Commentor: Department of Transportation – Robert F. Joseph

Date: April 23, 1999

Response:

Thank you for your comments, no response required.

Commentor: American Sportfishing Association – Daniel Frumkes

Date: May 1, 1999

Response:

Thank you for your comments. Please see response to the California Department of Fish and Game letter.

Commentor: Rimmon C. Fay, Ph.D.

Date: April 21, 1999

Response:

Thank you for your comments. Please see response to the California Department of Fish and Game letter.

STATE OF CALIFORNIA—THE RESOURCES AGENCY

GRAY DAVIS, GOVERNOR

CALIFORNIA COASTAL COMMISSION

45 FREMONT, SUITE 2000
AN FRANCISCO, CA 94105-2219
VOICE AND TDD (415) 904-5200
FAX (415) 904-5400

April 23, 1999

Mr. Goodyear K. Walker
California State Lands Commission
100 Howe Ave., Suite 100 South
Sacramento, CA 95825

Dear Kirk:

Thank you for sending the *Initial Study and Proposed Negative Declaration* (ND) for the proposed Exxon Belmont Island Decommission Project to Coastal Commission staff for review. Enclosed are our comments. The decommissioning of Belmont Island will require a Coastal Development Permit. The Coastal Commission will thus be reviewing the project for its consistency with the Coastal Act's resource protection and use policies. The additional information we request below is needed for our evaluation.

PROJECT DESCRIPTION

Removal of the Caisson Core and Other Island Components

1. Please explain in detail the plans for the removal, containment, transportation, treatment, and disposal of contaminated core materials, including Cellar No. 2 and its contents (mentioned on p. 3-40 of the *Initial Study and Proposed Negative Declaration*).

2. What is the rationale for cutting off the sheet piles at or below natural bottom when the well conductors will be 5 feet below natural bottom? If "below natural bottom," how many feet below will the well conductors be cut off? Will there be a depression in the center of the caisson core after work is completed, since all fill is proposed for removal?

3. Have the pilings been treated with, or do they contain, creosote?

4. For pilings that cannot be extracted and will be cut off, does the State Lands Commission have a standard policy—cutting them off even with the bottom, or some depth (quantify) below the bottom?

Offshore Pipeline Termination

5. If the pipeline bundle does not terminate at a pipe sled offshore, where will it terminate? How will the ends be plugged?

Onshore Pipeline Termination

6. How the onshore ends of the pipelines will be terminated onshore should be described.

7. The ND states, in regards to the pipelines, "The proposed decommissioning procedures will be typical of procedures used to decommission pipelines offshore California...All the lines will be disconnected from the offshore caisson and buried" (pp. A-4-A-5). Does the SLC have a standard policy for how deeply the pipeline ends should be buried, to eliminate snagging and other hazards?

Project Related Discharges to Marine Waters

8. How much wastewater is expected to be generated during removal of the concrete? Will it be discharged into the ocean, or contained?

9. The maximum amounts of paint, concrete, and steel cuttings that may enter marine waters should be estimated. What are the procedures that will be used to reduce potential discharges, to the maximum extent feasible?

Project Activities Requiring Artificial Light

10. What project activities will occur after dark, requiring artificial light (p. 3-47)?

Decommissioning of Onshore Facility

11. The ND states that the decommissioning of the onshore facility "...is a separate project being conducted in parallel with this proposed offshore decommissioning project" (p. A-6). We believe that the current status of the onshore facilities and their relationship to this proposed project should be described in this document. A detailed description and site plan showing all onshore facilities associated with Belmont Island, including a complete inventory of all past and present facilities and operations at the site should be included. What is the current disposition of these facilities, and what plans, if any, exist for future demolition/abandonment? Will remedial action be required? A summary of the hazardous substance assessments undertaken at the site should also be provided.

ANALYSIS OF ALTERNATIVES

12. Please assess the impacts of alternatives to leaving grouting the 8-inch pipeline and leaving all pipelines in place. Why is pipeline diameter a factor in grouting the lines? The alternatives of grouting all lines, not filling the lines and perforating them so they continue flush gradually over time, and removal of the pipelines through the surf zone should be assessed also. Similarly, removal of the power cable through the surf zone and associated impacts should be considered.

13. To support the analysis, current and historical pipeline and electrical cable burial status should be assessed for the entire length of the lines, supported with a recent sidescan sonar or

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diver survey and any other available surveys or observations. Have any of the pipelines or the cable been exposed due to beach erosion?

ENVIRONMENTAL IMPACT ANALYSIS

14. Please note that the California Coastal Commission is not the lead agency for this ND (p. 2-1).

Land Use Planning

15. The onshore facility should be described in detail in this section.

16. Please delete the "Coastal Act Policy Consistency section (pp. 3-3-3-6). The Coastal Commission has not yet reviewed the project and therefore there has been no finding yet of the project's consistency or inconsistency with Coastal Act policies.

Geology and Soils

17. Please analyze if there will be changes in sediment transport resulting from project activities.

18. Please include information, both in this section and in the "Biological Resources" section, about the substrate where work vessel anchoring will occur. Associated impacts and proposed mitigation should be presented.

Water

19. Note that the discussion of water contamination should state which tests will be used to determine contamination. We recommend that water associated with the core material should be tested by the GC/MS method. The Coast Guard standard for an oil spill is the presence of hydrocarbons greater than or equal to 15 ppm; if the tests show the level exceeds this standard, then all core water should be removed and treated. The document should describe how it will be handled and disposed of.

20. Did either the Preliminary Environmental Assessment or the Additional Environmental Assessment, undertaken to determine the extent of contamination of caisson core material, analyze the core material for PCBs?

21. If any rock and or other materials are proposed for aquatic disposal, then the method of judging them free of hydrocarbons and other hazardous materials should be provided in the ND.

22. If not already completed, a site assessment should be conducted by a certified laboratory to determine whether sediments that will be disturbed by piling removal and other project activities may be contaminated with petroleum hydrocarbons, metals or other hazardous materials.

23. The document should assess the potential for water quality or sediment quality impacts from abandoning the electrical cable in place (i.e., could the corroding cable be toxic?).

Air Quality

24. Will the SCAQMD require Exxon to provide mitigation offsets for air quality impacts associated with the project? If yes, this please include under "Mitigation Measures."

25. The statement that this project is for the removal of an operational stationary emission source is not correct, as this facility is no longer operating. The statement should be removed.

Transportation/Circulation

26. The number of vessel trips is not given, nor is the number of days the vessels will be at the work site or traveling to or from it, provided (p. 3-26). Because the project will intensify the number of vessels in the area during the work period, an appropriate mitigation measure would be issuance of Notices to Mariners.

27. In addition, since Belmont Island is currently found on the NOAA nautical charts, once it is removed, this will constitute a change in the navigational conditions in the area. As mitigation, please consider requiring Exxon to follow up with NOAA as soon as the project is completed to ensure new nautical charts are prepared that accurately reflect the change.

Biological Resources

28. The information presented in Section 3.7 regarding marine biology from 1995. It has been the Coastal Commission's practice that analysis of the biological impacts of marine projects be based on a marine biological survey completed within the last twelve months. Recruitment of marine organisms and numbers of resident and marine species and birds vary with the variances in ocean and other environmental conditions. Therefore, we suggest that all areas potentially disturbed by removal of island components should be surveyed, including the areas around submerged debris, areas that may be affected by the discharge or disturbance of hazardous substances, areas of work vessel anchoring. Accepted study methods, such as sidescan sonar surveys, diver surveys, and laboratory testing should be utilized. Comprehensive surveys will show substrate type and relief, species of commercial importance, kelp and other vegetation, sand dollar beds, dense beds of tube worms, sea pens, sea pansies, and other benthic biota. This information is necessary to assess baseline conditions and potential impacts of the proposed project.

29. What impacts, if any could project work done after dark have on biological resources and how might they be mitigated?

30. How many California brown pelicans and California least terns are estimated to be impacted by project activities, both for foraging and resting? What is the distance to the nearest alternative

roosting and foraging site for brown pelicans, least terns and other bird species that currently use Belmont Island that is comparable in terms of disturbance from human activities, predation, and size?

31. Migrating whales are known to pass by the Belmont Island area (p. 3-32). Can project work be scheduled to avoid the whale migration seasons? Will project noise and other activities affect whales or other marine mammal species? If yes, then noise levels during the project should be monitored so appropriate mitigation measures may be taken.

Hazards

32. We are concerned that the impact analysis (p. 3-40) omits other components of this project that have the potential to result in the release of pollutants (including, but not limited to: abandonment of the electrical cable, long term impacts from leaving the pipelines in place, removal of core materials, removal of core fill, removal of Cellar #2 and its contents, potential water contamination in the core, potential contamination of sediments, removal of pier pilings, and wastewater generation from concrete cutting). Please include analysis of all potential hazards and effects in the "Hazards," "Biological Resources," and "Water" sections of the ND.

Oil Spill Prevention and Response for Offshore Project Work

33. The discussion of the potential for minor and major offshore oil spills resulting from the project, found throughout the body of the ND (and Appendix C), is incomplete. To enable the Coastal Commission to analyze the oil spill potential and adequacy of proposed prevention and cleanup measures, please include all potential offshore spill sources in the ND. Besides a potential work vessel oil spill, which was identified in the ND, the potential for offshore oil spills exists for: flushing and capping of the pipelines; discharge of hydrocarbon-containing water or materials from removal of the various components of the island; and from a work vessel anchor rupturing oil pipelines in the vicinity of Belmont Island.

34. We understand there is a 16-inch Shell Oil Company pipeline near Belmont Island. Please provide information about the location and current operating status of this line.

35. Please identify in the ND all applicable prevention measures to prevent offshore spills from occurring due to project activities.

36. Once all spill sources have been identified, please identify in the ND the source and volume of the reasonable offshore worst case spill resulting from project operations.

37. Please analyze the adequacy of spill response equipment and services to clean up the reasonable worst case offshore spill.

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Oil Spill Prevention and Response for Onshore Project Work

38. Please include all potential onshore spill sources in the ND that may result from project work, including flushing and capping of the pipelines.

39. Please identify in the ND all applicable prevention measures to prevent onshore spills from occurring due to project activities.

40. Once all onshore spill sources have been identified, please identify in the ND the source and volume of the reasonable worst case spill resulting from project operations.

41. Please analyze the adequacy of spill response equipment and services to clean up the reasonable worst case onshore spill.

Recreation

42. Is any surfing done in the close vicinity of the island? If so, will project operations affect surfing?

43. Will staging or stockpiling of materials or equipment interfere with beach access or public parking? This should be quantified—length of time disrupted, number of parking spaces occupied, etc.

44. The ND notes that recreational boating will be affected by the removal of the island (p. 3-48). Again, we suggest that Notices to Mariners and updating the NOAA nautical charts will help to mitigate the recreational boating impacts from this project.

CUMULATIVE IMPACTS

45. Under the cumulative impacts analysis, please consider the impacts of oil spills, water and sediment contamination, abandonment of the pipelines in place and the disposition of the onshore facility, taking into account our questions and comments as presented in this letter.

Thank you for the opportunity to comment on the draft ND. Please feel free to contact me at (415) 904-5295; however, please note that I will be out of the office from April 26-May 9, 1999.

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In my absence, you may contact Alison Dettmer, Manager of the Energy and Ocean Resources Division, at (415) 904-5246.

Sincerely,

Lilli Ferguson

Lilli Ferguson
Coastal Program Analyst
Energy and Ocean Resources Division

cc: Karl Schwing, California Coastal Commission, South Coast Area Office
Simon Poulter, Padre Associates

State of California

Memorandum

To : Mr. Goodyear K. Walker
State Lands Commission
Division of Environmental Planning and Management
100 Howe Avenue, Suite 100-South
Sacramento, CA 95825-8202

Date : April 22, 1999

From : Department of Fish and Game

Subject : Proposed Mitigated Negative Declaration for the Belmont Island Decommissioning Project

Department of Fish and Game (Department) personnel have reviewed the proposed Mitigated Negative Declaration (MND) for the Belmont Island Decommissioning Project applicant, Exxon Company, U.S.A., (SCH No. 99031117). Belmont Island is a oil exploration and production facility located in approximately 42 feet of water, 8,100 feet offshore from the City of Seal Beach, Orange County, California. The project would remove all structural components which comprise Belmont Island and transport them to shore for appropriate disposal. Island components include the caisson core, north wharf, east wharf, south tower and south span, boat landing, strut supports, pipelines and power cables. The components are constructed from steel, concrete, wood, native sand, and quarry rock.

The Island's well conductors have been plugged as part of the well plug and abandonment program. As part of this proposal, the well plugs will be cut off 5 feet below the sea floor and removed. Associated pipelines, buried 6 feet under the sea floor throughout the route, were pigged and flushed at the end of the production operations. All pipelines will be re-flushed with seawater until the hydrocarbon content is within acceptable limits (15 parts per million or less). Wastewater will be transported to onshore facilities for proper disposal. Pipelines will be decommissioned in place as their removal would result in adverse impacts to the beach and near shore environment. Electrical cable will be disconnected and trenched 5 feet into the sea floor. The south span and tower will be removed with lifts. Deck sections from the east and north wharfs will be cut and removed, and support pilings from both wharfs will be extracted and cut off below or even with the sea floor. Boat landings piles will also be cut off and removed. The caisson deck and walls will be cut into sections, then removed along with sand and rock which fills the caisson; the caisson core contains 392 cubic yards of hydrocarbon impacted fill.

Exxon will develop a plan for the removal and disposal of project materials that will include prevention of and response to hazardous spills. When the plan is complete and approved, the caisson structure will be removed along with the rock rip-rap (approximately 15,724 cubic yards) that surrounds its exterior. The rip-rap will be placed on a barge and shipped to a suitable location for reuse. To offset impacts to water quality and marine organisms, Exxon will implement a containment system and utilize best management practices to minimize the introduction of demolished materials into the water.

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Construction of Belmont Island began in 1953. Thus, the structure has provided habitat for marine organisms for more than 45 years. Removal of the Belmont Island facility will result in mortality of benthic invertebrates and a permanent loss of hard substrate habitat currently utilized by fish and invertebrates. The MND mentioned that Exxon is investigating the option of reusing the caisson's exterior rip-rap protection to augment an existing, approved artificial reef. The Department supports this option as it would help offset impacts to fish and invertebrates caused by removal of the island and, furthermore, we recommend that the rip-rap material be utilized to enhance the Department's Bolsa Chica Artificial Reef.

We thank you for the opportunity to review the proposed project. As always, Department personnel are available to discuss our comments, concerns, and recommendations in greater detail. To arrange for discussion, please contact Ms. Marilyn Fluharty, Environmental Specialist, California Department of Fish and Game, 4949 Viewridge Avenue, San Diego, CA 92123, telephone (619) 467- 4231.

Sincerely,

DeWayne Johnston

DeWayne Johnston
Regional Manager
Marine Region

cc:: Ms. Marilyn Fluharty
Department of Fish and Game
San Diego, California 92123

State Clearinghouse
Sacramento, California

Mr. Robert Hoffman
National Marine Fisheries Service
Long Beach, CA 90802

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California Regional Water Quality Control Board
Santa Ana Region

Winston H. Hickox
Secretary for Environmental Protection

Internet Address: http://www.swrcb.ca.gov
3737 Main Street, Suite 500, Riverside, California 92501-3339
Phone (909) 782-4130 • FAX (909) 781-6288

Gray Davis
Governor

May 4, 1999

Goodyear Walker
California State Lands Commission
100 Howe Ave., Suite 100 South
Sacramento, CA 95825

NEGATIVE DECLARATION FOR THE PROPOSED BELMONT ISLAND DECOMMISSIONING, SEALBEACH, CA, SCH# 99031117

Dear Mr. Walker:

We have reviewed the Negative Declaration for this project. The following Best Management Practices have been proposed to protect water quality during the decommissioning project:

- Determination of contaminated core materials within the caisson will be based on visual inspection of the removed materials above the water line and by evidence of a sheen when the level of the materials have been removed to below the water line. Any contaminated water will be vacuumed, containerized and brought onshore for proper disposal. Contaminated fill will be transported to an approved waste handling facility for treatment and recycling or disposal.

- A containment system will be installed underneath the wharf decks to minimize the potential for introducing demolition materials into the water during deck removal operations: Also, basic oil spill equipment will be maintained on the site for the duration of the offshore activities. Exxon has prepared an Oil Spill Contingency Plan.

A plume of paint flakes and dust may be generated during cutting activities. Lead is present in the paint at concentrations greater than 1,000 ppm in some samples, and in one case, at 87,000 ppm. The staff of Longitude 1,2,3, with many years of experience performing underwater excavation work on the west coast, estimates that the plume should not extend further than 300 feet long by 100 feet wide and it should disperse within three hours after excavation ceases. During removal of the riprap associated with the caisson, the plume is estimated to be as large as 1,500 feet long and 750 feet wide, dispersing within three hours after the disturbance ceases. All work "will be conducted in accordance with the project 401 Certification issued by the Regional Water Quality Control Board."

According to Public Notice No. 199915473-RLK, issued on March 29, 1999, by the U.S. Army Corps of Engineers, Los Angeles District, they are planning to issue a Letter of Permission under Section 10 of the Rivers and Harbors Act of 1899. If a Letter of Permission is issued, a water quality certification under Section 401 of the Clean Water Act is not necessary. Information submitted to our office related to obtaining 401 certification will be forwarded to our Regulations Section for their evaluation and an NPDES permit will be issued, if necessary. If you have any questions, please call me at (909) 782-4241.

Sincerely,

Scott A. Dawson
Planning Section

CC: Mosie Boyd, State Clearinghouse
Russ Kaiser (CESPL-CO-R), U.S. Army Corps of Engineers, L.A. District

State of California

MEMORANDUM

The Resources Agency

FILED
MAY 3 1999
STATE CLEARINGHOUSE

Cleared 4-29-99 Late E

To: Project Manager
Resources Agency

Date: April 30, 1999

Mr. Goodyear K. Walker
Division of Environmental Planning and Management
California State Lands Commission
100 Howe Avenue, Suite 100-South
Sacramento, CA 95825-8202

From: Department of Conservation
Office of Governmental and Environmental Relations

Subject: Negative Declaration for the Belmont Island Decommissioning, Orange County **SCH # 99031117**

The Department of Conservation's Division of Oil, Gas, and Geothermal Resources (Division) has reviewed the above referenced project. The Division supervises the drilling, maintenance, and plugging and abandonment of oil, gas, and geothermal wells in California. We offer the following comment for your consideration.

In order to assure the protection of public safety and environmental quality, prior to commencing the removal of the conductor casings, the project applicant is required to consult with the Division's Cypress office. Written approval from the Division's district Supervisor must be secured prior to changing the physical condition of any well. Also, histories of the well conductor operations and pipeline abandonment must be filed with the Division.

Thank you for the opportunity to comment on the Negative Declaration. If you have any questions on the above comment, or require technical assistance or information, please contact Richard K. Baker or Robert Samuelian at the Cypress district office. The address is: 5816 Corporate Avenue, Suite 200, Cypress, California 90630-4731; phone (714) 816-6847.

for Jason Marshall
Assistant Director

cc: Robert Samuelian
Division of Oil, Gas, and Geothermal Resources, Cypress
Linda Campion
Division of Oil, Gas, and Geothermal Resources, Sacramento

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STATE OF CALIFORNIA—BUSINESS AND TRANSPORTATION AGENCY

GRAY DAVIS, Governor

DEPARTMENT OF TRANSPORTATION

DISTRICT 12
3347 MICHELSON DRIVE, SUITE 100
IRVINE, CA 92612-0661

April 23, 1999

Goodyear K. Walker
California State Lands Commission
100 Howe Street, Suite 100 South
Sacramento, CA

IGR/CEQA
SCH# 99031117
NOC/ND

Dear Mr. Walker:

Thank you for the opportunity to review and comment on the Notice of Completion/Negative Declaration (NOC/ND) for the Belmont Island Decommissioning project. The proposed project is located offshore of the City of Seal Beach in Orange County. Facilities on Belmont Island will be decommissioned and the island itself will be removed.

District 12 is a reviewing agency and has no comments at this time.

Please continue to keep us informed of future developments that could potentially impact our State Transportation Facilities. If you have any questions, or need to contact us, please call Lynne Gear at (949) 724-2241.

Sincerely,

Robert F. Joseph, Chief
Advance Planning Branch

cc: Tom Loftus, OPR
Ron Helgeson, HDQTRS Planning

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MINUTE PAGE 0007217

California State Lands Commission
100 Howe Ave, Suite 100-South
Sacramento, CA 858825-8202

21 April 1999

Attn: Goodyear K. Walker

Re: **SCH** 9903117

Dear Mr. Walker:

Offshore oil and gas production platforms will be described in more or less detail as a part of the developing literature on artificial reefs. Because each platform will differ in design, materials, siting, oceanography, local conditions, history, and other details, each will amount to a more or less unique experiment. Thus each will provide unique information and an opportunity for appropriate mitigation.

The concept of "Rigs to Reefs" will be a subject discussed during a Symposium at the next meeting of the Southern California Academy of Sciences 1 May 1999 at the California State University Dominguez Hills.

Certain features of the Belmont Island site will determine the environmental impacts of the platform and the probable course of events following its removal and site restoration, if that should occur. This site is notable for turbid water to some extent resulting from run-off from the San Gabriel River, Red Tides, and local dredging projects. The irradiance conditions have not been measured but may be responsible for the depauperate variety of benthic flora on or about the platform. This point is important because many artificial reefs have been constructed nominally as sites for benthic algae (e.g., Pendleton Reef, Oceanside, Tremescal Canyon and others) but have failed to support large or diverse populations of benthic algae.

Some explanation of why benthic algae do not appear to have succeeded at Belmont Island should be provided. Siting of Artificial Reefs at locations where benthic algae will not prosper may be explained from a more detailed examination of this site. Some benthic algae, e.g., *Egregia*, are established at similar depths on the nearby Long Beach Breakwater.

Pages 3-3, 3-4, 3-29, 3-30, 3-31 report comments on marine invertebrates either observed or reported from the area that might be impacted by the project.

Because I questioned the brevity of the list of species cited and the following identifications of *Tealia* sp., *Adelogorgia phyllosclera*, and *Polyclinum planum*, I made two visits to the Belmont Island for brief efforts at characterizing the biotic composition of the site.

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Nearly 100 species of invertebrates were observed and identified. Unusual high abundances of mussels and rock scallops were noted along with high abundances of sea stars and keyhole limpets. Additional sampling and identification may be expected to significantly expand a location-species check list.

Thirteen species of fishes were observed and six species of benthic algae. While sea urchins were present, they were not dominant as they are on other artificial structures, e.g., the nearby oil islands and the LA-LB Breakwater.

On P. 3-32 of the EIR mention of abalone is superfluous. No abalone have been observed anywhere near this site in the past thirty+ years.

More intensive examination of the biota of the island is justified to avoid loss and/or displacement of sensitive species in addition to those already identified.

Superfluous also is the projection (p 38) of the EIR that Least Terns will roost on the Long Beach Breakwater.

It is suggested that special attention be devoted to reuse of the rip rap rock. These rocks have been in place for over 40 years. They may have special value for the attachment of colonizing biota if they are used to add to an existant artificial reef, e.g., Bolsa Chica. This could be an uncommon opportunity to evaluate aged rock vs raw quarry rock in the construction of artificial reefs.

Consideration maybe given to addition of this quarry rock to the Oil Islands in Long Beach Harbor for enhacement of fising opportunity.

Removal of Oil Platforms Hilda and Hazel apparently occurred without specific evaluation of the ecological effect of the loss of the associated biota. Recent calls for conversion of "Rigs to Reefs" suggests that appropriate mitigation should include assurance that important species are not lost in the process. Of greater importance is site specific function of Artificial Reefs. Related to this is the evaluation of component materials.

This project offers opportunity for consideration of these points as a part of the requirements for mitigation. Since this structure provides significant intertidal habitat, it provides and opportunity to relate intertidal and subtidal habitat.

As proposed in the EIR, no provision is made for relocation of the thousands of pounds of mussels and rock scallops on this structure. These bivalves have ecologic and commercial importance which should not be wasted.

Further, dumping of the high biomass of material willl create a solid waste disposal problem not noted or discussed in the EIR.

COMMENTS

For its size, area, and structure, Belmont Island is the richest artificial reef with respect to its biota, both quantitatively and qualitatively, that I have visited. The EIR fails to even mention the possibility that the structure may provide resouce value as habitat, for intrinsic information, as a part of the "rigs to reefs" question, and the mixed problem of solid waste disposal. The listing of species as present which could not be confirmed (see Appendix B) and the failure to note the presence of at least nearly 100 other species casts question on the accuracy and completeness of the EIR.

This EIR fails to consider alternatives to the proposed project and appears only to "justify" a negative declaration to the requirements of CEQA.

In dealing with offshore structures, there are three periods of disruption - 1) Construction, 2) Operation, and 3) Removal - why not design offshore structures to function as marine habitat during their lives and as augmented habitat once they are decommissioned? Would it be appropiate to modify Belmont Island and leave the majority of it as functional habitat? Is the site suitable for modification to function as enhanced habitat? These are the questions to answer to provide the information needed for management of coastal resources.

Removal of Belmont Island as proposed may not be an optimal solution to the problem. Unless there is urgency to complete this project, why not take a more detailed examination of the problem?

Sincerely,

Rimmon C Fay

Rimmon C. Fay, Ph.D.
P.O. Box 1348
Venice, CA 90294
Tel: (310) 677-1056
Fax: (310) 677-1207

cc: Bob Grove
Terry Tamminen

APPENDICES

APPENDIX A

ARTIFICIAL REEFS OR STRUCTURES EXAMINED BY R.C.FAY

All harbors in southern California except Ventura Marina
Goleta Pier and Outfall Pipe
Santa Monica: Artificial Reefs, Breakwater,Pier
Marina del Rey/Venice:Artificial Reefs, Pier, Breakwaters, Hyperion Outfall Lines
LA City and SCE Risers
Redondo:Artificial Reefs, Piers, and Breakwater
Los Angeles-Long Beach Harbors and Breakwaters, Oil Islands Chaffey and Freeman Grissom
Belmont Island
Newport Bay Entrance Channel
San Onofre Effluent Lines
Pendleton Artificial Reef

APPENDIX B

Species Listed in EIR not confirmed as present at Belmont Island
Tealia, Metridium. Polyclinum planum, "*moon anemone*", *Adelogorgia phyllosclera*

APPENDIX C

Species present at or in the vicinity of Belmont Island subject to Regulatory Control or Interest

Catergorically:All algae, invertebrates, fishes

Specifically: Red algae Garibaldi nests
Macrocystis

Lobster, Mussels, Rock Scallops, Feather duster worms,

Sculpin, Cabezon, Sheephead, Perches, Sand and Kelp Bass, Sargo, Garibaldi

Sea Lions

AMERICAN SPORTFISHING ASSOCIATION
Conservation Network
24958 Malibu Road. Malibu. California 90265
310•456•9201 • FAX 310•456•9491

Via Fax

May 1. 1999

California State Lands Commission
100 Howe Avenue. Suite 100-south
Sacramento. CA 95825-8202

Attn: Goodyear K. Walker
Re: Belmont Island Decommissioning

The evaluation of the project's effect on reef dependent marine life is insufficient to justify the removal of this important habitat. Less than ten percent of the bottom of southern California open coastal waters are composed of hard substrate. Based on surveys of similar habitats, the island would be expected to have more than 5 times the habitat value of the surrounding muds. Similar structures are very important to anglers. Anglers would negatively impacted if Belmont Island is removed. We understand that the California Department of Fish and Game considers the site to be appropriate for an artificial reef. and concrete and quarry rock are appropriate artificial reef materials.

Comparable reefs are important in the life cycle of several species of rockfish. Many species of rockfish have been over exploited in southern California. The bocaccio may be listed as threatened. The National Marine fisheries service is in the process of determining which of the oil drilling support structures are essential fish habitat. Such habitat is protected under the Magnuson Act. The California legislature has a bill pending (SB541, Alpert) to establish state policy guidelines for decommissioning oil drilling support structures.

Belmont Island should not be removed until a more thorough survey is completed on which to base an evaluation of the implications of removing such important habitat is completed. It would also be prudent to allow the National Marine Fisheries Service and the legislature to provide policy direction prior to approving a decommissioning plan.

Thank you for you attention to these serious environmental implications.
Dan Frumkes
Daniel Frumkes. Director

CALENDAR PAGE 000543
MINUTE PAGE 0007222

12/3/99
W 40792
J. Planck
K. Walker

EXHIBIT E

SUMMARY OF STAFF INVESTIGATIONS SINCE THE JUNE 14, 1999, COMMISSION MEETING

Since the June Meeting
At the June meeting, the Commission expressed a desire to have Staff address specific issues before the Commission acted on the removal of Belmont Island. Specifically, the Commission wanted more information on the immediate and local marine habitat, water clarity/quality issues, a more definitive accounting of the potential hazard to navigation, options for leaving an artificial reef site, and the impacts to existing habitat given the various disposition scenarios. The Commission also requested the staff to look into the regulatory and liability issues associated with an artificial reef in this location.

The Alternatives Reviewed. Three reef alternatives, in addition to the recommended removal and redeposit of material at the Bolsa Chica offsite reef complex, were investigated by the project team. There were two "high relief" alternatives and one "low relief" alternative considered (see Exhibit F – Island Facility Reefing Alternatives). The two high relief alternatives assumed that a reef would be left with 10-15 feet clearance for vessel traffic. These alternatives also allowed for a greater biological diversity than the low relief model. The low relief alternative assumed a scattered array of rock with 33-39 feet of clearance. The two high relief alternatives have adverse navigation consequences and the Coast Guard would require the "responsible party", i.e. the entity accepting maintenance and liability of the site, to mark the site and to maintain reasonable aids to navigation. The Marine Safety Office of the U.S. Coast Guard, specifically the Port Operations Officers of the Long Beach and Los Angeles Ports prefer to have the entire structure removed (see Exhibit G). A number of other agencies including the Army Corps of Engineers and California Coastal Commission deferred to the Coast Guard on this issue. The low relief alternative is considered in detail below.

Marine Habitat and Biological Issues. The complete removal of the Island would remove some local marine habitat and cause considerable mortality, from crushing or suffocation, to the species attached to the existing island components. This is somewhat mitigated by the fact that the rock components will be redeposited at the Bolsa Chica reef site, but marine life would not colonize the new reef for several years. This was a major concern for the speakers and the Commission.

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The problem with this particular site for an artificial reef is one of water clarity. The Commission consultant contracted with L.A. de Wit to conduct an extensive biological survey of the Belmont Island site, and also to survey the surrounding marine habitat (within a 1.5-mile perimeter). The investigation was done using an SLC/NMFS/CDF&G approved survey plan. A species list was developed from diver observations at the Belmont Island site, and at the Long Beach Harbor breakwater, and in the area of Platform Esther. Island Esther was destroyed in the 1983 El Niño storms. Rock materials were left in place after the storm. The site is generally considered a model for what would occur in the "low relief" alternative for the Belmont site. The survey report is attached as Exhibit H, and the species comparison charts are attached as Exhibit I.

Fish. Underwater surveys of the site indicated that the local fish population was clearly attracted to, and most abundant, around the pilings, not the rip-rap material. This is probably due to the vertical expression of those features, i.e. the fish have more places to hide from and/or elude predators. While there were other biological communities elsewhere, there was a general absence of fish at the other locations in and around the Belmont site. In all of the decommissioning scenarios, the pilings are to be removed for various engineering and safety reasons, so the Belmont site, once reconfigured, would in all probability not support the fish population one sees at the site today.

Kelp. There is no kelp growth at the Belmont site and it is unlikely to occur due to the water clarity issue. The amount of sediment and other detritus and debris in the water column, presumably from proximity to the San Gabriel River mouth, make this a poor site for kelp growth, and a poor site for other biota dependant on the photic zone clarity for growth and viability. This is also the case at the nearby Esther site. Although the amount of material in the water at Esther appears less in the photographic documentation done during the survey, there is still enough to apparently discourage kelp on the scattered rock clusters found in the area. The clarity and water quality issues are not found at the Long Beach breakwater, where kelp is found, along with a much wider diversification of the biota.

Uniqueness of Habitat. The survey demonstrated that the Belmont site is not a unique habitat in the general area, and comprises 0.2 percent of the underwater rock surface area within the 1½ mile survey radius. The survey also concluded that the species found at the Belmont site are not unique to the vicinity (see Exhibits H and I). Further, the habitat at the Belmont site is similar to that found at the Bolsa Chica reef site despite the water depth difference, i.e. that site supports similar species at a greater depth – probably due to the better water clarity and quality.

Navigational Safety. Contact with the U.S. Coast Guard, who responded as the local Port Operations Office and to whom the LA/LB Harbor Safety Commission, the U.S. Navy, and the Army Corps of Engineers deferred, will require the

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"responsible party," i.e. the entity accepting maintenance and liability of the site, to mark the site and to maintain reasonable aids to navigation if anything remains at the Belmont site. The preference of the Marine Safety Office of the U.S. Coast Guard is to have the entire structure removed (see Exhibit G). The Coast Guard will not accept any responsibility for it, if its removed. Aids to navigation may not be required for a "low relief" reef site.

Regulatory/Liability Issues. Leaving an artificial reef at the Belmont site will require obtaining authorizations from the State Lands Commission, Coastal Commission and the U.S. Army Corps of Engineers, and U.S. Coast Guard. As discussed, the high relief alternatives pose navigational hazards

The California Department of Fish and Game has declined to accept the site into its reef program because it does not meet its criteria. Contact with local agencies, the City of Seal Beach, and Orange County Public Facilities & Resources Department and other state and federal agencies, Orange Coast District of California State Parks and the National Marine Fisheries Service, has confirmed each has no interest in accepting responsibility for maintaining a reef site. Exxon will not accept any responsibility or liability for the site, and the lease imposes no such requirement. Finally, there is no legislative mechanism providing for the movement of these commercial sites to the State, as there are in the Gulf Coast (Louisiana in particular). Therefore, without an agency or group willing to accept the maintenance and liability associated with the site as an artificial reef, its complete removal will be required in accordance with the terms of the lease.

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EXHIBIT F

W 40792

Exxon Belmont Island Decommissioning Program
Island Facility Reefing Alternatives

The permit application for the Exxon Belmont Island Decommissioning Program is based on complete removal of the offshore structures and riprap and restoration of the bottom to natural conditions. The decommissioning program includes relocation of the riprap to the California Department of Fish and Game's approved Bolsa Chica Artificial Reef Site. Exxon continues to fully support this alternative.

The following documents outline the onsite and offsite reefing alternatives that were evaluated. The Exxon Project Team has developed this information in response to a request by the State Lands Commission for additional information regarding potential onsite reef alternatives. For each alternative the following is provided:

- a reef description,
- a summary listing of pros and cons, and
- a summary of key issues that need to be successfully addressed if an alternative is to be considered.

This discussion assumes that the reader is familiar with the Belmont Island facilities, the proposed decommissioning program, and the issues and permitting requirements for artificial reef construction in California.

Four reef alternatives have been investigated by the Exxon project team and include three onsite alternatives and the currently proposed alternative of rock rip-rip placement in the existing Bolsa Chica Artificial Reef Site. The reef alternatives examined are:

- Alternative A – High Relief Onsite Reef
- Alternative B – Reconstructed High Relief Onsite Reef
- Alternative C – Low Relief Onsite Reef
- Alternative D – Offsite Reef

All of the alternatives evaluated assume that existing above water structures are removed for the following reasons:

- Most of the Belmont Island structures are over 40 years old and are continuing to deteriorate. These structures have no further utility for oil & gas production operations.
- The island core contains some hydrocarbon impacted material that must be removed. Removal of the impacted material requires the removal of the caisson decks to allow unrestricted access to the impacted material. The structural integrity of the caisson core will be significantly compromised once the core fill material is removed.
- Reconstruction of the facility and long term maintenance would be required to retain the above water portions of the structure in order to ensure personnel safety.
  - Reconstruction and maintenance of the facility will not guarantee that the structure will remain intact. Nearby Platform Esther was originally an artificial island similar to Belmont Island and was destroyed in a storm in 1983. The rock riprap was scattered over a large area. A similar risk exists for a Belmont Island onsite artificial reef alternative.

It should be noted that the figures that accompany this discussion are conceptual and as such are approximations based upon existing bathymetric information. The slope, height, dimensions and volumes of the alternative reef profiles are approximate.

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Reef Alternative "A" – High Relief Onsite Reef

Description: The intent of this alternative is to decommission the island with the least amount of disturbance to the riprap portion of the island. The caisson sheet pile and wharf bearing pile would be cut at a predetermined height below the existing rip-rap or mudline. Existing riprap and armor rock would be moved only to the extent required to safely remove the structures. The portions of these steel, concrete and wood structures located below the rock line would be abandoned in place (See Figure 1). The structure would be comprised of a relatively flat topped mound composed of three inch minus rock at an agreed upon depth. Surrounding the flat top structure would be sloping rock riprap sides.

Pros/Cons Associated with Alternative A

Pros	Cons
Reef damage would vary from significant to possibly minor (depending on rock movement required to remove structure).	Significant vessel grounding hazard created requiring aids to navigation to be installed at the site.
	Extensive work and possible reef destruction required to rig-up and re-enter an abandoned well.
	Winter storms will likely result in reconfiguration of the reef and periodically expose some structural components previously buried below the rock line.
	Site not suitable for future reef augmentation
	Pier piling, where higher numbers of fish are shown to aggregate, will be still need to be removed.

Key Issues

- Mitigation will be required to ensure vessel grounding hazard is eliminated
  - Shallow underwater hazard at entrance to harbor is unacceptable
  - COE/USCG communicated minimum clearance of 30 ft. at this location
- Federal and State permitting will be required to establish and maintain this site as an artificial reef
  - State of California entity to be owner/permittee for artificial reef
  - Maintenance of ongoing permit conditions
- Ongoing maintenance of underwater reef structure to ensure safety hazards are mitigated
- Ongoing maintenance of navigational aids

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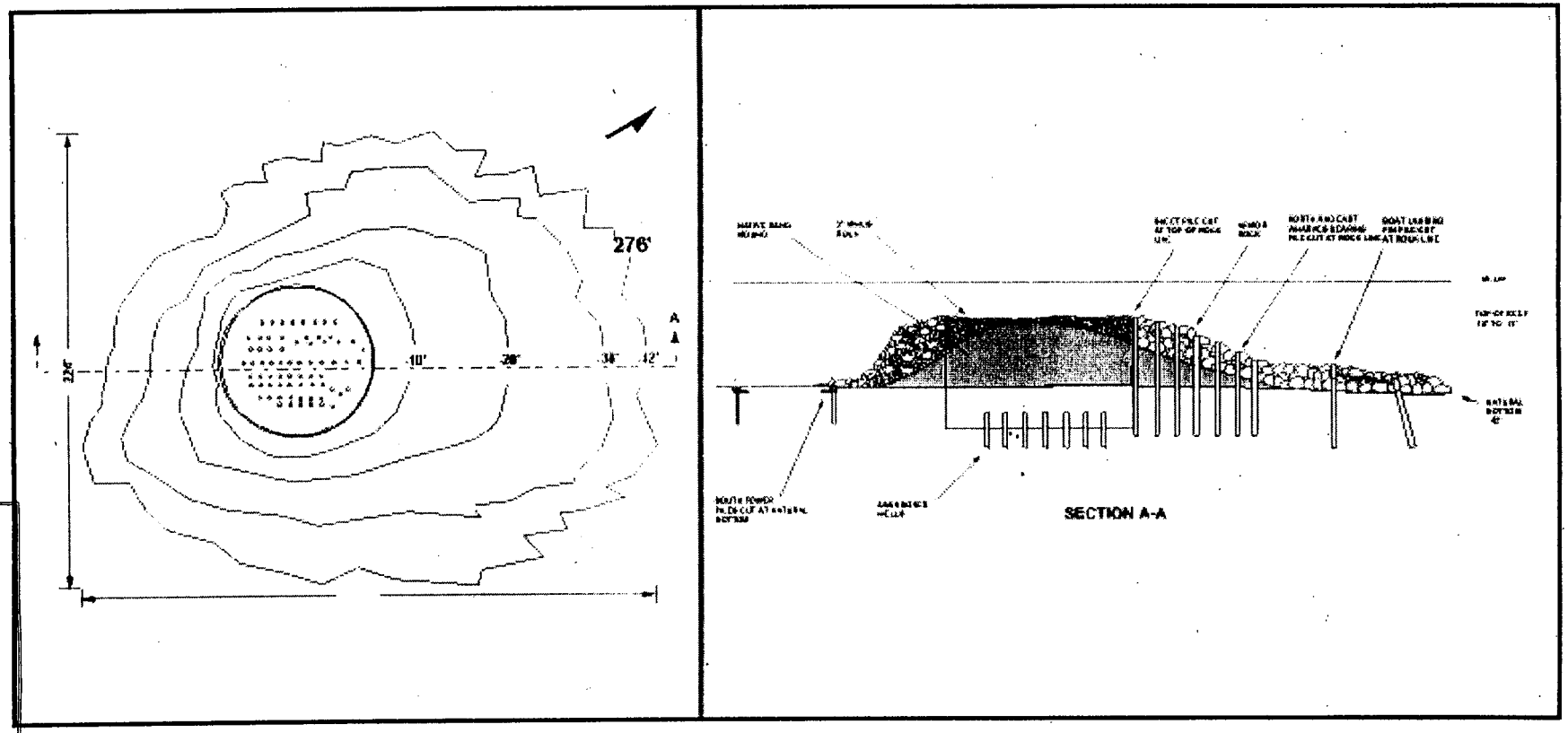
High Relief Alternative



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Reef Alternative "B" – High Relief Reconstructed Onsite Reef

Description. The intent of this alternative is to remove all the islands structural components down to and below natural mudline, while reconstructing a high profile rocky mound onsite using the existing rock rip-rap (See Figure 2). Removal of the steel towers, concrete wharves and caisson core would require that the rock rip-rap be removed away from the caisson core and repositioned around the existing island site. All island steel and concrete components would be removed to the natural mudline, reducing the potential for exposure in the future. Rock components would be mounded at the site to create a crescent shaped mound standing approximately 10 to 15 feet below the water line.

Pros/Cons Associated with Alternative B

Pros	Cons
Removes steel and concrete components and reduces the risk of potential re-exposure.	Significant vessel grounding hazard created requiring aids to navigation to be installed at the site.
	High likelihood that winter storms will reconfigure reef, causing considerable damage to high relief components of the reef.
	Substantial rock movements required, causing significant mortality to existing habitat.
	Site not suitable for future reef augmentation
	Pier piling, where higher numbers of fish are shown to aggregate, will be still need to be removed.

Key Issues

- Mitigation will be required to ensure vessel grounding hazard is eliminated
  - Shallow underwater hazard at entrance to harbor is unacceptable
  - COE/USCG communicated minimum clearance of 30 ft. at this location
- Federal and State permitting will be required to establish and maintain this site as an artificial reef
  - State of California entity to be owner/permittee for artificial reef
  - Maintenance of ongoing permit conditions (surveys, permit renewal)
- Ongoing maintenance of underwater reef structure to ensure safety hazards are mitigated
- Ongoing maintenance of navigational aids

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Exxon Belmont Island
Decommissioning Program

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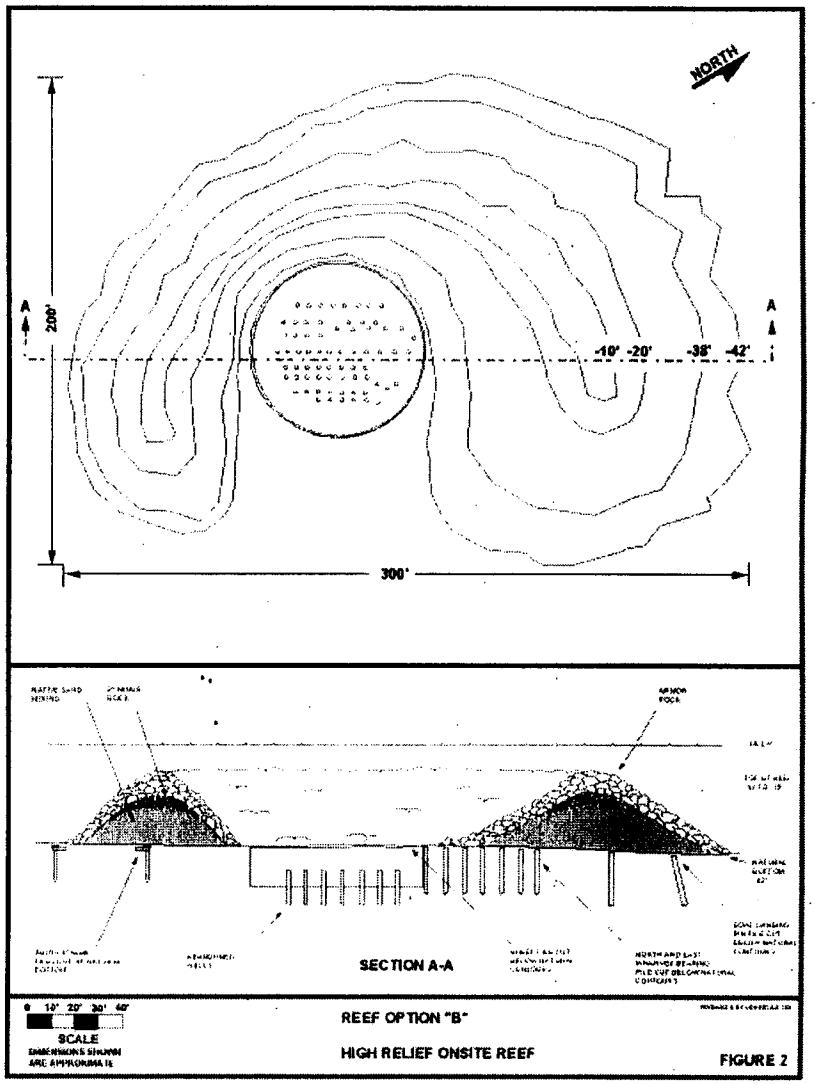
High Relief Two Alternative



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Reef Alternative "C" – Low Relief Onsite Reef

Description. The intent of this alternative is to remove all the islands structural components down to and below natural mudline, while constructing a low profile rocky mound onsite using the existing rock rip-rap (See Figure 3). Removal of the steel towers, concrete wharves and caisson core would require that the rock rip-rap be removed away from the caisson core and repositioned around the existing island site. All island components would be removed to the natural mudline reducing the potential for exposure in the future. Rock components would be spread around the site to create a oval shaped structure standing approximately 39 to 33 feet below the water line. The center of the structure would be composed of natural sand material.

Pros/Cons Associated with Alternative C

Pros	Cons
Reduced potential of vessel grounding hazard	Substantial rock movements required, causing significant mortality to existing habitat.
Well access maintained	Not incrementally more beneficial than use of rock rip-rap at Bolsa Chica artificial reef
Removes steel and concrete components and reduces the risk of potential re-exposure.	Pier piling, where higher numbers of fish are shown to aggregate, will be still need to be removed.

Key Issues

- Federal and State permitting will be required to establish and maintain this site as an artificial reef
  - State of California entity to be owner/permittee for artificial reef
  - Maintenance of ongoing permit conditions (surveys, permit renewal)
- Ongoing maintenance of structure and navigational aids

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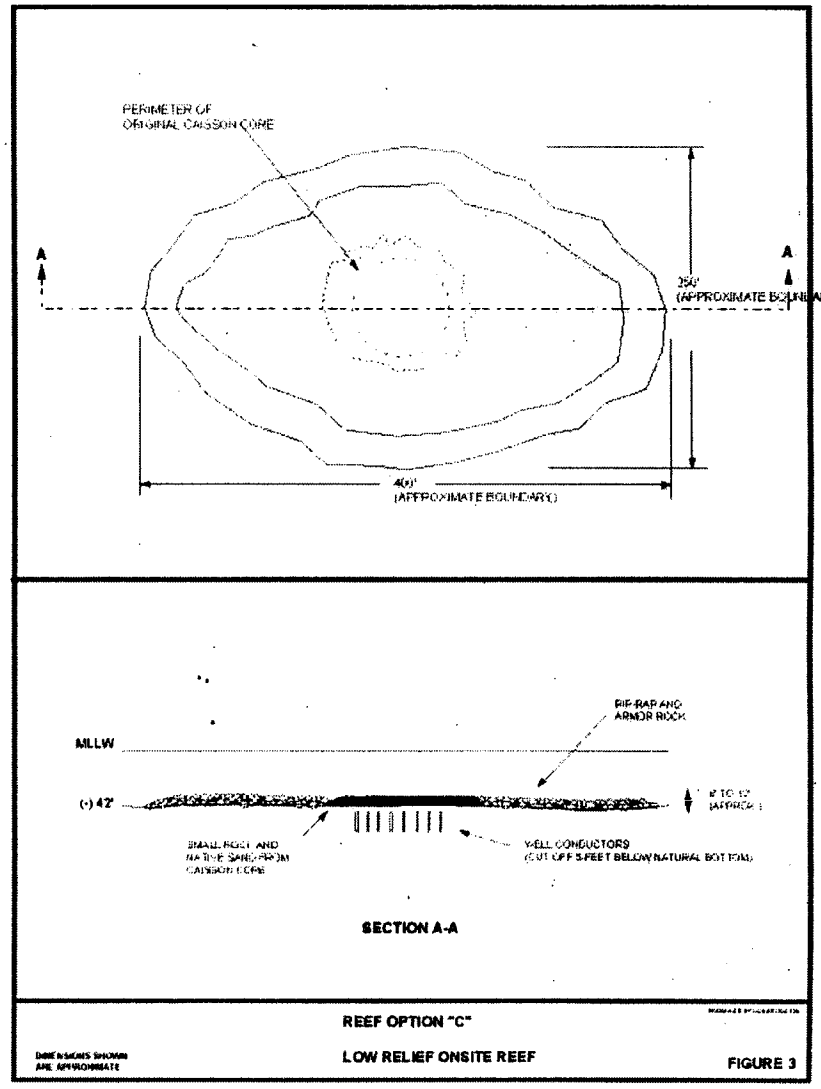
Low Relief Alternative



REEF OPTION "C"

DIMENSIONS SHOWN ARE APPROXIMATE

LOW RELIEF ONSITE REEF

FIGURE 3

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Reef Alternative "D" – Offsite Reef

Description. This alternative is currently proposed by Exxon and would involve the removal of facility components from the site. Rock rip-rap recovered from the site would be loaded on to barges and transported to the Bolsa Chica Artificial Reef site. The Bolsa Chica site is an approved California Department of Fish and Game Artificial Reef site located in approximately 80 to 120 feet of water, 3 miles offshore of Huntington Beach State Park. All island components would be removed to the natural mudline reducing the potential for exposure in the future. Rock components would be deposited at a predetermined site within the Bolsa Chica Reef site.

Pros/Cons Associated with Alternative D

Pros	Cons
Elimination of potential of vessel grounding hazard	Substantial destruction of existing marine community on rock rip-rap
Well access maintained	
Relocation of riprap to more suitable, well established reef location	

Key Issues

- Belmont Island existing reef surface area is less than 0.2% of total surface area of submerged rock riprap in the vicinity of the facility.
- Establishes beneficial use of facility components (riprap) at approved reef site.
- No additional Federal or State permitting required.
- Alternative supported by California trustee agencies.

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Exxon Belmont Island Decommissioning Program
Island Facility Reefing Alternatives

Supporting Documents

- Belmont Island Decommissioning Project - California State Lands Commission Negative Declaration
- California Department of Fish and Game comment letter dated April 22, 1999
- Report of L.A. De Wit, Consultant, 1999
- *National Artificial Reef Plan*, NOAA Technical Memorandum NMFS OF-6, November 1985
- *Artificial Reef Plan for Sport Fish Enhancement*, California Department of Fish and Game, November 1990

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EXHIBIT "G"

U.S. Department of Transportation
United States Coast Guard

Commander (oan)
Eleventh Coast Guard District

Coast Guard Island
Alameda, CA 94501-5100
Staff Symbol: (oan)
Phone: (510) 437-2984
FAX: (510) 437-5836

16600
Ser: oan 596-99
November 24, 1999

Mr. Jeff Planck
California State Lands Commission
200 Oceangate, 12th Floor
Long Beach, CA 90802

Dear Mr. Planck:

We have reviewed the proposal for the decommissioning of the Belmont Island oil & gas facility in Orange County California. We prefer the proposed option to completely remove the structure down to the ocean floor. This will eliminate any concerns about obstructions to navigation in an area that is frequently transited by vessels.

The two "high relief" alternatives that were proposed for an artificial fishing reef at the site would allow only 10-15 feet clearance for vessel traffic. If either of these options are selected the Coast Guard will require the party responsible for the site to mark this obstruction with aids to navigation.

If you have any questions concerning this letter, please contact me at (510) 437-2968.

Sincerely,

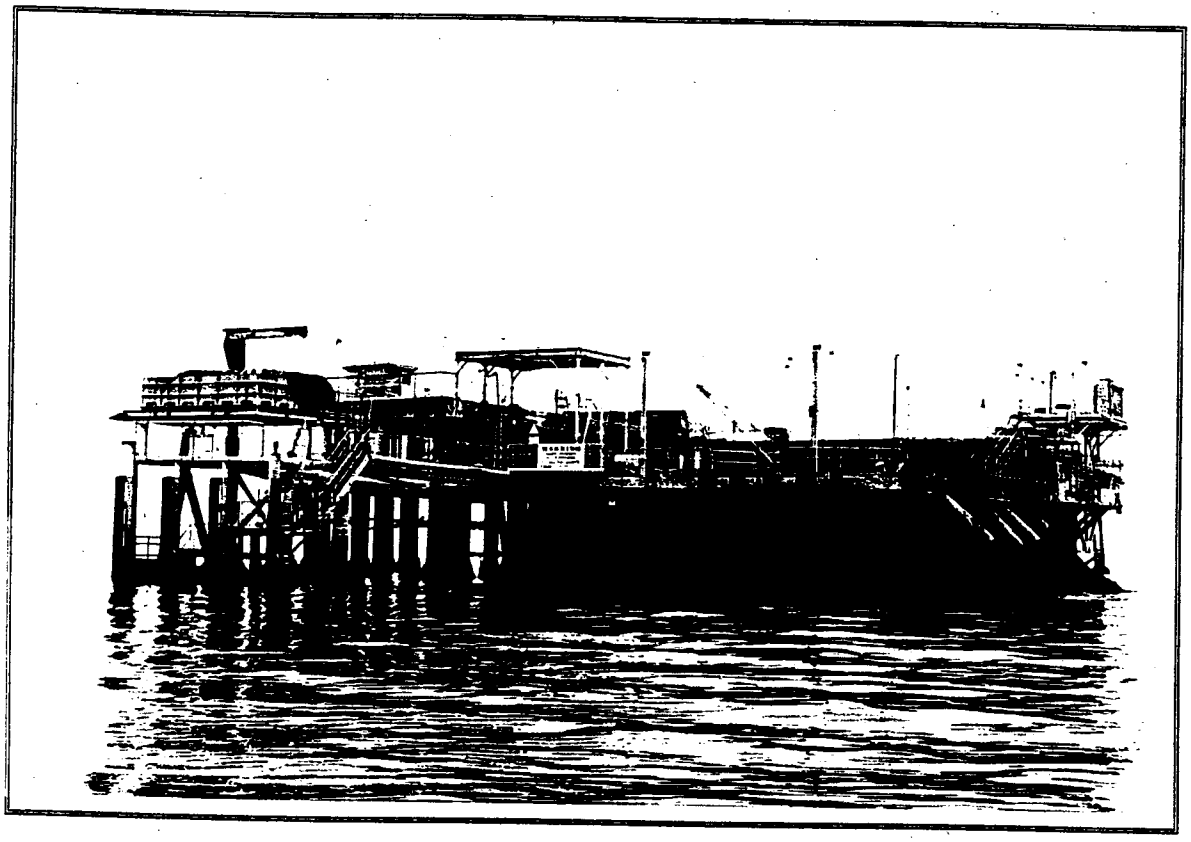
M. L. VAN HOUTEN
U. S. Coast Guard
Chief, Aids to Navigation Section
By direction of the District Commander

Copy: Coast Guard Marine Safety Office Los Angeles/Long Beach

W 40792

EXHIBIT H

BELMONT ISLAND DECOMMISSIONING
MARINE BIOLOGICAL SURVEY
JULY 1999



Prepared for
Padre Associates
5450 Telegraph Road, Suite 101
Ventura, CA 93003
805-644-2220
Contact: Mr. Simon Poulter

Prepared by
L.A. de Wit, Consultant
2054 Bluerock Circle
Concord, CA 94521
925-685-9441
Contact: Mr. Ray de Wit

August 1999

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2	Transect Locations, Belmont Island	2

Appendices

A Species List and Relative Abundance From Diver Observations
B 0.1 Square Meter Quadrat Data (28-30 July 1999 Survey)

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Introduction

Exxon Company's Belmont Island Offshore Production Facility (Belmont Island) is a man-made structure constructed in the mid-1950s offshore Seal Beach, California. Located approximately 8,100 ft. offshore Seal Beach in State Lease P.R.C. 1865 (latitude 33° 43' 18.19" N and longitude 118° 07' 28.77" W), Belmont Island lies on a sedimentary seafloor in approximately 42 ft. of water. Figure 1 shows the location of Belmont Island that comprises:

- a 75-foot diameter circular steel sheet pile caisson core filled with native sand and quarry rock topped with a concrete drilling deck and approximately 70 steel pipe well conductors,
- a steel south tower and span that connects the tower to the caisson,
- a timber pile-supported concrete north deck,
- a timber jacket-supported boat landing adjacent to the north deck,
- a concrete pile- and H-beam-supported concrete-decked east wharf,
- four subsea pipelines and one power cable connecting Belmont Island to onshore facilities, and
- native sand and armor rock rip-rap around the base of the structure and up to a depth of approximately 15 ft (MLLW).

Belmont Island was constructed over a two-year period from1953 to 1954; piers, towers, and wharves were added from 1955 through 1958. Additional support structures comprising tubular bracing and steel strut piles were added in 1962 and 1983, respectively. Oil was produced from Belmont Island wells from 1954 through 1995; wells were plugged and abandoned in 1996. Exxon proposes to abandon Belmont Island and utilize the armor rock to enhance an existing artificial reef located offshore Bolsa Chica, approximately 11 miles to the south.

In response to a request by the California State Lands Commission, data on the habitats and marine biota associated with Belmont Island and nearby rip-rap habitats was to be collected. These site-specific data were to be compared with similar data from nearby rock habitats to identify any unique biological characteristics associated with the Belmont Island rip-rap. In July 1999, a field survey plan was prepared by L.A. de Wit, Consultant and verbally approved by staff biologists from the State Lands Commission, National Marine Fisheries Service, and California Department of Fish and Game. The plan included video and still photodocumentation, diver observations and quadrat counts of epibiota on the rip-rap, and reconnaissance surveys of the surrounding sedimentary habitat at three locations: Belmont Island, the eastern Long Beach Breakwater, and Platform (Island) Esther (see Figure 1). The field data collection effort was to be initiated in late July 1999.

Personnel, Methods, and Equipment

The field data collection effort was by completed by Mr. Ray de Wit of L.A. de Wit, Consultant and Dr. Noel Davis of Chambers Group from 28 through 30 July, 1999. The R.V. *Osprey*, a 24-ft. vessel owned by Osprey Marine Management, Costa Mesa, California, was used as a dive-support boat. Mr. Paul "Doc" Ames operated the boat during the dive survey, and SCUBA was used for all dives.

The diver-biologists swam along a pre-determined compass heading to a point where the rock substrate ended at Belmont Island or to the -42 ft. isobath, the depth where sediment was found at Belmont, at the Long Beach Breakwater. At Platform Esther, where rock was scattered over a relatively large area, the transects there were in water depths from 25 to 35 ft. The minimum water depth surveyed was 15 ft. (MLLW), the depth at which rock rip-rap ended at Belmont Island. All

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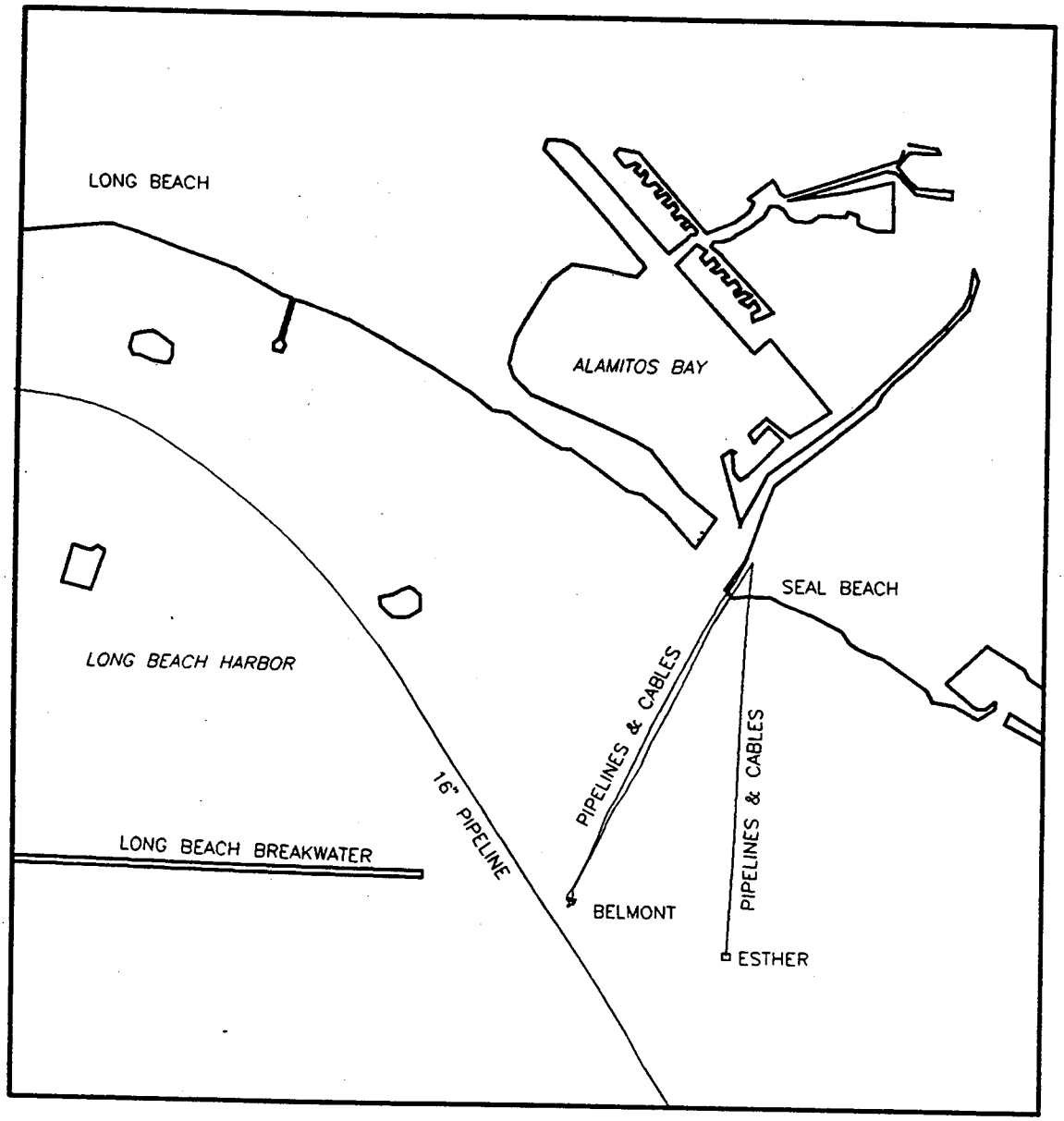

Source: Fugro West, Inc. 1999

Figure 1

Survey Sites: Belmont Island, Long Beach Breakwater, Platform (Island) Esther

July 1999

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identifications were completed in the field, no specimens were collected for laboratory taxonomic analysis.

Results and Discussion

Weather throughout the survey was partly cloudy to clear; winds were light in the a.m. hours, increasing to 10 to 15 miles per hour from the west in the afternoon. Water temperatures ranged from 65°F on the surface to approximately 62°F on the bottom; a distinct thermocline was found at about -20 ft. A long-period 2 to 3-ft. southwesterly swell prevailed throughout the survey period.

Data collection comprised diver-biologists' observations throughout the dives, video- and still photodocumentation along nine transects: four at Belmont Island, two at the Long Beach Breakwater, and three at Platform Esther, and macroepibiota counts in replicate 0.1 m^2 quadrats along each transect. Thirteen dives, totaling 6.5 hours, were completed at the three sites. Approximately 25 minutes of video and over 100 still photographs were taken; and 51 depth-stratified quadrats were completed. A log of the videotape is provided at the end of this report.

Habitat Characterization

The focus of the study was on the biota associated with rock rip-rap habitats, although natural sedimentary habitat and areas of shell talus, characteristic of the transitional area between the rip-rap and natural bottom, were also surveyed. The following discusses the habitats observed at each site.

Belmont Island. The rip-rap is relatively continuous from -42 ft. to -15 ft. (MLLW), the minimum depth surveyed. All three transects at Belmont Island (Transect 3a was a general observation area only) were approximately 100 ft. long. Rocks range from approximately 3 to 6 ft. in diameter; spaces between the rip-rap were usually "filled in" with shell talus or live mussels. Sediment-covered rock was most apparent on the northwest side of the island. The natural habitat around the manmade "island" is sedimentary; near the base of the rock rip-rap in approximately 42 ft. of water, some shell talus was also observed (see Plate 1)

The initial dive along the northeast side of Belmont Island (see Figure 2) was designed to ascertain what, if any, biological stratification existed on the rip-rap. Although not abrupt, gorgonian coral was less abundant in water depths of 30 ft. or less, and feather-duster worms, *Eudistylia polymorpha* and an anemone, *Anthopleura elegantissima* appeared to be more abundant in water depths of 30 ft. or less. Based on these observations, distribution of quadrats was stratified into two depth zones (-42 to –30 ft. and –29 to –15 ft.).

Eastern Long Beach Breakwater. From the -42 to -15 ft. (MLLW) water depths, the habitat comprises rock rip-rap; no sedimentary habitat was surveyed in this area. The rip-rap is of similar size as that found at Belmont Island, although some rocks were estimated to be up to 10 ft. in diameter. Spaces between the rip-rap range up to 6 ft. in diameter and were filled with sediment and shell talus.

Platform (Island) Esther. The surveyed habitat at this site comprises a wider range of rock sizes (1 to 5 ft. in diameter) than the other sites. The smaller rock was more evident along the southeast and southwest transects, while larger rock was obvious along the northwest transect. Water depths along the three transects ranged from -25 to -35 ft. (MLLW); no sediment or "shallow water" rock habitats were surveyed. The northwest transect was almost all rock; the habitat along the two south-trending transects comprised a mixture of talus, sandy sediment, and rock.

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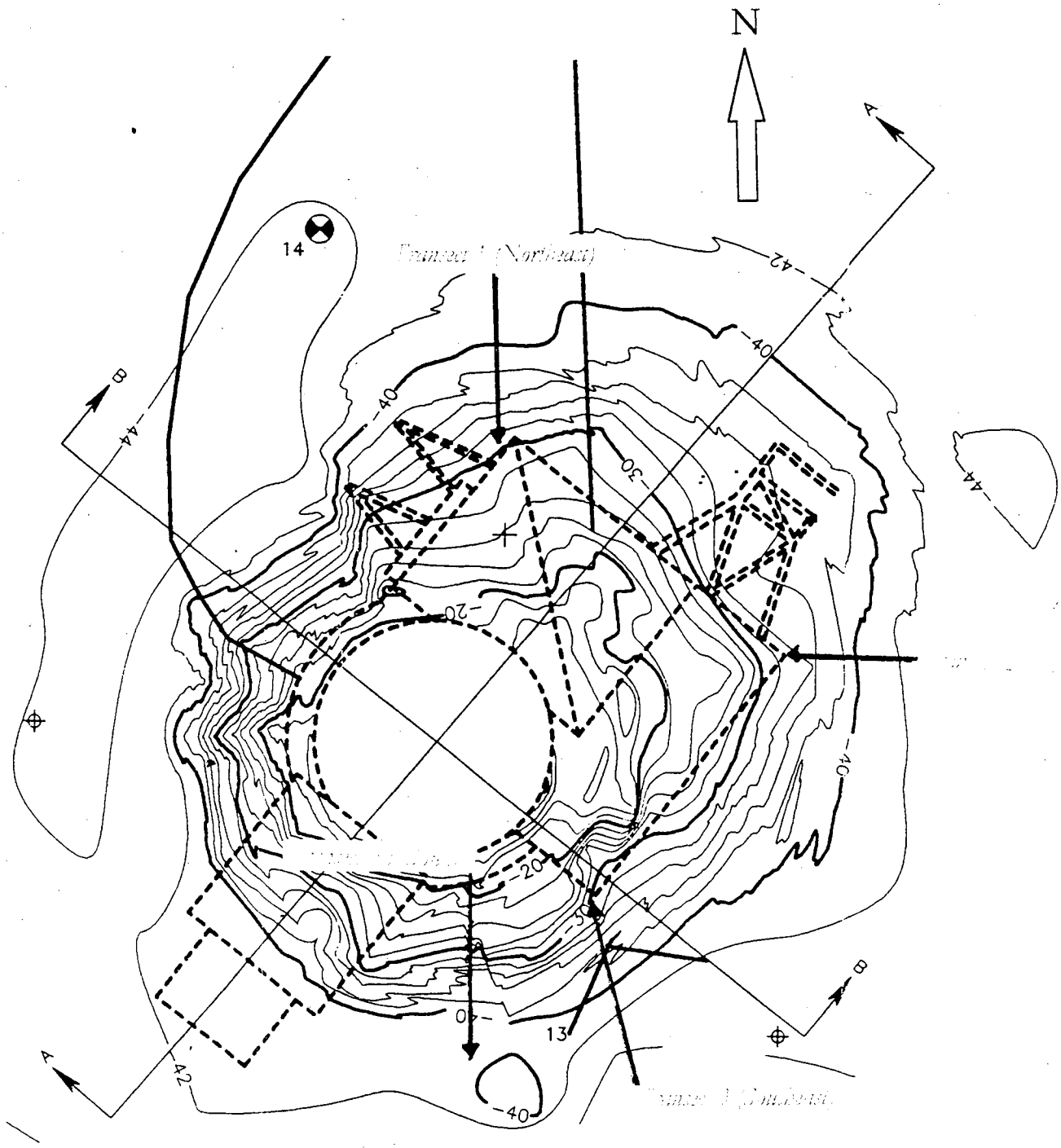

Depths in Feet (MLLW)

Figure 2
Transect Locations, Belmont Island
July 1999

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Epibiota and Fish Communities

Appendices A and B list the biota observed along the transects and within the quadrats at each site, respectively. A total of 80 taxa of marine algae, invertebrates, and fish (77 observed along the transects and within the quadrats and three observed only in the quadrats) have been identified from diver-biologists' notes, quadrat data, photographs, and video records at the three survey sties. Fish were most abundant, comprising 22 taxa, followed by molluscs (15 taxa), and echinoderms (11 taxa). Eight Cnidaria (corals, jellyfish, and anemones) were observed. The following discusses the dominant taxa observed at each site.

Belmont Island: (see Plates 1-3) Fifty of the 77 taxa noted along the transects were observed at this site, including 12 of the 15 molluscs and six of the eight Cnidarian species. Twelve taxa, including six fish species and four molluscs were unique to Belmont Island. The macroepibiotic community along the four transects is only marginally depth-stratified with an apparent transition at -30 ft. In water depths of -30 to -42 ft. gorgonian corals, particularly *Muricea californica*, were abundant. Shallower than -30 ft., mussels (*Mytilus edulis*) and the short-spined seastar (*Pisaster brevispinus*) were abundant; *P. brevispinus* individuals up to approximately 2 ft. across were common throughout the shallower areas. Other common or abundant invertebrates included the tube-building mollusc *Serpulorbis squarmigerus* and the rock scallop, *Hinnites giganteus*. Ectoprocts, particularly *Diaporecia californica*, were common to abundant throughout the surveyed rock habitat.

Macroalgae was limited to some filamentous reds and the encrusting coralline complex *Lithothamnion/Lithophyllum* in water depths of 25 ft. or less along the southwest transect. The fish community was diverse (15 species of fish were observed) and abundant, particularly under the wharf structures where pier pilings were present. Dominant fish species included barred sandbass, *Paralabrax nebulifer* and black croaker, *Cheilotrema saturnum*. The sedimentary habitat surrounding Belmont Island was dominated by the tube-building worm *Diopatra ornata*.

Data from the 23 quadrats at Belmont Island (13 in water depths from 42 to 30 ft. and 10 in water depths less than 29 ft.) show the same general distribution and abundance patterns as those found along the diver transects. The orange gorgonian *Muricea californica* and tunicates were most abundant in the deeper-water; ectoprocts and the tube-building worm *S. squarmigerus* was more abundant in water depths of 30 ft. or less.

Eastern Long Beach Breakwater: (see Plates 4-6) Forty-seven of the 77 taxa were observed along the two breakwater transects, including 12 of the 22 fish species and all eight of the Cnidaria. Ten taxa, including three species of algae, were unique to this site. The biota differed along the two transects surveyed, with the eastern area supporting a relatively lush algal community comprising both red and brown species. Giant kelp, *Macrocystis pyrifera* was common in water depths of 25 ft. or less only along the eastern transect. Urchins, particularly *Strongylocentrotus purpuratus* were common throughout the water depths surveyed and where they were abundant, little non-coralline algae was present. The bay mussel, *Mytilus edulis* was abundant in water depths of 25 ft. or less along the southern transect. The presence of the kelp along the eastern transect is probably due to the presence of a supply of spores from the nearby kelp bed at the Los Angeles Breakwater and the relatively clear water conditions at that site. The absence of kelp along the south-facing portion may be due to the turbulence from the prevailing waves and abundant urchins that have removed most macrophytes along the rip-rap.

Thirteen quadrats (eight from 42 to 30 ft. and five from 29 to 15 ft.) were located along the two Long Beach Breakwater transects. Relatively large areas of the encrusting coralline algal complex *Lithothamnion/Lithophyllum* and the colonial coral *Astrangia lajollaensis* were present on the deeper

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rocks. Shallow-water quadrat data indicate the mussel *M. edulis* was abundant, consistent with diver observations along the transects.

Platform (Island) Esther: (see Plates 7-9) The relatively low-relief rock habitat and uniform water depth found at this site supported a less diverse biological community than the other two areas surveyed. Forty-two of the 77 taxa, including 11 species of fish and eight echinoderms, were noted at this site. Only five taxa were unique to Platform Esther. Although seastars, gorgonian corals, and the elegant anemone *Anthopleura elegantissima* were common, only the latter was more abundant here than at Belmont Island. Macrophytic algae was limited to the encrusting coralline complex *Lithothamnion/Lithophyllum* and some filamentous rhodophytes. Diver observations indicated no one taxa was particularly abundant or characteristic of the habitat there, although the sandcastle worm *Phragmatopoma californica*, normally more common in the intertidal zone, was common throughout the area.

Data from 15 quadrats at this site, all within the 29 to 15 ft. depth strata, indicate *Lithothamnion/Lithophyllum* covered relatively large areas and, similar to diver observations, the sandcastle worm *P. californica* was also common. This species was not found at either of the other two survey sites.

Bolsa Chica Artificial Reef. Bedford, *et. al*, 1992 describes the Bolsa Chica Artificial Reef (BCAR) as a complex of 16 modules comprising 10,400 tons of concrete rubble and steel and concrete barges placed on a sedimentary bottom approximately five miles south of Anaheim Bay. Five and one-half years after its construction a survey of the biota associated with the reef and surrounding natural bottom was conducted by the California Department of Fish and Game. Those data are used in this report to characterize the community and are compared to that found at Belmont Island.

The 1992 survey was conducted in April at Module D in 90 ft. of water and consisted of diver observations during 15 over a four-day period. The module height varied between two and six ft. above the seafloor and comprised rip-rap-type armor rock. Twelve species of fish, and eight non-algae- associated and 13 algae-associated macroinvertebrate taxa were recorded at Module D during that survey. Common and abundant fish included blacksmith (*Chromis punctipinnis*), two species of bass (*Paralabrax nebulifer* and *P. clathratus*), the sargo (*Anisotremus davidsoni*), and the pile perch (*Damalichthys vacca*). Rock scallops and short-spined sea stars were common non-algal macroinvertebrates. Within the sparse algal turf habitat, only unidentified erect ectoprocts were common, although anemones, hydroids, and feather duster worms were noted as present.

Twenty of the 33 taxa observed at BCAR in 1992, including seven fish species, were found at Belmont Island during the survey conducted for this project. Although blacksmith were noted as abundant at BCAR and were only present to common at Belmont Island, relative abundance of the other six fishes common to BCAR and Belmont Island was similar. Macroinvertebrates more commonly observed at Belmont Island. than at BCAR included the short-spined sea star (present to abundant at Belmont Island and only common at BCAR), Kellet's whelk (common to abundant vs. occasional), and sea cucumbers (present to common vs. occasional). Within the algal turf community only the feather duster worm was more common at Belmont Island than at BCAR. In general, fewer taxa were observed at BCAR than at Belmont Island, although dominant organisms were similar at both locations.

Comparison of Sites

The habitat at the four sites discussed above are similar, comprising rip-rap of varying sizes surrounded by natural sedimentary bottom. The macroepibiota at Belmont Island, characterized by

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gorgonian corals, anemones, scallops, mussels, tube-building molluscs, and sea stars is similar to that found at the other three sites. Thirty of the 80 taxa were common to the three sites surveyed during this study. The lack of macrophytic algae is the major difference between Belmont Island and the Long Beach Breakwater. The ichthyofauna at Belmont Island, however, appears to be more diverse and more abundant than that at the eastern Long Beach Breakwater or at Platform Esther. Six of the 14 fish taxa observed at Belmont Island were unique to that site. This increased abundance and diversity is likely due to the presence of pilings at Belmont Island and the lack of fishing pressure (sport fishing activities appear to be limited to areas outside of the piers and wharves at Belmont Island and the majority of the fish were observed under those structures).

Summary of Findings

- Except for algae, the rock rip-rap habitat at Belmont Island supports a relatively diverse macroepibiota and fish community that is similar to that found at other nearby rip-rap habitats within the same water depths at the Long Beach Breakwater and Platform (Island) Esther. Thirty-four of the 80 taxa were common to Belmont Island and one or both of the other sites.
- The algal community at Belmont Island is depauperate and limited to encrusting corallines and filamentous and foliose rhodophytes in water depths of 25 ft. or less in areas not shaded by wharves and piers.
- Gorgonian corals, particularly *Muricea californica*, scallops, and mussels are abundant throughout most of the water depths observed at Belmont Island, although gorgonians are most common below -30 ft. (MLLW).
- Only minor differences in substrate and biota on the three sides of Belmont Island were observed. The rip-rap on the northwest side appears to be subjected to slightly more sedimentation.
- Compared to the other sites, the more diverse ichthyofauna at Belmont Island appears to be related to the presence of pilings that support docks and piers. Fewer fish were observed where those features were absent.
- Removal of the "topsides", pilings, and the leveling the rip-rap to six to eight feet above the seafloor would likely reduce the diversity and abundance of the existing biological community. Little natural algal development would be expected to occur on the rocks in water deeper than -25 ft. and the diversity of the fish community associated with just the lower-relief rock areas would be expected to be reduced from what is currently present.
- The fish and macroepibiotic communities at Belmont Island and BCAR are similar despite the difference in water depths of the two sites. Algae is not abundant at either site.
- Due to the relatively turbid water at Belmont Island and the lack of a nearby kelp bed to provide spores, natural kelp recruitment is unlikely. This assumption is furthered by the lack of kelp and other macrophytes on the rip-rap at Platform Esther which is in located in similar water depths as Belmont Island. Even with transplanting, kelp survival at Belmont Island is questionable due to the relatively turbid water conditions there.

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MINUTE PAGE 0007244

References

Bedford, D., J. Tarpley, and M. Palmer-Zwahlen, 1992. *Observations of the Biological Communities at Bolsa Chica Artificial Reef.* California Department of Fish and Game Nearshore Enhancement Program report. 18 pp. plus appendix. May 1992.

Fugro West, Inc. 1999. *Bathymetry and Seafloor Features Survey for Belmont Decommissioning Project, Orange County, California.* Fugro West Work Order #99-83-6351. 14 pp. plus maps. May 1999.

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MINUTE PAGE 0007245

LOG OF UNDERWATER VIDEOTAPE
BELMONT ISLAND MARINE BIOLOGICAL SURVEY
28-30 JULY 1999

Tape Time (minutes:seconds)	Location
0-2:00	Belmont Island (Transect #1, Northeast corner)
2:01-6:09	Belmont Island (Transect #2, East side)
6:10-9:00	Belmont Island (Transect #3, Southeast corner)
9:01-12:30	Eastern Long Beach Breakwater (Eastern end)
13:00-16:20	Eastern Long Beach Breakwater (South side)
16:25-19:40	Island Esther (Southeast corner [labeled as south on tape])
19:50-22:58	Island Esther (Southwest corner [labeled as southeast on tape])
23:05-25:20	Island Esther (Northwest corner [labeled as southwest on tap])

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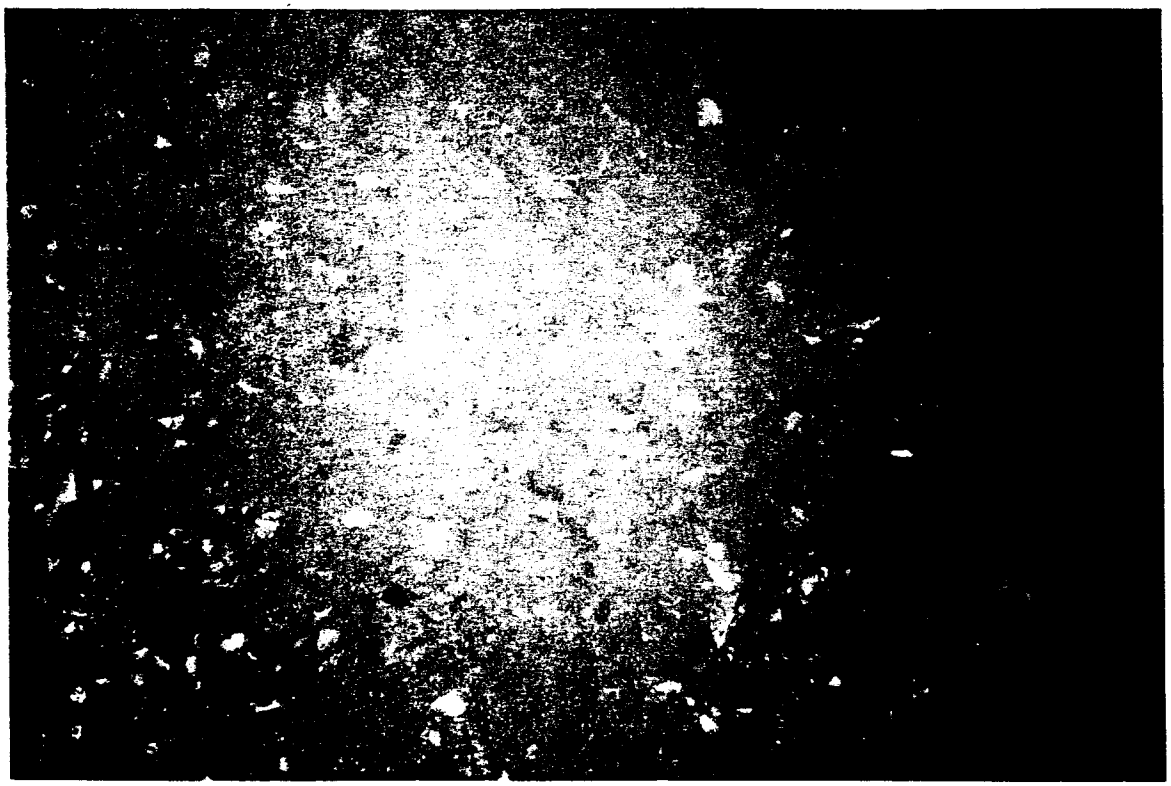
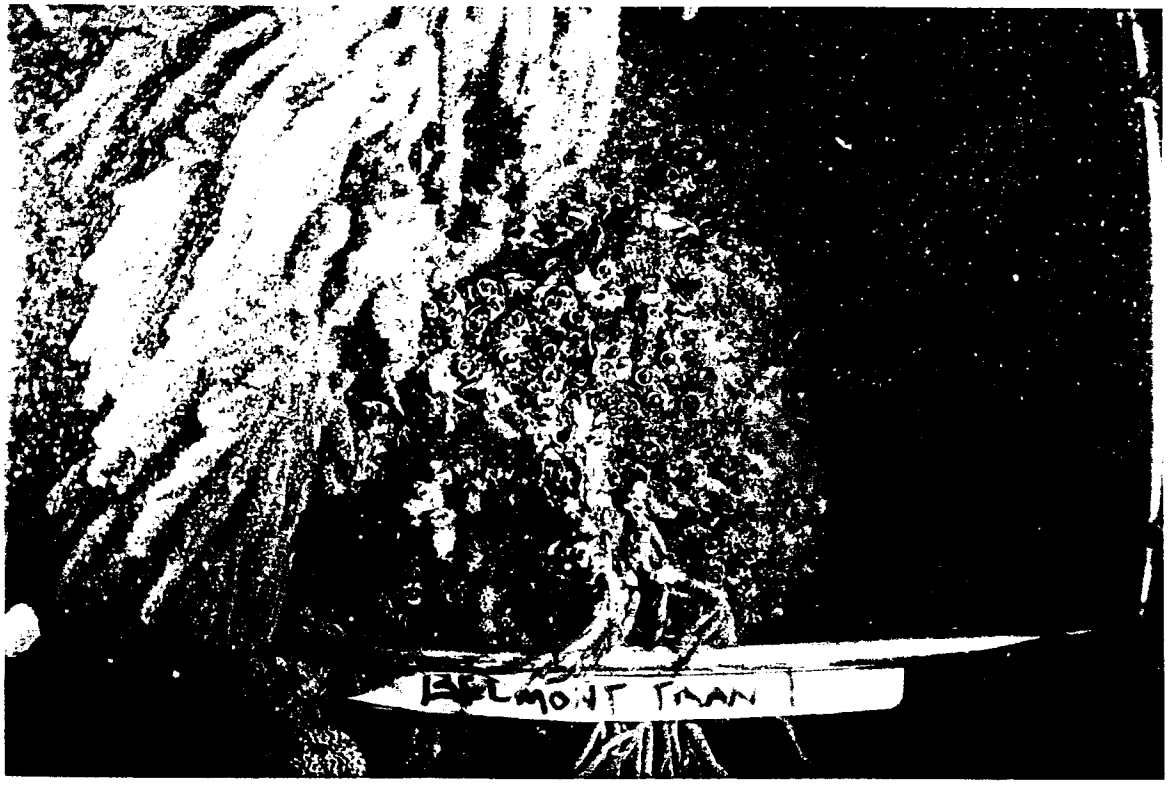
MINUTE PAGE 0007246



Sediment and talus shells with Diopatra ornata polychaete worms



Tube-building molluscs, Serpulorbis squamigerus, gorgonian corals, Muricea californica and Lophogorgia chilensis

Plate 1
Belmont Island Sediment Bottom and Deeper Rock Habitat
July 1999

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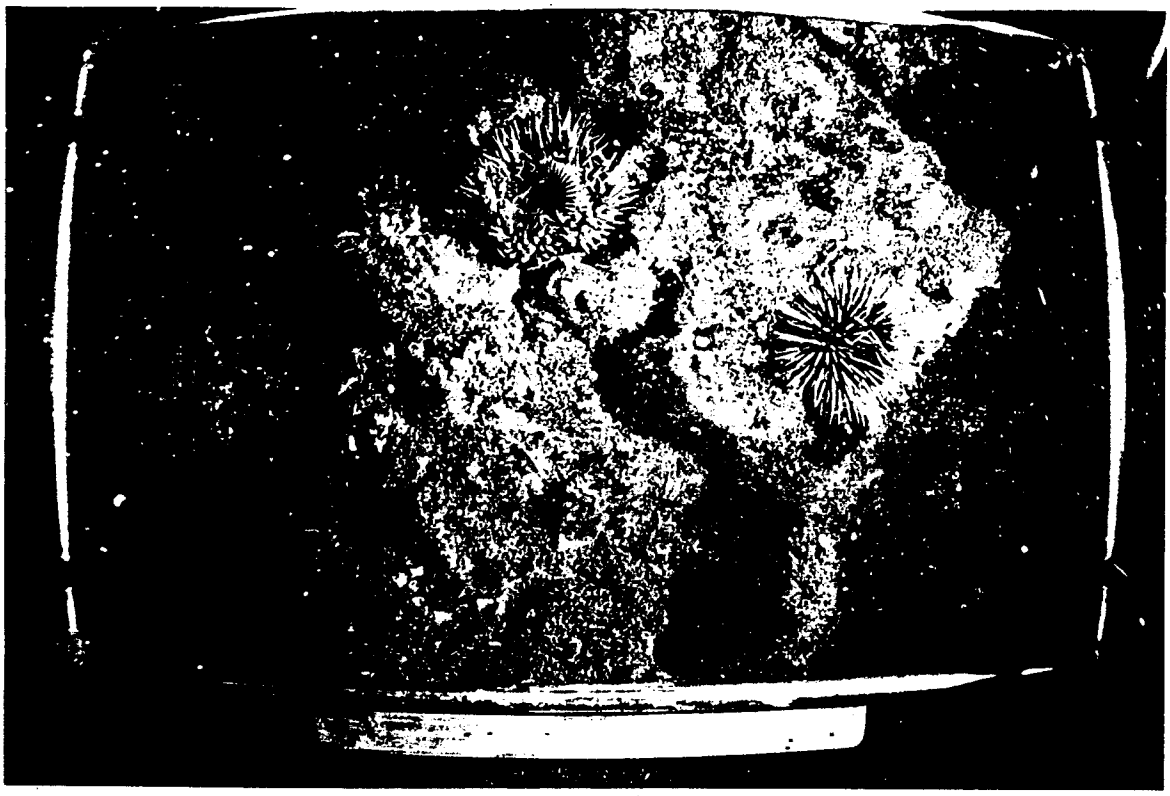
Abundant feather duster worms, Eudistylia polymorpha, and anemones, Anthopleura elegantissima, with garibaldi, Hypsopops rubicunda in the background

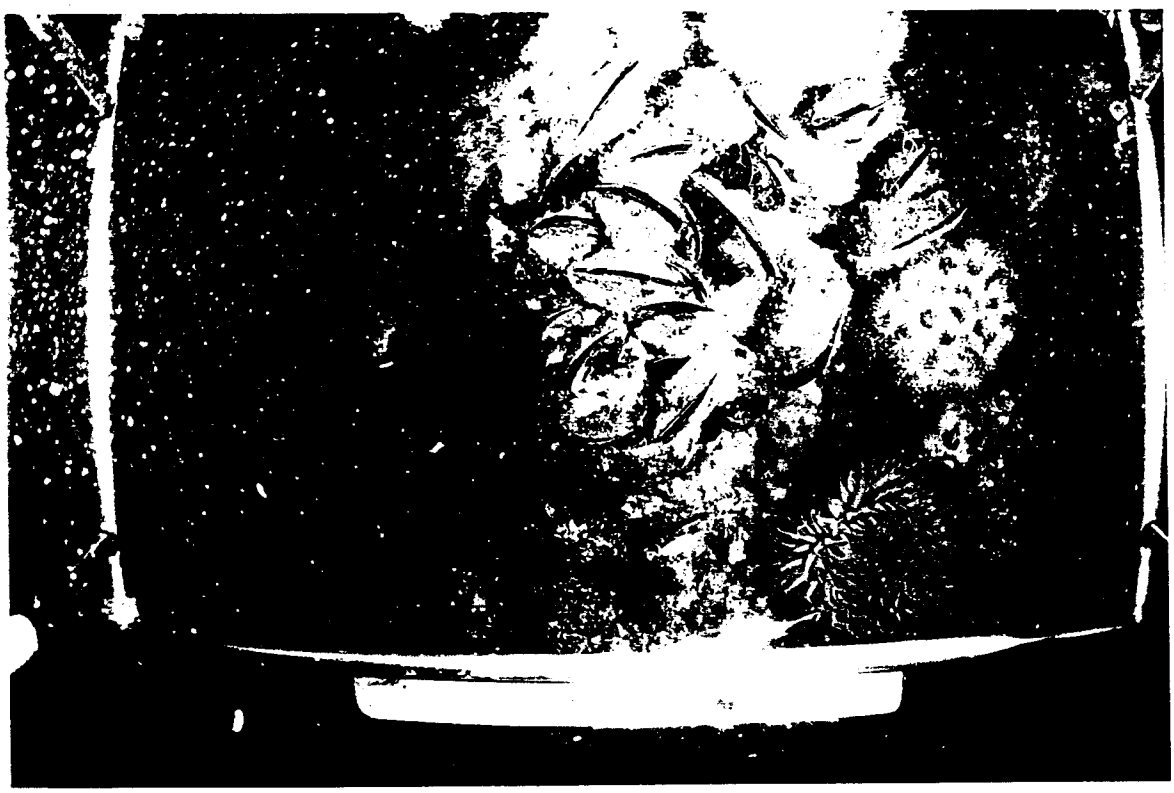
S. squamigerus and purple sea urchins, Strongylocentrotus purpuratus with some encrusting coralline algae Lithothamnion/Lithophyllum in lower left corner

Plate 2
Belmont Island Mid-Water Rock Habitat and Biota
July 1999

CALENDAR PAGE 000569
MINUTE PAGE 0007248



S. purpuratus and strawberry anemones, Corynactis californica, with ectoprocts and encrusting purple algae, Peysonnelia pacifica in upper right



Mussels, Mytilus edulis, solitary anemone, A. elegantissima, and strawberry anemones, C. californica

Plate 3

Belmont Island Shallow-Water Rock Habitat and Biota

July 1999

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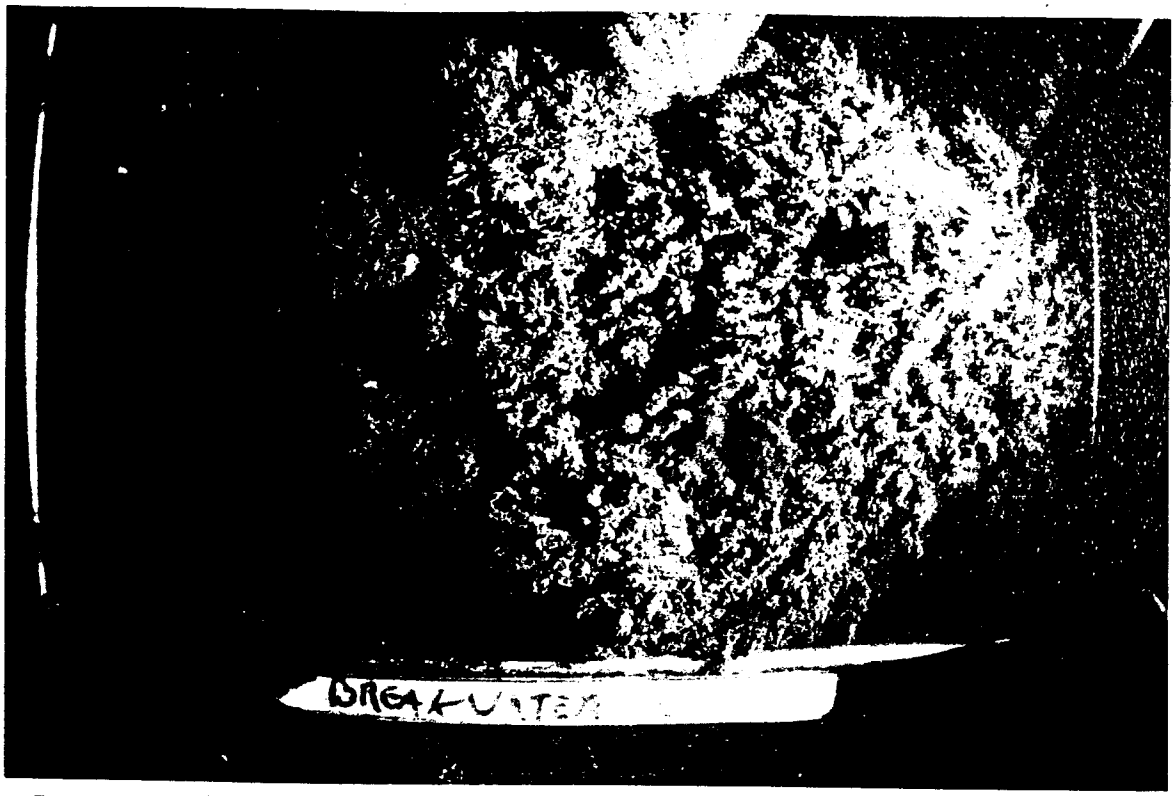

Erect ectoprocts probably Crisia occidentalis, with gorgonians M. californica and L. chilensis in upper middle and left corner

Mussels, M. edulis, strawberry anemones, C. californica, and encrusting coralline algae Lithothamnion/Lithophyllum

Plate 4

Eastern Long Beach Breakwater, Deep-Water Rock Habitat and Biota

July 1999

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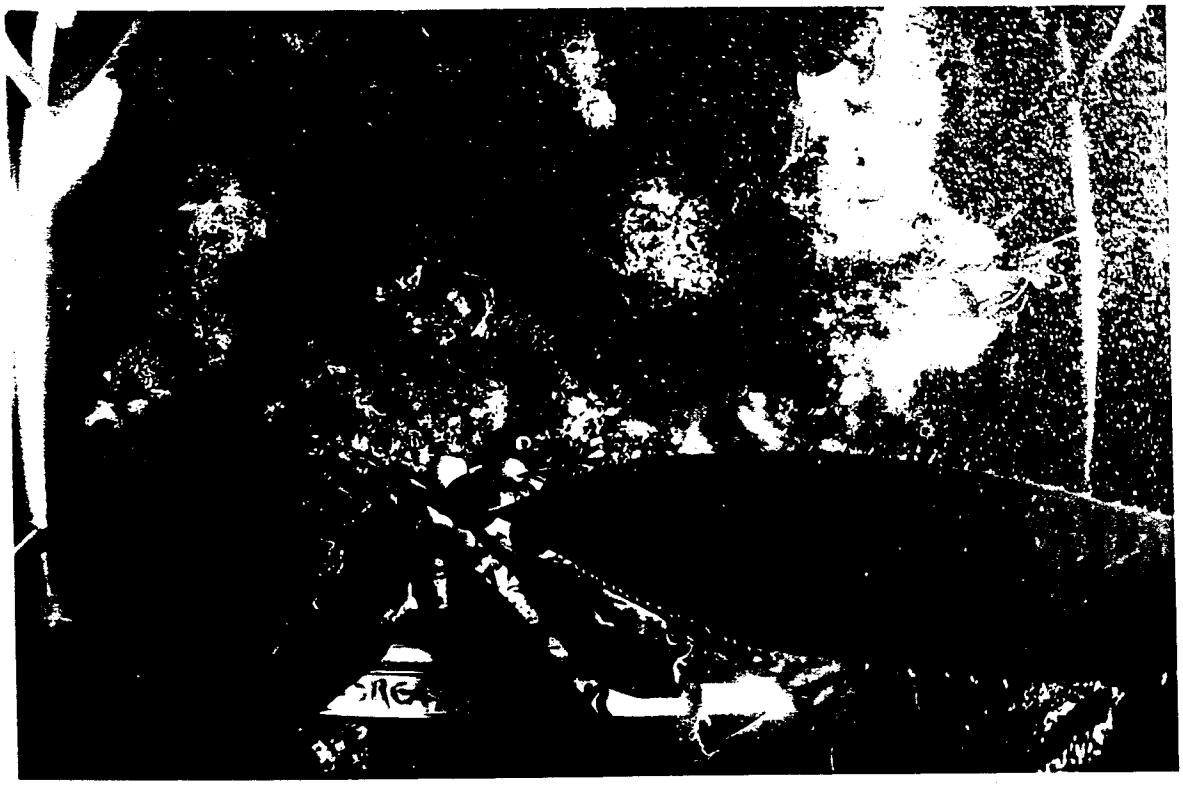
Tube building mollusc, S. squamigerus, feather duster worms, E. polymorpha, and brown algae, probably juvenile Pterygophora



Juvenile giant kelp, Macrocystis pyrifera

Plate 5

Eastern Long Beach Breakwater, Mid-Water Rock Habitat and Biota

July 1999

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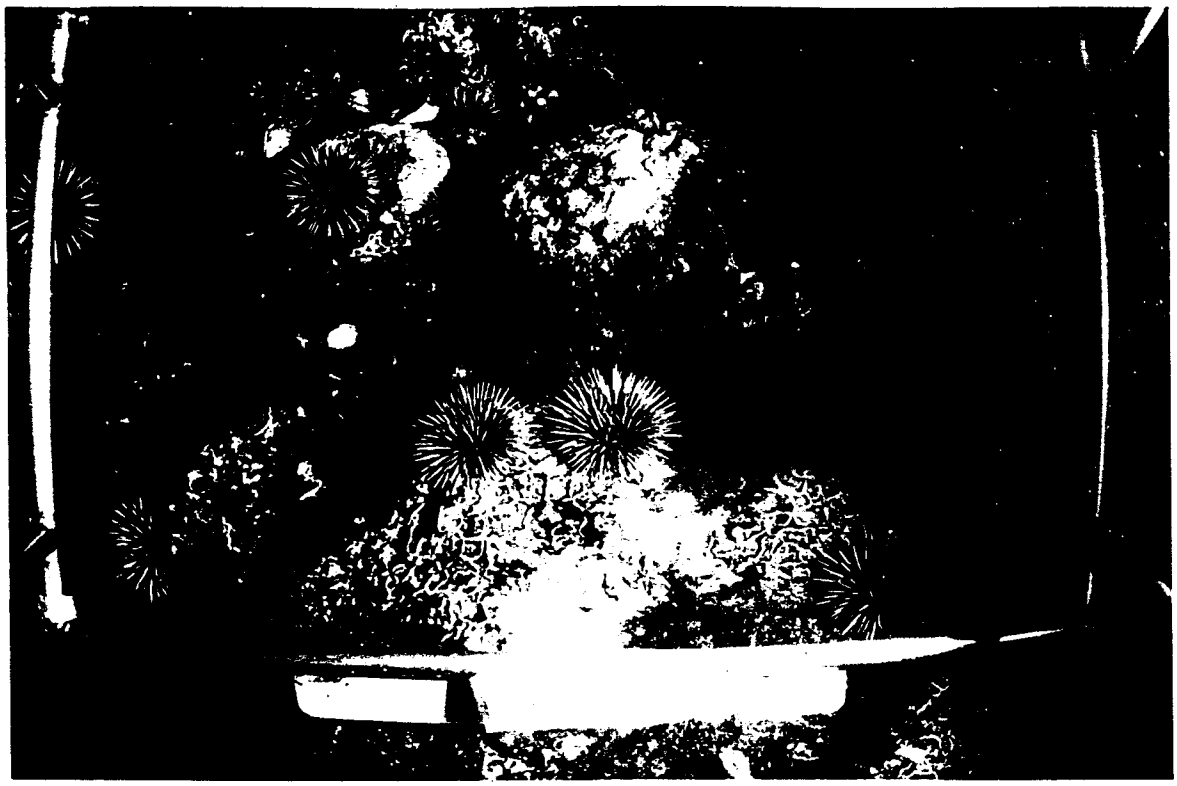
MINUTE PAGE 0007251



Encrusting coralline algae, feather duster worms, and purple sea urchins

Giant sea stars, Pisaster giganteus and purple sea urchins on a bed of mussels

Plate 6

Eastern Long Beach Breakwater, Shallow-Water Rock Habitat and Biota

July 1999

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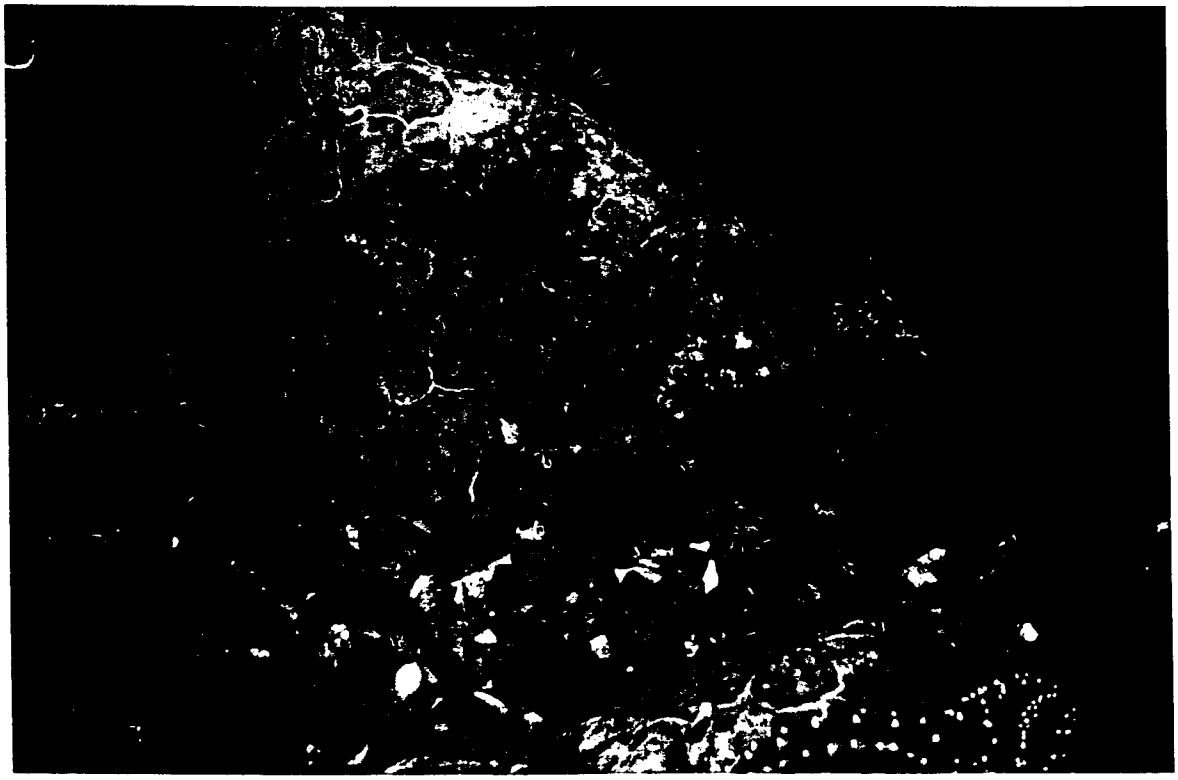
MINUTE PAGE 0007252

Feather duster worms, mussels, and shell talus



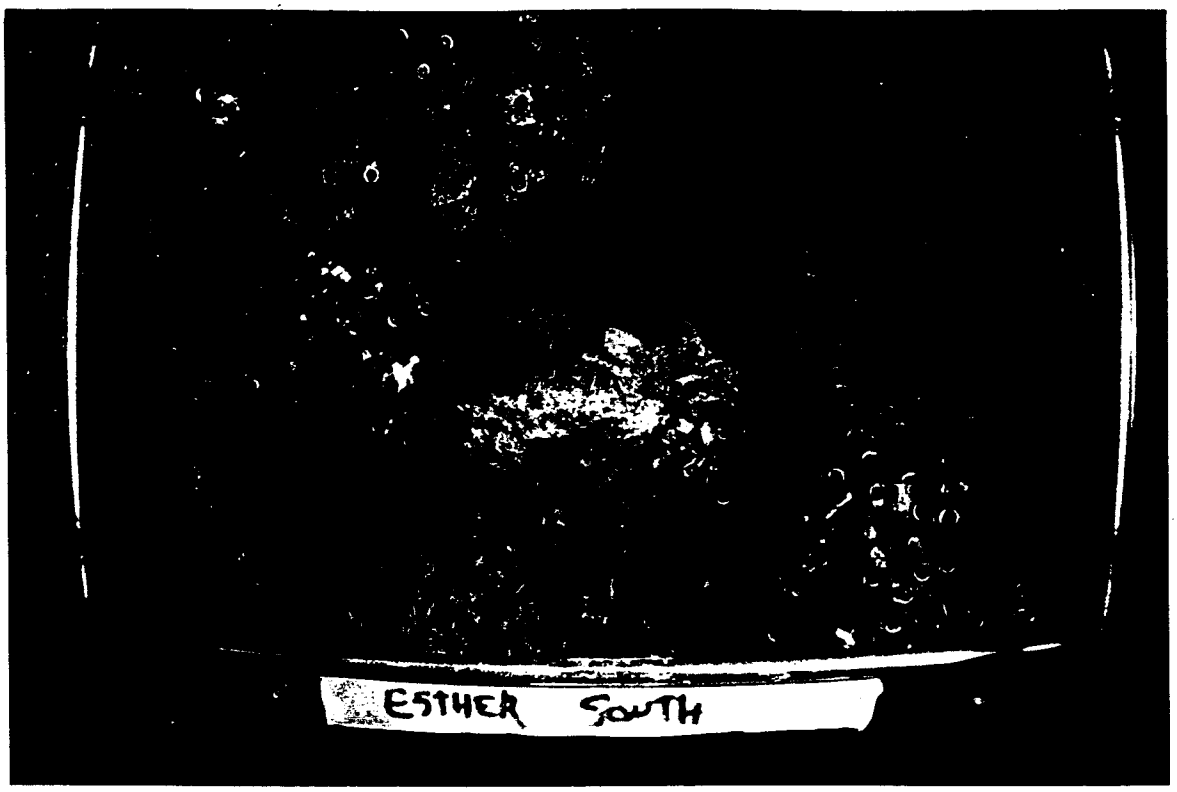
Encrusting coralline algae-covered rock with purple sea urchins, bat stars Asterina (Patiria) minata, solitary anemone, and shell talus

Plate 7

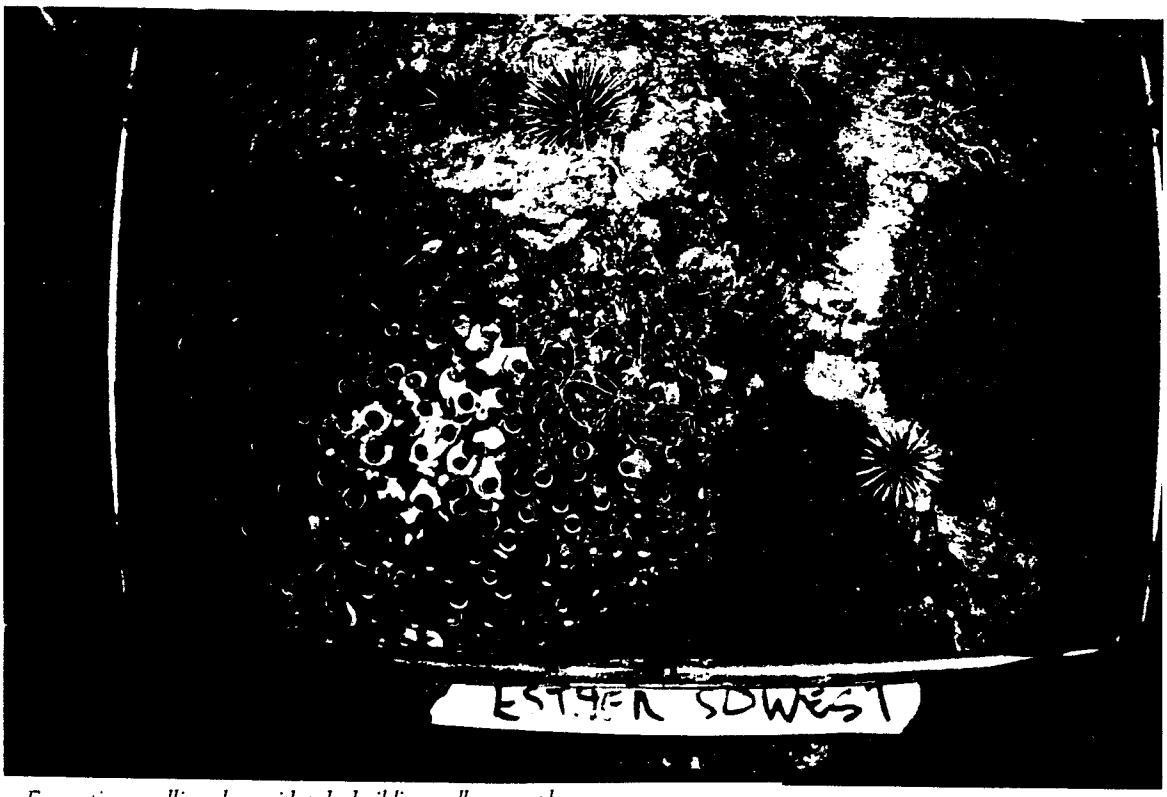
Platform (Island) Esther, Deep-Water, Low-Relief Rock Habitat and Biota

July 1999

CALENDAR PAGE 000374
MINUTE PAGE 0007253



Encrusting coralline and filamentous red algae, tube building mollusc, and feather duster worms



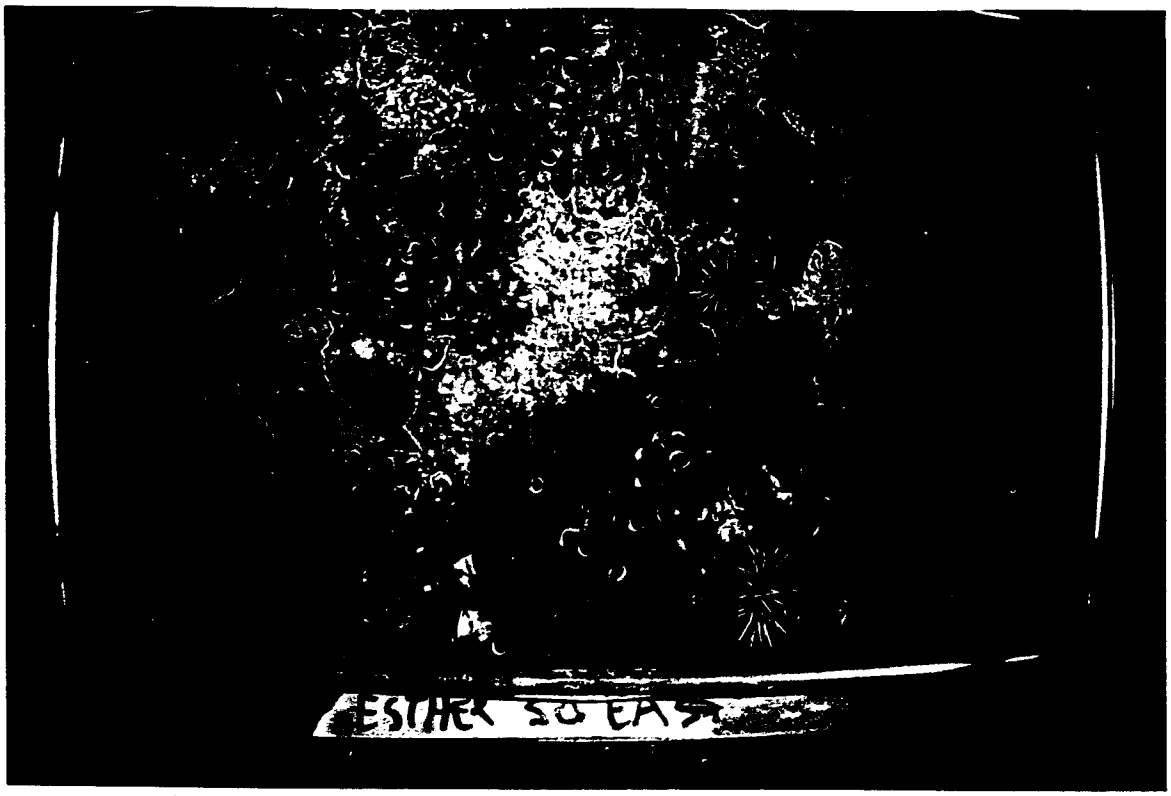
Encrusting coralline algae with tube building mollusc, purple sea urchins, encrusting orange coral, Astrangia lajollaensis, and gorgonian coral, Muricea sp.

Plate 8

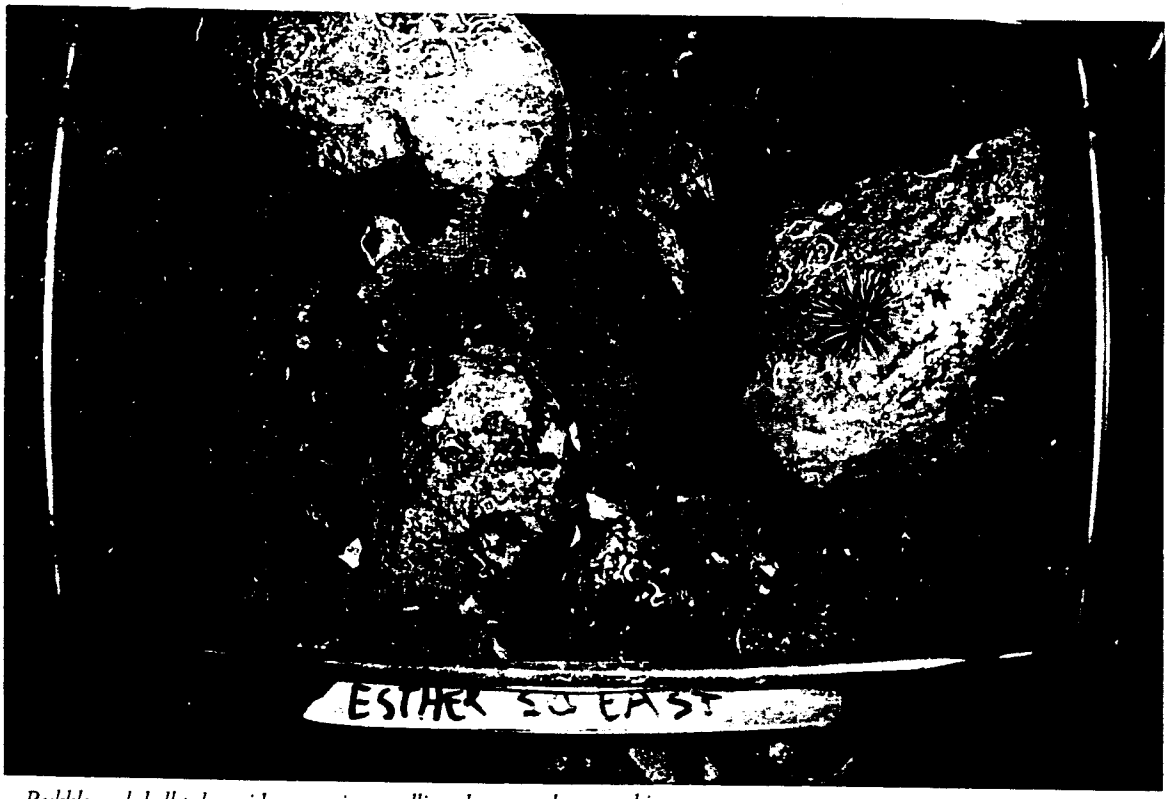
Platform (Island) Esther, Mid-Water, Low-and High-Relief Rock Habitat and Biota

July 1999

CALENDAR PAGE 000575
MINUTE PAGE 0007254



Encrusting coralline algae, bat stars, purple urchins, tube building mollusc, and Kellet's whelk, Kelletia kelleti



Rubble and shell talus with encrusting coralline algae, purple sea urchins, and bat stars

Plate 9

Platform (Island) Esther, Mid-Water, Low-Relief Rock Habitat and Biota

July 1999

CALENDAR PAGE 000576
MINUTE PAGE 0007255

APPENDIX A

SPECIES LIST AND RELATIVE ABUNDANCE OF MARINE BIOTA FROM DIVER OBSERVATIONS (28-30 JULY 1999 SURVEY)

CALENDAR PAGE 000577
MINUTE PAGE 0007256

SPECIES LIST AND RELATIVE ABUNDANCE FROM DIVER OBSERVATIONS
28-30 JULY 1999 SURVEY

	Belmont Island				L B Breakwater		Esther			
	T1	T2	T3	T3A	East	South	NoEast T1	SoEast T2	SoWest T3	81/82*
Algae										
Dictyopteris undulata					P	P				
Egregia menziesii						C				
Gelidium robustum					C					
Lithothamnium/Lithophyllum				P		P	C	P		
Macrocystis pyrifera					C	P				
Peysonelia pacifica				P						
Unid. coralline algae				P	P					
Unid. filamentous red algae			P	P	P	P		P		
Cnidaria										
Anthopleura elegantissima	A	A	A	P	P	C	C	C	C	C
Astrangia lajollaensis			P		P	P	P	C	C	P
Corynactis californica	P	P	P			P		P		P
Lophogorgia chilensis		R			P	P				P
Muricea californica	A	A	A	A	A	C	C	C	C	A
Muricea fruticosa	R	R	R		P	P	P	P	P	P
Pachycerianthus fimbriatus					R					
Paracyathus stearnsi					R					
Annelida										
Diopatra ornata	A-soft bottom			C					C	
Eudistylia polymorpha	C	C	C	C		C	C	C	C	P
Phragmatopoma californica							C	C	C	P
Salmacina tribranchiata					C	P				
Mollusca										
Anisodoris nobilis			P							
Astraea undosa								P	P	
Conus californicus	P	C	P					P		P
Cypraea spadicea			R							
Dendrodoris fulva						C				
Dialula sandiegensis	P	P								
Flabellinopsis iodinea		P			P	P				P
Hinnites giganteus	C	A	A	C	P	P				
Kelletia kelleti	A	A	A	C		P	C	C	P	P
Megathura crenulata	P	C	C	C	P	C		P	P	P
Mytilus edulis	A	A	A	C		A	C	C		C

MINUTE PAGE 0007257

SPECIES LIST AND RELATIVE ABUNDANCE (page 2)

28-30 JULY 1999 SURVEY

	Belmont Island				L B Breakwater		Esther			
Molluscs (Con't)	T1	T2	T3	T3A	East	South	NoEast T1	SoEast T2	SoWest T3	81/82*
Octopus sp.		P					P			
Polycera atra					P					
Pteropurpura festiva		P		C						
Serpulorbis squamigerus	A	A	A	C	P	C	C	P		P
Echinodermata										
Asterina miniata		R	R				C	C	C	P
Lytechinus anamesus								R		
Parastichopus parvimensis	C	C	C	P	P		P	C	C	
Pisaster brevispinus	A	A	A	P		P		P	P	P
Pisaster giganteus	P		P	P	R	C	C	C	C	P
Pisaster ochraceus	C	C	C			C	C			P
Strongylocentrotus franciscanus	R		R	P	P	P	C	C	P	C
Strongylocentrotus purpuratus	R		R	C	C	A	A	C	C	C
Unid. ophiuroids							P			
Unid. burrowing holothuroid	P	P								
Arthropoda										
Balanus tintinabulum										P
Loxorhynchus grandis		P			P					
Pollicipes polymerus		P	P							
Ectoprocta										
Bugula neritina									P	
Crisia occidentalis					A	C				
Diapoericia californica	C	C	C	A	C	C	P		P	
Thalamoporella sp.					P					
Unid. encrusting ectoproct							P			
Urochordata										
Boltenia villosa		R								
Styela montereyensis		P	P	P			P			
Pisces										
Anisotremus davidsoni		P								P
Cheilotrema saturnum	A	A								
Chromis punctipinnis	P	P	P	P	P	C		P	P	
Damalichthys vacca		P	P			P			P	P
Embiotica jacksoni	C	P	P	P	C	C			P	P
Girella nigricans		P	P							P

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SPECIES LIST AND RELATIVE ABUNDANCE (page 3)

28-30 JULY 1999 SURVEY

	Belmont Island				L B Breakwater		Esther			
Pisces (Con't)	T1	T2	T3	T3A	East	South	NoEast T1	SoEast T2	SoWest T3	81/82*
Hermosilla azurea					C					
Hypsypops rubicunda		P	P	P		P		P	P	P
Medialuna californiensis	P									P
Oxyjulis californica					P			P	P	P
Oxylebius pictus		P			P			P		P
Paralabrax clathratus	P	P	P	P				P	P	P
Paralabrax nebulifer	C	C	P	P	P	P	P	P	C	P
Phanerodon furcatus		P	P							
Pleuronichthys coenosus	P									
Rhacochiles toxotes		P	P			P				P
Scorpaena guttata									P	P
Scorpaenichthys marmoratus				P		P				
Semicossyphus pulcher						P			P	P

KEY

*Observed by Chambers Consultants during a 1981-1982 survey at Island Esther

A = Abundant (seen on every dive or in large numbers locally)

C = Common (Observed routinely)

P = Present (seen on more than 1 dive)

R = Rare (seen on 1 dive)

CALENDAR PAGE
MINUTE PAGE 0007259

APPENDIX B

0.1 SQUARE METER QUADRAT DATA (28-30 JULY 1999 SURVEY)

CALENDAR PAGE 000581
MINUTE PAGE 0007260

0.1 SQ. METER QUADRAT DATA (28-30 JULY 1999 SURVEY)

	(% Cover or Number of Individuals)					
	42 to 30 ft. (MLLW)			29 to 15 ft. (MLLW)		
	Belmont	L.B. Break	Esther	Belmont	L.B. Break	Esther
Algae						
Dictyopteris undulata			N		0-2%	
Lithothamnion/Lithophyllum		0-80%	O		0-10%	0-60%
Macrocystis pyrifera					0-1	
Unid. filamentous red algae		0-20%		0-20%*	0-10%	0-1%
Unid. brown algae			S		0-20%	
Unid. coralline algae			A		0-5%	
Cnidaria			M			
Anthopleura elegantissima			P	0-1		
Astrangia lajollaensis	0-2%	0-80%	L			0-10%
Corynactis californica	0-5%**		E	0-5%		
Lophogorgia chilensis	0-1%	0-5%	S	0-1%		
Muricea californica	0-20%	0-20%		0-1%	0-10%	0-10%
M. fruticosa		0-1%	A			
Paracyathus stearnsi		0-2%	T			
Dead gorgonian stalks	0-10%	0-2%				
Annelida			T			
Eudistylia polymorpha	0-5	0-1	H	2 to 4	0-1	0-1
Phragmatopoma californica			E			0-20%
Salmacina tribranciata		0-2%	S		0-10%	
Unid. serpulids			E			0-1%
Mollusca						
Astrea undosa						0-1
cf *Callisotoma* sp.		0-1	W			
Conus californicus			A	0-6		0-1
Dialula sandiegensis			T	0-1		
Hinnites giganteus			E	0-1	0-1	
Kelletia kelleti	0-1		R			0-1
Mytilus edulis				0-5%	0-80%	0-10%
Pteropurpura festiva	0-1			0-1		
Serpulrobis squamigerus	5 to 95%		D	10 to 90%	0-15%	0-20%
Unid. gastropods	0-1		E		0-1	
Ectoprocta			P			
cf *Crisia occidentalis*	0-5%	0-25%	T	0-80%		
Diaporecia californica	0-10%	0-10%	H		0-10%	0-2%
Phidolopora pacifica	0-2%		S			
Unid. ectoprocts	0-5%			0-20%		
Echinodermata						
Asterina miniata	0-1		A			0-1
Lytechinus anamesus			T			0-1
Parastichopus parvimensis					0-1	0-1
Pisaster brevispinus			E			
Strongylocentrotus franciscanus			S			0-2
S. purpuratus		0-2	T	0-1	0-1	0-5
Unid. burrowing holothuroid	0-1		H	0-1		
Unid. ophiuroids			E			0-Common
Tunicata* **	0-7		R			0-1

*Found only on the exposed rocks on the south side of the island

** Found only on high rock habita

*** Includes *Styela montereyensis* and *Botenia villosa*

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MINUTE PAGE 0007261

EXHIBIT I

W 40792

SPECIES LIST FROM DIVER OBSERVATIONS
28-30 JULY 1999 SURVEY

	Belmont Island	L B Breakwater	Esther	Bolsa Chica
Algae				
Dictyopteris undulata				
Egregia menziesii				
Gelidium robustum				
Lithothamnium/Lithophyllum				
Macrocystis pyrifera				
Peysonelia pacifica				
Unid. brown algae				
Unid. coralline algae				
Unid. filamentous red algae				
Anisocladella pacifica				
Rhodymenia pacifica				
Porifera				
Leucilla sp.				
Cnidaria				
Anthopleura elegantissima				
Astrangia lajollaensis				
Corynactis californica				
Lophogorgia chilensis				
Muricea californica				
Muricea fruticosa				
Pachycerianthus fimbriatus				
Paracyathus stearnsi				
Dead gorgonian stalks				
Obelia sp.				
Stylatula elongata				
Annelida				
Diopatra ornata				
Eudistylia polymorpha				
Phragmatopoma californica				
Salmacina tribranchiata				
Unid. Serpulids				
Mollusca				
Anisodoris nobilis				
Astraea undosa				
cf. *Callisotoma* sp.				
Conus californicus				
Cypraea spadicea				
Dendrodoris fulva				
Dialula sandiegensis				
Flabellinopsis iodinea				
Hinnites giganteus				
Kelletia kelleti				
Megathura crenulata				
Mytilus edulis				
Octopus sp.				
Polycera atra				
Pteropurpura festiva				
Serpulorbis squamigerus				

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SPECIES LIST FROM DIVER OBSERVATIONS
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	Belmont Island	L B Breakwater	Esther	Bolsa Chica
Crassedoma giganteum				■
Polinices lewisii				■
Volutacea				■
Chama arcana				■
Pododesmus cepio				■
Echinodermata				
Asterina miniata	■		■	
Lytechinus anamesus			■	
Parastichopus parvimensis	■	■	■	
Pisaster brevispinus	■	■	■	■
Pisaster giganteus	■	■	■	
Pisaster ochraceus	■	■	■	■
Strongylocentrotus franciscanus	■	■	■	
Strongylocentrotus purpuratus	■	■	■	
Unid. ophiuroids			■	
Unid. burrowing holothuroid	■			
Parastichopus californicus				■
Arthropoda				
Balanus tintinabulum			■	■
Loxorhynchus grandis	■	■		■
Pollicipes polymerus	■			
Panulirus interruptus				■
Ectoprocta				
Bugula neritina			■	
Crisia occidentalis	■	■		
Diapoericia californica	■	■	■	
Phidolopora pacifica	■			
Thalamoporella sp.		■		
Unid. encrusting ectoproct	■		■	
Hippodiplosia insculpta				■
Tricellaria occidentalis				■
Urochordata				
Boltenia villosa	■			
Styela montereyensis	■		■	■
Pisces				
Anisotremus davidsoni	■		■	■
Cheilotrema saturnum	■			
Chromis punctipinnis	■	■	■	■
Damalichthys vacca	■	■	■	■
Embiotica jacksoni	■	■	■	■
Girella nigricans	■		■	
Hermosilla azurea		■		
Hypsypops rubicunda	■	■	■	
Medialuna californiensis	■		■	
Oxyjulis californica		■	■	
Oxylebius pictus	■	■	■	
Paralabrax clathratus	■		■	■
Paralabrax nebulifer	■	■	■	■
Phanerodon furcatus	■			■
Pleuronichthys coenosus	■			

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SPECIES LIST FROM DIVER OBSERVATIONS
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	Belmont Island	L B Breakwater	Esther	Bolsa Chica
Rhacochiles toxotes	■	■	■	■
Scorpaena guttata			■	■
Scorpaenichthys marmoratus	■	■		
Semicossyphus pulcher	■	■		
Coryphopterus nicholsii				■
Rathbunella hypoplecta				■

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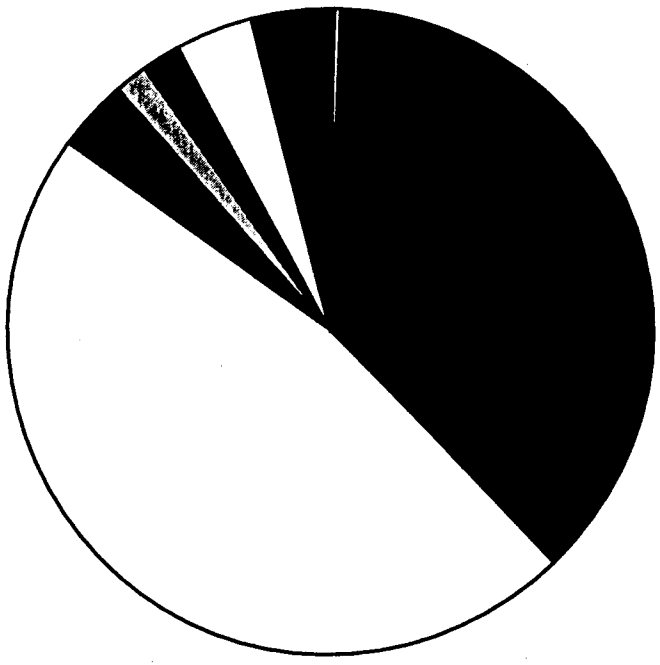
Structure	Water Depth	Surface Area in ft²	Avg Depth in ft
		0	0
Belmont Island	42 ft	14,000	42
Long Beach Breakwater	50 ft	2,974,000	50
Middle Breakwater	50 ft	3,727,000	50
Island Freeman	37 ft	276,000	37
Island White	25 ft	147,000	25
Island Chaffee	27 ft	142,000	27
Los Alamitos Bay Jetties	6-12 ft	314,000	9
Seal Beach NWS Jetties	12-15 ft	330,000	14
Totals		7,924,000	

Vicinity Total
7,924,000

Rip-rap Structures near Belmont Island



Pie chart repesents rip-rap surface area in square feet

Structure	Water Depth
Belmont Island	42 ft
Long Beach Breakwater	50 ft
Middle Breakwater	50 ft
Island Freeman	37 ft
Island White	25 ft
Island Chaffee	27 ft
Los Alamitos Bay Jetties	6-12 ft
Seal Beach NWS Jetties	12-15 ft

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