthropogenic discharges. It is anticipated that municipal storm water from Bolinas will be regulated under the new Phase II MS4 General Permit. The northern half of the Reserve is less populated; the only two permanent residences along this portion are a six-man Coast Guard Station and a cancer hospice. There are a few trails leading to the expansive beach in this area, and the road sees limited automobile traffic.

**Farallon Islands.** The Farallon Islands are a small group of rock pinnacles located about 30 miles offshore from San Francisco. This group consists of five small islands, the largest of which is Southeast Farallon. Total coastline length for the combined islands is 4.8 miles. Only Southeast Farallon Island is inhabited and that is by scientific personnel at the US Fish and Wildlife Service field station. A permanent lighthouse, maintained by the US Coast Guard, graces the island's peak. Two houses are on the island along with several small buildings for support facilities. The islands are unique biological habitats for nesting seabirds and wintering marine mammals. Access to the public is restricted. A total of 8 drainages were found, 6 discharges and 2 springs/seeps (uncontaminated). At SE Farallon Island a composting toilet does involve land disposal with potential for runoff during storms. Also at SE Farallon Island another restroom or toilet is associated within a point source discharge of human waste and grey water directly into Sewage Gulch and the SWQPA. This point source discharge is in violation of the Ocean Plan, since it does not have a permit from the Regional Board or an exception from the State Board. While not a part of this survey of discharges along the island coastline, it is worth noting that various wastes have historically been disposed of in the waters in the general vicinity of the Farallon Islands; among these wastes are radioactive wastes discharged between 1946 and 1966, from four to fourteen miles away from the Islands (California Marine Waters, Areas of Special Biological Significance Reconnaissance Report, Farallon Island, May 1979, SWRCB Monitoring Report 79-13).

**James V. Fitzgerald Marine Reserve.** This SWQPA, with a coastline length of 3.3 miles, was preserved for its unique underwater habitat and extensive tide pools. The beaches are well visited by the public and access is good to most stretches, except the northern end. The surrounding land encompasses an array of land uses such as residential, light industrial, and agricultural. There were a total of 38 drainages in this SWQPA, 28 discharges, 3 outlets, and 7 potential non-point source springs/seeps. One of the outlets was San Vicente Creek, which drains an urban watershed and is chronically contaminated with coliform bacteria (SWRCB 2003 303d List, Resolution 2003-0009). The discharges were primarily from private residential properties along the bluffs. Urban runoff from the houses near the northern end dominate the non-porous discharges. It is assumed that municipal storm water from this area is regulated under the San Mateo County Phase I Municipal Storm Water Permit. The southern half of this region is less

populated with the southern terminus, near Pillar Point, being occupied by a large military radar station.

## **Central Coast**

### ***Central Coast Regional Water Quality Control Board (Region 3)***

**Ano Nuevo Point and Island.** This SWQPA is located to the north of Santa Cruz and south of Half Moon Bay. Its coastline extends 8.0 miles and provides unique habitat for wintering sea lions and elephant seals. Access to beaches is limited and most visitors to the park are confined to marked footpaths. A total of 34 drainages were observed, the most significant being from the rural watersheds of Ano Nuevo Creek to the south and Cascade Creek to the north. Fourteen of the drainages were discharges, 17 were outlets, and 3 were uncontaminated springs/seeps. The majority of drainages were from runoff over the coastal cliffs. Some of the direct nonpoint source discharges into the SWQPA are from agricultural fields. Some farming is conducted within the park boundaries, so agricultural discharges may influence the streams as well. The primary crops grown in this area are artichokes, brussel sprouts, and flowers.

**Pacific Grove Marine Gardens Fish Refuge and Hopkins Marine Life Refuge.** The Pacific Grove Marine Gardens Fish Refuge and Hopkins Marine Life Refuge form a SWQPA 3.3 miles in length. This SWQPA had the third highest number of drainages with 268. Of these, 246 were discharges, 4 outlets, and 18 potential non-point source springs/seeps. Because this SWQPA covers the coastline of the city of Pacific Grove, many of the 268 discharges flow from the urban watershed and roads when it is raining. Seawalls with pipes used to drain the landscape and road runoff have been constructed along portions of this SWQPA. A walkway that runs parallel to the coastline provides many access points to the water. The southern portion of the Monterey Bay coastline, including Pacific Grove, is listed as impaired for metals (SWRCB 2003 303d List, Resolution 2003-0009). The Hopkins Marine Laboratory has several point sources of waste laboratory seawater that discharge directly into the SWQPA. This is in noncompliance with the Ocean Plan since Hopkins does not have an exception from the State Board. The Monterey Bay Aquarium is located immediately adjacent to the SWQPA and Hopkins laboratory, and its discharge undoubtedly enters SWQPA waters. The Monterey Bay Aquarium discharges waste seawater and desalination brine through the same discharge. It also does not have an exception from the Ocean Plan's ASBS discharge prohibition. The Hopkins Lab and the Monterey Bay Aquarium share the same intake line and may eventually be regulated under Region 3's Aquaculture and Aquarium General NPDES Permit. It is anticipated that municipal storm water from Pacific Grove will be regulated under the new Phase II MS4 NPDES Permit.

**Carmel Bay.** The Carmel Bay SWQPA is roughly 5.0 miles in length encompassing the city of Carmel with the southern boundary occurring at the Carmel River mouth. The Pebble Beach Golf Course and the highly visited Carmel Beach occur within the boundaries of this SWQPA. This SWQPA had the second largest number of discharges. A total of 369 drainages were found in this SWQPA, with 348 being discharges, 9

outlets, 10 potential non-point source springs/seeps, and 2 unknowns. Sources of the 348 discharges include road runoff, landscaping from the golf course (approximately 176) and other private homes, and drainage from the urban watershed. Seawalls with drainage pipes have also been constructed along the coastline. Approximately 40% of the storm water from the City of Carmel drains directly into the Carmel River (California Marine Waters, Areas of Special Biological Significance Reconnaissance Report, Carmel Bay, April 1979, SWRCB Monitoring Report 79-10); these storm drains which are from the eastern part of the city were not surveyed as part of this study, since they are not ocean discharges. It is anticipated that municipal storm water from Carmel will be regulated under the new Phase II General Municipal Storm Water Permit. Carmel's sewage treatment plant discharges treated wastewater to the SWQPA (submerged, offshore) in the vicinity of the mouth of the Carmel River. This facility has a permit from the regional Board and an exception from the ASBS discharge prohibition issued by the State Board.

**Point Lobos Ecological Reserve.** The Point Lobos Reserve protects 4.5 miles of rocky coastline to the south of the cities of Monterey and Carmel. This SWQPA is regularly visited by a large number of day hikers, and several small campgrounds and a small boat launch ramp are located within the Reserve. Fifty-six drainages were identified in this area, the majority being outlets (39) draining small watersheds and walking paths along the coastline, and the remainder being discharges (16) and a potential non-point source spring/seep (1). Land use to the north and south of this SWQPA is primarily residential. To the south the residences and hotels are serviced by two small wastewater treatment plants that discharge within a quarter mile of the SWQPA. Since these discharges are outside of 100 meters they were not included in the survey data; however, historically there has been some concern that discharges from these outfalls may enter the SWQPA waters. The Regional Board is currently working with these dischargers and the Carmel Wastewater District to divert their wastewater flows to the Carmel plant and to abandon the current outfalls employed by these facilities.

**Julia Pfeiffer Burns Underwater Park.** This SWQPA is located to the south of Monterey on the Big Sur coast. It is 3.4 miles in length with Partington Creek near the northern boundary and Anderson Creek near the southern boundary. Cliffs along this stretch of coastline are rugged and steep, greatly limiting access to the waterline. Only Partington Creek has a hiking trail leading to its mouth. Pfeiffer Park has a small campground and parking area near the scenic McWay Falls. There were a total of 28 drainages, the majority being discharges (25) and the remainder outlets (3). Most drainage into the coastal waters is runoff from rural and wilderness watersheds; however, there are high numbers of road drainage discharges from Highway 1 (regulated under the Caltrans storm water NPDES permit), which parallels the coastline several hundred feet above the waterline. A large landslide associated with Highway 1 and Caltrans road clearing operations has resulted in the deposition of massive amounts of sediment into the SWQPA. This discharge, occurring during the early 1980 s, was so large that it has completely filled McWay Cove; where the waterfall on McWay Creek once flowed into a cove populated by diverse intertidal and subtidal marine life, it now flows onto a sandy beach (personal communication, James Barry, State Department of Parks and Recreation, April 2003). Sediment erosion and downstream deposition into the SWQPA appears to



be a continuing concern. Several private homes are located within the SWQPA; however, other human impacts within most of the SWQPA appear limited.

**Ocean Area Surrounding the Mouth of Salmon Creek.** This SWQPA is located to the south of Monterey on the Big Sur coast and to the south of the Julia Pfeiffer Burns SWQPA. It is 3.2 miles in length and includes two significant perennial creeks, Soda Spring Creek and Salmon Creek, which drain large wilderness watersheds. Like the Pfeiffer SWQPA, cliffs along this stretch of coastline are rugged and steep, greatly limiting access to the waterline. A total of 44 drainages were present, consisting of 35 discharges, 8 outlets, and 1 uncontaminated spring/seep. Most drainage into the coastal waters is runoff from rural and wilderness watersheds; however, there are high numbers of road drainage discharges from Highway 1 (regulated under the Caltrans storm water NPDES permit) that parallel the coastline several hundred meters above the waterline. Several private homes are located within the SWQPA, however few discharges were observed and human impacts within most of this SWQPA appears limited.

**San Miguel, Santa Rosa, and Santa Cruz Islands.** San Miguel Island is approximately 26 miles from the coast and is managed by the National Park Service. This island is unprotected from and directly exposed to all storms and turbulence that comes its way. There are no roads and a few structures that are well beyond 100 meters of the coast. These structures as well as a leach field located near the ranger station are not likely to contribute to discharges into the SWQPA. Although it is unlikely that the leach field could drain to the SWQPA, this area was listed as a potential source of discharge. This SWQPA was surveyed primarily from the Ranger Station and the 29 outlets were added during post-processing using USGS quads.

Santa Rosa Island is the second largest of the Channel Islands and has approximately 46 miles of shoreline. It is a diverse island of grass-covered rolling hills, steep canyons, creeks, rocky intertidal areas and sandy beaches. This SWQPA was surveyed by boat and 41 outlets (gullies or streams) were recorded. There are few potential anthropogenic sources upstream of these outlets, with the exception of road drainage and previous grazing impacts. It is known that the Central Coast Regional Board has issued a cleanup and abatement order to the National Park Service requiring them to develop a road management plan, since the roads on this island do contribute to erosion and downstream deposition of sediment. No point sources were seen from the boat on this island. Santa Rosa Island has few structures and hosts mainly campers and hikers.

Santa Cruz Island is the largest of the Channel Islands and has approximately 77 miles of shoreline. The coastline of this island is diverse, consisting of sheer cliffs and bluffs, beaches, and grasslands. The Nature Conservancy owns and manages the western 76% of the island; the eastern 24% is owned and managed by the National Park Service. Sheep ranching was historically practiced on this island and areas where vegetation was depleted are still visible. This SWQPA was sampled by boat and 65 outlets (gullies or streams) were recorded. There are few potential anthropogenic sources upstream of these outlets, with the exception of previous grazing impacts. No pipes (point sources) were seen from the boat at any point on this island. Santa Cruz Island has few structures and hosts mainly campers and hikers. The inland Central Valley, somewhat distant from the

island's coast, has a few structures which house visiting scientists doing research on island flora and fauna.

## **Southern Coast**

### ***Los Angeles Regional Water Quality Control Board (Region 4)***

**Santa Barbara Island, Santa Barbara County and Anacapa Island.** Santa Barbara Island is surrounded by volcanic cliff walls and has only two facilities, a Ranger Station that is staffed by the National Park Service, and a landing facility, both of which are listed as non-point sources. Near the Ranger Station there is a leach field and three portable toilets. Although doubtful that the leach field contributes any significant discharge, it is listed as a potential nonpoint source discharge. The few visitors to the island are limited to some camping and hiking, but the primary activities take place offshore and include diving and fishing. There are no roads and only a few small foot trails.

Anacapa is the smallest of the Channel Islands and consists of three small islets. Ocean waves have eroded the perimeter of the island, creating steep sea cliffs and exposing the volcanic origins of air pockets, lava tubes, and sea caves. There are few structures on the island, which include a museum, visitor center, and a lighthouse. Activities on the island include camping and hiking. Only the boat landing facility for Anacapa Island was classified as a nonpoint source discharge.

**Mugu Lagoon to Latigo Point.** This is the largest of the mainland SWQPAs, covering approximately 22.5 miles and had the largest number of drainages than any other SWQPA. Of the 444 drainages, 410 were considered discharges, 31 natural outlets, and 3 were potential sources. Land area uses vary in this SWQPA. The Point Mugu Naval Base occupies the northern portion of this SWQPA and just south of the Navy Base are unpopulated beaches with a few camping areas. Mugu Lagoon is the estuary for Calleguas Creek, which is impaired for DDT, copper, nitrogen, chlordane, PCB, sediment toxicity, sedimentation/siltation, endosulfan, mercury, zinc, and nickel (SWRCB 2003 303d List, Resolution 2003-0009). The majority of discharges in the north are from pipes leading to the beach from Highway 1, which parallels the majority of this SWQPA. The central and southern areas are populated sections of Malibu, with many areas containing beachfront homes that are on septic systems. Some apartment complexes and condominiums are served by small secondary treatment systems. Effluent from the septic tanks and small secondary treatment plants are via leach fields or spray irrigation. Some of the leach fields are located on the beach (California Marine Waters, Areas of Special Biological Significance Reconnaissance Report, Mugu Lagoon to Latigo Point, March 1979, SWRCB Monitoring Report 79-5). Several beaches (Escondido, Leo Carillo, Nicholas Canyon, Paradise Cove, Point Dume, Robert H. Meyer, Trancas, Zuma, and Sea Level) along this SWQPA are listed for beach closures and in some cases high coliform counts; Santa Monica Bay, within which much of this SWQPA lies, is impaired for Chlordane, DDT, debris, PAH, PCB, fish consumption advisory, and sediment toxicity (SWRCB 2003 303d List, Resolution 2003-0009). A large number of discharges in these

areas are from roads (including Highway 1) and urban (landscape) runoff. The stormwater discharges in this SWQPA are regulated under Phase I municipal storm water permits (Los Angeles County and Caltrans). It was difficult to sample 100 meters from the high tide line in this SWQPA because of extensive bluffs and private property on the bluffs and beaches.

**San Nicolas Island and Begg Rock.** This island is approximately 61 miles from the mainland. It is owned and managed by the U.S. Navy and not open to the public. There were a total of 47 drainages documented, 12 discharges and 35 outlets. The Navy provided maps of storm water discharges and drainage areas (personal communication, Steve Schwartz and Dean Hill) to aid in the survey. There are piers/barge landings, roads, structures, military activities (including the launching of rockets), and an airfield on this island that contribute to discharges into the SWQPA. The airfield and some other industrial activities discharge under the SWRCB General Industrial Storm Water NPDES Permit. It is anticipated that the residence area of the island will be covered under the Phase II MS4 NPDES Permit. During the survey, fuel was being offloaded to the island with appropriate oil spill response equipment and personnel deployed. Regarding another barge landing area and pier, a Navy representative stated that the landing facilities might be replaced. This temporary construction activity will require an approval by the Regional Board in order to be in compliance with the Ocean Plan. A desalination facility operated by the Navy discharges brine into a sand pit on the beach on the SWQPA, under an exception from the State Water Board. Parts of the island were inaccessible to survey by foot; hence, many of the un-named streams were added during post-processing, using USGS quads.

**Santa Catalina Island – Subarea One, Isthmus Cove to Catalina Head.** Subarea one is the largest of the four subareas on Catalina covering approximately 17 miles on the west end. This area had the most drainages, numbering 58 and consisting of 38 discharges, 17 outlets, 1 intake line, and 2 potential sources. The only area in this subarea that was sampled by land was Two Harbors. Two Harbors consisted mainly of small earthen channels and pipes that appeared to be used mainly for storm water runoff. Two Harbors is served by a sewage treatment plant, the effluent from which is disposed of via spraying on a hillside (Dykzeul and Given, California Marine Waters, Areas of Special Biological Significance Reconnaissance Report, Santa Catalina Island, April 1979, SWRCB Monitoring Report 79-6). It is anticipated that the storm water discharges from Two Harbors should be regulated under the State Board's Phase II General Municipal Storm Water Permit since it drains to a sensitive area (the SWQPA). In addition, Two Harbors has marina facilities (mooring field and pier facilities) that were included in the survey as a nonpoint source. The rest of this subarea was sampled by boat where natural outlets and potential discharges were identified. Many of these areas are used for youth camps and contained structures for camping, picnicking, and recreational use. Any discharges from these areas are likely to be from storm water runoff.

On the northeast corner of this SWQPA, adjacent to Blue Cavern Cove, is the intake line for the Wrigley Catalina Marine Science Center Laboratory (University of Southern California). Roughly adjacent to this location is the land disposal site (leach field) for

treated domestic wastewater from the Marine Science Center. While the disposal of the wastewater is to land, storm runoff from the land disposal site could possibly enter the SWQPA waters. The seawater return and freshwater rinsing of dive equipment from the University of Southern California Wrigley Marine Science Center flows from the laboratory facilities through an open ditch and into Big Fisherman Cove (part of the SWQPA) adjacent to the facility's dock. This is a point source of wastewater that is not in compliance with the Ocean Plan, since it does not have an exception from the State Water Board. Storm water runoff also drains from the laboratory and dormitory areas into the SWQPA.

**Santa Catalina Island – Subarea Two, North End of Little Harbor to Ben Weston Point.** This subarea is relatively small covering approximately 2.7 miles and ranging from the north end of Little Harbor to Ben Weston Point. This area is used primarily for recreation by islanders and boaters and consists of areas used for camping, picnicking, hiking, and surfing. This subarea was surveyed entirely by boat. A total of 8 drainages were documented, 3 discharges and 5 outlets. There is a road that runs along part of this SWQPA, which may contribute to storm water runoff. Portions of the road are paved one to two times annually with oil slurry, which may be discharged during storms into the SWQPA (October 1981, SWRCB Water Quality Monitoring report 81-10).

**Santa Catalina Island – Subarea Three, Farnsworth Bank Ecological Reserve.** This is the Farnsworth Bank Ecological Reserve and its location offshore precludes it from having any direct land-based anthropogenic inputs. This area is popular for such activities as scuba diving and fishing and it may receive impacts (waste discharges and anchoring) from boats and people using it for such activities.

**Santa Catalina Island – Subarea Four, Binnacle Rock to Jewfish Point.** This subarea covers approximately 2.8 miles and ranges from Binnacle Rock to Jewfish Point on the east end of the island. It had a total of 5 drainages, 2 discharges and 3 outlets. Its major source of anthropogenic inputs most likely would come from a large quarry that has both nonpoint and point source types of discharges. Although only one pipe was viewed from the boat, the surface topography in the quarry area has been altered in such a way that inputs from storm water (including sheet flow) runoff, as well as aerial deposition, may occur. In addition, it is possible that dredging may also occur at the barge loading site, since such activity was described by Coyer and Engle in the ASBS Reconnaissance Survey (October 1981, SWRCB Water Quality Monitoring report 81-10). To the authors' knowledge this quarry is not currently regulated under a Regional Board issued NPDES Permit or Waste Discharge Requirements.

**San Clemente Island.** This island is approximately 49 miles from the mainland. It is occupied and managed by the U.S. Navy. The Navy provided maps of storm water discharges and drainage areas (personal communication, Lance Becker) to aid in the survey. There were a total of 125 drainages, consisting of 23 discharges, 100 outlets, one potential source, and 1 unknown. There are piers, roads, structures, military activities (including the use of ordinance), and an airfield on this island that contribute to discharges into the SWQPA. The airfield and some other industrial activities discharge

under the SWRCB General Industrial Storm Water NPDES Permit. It is anticipated that the residence area of the island will be covered under the Phase II General MS4 NPDES Permit. Offshore areas are accessible; however, military maneuvers are common and schedules for these activities were taken into account. A freshwater sink, probably used in part for cleaning dive gear, on the NOTS Pier discharges directly into the SWQPA. A large area in the southern part of the island (SHOBA) is used for military operations including explosions of ordinance. This undoubtedly results in erosion and resulting sedimentation into the coastal portions of the SWQPA. A sewage treatment plant, operated by the Navy, discharges into an excluded zone within the SWQPA, under an exception from the State Water Board. Much of this island was inaccessible to survey by foot; hence, many of the un-named streams were added during post-processing, using USGS quads.

### ***Santa Ana Regional Water Quality Control Board (Region 8)***

**Newport Beach Marine Life Reserve.** This SWQPA covers approximately 0.7 miles and contained 21 drainages, of which 18 were discharges and 3 natural outlets. Upstream sources of storm water are difficult to track at Newport Beach because of the private property on top of the bluffs. The primary drainage sources are pipes and stairways that appear to lead from this development. There are two perennial flows that empty onto the beach, the largest of which is Buck Gully, which is an impaired water body known to exceed water quality standards for coliform bacteria (SWRCB 2003 303d List, Resolution 2003-0009). The storm water discharges in this SWQPA are regulated under a Phase 1 MS4 Permit (Orange County).

### ***Santa Ana and San Diego Regional Water Quality Control Boards (Regions 8 and 9)***

**Irvine Coast Marine Life Refuge.** This SWQPA, covering approximately 3.2 miles, had 32 drainages, of which 16 were discharges and 16 natural outlets. The source of inputs to the Irvine Coast Marine Life Refuge is largely classified as urban watershed; however, inputs from parking lots and walkways within the park and from the development and highway upstream of the park are likely. There are many natural outlets in this SWQPA, one of which is Los Trancos Creek, which is impaired for fecal coliform bacteria (SWRCB 2003 303d List, Resolution 2003-0009). During the survey flow was heavy and signs were posted at the base of a few of the channels indicating that there may have been input from a pipe. Such pipes were not always visible from the beach or the top of the bluff and were difficult to track. Where possible, pipes were tracked back to a drain at the top of the bluff or along the highway. In the March 1979 ASBS Reconnaissance Report for the Irvine Coast Marine Life Refuge (SWRCB Water Quality Monitoring report No, 79-3), Brusca and Zimmerman stated: "Future land development east of Pacific Coast Highway will eventually result in storm drainage to the ASBS. When this development ensues, much of the pristine Irvine Refuge Area may be threatened unless control measures are implemented." It is the understanding of the authors that Caltrans is currently planning to modify its runoff conveyances from Highway 1 in this area to include treatment via a vegetated swale prior to discharging into the streams (outlets)

tributary to the SWQPA. The storm water discharges in this SWQPA are regulated under a Phase 1 MS4 Permit (Orange County and CalTrans).

***San Diego Regional Water Quality Control Board (Region 9)***

**Heisler Park Ecological Reserve.** This small SWQPA, covering approximately 0.6 miles, had 15 drainages, consisting of 14 discharges and 1 outlet. Discharges into the Heisler Park SWQPA are typically from walkway and street sources. Most of the pipes in the bluff can be tracked back to a drain either along the walkway at the top of the bluff or on the street. There are two pipes that have significant flow during wet weather and appear to be linked to drains in the streets. There was only one obvious outlet, but there are indications of sheet flow over the bluffs during wet weather. The shoreline in this SWQPA exceeds water quality standards for bacterial indicators due to nonpoint and point sources (SWRCB 2003 303d List, Resolution 2003-0009). Since the field survey was performed a storm drain diversion device was installed on the Jasmine Street storm drain by the City of Laguna Beach. This device is designed to divert dry weather flows to a sewage treatment plant, and to treat high flow discharges (by removing suspended sediments and trash) prior to discharge to the SWQPA. The storm water discharges in this SWQPA are regulated under a Phase 1 MS4 Permit (Orange County). It should be noted that the original Pilot Project identified 32 drainages into this SWQPA; however, the boundary used during that survey was not accurate, and 17 of the original 32 were found to be outside of the SWQPA boundary.

**San Diego Marine Life Refuge.** This SWQPA covered approximately 0.5 miles of shoreline and had approximately 92 discharges. The primary discharges into this SWQPA were from pipes and/or holes coming through seawalls, draining bluffs and urban landscaped areas. A majority of these pipes came from privately owned homes. Except for the portion of this SWQPA within the UCSD campus, the storm water discharges are regulated under a Phase 1 MS4 Permit. The most notable flowing discharges were from the area near and underneath the Scripps Institute of Oceanography pier, including wastewater point sources consisting of return seawater discharges from the UCSD Scripps research facilities and the Birch Aquarium. A pier facility at Scripps was listed as a nonpoint source of pollution. The wastewater discharges from Scripps may in some places be co-mingled with storm water runoff. The Scripps wastewater outfalls are regulated under an NPDES permit issued by the San Diego Regional Board; however, these discharges are in violation of the Ocean Plan since Scripps does not have a State Board exception from the ASBS discharge prohibition. The strictly storm water discharges from the UCSD campus are expected to be regulated under the Phase II MS4 General Permit. The shoreline in this SWQPA exceeds water quality standards for bacterial indicators due to nonpoint and point sources (SWRCB 2003 303d List, Resolution 2003-0009).

**San Diego-La Jolla Ecological Reserve.** This SWQPA covered approximately 1.6 miles and had 195 drainages, including 184 discharges, 9 outlets, and 2 potential sources. The majority of discharges into this SWQPA, adjacent to the San Diego Marine Life Refuge SWQPA, were also from pipes and/or holes coming through seawalls, draining bluffs and landscape areas. The largest pipe with possible drainage into this SWQPA was located at

the southern end of Kellogg Park, and at the time of this survey was being repaired. A large section of this SWQPA included a tide pool area that receives discharges from pipes on the bluffs and gullies. The storm water discharges in this SWQPA are regulated under a Phase 1 MS4 Permit. The shoreline in this SWQPA exceeds water quality standards for bacterial indicators due to nonpoint and point sources (SWRCB 2003 303d List, Resolution 2003-0009).

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California Regional Water Quality Control Board, Los Angeles Region, Order No. 01-182, NPDES Permit No. CAS004001, Waste Discharge Requirements for Discharges of Urban Runoff from Municipal Separate Storm Sewer Systems for the County of Los Angeles, and the incorporated cities within Los Angeles County, except the City of Long Beach.

California Regional Water Quality Control Board, San Diego Region, Order No. R9-2002-0001, NPDES NO. CAS0108740, Waste Discharge Requirements for discharges of Urban Runoff from Municipal Separate Storm Sewer Systems for the County of Orange, Orange County Flood Control District, and the incorporated cities of Orange County within the San Diego Region.

California Regional Water Quality Control Board, San Diego Region, Order No. R9-2001-01, NPDES NO. CA S0108758, Waste Discharge Requirements for discharges of Urban Runoff from Municipal Separate Storm Sewer Systems for the County of San Diego, the incorporated cities of San Diego County, and the San Diego Unified Port District.



California Regional Water Quality Control Board, San Francisco Bay Region, Order No. 99-059, NPDES Permit and Waste Discharge Requirements for San Mateo Countywide Storm Water Pollution Prevention Program.

California Regional Water Quality Control Board, Santa Ana Region, Order No. R8-2002-0010, NPDES No. CAS618030, Waste Discharge Requirements for discharges of Urban Runoff from Municipal Separate Storm Sewer Systems for the County of Orange, Orange County Flood Control District, and the incorporated cities of Orange County within the Santa Ana Region.

Personal communication between James Barry, State Department of Parks and Recreation, and Dominic Gregorio, State Water Resources Control Board Contract Manager, April 2003.

Personal communication between Lance Becker, US Navy, San Clemente Island, and Dominic Gregorio, State Water Resources Control Board Contract Manager, February 2003.

Personal communication between Steve Schwartz and Dean Hill, US Navy, San Nicolas Island, and Dominic Gregorio, State Water Resources Control Board Contract Manager, November 2002.

State Water Quality Protection Areas, Areas of Special Biological Significance, State Water Resources Control Board, June 2003.

State Water Resources Control Board Order No. 2003 – 0005 – DWQ, NPDES Permit No. CAS000004, Waste Discharge Requirements for Discharges of Urban Runoff from Small Municipal Separate Storm Sewer Systems (Phase II General Permit).

State Water Resources Control Board Order No. 97-03-DWQ, NPDES Permit No. CAS000001, Waste Discharge Requirements for Discharges of Storm Water Associated with Industrial Activities (General Permit).

State Water Resources Control Board Order No. 99 - 06 – DWQ, NPDES Permit No. CAS000003, NPDES State Storm Water Permit for the California Department of Transportation (CALTRANS).

State Water Resources Control Board Resolution 2003-0009, 2003 303d List.

## APPENDIX

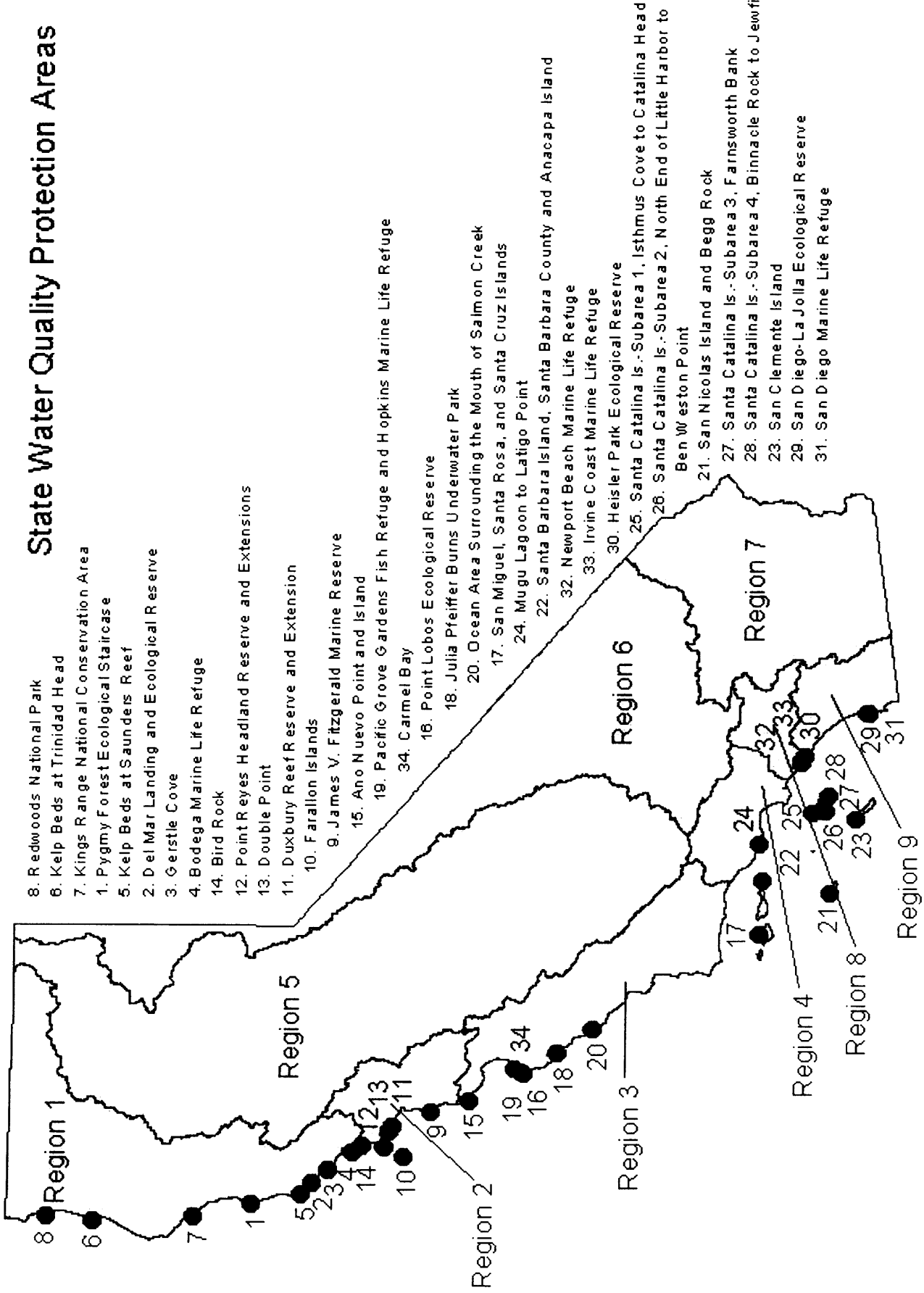
The following are images of maps excerpted from the ArcView GIS project (.apr) files:

1. Map of all SWQPAs
2. Pygmy Forest Ecological Staircase (SWQPA # 1)
3. Del Mar Landing Ecological Reserve (SWQPA # 2)
4. Gerstle Cove (SWQPA # 3)
5. Bodega Marine Life Refuge (SWQPA # 4)
6. Kelp Beds at Saunders Reef (SWQPA # 5)
7. Kelp Beds at Trinidad Head (SWQPA # 6)
8. Kings Range National Conservation Area (SWQPA # 7)
9. Redwoods National Park (SWQPA # 8)
10. James V. Fitzgerald Marine Reserve (SWQPA # 9)
11. Farallon Islands (SWQPA # 10)
12. Duxbury Reef Reserve and Extension (SWQPA # 11)
13. Point Reyes Headland Reserve and Extension (SWQPA # 12)
14. Double Point (SWQPA # 13)
15. Bird Rock (SWQPA # 14)
16. Ano Nuevo Point and Island (SWQPA # 15)
17. Point Lobos Ecological Reserve (SWQPA # 16)
18. San Miguel, Santa Rosa, and Santa Cruz Islands (SWQPA # 17)
19. Julia Pfeiffer Burns Underwater Park (SWQPA # 18)
20. Pacific Grove Marine Gardens Fish Refuge and Hopkins Marine Life Refuge (SWQPA # 19)

21. Ocean Area Surrounding the Mouth of Salmon Creek (SWQPA # 20)
22. San Nicolas and Begg Rock (SWQPA # 21)
23. Santa Barbara Island, Santa Barbara County and Anacapa Island (SWQPA # 22)
24. San Clemente Island (SWQPA # 23)
25. Mugu Lagoon to Latigo Point (SWQPA # 24)
26. Santa Catalina Island - Subarea One, Isthmus Cove to Catalina Head (SWQPA # 25)
27. Santa Catalina Island - Subarea Two, North End of Little Harbor to Ben Weston Point (SWQPA # 26)
28. Santa Catalina Island - Subarea Three, Farnsworth Bank Ecological Reserve (SWQPA # 27)
29. Santa Catalina Island - Subarea Four, Binnacle Rock to Jewfish Point (SWQPA # 28)
30. San Diego-La Jolla Ecological Reserve (SWQPA # 29)
31. Heisler Park Ecological Reserve (SWQPA # 30)
32. San Diego Marine Life Refuge (SWQPA # 31)
33. Newport Beach Marine Life Reserve (SWQPA # 32)
34. Irvine Coast Marine Life Reserve (SWQPA # 33)
35. Carmel Bay (SWQPA # 34)

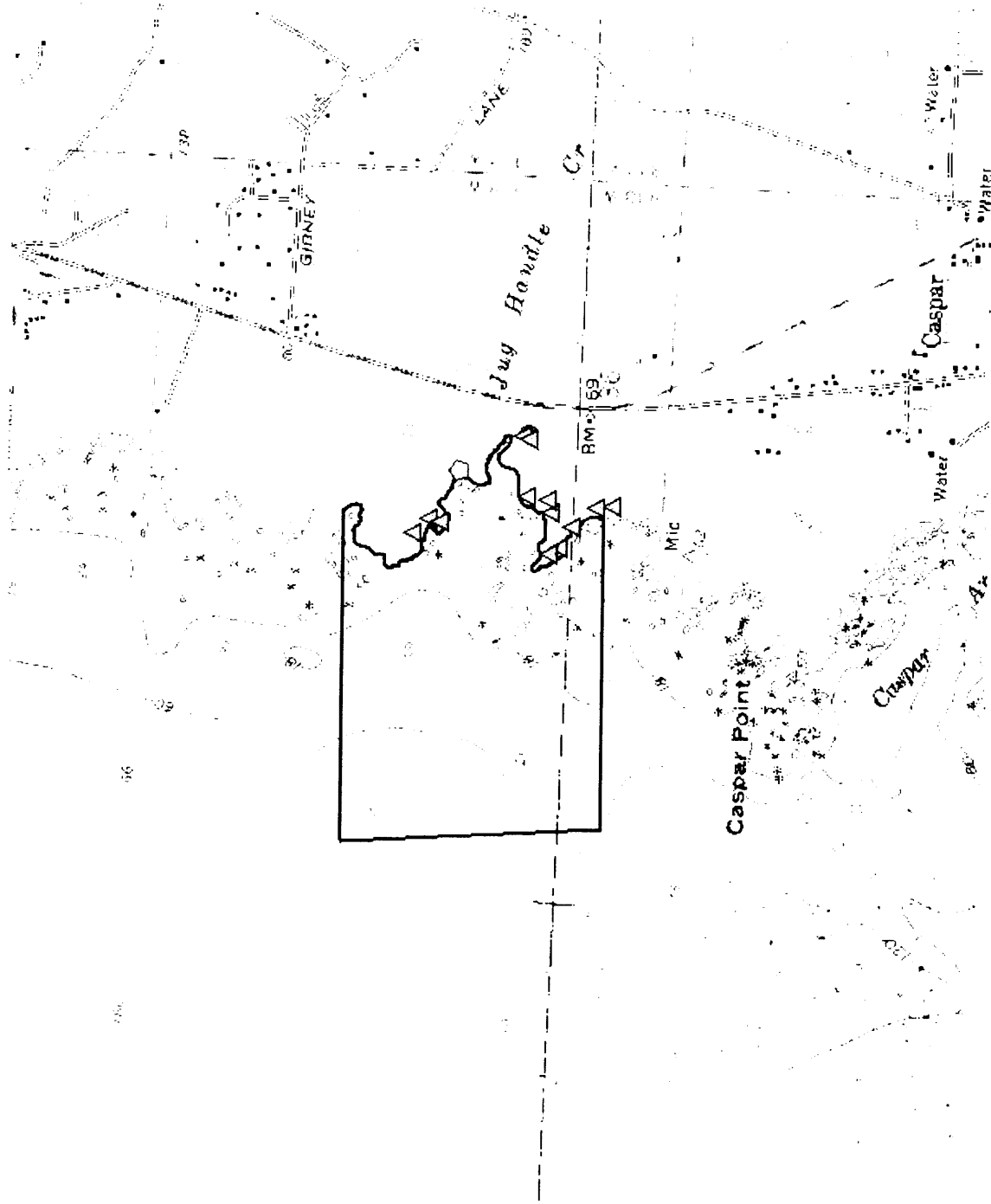
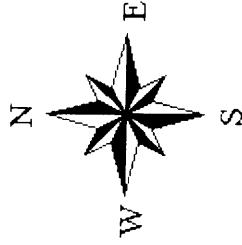


# State Water Quality Protection Areas



# 01-Pygmy Forest Ecological Staircase

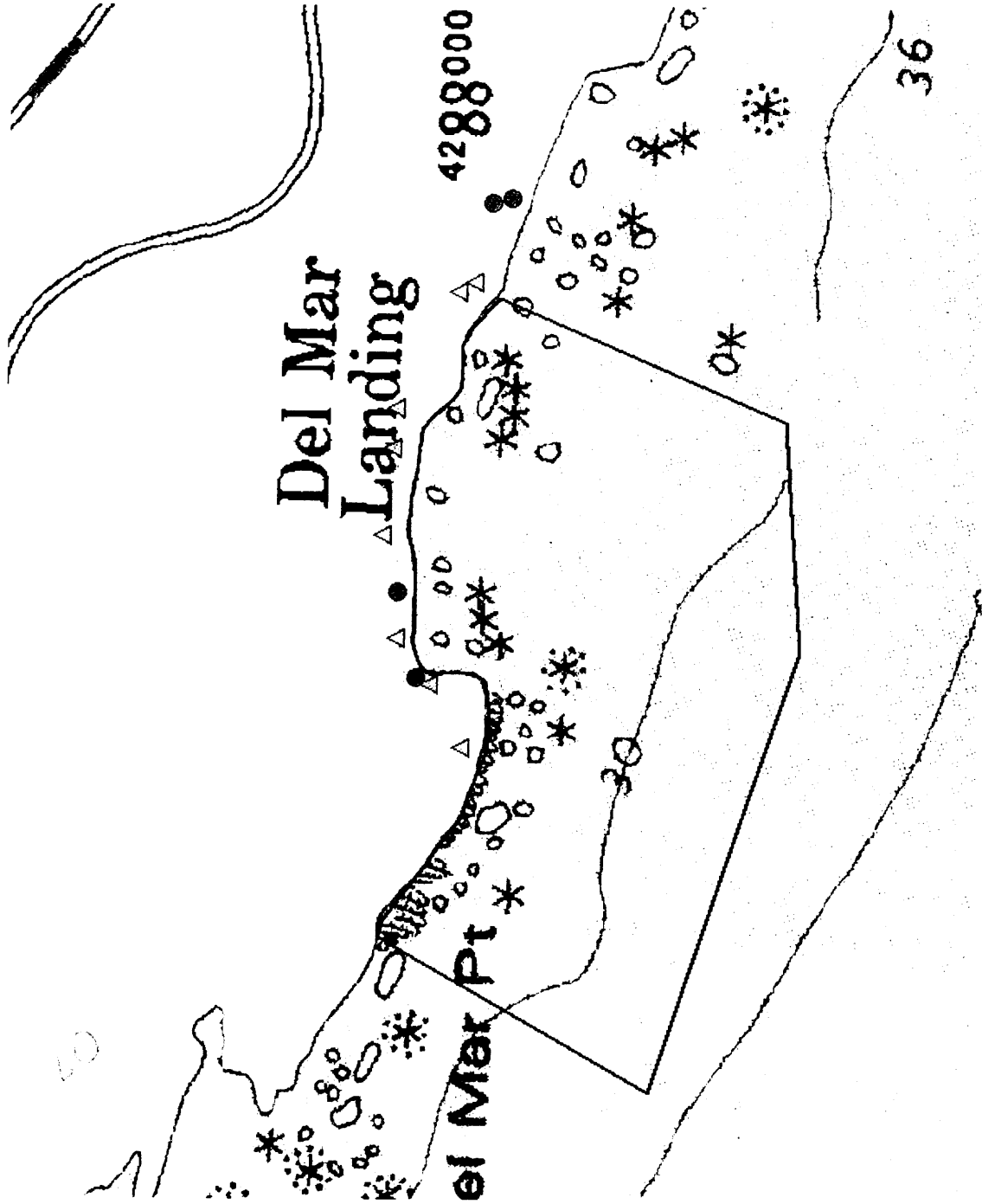
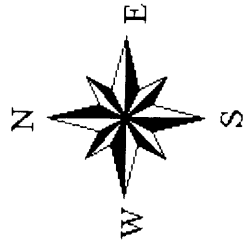
- Drainages
- Discharge
  - △ Outlets
  - ◻ Spring/Seep
  - SWQPA Boundary



0 0.7 1.4 Miles

# 02-Del Mar Landing Ecological Reserve

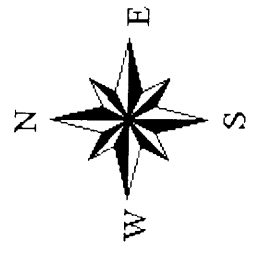
- Drainages
- Discharges
  - △ Outlets
  - SWQPA Boundary



# 03-Gerstle Cove

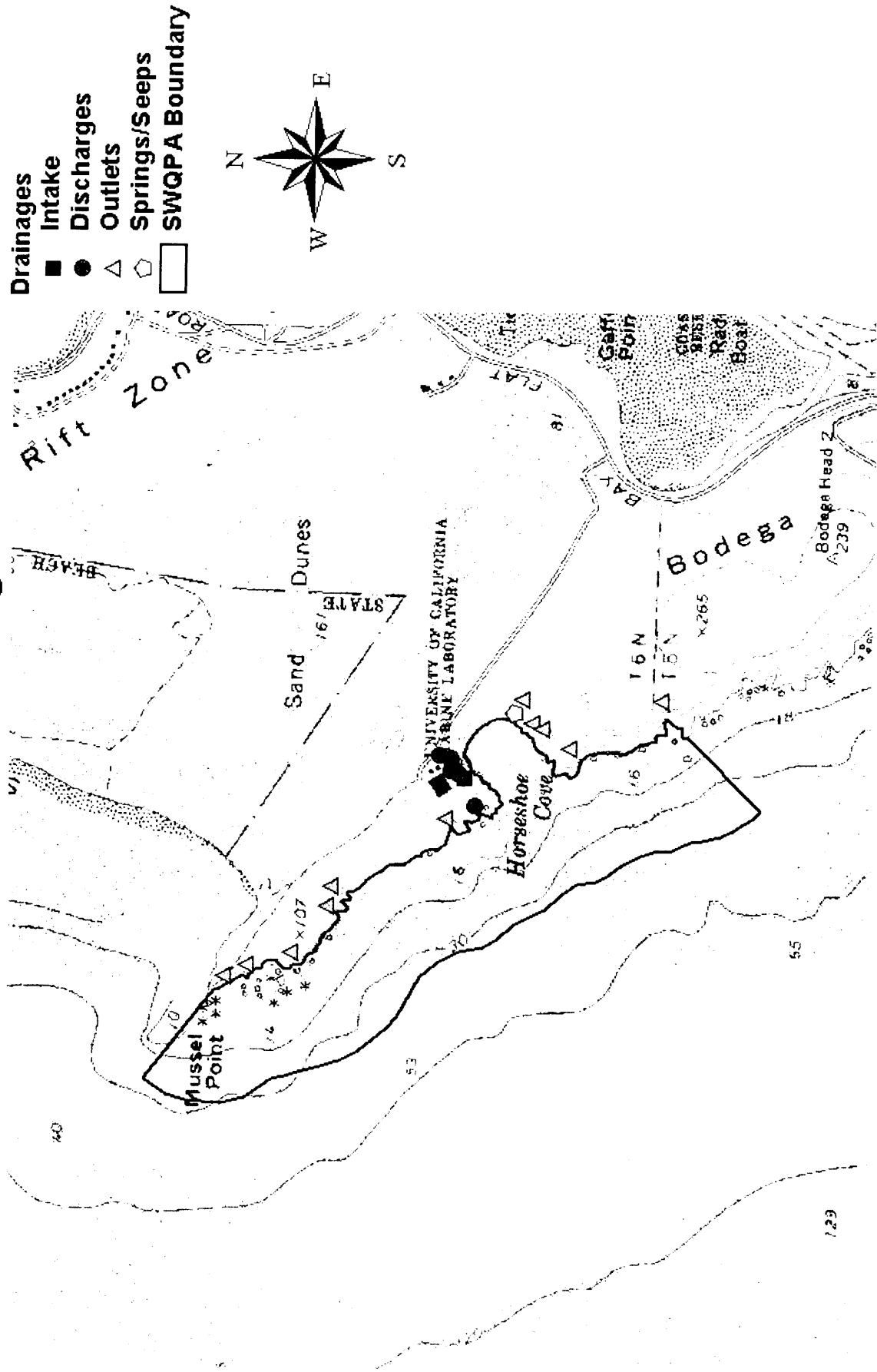


- Drainages
- Discharges
  - △ Outlets
  - Springs/Seeps
  - ▭ SWQPA Boundary



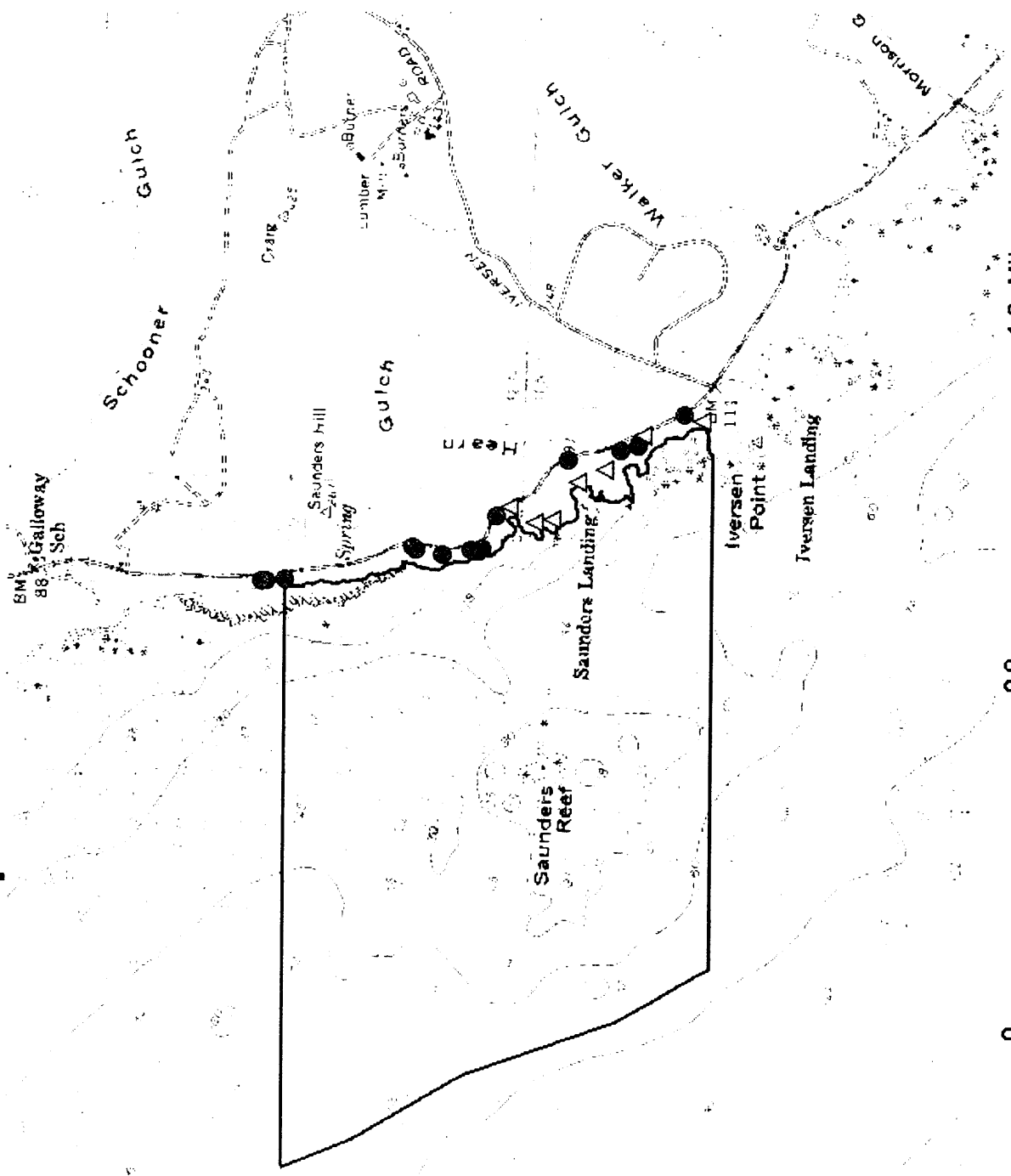
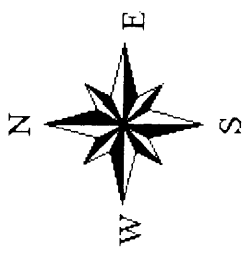


# 04-Bodega Marine Life Refuge

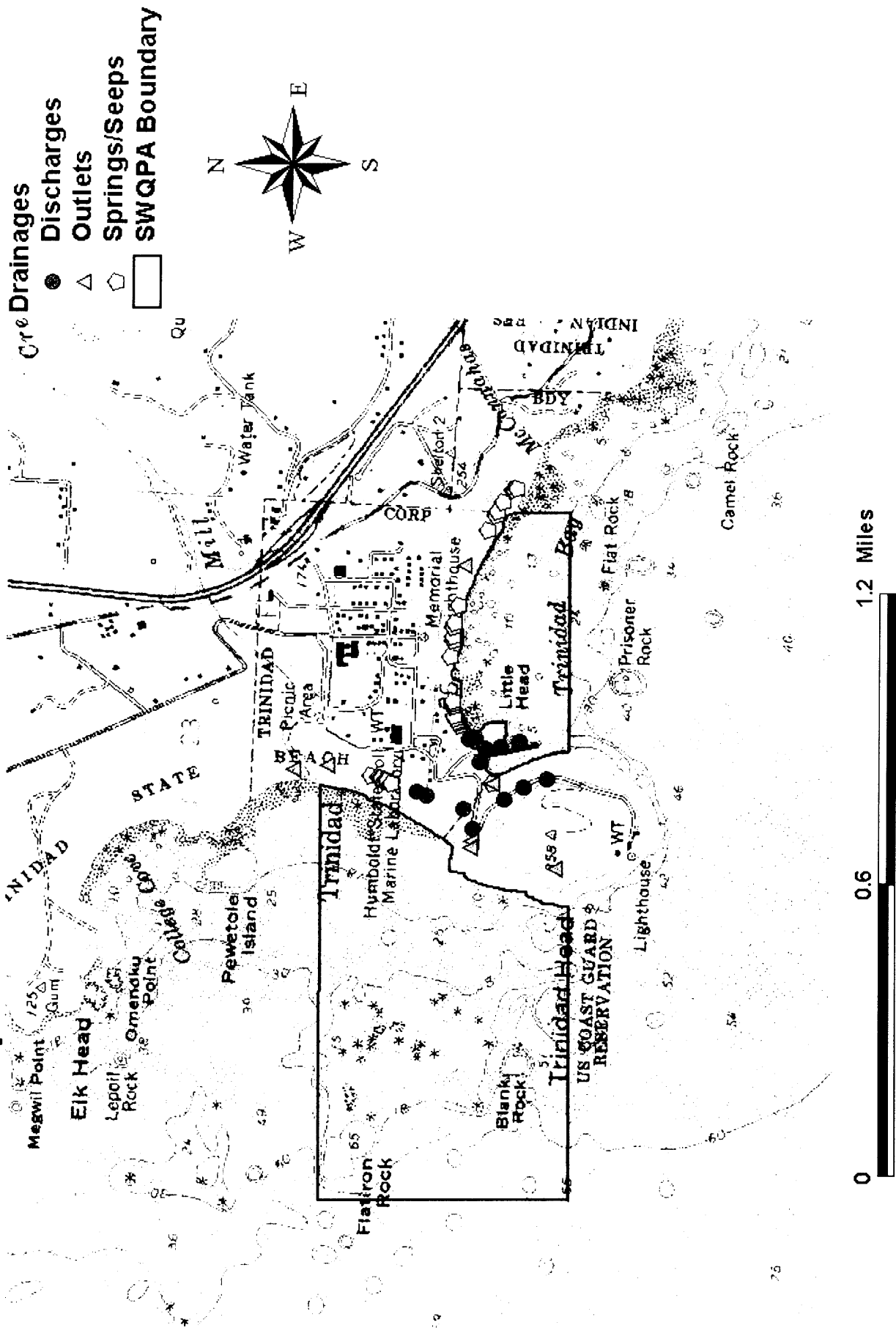


# 05-Kelp Beds at Saunders Reef

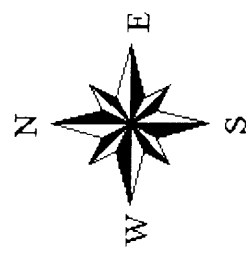
- Drainages
- Discharges
  - △ Outlets
  - SWQPA Boundary



# 06-Kelp Beds at Trinidad Head

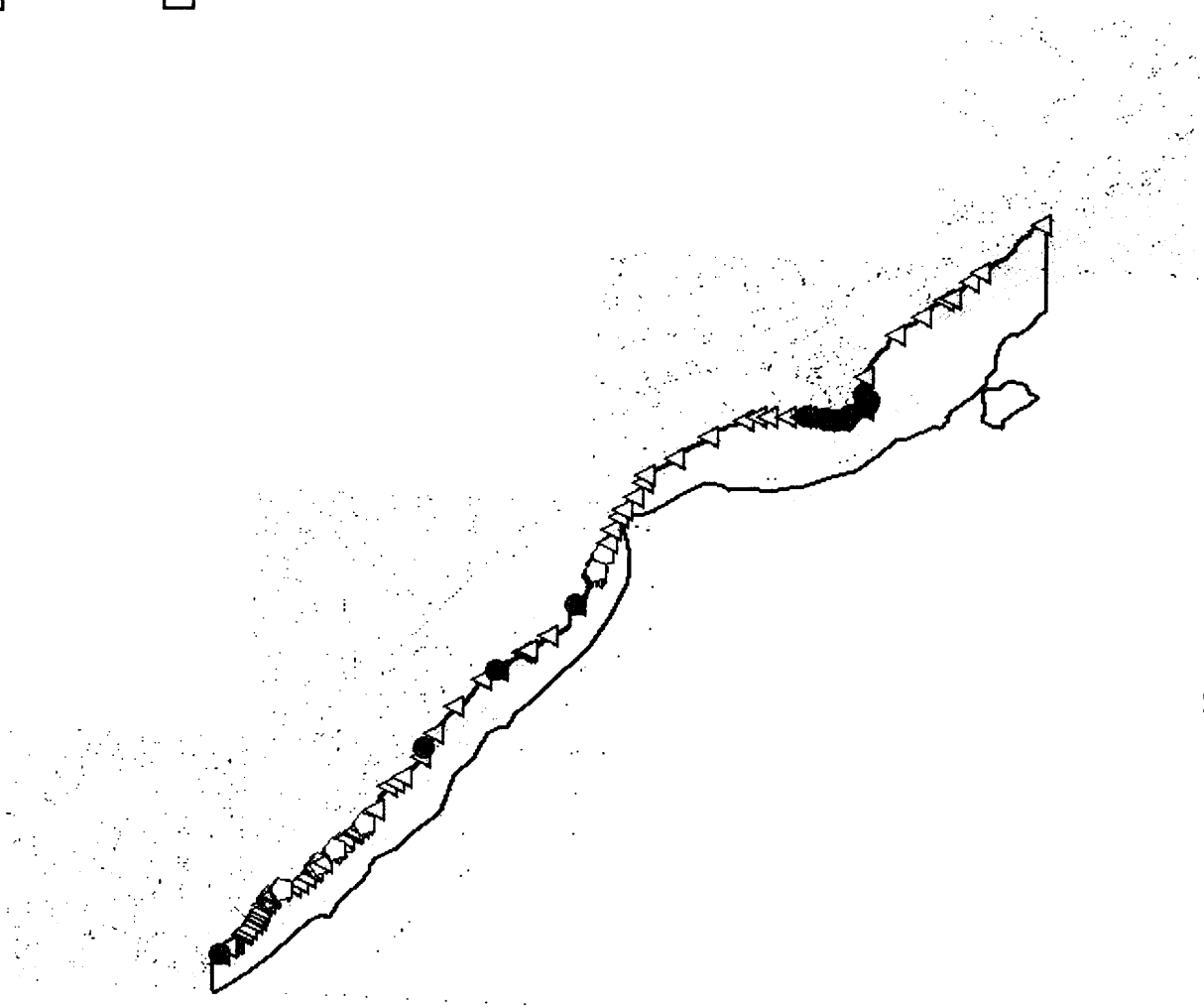
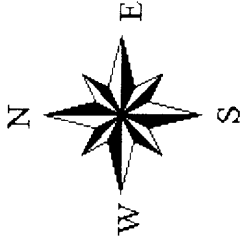


- Cre Drainages  
 ● Discharges  
 △ Outlets  
 ○ Springs/Seeps  
 □ SWQPA Boundary



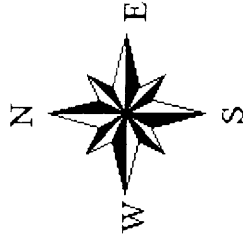
# 07-Kings Range National Conservation Area

- Drainages
- Intake
  - Discharges
  - Outlets
  - Springs/Seeps
  - SWQPA Boundary



# 08-Redwoods National Park

- Drainages
- Discharges
  - △ Outlets
  - ◻ Springs/Seeps
  - ◻ SWQPA Boundary



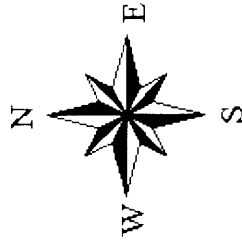
20 Miles

10

0

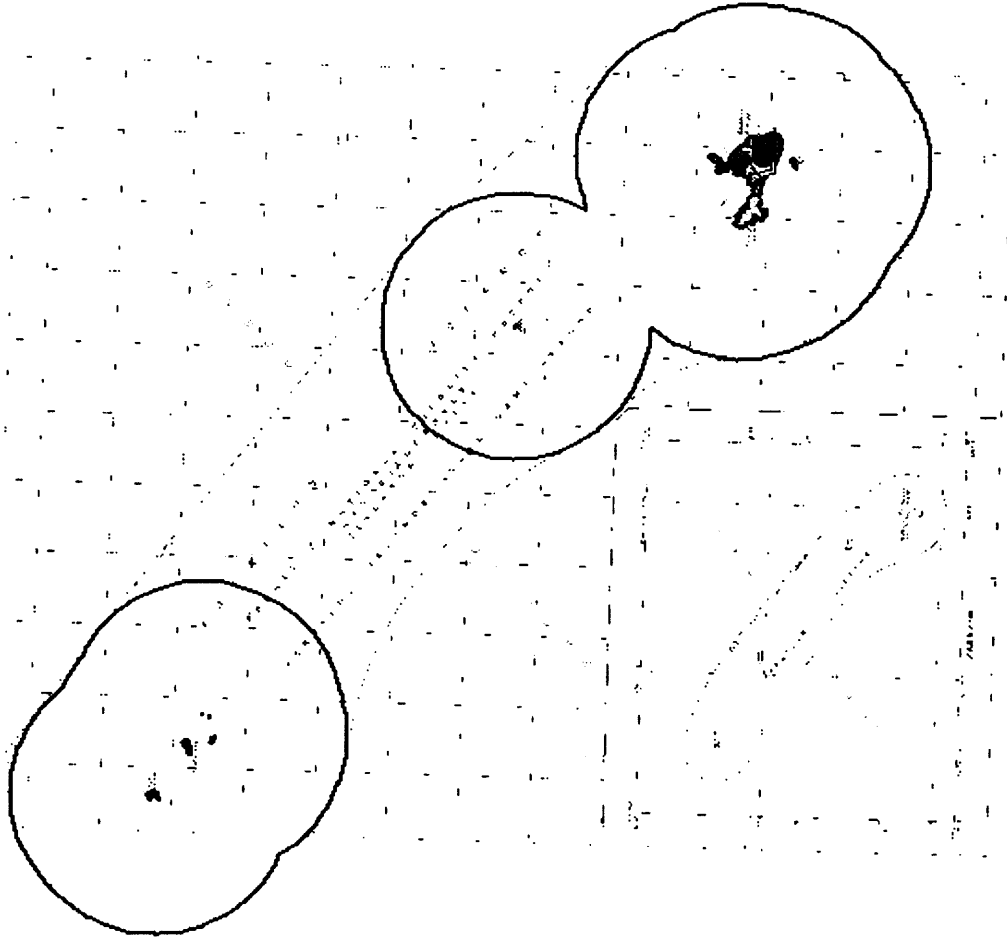
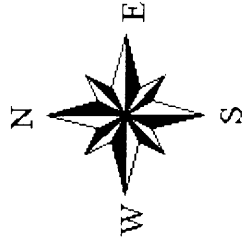
# 09-James V. Fitzgerald Marine Reserve

- Drainages**
- Discharges
  - △ Outlets
  - ◻ Springs/Seeps
  - SWQPA Boundary



# 10-Farallon Islands

- Drainages
- Discharges
  - ⬠ Springs/Seeps
  - SWQPA Boundary

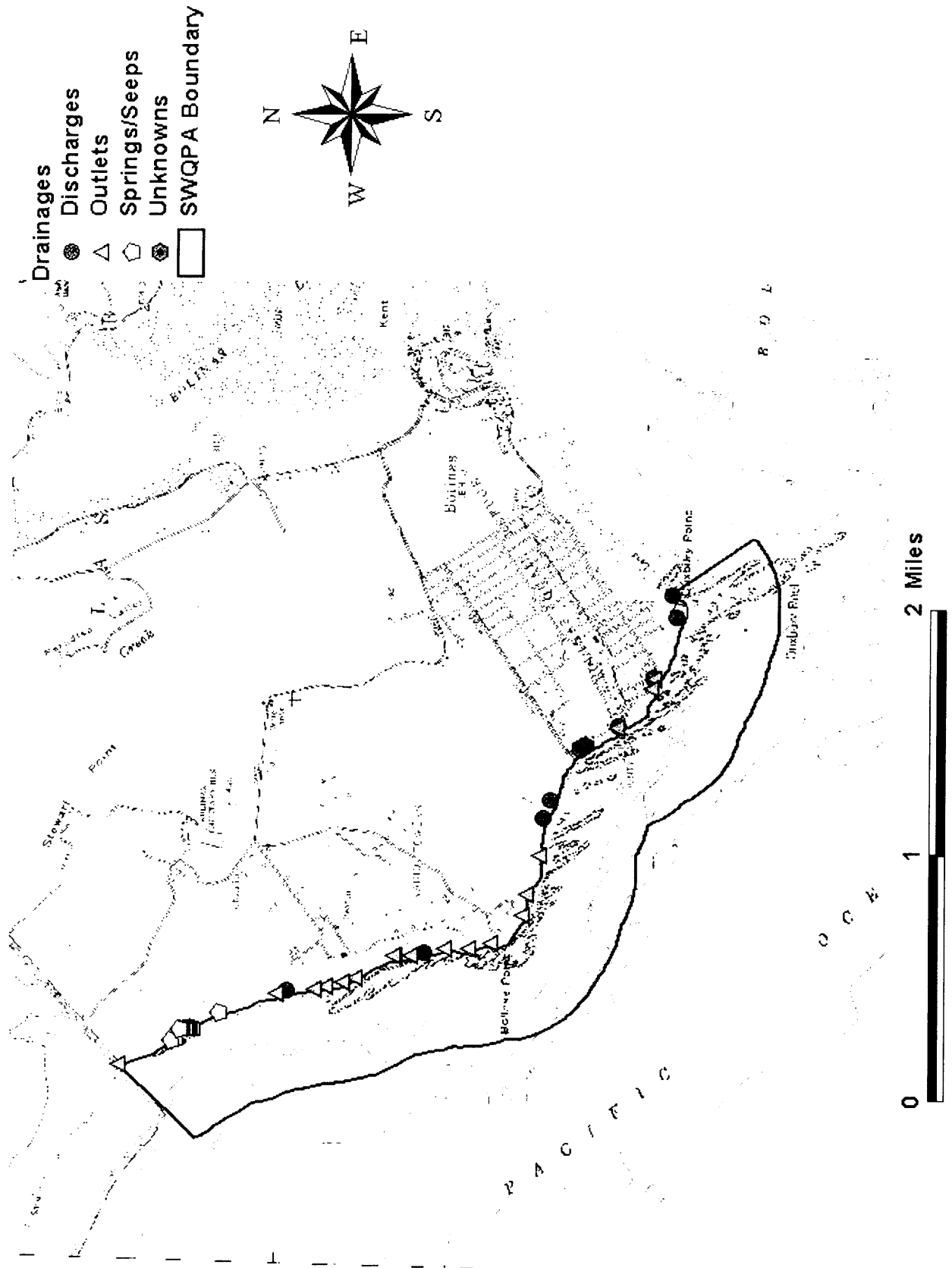


8 Miles

4

0

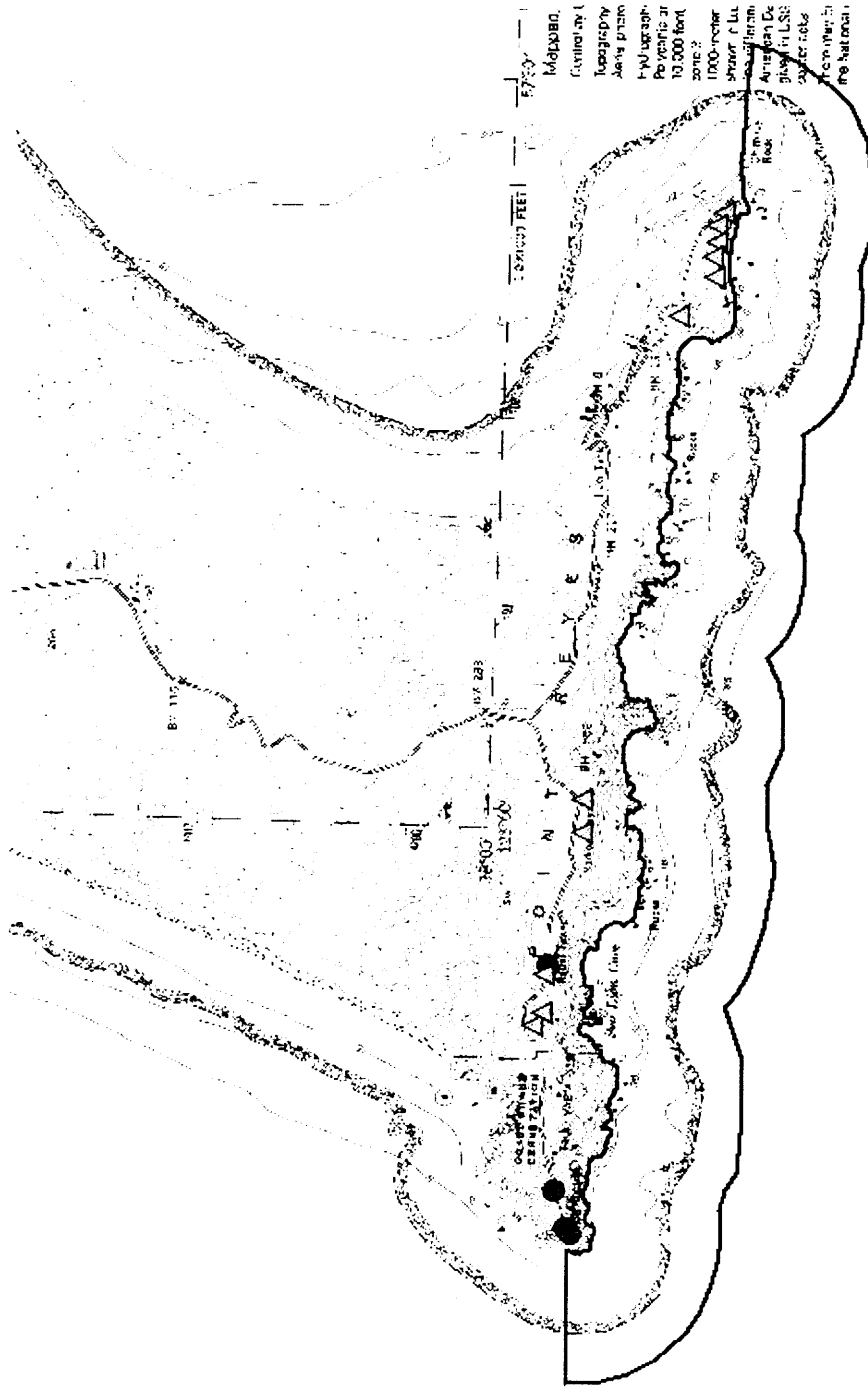
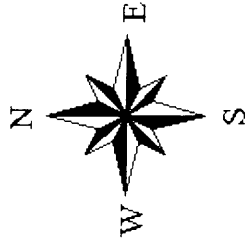
# 11-Duxbury Reef Reserve and Extension





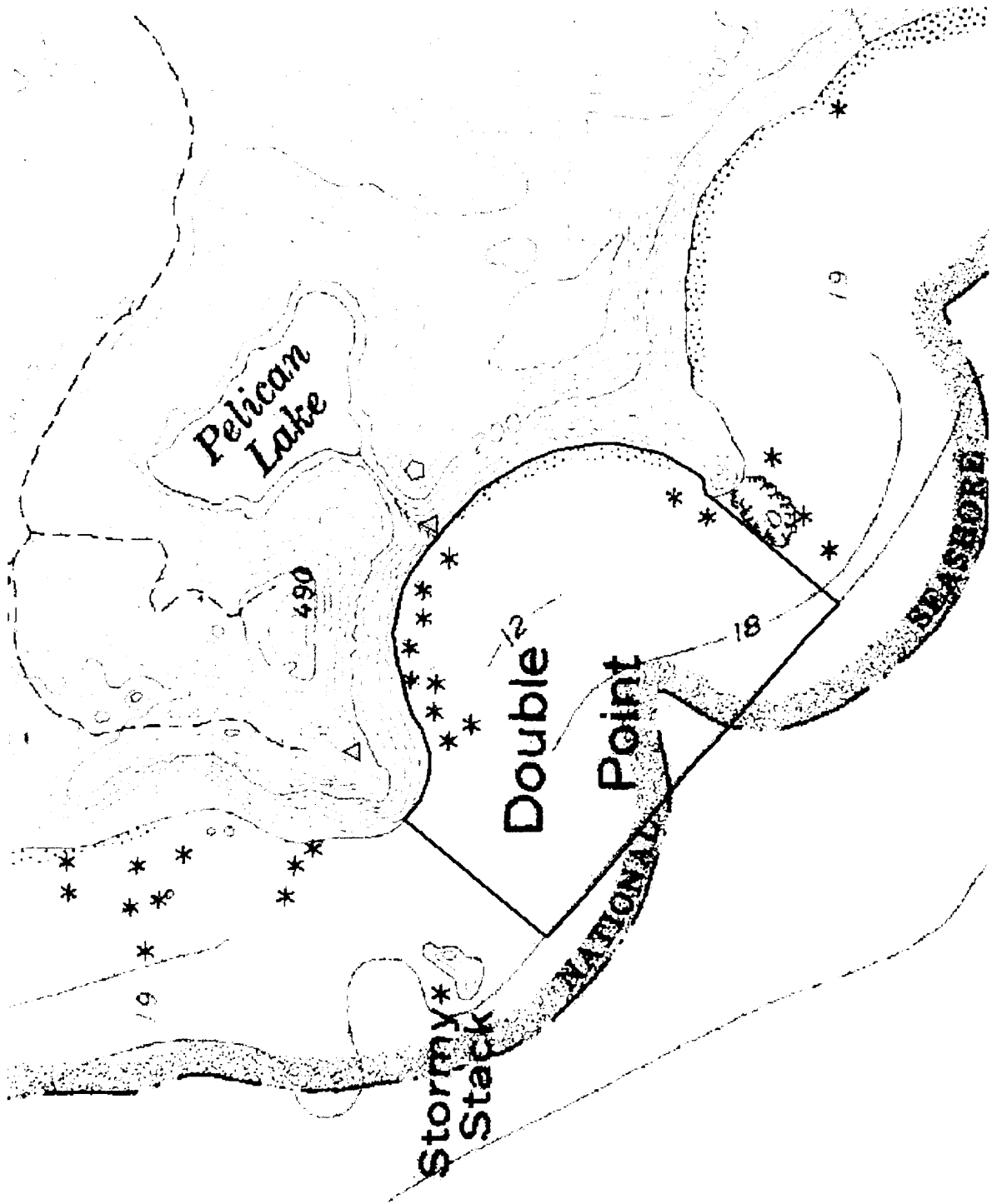
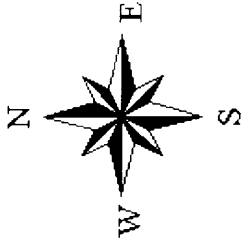
# 12-Point Reyes Headland Reserve and Extension

- Drainages**
- Discharges
  - △ Outlets
  - SWQPA Boundary

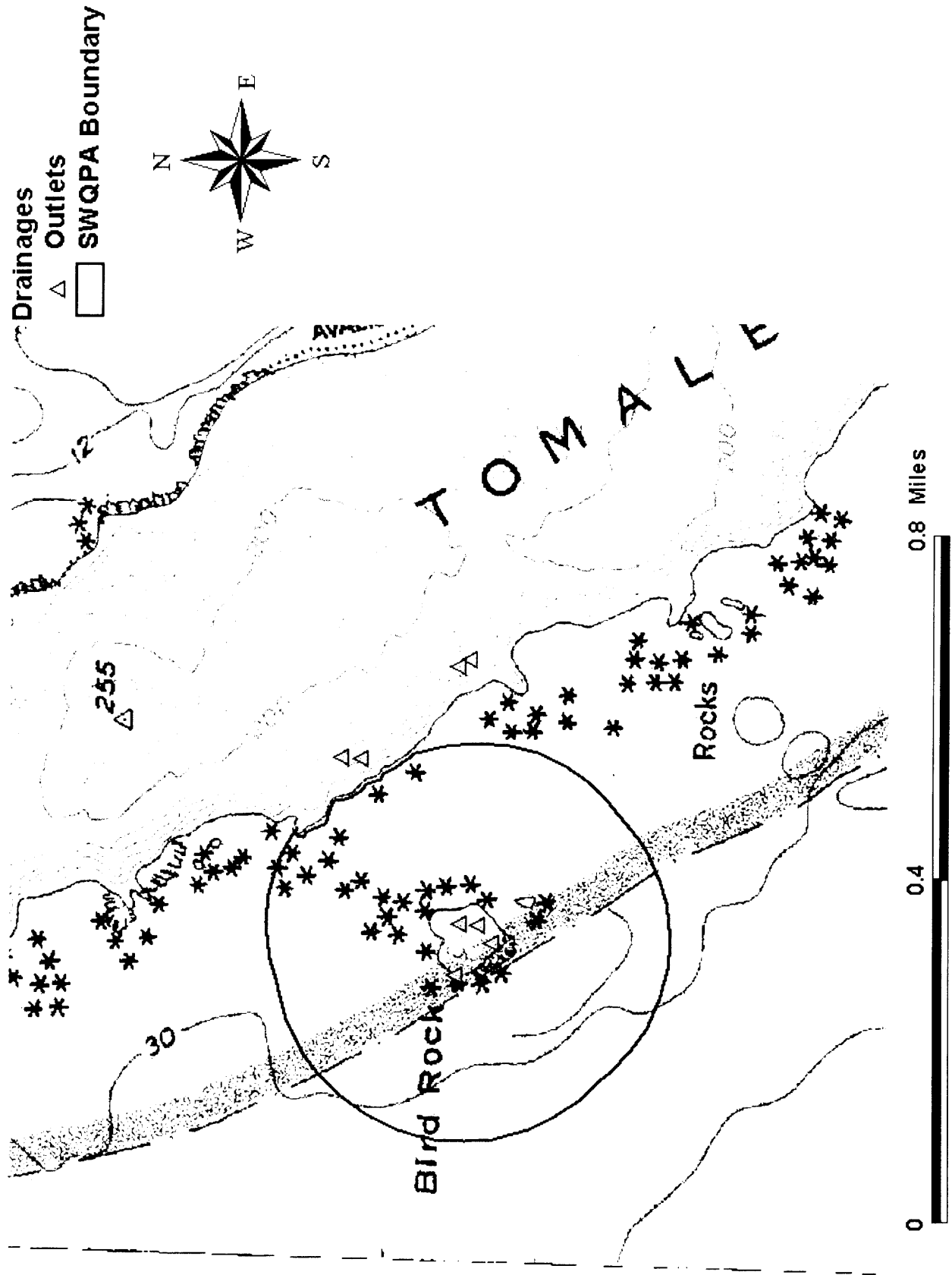


# 13-Double Point

- Drainages**
- △ Outlets
  - ◻ Spring/Seep
  - SWQPA Boundary

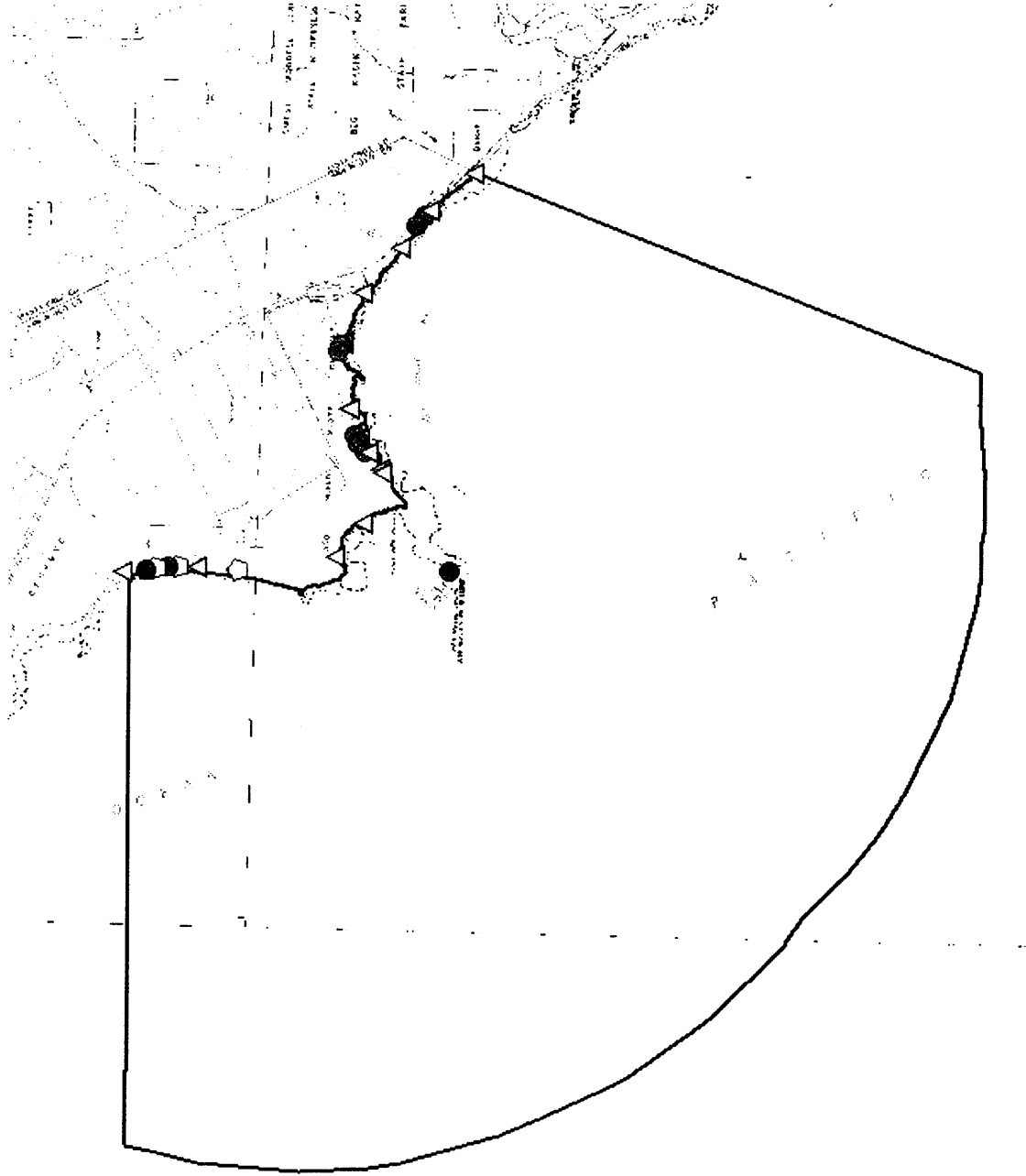
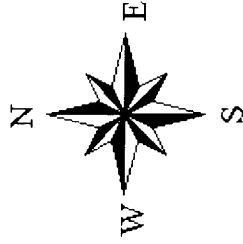


# 14-Bird Rock



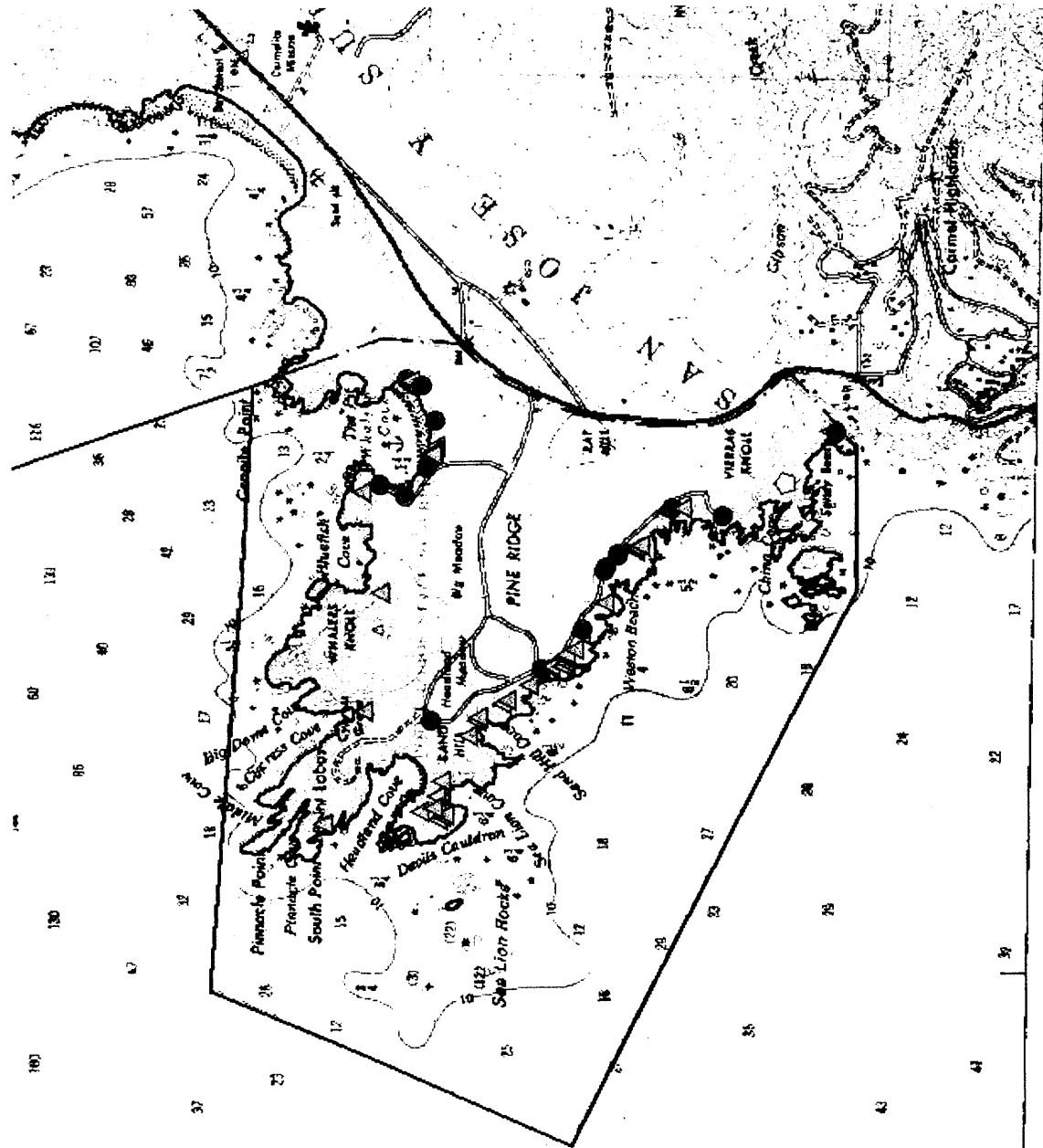
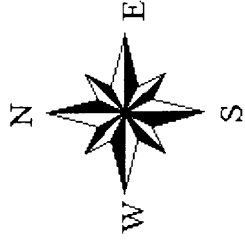
# 15-Ano Nuevo Point and Island

- Drainages**
- Discharges
  - △ Outlets
  - ◊ Springs/Seeps
  - SWQPA Boundary



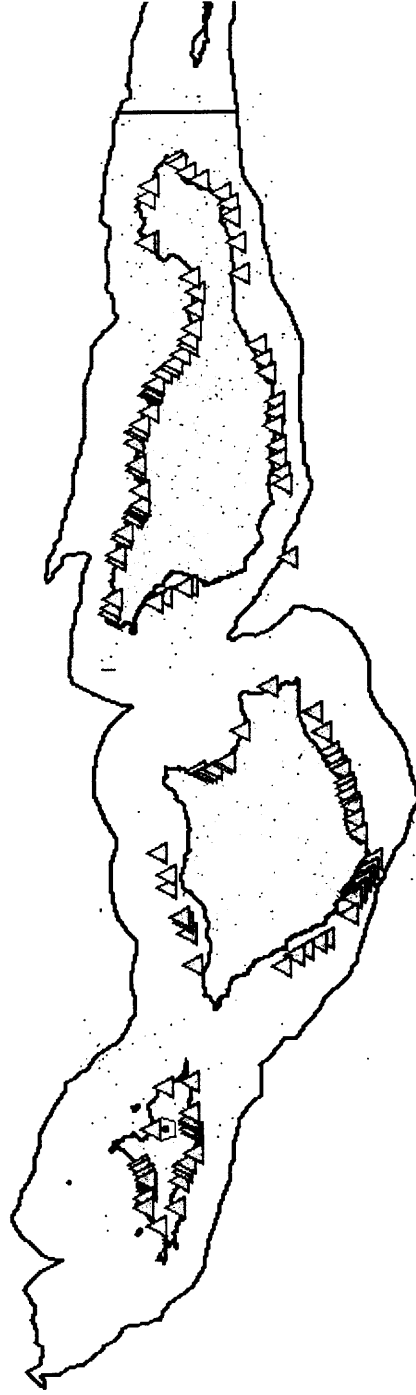
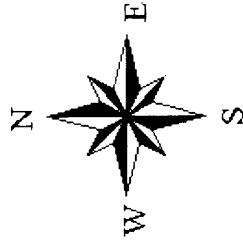
# 16-Point Lobos Ecological Reserve

- Drainages
- Discharges
  - △ Outlets
  - ◊ Spring/Seep
  - SWQPA Boundary



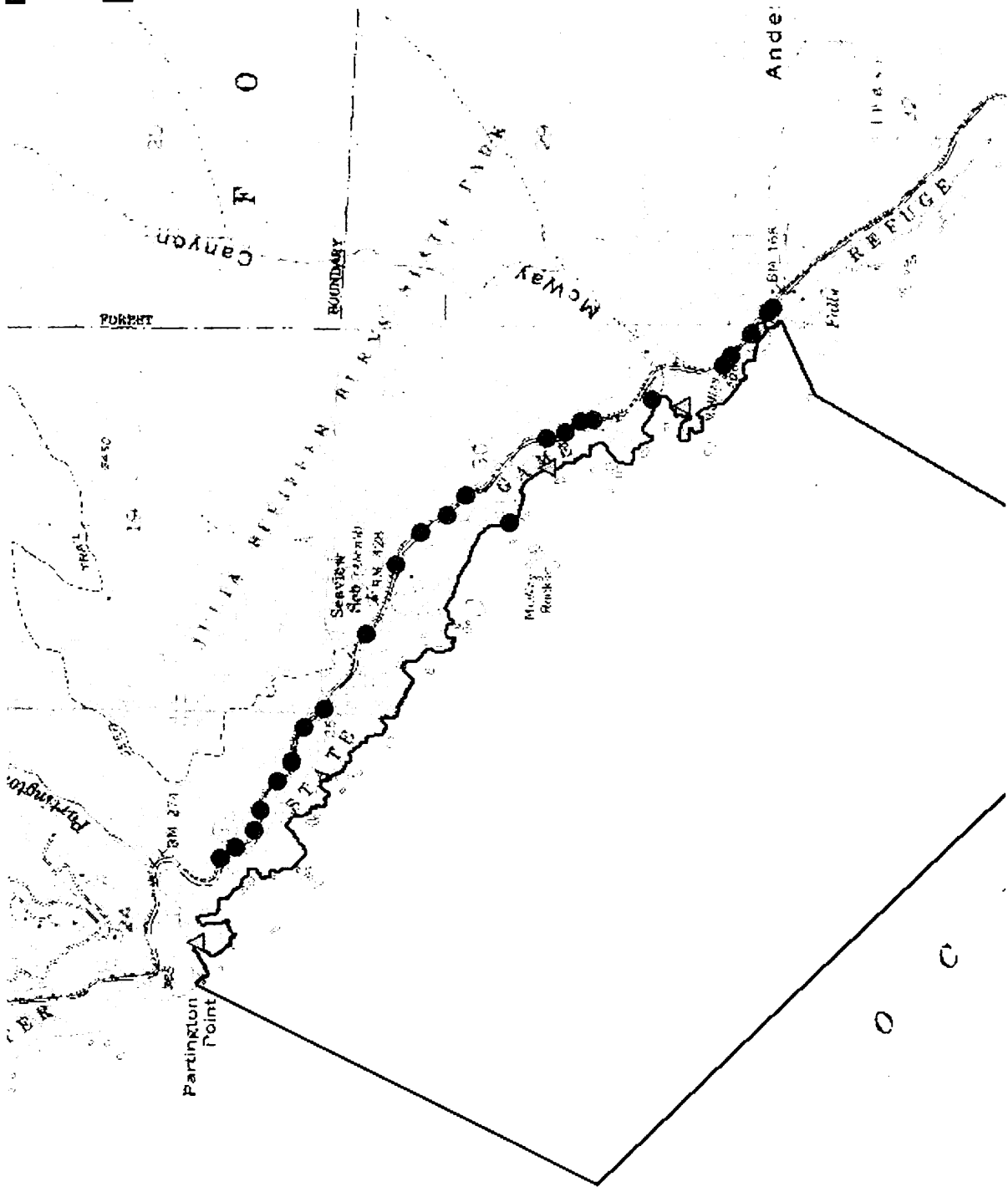
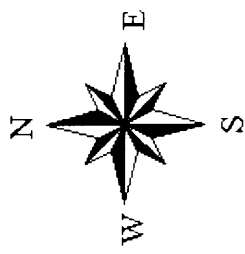
# 17-San Miguel, Santa Rosa, and Santa Cruz Islands

- Drainages**
- △ Outlets
  - ⊕ Potential
  - SWQPA Boundary



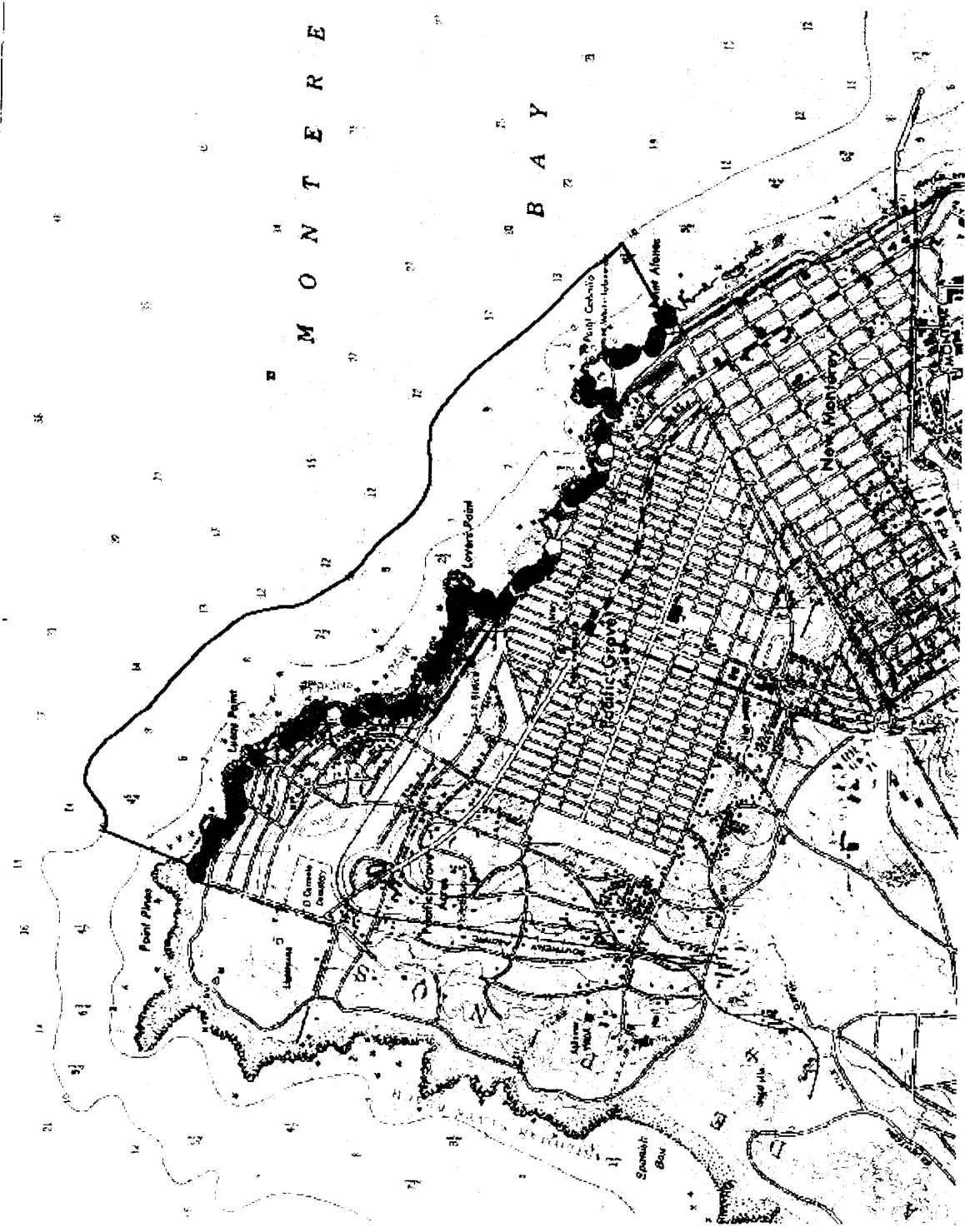
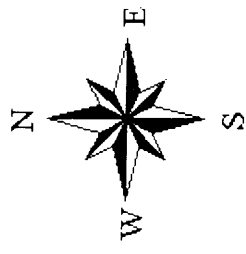
# 18-Julia Pfeiffer Burns Underwater Park

- Drainages**
- Discharges
  - △ Outlets
  - SWQPA Boundary



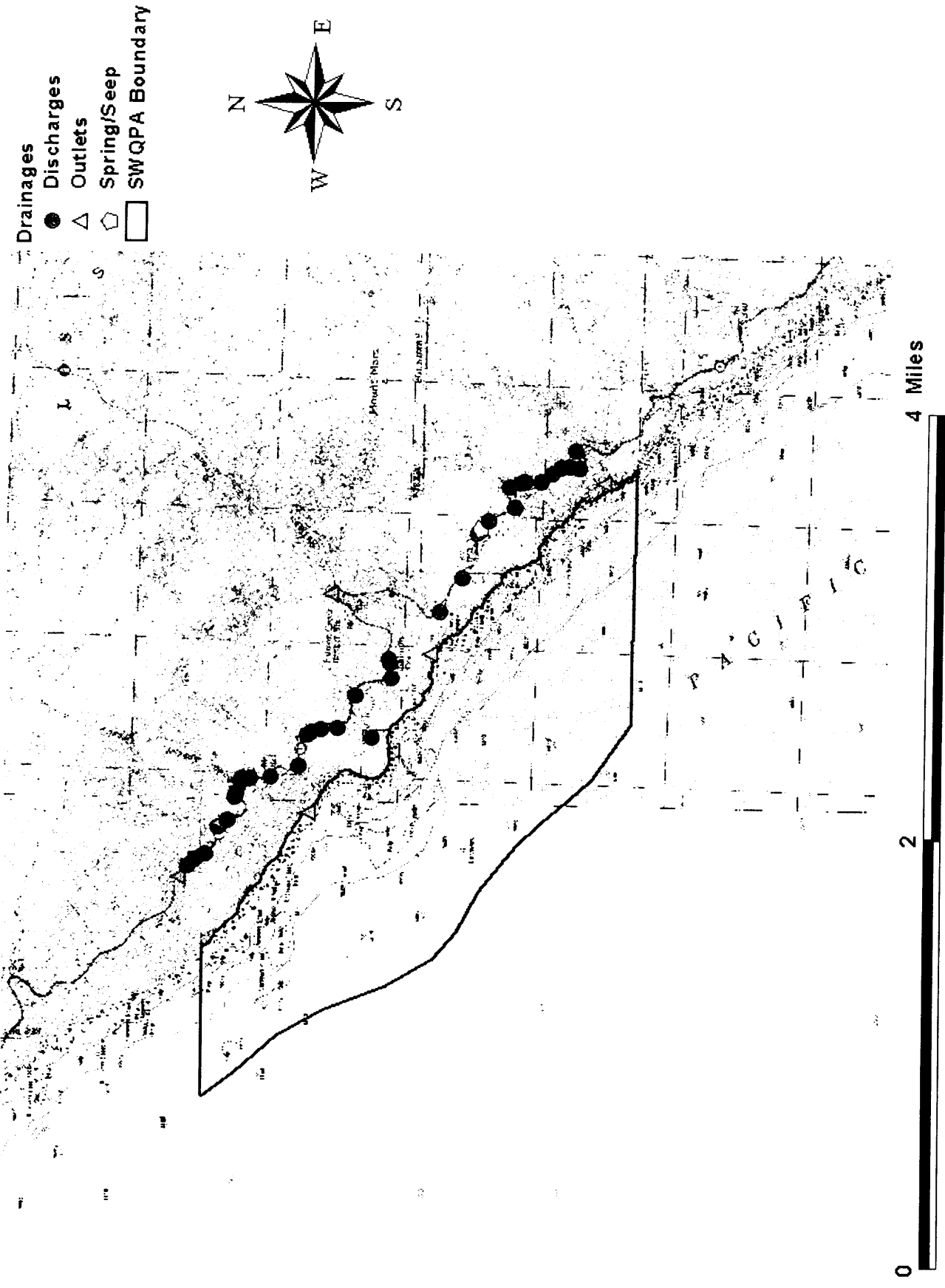
# 19-Pacific Grove Marine Gardens Fish Refuge and Hopkins Marine Life Refuge

- Drainages**
- Discharges
  - △ Outlets
  - ◊ Springs/Seeps
  - SWQPA Boundary



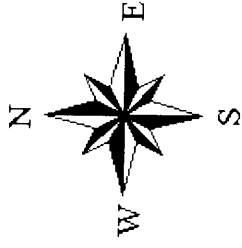


# 20-Ocean Area Surrounding the Mouth of Salmon Creek

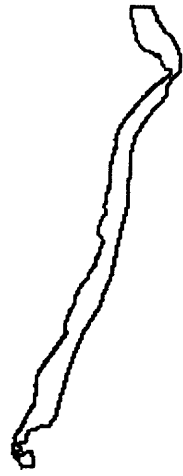
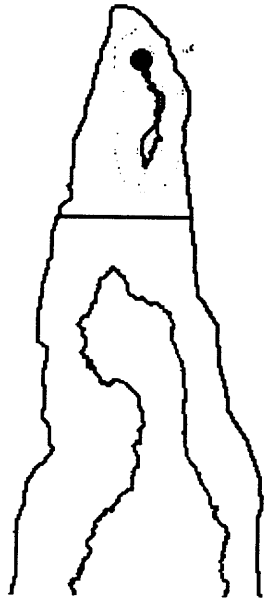


# 21-San Nicolas Island and Begg Rock

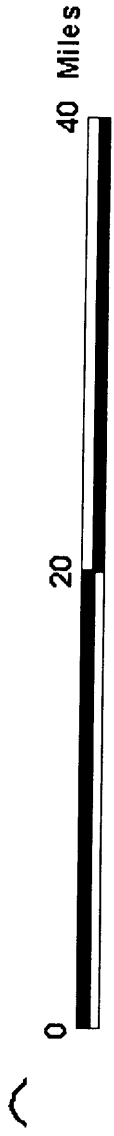
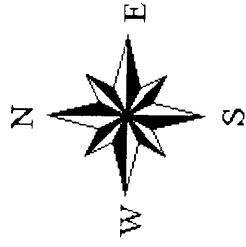
- Drainages
- Discharges
  - △ Outlets
  - SWQPA Boundary
  - Begg Rock



# 22-Santa Barbara Island, Santa Barbara County and Anacapa Island

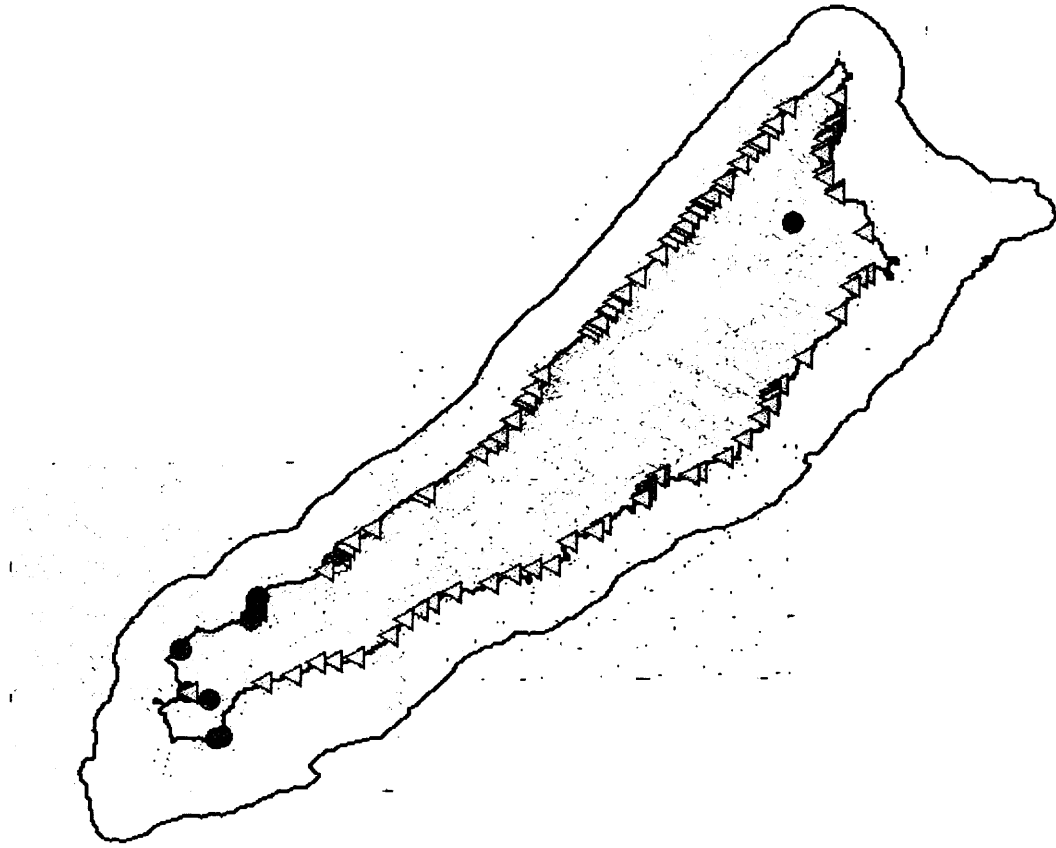
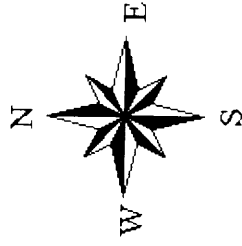


- Drainages
- Discharges
  - ⬜ Potential
  - ⬜ SWQPA Boundary



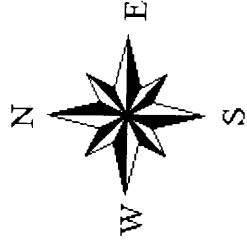
# 23-San Clemente Island

- Drainages
- Discharges
  - △ Outlets
  - ◻ Potential
  - ◻ Unknown
  - SWQPA Boundary



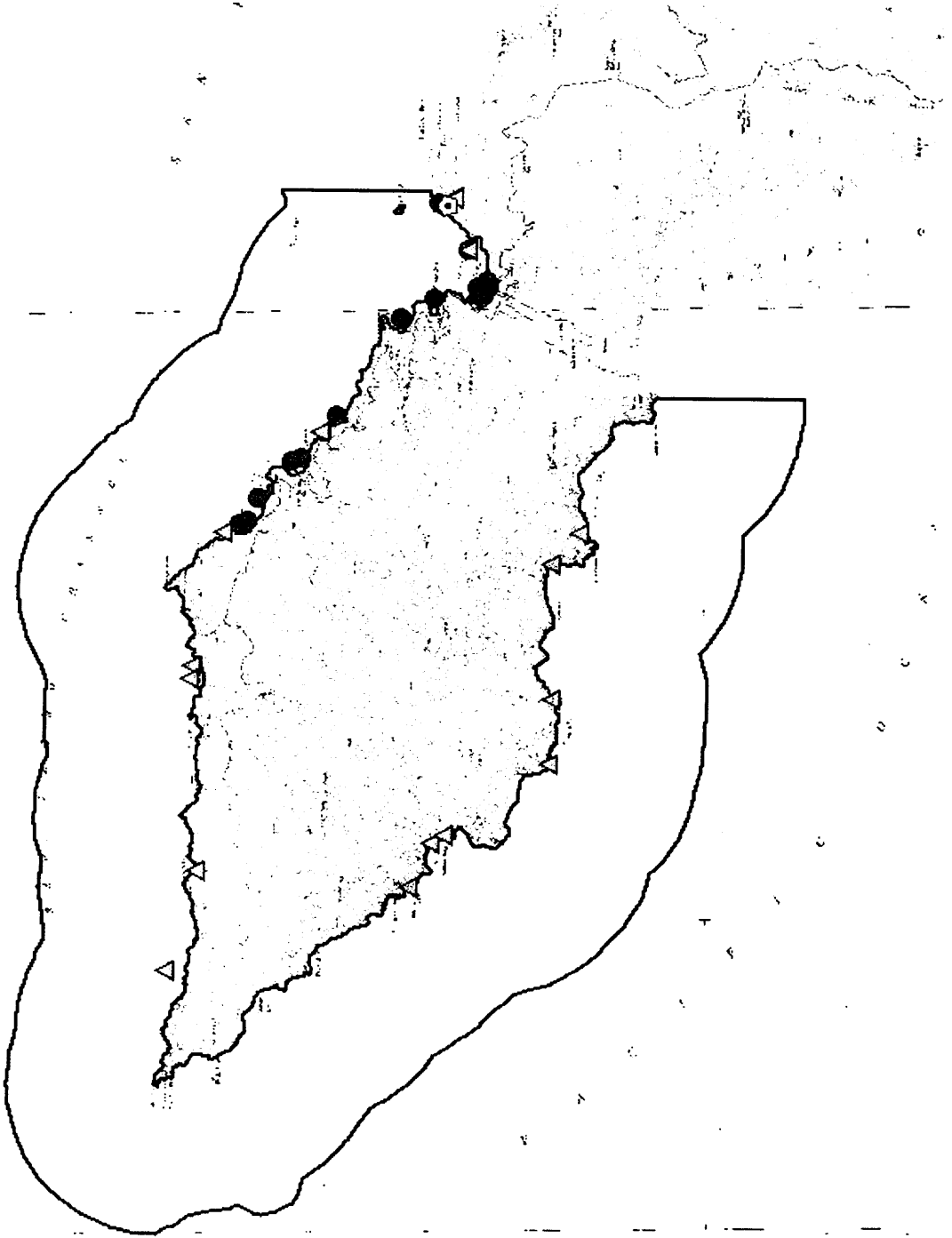
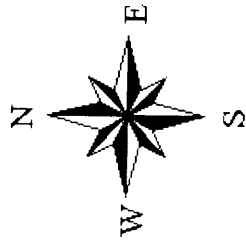
# 24-Mugu Lagoon to Latigo Point

- Drainages**
- Discharges
  - △ Outlets
  - ⊕ Potentials
  - SWQPA Boundary

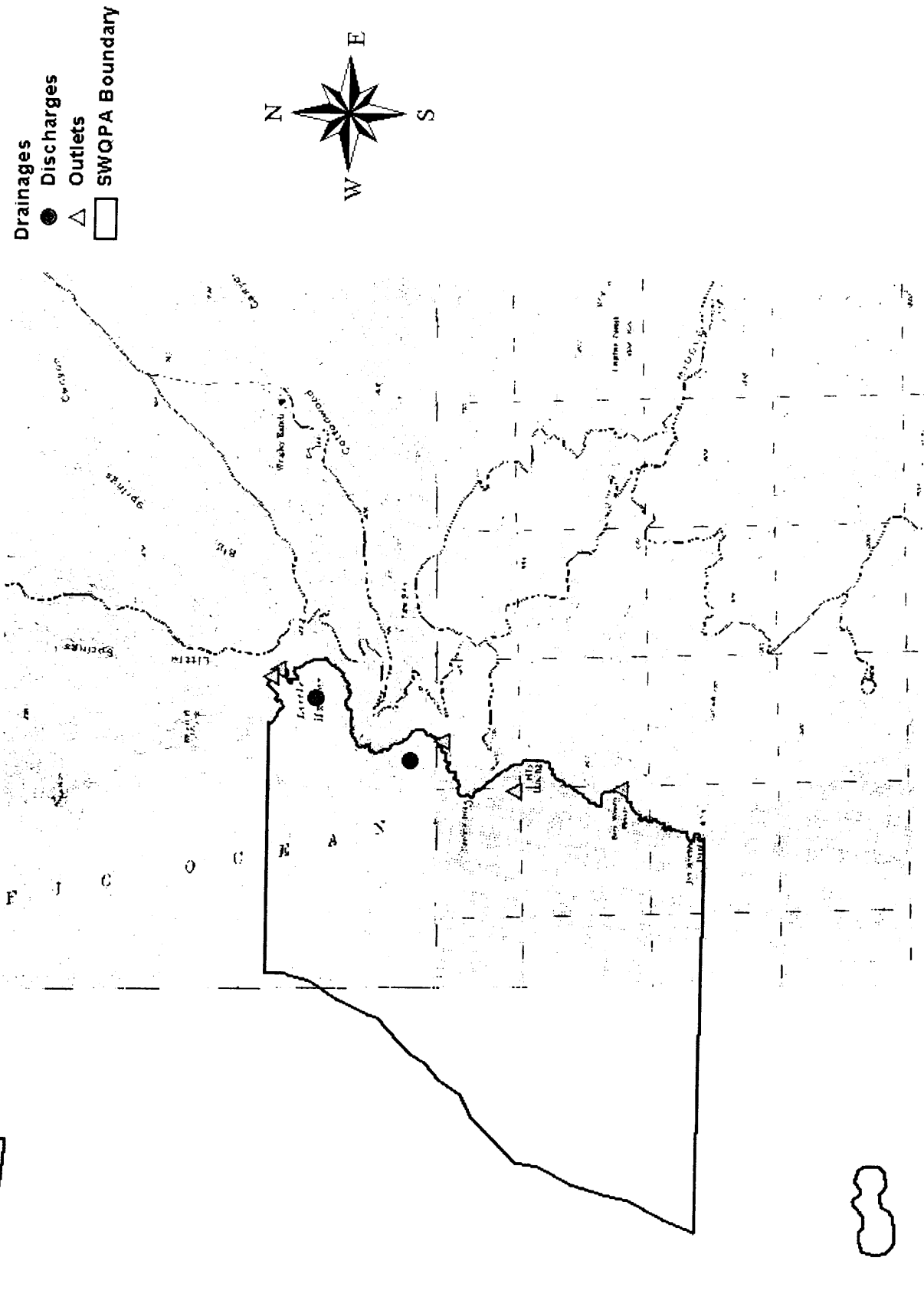


# 25-Santa Catalina Island - Subarea One, Isthmus Cove to Catalina Head

- Drainages**
- Intake
  - Discharges
  - △ Outlets
  - ⊕ Potentials
  - SWQPA Boundary

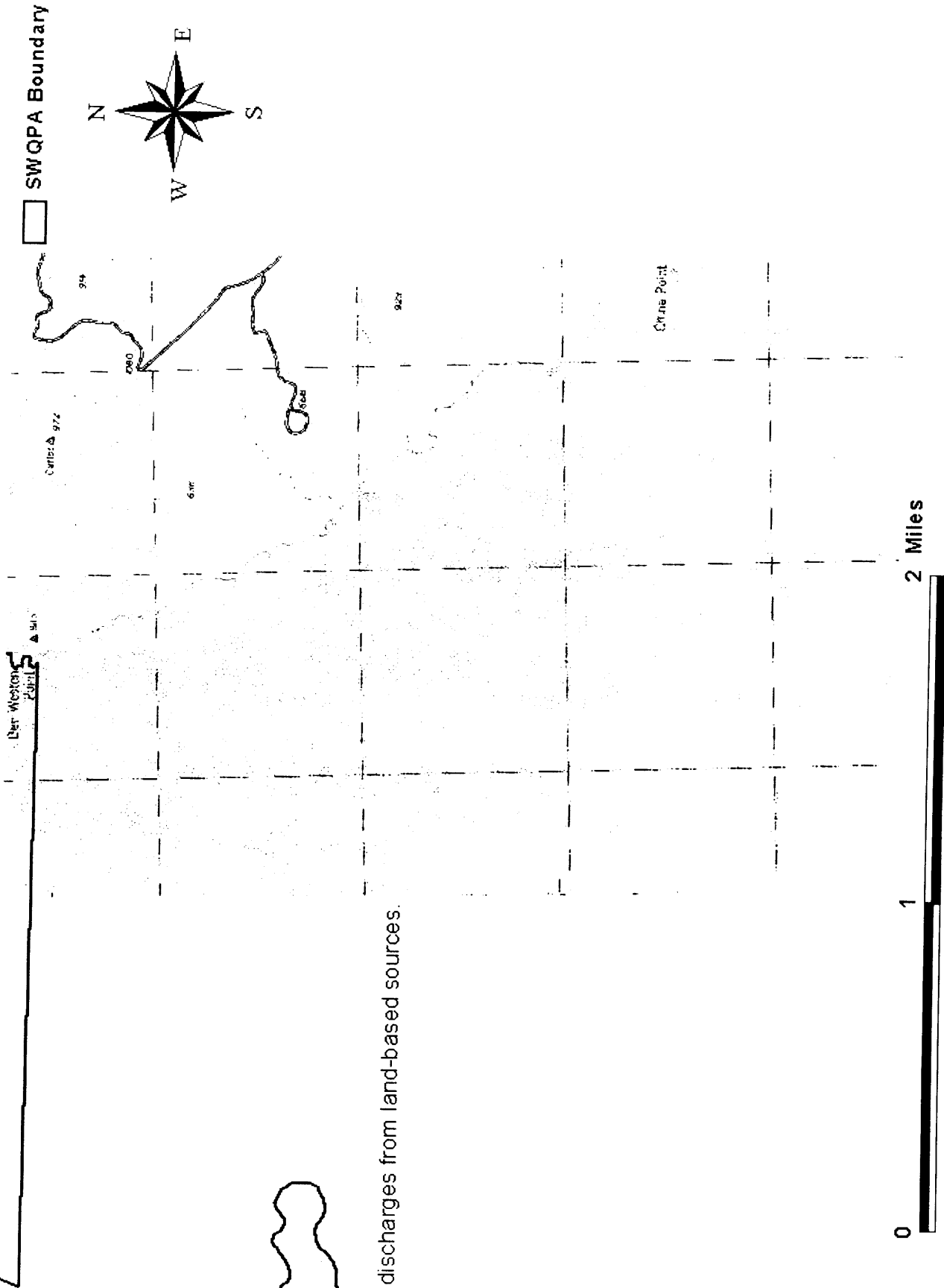


26-Santa Catalina Island - Subarea Two, North End of Little Harbor to Ben Weston Point



0 2 4 Miles

# 27-Santa Catalina Island - Subarea Three, Farsworth Bank Ecological Reserve

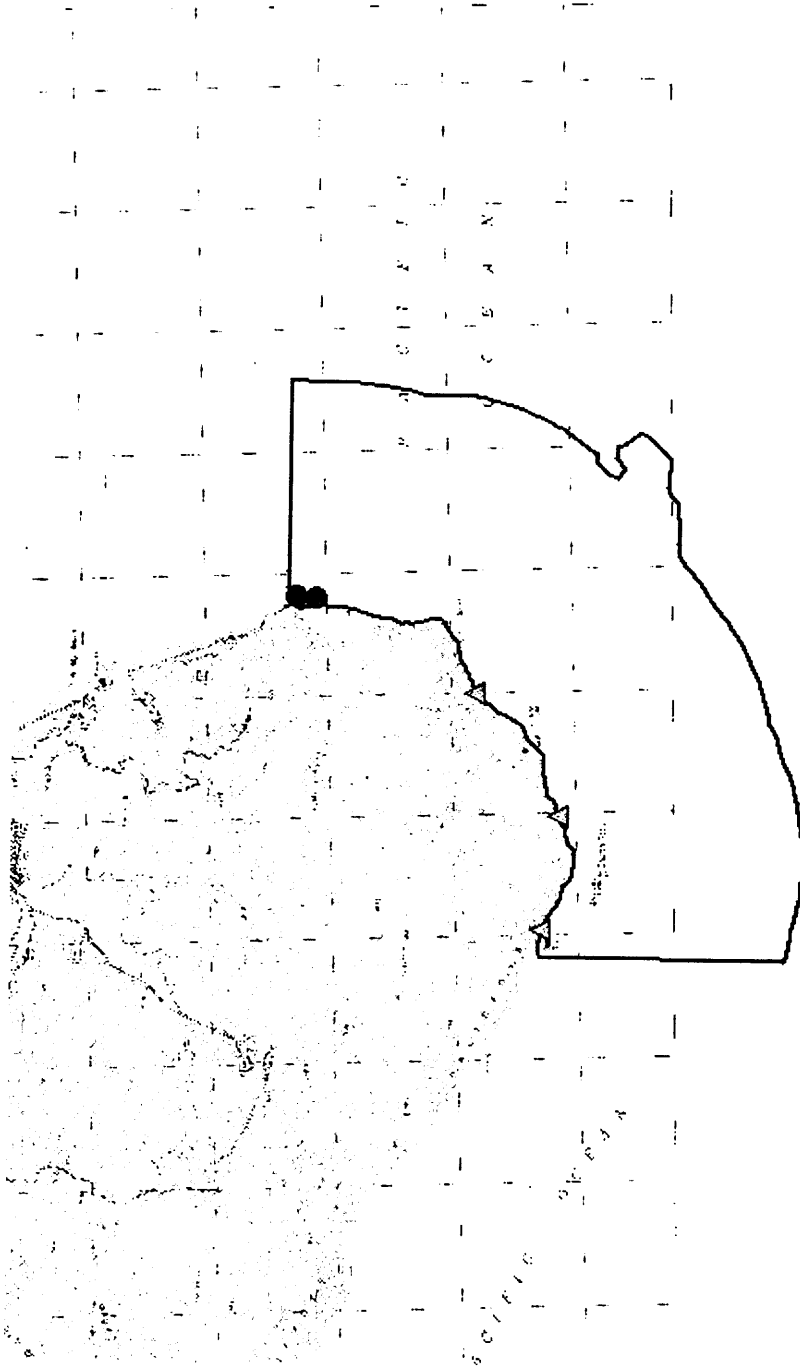


No discharges from land-based sources.

0 1 2 Miles

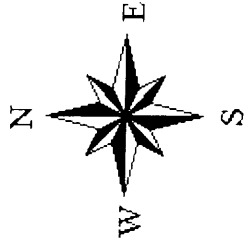


# 28-Santa Catalina Island - Subarea Four, Binnacle Rock to Jewfish Point

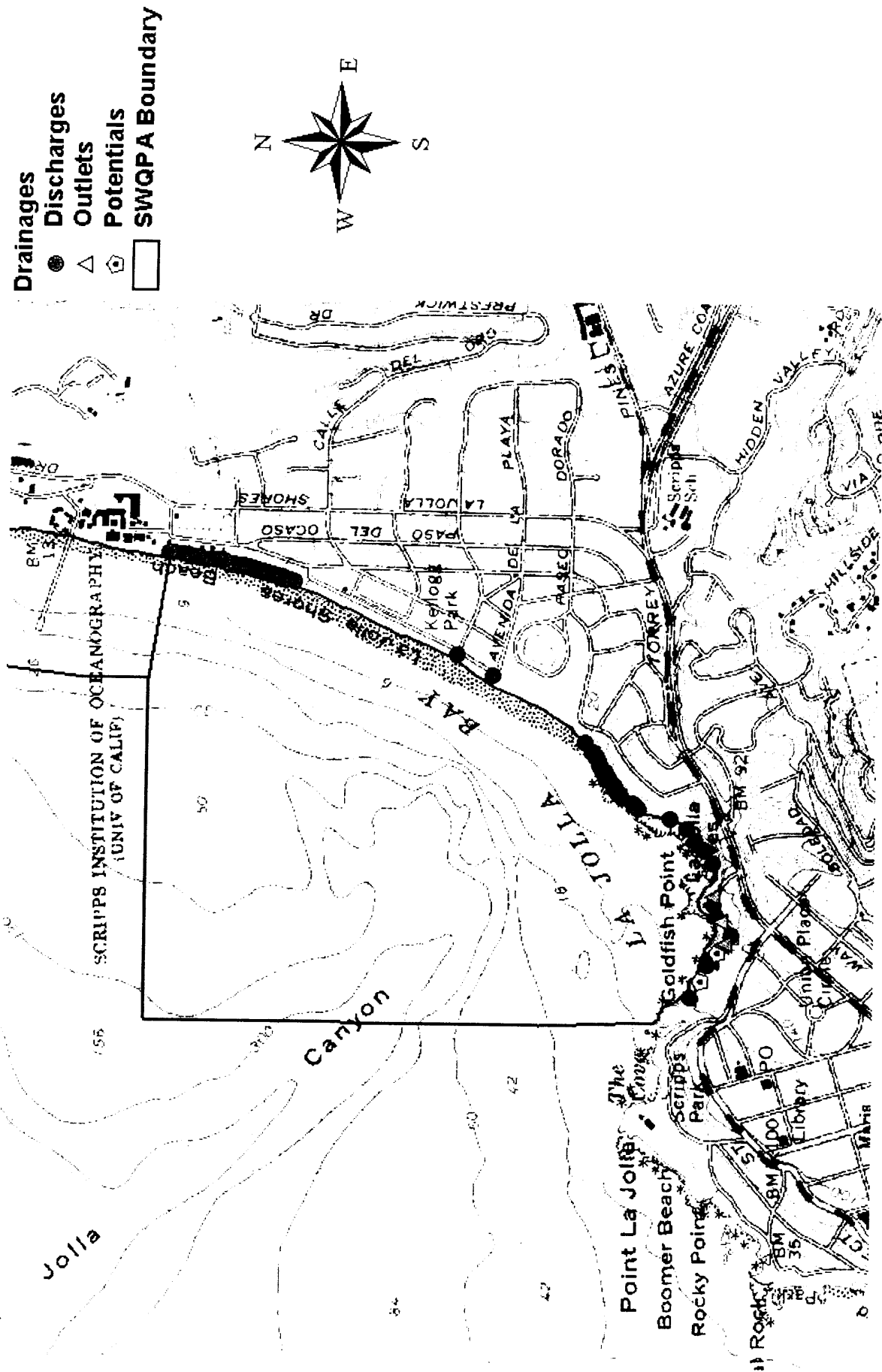


## Drainages

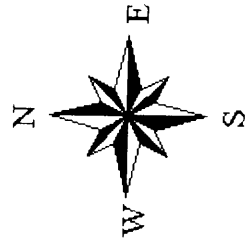
- Discharges
- ▲ Outlets
- SWQPA Boundary



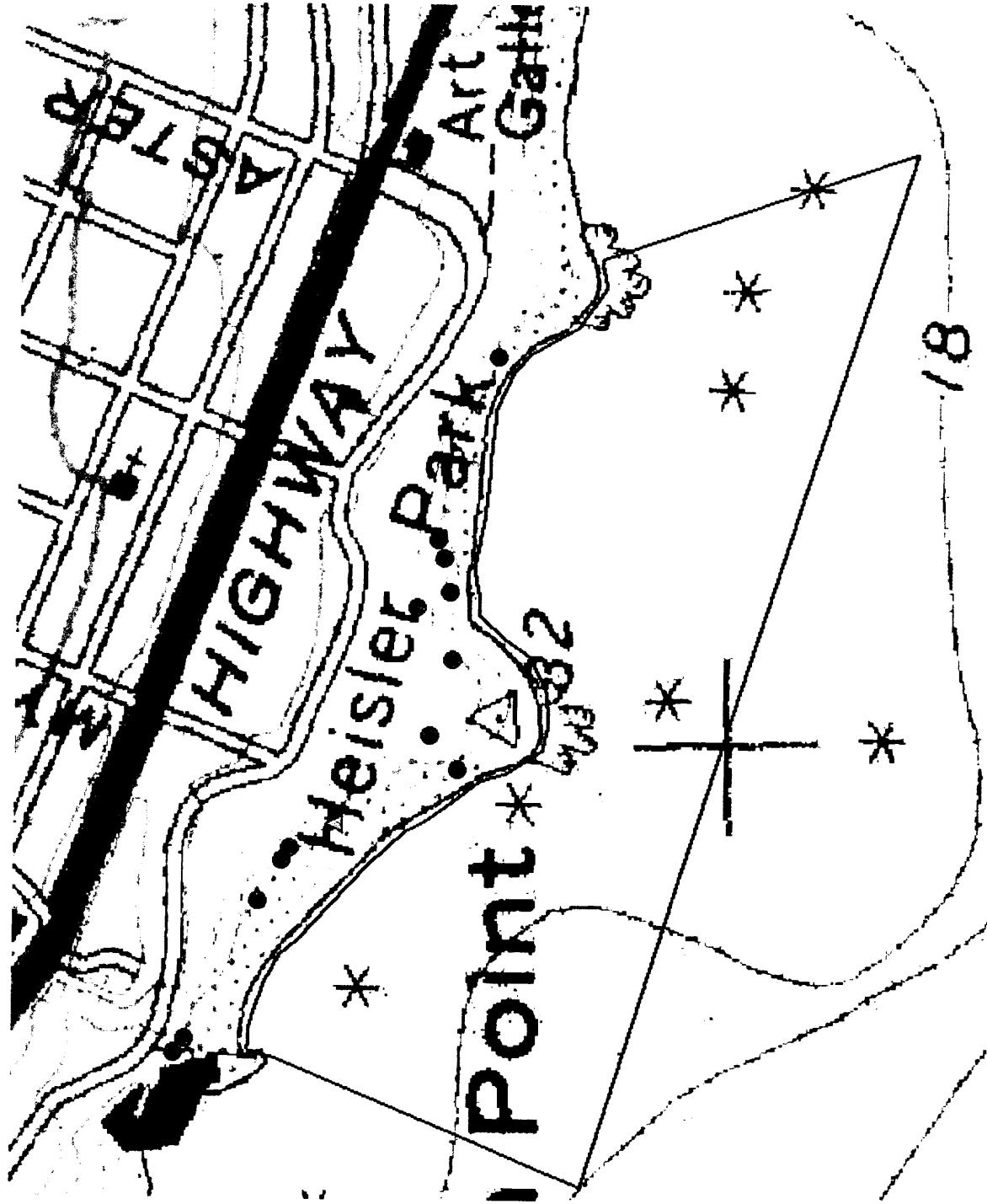
# 29-San Diego-La Jolla Ecological Reserve



- Drainages**
- Discharges
  - ▲ Outlets
  - ⬠ Potentials
  - ▬ SWQPA Boundary

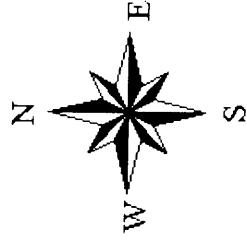


# 30-Heisler Park Ecological Reserve



## Drainages

- Discharges
- △ Outlet
- SWQPA Boundary



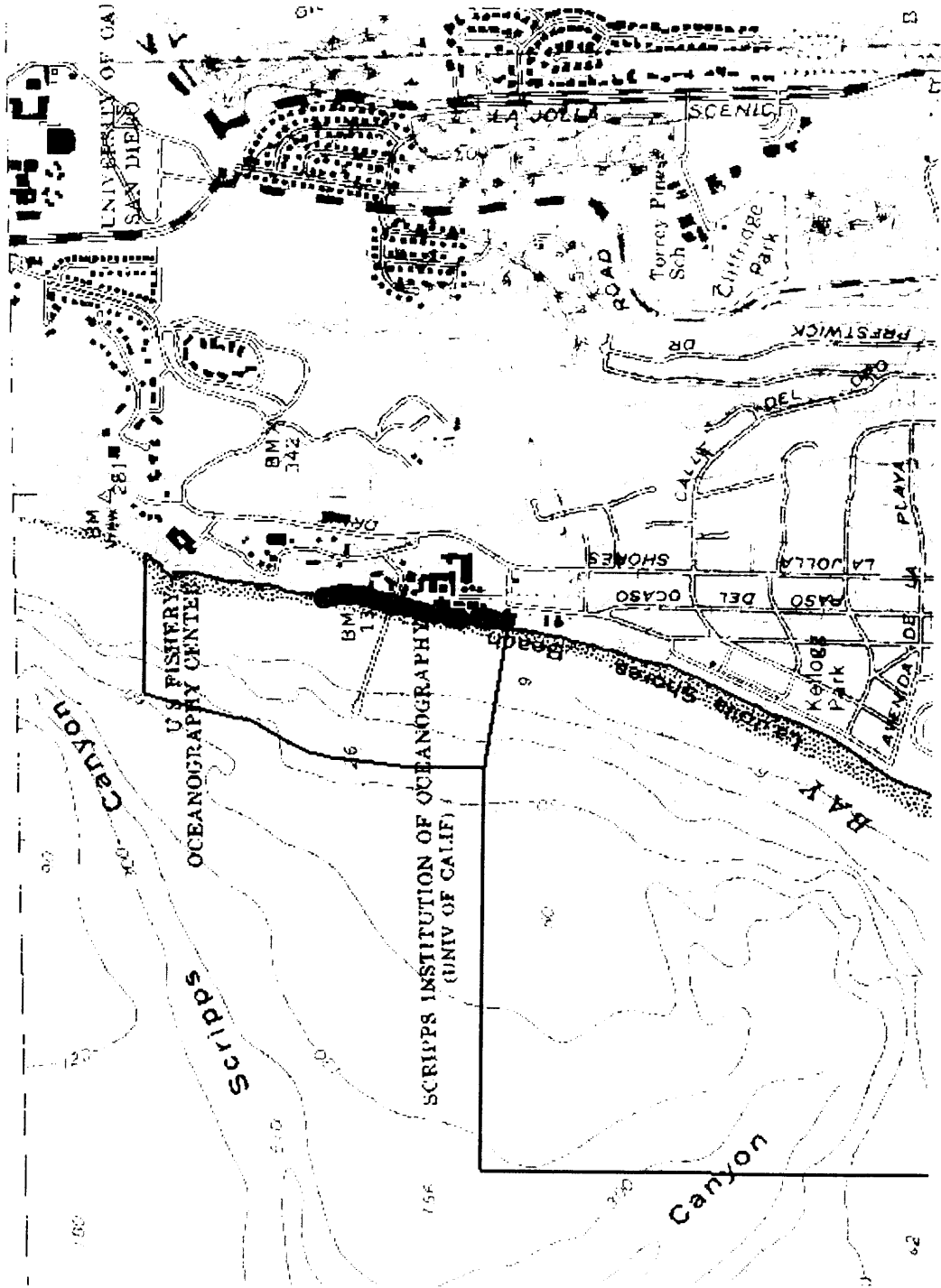
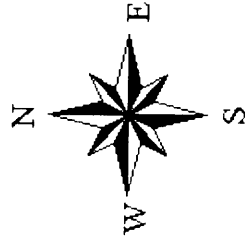
0.4 Miles

0.2

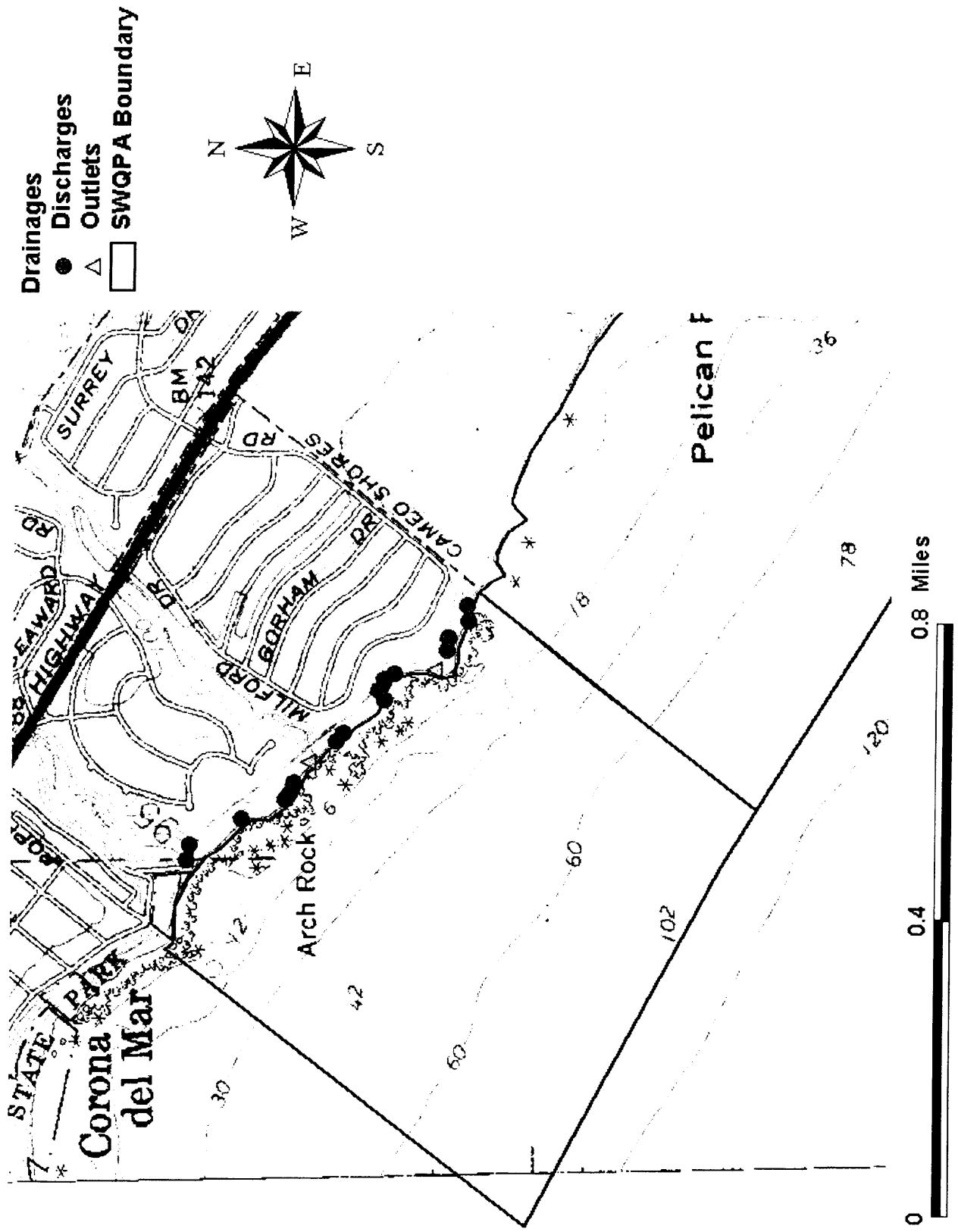
0

# 31-San Diego Marine Life Refuge

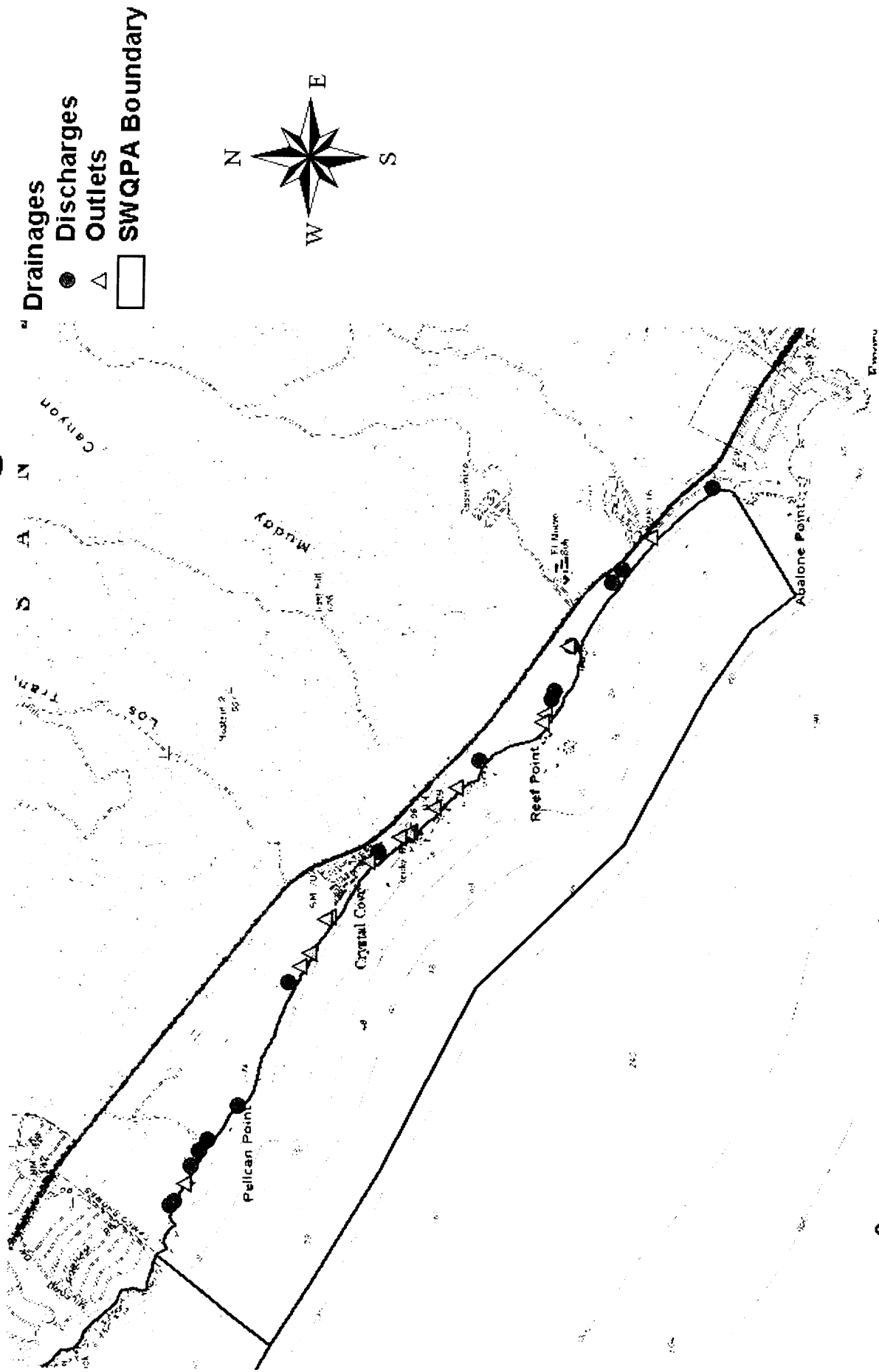
- Drainages
- Discharges
  - SWQPA Boundary



# 32-Newport Beach Marine Life Refuge

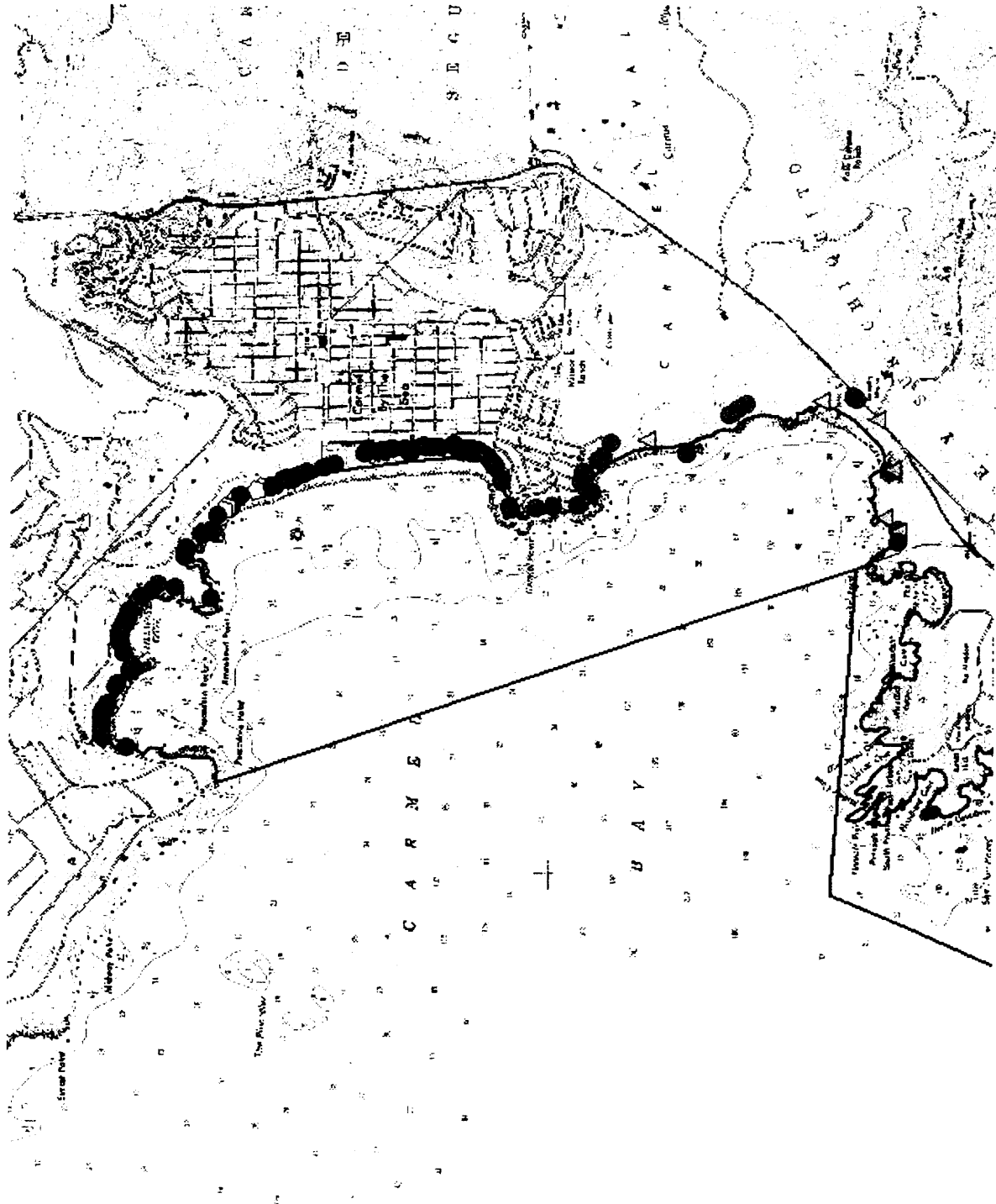
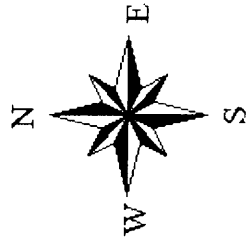


# 33-Irvine Coast Marine Life Refuge



# 34-Carmel Bay

- Drainages**
- Discharges
  - △ Outlets
  - ◊ Springs/Seeps
  - ◆ Unknowns
  - SWQPA Boundary



0 1 2 Miles

