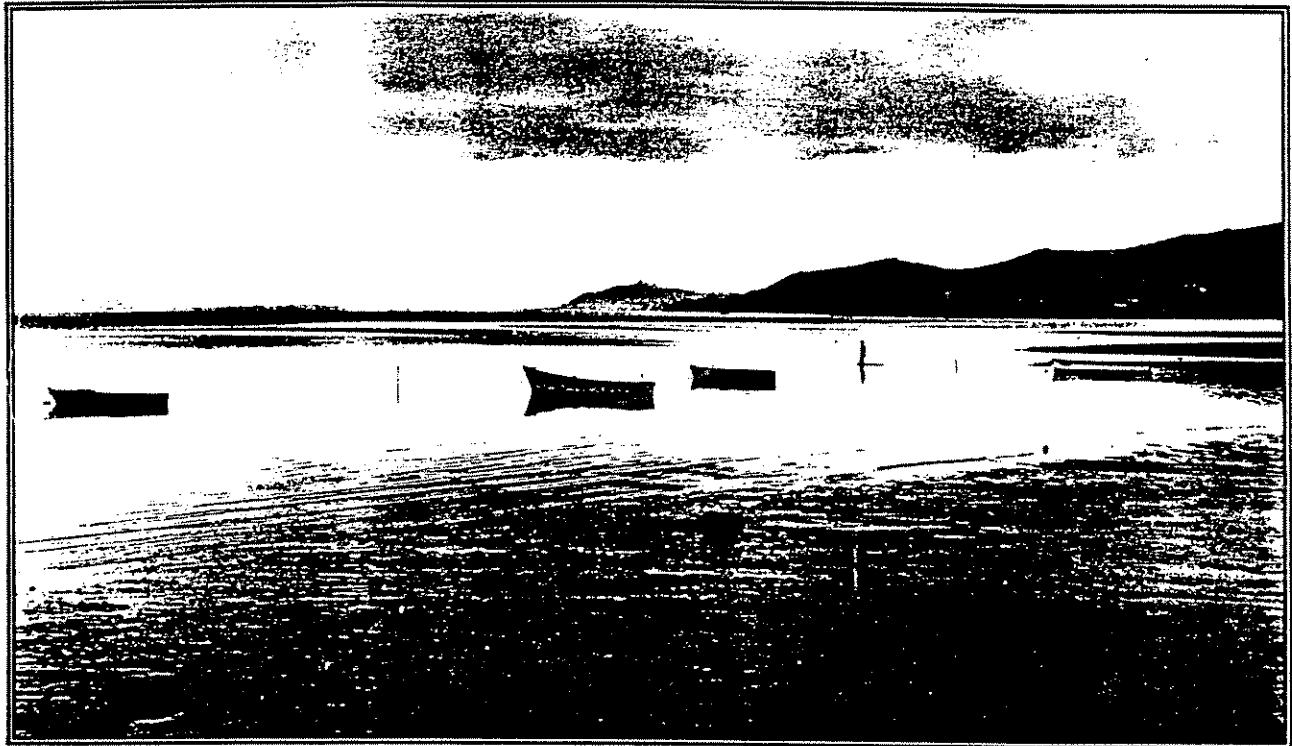


Kane'ohe Bay Master Plan



by the
**Kane'ohe Bay Master Plan
Task Force**

**State of Hawaii
Office of State Planning**

May 1992

KANE'OHE BAY MASTER PLAN

prepared by the

KANE'OHE BAY MASTER PLAN TASK FORCE

prepared for

**STATE OF HAWAII
OFFICE OF STATE PLANNING**

MAY 1992



OFFICE OF STATE PLANNING

Office of the Governor

MAILING ADDRESS: P.O. BOX 3540, HONOLULU, HAWAII 96811-3540
STREET ADDRESS: 250 SOUTH HOTEL STREET, 4TH FLOOR
TELEPHONE: (808) 587-2846, 587-2800

FAX: Director's Office 587-2846
Planning Division 587-2824

Ref. No. P-2877

March 19, 1992

Mr. John B. Goody
Chairperson
Kaneohe Bay Master Plan Task Force
47-401 Lulani Street
Kaneohe, Hawaii 96744

Dear Mr. Goody:

This letter acknowledges the receipt of the Kaneohe Bay Master Plan Task Force resolution submitting the Kaneohe Bay Master Plan (Master Plan) to the Office of State Planning for review and approval pursuant to Act 208, SLH 1990.

After reviewing the Master Plan and public comments, the Office of State Planning approves the Master Plan conditioned upon and subject to the State agency promulgation of appropriate policies, rules, and regulations relating to Kaneohe Bay which implement the Master Plan's recommended guidelines. By separate letters the appropriate State agencies will be advised regarding Master Plan implementation.

I also want to take this opportunity to extend a warm mahalo nui loa to you and the Kaneohe Bay Master Plan Task Force for your contributions of time, energy, and resources in developing this important policy document. I am sure that the community will view the Master Plan as an invaluable tool in balancing Kaneohe Bay's diverse resources in relationship to the interests of its many users.

Should you have any questions, please feel free to call.

Sincerely,

Harold S. Masumoto
Director

Kaneohe Bay Master Plan Task Force Resolution

REQUESTING THE OFFICE OF STATE PLANNING TO APPROVE THE PROPOSED KANEOHE BAY MASTER PLAN.

WHEREAS, Act 208, SLH 1990, created the Kaneohe Bay Master Plan Task Force and requested it to develop a master plan for Kaneohe Bay;

WHEREAS, Kaneohe Bay Master Plan Task Force meet regularly between October 1990 and November 1991, and developed a master plan;

WHEREAS, Kaneohe Bay Master Plan Task Force has formally adopted all the recommendations contained in the proposed Master Plan at public meetings as noted in the minutes of the meetings; now, therefore,

BE IT RESOLVED by the Kaneohe Bay Master Plan Task Force that the Office of State Planning is requested to approve the proposed Master Plan and distribute it to the appropriate agencies for implementation;

BE IT FURTHER RESOLVED that a copy of this Resolution be transmitted to the Office of State Planning.

John B. Gaddy
David Barsohn
James Hardman
Ed Richard
W. W. H. H.

Thomas Ross
Philip Kelfrick
Peter D. H. H.
John Lewis Reppun

EXECUTIVE SUMMARY

Pursuant to Act 208 (Act), Session Laws of Hawaii 1990, the Legislature established the Kane'ohe Bay Master Planning Task Force to develop a comprehensive master plan for Kane'ohe Bay. The Kane'ohe Bay Master Plan was developed through extensive public participation with the assistance of a Kane'ohe fisherman, a commercial recreation businessperson, representatives from neighborhood boards and State agencies, as well as non-voting representatives of the Marine Corps Air Station, Kane'ohe Bay, and the City and County of Honolulu.

The Act established a one-year time frame from October 1, 1990, to develop the Master Plan. Due to the magnitude of the issues, however, the planning period was extended to ensure maximum public participation.

The planning area includes the Ko'olaupoko District as well as the watersheds of the twelve streams entering Kane'ohe Bay, the inner bay waters designated Class AA, and the outer bay Class A waters. The boundary line between the two waters runs between Pyramid Rock off Moku Peninsula and Kaoio Point at Kualoa.

Planning proceeded in four phases from:

- October 1990 through January 1991, the Task Force developed an agenda of issues, developed information sources, and organized committees;
- February 1991 through April 1991, committees developed problem statements, gathered and analyzed public viewpoints, and develop alternatives;
- May 1991 through November 1991, the committees and subcommittees continued to meet, and the Task Force held public discussions and made decisions on the alternatives proposed, making modifications as necessary. From June through November, an ad hoc committee met in mediated sessions to develop a plan for commercial recreation management, the results of which were approved at the November 20, 1991 Task Force meeting; and
- November 1991 to January 1992, the Task Force prepared a draft report of the Master Plan, which was reviewed at an OSP-sponsored public meeting on January 13, 1992, and then finalized and distributed as this report.

Several planning concepts established the foundation for subsequent Task Force positions and recommendations. These included:

- sustainable use of the resources of the Bay;
- the need to accommodate a variety of interests and existing uses within the limits of sustainability; and
- the recognition that different zones of use and areas of different ecological value and sensitivity existed within the Bay. Ecological integrity, economic use, preservation of the opportunity for cultural and traditional pursuits, water safety, aesthetics, and fairness were of predominant concern in the public dialogue.

A strong relationship exists between activities in the watershed and the health of the Bay. Land use concerns included riparian influences, runoff and pollution from urban development, and limited public access to the bay shore. Strong evidence assembled by the Task Force indicated that water and ecological quality in the Bay has been deteriorating since the mid-1980's, and continues to deteriorate. The Task Force takes the following positions on *land use issues*:

- Protect natural streams and preserve existing stream water flows into Kane'ohe Bay;
- Preserve in their natural state existing wetlands, natural riparian zones, and hillsides with slopes of 20 percent or more;
- Mitigate deteriorating water quality in key watersheds by installing pollution control measures and restoring historic wetlands at the confluence of Kane'ohe and Kawa streams;
- Restrict development in the watershed in accordance with the Ko'olaupoko Development Plan. Limit development where a sewage collection system does not exist, and restrict use of septic and individual waste water systems to residential lots with sufficient size (15,000 square feet or more) for proper disposal;
- Delay northward extension of the sewage collection system until existing infrastructure deficiencies are rectified. Repair and upgrade the existing sewage collection system to prevent by-passes of raw or partially treated sewage effluent into the Bay and to prevent sewage infiltration through ground water to the Bay;
- Preserve and procure existing public open space to increase present and future public access. Key locations include Kane'ohe stream/Bay View Golf Course, He'eia Kea, and the Waikane-Waiahole stream areas;
- Develop access points to launch and retrieve small-trailered boats at locations such as Kokokahi to reduce pressure on He'eia Kea Harbor. No additional marina facilities are recommended because of the congestion that already exists on the Bay and the typical rough windward sea conditions that confine most boats within the Bay;
- Provide stable legislative support for a comprehensive water quality monitoring program for the Bay and its major streams; and
- Establish and promote the use of cost-free hazardous waste collection sites.

Concerns regarding *in-water* uses of Kane'ohe Bay included commercial recreation activities, overfishing, safety and public recreation conflicts, and inadequacy of existing mooring areas, resulting in the following recommendations:

- Establish a Kane'ohe Bay Fishing Panel, comprised of Kane'ohe fishermen, other residents, and fishery specialists, to evaluate and advise various government agencies, the public, and the Kane'ohe Bay Council on the use of gill nets and other fishing techniques, enforcement of existing regulations, and establishment of a research program to identify the causes of the resource decline. The Task Force assembled firm evidence to substantiate a decline in the reported commercial fish catch and catch rates. Recreational catch data have not been collected, but many Bay users believe fish abundance has declined. Evidence was insufficient to positively identify the causes of the decline, although it coincided with an increase in net fishing and a decrease in sewage discharges through outfalls in Kane'ohe Bay. Gill netting alone is responsible for up to 5-10 times more of the commercial catch than other types of fishing. Pollution and motorized recreation are also possible contributors. In particular, non-point source pollution continues to increase and there have been numerous sewage "bypasses" into the Bay in recent years.
- Require slow-no wake speed limits for water craft within 200 feet of the central Bay shallows (commonly known as "the sand bar") and reef area, and a 25 knot speed limit within the congested area of the central Bay to allow a safe mix of a variety of water uses and also ban private recreational thrillcraft in Kane'ohe Bay because of their adverse impact on other Bay users.

- Create two new mooring areas for larger boats presently anchored in the Bay in the southern Bay, expand an earlier proposed mooring area north of He'eia Kea, and also eliminate another mooring area, "B," proposed earlier near He'eia Kea. Existing private moorings associated with Kane'ohe shoreline residences should be grandfathered, and small skiffs moored in shallows should not be limited.
- Manage commercial recreation through limits on the number of operations, their size, customer capacity, types of equipment, locations, and times of operation. Public interest is protected through annual permit renewal process with public input, pollution control, filing of daily logs, and attaining conservation district use permits for use of submerged lands.

The Task Force's *long range plan* addresses implementation of the Master Plan, research needs for future management, and consideration of the possible protected status for Kane'ohe Bay and includes the following recommendations:

- Institute a research program coordinated by the University of Hawaii's Institute of Marine Biology (HIMB), located on Coconut Island in Kane'ohe Bay (because the needs of resource management are inadequately served by existing research and data gathering programs) which should:
 - ascertain current levels of pollutant input into the Bay, and determine the causes of deteriorating Bay water quality;
 - determine the impacts of fishing and water quality degradation on fish abundance, complementary to ongoing DLNR studies;
 - evaluate the impacts of recreational use of the Bay; and
 - evaluate opportunities for fish re-stocking and habitat enhancement of Bay waters and fishponds. However, re-stocking of the Bay will not be successful until overfishing is addressed.
- Form a Kane'ohe Bay Council consisting of government agency and community members, to provide a forum for future issues affecting the Bay and to advise to County and State agencies responsible for managing Kane'ohe Bay. The council should be an advisory body, supported by the Fishing Panel, with no regulatory or management responsibilities.
- Convene an annual review by the state agency responsible for the majority of the implementing actions on the status of all implementing actions of the Kane'ohe Bay Master Plan. The Council or selected researchers should also present the current status and findings of research programs to the public.
- Focus the community and government agencies on preserving Kane'ohe Bay's fishponds for uses such as education, food production, fish restocking (*kumu, moi, awa, ama'ama*, lobster, and other important food fishes of the Bay), and wildlife habitat. A fundamental concept of this plan is the protection of the cultural and traditional Hawaiian uses of Kane'ohe Bay particularly those associated with fishponds, canoeing, fishing, and surfing.
- Request the federal government to provide public access to surfing sites on Mokapu Peninsula and to return jurisdiction of the Nu'upia Pond complex (ceded lands) to the State of Hawaii, Office of Hawaiian Affairs.
- Convene a new task force in 1998 to study programs and progress in management of the Bay in light of changing circumstances to evaluate the possibility of seeking protective status for Kane'ohe Bay by reviewing different protective status programs for possible applications to the Bay and making use of information from the research program noted above.

Stresses and priorities require specific focus on environmental concerns. The Task Force, therefore, recommends that primary responsibility for environmental issues be assigned to a proposed Department of the Environmental Protection, if it is established. The Department of Health (DOH) is currently responsible for environmental policy and enforcement, including responsibilities delegated by the U. S. Environmental Protection Agency. DOH has appropriately concentrated on water quality and human health.

The Master Plan recognizes the varied meanings that Kane'ohe Bay has for its diverse users. It also recognizes the intrinsic value of Kane'ohe Bay, apart from its resource value. Deliberations during the planning process at times evoked intense emotional responses. The Bay is a recreational resource, an economic resource, a cultural and traditional Hawaiian resource, and a natural ecological treasure. Kane'ohe Bay is also an internationally recognized research resource for which the people of Hawaii are custodians. It is in serious jeopardy of being despoiled by over-exploitation and pollution. There is an urgent need to address pollution of the Bay originating in the watershed, the decline of the fishery and coral reefs, and the preservation of qualities that allow the continuation of Hawaiian cultural traditions and uses. This master plan presents an approach to accomplish these ends. The approach used in developing the Master Plan for Kane'ohe Bay may also have application to other communities.

* * * * *

The Task Force acknowledges the assistance of the numerous contributors to the Master Plan and extends a mahalo nui loa to all. In addition to the Task Force, committee, and subcommittee members and the community played a large role in developing this document possible; approximately 3,700 volunteer hours were contributed to this process. The Legislature is thanked for its assistance in it making it all possible. The Friends of He'eia State Park are deeply thanked for allowing the Task Force to use its space for meetings and storage of materials. The staff of the Kokokahi YWCA is also thanked for allowing the Task Force to use its space. Additionally, this report was compiled with the diligent consultation and assistance of Dr. James Maragos, principal for Coastal Ocean, Reef, and Island Advisors, Ltd. (CORIAL).

As a closing note, the Task Force recognizes the participation of "Uncle Richard" Kinney who represented the commercial fishermen on the Task Force. On April 21, 1992, Uncle Richard passed away. His spirited humor and contributions will be remembered by all.

CONTRIBUTORS

Kane'ohe Bay Task Force: members (*) and alternates (a)

John Goody, Kahalu'u Neighborhood Board (Chair) *
Keith Ahue, Deputy Director, State Department Land and Natural Resources
Dr. Bruce Anderson, Deputy Director, State Department of Health*
Art Challacombe, City and County of Honolulu, Department of Land Utilization (ex officio)
Brian Choy, State Dept of Health (a)
Paul Dolan, State Department of Transportation (a)
David Dunning/John Reppun, Kahalu'u Neighborhood Board *
Robert Gould, Kane'ohe Neighborhood Board (a)
Dr. Philip Helfrich, Director, Hawaii Institute of Marine Biology*
David Higa, State Department of Transportation (a)
Dr. Carl Honig, Kane'ohe Neighborhood Board (a)
Dr. Cindy Hunter, Hawaii Institute of Marine Biology (a)
Dr. Paul Jokiel, Hawaii Institute of Marine Biology (a)
Galbraith Kawelo, Kahalu'u Neighborhood Board (a)
Paul Kawamoto, State Department Land and Natural Resources (a)
Robert Kenny, Kahalu'u Neighborhood Board (a)
Richard Kinney, commercial fishing representative*
Victor Lozano/Joe Pickard, commercial recreation representative*
Amy Luersen/Keith Krueger, Kahalu'u Neighborhood Board (a)
Peter Nottage, Kane'ohe Neighborhood Board (Vice Chair)*
Gary Okino, City and County of Honolulu Department of General Planning (ex officio)
David Parsons, State Department of Transportation (a)
William Paty, Director, State Department Land and Natural Resources*
Joe Pickard, commercial representative *
Tomas Rosser, Kane'ohe Neighborhood Board *
Henry Sakuda, State Department Land and Natural Resources (a)
Jim Schoocraft, State Department of Transportation (a)
Dr. Kimberly Smith, State Department Land and Natural Resources (a)
Calvin Tsuda, Deputy Director, State Department of Transportation *
Larry Yamamoto, State Department of Health (a)
Melvyn Yoshinaga, Marine Corps Air Station, Kane'ohe (ex-officio)*

Kane'ohe Bay Task Force Land Use Committee Members

Dr. Carl Honig (Chair)
Mark Brooks
Art Challacombe
Christopher Evans
John Goody
Dick Van Horn
Herb Lee
Amy Luersen
Carole McLean
John Reppun
Charlie Reppun
Ralph Schrader
Carol Wilcox
Marjorie Ziegler

Kane'ohe Bay Task Force Water Use Committee Members

Peter Nottage (Chair)
Dr. John Harrison (Vice Chair)
Mike Cripps
Bob Dall
Alan Everson
Wayne German
John Goody
Robert Gould
Richard Kinney
Victor Lozano
David Parsons
Joe Pickard
Sylvia Krewson-Reck
Dr. Kimberly Smith
Ernest Theodore

Kane'ohe Bay Task Force, Long Range Planning Committee Members

Dr. Cindy Hunter (Chair)
Howard Blatt
John Goody
Carole McLean
Tomas Rosser
Dennis Yee
Melvyn Yoshinaga

State of Hawaii Office of State Planning

Harold Masumoto, Director
Maile Bay, Planning and Policy Analyst
Thomas Eisen, Planner
Tim Hata, student
Kenton Kuwada, Planning and Policy Analyst
Lorene Maki, Planner
Doug Torn, Coastal Zone Management Chief
Murray Towill, Former Deputy Director

Hawaii State Legislators Attending Task Force Meetings

Senator Mike McCartney
Representative Reb Bellinger
Representative Carol A. Fukunaga
Representative Terrence Torn

Kane'ohe Bay Task Force Consultants

Dr. Peter Adler, Center for Alternative Dispute Resolution (facilitation)
Kathy Bryant, Center for Alternative Dispute Resolution (facilitation)
Jane Eckelman, Manoa Mapworks (cartography)
Chris Erbes, Center for Alternative Dispute Resolution (recorder)
Leanne Fernandes, East-West Center (economic assessment)
Royce Jones, Geographic Decision Systems International (wetland mapping)
Rebekah Kanter, East-West Center (economic assessment)
Richard D. Klein, Community and Environmental Defense Assoc. (golf courses)
Dee Dee Letts, Center for Alternative Dispute Resolution (facilitation)
Dr. Thomas Loudat, CORIAL (economic assessment)
Amy Luersen, AICP (report compilation)
Dr. James Maragos, CORIAL (technical consultant/report compilation)
Karin Meier, CORIAL (report production)
Karen Takahasa, Center for Alternative Dispute Resolution (recorder)
Dick Van Horn, Belt Collins and Associates (map of Bayview plan)
Jay Whiteford, Air Survey Hawaii (aerial photography)

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KANE'OHE BAY MASTER PLAN

CHAPTER 1 - INTRODUCTION

1.1. Purpose of the Plan. The Kane'ohe Bay Master Plan examines the current and future uses of the Bay. The purpose of the plan is to:

- Preserve and protect the unique natural resources of Kane'ohe Bay for the continued enjoyment of the general public;
- Resolve conflicting use problems between recreational users of the Bay, the general public, and commercial ocean recreation operations; and
- Assess the environmental and ecological impacts of activities on the Bay.

The need to develop and implement a Master Plan is critical. Diverse effects of urbanization are leading to potentially disastrous ecological changes within the Bay. Increased siltation, toxic chemicals, eutrophication, and more intense uses of the Bay and its watersheds are creating adverse impacts. Habitat degradation combined with fishing pressures have coincided with a dramatic decline in the once abundant commercial fisheries in the Bay. It is the opinion of many that recreational fisheries may also be declining, although no statistics are collected by the State. Commercial recreation activities conflict with general public use of some areas and may be causing other impacts. There is also a need to accommodate the strong interest in cultural and ethnic resources to be preserved for and by the Hawaiian community, including facilities for and access to Hawaiian fishponds for traditional mariculture, canoeing, boating, fishing, education, and surfing. Finally, there is a need to recognize the Bay's importance to internationally recognized research and to continue support for research.

1.2. Scope of the Plan. The area of the Kane'ohe Bay Master Plan extends from Pyramid Rock (off Mokapu Peninsula, on the south), to the northern boundary of Ko'olaupoko at Kaolo Point (near Kualoa, on the north), and the entire Kane'ohe Bay watershed (see Map 1). This is more fully described in Chapter 3.

The intent of the plan was broadly defined in Act 208, SLH1990, the legislation that created the Task Force. The Task Force established its mission through a matrix that identified major areas of concern. Participants ranked uses of the Bay with potential impacts and qualities of the Bay to be preserved (see Table 2). An analysis of the results of the ranking of uses in the matrix resulted in the creation of committees. This process is discussed more fully in the Planning Process section. The Task Force later addressed additional concerns.

Konohiki and *kuleana* rights were raised early (see Dr.J. Anthony letter in Appendix A, Public Comments). The State Attorney General determined that *konohiki* rights did not exist in Kane'ohe Bay (see Attorney General letter, in Appendix volume). Therefore, the Task Force did not directly address this issue. However, Hawaiian cultural values and uses of the Bay were recognized in the analyses of different issues with in Master Plan.

As the Master Plan was being developed, events were occurring that would preempt planning options. In particular, the City Council had before it the decision making on the Bayview golf course proposal. Early in the Master Plan development, the Task Force recognized the value of this site as public open space and access in the south, the most developed, portion of the Bay. Furthermore, its strategic location between the mouths of Kawa and Kane'ohe streams was recognized as critical for potential measures to mitigate water quality impacts on the Bay. The potential impact on Waikalua Fishpond was also a concern. Therefore, the Task Force developed a recommendation on this issue before the adoption of full recommendations to preserve future planning options.

The Kane'ohe Bay Master Plan reviews current issues and conditions in and around the Bay. It includes recommendations on land use affecting water quality, public access, fishing, commercial recreation, mooring, fishponds, and long range planning. Data gaps concerning impacts on the ecosystem are identified, and recommendations for monitoring are proposed. The Master Plan does not resolve all issues but provides guides for future use and preservation of Kane'ohe Bay.

1.3. Plan Outline. This chapter is an introduction to the plan. Chapter 2 is a brief history of the Kane'ohe Bay region including some past efforts of planning for the Bay. Chapter 3 describes the planning area including descriptions of the watersheds and areas on the Bay itself. Chapter 4 summarizes issues and recommendations for land use, water use and long range planning. Chapter 5 provides recommendations to guide implementation of the Master Plan, arranged by agency responsibilities. Chapter 6 is a preliminary environmental assessment of the impacts of recommendations in the Master Plan. A separate Appendix volume includes important background information and correspondence generated during preparation of the Master Plan. Appendix A covers public involvement and comments during the Task Force deliberations. Appendix B includes the excerpts of reports that were critical to the development of specific recommendations prepared by each committee of the Task Force. Appendix C is an economic impact assessment of the Master Plan. Appendix D is a draft of the Kane'ohe Fishpond Master Plan developed by an *ad hoc* committee after the Task Force adjourned.

As the Master Plan developed, underlying principles and assumptions were clarified. One underlying principle was that water quality is most affected by what is occurring on land, not by what is occurring on the water. Accordingly, water quality became a Land Use Committee issue, not a Water Use Committee issue.

The Task Force chose to retain existing patterns of use of Kane'ohe Bay. In the southern Bay, which is surrounded by urban development, activities are more intense, urban type activities. The central Bay, with access from He'eia Kea Harbor, is where many of the recreational activities occur. The northern Bay is the most rural and is where much of the fishing and quieter activities occur. The intent of the Task Force was to maintain these patterns and not to create new conflicts by introducing new activities.

Another underlying principle was that all citizens have a right to use Kane'ohe Bay, but all potential uses are not necessarily permitted. Public trust concepts are inherent in management of a commonly used resource. As issues were examined, the concept of intergenerational equity was introduced as a way of saying we should be caretakers of the Bay to preserve it for our children and grandchildren. The public trust requires that rights to enjoy and responsibility to protect unique natural resources for future generations be ensured.

1.4. Planning Authority. The Legislature of the State of Hawaii passed Act 208, SLH 1990, effective July 1, 1990, relating to Kane'ohe Bay. The Legislature found that:

Kane'ohe Bay is a unique and treasured natural resource that must be preserved and protected for the continued enjoyment of the general public. The Bay is an extensive ecosystem that contains a unique estuary system surrounded by barrier reefs that are unequaled in the world. Currently the Bay is heavily used by the general public, ocean and marine research programs, and commercial ocean recreation operations, creating conflicting use situations. Use of Kane'ohe Bay by commercial operators is a privilege and not an exclusive right. Therefore, in order to resolve the conflicting use problem, the legislature finds that a Master Plan should be developed which shall be used as the recommended guideline in the adoption and implementation of rules with regard to the regulation of all activities in Kane'ohe Bay.

The purpose of the Act is "to establish a Kane'ohe Bay Task Force to study and develop recommendations for a Kane'ohe Bay Master Plan."

The Kane'ohe Bay Master Planning Task Force was created for a period of one year beginning October 1, 1990. This period was extended due to extensive citizen participation. All Task Force recommendations were completed by November 20, 1991. The public meeting on the plan was held on January 13, 1992, after which, the Master Plan report was finalized. After completing the Master Plan, the Task Force submitted it to the Director of the Office of State Planning for approval. The Task Force dissolves thirty days after the Master Plan is approved by the Director, Office of State Planning.

The Task Force was established by the Legislature to be comprised of eleven members as follows: Directors from the State Departments of Transportation, Health, and Land and Natural Resources; the Director of the Hawaii Institute of Marine Biology; two representatives from Kane'ohe Neighborhood Board; two representatives from Kahalu'u Neighborhood Board; a representative from the commercial fishing industry; a representative from the commercial recreation industry; and the Commanding officer, Marine Corps Air Station, Kane'ohe. As advised by the Marine Corps, its representative of the KMCAS could only act as an ex-officio member, participating but not voting on issues brought before the Task Force. The Task Force also requested the City and County of Honolulu Departments of Land Utilization and General Planning to serve ex-officio on the Task Force.

1.5. Planning Process. The goals of the Master Plan in accordance with Act 208 are: to preserve and protect the unique resource of Kane'ohe Bay, to resolve conflicts between users on the Bay, and to assess the environmental and ecological impacts of activities on the Bay.

Problem Identification - The Task Force was convened on October 2, 1990. The first meetings, between October and December of 1990, were spent defining problems. A list of various uses of the Bay was developed and presented as a matrix. Task Force members scored these uses in terms of detrimental and beneficial impacts on the resources of the Bay (see Table 2). These scores identified those items which members felt were of greatest concern, that is, those for which solutions would have to be developed. These issues were later grouped as either land use, water use, or long range planning issues.

Committee Analysis and Recommendations - Three committees: Land Use, Water Use, and Long-Range Planning, were established to examine the corresponding issues. The Committees were comprised of Task Force Members, Alternates, and interested members of the community. In the Water Use and the Land Use Committees, the issues were grouped and assigned to subcommittees to research and evaluate.

The Water Use Committee had three subcommittees: commercial recreation; public recreation; high speed boating, mooring and berthing, and sea planes; and fishing, diving and picnicking. The Land Use Committee had three subcommittees: water quality, public open space and access, and streams and fishponds. Fishpond issues were later transferred to the Fishing subcommittee of the Water Use Committee. Surfing issues were later added to the Water Use Committee.

The committees used the following outline to address each of the areas of concern: problem statement, analysis, conceptual solutions, alternatives, and recommendations.

Each subcommittee met, researched the issues, and developed alternatives. The alternatives, including a recommended alternative, were presented to the full committee for public review and comment, modification, and adoption. Minutes of all committee meetings were distributed at Task Force meetings.

Task Force Review and Recommendations - After being adopted by the respective committee, a report on each issue was presented to the Task Force (see separate Appendix volume). For each Committee presentation, the first meeting on the subject was a session facilitated by the Center for Alternative Dispute Resolution. No votes were taken at these meetings, but comments and questions from both Task Force members and the public were accepted.

A regular Task Force meeting followed the facilitated sessions, usually by a week, and at that meeting the recommendations were adopted, modified, deferred, or deleted. Those that were deferred were further modified by a committee of the Task Force, usually through a set of mediated sessions, and presented to the full Task Force for consideration at a later time.

Kane'ohe Bay Master Plan - The Task Force recommendations were then compiled in a draft Kane'ohe Bay Master Plan. The Master Plan included an implementation strategy and preliminary assessment of environmental impacts. The draft was sent out for public review in early January, 1992, and OSP sponsored a public meeting on January 13, 1992, to present the Master Plan and take comments and suggestions. Minutes of this last meeting are included in the separate Appendix volume.

Comments from the public and Task Force members included the following:

- Add in the report recommendations passed by the Task Force for fishpond protection and utilization;
- Request the transfer of ponds within the Marine Corps Air Station, Kane'ohe Bay, to the State of Hawaii;
- Clarify that no gill net controls were being recommended by the Task Force;
- Clarify that the slow-no wake zone applies only to the Central reef shallows;
- Clarify whether Bay water quality or ecosystem health is presently declining;
- Questions on the caps for commercial recreation vessels;
- Clarify the time limit to transfer commercial recreation interest to other parties;
- Clarify which moorings are to be grandfathered in the Master Plan;
- Concern that there has been no public review of the economic impact assessment;
- Expand the slow-no wake zone;
- Concern by some commercial interests that the Master Plan will overly restrict commercial activities on weekends and holidays; and that caps on vessel capacities were too restrictive;
- Statement by the State that "thrillcraft" is to be redefined for regulatory purposes; and
- Questions on which companies are to get permits.

The report was then revised, finalized, and distributed based on the public meeting comments and other written comments submitted on the proposed Master Plan and draft report.

Public Involvement - The public was involved throughout the development of the Master Plan. The Task Force included representation from both Kane'ohe and Kahalu'u Neighborhood Boards as well as specific interest groups. In addition, anyone interested in participating on a committee was welcome. As specific issues were evaluated, effort was made to involve those in the community who might be affected by Task Force decisions.

All twenty-one Task Force meetings and the OSP sponsored public meeting were advertised and open to the public. The first few meetings alternated between a location in Honolulu during the day and a location in Kane'ohe in the evening. As the committee reports were presented, most of the meetings were held in Kane'ohe in the evening. All Land Use and Water Use committee meetings were open to the public. The public meeting of January 13, 1992, was also open to the public and held in the evening in Kane'ohe.

CHAPTER 2 - HISTORY OF KANE'OHE BAY REGION

2.1. Development History of Kane'ohe Bay Area. The Kane'ohe Bay area has changed dramatically in the past 200 years and continues to change as urbanization progresses. This is a brief discussion of the developmental history of the area (largely taken from Devaney, *et al.*, 1976, and republished in 1982).

Before Western contact, Hawaiian society was organized around subdistricts, or *ahupua'a*, which extended from the mountains to the sea, allowing each individual access to all needed subsistence and natural resources. The Hawaiians believed in conserving and taking care of the natural resources.

In the Kane'ohe Bay region, there are nine *ahupua'a*: Kane'ohe, He'eia, Kahalu'u, Waihe'e, Ka'alaea, Waiahole, Waikane, Hakipu'u, and Kualoa. The Bay, the islands in the Bay, and Mokapu Peninsula were part of various *ahupua'a* that originated in the mountains. The northern end of Mokapu Peninsula was part of the *ahupua'a* of He'eia, while the rest of the peninsula was a part of the *ahupua'a* of Kane'ohe.

Population: The population of windward O'ahu before European contact is estimated to have been the largest on O'ahu. Due primarily to Western introduced disease during the 1880's, there was a downward trend of the Hawaiian population throughout the islands, including the Kane'ohe Bay area. The Kane'ohe Bay area population dropped to its lowest point in 1872 with a recorded population of 2,028. It then began to increase fairly consistently to the present. The census data from 1900 to 1970 is compiled from various geographic boundaries, enumeration districts and census tracts. The exact population for the Kane'ohe Bay region is difficult to determine due to the various areas used in different years. In 1920, the population was 2,990. By 1940 it was 5,387, an increase of 80 percent over 20 years.

The years from 1940 to 1960 show a dramatic population increase of 450 percent, from 5,387 to 29,622. Neighborhood statistics for Kahalu'u and Kane'ohe in 1980 show 47,335 people in the area (State of Hawaii Data Book, page 26). This is a 60 percent increase from 1960 to 1980. While growth in the area has slowed, the number of people occupying the Kane'ohe Bay region continues to increase. In 1988, neighborhood statistics show a population of 54,903.

Cultivation/Agriculture: Taro was the staple in the diet of the early Hawaiians, including those in the Kane'ohe Bay region. Much land was cultivated in taro through the early 1880's. Cultivation was primarily in lowland areas near streams with 'auwai, or ditches, used to divert the water from the streams. In the late 1880's, there were several sugarcane plantations operating in the Bay area, but all were closed by 1903, since it was not as successful to grow sugarcane in Kane'ohe as it was elsewhere on the island.

A major land use change in the Kane'ohe area occurred from the 1880's to the 1920's. Many traditional taro patches were converted to rice, changing from relatively small areas to large plantations. This necessitated the construction of many irrigation ditches. As rice production declined, more diversified agriculture was developed. Pineapple became a major industry in the Kane'ohe area from about 1910 to 1925. This changed the land uses again, since it allowed more intense cultivation of upper slopes. As pineapple was relocated to central O'ahu, the pineapple fields usually became pastures or reverted to uncultivated growth. Much of the Kane'ohe area was then used for grazing.

Water: Windward O'ahu is the largest water producing area on O'ahu. Water rights were under communal control in the times of the ancient Hawaiians. Cultivation of wet land taro required an elaborate system of 'auwai or ditches. Early water rights dealt mostly with surface water, with ground water not specifically considered. From 1879 to 1925, rapid development of the ground water resources resulted in the establishment of predecessor of the Board of Water Supply, the Rural Water Works.

Beginning in 1916, with completion of the Waiahole Ditch Tunnel system, large amounts of windward water were exported to leeward O'ahu. The Waiahole Ditch Tunnel system was the largest water diversion project on O'ahu. It consists of a main tunnel through the Ko'olau mountains, four development tunnels, 27 connected tunnels and 37 stream intakes. The results of this massive diversion of water are significant: springs dried up in Waiahole and Kahalu'u; ground water storage was reduced; most of the water above the 500 foot elevation was diverted from the windward side; individual stream flow was reduced by as much as 20 percent to 60 percent; and overall reduction of stream runoff into Kane'ohe Bay was over 40 percent.

Marine Environment: The marine environment of the Bay has been extensively modified. The fishponds built by the Hawaiians were probably the earliest modifications. In 19th Century, 30 fishponds were identifiable in the Bay. Many fishponds have been filled. From 1946 to 1948, it appears that nine fishponds were filled to create land for housing developments. Currently, only 12 recognizable fishponds border the Bay with only five considered intact (see Maps 7A and 7B).

Other major modifications to the Bay have been dredging and filling. From 1882 to 1927, there was not a significant change in the depths of the Bay. From 1927 to 1969, drastic changes occurred with increases and decreases in water depths (Roy, 1970). 72 percent of the decreases in water depth was derived from reef material with the remainder land derived (Hollett, 1976). Land derived material is thought to be due to an increase in soil erosion runoff and sedimentation from increased urbanization (Jokiel, *et al.*, 1991). The source of the reef material was originally unclear, but Devaney *et al.* (1982) maintain it was largely discharged into the Bay during military dredging of the reefs.

From 1939 to 1945, the Kane'ohe Naval Air Station (currently Marine Corps Air Station, Kane'ohe Bay) was constructed on Mokapu Peninsula. This resulted in major dredging and filling of the area around the peninsula involving over 15 million cubic yards of reef material. From 1928 to 1945, 280 acres of the Bay were filled to expand Mokapu Peninsula. Other military dredging in the Bay included clearing of Mokolii passage, the Ship Channel, and sea plane runways.

Urbanization: From 1940 to 1988, the Kane'ohe area changed from a rural to a residential community. The population increased from 5,387 in 1940 to 54,903 in 1988. The population increase required more houses, streets, and sewers, creating more paved areas and less vegetated area. Until 1977-1978, sewage from the Kane'ohe sewage treatment plant was discharged into the Bay. This continues to occur periodically through the outfalls as "bypasses," and as seepage from the aging sewer collection system in urban Kane'ohe.

In an attempt to protect houses built in natural flood plains from periodic flooding, many streams in the southern portion of the watershed were lined with concrete channels. These channelized streams reduce ground water recharge and increase sediment and freshwater, storm runoff flowing into the Bay.

The Devaney report, summarizes, in part:

We have examined the land around Kane'ohe Bay and found that they were once among the most productive on O'ahu, well watered and fertile. The nature of Hawaiian agriculture precluded, for the most part, massive runoff of soil and high nutrient fresh water into the Bay. The land and water use practiced by the early Hawaiians in Kane'ohe, as elsewhere, was well managed and productive and did not result in large scale detrimental changes to the natural environment. The plentiful products of land and sea were sufficient to feed large numbers of people and labor was adequate...but...introduction of the market economy in these early days of Western contact triggered a qualitatively different kind of exploitation of Hawaii's natural resources. (at page 209)

Early Hawaiians achieved a balance with nature that Western contact upset. The use of land for sugar, rice, and pineapple production, and when abandoned, grazing, contributed deforestation, erosion, and Bay siltation, reducing stream flows through irrigation ditches and water diversion to central O'ahu. These land use practices had a detrimental effect on Kane'ohe Bay. Between 1939 and 1950, dredging many reefs of the Bay, filling many reefs around Mokapu Peninsula, and filling fishponds for housing development and roads contributed to the detrimental effects on the marine environment.

The effects of urbanization are dramatic. As Devaney *et al.* state, "What has been destroyed in Kane'ohe Bay, because of the massiveness of that destruction, may possibly never be regained. What took nature eons to create has taken modern man only a few score years to lay waste." (at page 212)

2.2. Recent Planning History of the Kane'ohe Bay Area. There have been numerous studies on various aspects of Kane'ohe Bay. There have also been a number of comprehensive planning efforts. This section summarizes several studies, others are referenced in the bibliography.

Kane'ohe Bay in Crisis: This organization of individuals and citizen groups was formed in the early 1970's over concern about degradation of Kane'ohe Bay. While this was not a formal study, this group significantly raised awareness of problems in Kane'ohe Bay. They blocked construction of a planned power plant along Kane'ohe Bay's shoreline that would have added thermal pollution to the other problems. They also drafted a grading ordinance for city use to reduce sediment entering the Bay.

Kane'ohe Bay Task Force: In 1971, Governor John A. Burns appointed a Kane'ohe Bay Task Force partially stemming from the Kane'ohe Bay in Crisis group. This task force built a case for the diversion of sewage discharges from the southern Bay to the open ocean off Mokapu Peninsula.

Kane'ohe Alternatives: An Application of Impact Methodology: The State Office of Environmental Quality Control by the Hawaii Environmental Simulation Laboratory (HESL), University of Hawaii prepared this study in 1974. The report was not a plan, but a consolidation of broad range, alternative futures for the Kane'ohe Bay region. Three growth scenarios were identified: current trends, open market, and controlled growth, and it analyzed the physical and social impacts of each.

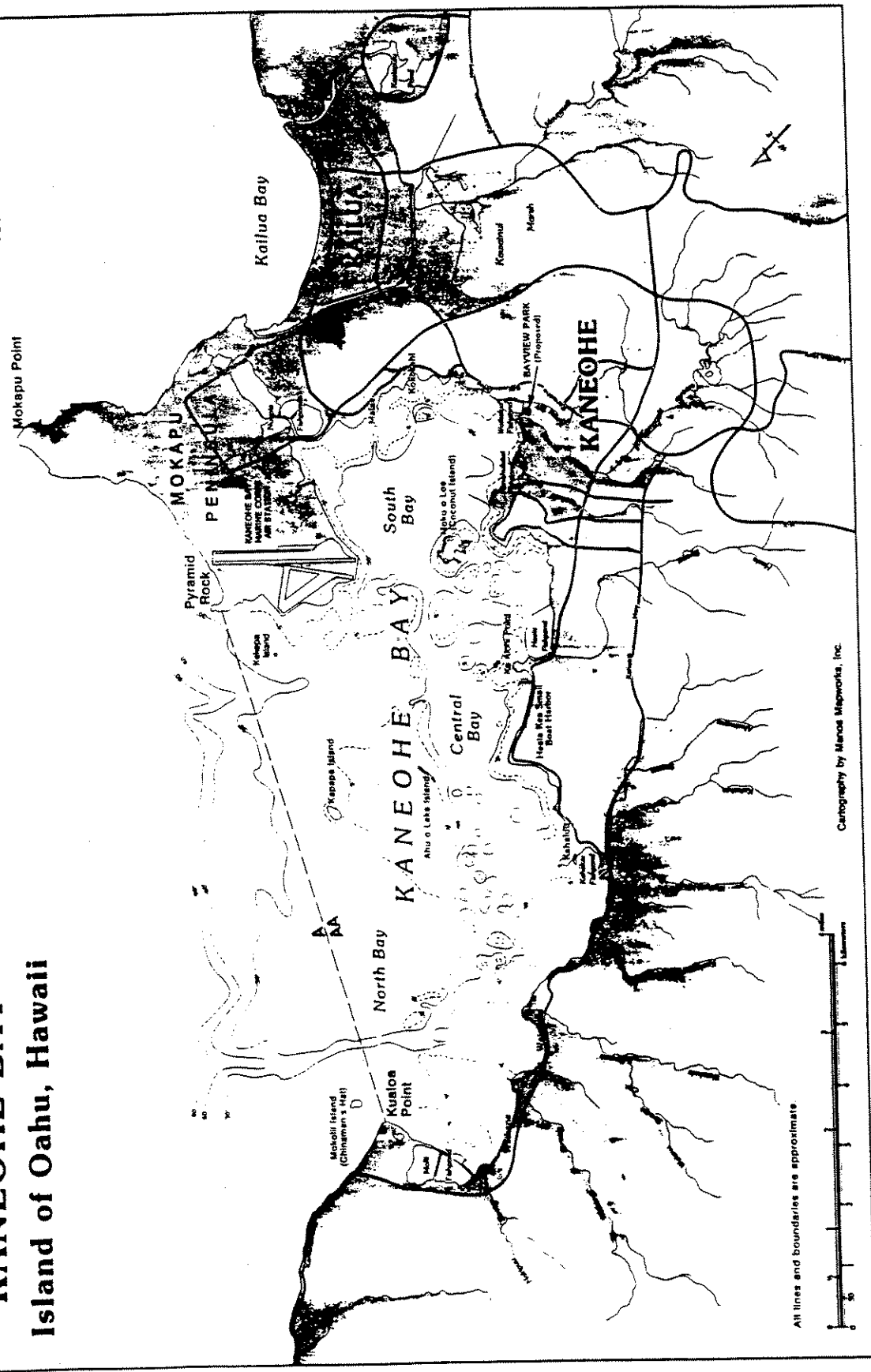
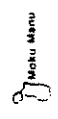
Kane'ohe Bay Urban Water Resources Study: The U.S. Army Corps of Engineers (USCOE) conducted an extensive advisory study from 1975 to 1978 at the request of the State. It examined many aspects of the Bay including watershed, estuarine, and marine ecosystems, wastewater management, flood plain management, water supply, water and land related recreation, and navigation. Issues in the study included the diversion of sewage from the Kane'ohe Sewage Treatment Plant outfall to a deep ocean outfall off Mokapu Peninsula, the channelization of many of the southern streams, and the creation of Ho'omaluhia Park as a flood control facility. The USCOE sponsored studies and reports, many of which were used by the current Kane'ohe Bay Task Force, including the first printing of the Devaney, *et al.* report in 1976, and water quality monitoring and modeling studies of the Bay and streams. A USCOE study also recommended that the Bayview area be retained in open space for public recreation.

A Study on the Feasibility of Establishing a Kane'ohe Bay Authority: The State Legislative Auditor submitted this a report to the Governor and the State Legislature in 1988. The intent of the study was to review the circumstances and conditions of the Bay, review the authority concept, and analyze alternatives to a Kane'ohe Bay authority. The methodology included interviews with legislators, public officials, and community leaders and reviews of publications. It outlined three major options: continue with the existing system, create an authority, or establish a new department. No recommendation was made pending determination of State priorities.

KANEOHE BAY

Island of Oahu, Hawaii

A State of Hawaii Water
AA Quality Designation



CHAPTER 3 - DESCRIPTION OF PLANNING AREA

3.1. Overview. Kane'ohe Bay is on windward O'ahu, Hawaii, generally landward of a line drawn from Kualoa ridge (northern boundary of Ko'olaupoko) on the north, to Pyramid Rock on Mokapu Peninsula on the south. The planning area for the Kane'ohe Bay Master Plan includes the Bay and its surrounding watershed. The Kane'ohe Bay Watershed is a combination of smaller watersheds extending along the Ko'olau mountains from Kualoa Ridge to Mokapu Peninsula (see Map 1).

Kane'ohe Bay is unique because of its beauty, rich cultural heritage, and recreational value, and the opportunities it affords for enhancement of public awareness and appreciation are unique. The long history of research conducted in the Bay enables present day researchers to evaluate the impacts of urbanization on Bay ecosystems. Studies of the diverse marine environments in the Bay have contributed substantially to a basic understanding of estuary and coral reef ecology. Kane'ohe Bay is the northern most barrier reef in the world and the only barrier reef in the Hawaiian islands. It is a unique ecosystem due to its combination of multiple stream estuaries in the lagoon, influenced by runoff from the watershed, its semi-protected lagoon, and the offshore barrier reef, influenced by open ocean waters. Therefore, the impacts of urbanization are felt more than in an open ocean coastline (Jokiel, *et al.*, 1991).

There are different ways to describe the Bay, including physically, geographically, and institutionally (classes of water and military zones within the Bay). In addition, the watersheds vary in their contributions to water quality of the Bay.

3.2. Physical Description of the Bay. The surface area of Kane'ohe Bay at mean sea level is approximately 11,000 acres, about eight miles long by 2.6 miles wide (USCOE, 1978). There are five major islands within the Bay, Moku O Loe (Coconut Island), Mokoli'i (Chinaman's Hat), Kapapa, Ahu O Laka, and Kekepa (Turtle Back Rock). Two natural shallow channels cross the barrier reef into the Bay, the northwest Mokoli'i Passage, and the southeast Kane'ohe Passage (referred to as the Sampan Channel). Mokoli'i was dredged to approximately ten meters (33 feet) during 1939-1945 by the U.S. Navy. Sampan Channel is used by smaller boats since it has not been dredged and is approximately two to three meters (6.6-10 feet) deep at its shallowest point. In addition to these channels, there is a ship channel that extends the length of the Bay, connecting the KMCAS with Mokoli'i channel, and providing deep-draft ship access between the Bay and open ocean. It was dredged to a minimum depth of 12 meters (40 feet) by the U.S. Navy in 1939-1940 (Maragos, 1972; Jokiel, *et al.*, 1991).

Kane'ohe Bay has three inshore to offshore zones: a fringing reef zone, a lagoon zone and a barrier reef complex. There are three types of reefs in the Bay: fringing reefs, patch reefs and a barrier reef. The fringing reefs are in the inshore zone around the shoreline, except for gaps where freshwater streams enter the Bay or where dredging has modified them.

Patch reefs are round to irregular, upward growths of coral off the floor of the inner Bay that reach close to the sea surface. They are in the lagoon zone and concentrated near the two channels that bisect the barrier reef.

The barrier reef complex extends across the mouth of the Bay, including the channels at the northern and southern ends. The shallow portion of the reef is about five kilometers (three miles) long and two kilometers (1.2 miles) wide. The sand flat and Kapapa Island are part of the barrier reef system. The central barrier reef flat accommodates much recreational activity and is therefore the focus of many conflicts on the Bay (see Map 1).

3.3. Geographical Description of the Bay. Three distinctive northern to southern geographic sections are in the inner Bay based on physical characteristics and human activity (see Map 1). The southern portion has the most restricted circulation, has received the most impact from adjacent land uses, and has the lowest average salinity. Most of the World War II-era dredging occurred in the southern Bay. It is surrounded by the most developed land including

residential, commercial, and industrial areas. Many of the activities are intense and urban. The Hawaii Institute of Marine Biology, a world-renown marine research facility, is located on Moku O Loe (Coconut Island) between the southern Bay and central Bay boundary.

The central Bay accommodates many recreational activities, partially due to easy access from He'eia Kea Harbor and the use of the central barrier reef and sand flat. He'eia State Park is to the south of the Harbor on Ke Alohi Point. The sand flat is a favorite destination for many commercial and recreational boaters. He'eia Kea Harbor, the only major public boat ramp and harbor, is the point of origin for most commercial recreational activity, most commercial fishing, and much of the recreational fishing.

The northeastern section of the Bay is the most oceanic. There is a large influx of ocean water over the deeper parts of the barrier reef and through Mokolii channel (Jokiel, *et al.* 1991). The northern portion is the most rural both on land and on the water, and people pursue quieter activities, such as fishing.

3.4. Classes of Water within the Bay. Department of Health (DOH) designates most of Kane'ohe Bay as Class AA waters (see Map 1). The outer portion of the Bay is designated Class A waters. There are management objectives for each class.

For Class AA waters, the objective is that:

[T]hese waters remain in their natural pristine state as nearly as possible with an absolute minimum of pollution or alteration of water quality from any human-caused source or actions. To the extent practical the wilderness character of these areas shall be protected. (See §11-54-03(c)(1), Hawaii Administrative Rules).

For Class A waters, the objective is that:

[T]heir use for recreational purposes and aesthetic enjoyment be protected. Any other use shall be permitted as long as it is compatible with the protection and propagation of fish, shellfish, and wildlife, and with recreation in and on these waters. (See §11-54-03(c)(2), Hawaii Administrative Rules).

3.5. Military Zones in Kane'ohe Bay. The military is present in Kane'ohe Bay at the Marine Corps Air Station, Kane'ohe Bay (KMCAS), on Mokapu Peninsula. Immediately before World War II, a Naval Defensive Sea Area was established in all of Kane'ohe Bay. Currently, all but a 500-yard buffer Zone has been suspended, subject to reinstitution in the case of a national emergency. There is also a Naval Airspace Reservation over the Bay which is presently inactive. In 1983, an Air Installations Compatible Use Zones (AICUZ) study was conducted, and updated in 1990 (U.S. Department of the Navy, 1990), to evaluate the effects of KMCAS aviation operations on the surrounding community. This study identifies air accident potential zones (APZ) within the Bay (see Map 2), and identifies aircraft noise levels throughout the area. Portions of the Bay and Mokapu Peninsula are used for military training and research activities (see Map 2), and some water areas are restricted from public use, such as fishing and surfing.

3.6. Description of Kane'ohe Bay Watersheds. The lands surrounding Kane'ohe Bay can be divided into seven watersheds: Kane'ohe, He'eia, Kahalu'u, Ka'alaea, Waiahole, Waikane, and Hakipu'u/Kualoa (see Map 3). In addition, approximately 25 percent of the watershed, including Kualoa Point, Maelieli Ridge, and Mokapu Peninsula, drains directly into the Bay in sheet flows (USCOE, 1978). The impact of these watersheds on Kane'ohe Bay is related to the amount of water entering the Bay, peak flows during rainfall events, and the quality of the water. Table 1 provides the estimates of the average amount of water entering the Bay from these watersheds. See Appendix B for the full Streams Report of the Task Force.

[illegible]

Cartography by Manoa Mapworks, Inc.

Table 1. Kane'ohe Bay Watersheds (after Wilcox, Appendix B)

WATERSHED	STREAM	BASIN AREA (Acres)	MEAN DAILY FLOW*
Kane'ohe	Kawa	1010	1
	Kane ohe	3670	13
	Keaahala	710	3.4
Mokapu Sheet Flow	KMCAS Sheet Flow	< 2950	
	K. Bay Drive Sheet Flow	780	
He'eia	He'eia	2050	4
Maelieli Ridge Sheet Flow	Sheet Flow	540	
Kahalu'u	Ahuimanu	3715	20
	Kahalu'u		
	Waihe'e		
Ka'alaea	Haia moa	310	0.8
	Ka'alaea	920	2.4
Waiahole	Waiahole	2435	9
Waikane	"Unnamed"	595	1.7
	Waikane	1660	6
Hakipu'u	Hakipu'u	740	1.1
Kualoa Sheet Flow	Sheet Flow	795	
Other Sheet Flow		865	
Total Acreage		23745**	

* Millions gallons per day (mgd)

** The KMCAS Sheet Flow may reduce the total.

Due to the extreme variations in water flow, the water quality from streams is more difficult to determine. Urban development increases the input of contaminants and sediment along with stream channelization that also increases freshwater pulses and peak flows.

The southern watersheds are the most urbanized and modified; Kane'ohe watershed is almost entirely developed, and most of its streams are channelized. Moving north, the watersheds are less urbanized and the streams more natural. Waikane watershed is relatively undeveloped, and its streams are not channelized. However, the northern streams have some of their water diverted to central O'ahu by the Waiahole Ditch Tunnel System. See the Land Use Section for more detailed descriptions of each watershed.

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CHAPTER 4 - KANE'OHE BAY MASTER PLAN

4.1. Goals and Objectives. The overall goals of the plan are to:

- Preserve and protect the unique natural resources of Kane'ohe Bay for the continued use and enjoyment of the general public and future generations;
- Resolve conflict among various uses of the Bay: including the general public, anglers, and commercial ocean recreation operations; and
- Assess the environmental and ecological impacts of activities on the Bay and in the watershed.

At its first meeting, the Task Force unanimously agreed upon several values. These became the general objectives of the plan, and include the preservation of:

- Ecological integrity;
- Rural character and aesthetic character;
- Traditional cultural and family values; and
- The public trust.

4.2. Issues Matrix for Kane'ohe Bay. As a means to refine the goals and define and identify major issues of management concern, a matrix was developed (see Table 2). The matrix lists ecological, social, and economic resources of the Bay, and the types of uses of the Bay. Task Force members subjectively evaluated the uses for their impacts on the resources of the Bay. Concerns not rated HIGH, HIGHER, or HIGHEST, were not analyzed further.

During the matrix process, the Task Force identified issues and concerns for further analyses:

1. **PICNICKING/CAMPING** - Picnicking and camping on offshore islands and the build-up of debris and solid waste were rated HIGH.
2. **FISHING** - Declines in the number of fish as well as fishing success on reefs, debris and solid waste accumulations, and the lack of adequate small boat ramp access were rated HIGHER.
3. **DIVING** - Decreasing quality of diving on coral reefs, low numbers of fish at diving sites, and the lack of adequate boat ramp access for divers were rated HIGH.
4. **MOORING** - Inadequate mooring areas and impacts on reefs were rated HIGH.
5. **MOTOR BOATING** - There were several motor boating issues, including existing conflicts among various users, the need for more small boat ramps, and boater safety, which were rated HIGHER.
6. **WATER SKIING** - Water skiing conflicts with other users, the need for boat ramps, and unsafe water skiing practices were rated HIGHER.
7. **THRILLCRAFT** - Thrillcraft operations conflicting with other users and creating safety problems were rated among the HIGHEST.
8. **SEAPLANES** - Similar concerns over seaplane operational conflicts with other users and safety were rated HIGH.
9. **SEWAGE TREATMENT PLANT (STP) DISCHARGES** - Impacts of STP discharges on Bay water quality and reefs, and contribution to solid waste pollution were rated among the HIGHEST.

10. **RUNOFF AND STORM DRAIN DISCHARGES** - Similar concerns over the impacts of discharges from non-point sources and storm drains on water quality and reefs, and contribution to solid waste pollution were rated among the **HIGHEST**.
11. **SEPTIC TANK SYSTEM DISCHARGES** - Impacts of septic tank and leaching field discharges on water quality were rated among the **HIGHEST**.
12. **BOAT DISCHARGES** - Impacts of boat discharges on water quality and shorelines, and contribution to solid waste and debris were rated **HIGHER**.
13. **COMMERCIAL RECREATION** - Commercial recreation conflicts with other Bay users, fishpond uses, and the need to protect the public interest were rated **HIGHER**.
14. **COMMERCIAL PICNICKING AND TOURS** - Picnic and tour conflicts with other Bay users, inconsistency with existing water use designations for submerged lands, and competition for limited parking and the need to protect the public interest were rated **HIGH**.
15. **COMMERCIAL IN-WATER ACTIVITY** - Commercial in-water conflicts with other Bay users, the rural character of the Bay, and impact on reefs were rated **HIGH**.
16. **COMMERCIAL THRILLCRAFT** - Commercial thrillcraft operations conflicting with other Bay users, public safety, and the rural character of the Bay were rated among the **HIGHEST**.
17. **COMMERCIAL FISHING** - Declining diversity and abundance of commercial fisheries in the Bay were rated **HIGH**.
18. **MOORING AND BERTHING** - Mooring and berthing area impacts on Bay water quality and contribution to debris and solid waste pollution were rated **HIGH**.
19. **GOVERNMENT AVIATION** - Government (military) aviation impacts on public safety, aesthetic values of the Bay, and private property values were rated **HIGH**.
20. **GOLF COURSES** - Golf course impacts on water quality, stream habitat, shoreline habitat, and the need to protect the public interest were rated **HIGHER**.
21. **SHORELINE DEVELOPMENT** - Impacts of shoreline development on wetland habitat, shoreline habitat, public shoreline access, and the need to protect the public interest were rated **HIGH**.

These areas of concern were divided between the Water Use and Land Use Committees. The Land Use Committee's responsibilities included: water quality (including discharges from golf courses/shoreline development, and impacts on reef habitat), public open space and access (including protection of public interest, access to boat ramps, shoreside access, access to parking and shoreline habitat), and streams and fishponds (including impacts on reef habitat, estuarine habitat, and water quality). The Water Use Committee's responsibilities included: commercial recreation, fishing, non-commercial recreation including thrillcraft, speed and safety, and mooring issues. Fishponds were later transferred from the Land Use Committee to the Fishing Subcommittee of the Water Use Committee. Surfing access was later added as an issue to the Water Use Committee.

Table 2. Matrix of Impact Rankings conducted by the Kane'ohe Bay Master Planning Task Force. See Section 4.2.

	TYPES OF USES OF KANEOHE BAY								
	PRIVATE RECREATIONAL USES								
RESOURCES	Picnicking/ Camping	Fishing	Diving	Mooring	Paddling	Surfing	Sail Boarding	Sail Boating	Motor Boating
I. ECOLOGICAL SYSTEMS									
A. Water quality									
B. Habitat:									
•Streams									
•Wetlands									
•Estuaries									
•Shoreline									
•Reefs		1	3	3					
•Islands	3								
C. Wildlife species:									
•Diversity									
•Numbers									
D. Fish species:									
•Diversity									
•Numbers		3	2						
II. SOCIAL SYSTEMS									
A. Reduce Conflict					1			2	1
B. Debris and Solid Waste	3	1							
C. Protect Public Interest									
D. Access:									
•Boat ramps		1	1						3
•Parking					3	3	2		
•Military lands									
•Submerged lands									
•Islands									
•Shorelines						3			
E. Safety									3
F. Cultural/Traditional Use:									
•Fishponds									
G. Rural Character									
H. Research									
I. Education									
III. Economic Systems									
A. Livelihood:									
•Monetary									
•Subsistence									
B. Indirect Economics:									
•Aesthetic value									
•Property value									
C. Aquaculture									
IMPACT	HIGH	HIGHER	HIGH	HIGH					HIGHER
LEGEND: 3 = VERY HIGH; 2 = MODERATELY HIGH; 1 = MODERATE									

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	TYPES OF USES OF KANEOHE BAY							
	ECONOMIC USES							
RESOURCES	In Water	Thrill	Submerged	Commercial	Subsistence	Mooring/		
	Activity	Craft	Land Use	Fishing	Fishing	Berthing	Shipping	Aviation
I. ECOLOGICAL SYSTEMS								
A. Water quality						2		
B. Habitat:								
•Streams								
•Wetlands								
•Estuaries								
•Shoreline								
•Reefs	2		3					
•Islands								
C. Wildlife species:								
•Diversity								
•Numbers								
D. Fish species:								
•Diversity				3	3			
•Numbers				3	2			
II. SOCIAL SYSTEMS								
A. Reduce Conflict	3	3					2	
B. Debris and Solid Waste						2		
C. Protect Public Interest			3					
D. Access:								
•Boat ramps								
•Parking								
•Military lands								
•Submerged lands			2					
•Islands								
•Shorelines								
E. Safety		3						2
F. Cultural/Traditional Use:								
•Fishponds								
G. Rural Character	1	3						
H. Research								
I. Education								
III. Economic Systems								
A. Livelihood:								
•Monetary								
•Subsistence								
B. Indirect Economics:								
•Aesthetic value								3
•Property value								2
C. Aquaculture								
IMPACT	HIGH	HIGHEST		HIGH		HIGH		HIGH
LEGEND: 3 = VERY HIGH; 2 = MODERATELY HIGH; 1 = MODERATE								

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4.3. Land Use Development Patterns and Designations

4.3.1. Watersheds. The Kane'ohe Bay watershed is a combination of several smaller watersheds (see Map 3). The watersheds each have different impacts on the Bay due to the: level of urbanization in the watershed, type of stream (channelized or relatively natural), and volume of water entering the Bay from the watershed.

In the more urbanized watersheds with channelized streams, the primary objective is mitigation of existing urban impacts on Bay waters. For less urbanized watersheds with more natural streams, the primary objectives are to preserve of natural riparian features, to minimize negative impacts of any future development on the Bay, and to compensate for some of the negative impacts of the more urbanized watersheds.

Understanding the current characteristics of the watersheds is critical in order to mitigate existing impacts and minimize future impacts on the Bay. Generally, watersheds in the south are the most urbanized and the most modified. As one moves north, there is less development and streams are more natural in character, although siltation from construction and agriculture remains a problem.

Kane'ohe (includes Kawa, Kane'ohe, Kea'ahala streams): The Kane'ohe watershed is the largest watershed in the Ko'olaupoko District in terms of land area. It is also the most densely developed, containing residential, commercial and industrial land uses. A major flood control project in the 1980's created Ho'omaluhia Park, and channelized part of Kane'ohe and Kamo'oali'i streams in this watershed.

Kane'ohe stream may have the most significant impact on the Bay's water quality. It is the largest in the Kane'ohe watershed in terms of flow. It empties into the part of the Bay least exposed to ocean mixing and circulation. By virtue of its heavy urbanization, this stream's watershed is the most modified and contains significant sources of pollution, both point (Sewage Treatment Plant) and non-point (residences, businesses, golf courses, and construction).

A preliminary survey by the National Oceanic and Atmospheric Administration of Kane'ohe and Kawa streams indicated that chlorinated pesticides and silver concentrations were the highest in a nation-wide survey of oyster tissues. Thus, Kane'ohe stream has the greatest potential source of contaminants and sediment to the Bay. Conversely, if clean and healthy, the stream could be the greatest asset in improving the southern portion of Kane'ohe Bay's water quality. The risk of pollution to human health remains to be evaluated.

Kane'ohe stream is channelized throughout most of its length from Ho'omaluhia Park in the upper reaches to its mouth at the Bay. Kawa stream is not channelized in the upper or lower reaches, and it supports bayshore wetlands and the Waikalua fishpond. However, it is channelized in the middle reaches where heavy residential development occurs. Kea'ahala stream is not channelized in its upper reaches, but is channelized as it travels through the heavily urbanized areas of Kane'ohe. Its flow is low, but has significant potential for non-point source pollutants from urban runoff.

Mokapu-Kane'ohe Sheet Flow: Sheet flow enters the Bay from Mokapu Peninsula after crossing some industrial-type land uses at the Marine Corps Air Station, Kane'ohe Bay, and residential land uses along Kane'ohe Bay Drive.

He'eia: He'eia stream has been modified in the middle reaches where residential development occurs and flows through mangroves just north of He'eia fishpond supporting federally-designated wetlands and the fishpond. These wetlands are some of the largest in the State. They provide natural habitat for endemic endangered species and serve as natural flood control and as a water purifier for Kane'ohe Bay by trapping sediment and pollutants and reducing freshwater pulses that would otherwise enter the Bay.

Maelieli Ridge Sheet Flow: Maelieli Ridge is generally parallel to the shore. Sheet flow from the *makai* (ocean) side of the ridge enters the Bay directly. The ridge top is undeveloped Conservation land. The northern portion of this ridge is developed with residences along Kamehameha Highway. The south section of this ridge, He'eia Kea Valley, is basically undeveloped.

Kahalu'u (includes 'Ahuimanu, Kahalu'u, Waihe'e Streams): The three major streams in this watershed, Waihe'e, Kahalu'u, and 'Ahuimanu, converge at the mouth and enter the Bay by way of the Kahalu'u flood control lagoon. The Kahalu'u and 'Ahuimanu streams run through the periphery of urban areas (primarily residences and small farms). The middle and lower reaches of these streams are channelized. Waihe'e stream begins in an undeveloped, natural amphitheater in the *mauka* (mountain) area.

Neither the stream nor its tributaries are channelized, although there is currently a task force of community members working to resolve flooding issues due to residential encroachment into the natural stream channel and flood zone in that area. Channelization is one option being considered. Waihe'e stream supports federally designated adjacent wetlands in its middle reaches and flows primarily through agricultural areas with some residential areas in the middle reaches. It is home to all five species of endemic Hawaiian freshwater fishes and major invertebrates. Waihe'e also supports large mullet populations and contains few exotic species. Like 'Ahuimanu and Kahalu'u streams, it empties into the Kahalu'u flood control lagoon before entering the Bay.

Ka'alaea (includes Haiamoa and Ka'alaea Streams): Haiamoa stream, fed by a freshwater spring, supports a federally designated wetland in the lower reaches and flows through agricultural lands primarily used for grazing. The Ka'alaea stream area is developed with residential uses, small farms, including grazing, and some commercial uses along Kamehameha Highway. The streams have not been modified to any large extent.

Waiahole: Waiahole is the largest of the unmodified streams in Ko'olaupoko. It is diverted at its headwaters by the Waiahole Ditch but then flows, with some modification, but without channelization, to the Bay. Waiahole Valley is developed with small farms and residences.

Waikane (includes Waikane, Waikeekē, and "Unnamed" Streams): The Waikane stream watershed includes both Waikeekē and Waikane streams. The watershed is broad in the *mauka* areas, then funnels through a narrow valley as it approaches Kamehameha Highway. It contributes a major portion of the freshwater inflow to the northern part of Kane'ohe Bay. Although Waikane stream is diverted at its headwaters by the Waiahole Ditch, the rest of the stream and its tributary, Waikeekē stream, is relatively natural without channelization. Waikane stream supports wetlands as it approaches the Bay. The *mauka* area of the watershed is primarily undeveloped conservation land. There are some residential and agricultural uses closer to the highway. The intermittent "Unnamed stream," is included in the Waikane watershed. It joins Waikane stream on the *makai* side of Kamehameha Highway, after passing through agricultural land, particularly as it approaches the highway.

Hakipu'u and Kualoa: Hakipu'u stream is a natural stream that has not been channelized or modified in any major way. The area surrounding the stream is used for grazing and agriculture. The mouth is adjacent to Moli'i fishpond and a mariculture center. The sheet flow from Kualoa Point crosses agricultural and recreational land before entering the Bay.

4.3.2. State Land Use Designations. There are four State Land Use Designations: Conservation, Agriculture, Rural, and Urban. Only three are represented in lands surrounding the Bay (see Map 4). The State land use designation for the islands within Kane'ohe Bay, the fishponds, and all submerged land of the Bay is Conservation, with either Protective or Resource subzone designation. Within the watershed, Conservation lands are generally along the slopes and crest

of the Ko'olau mountains, including some *mauka* valleys, and on the upper slopes of the other prominent ridges. Agriculture is designated in the northern portion of the watershed: Waiahole, Waikane, Hakipu'u, and Kualoa. The rest of the watershed is designated Urban (see Map 4). This urban designation is a residual of 1960's plans for urban development of the Kane'ohe area and is inconsistent with more recent County designations for the area as discussed in Section 4.3.3.

There are many other areas in the Kane'ohe Bay watersheds where the State designation, usually Urban, does not match City designations, or the current and proposed use of the land. For example, He'eia meadowlands and He'eia State Park are designated Urban by the State. The Office of State Planning is currently reviewing all State designations as part of the State's Five-Year Land Use District Boundary review process.

4.3.3. City General Plan and Development Plan Designations.

General Plan: The General Plan of the City and County of Honolulu designates the southern portion of the Kane'ohe Bay watershed as Urban Fringe and designates the area north of Kahalu'u as Rural through the year 2010 (General Plan, 1989 Appendix).

Development Plan: The Ko'olaupoko Land Use Development Plan Map of the City and County of Honolulu designates a variety of land uses throughout the Kane'ohe Bay watershed that conform to the General Plan. Residential is in the southern portion of the watershed (Kane'ohe) in 'Ahuimanu and along Kamehameha Highway. Commercial and industrial designations are concentrated in Kane'ohe town. Agriculture is throughout the northern portion of the watershed. Preservation is the designation for the islands and fishponds, as well as the Ko'olau mountains, other ridges, and He'eia meadowlands.

4.4. PUBLIC OPEN SPACE AND ACCESS ISSUES

4.4.1. Introduction. The public has very limited access to the shoreline and waters of Kane'ohe Bay. Access is provided by City and State parks, boat ramps, and a few small shoreline access points. However, most of the shoreline is not accessible to the general public, as it is encumbered by private residences, privately owned fishponds, private yacht clubs, military use areas, and other private property.

Public open space is critical to preserve both the rural character and water quality of the Bay. There are a few sites in public ownership in the southern watershed, but only one, Kane'ohe Beach Park, along the shoreline. In the northern watershed, more land is designated open space, but is not necessarily preserved as public open space. Development pressures may lead to residential or golf course development in these locations. Several small, publicly-owned shoreline parcels in the northern Bay area have not been developed as parks. Although golf course developers sometimes promote their projects as open space, they may not be open to all of the public or serve as public open space.

4.4.2. Public Parks. The portion of the Bay accessible to the general public is confined to seven sites: Kualoa Regional Park, Waiahole Beach Park, Kahalu'u Beach Park, Laenani Beach Park, He'eia Kea Harbor, He'eia State Park, and Kane'ohe Beach Park. Of the City-owned parks, only Kualoa, Laenani, and Kane'ohe Beach Parks are maintained; the others are currently undeveloped, but are used by the local community.

There are inconsistencies between the City Development Plan and the State Land Use designation at many of the parks. Kualoa and Waiahole have land use designations of Parks and Recreation (City) and Agriculture (State). Kahalu'u, Laenani, He'eia, and Kane'ohe parks have designations of Parks and Recreation (City) and Urban (State).

Kane'ohe Beach Park: This park is very small and most often used as a playground. It provides visual access to the Bay but is not often used for physical access. It is the only public access point in the southern, most populated, portion of the watershed.

C = Conservation
A = Agriculture
U = Urban



A major park in the southern portion of the Bay could serve many purposes. The last major piece of public open space where this might be possible is the Bayview and Sewage Treatment Plant site. Excluding the privately owned golf course, this land is publicly owned, and with the acquisition of the narrow strip of land separating it from the shore, would provide an excellent bayshore public park. A park here would also serve an important unmet recreational need in the residential center of Kane'ohe, particularly for youths and others who do not always have access to cars. A park could be created that would serve the purpose of mitigating some of the detrimental water quality impacts of Kawa and Kane'ohe streams on the Bay. A park could be used in conjunction with educational facilities at Castle High School. The park could be designed as a "mini-*ahupua'a*" and provide an opportunity to create cultural exhibits and interpretative displays around the fishpond and through the mangrove trees and perhaps taro demonstration projects. A canoe *halau* could use the site if shelters were incorporated into the design. Passive recreation areas (picnic tables and benches), and ballfields could round out the recreational and educational uses of the park. Located in the oldest and most urbanized portion of the Bay, many residents could walk or ride bicycles to the park.

He'eia State Park: He'eia State Park occupies most of Ke Alohi Point. It has a visitor center, provides educational activities, and affords spectacular panoramic views of the Bay. The Friends of He'eia State Park, a non-profit, non-governmental organization, runs educational and interpretive programs at the park.

The facilities of He'eia State Park at Lae O Ke Alohi and the frontage of King Intermediate School, with the He'eia Fishpond between them, present a unique opportunity to create and enhance access for educational purposes. An additional major benefit would be access for youth through organized activities - canoe *halaus*, sailing clubs, etc. Educating youth about the ecology and cultural resources of the Bay and allowing them the opportunity to experience the Bay may provide the best long term protection for the Bay. The addition of finger piers for fishing and passive recreation might be considered for these sites. King Intermediate School, He'eia State Park, and HIMB-Coconut Island form a potential educational "triangle" worthy of further program expansion.

Laenani Beach Park: This park is small and most often used as a playground with visual access to the Bay. It has a small boat ramp but no parking for trailers. This ramp is only usable for shallow draft boats at high tide.

Kahalu'u Regional Park: The proposed Kahalu'u Regional Park, planned around the flood control project, has the appropriate City Development Plan (DP) designation, and most parcels are already owned by the City. However, due to litigation between the City and a property owner, it is a park on paper only and recreational use of this area has been on hold for over twenty years. Kahalu'u Beach Park, also undeveloped, is the shoreline component of the Kahalu'u Regional Park. It is situated at the mouth of the flood control lagoon and has a de facto boat ramp for shallow draft boats that was installed by residents without government approvals. It gets considerable use, especially on weekends, by those trying to avoid the congestion at He'eia Kea Pier. The City does not intend to build boat ramps, however, State plans presently call for the Boating Branch (BB) to design and build a ramp at this site. The plans include minimal trailer parking to ensure that the parking does not infringe on other park uses. This ramp and parking area should be designed for "drop-off," primarily servicing local residents.

Waiahole Beach Park: This "park" is comprised of two small parcels, both undeveloped with no maintained facilities. There is an opportunity to acquire the intervening land and connect the two parcels, creating a significant park between the mouths of Waiahole and Waikane streams, as well as strips of land fronting the 95-acre "Mark's" property, extending to the Waikane Pier on the north and to the division between Ka'alaea and Waiahole on the south. The park could provide for picnicking, crabbing, fishing pier access, and camping in a beautiful rural setting. Providing public access here would serve the residents of the central and northern portions of the Bay.

Kualoa Regional Park: This park, at the northern point of the Bay, provides most of the active public shoreline access to the Bay and the only white sand beach. Camping, fishing, swimming and views of the Bay and watershed are provided. The northern side of the park is eroding and sand is being transported around the point and being deposited along the northern shore of the Bay.

4.4.3. Public Boat Access

He'eia Kea Harbor: The primary boat launching access for Kane'ohe Bay is at He'eia Kea Harbor, where fishing, recreational, and commercial boats are moored and launched. There are three ramps two large and one small, and congestion is a problem both for launching and for boat trailer parking on high-use days (summer weekends and holidays). He'eia Kea Harbor does not provide good access for sailboats without power due to prevailing wind patterns and inadequate water depth.

With public boat access concentrated at He'eia Kea Harbor, congestion occurs both at the Harbor and on the roads leading to the Harbor. Congestion at He'eia Kea could be reduced by providing alternative access sites for smaller recreational boats.

Alternative Small Boat Access: Another option is to provide access for small boats at alternative sites. If there were a number of these sites, the impacts of traffic and parking would be minimized. A park near Kane'ohe and Kawa streams and improvement of the Kahalu'u Beach Park boat ramp could provide better access for small boats in the south and central parts of the Bay.

Additional access for small boats in the more urbanized, southern part of the Bay, would reduce the amount of traffic on Kamehameha Highway, a two-lane highway at He'eia Kea. The Kokokahi YWCA site is presently used, with the permission of the property owner, for launching small boats, particularly sail boats. The Kokokahi YWCA site has other advantages including an existing pier that is in need of repair, but would not necessarily require new pilings. There is enough land to accommodate parking needs and, although traffic would be on a two-lane highway (Kane'ohe Bay Drive), it is fairly close to Kamehameha and Likelike Highways. Since the Kokokahi YWCA is already a "quasi-public" area, there may be the opportunity to develop a feasible access agreement with the owners. If a park were developed at the Bayview site, there could be access both to the shore and along the shore connecting the Kokokahi YWCA and Bayview sites. The widened, channelized mouth of Kane'ohe atream could also provide a site for additional small boat ramps as part of the park. A private marina, the Kane'ohe Yacht Club, is near the Kokokahi YWCA site.

4.4.4. Other Boat Access Points. In addition to the public boat ramps, a number of private boat ramps and marinas provide access to the Bay, including Kane'ohe Yacht Club, Kokokahi YWCA, Makani Kai and Ali'i Shores Yacht Clubs, and KMCAS special services boat ramp.

There are also publicly or privately owned and publicly used access points to Kane'ohe Bay (Na Ala Hele, 1990). Most are either right-of-ways approximately ten feet wide perpendicular to the water, for example, Mikiola Drive right-of-way, or narrow strips of land running parallel to water, for example, He'eia Open Shoreline along Kamehameha Highway. Most access points are in the Kane'ohe Watershed with a few in He'eia Watershed. Some are suitable for launching small "car-top" canoes and kayaks, but do not have associated parking. Efforts should be made to ensure that these accessways continue to be available to the public. In addition, people should be made aware of their availability and location.

4.4.5. Public Open Space. Maintaining open space is critical to preserve both the permeability of the watershed, which can help offset the effects of urbanization and channelization, and the existing rural character of the Bay. Open space exists in the northern portion of the watershed, but is not generally in public ownership or in the Conservation District; thus, there is no guarantee of its continued availability as public open space.

Public open space should be provided both along the shore and within the watershed, where possible. The major sites providing public open space along the shore are Kualoa, He'eia State Park, and the Bayview (Kane'ohe and Kawa stream confluence area). The Kokokahi YWCA is privately owned, but provides quasi-public access. More public open space is needed along the shoreline, particularly in the southern portion of the watershed. There is potential at Bayview and Kokokahi, Kahalu'u Regional Park, and Waiahole Beach Park. Each is described under Public Access.

Away from the shoreline and within the watershed, Ho'omaluhia Botanical Park, Kane'ohe District Park, He'eia Wetlands, and the *mauka* area of Waihe'e are publicly owned public open space. Preservation of public open space is needed in additional watershed areas away from the shore. The areas identified as potential public open space are He'eia Kea Valley, Waihe'e Marsh, and Waikane watershed.

He'eia Kea Valley: He'eia Kea Valley is a privately owned, undeveloped, and geographically isolated across Kamehameha Highway from He'eia State Park and He'eia Kea Harbor. The central portion of the Kane'ohe area is undergoing rapid changes and needs protection from urbanization. There is a recent proposal to develop a small residential and golf course complex in the valley. With the need to preserve public open space in this central portion of the Kane'ohe area, this site could provide a major passive recreational resource as an extension of He'eia State Park. Preserving this undeveloped ridge would retain the rural character of this portion of Kane'ohe, especially when viewed from the Bay. This would help control the present congestion at He'eia Kea Harbor which any major development in the *mauka* valley would exacerbate.

Waihe'e Marsh: Waihe'e Marsh is a federally designated wetland on both sides of Kamehameha Highway, north of Waihe'e Road. The *makai* side is adjacent to the planned Kahalu'u Beach Park. The opportunity exists to create educational access with use of boardwalks through the wetland. As a natural wetland, the entire area provides flood control protection and preserves the water quality of the Bay by slowing freshwater pulses and trapping potential pollutants and sediment.

Waikane Watershed: The entire undeveloped portion of Waikane stream watershed should be protected to preserve the water quality of the Bay. This watershed contributes a major portion of the fresh water to the northern portion of the Bay. stream water quality degradation from urbanization or sedimentation will significantly affect the water quality of the Bay.

4.4.6. Conceptual Solutions for Public Open Space and Access.

Watershed: The principle behind the recommendations is to consider land use in the Kane'ohe Bay region by watershed, rather than as a combined unit. Each discrete watershed in the Kane'ohe Bay watershed should be considered as a separate planning unit, physically related to the others by the cumulative impact of discharges on the Bay.

Streambelts: In the watersheds that are currently undeveloped, sufficient natural area should be maintained to absorb the majority of rainwater falling in the watershed, with a generous corridor established following the main stream channel from the ridge to the ocean. This stream corridor would continue to slow future discharges into the stream with natural ponding areas, and allow room for the natural meandering of streams and wetlands, and to contain overflow water for a limited time. This would allow fresh water to enter the Bay at a measured rate, rather than as a sudden discharge, and would minimize freshwater impacts on the Bay. Keeping residences and other structures from the stream via a streambelt approach would also reduce flooding damage problems and the need for future channelization at public expense.

Impoundments: A similar approach for watershed areas that are currently under development is proposed. Rather than channelizing streams, it is recommended that measures be taken to site developments away from natural stream riparian zones, where they are endangered by naturally recurring flood events. Left with sufficient space, streams in a natural state absorb flood water and reduce runoff velocities. Each development along a stream should be required to prepare a site plan that considers options other than channelization, including impounding flood water and allowing it to discharge into the stream at a measured rate rather than causing catastrophic runoff. The stream itself should be left in its natural state to hold water naturally.

Steep Slopes: Areas in excess of 20 percent slope be designated Conservation District by the State (see Map 3). The intent is to limit subdivisions in areas of steep slopes, although existing house lots could be grandfathered and built upon. Additionally, graded areas should be limited to ensure that runoff is manageable with the City and County enforcing erosion controls measures until the ground is restabilized.

Visual Access: Based on a photographic inventory, a list of headlands, down to a specified elevation, and unique undeveloped areas noted in Section 4.8.1 should be preserved as public open space to guarantee the visual character of the Bay. This could be achieved by creating a Special Subzone in the Conservation District similar to Mt. Olomana. Developers should be required to provide public access to the lower parts of these headlands to allow public views of the Bay. Preservation of natural features should also help retain natural runoff.

Shoreside Public Access: Shoreside public access sites should be provided within each major watershed of the greater Kane'ohe Bay watershed including: Kualoa, Waikane-Waiahole, Kahalu'u, He'eia, and Kane'ohe. The access points are discussed in detail in the recommendations for each watershed (see Section 4.8.2). While access is important in all the watersheds, it is critical in the Kane'ohe watershed which supports 70 percent of the Bay areas population.

Large Boat Access: Large boats are defined as those inconvenient or impractical to store on land or to launch and retrieve at boat ramps; they include sailboats with deep keels. Because of the congestion on the Bay caused by limited navigable water space and prevailing rough sea conditions outside, large boat access should be restricted to the existing harbor at He'eia Kea. Congestion and conflict at He'eia Kea Boat Harbor can be reduced by limiting commercial recreation growth and providing alternative sites for small boat accesses.

Small Boat Access: Launch ramp accesses for smaller boats, including small sailboats, should be provided at locations away from He'eia Kea pier.

Educational Access: The amount and type of educational access to the Bay should be increased so that people can more easily learn about the preservation of this natural resource. Youth programs at He'eia State Park, King Intermediate School, HIMB, and at the several fishponds should be supported as discussed in Chapter 4.

4.5. WATER QUALITY ISSUES

4.5.1. Introduction. The health of the Kane'ohe Bay ecosystem depends chiefly on the water quality in streams, estuaries, and the Bay. Urbanization of the watershed is the most significant factor affecting water quality (USEPA, 1983; Klein, 1979).

The water quality is effected by land use factors including: (1) urban form including density, layout, percent of multiple dwellings, and type of commercial establishments; (2) rate and location of population growth; (3) percentage of land area conserved for recreation and public open space; (4) freshwater transfer from Bay watersheds; (5) stream base flow, extent of channelization, and use of riparian lands; (6) wastewater and stormwater management; (7) interaction of the foregoing factors; (8) mitigation measures; and (9) enforcement of ordinances and administrative rules. (Intasa, Inc. 1976).

Kane'ohe Bay and its watersheds have served planners around the world as a living laboratory to analyze the influence of land use on tropical marine resources (Smith, *et al.*, 1981; Wood and Johannes, 1975; Maragos, 1972). However, much remains unknown. In particular, the interactions of ecosystem components, the effects of toxic chemicals on indigenous organisms, the combined effects of toxics and other stresses, and the long term effects of environmental change are all poorly understood. Consequently, the carrying capacity of the ecosystem for further urban development based on responses to specific parameters is unknown. Aggregate changes in reef community structure indicate that the ecosystem may be approaching its adaptive limits (Evans, *et al.* 1986). These warning signals, and the noted uncertainties, necessitate conservative land use decisions. Future urbanization can be controlled; existing urbanization can possibly be mitigated, but not reversed.

Pollution falls into two major categories: point source and non-point source. Point sources are those identifiable at a fixed location such as sewage outfalls, individual wastewater systems (IWS), and landfills. The sum of all other discharges is non-point source pollution (NPS) including sediment, nutrients, toxics, and pathogens. In Hawaii, pulses of freshwater inflow into the marine environment are also considered a NPS pollutant (Schmitt and Brumbaugh, 1990).

4.5.2. Point Source Pollution.

Sewage Treatment Plants. The sewered portion of the Kane'ohe Bay watershed extends from Mokapu Peninsula north to Ahuimanu. Kahalu'u is scheduled to be sewered as funds become available. There is no plan to furnish sanitary sewer service north of Ka'alaea stream (North Kahalu'u, Waiahole, Waikane, and Kualoa) through the year 2005.

Three sewage treatment plants (STP's) and one pump station currently serve the Kane'ohe Bay watershed. The Kane'ohe STP is near the mouth of Kane'ohe stream. Constructed in 1961, it is obsolete and operating at capacity, about 4.3 million gallons per day (mgd). Prior to 1977-1978, the effluent was discharged into Kane'ohe Bay via an outfall site off Kane'ohe stream. Since 1977-1978, the treated effluent is sent to the Kailua Sewage Treatment plant at Aikahi to be discharged via the Mokapu ocean outfall. During some emergencies and power outages since 1978, raw or partially treated sewage has been shunted through the old outfall into Kane'ohe Bay. This has occurred on numerous occasions over the past several years (see Honig and Evans report, Appendix B). The Kane'ohe STP will be replaced by a pump station, scheduled for completion in 1994-1995.

Replacement of the 'Ahuimanu STP by a pump station in 1986, eliminated the last major point source discharging directly into the Bay. The 'Ahuimanu pump station has sufficient capacity to handle the unsewered portion of Kahalu'u.

The Kailua Plant at Aikahi is the primary STP serving the Kailua and Kane'ohe Bay watersheds. It is being modernized and expanded from seven to 15 million gallons per day capacity to accept the projected outputs from the 'Ahuimanu and Kane'ohe pump stations. The projected average flow in 2005, based on population projections and the 1980 census, is 15-16 million gallons per day. Treated effluent is pumped to the outer Kailua Bay in 100 feet of water via the Mokapu ocean outfall; it is unlikely that this outfall has an adverse effect on the Bay.

The Marine Corps Air Station, Kane'ohe Bay, has a trickling-filter STP with a capacity of two million gallons per day. Its average flow is less than that capacity. Approximately 0.5 million gallons per day of treated effluent is used to irrigate the golf course and other grounds on the KMCAS. The remainder of the effluent is discharged via the Mokapu ocean outfall without traversing the Kailua STP. Sewage from KMCAS was discharged into southern Kane'ohe Bay until completion of the Mokapu outfall in the late 1970's.

Effects of sewage on the marine environment. An extensive study of the effect of wastewater on the marine environment was conducted on Kane'ohe Bay, in conjunction with

diversion of the sewage outfall sites from the Bay in 1977-1978 (Smith, et al., 1981). Nitrogen was the limiting nutrient for the metabolism and growth of the lagoon biologic community both before and after diversion. There was an almost ten-fold decrease in inorganic nitrogen, the nutrient pool most readily used for plant growth, following diversion.

Abundant nutrients, before sewage diversion, supported a luxuriant growth of algae. Dictyosphaeria cavernosa (green bubble alga) predominated on the reef slopes, particularly in the central Bay. This alga covered entire coral colonies, shutting off light, oxygen, and food, and eroding the coral colonies (Banner and Bailey, 1970; and Maragos, 1972). Additional studies several years after diversion indicated decline of green bubble algae and recovery of corals in the lagoon (Maragos, et al., 1985; and Evans, et al. 1986). However, since that time green bubble algae have increased, and the causes are under study by scientists at the University of Hawaii.

Collection System. The Kane'ohe, Ahuimanu, and Kahalu'u collection system includes approximately 65 miles of sanitary sewer lines. The average age of the gravity lines is 25 years with some being more than 35 years old. Wastewater is conveyed by force mains to a higher elevation where it is discharged into the gravity system. Since 75 percent of the system lies below the groundwater table, water infiltration is a major weakness. Infiltration and inflow comprise up to 40 percent of total flow volume during rainy seasons. Since the Kane'ohe STP currently operates at its capacity, this added volume requires regular bypassing of a portion of flow to the old outfall site off Kane'ohe stream. Plant malfunctions and power outages also continue to result in bypass flows (See Honig and Evans report in the separate Appendix).

Leaks or seepage from approximately 25 percent of the system located above the ground water table contributes to non-point source pollution effecting ground water and streams. The magnitude of this problem is unassessed. Line breaks have been a problem for the force mains resulting in an estimated 10-30 million gallons per year of sewage reaching Kane'ohe Bay.

Individual Wastewater Systems (IWS) Including Cesspools. Kane'ohe Bay watersheds have the highest density of cesspools on O'ahu; 2,900 cesspools serve about 10,000 people. Part of the discharge of nitrogen and phosphate from IWS eventually reaches Kane'ohe Bay. The nutrients at their sources amount to about half the output of nutrients from the Kane'ohe STP (State Department of Health, 1990; and City Department of Public Works, 1990).

Management of IWS is the responsibility of the State of Hawaii Department of Health (DOH). The entire island of O'ahu is declared to be a Critical Wastewater Disposal Area. This means that a number of regulations are required before new construction. Septic systems or treatment-type IWS rather than cesspools will be imposed for new construction. A treatment-type IWS includes aerobic treatment and disinfection, but these systems can be, and often are, turned off by the owners to reduce operating costs. This system then becomes, in effect, a cesspool. DOH seeks to eliminate cesspools by requiring upgrades to septic tanks and leach fields if a residential lot is subdivided or if a cesspool must be pumped more than once during a calendar year.

Landfills and Waste Disposal Sites. There are no non-military landfills in the Kane'ohe Bay Watershed. However, illegal dumping in or near streams likely contributes to the load of pollutants entering the Bay. No survey of windward streams has been conducted to evaluate this potential problem, although there are numerous anecdotal accounts and obvious dumps exist. An active sanitary landfill exists at the KMCAS on the lower east slope of Ulupau crater; this site is unlikely to affect Kane'ohe Bay.

4.5.3. Non-point Source Pollution. The Environmental Protection Agency's (EPA) National Water Quality Inventory of 1988 concluded that non-point source pollution (NPSP) is the leading cause of water quality impairment in the United States. In Hawaii, NPSP is transported by rainwater to ground water, streams, and the marine environment. The effects are intermittent and vary with the degree of urbanization. The receiving waters of NPSP are determined by the watershed including its topography, including slope, permeability,

erodibility, vegetative cover, stream flow, stream channelization, riparian zones, and presence or absence of wetland buffers. NPSP creates more problems within the confined conditions of embayments and coast waters than in water with greater mixing, like the ocean.

Hawaii's NPSP falls into six categories: nutrients, pathogens, sediment, toxics, freshwater pulses, and thermal. Though fresh water is an essential component of a marine ecosystem, it can become a pollutant if too much enters at one time. This can occur when human activity alters the natural mechanisms that control the rate of entry of fresh water.

Nutrients. Nutrients can slow down coral growth and contribute to plant growth covers coral colonies, shutting off light, oxygen, and food and eroding the colony. Sources of nitrogen include wastewater; fertilizer applied to crops, yards, and golf courses; aquaculture ponds; fecal contamination of stormwater runoff; and sewage discharge from vessels.

Pathogen. Hawaii has no fecal coliform standards for Class AA waters. However, any indication of fecal contamination is considered undesirable.

Sediment. Sediment is the most prevalent NPSP in Hawaii. The Kane'ohe Bay watersheds have the highest rate of erosion on O'ahu. Sediment reduces water light levels, limits visibility, degrades aesthetic and recreational use of the Bay, and threatens marine biologic research, and is a major carrier of nutrients and toxics. In the extreme case, excessive sediments can accumulate on the bottom, burying corals and other important bottom dwelling marine life. The effect on corals varies with particle size and coral species. Most corals cannot tolerate prolonged cover with terrigenous sediment (Wood, *et al.*, 1975, Rogers, 1990). Sediments are particularly damaging in embayments which lack strong currents and in nearshore waters where particles tend to be too large to be removed by ciliary action of the coral. These conditions are characteristic of the semi-enclosed southern portion of Kane'ohe Bay. Reduced light levels in silt laden waters strongly inhibit growth of most algae and corals. Sediment is also damaging to streams and the estuarine environment (Duda, 1982; Klein, 1979). Kane'ohe and Kawa estuaries have become, in effect, siltation basins. As noted earlier, the average depth of Kane'ohe Bay has shoaled significantly over the past half century, in part attributed to eroded soils filling in the Bay (Roy, 1970; Hollett, 1976; Devaney, *et al.*, 1982).

Freshwater Inflows. Stream flow dominates freshwater input into the Bay. About 60 percent of the stream flow enters the northern Bay; 25 percent enters the southern Bay; and about 15 percent enters the central Bay. Stream channelization, impermeable surfaces (roofs, roads, parking lots, and drainage ditches), and the loss of functional wetlands increase the amount, collection, depth, and velocity of the runoff.

Freshwater pulses lower the density and salinity of the receiving seawater. The diluted seawater, therefore, forms a surface layer which can be lethal to shallow water marine communities. The problem appears to be greatest in the southern and middle Bay where convective mixing is slowest and the effects of urbanization are greatest. Massive coral mortality followed by change in reef community structure was observed after catastrophic storms in 1965 in Kaha'u'u and 1988 in Kane'ohe. (Banner, 1968; Jokiel and Hunter, P.C.) Urbanization increases the frequency of freshwater "kills." It is also possible that hypotonic stress (exposure to less saline water) renders marine organisms more susceptible to the effects of other NPS pollutants.

Thermal Pollution. Runoff from heated impervious surfaces can raise the temperature of a receiving stream by up to ten degrees Centigrade (Galli, N.D.). Heating can also be caused by stormwater retention ponds or instream golf course water features (Galli, N.D.). Thermal shock can destroy freshwater and estuarine biota, particularly after light rainfall in the summer months when stream flows are low and temperature buildups high. The problem is greatest where streams are extensively channelized, lack shade along the stream banks, and have low base flow. Reef corals in Kane'ohe Bay are regularly exposed to summer water temperatures within one to two degrees Centigrade of their upper lethal limit (Intasa, Inc., 1976).

Toxic Substances. Metals, pesticides, and industrial organic pollutants may constitute the principal long-term threat to aquatic ecosystems in near urban environments (Schmitt and Brumbaugh, 1990; Schmitt *et al.*, 1990; Hunter *et al.*, 1979). The effects of toxic substances are more difficult to recognize than those of sediment and nutrients and are far more expensive to assess. Identification of toxics and evaluation of their effects depends on three data bases: results of chemical monitoring of water sediment and biota, bioassay data to assess the combined effects of all pollutants, and surveys of biologic community structure and diversity. The current data base is small for the marine environment in general and virtually non-existent for Kane'ohe Bay.

Residences. Applications of nutrients and pesticides on residential lots are not subject to direct regulation, but are considered a major factor in urban NPSP (Duda, 1982; USEPA, 1983; Klein, 1979). Lack of regular, cost-free collection facilities for household hazardous waste, and, thus, consequent dumping, may partly account for the high concentrations of toxics in Hawaiian freshwater fish (Schmitt and Brumbaugh, 1990; Schmitt *et al.*, 1990).

4.5.4. Conceptual Solutions For Non-Point Source Pollutants.

Monitoring: Monitoring of water quality, sediment, and biota is the principal tool to recognize ecological change and identify its causes and solutions.

Minimize Erosion: The most effective strategies to decrease NPSP minimize runoff and erosion because more than 80 percent of petroleum hydrocarbons and more than 50 percent of the metals and pesticides entrained in urban runoff are bound to sediment (Klein, 1979). Standard sediment control measures (i.e., berms, siltation basins, silt fences, mulches, and grassing) would suffice in most areas except where rainfall is high and the gradient is steep. These conditions exist in most of the Kane'ohe Bay watersheds for much of the year. Sediment control was grossly inadequate at each of the ten active Windward construction sites inspected by Task Force members in 1991.

Wetlands: Preservation and expansion of wetlands are effective and inexpensive measures to limit sediment entry into marine waters. Wetland biota are sensitive to fungicides and herbicides; therefore, a natural wetland should not be the primary control for storm water or sediment. Pollutants should be captured before entering a wetland, where possible. The wetlands of Kane'ohe Bay are shown on Maps 7A and 7B.

Education: The most effective control measure for household NPSP is environmental education for all segments of the population. Education should include incentives and public participation in clean-up projects, waste reduction, and recycling programs.

4.6. STREAMS.

4.6.1. Introduction. Freshwater intrusion and its impact on nearshore environment is complex and difficult to quantify. Intrusion of fresh water lowers the salinity of the nearshore water. In the open ocean, the impact may be fleeting and minor. However, in protected waters such as inside fringing reefs, estuaries, and embayments such as Kane'ohe Bay; freshwater intrusion can significantly affect the salinity levels for extended periods of time. Low to median water flow from streams into the Bay provides a stable, dependable environment, upon which many native aquatic species are dependent. Marine species might be dependent as well.

The flow regime of Hawaii's streams tends to be unique due to flash flooding and extreme variability in runoff rates. Typically, a Hawaii stream receives small amounts of fresh water from freshets daily, and in wetter areas, many times a day, depending on *mauka* rainfalls. These keep the streams clean, lively, and oxygen-rich, an environment many native species need. Urbanization and agricultural development in Kane'ohe Bay watersheds has probably increased both the incidence of flash flooding and the degree of sediment loading, with possible detrimental effects on marine life of the Bay.

Flood water patterns in Hawaii streams are also unique and can typically exceed median flows by a factor of 100 to 1000. These enormous fluctuations of fresh water are also important to the salinity of semi-enclosed areas such as Kane'ohe Bay.

4.6.2. Nearshore Environment. Stream waters bring nutrients, reduce temperatures, and carry higher oxygen content to the estuarine and nearshore area. Recent studies document the use of estuaries as nurseries by marine juveniles (Harrison, 1989). Wise management of streams and enhancement of the interfacing or buffering ecosystems, wetlands, and estuaries, are critical to protect the fishery values of Kane'ohe Bay. Further studies are needed to determine the role of fresh water on the viability of nearshore ecosystems.

4.6.3. Fishponds. Fishponds are located in direct relationship to streams and appear to depend heavily on fresh water and its associated nutrients. While a known Hawaiian practice was to stock fishponds, a reasonable assumption is that fishponds were located in optimum natural conditions for fish survival. Like wetlands and estuaries, fishponds probably also serve to buffer the impacts of large discharges of fresh water in the offshore marine environment. Fishponds are discussed more fully in the Fishing Section of this report.

4.6.4. Gauging. The U.S. Geological Service has collected the only surface water data available to the public. Most of these data are old and often inadequate to answer current questions. Historically, at least 22 gauges have been on the streams and three on Waiahole Tunnel. Currently, there are only 14 active gauges. Of these, only six have meaningful continuous instream flow records. Without proper gauging, determining the stream flow into Kane'ohe Bay and the amount of water being exported from the watershed is impossible.

4.6.5. Stream Management. The salient determinants of stream quality are channelization, especially lined channels; water diversion; reduction of base flow; channel erosion and widening; feral animals grazing in the watersheds; thermal pollution caused by lack of streambelt vegetative cover; inadequate wastewater disposal, impermeable surfaces; and non-point source pollutants. Mitigating these factors can reduce sediment and protect, to a degree, water quality (i.e., reducing toxics, pathogens, etc., which bind to sediment). Measures to minimize the introduction of sediment into the Bay can be achieved by implementing stream management measures.

4.7. GOLF COURSES.

4.7.1. Introduction. The Land Use Committee assessed the impacts of golf course development. Instead of examining each golf course, the committee focused on the generic qualities to be protected, public access to the Bay, preservation of public open space, and water quality. There are four existing golf courses in Ko'olaupoko with proposals for ten more, most within the watersheds of Kane'ohe Bay (State OSP, 1992).

4.7.2. Impact of Golf Courses on Water Quality. The concern with golf courses in the Kane'ohe Bay watersheds stems from the cumulative impacts golf courses may have on Kane'ohe Bay. There are serious water quality issues surrounding golf course development and operation. During construction, the potential impacts are from soil erosion caused by mass grading and sediment transported by streams to the Bay. During operation, the potential impacts are from fertilizers, pesticides, and herbicides that are applied to the turf which can percolate to ground water or runoff into streams and the Bay (State OSP, 1992).

The influence of golf courses on the aquatic environment depends on their location, number, design, and chemical management procedures. Those most likely to affect the Bay are constructed near streams or the shoreline, occupy a significant portion of the respective watershed area, or require grading of steep slopes. These concerns are especially important for Kane'ohe Bay, a semi-enclosed estuary. An analysis of the impacts of golf courses on the aquatic environment and an estimate of the cumulative effects of proposed projects on Kane'ohe Bay are included in Klein, 1991 (see Appendix B).

4.7.3. Impact of Golf Courses on Public Open Space and Access. The Public Open Space and Access Sub-committee recommended actions concerning streambelts, wetlands, park areas, major public open space, boat access, etc. These recommendations were made to protect water quality, mitigate the impacts of existing uses, preserve major public open space where possible, provide public shore access to the Bay, provide access for both large and small boats, and maintain the views of the Bay and from the Bay. Since the Task Force identified golf course development as a concern, the subcommittee addressed it within its recommendations.

4.7.4. Specific Golf Course Proposals. Golf course development has been proposed at locations in the Kane'ohe Bay watershed considered to be inappropriate. These areas protect the water resources and preserve major public open space and public access to the Bay. Three major golf course proposals within the Kane'ohe Bay watershed were in some stage of public decision-making during the year that the Task Force was developing the Master Plan:

Bayview and Kane'ohe Sewage Treatment Plant Site: The Bayview site is the last major area of public open space in the southern part of the Bay. It is the only site with potential to mitigate the adverse water quality impacts of channelization and urbanization before Kane'ohe stream reaches the waters of the Bay. Much of the site is already government-owned. Pacific Atlas, a developer, proposed to enlarge the existing pitch-and-putt (Par 3) course to a full-length 18-hole course requiring the acquisition of government-owned land. In 1990-1991, the developer presented its request to the City Council. To ensure future planning options at this site, the Task Force reviewed and opposed this proposal before the completion of the Master Plan. The City Council has since voted unanimously not to approve the golf course. The Land Use Committee developed an alternative land use plan for the Bayview area, focusing on public recreation, historic, and cultural preservation land uses, and water quality mitigation (see Map 5).

He'eia Kea Valley: He'eia Kea Valley is a major undeveloped, geographically isolated area with the potential to become an extension of He'eia State Park. Nanatomi, Hawaii, developers of the proposed Manulani Sports Complex (i.e., 18-hole golf course with housing), agreed to wait until after the Task Force had developed the Kane'ohe Bay Master Plan before requesting permits from the City and County of Honolulu and the State.

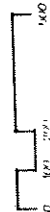
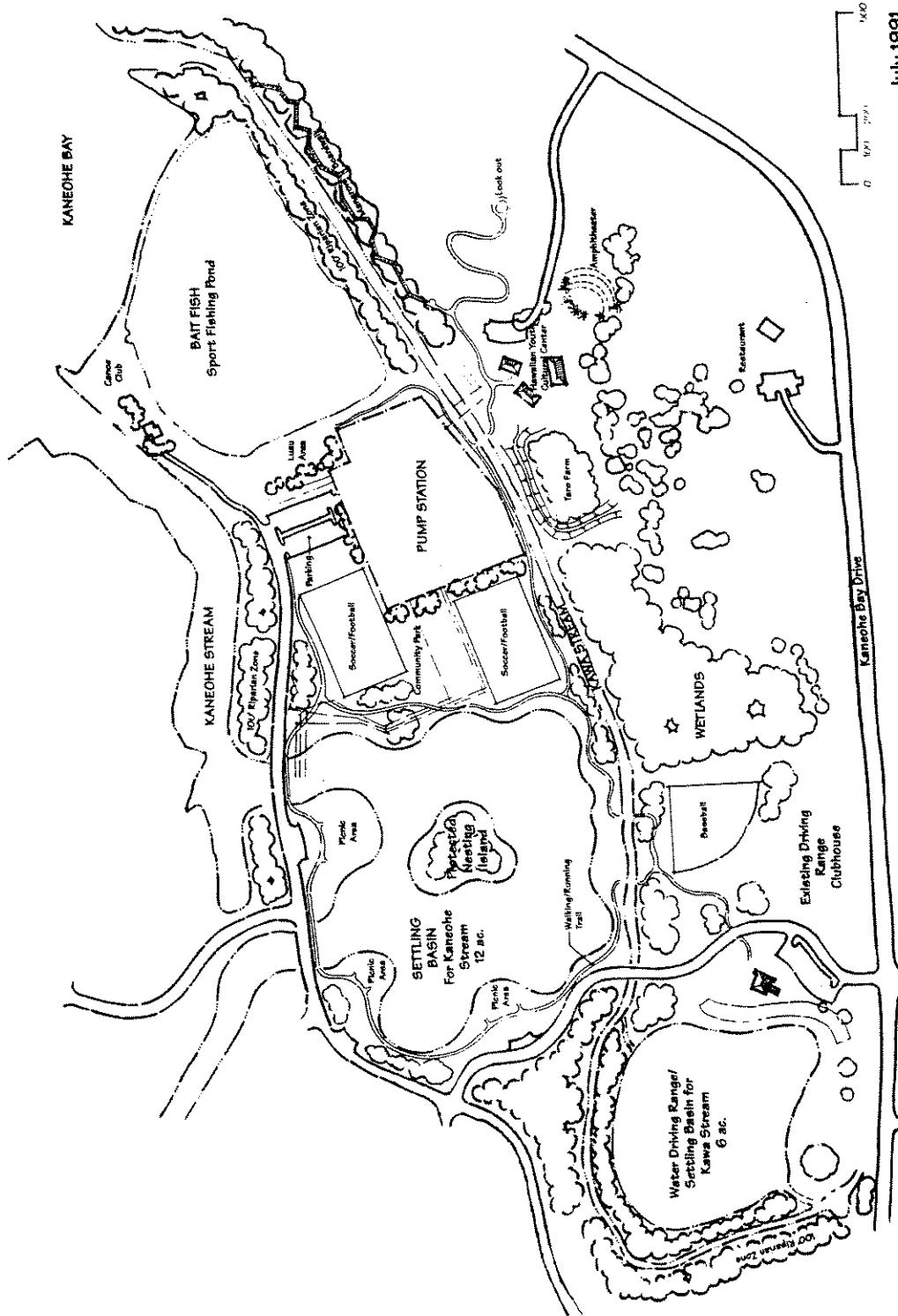
Waikane Valley golf courses: Waikane stream is the least modified stream of the Kane'ohe Bay watershed. It also provides most of the freshwater input to the northern end of the Bay. The water quality of this stream should be maintained. Two golf courses are proposed for Waikane Valley: SMF's, Inc., proposal for 18-holes plus four "training holes" and Pan Pacific's proposal for 27-holes. During the Task Force's tenure, SMF, Inc., petitioned to change more than 300 acres of land from Agriculture District to Conservation District. The Task Force had already recommended to OSP that the Waikane stream watershed be changed to Conservation and that the Waikane stream watershed should preserve its natural character and water quality through the prohibition of golf courses. The principal concern is soil erosion during construction. The State Land Use Commission has reclassified the land to the Conservation District.

4.7.5. Performance Standards. No golf course development in the Kane'ohe Bay watershed should be considered until performance standards have been developed. These standards should include strict methods to control erosion, sedimentation, and nutrient loading, and to prevent contaminating streams, ground water, or the Bay. Each golf course site should also be reviewed to assess its use as major public open space for the community.

4.8. LAND USE RECOMMENDATIONS

4.8.1. State Land Use District Changes. The Task Force recommends changes to the State Land Use (SLU) designations through Office of State Planning, Five-Year District Boundary Review (See Map 4, except for the Bayview site, which is on Map 5):

1. Bayview and Sewage Treatment Plant Site: from Urban to Conservation to preserve future planning options to mitigate water quality impacts
2. Pu'u Pohakea: from Urban to Conservation to allow views of the Bay and to interrupt the nearly continuous urban residential character of the Kane'ohe end of the Bay when viewed from the water.
3. He'eia Meadowlands: from Urban to Conservation to preserve the natural ecosystem and the natural flood-control role it provides for the Bay by trapping sediment and reducing freshwater pulses.
4. He'eia State Park (Lae O Ke Alohī): from Urban to Conservation to preserve this prominent land feature that is a major public access point for viewing the Bay and to be consistent with current and intended use of the area.
5. He'eia Kea Valley: from Urban to Conservation to preserve this geographically isolated valley as an undeveloped area when viewed from the Bay.
6. Waihe'e Valley *Mauka*: from Urban to Conservation to preserve water quality, to allow ground water recharge and to preserve future planning options.
7. Waihe'e Streambelt: from Urban to Conservation to create, where possible, a 100-foot buffer area along the stream to protect water quality and the ecosystem.
8. Kahalu'u "Regional Park": from Urban to Conservation to protect water quality, preserve public open space and provide public access to the Bay.
9. Waihe'e Marsh: from Urban to Conservation to protect water quality by preserving and restoring the wetlands that are natural flood controls for the Bay.
10. Haiamoa Streambelt: from Urban to Conservation to create, where possible, a 100-foot buffer area along the stream to protect water quality and the ecosystem of the Bay.
11. Expanded Waiahole Beach Park: from Agriculture and Urban to Conservation to provide public access to the Bay and to protect the environmentally sensitive ecosystem between the mouths of Waiahole and Waikane streams.
12. Waiahole Streambelt: from Agriculture and Urban to Conservation to create a 100-foot buffer, where possible, along the stream to protect water quality and the ecosystem of the Bay.
13. Waikane Watershed: from Agriculture to Conservation to protect the water quality of this watershed that is critical to the health of the northern part of the Bay, to preserve public open space, and to provide public access to the *mauka* areas.
14. Hakipu'u Streambelt: from Agriculture to Conservation to create, where possible, a 100-foot buffer along the stream to protect water quality and the ecosystem of the Bay.
15. Kualoa Regional Park: from Agriculture to Conservation to preserve the only major shoreline park along Kane'ohe Bay and to reflect current and proposed use of the area.



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4.8.2. Public Open Space and Access Recommendation. The following recommendations are designed to provide public open space and access in critical areas of Kane'ohe Bay (see Map 3). (Abbreviations are at the end of the report).

RECOMMENDATIONS	IMPLEMENTATION
<u>Kane'ohe Watershed</u>	
1. Provide a major shoreline park at the Kokokahi/Bay View site that would include a finger pier at Kokokahi and public launching facilities for small sailboats.	C&C - acquisition P&R - maintenance DLNR - finger pier BB - launching ramp
2. Restore the wetlands and estuary area between Kawa and Kane'ohe streams to reduce runoff and pollutants entering the Bay.	Land Owner
3. Explore creating a pedestrian trail along Kane'ohe stream to connect the urban portions of Kane'ohe and mauka resources including Ho'omaluhia Botanical Park, Likeke Trail (below Pali), etc., to the Bay.	DPW - C&C P&R
<u>He'eia Watershed</u>	
4. Provide finger piers at King Intermediate School and near Lae O Ke Alohi (connected to He'eia State Park) to increase access to and opportunities for educational activities on the Bay.	DOE/DLNR
5. If possible, connect He'eia Kea Harbor to He'eia State Park at Ke Alohi Point.	BB/DLNR
<u>He'eia Kea Valley</u>	
6. Create an extension of He'eia State Park in He'eia Kea valley to preserve public open space and provide protection from urbanization. Its location near He'eia Kea Harbor would also allow space for additional parking and pier related facilities.	State - acquisition FOH - maintenance
<u>Kahalu'u Watershed (includes 'Ahuimanu, Kahalu'u and Waihe'e).</u>	
7. Improve the facilities at "Kahalu'u Regional Park" (per City Regional Park Plan and Neighborhood Board recommendations) to improve small boat access. Develop rules and regulations for use of flood-control lagoon within the Regional Park, such as limits on power boats, etc.	C&C - acquisition P&R - maintenance
8. Create a streambelt along Waihe'e stream to protect water quality and prevent flooding.	OSP/BLNR

Ka'alaea Watershed

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|---|---|
| 9. Consider adding land <i>makai</i> of Kamehameha Highway near Waihe'e Marsh to the adjacent Kahalu'u Regional Park. There is potential for "boardwalks" through mangrove and estuarine environment. | DLNR/FWS - acquisition
P&R - maintenance |
| 10. Create a streambelt buffer along Haiamoa stream to protect water quality. | OSP/BLNR |

Waiahole Watershed

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|--|--|
| 11. Expand and improve Waiahole Beach Park to provide public access for this portion of the Bay. | C&C - acquisition
P&R - maintenance |
| 12. Create a streambelt buffer along Waiahole stream to protect water quality. | OSP/BLNR |

Waikane Watershed

- | | |
|---|----------|
| 13. Preserve the entire undeveloped portion of Waikane stream Watershed to preserve the water quality of the Bay. | OSP/BLNR |
|---|----------|

Hakipu'u/Kualoa Watershed

- | | |
|---|-----------|
| 14. Create a streambelt along Hakipu'u stream to protect water quality. | OSP/BLNR |
| 15. Permanently stop erosion of the shoreline from Kualoa Park. | C&C - P&R |

4.8.3. Water Quality Recommendation. Statement of general principles: slow the rate of urbanization in Kane'ohe Bay watersheds and mitigate the effects of urbanization on water quality.

RECOMMENDATIONS

IMPLEMENTATION

Point Source Pollution Recommendations:

Sanitary Sewer System: (in order of priority).

- | | |
|---|---------------------------------|
| 1. Minimize fiscal competition between extension and renovation of the collection system by providing additional funding. | C&C Council
DPW - Wastewater |
| 2. Eliminate sources of infiltration to the sanitary sewer system, and illegal connections between storm drains and sanitary sewers. | C&C - DPW |
| 3. Identify sites of seepage from gravity lines that lie above the groundwater table and correct all deficiencies. | C&C - DPW |
| 4. Install a "can-type" pump station and 8-inch force main at He'eia Kea Harbor to eliminate the existing cesspools, and provide for bilge and sanitary pump-out. | BB/DLNR |
| 5. Maintain or accelerate original completion date to convert the Kane'ohe STP to a pump station. | C&C - DPW |
| 6. Stringently enforce the moratorium on new construction in the area served by the Kane'ohe STP. | C&C - DLU/DPW/DOB |

- | | |
|---|-------------------|
| 7. Require dry sewer lines for all new construction in unsewered portions of the watershed. | C&C - DLU/DPW/DOB |
| 8. Inform researchers at HIMB of all line breaks and by-pass incidents, and furnish them results of related monitoring. | C&C - DPW |
| 9. Drain water from swimming pools in to the sewage treatment system, not directly into the Bay. | DOH
C&C - DPW |

Individual Wastewater Systems:

- | | |
|--|-------------|
| 1. Have City and County DPW manage wastewater disposal from IWS based on general policy guidelines developed in conjunction with DOH. | DOH/DPW |
| 2. Undertake engineering and monitoring studies of the behavior of septic tank and leach field systems in various Hawaiian soils. | DOH/EPA |
| 3. Increase the minimum lot size for septic systems from 10,000 to 15,000 sq. ft. until the performance of leach fields in Hawaii is clarified by engineering studies. | DOH |
| 4. Require the outermost boundary of leach fields to be at least 100 feet from any waterway. | DOH |
| 5. Prohibit use of treatment IWS to permit construction of individual residences on lots smaller than 15,000 sq. ft. because the requirement to operate the treatment system cannot be enforced. | DOH |
| 6. Require secondary treatment and dechlorination before injection, if a treatment plant rather than pump station is installed at He'eia Kea Harbor. | BB/DLNR/DOH |
| 7. Facilitate identification and replacement of failing systems by requiring private firms engaged in pumping cesspools to report such pumping to the oversight authority. | DOH/DPW |

Non-Point Source Pollution Recommendations:

Monitoring: (Recommendation No. 1 is paramount.)

- | | |
|---|-----------------------|
| 1. Provide stable funding for a comprehensive monitoring program for the Bay and its major streams. | State Legislature/DOH |
| 2. Assign primary responsibility for environmental monitoring to the State Department of Health or to the Department of Environment, if it is established. Establish clear lines of responsibility among the agencies. | State Legislature/DOH |
| 3. The lead agency should consult with HIMB, the UH Environmental Center, DNLNR, and professional statisticians and design the environmental monitoring protocols. | DOH/UH/DLNR |
| 4. Assign a full-time, aquatic toxicologist to the lead agency to design, prioritize, and implement data collection in consultation with HIMB, UH Environmental Center, USGS, and others. | DOH |
| 5. Establish and annually monitor permanent transect stations to coordinate chemical monitoring of fresh water, marine water, bottom sediments, and biota with studies of aquatic community structure and biodiversity. | DOH/HIMB |

6. Manage monitoring data collected by all entities in a central database to be maintained and kept current indefinitely. Make the database accessible to the public.
7. The monitoring data base should be reviewed and analyzed on a regular schedule by environmental scientists, toxicologists and those concerned with public health.

UH - Environmental Center

DOH/UH/HAEP

Erosion and Sedimentation:

1. Improve enforcement of grading ordinances by: adding enforcement staff; training staff in environmental affairs; requiring regularly scheduled refresher courses for inspectors; and promulgating and significantly increasing schedules, assessment standards, and procedures for non-compliance.
2. Revise grading ordinances by: placing greater emphasis on sediment transport and specifying which control measures are permissible under various conditions.
3. Preserve, and where possible expand, existing wetlands. Do not permit off-site mitigation.
4. Apply techniques developed by the Soil Conservation Service to minimize soil erosion to Kane'ohe Bay Watersheds.

C&C

C&C

C&C
USCOE/FWS
C&C/Property Owners

Education:

1. Establish and promote the use of cost-free hazardous waste collection for households, do-it-yourself mechanics, and subsistence farmers.
2. Include Kane'ohe Bay in public education projects.
3. Emphasize that substances such as oils, paints, cleansers, solvents, batteries, etc., can be as environmentally damaging as registered pesticides.
4. Combine incentives with education to recruit public participation in voluntary clean-up efforts.
5. Provide signage on proper sanitation at He'eia Kea Harbor and other primary access points to the Bay.

DOH

DOH/DOE & Others
DOH

DOH

DOH

4.8.4. Streams Recommendations. Maintain and improve water quality in streams by implementing these recommendations (from Water Quality Report and Streams Report):

RECOMMENDATIONS

IMPLEMENTATION

1. Maintain low population density in watersheds not serviced with public sewer facilities.
2. Allow no further channelization of streams. Where consistent with public safety, restore channelized portions of streams to natural banks.
3. Establish a 100-foot wide riparian buffer zone, where possible, on either side of Waihe'e, Haiamoa, Waiahole, Waikane, and Hakipu'u streams. Prohibit further housing in this area

C&C - DGP/DLU

C&C - DPW
CWRM - DLNR

OSP/BLNR
C&C DGP/DLU

- | | |
|--|---------------------------------|
| 4. Install sediment retention basins of sufficient capacity and expand existing wetlands to mitigate sediment pollution and influx of toxic chemicals via Kane'ohe and Kawa streams. | C&C - DPW
PROPERTY
OWNERS |
| 5. Allow no further reduction of amount of surface water flowing into Kane'ohe Bay. | BWS/CWRM |
| 6. Maintain and, if possible, enhance the current median flow of Kane'ohe Bay streams by limiting withdrawals. | BWS/CWRM |
| 7. Initiate an appropriate gaging program for Kane'ohe Bay (and greater windward O'ahu) streams. | USGS/CWRM |
| 8. Initiate studies on the role of fresh water in nearshore water habitats and the contribution of marine habitats to the functioning of freshwater stream ecosystems. | DLNR - DAR |
| 9. Supplement the 1988 Board of Water Supply (BWS) Environmental Impact Statement (EIS) to address identified issues. | BWS/CWRM |

4.8.5. Golf Course Recommendations. The recommendations will minimize the adverse impacts of golf courses on Kane'ohe Bay:

RECOMMENDATIONS

IMPLEMENTATION

- | | |
|--|---------------------------------|
| 1. Develop a policy on golf course projects addressing cumulative effect on streams, estuaries, and embayments. | City Council,
HSL/OSP |
| 2. Golf course projects should conform to state-wide environmental standards for location, design, construction, management, and monitoring. | DOH/DLNR/DOA/City and
County |
| 3. Prohibit expansion of the Bayview golf course. | C&C |
| 4. Relocate He'eia Kea golf course to a more environmentally suitable site. | Developers/
State/County |
| 5. Prohibit golf course development in the Waikane Stream watershed. | BLNR
C&C |

4.9. WATER USE ISSUES

4.9.1. Commercial Recreation

4.9.1.A. Commercial Recreation Concerns. Commercial recreation has the potential to affect a number of qualities, resources, and public values in Kane'ohe Bay. Many of these concerns become problems as the numbers and sizes of commercial operations grow.

Rural character - Noise from boats, concentration of people, high speed activities, exhaust fumes, fuel odor and sheen on the water from fuel and oil spills, and trash including paper and plastic utensils detract from the rural character of the Bay.

Public interest - General public access to public lands and waters is compromised by certain activities of commercial operations which are considered noxious or dangerous to users who swim, wade, anchor, picnic, or fish in the Bay.

Harmony and tranquillity - Absence of competition for space among non-compatible activities and the abundant supply of desired resources maintain these qualities. Competition among users is aggravated by soliciting commercial bay users from a potentially unlimited

population of tourists. Concentrations of people, the high speed of their activities, and the unaesthetic attributes of commercial recreation, including noise, appearance, and intensity of activity are characteristics that become problems as the number and size of commercial operations grow.

Public safety - There is a real or perceived potential for injury or damage from high speed towing operators who may pay more attention to their customers than others in the waters around them. As the number of tourists increases, dangers increase to other users, particularly low speed sailboats, canoes, kayaks, divers, and swimmers. Thrillcraft operated by untrained tourists, if not properly supervised, can move erratically and be steered improperly. Other vessels cannot safely share the water with these operations, and it is a particular problem in narrow channels between reefs.

Coral reefs - These ecosystems can be physically damaged or their functions disrupted by commercial recreation activities, including chronic noise impact on reef communities, grounded vessels, and people trampling, touching, or breaking coral.

Parking - Commercial recreational operators and customers compete with other residents for the limited parking at departure points such as He'eia Kea Harbor, particularly on weekends.

Submerged lands - The displacement of the general public from submerged lands by commercial operations without Conservation District Use permits may constitute unauthorized use of public property. This is particularly acute if commercial recreational operations monopolize specific desirable recreation sites.

Class AA waters - The proliferation of commercial recreational activities in Kane'ohe Bay may constitute a violation of the criteria for the management of such waters as stated in Section 3.4.

Before the July 1990 moratorium prohibiting expansion of commercial recreation activity in Kane'ohe Bay, there were no effective limits on densities of people or equipment in the designated commercial recreation areas. Commercial operators shuttled passengers from dockside and waiting vessels or to the central sand flat increasing the number of customers. Competition among the operators led to a proliferation of shuttling to maintain their respective "market shares."

In response to public concerns over ever expanding commercial recreation and degradation of the Bay for other users, the State Legislature imposed a moratorium, effective July 1990, on further increases in commercial recreation. This moratorium is to remain in effect until the report of the Task Force is approved by the Director of the Office of State Planning. At the time of the moratorium, the State Boating Branch conducted a census of all uses and vessels to establish a baseline from which future management options will be compared.

The Task Force established a Water Use Committee and subcommittee to develop commercial recreation management recommendations. General agreement was reached early that all the resources and qualities of the Bay are affected to greater degrees with the increase in density of Bay uses by both commercial and non-commercial interests. The Task Force also agreed that the alternatives of either total elimination of commercial uses or complete deregulation of commercial activity were neither fair nor practical. The Task Force and its committees decided to focus on the best means to eliminate the objectionable and harmful aspects of commercial uses, while maintaining the economic viability of Kane'ohe Bay's commercial recreation industry.

Commercial recreation in Kane'ohe Bay is inherently constrained by a number of factors including: limited number and capacity of acceptable reefs, the sand flat, and other water destination sites; limited boat launching access; the need to retain rural and aesthetic

character in areas surrounding the operations; limitations imposed by rough tradewind seas outside the protective reefs of the Bay; the need for proper anchorage and safe navigation in the Bay; the need to protect the small number of remaining healthy reefs in the Bay; and the limited number of sand flats with adjacent access to deep water off the downwind side.

4.9.1.B. Analysis. Reaching consensus on an acceptable commercial recreation plan for Kane'ohe Bay was a lengthy, intense process encompassing many months. At times, discussions were heated and progress towards an acceptable compromise was uncertain. However, the Task Force reached a consensus agreement on a commercial recreation plan during its last meeting on November 20, 1991.

Achieving this consensus involved several steps. A subcommittee of the Water Use Committee evaluated available data, assessed impacts, and identified alternative solutions. Management concepts for commercial recreation focused on placing limits on the scale and intensity of commercial uses. A transition period was agreed upon to allow commercial operators time to adjust their operations and equipment to conform with the recommendations.

The subcommittee submitted two alternatives to the Task Force through the Water Use Committee. Additionally, two more alternatives were proposed, one by commercial recreation interests, the other by those advocating minimal commercial recreation. When consensus could not be reached among the Task Force on any one alternative, the Task Force agreed to subsequent deliberations by an *ad hoc* committee involving a series of mediated sessions. The starting point was the development of general management principles upon which to base the elements of an acceptable plan. The Task Force at its May 1991 meeting agreed upon these principles:

GENERAL MANAGEMENT PRINCIPLES:

- Community protection provisions shall be established including:
 - annual license renewal
 - public input to the licensing process
 - maintaining and filing daily logs
 - environmental monitoring at impact and control sites
 - funding of monitoring from user fees collected from customers
 - requiring sanitation devices on vessels
 - requiring conservation district use applications and permits for the plan as developed for use of submerged lands
- Eventual shift to low-impact operations without thrillcraft and high speed towing
- No fixed base commercial operations on submerged lands
- Minimal use of submerged lands
- Consistency of operations with the intent of class AA waters
- Caps on the total number of permits and operations
- Limits on the capacity of each permitted operation and daily customer allowances
- Limits on the types of allowable activities
- Limits on the locations for allowable activities
- Limits on allowable times for activities
- Non-transferability of permits to non-vested parties, consistent with existing Ocean Recreation Management Program (ORMP) regulations
- No new commercial uses introduced without demonstrating consistency with the long-term management goals for the Bay
- Demonstrated need for the operations to be located in Kane'ohe Bay due to the Bay's unique attributes
- Permits to be granted by the State in the public interest
- Permits not to be construed as leases

4.9.1.C. Conceptual Solutions for Commercial Recreation. The alternative plans initially developed by the subcommittee, the Task Force, and commercial interests are summarized in Table 5. During Task Force deliberations and mediated sessions, the agreed upon principles and acceptable elements from the plans were incorporated into the approved plan which combined the elements of some of the earlier alternatives.

The two concepts developed by the Water Use Committee and its subcommittee sought to provide higher (Alternative No. 1) and lower (Alternative No. 2) density alternatives. These two alternatives differ in three ways: the maximum number of customers allowed per commercial vessel and commercial use permit, the numbers and type of supporting water sports equipment used per commercial recreation permit holder, and the total number of commercial operations allowed in Kane'ohe Bay. For both alternatives, the subcommittee felt that existing commercial use areas, while extensive, can be shared with the general public while still preserving other qualities of concern.

Under Alternatives Nos. 1 and 2, permits would not be transferable. Two types of permits were suggested to replace the existing ORMP permit: a high-impact commercial recreation permit and a low-impact commercial recreation permit.

Neither Alternative No. 1 nor 2 found complete favor among the Task Force members and members of the public attending the Task Force, Water Use Committee, and subcommittee meetings. This led to the commercial recreation operators to develop Alternative No. 3 which relaxed and changed some provisions of Alternatives Nos. 1 and 2. In addition, the Task Force considered an Alternative No. 4, termed the "Minimal Impact Alternative," presented by those wanting a plan that would more protective of traditional uses and qualities of the Bay than offered by the other alternatives. See Chapter 6, Table 5, Attachments A and B, respectively, for changes proposed by Alternatives Nos. 3 and 4.

The mediated sessions were characterized by considerable discussion and compromise and addressed the following needs:

- to allow continued use of existing jet skis and high speed towing vessels until businesses are sold or terminated;
- to continue full service commercial activities in AA waters, subject to a number of restrictions to protect designated priority uses of AA class waters; and
- limit shuttling and loading procedures at He'eia Kea Harbor, and the need for specific provisions for snorkeling tours, glassbottom boats, small sailing charters, and ramp permits.

The sessions also addressed the need:

- to place caps on capacity and location of operations by permit type;
- to provide for a transition period for commercial operations;
- to transition from the present situation to the desired end goals; and
- to include community and public interest protection provisions.

The complete text of the approved mediated plan is in Section 4.10.1 and the designated commercial recreation sites are shown on Map 6.

4.9.2. Non Commercial Thrillcraft and High Speed Boating Issues

4.9.2.A. Problems. In recent years, recreational boating in Kane'ohe Bay has proliferated at the limited desirable destinations. Increased activity, especially high speed boats and thrillcraft, has elevated the frequency of unsafe congestion in popular waterways. Strict enforcement of current regulations would alleviate much of the potential hazard. An additional measure of safety can be achieved with policies and regulations that emphasize use of common sense and facilitate implementation and enforcement. Only a small portion of the Bay is actually navigable, and the carrying capacity for a mix of vessels is less than apparent.

Promoting management which will ensure the safety of all present and future users is important.

Power Boat Impacts: Potential impacts of power boats include ocean disposal of bilge, solid, and sanitary waste; collisions with reefs; underwater noise which may disturb fish; traffic conflicts; high speeds close to shore; and, in the case of water skiing, diversion of the driver's attention. Speedboats towing skiers and operating in limited areas with poorly defined perimeters are difficult to see or identify. The driver and skier can also constitute a safety hazard due to the amount of attention paid to staying within the confines of the area in lieu of watching for traffic and other hazards. Potential problems involving thrillcraft include erratic unpredictable maneuvers at high speeds, buzzing other boaters, hot-dogging, creating traffic conflicts, using high speeds close to shore, causing excessive noise both above and below the water, and unsafe operating by inexperienced operators. All these activities pose potential safety hazards if the vessels are operated close to swimmers, snorkelers, kayakers, or operators of other small or slow boats.

Conflict Reduction: Water skiing and high speed boating near swimmers, anglers, and operators of small slow craft create conflicts when water users feel constrained in their activities due to the danger posed by high speed boats. Conversely, moored boats and swimmers in the few good water ski areas in the Bay create conflicts with skiers and ski boat drivers. Water skiers and other high speed recreational boaters normally operate in confined smooth water areas at speeds of 30-40 miles per hour. Designating high speed, priority use areas may encourage high speed operators to congregate in those areas and reduce conflicts and safety hazards in more congested areas frequented by other users. Unfortunately, few appropriate areas exist. Furthermore, as operators increase their speed, the number of vessels that may safely be used decreases. Thus, as the number of people wanting to use the Bay increases, the speed must decrease.

Thrillcraft Impacts: Under present ORMP rules, recreational thrillcraft can operate only in the shallow areas between the sand flat and Kapapa Island and from the main Ship Channel to the northeastern edge of the Sampan Channel.

Thrillcraft, when operated by "un-supervised" individuals, often pose a hazard to swimmers, snorkelers, anglers, and operators of slower, lower impact vessels. The high speed and erratic directional changes of thrillcraft operators prevent slower craft and persons in the water from taking evasive action. The thrillcraft dictate whether or not there will be an accident. The areas currently used by thrillcraft are traditionally used by swimmers, snorkelers, skin divers, board surfers, and kayakers. A thrillcraft traveling at 30 miles per hour covers a distance of half a mile per minute, and all other users in the area must be constantly on the alert to danger. A thrillcraft in the area can be a very upsetting experience for all other users.

Rural Quality: A single thrillcraft with noise, erratic behavior, and changing speed is not conducive to relaxation. The Bay is perceived by most of its users as a place of relaxation and escape from the stress and bustle of their onshore environment. The noise and erratic operation of thrillcraft can be annoying and disturbing. Having to keep a weather eye open for an erratic high-speed intruder is not conducive to relaxation or safe recreation.

4.9.2.B. Analysis. The Task Force and Water Use Committee evaluated all types of recreational craft used in the Bay to determine which cause significant problems. Types of boats evaluated include sailboats, power boats, water skiing boats, canoes, kayaks, windsurfers, and thrillcraft. The impacts were determined to be minor for all categories except high-speed boats, water skiing boats, and thrillcraft. The need to provide designated mooring areas for sailboats is addressed in Section 4.9.3.

Conceptual alternatives to solve existing conflicts and problems were developed for high-speed boating (including water skiers) and thrillcraft.

4.9.2.C. Conceptual Solutions and Alternatives for High Speed Boating

A. Maintain the State Department of Transportation October 24, 1990 Ocean Recreation Management Area amendments.

Perpetuation of the October 24, 1991, ORMA amendments would not resolve the problems and conflicts noted in Section 4.9.2.A.

B. Improve speedboating and water skiing conditions.

Using common courtesy and common sense, and adhering to the established "rules of the road" were advocated rather than a proliferation of new signs, zones, regulations, and restricted areas within the Bay. Registration and educational requirements for boaters should accomplish these goals. As a minimum, a written test should be given and information pamphlet should be distributed along with all boat registration applications, with issuance of a license dependent on passing the test. The test and informational pamphlets should cover:

1. Rules of the road;
2. Good boating practices;
3. Good kayaking and canoeing practices;
4. Good water skiing practices;
5. Good fishing practices and fishing rules;
6. Effects of boats and wakes on other users and boaters; and
7. Special restrictions in Kane'ohe Bay.

This program should be supplemented with more comprehensive licensing procedures for boat operators or completion of an accredited course on seamanship and small boat handling as offered by the U.S. Power Squadron or the Coast Guard Auxiliary. This alternative would be difficult and expensive to implement, as it requires modification to a statewide program.

Speed Limits: Existing "slow-no wake" rules apply to all vessels within 200 feet of any shoreline, float, dock, launching ramp, congested beach, swimmer, diving flag, or anchored, moored, or drifting vessel. Given the tendency of swimmers and anglers to frequent the central shallow waters of the Bay, existing slow-no wake restrictions should be extended to apply within 200 feet of the central reef shallows, defined as waters five feet or less in depth at Mean Lower Low Water.

To provide control over excessive speeding in the most congested areas of the central Bay, a 25 knot speed limit should be enacted within the triangular area, seaward of the three points shown on Map 6 and demarcated:

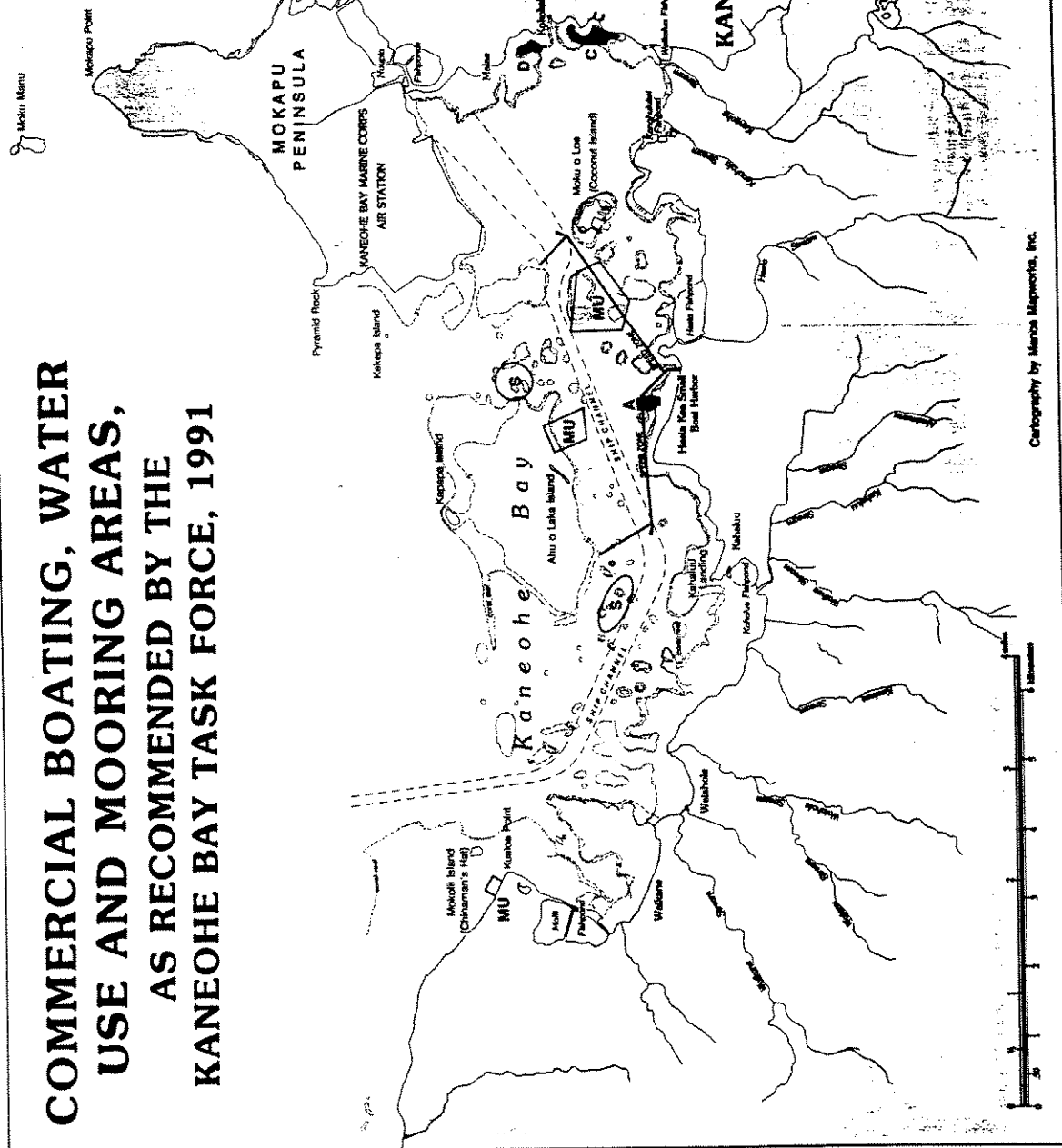
- red nun buoy N-20 at the northeast corner of Coconut Island (Moku O Loe);
- red pole marker on the patch reef at Kahalu'u and opposite channel buoy C-11; and
- He'eia Kea Harbor.

This area encompasses the confluence of the main Ship Channel, the inner portion of the Sampan Channel, and routes of access between the central Bay shoreline and the sand flat. Slow-no wake speeds would also remain in effect within 200 feet of the central reef shallows within this area, also shown on Map 6. The existing zone "H" within the Bay designated by the State Boating Branch should also be replaced with other slow-no wake zones established in the shallow areas.

Other Restrictions: He'eia Kea Harbor should not be enlarged to reduce boating congestion and conflicts at the sand flat. The capacity of Bay to absorb boating traffic is limited due to limited navigable water areas, rough and often dangerous outside seas, and relatively few destinations. On weekends and holidays, the Bay's carrying capacity is often reached especially for the larger, faster boats. Planning future launching ramps for small, low powered vessels at other locations to should minimize congestion at He'eia Kea and to enable more people to safely use the Bay.

COMMERCIAL BOATING, WATER USE AND MOORING AREAS, AS RECOMMENDED BY THE KANEHOE BAY TASK FORCE, 1991

- 25 Knot/our Speed Limit Boundary
- Ship Channel
- Channel Markers (not complete)
- A ● Mooring Areas A, C, and D
- S S Stockpiling Areas (proposed)
- MU Multiple Use Areas (proposed)
- 5' Depth Contour



All lines and boundaries are approximate.

Cartography by Marine Magnetics, Inc.

According to Federal law, operation of any recreational watercraft by any person with a blood alcohol level of 0.10 per cent or greater is prohibited (see 33 Code of Federal Regulations, Subchapter F, Part 95). A first offense of a violation should be required education; subsequent offenses should be fines or other sanctions.

Conceptual Solutions for Non-commercial Thrillcraft: Two alternatives were considered: a total ban on recreational thrillcraft in Kane'ohe Bay and relocating the presently designated zone for recreational thrillcraft to another area in Kane'ohe Bay. The following alternative areas were investigated:

- South Bay - this area is offshore from the KMCAS buffer zone and nearby residential communities and is presently used by many recreational sailing groups and has no nearby public access. Military training is also conducted here, and this is a long-standing *nehu* fishing area.
- North Bay - this is a rural area and community which favors fishing and other low impact activities which would be compromised should thrill craft use the area. There is only limited public access.
- East of Sampan Channel - this area is between the Ship Channel and the Crash Boat Channel. It is heavily fished and transited by slower vessels, which are not compatible with thrill craft.
- KMCAS buffer zone (Naval Defensive Seal and Air Accident Potential Zone I (APZ-I) - this area is within a federally restricted water area.
- East of He'eia State Park - this area is also being considered for a large boat mooring area (see Section 4.9.3), and is near a commercial operating area.
- Kahalu'u inshore area near the Hygienic Store - this area is an established *nehu* fishing grounds used by commercial fishermen. It has limited access and is presently an alternative access way for small boats and canoes.
- Offshore from King Intermediate School - this area is between the fringing reef and mud flats and patch reefs. Use of this area, which is close to shore, would disturb school activities, He'eia State Park activities, and nearby residents.

There was no alternative site with a clear lack of potential conflicts with other Bay users and residents. A total ban is the only acceptable option.

4.9.3. Mooring and Seaplane Issues

Seaplanes: Recreational seaplane activity was evaluated due to potential public safety and noise impacts. After further analysis, the Water Use Committee decided that further restrictions over seaplanes are unnecessary. Seaplanes rarely use Kane'ohe Bay, and their operation is adequately addressed by current Federal Aviation Administration regulations and State and Federal boating laws. As demonstrated in many other countries, seaplanes can operate safely close to other water users. The air-space over Kane'ohe Bay is controlled by KMCAS. Potential seaplane users in Kane'ohe Bay need to check with the KMCAS airfield control tower to avoid conflicts with military air activities.

4.9.3.A. Mooring Areas. As a protected refuge, Kane'ohe Bay provides the safest natural anchorage on windward O'ahu for larger vessels. Due to their size and deep keels, these vessels cannot be easily launched and retrieved from boat ramps and stored on shore. The great shortage of safe anchorages for boats in Hawaii has led to the increase of moored vessels in Kane'ohe Bay. Despite the clear need and feasibility for safe mooring areas, the existing State designated mooring areas in the Bay are inadequate and have caused a proliferation of individual boat moorings throughout the Bay which potentially encroach upon or displace other water uses. Clearly, the designation of adequate and appropriate boat mooring areas in Kane'ohe Bay would benefit both the boat owners and other Bay boaters and users.

4.9.3.B. Analysis of Mooring Issues. The Water Use Committee and the Task Force evaluated existing mooring activity in Kane'ohe Bay by consulting Boating Branch permit records and other regulatory documents. In addition, the Task Force obtained color aerial photography of Kane'ohe Bay, flown on May 20, 1991. From the photographs, the total number of moored boats (64) at the time of the photographs was estimated, and present mooring sites were delineated. The Task Force also endeavored to estimate the future demand for boat moorings and evaluated whether the sites should be sized to accommodate extra boats.

4.9.3.C. Conceptual Solutions for Moorings. Three alternatives were evaluated: adopt proposed State Boating Branch designated areas, establish additional mooring areas, and eliminate one or more of the existing designated areas. The Task Force also evaluated shoreside moorings and reviewed existing permit and pollution control regulations associated with moorings.

At present, the State has proposed two sites by letters, "A" and "B", in central Kane'ohe Bay, near Ke Alohi Point. The Task Force evaluated two other new mooring areas, "C" and "D", as shown on Map 6. Proposed mooring area "C" is in the southern Bay near Mikiola. Proposed mooring area "D" is also in the southern Bay across the mouth of the inlet north of the Kane'ohe Yacht Club.

4.9.4. Fishing, Diving, and Picnicking Issues.

4.9.4.A. Problems.

Decline in Catches and Catch Rates: Kane'ohe Bay supports diverse fishery resources and is a popular area for commercial, baitfish (including *nehu*), subsistence, and recreational fisheries (see Maps 7A and 7B). There has been an apparent decline in catches and catch rates of many fishes, crustaceans, and algal species within Kane'ohe Bay. The exact causes of this decline are unknown, but probably include overfishing, pollution, increased boat traffic, and the long term effects of dredging. Specifically, there is concern about the impacts of net fishing, and of netting and spearfishing in conjunction with SCUBA diving. A drastic decline in the populations of several important fish species coincided with expanded use of gill nets in Kane'ohe Bay, and with the recent deterioration of water quality (see Figures 1-8).

Conflict with Commercial Tour Groups: There is a possible conflict arising from commercial tour groups operating in areas traditionally used for fishing. Some of the areas within the central Bay currently designated for commercial tour use are important fishing grounds. Continuous daily commercial tour use makes access to fishing difficult and may be negatively impacting fish stocks. As a consequence, the fishing grounds near the sand flat are now more frequently fished at night.

Impact on Kapapa Island: There is concern about the negative impact of picnickers, including particularly disturbance of birds, improperly disposed of trash and human excrement, effects on birds and inshore fishery resources, and other marine life at Kapapa Island. Pet dogs brought to the island by boaters roam free and harass bird populations.

Inadequate Enforcement of Fishing Regulations: Inadequate enforcement of existing regulations, particularly as they apply to fishing, contributes to all three issues. At present, enforcement officers are inconspicuous to many Bay users, and infractions of fishing, tour operations, and picnicking rules occur constantly. A visible enforcement presence in the area would encourage people to comply with rules. Consolidation of enforcement jurisdiction from several state agencies (DOT, PSD, DLNR) may also be needed. More could be accomplished by having conservation enforcement and public boating safety officers spend some time informing the public of the regulations, making their rounds, and issuing warnings if necessary. If noncompliance continues, citations should be issued.

Figure 1

REPORTED COMMERCIAL LANDINGS: AHOLEHOLE
KANEHOHE AREA 1948-1988

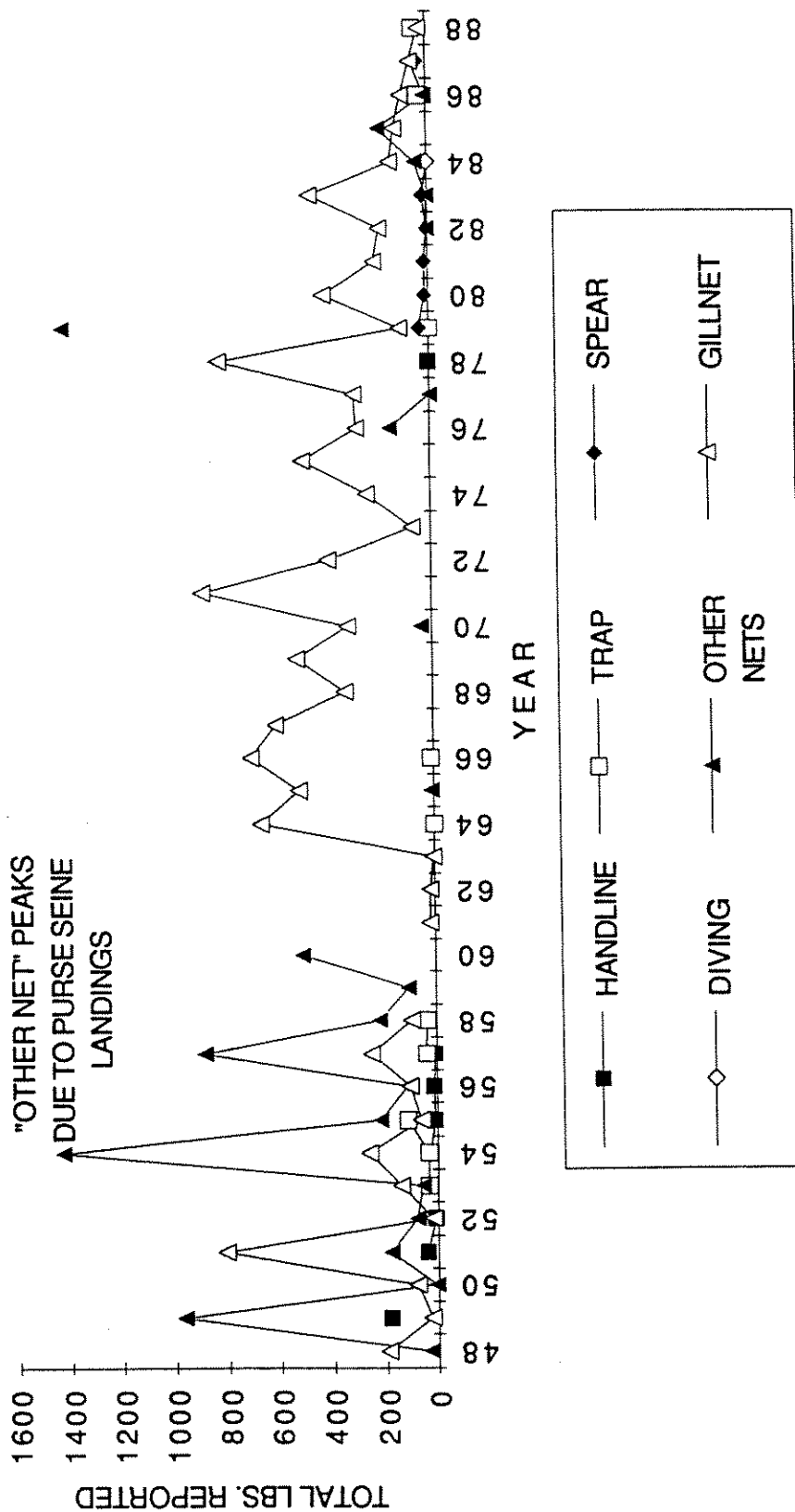


Figure 2

REPORTED COMMERCIAL LANDINGS: AMAAMA
KANEHOHE AREA 1948-1988

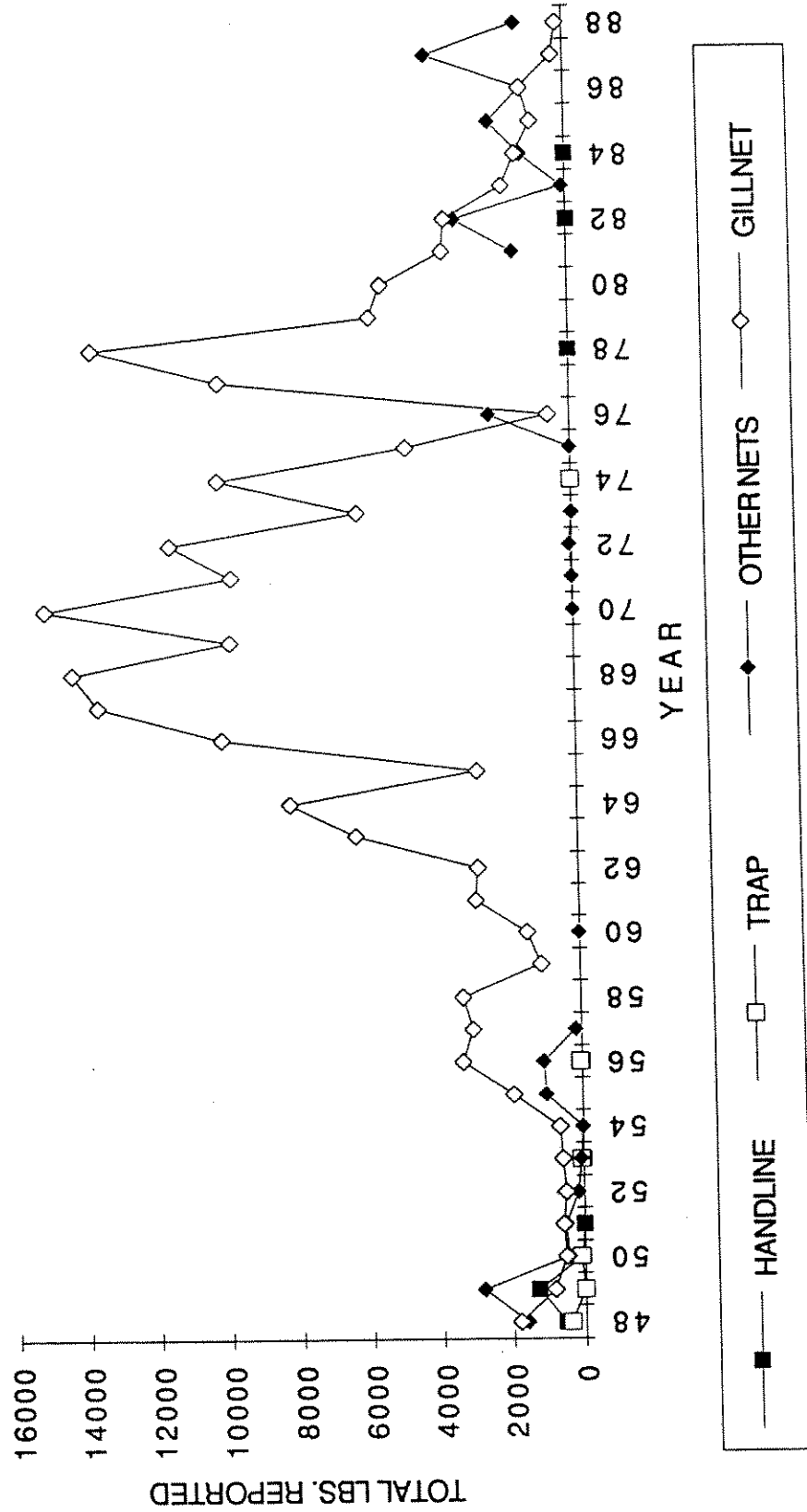


Figure 3

REPORTED COMMERCIAL LANDINGS: AWAAWA
KANEIOHE AREA 1948-1988

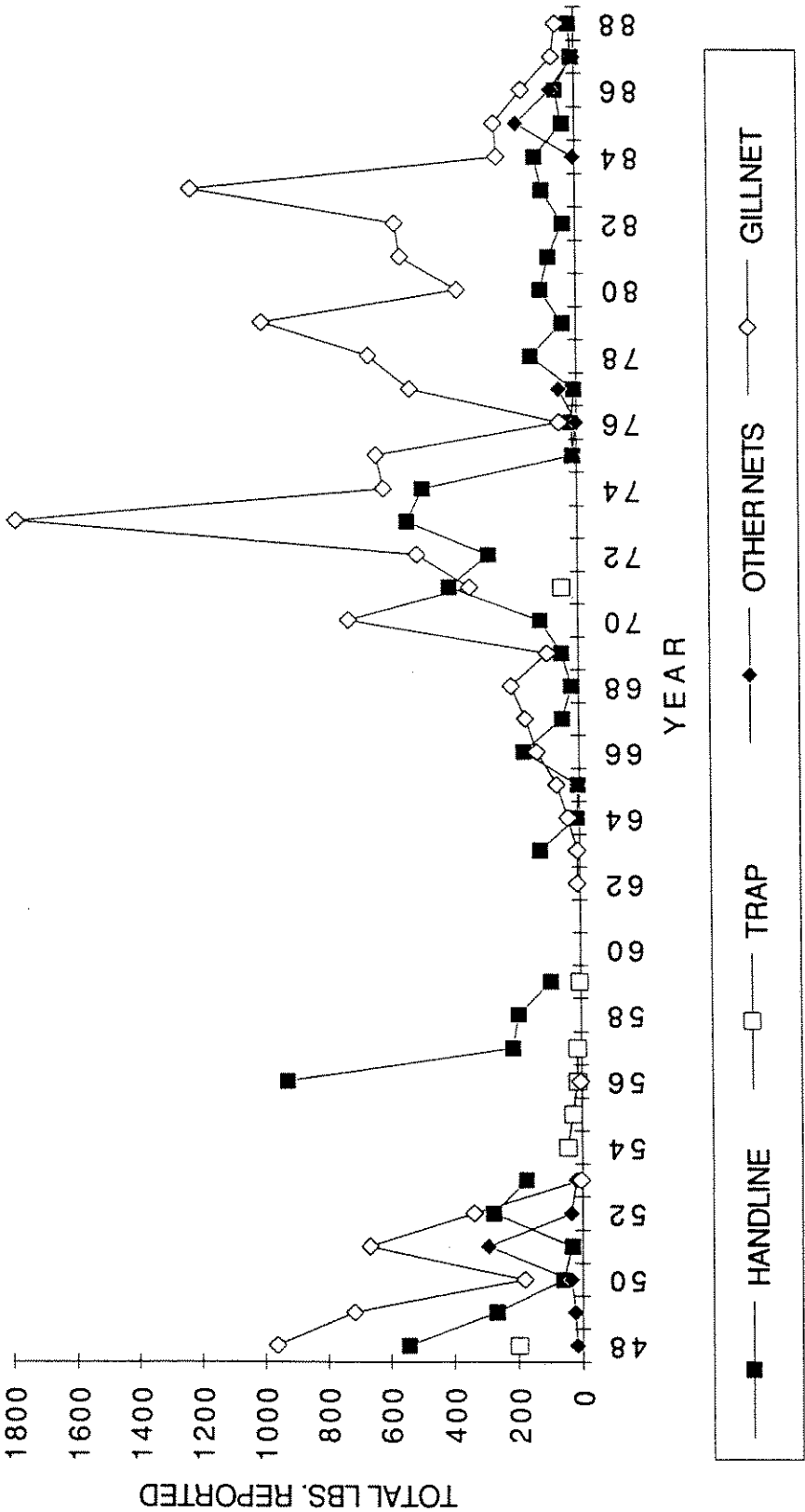


Figure 4

REPORTED COMMERCIAL LANDINGS: OAMAWEKE
KANEHOE AREA 1948-1988

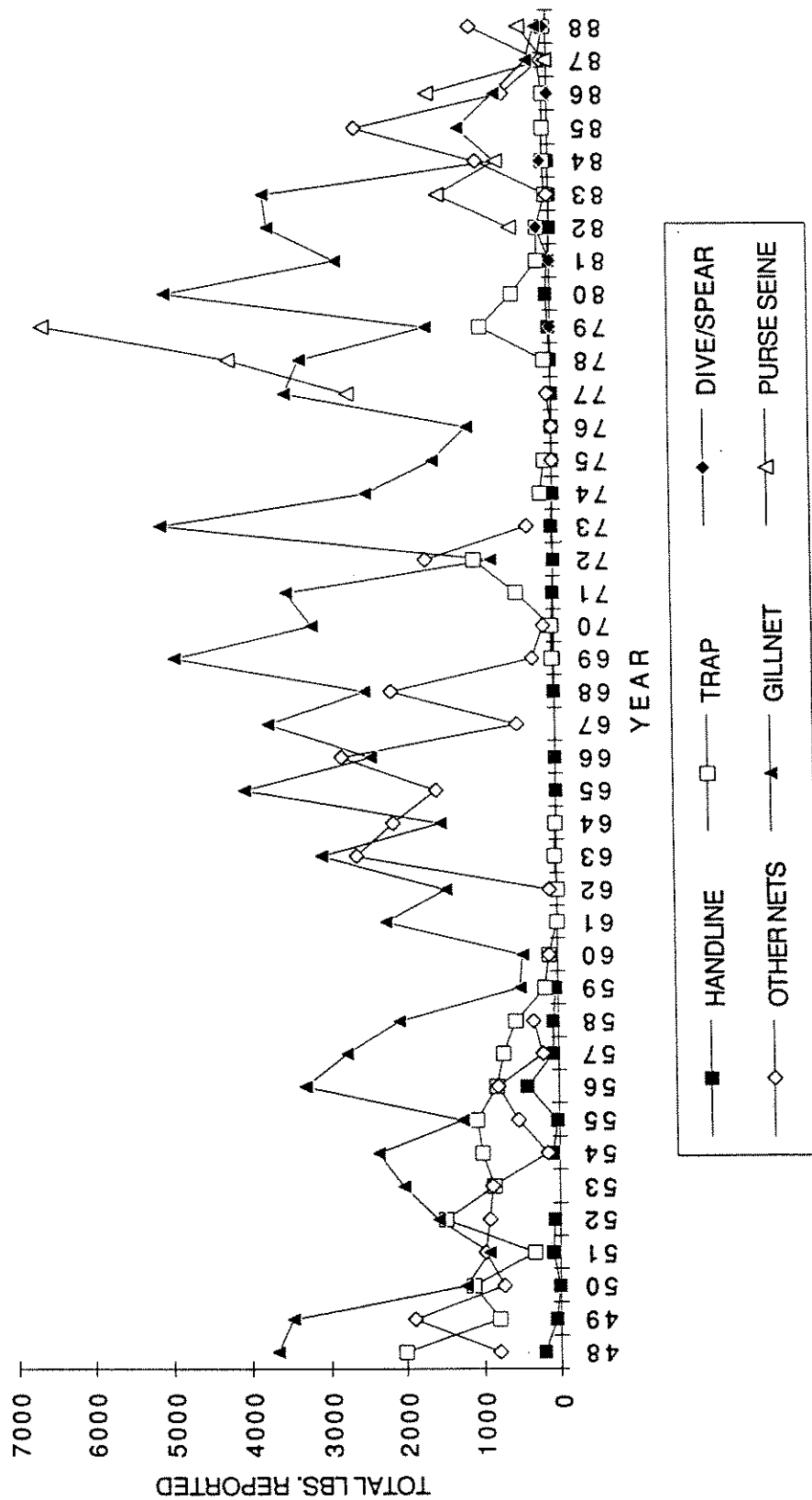


Figure 5

REPORTED COMMERCIAL LANDINGS: MOI
KANEHOE AREA 1948-1988

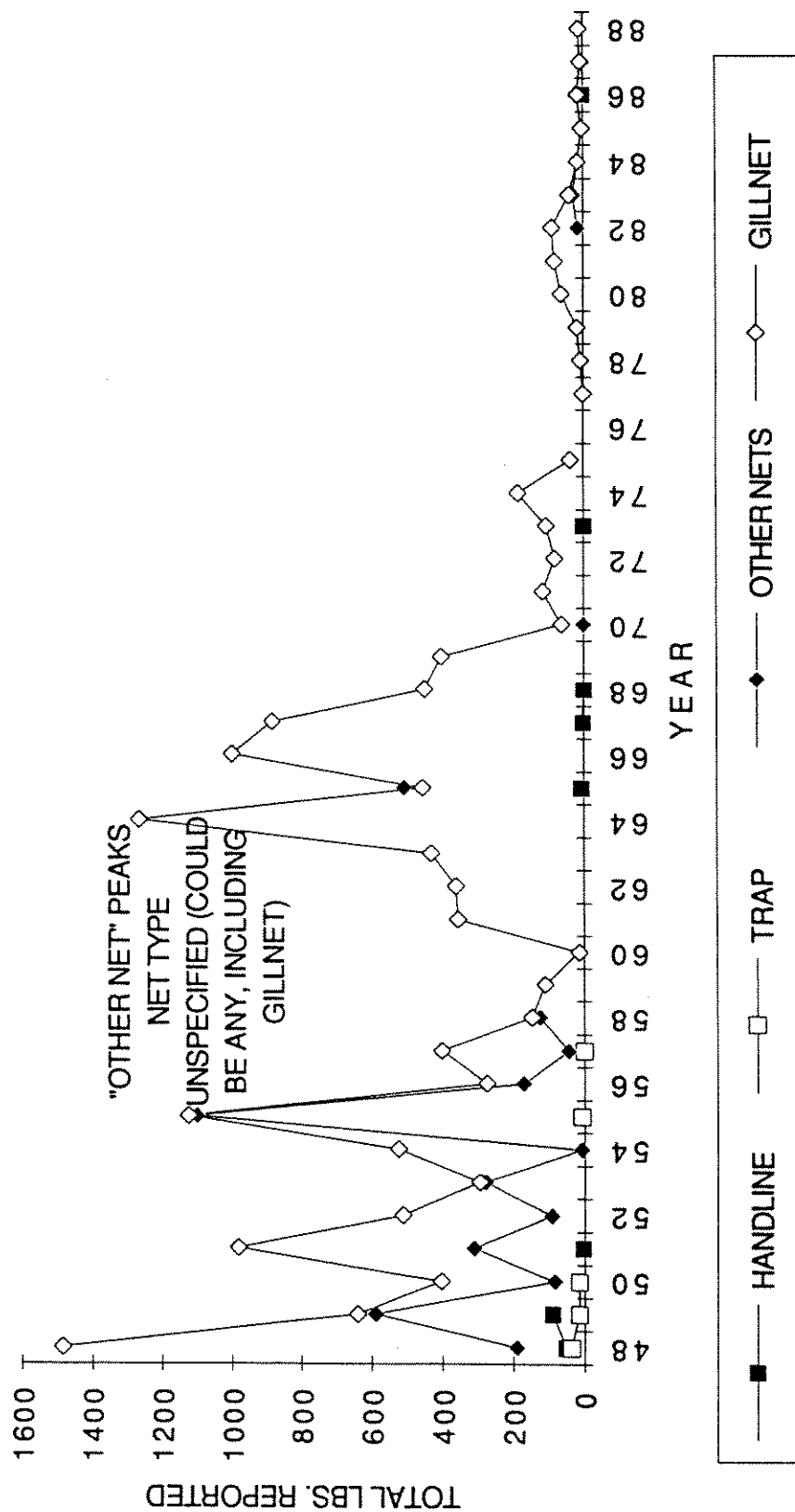


Figure 6

REPORTED COMMERCIAL LANDINGS:JULUA/PAPIO
KANEOHE AREA 1948-1988

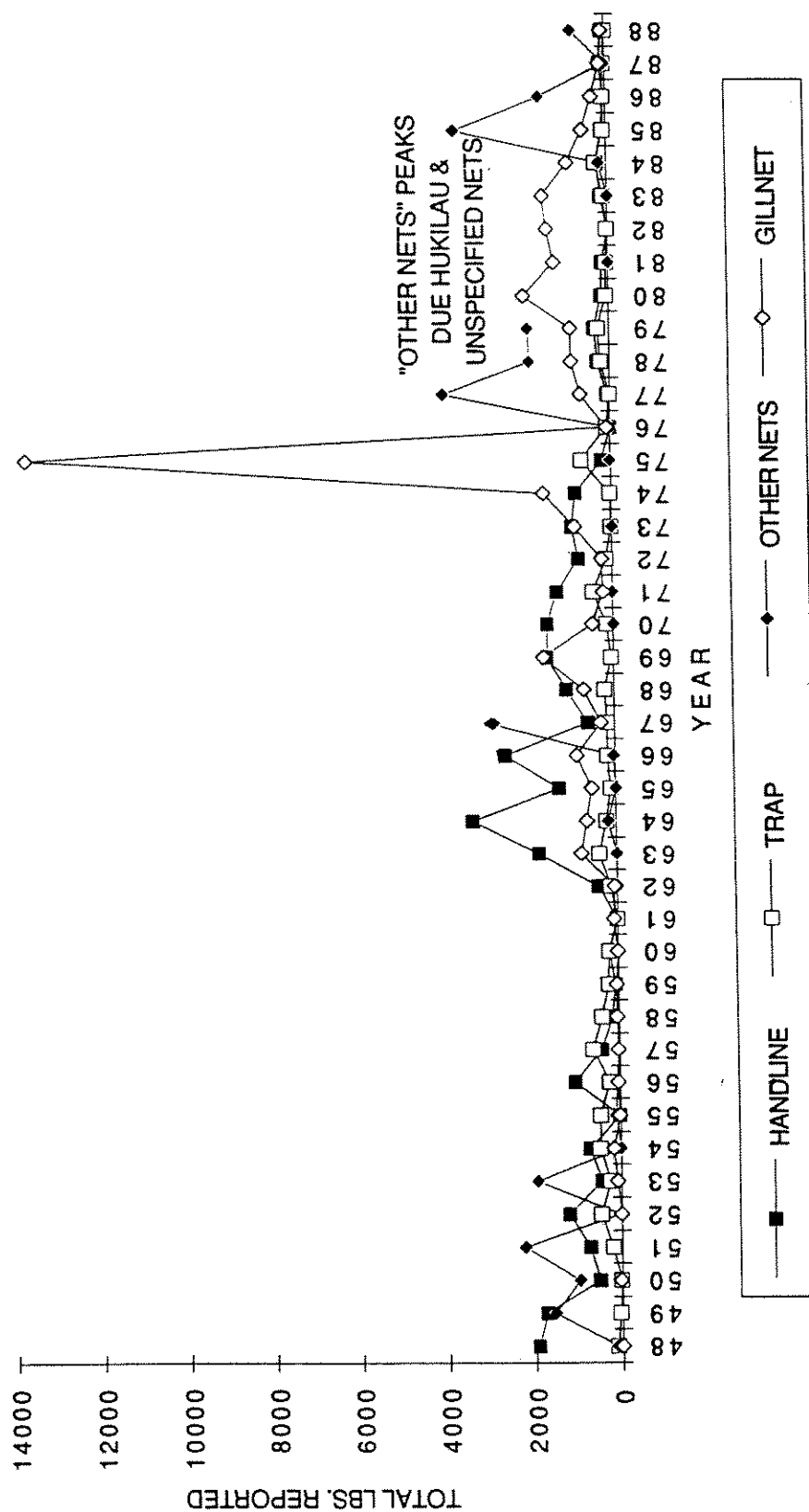


Figure 7

REPORTED COMMERCIAL LANDINGS: UHU
KANEIOHE AREA 1948-1988

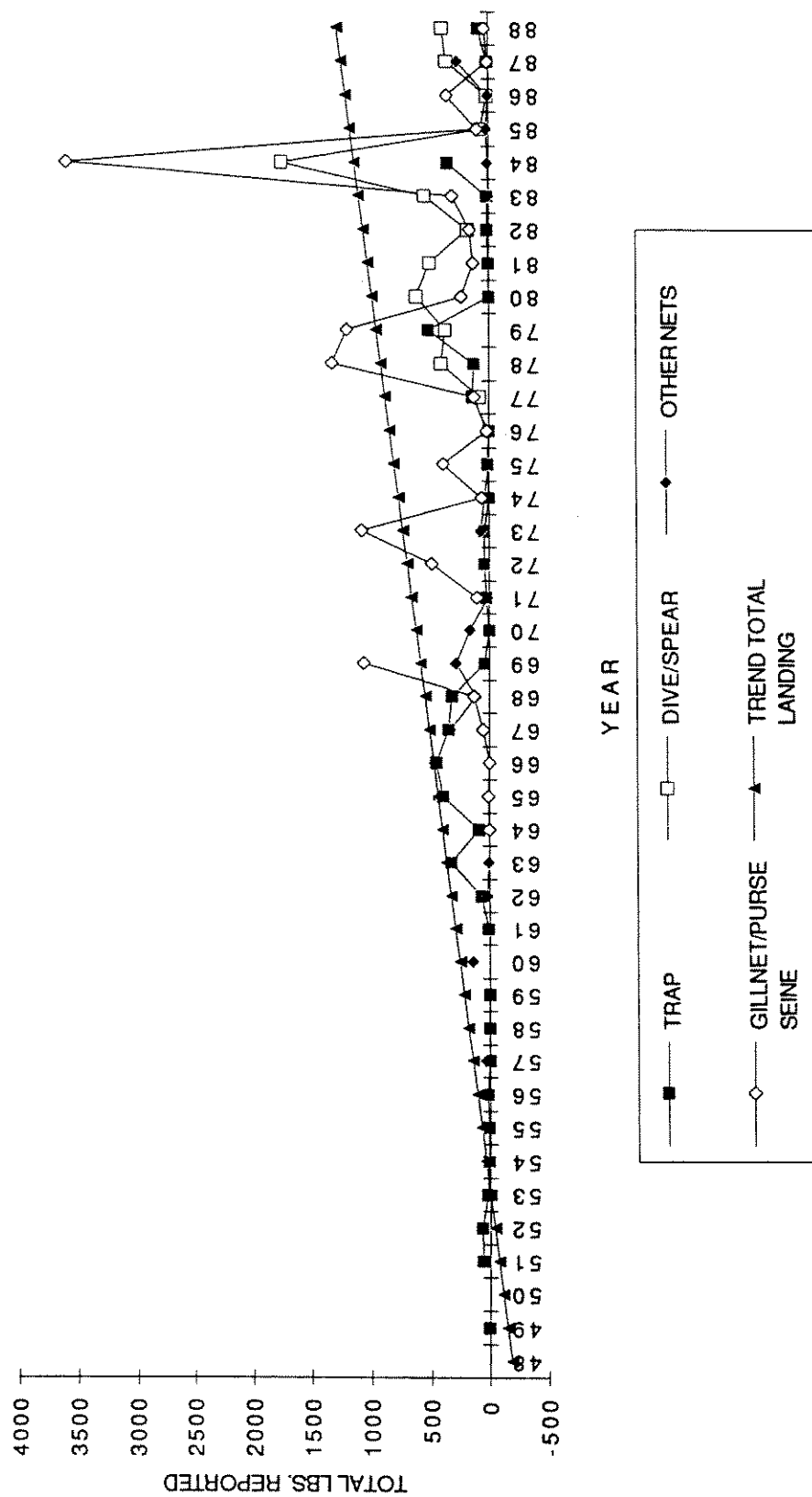
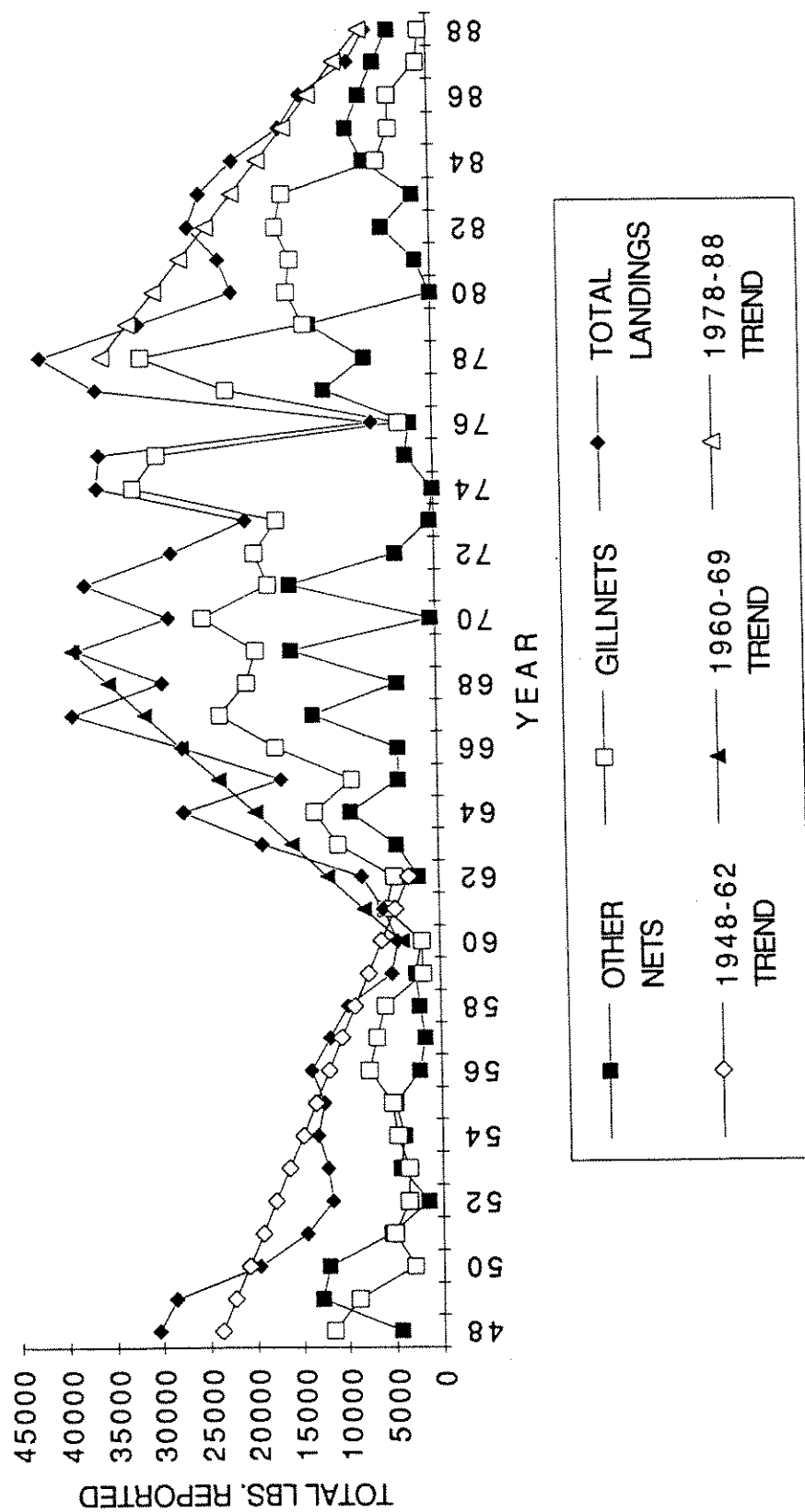


Figure 8

REPORTED COMM. LANDINGS: TARGET FISHES
KANEHOHE AREA 1948-1988



4.9.4.B. Analysis

Causes of Declining Catches: Potential factors in the decline in commercial catch-per-unit effort and total catch include: (1) overfishing, (2) changes in fishing methods, species preferences, and gears, (3) changes in spawning and migration patterns, (4) environmental factors (pollution involving compounds known to adversely affect rates of reproduction in various species, e.g., runoff), (5) disturbance due to increased boating activity including both non-commercial and commercial recreation, and (6) illegal or destructive fishing activities.

Trends in commercial catch data, the opinions of researchers, some fishermen, and other users suggest that the Bay is over fished. Other fishermen, however, believe fish abundance is not declining. Fish, *limu*, and other species are becoming increasingly scarce, and Bay resources are being reduced to very low levels. The decline of *limu* and other algae may have a direct relationship with removal of sewage and associated nutrients upon which some species thrive. There is general agreement that existing regulations are underenforced. Implementing interim measures to protect the Bay's fisheries and restore them to the extent possible is important.

Although data regarding fishing efforts are not as detailed as would be desirable (see Figures 1-8), the number of trips reported and catch-per-unit effort (CPUE) estimates indicate that the increase in landings during the 1960's may have been due to a change in fishing methods from handlines to nets and air spotters, while the decline since 1978 is attributable to a decline in both CPUE and the number of fishing trips. The decline in CPUE indicates a decline in abundance (or catchability) of the fishes of the Bay, while the reduction in number of trips may be a voluntary reduction in effort by fishers as fishing becomes less successful.

Anglers and researchers recognize shortcomings in the available data, due to underreporting by commercial fishers and because recreational landings are not included in the database. Recreational fishermen are neither licensed nor required to report their catch. Creel census estimating accurate recreational fish landings is needed.

Gill netting was shown to be responsible for up to five to ten times more of the commercial catch than other fishing gear, although surround netting was shown to account for more of the catch periodically. Although gill net fishing was discussed, the prevailing opinion was that no single gear type was solely responsible for the decline. Regulation and research should encompass a broader definition of netting, including surround nets.

Several studies are in progress to determine the impacts of fishing and environmental change on Kane'ohe Bay. Information obtained thus far indicates that some of the most important environmental concerns are:

- Urbanization of the watershed has increased the runoff of toxic substances into the Bay; for example, Kane'ohe and Kawa estuaries contain some of the highest concentrations of chlorinated pesticides reported in the United States. These compounds curtail reproduction in many species, although species harvested in Kane'ohe Bay were not tested. Sustained fishing in the face of less reproduction contributes to the fishery decline;
- Channelization of streams and destruction of forest and natural vegetation have increased runoff rates and sedimentation, while alteration of streams and estuaries has eliminated invertebrates at the base of the food chain; and
- There is strong evidence that the presence of the sewage outfall in the Bay pushed the natural balance from a coral-lined Bay towards a community dominated by bubble algae. While there has been an improvement since the major sewage discharges in the southern Bay were diverted outside the Bay, some sewage discharges still occur and recent studies suggest that bubble algae is increasing again. However, some fisheries flourished throughout the period of high sewage outfall, and there is no clear evidence that sewage pollution significantly reduced the abundance of fisheries resources (see Figures 1-8).

The final answers to these questions and their implications for management will require more detailed analyses. This evaluation is, in part, being made through a cooperative statewide project, DLNR's Main Hawaiian Islands Marine Resources Investigation (MHI-MRI). Kane'ohe Bay is one of MHI-MRI's target locations for assessment of fisheries (including recreational catch), and environmental impacts and restoration of resource abundance. Ongoing research includes: fieldwork to obtain more complete landings data, stock assessment research to evaluate how many fish of each species are presently left in the Bay, and an assessment of the impacts of pollution and other environmental changes on Bay fauna. The last will require applied research at HIMB to be supported by new funding.

The Task Force recommendations concerning public open space and access and water quality address some of the land-based environmental concerns.

Conflict with Commercial Tour Groups: From the angler's point of view, conflict between fishing and commercial tour activities arises when a sandbar or reef is occupied by a large number of people and becomes unsuitable for fishing. Historically, the sandbar area has been a particularly important fishing area. Fish and other species can be alarmed by people splashing around in the water or on the surface, especially if this activity involves jet skis. Outboard motors are equally disturbing, as is the shadow on the water of watercraft including kayaks, sailboats, skiers, etc. Anglers operate by these basic concepts sometimes using the light, shadow, movement, and sound to trick the fish into a net or trap.

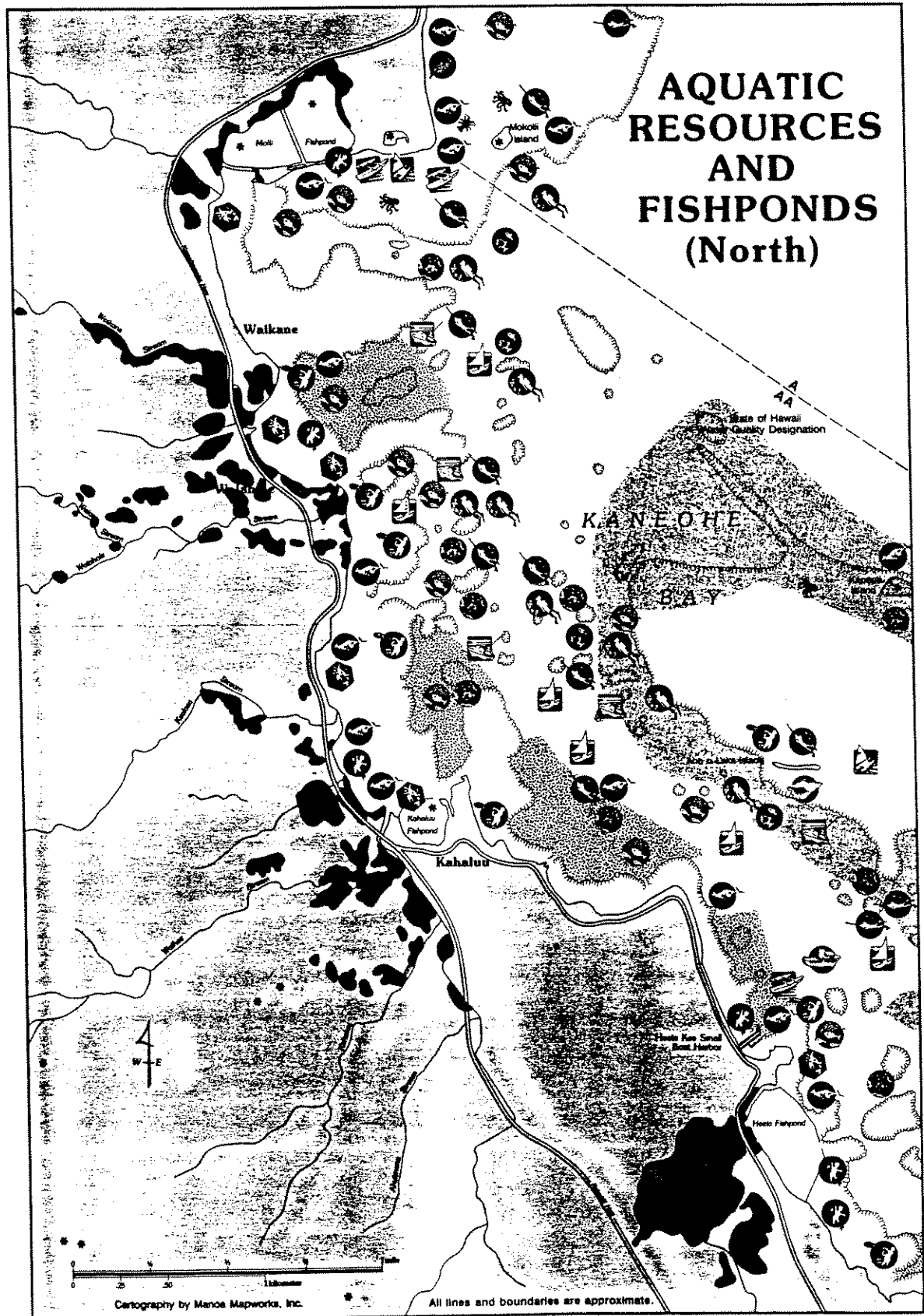
Anglers claim to be avoiding areas of Kane'ohe Bay occupied by tour groups because they do not catch anything in those locations. This is one reason why they fish increasingly at night. Some fishing methods cannot be safely employed where there are a lot of people in the water. This limits the amount of fishing and tour activity that can take place in the Bay at the same time.

An attempt was made to map the locations of the fishing grounds in the Bay (see Maps 7A and 7B), so that areas overlapping with tour locations could be identified, but essentially all of the Bay can be fished by those who know how to find the fish. The fishing community has lost access to former fishing areas now used by tours. Therefore, the fishing community felt that it was necessary to limit tour activity and to ban jet skis. This matter is addressed in the Commercial Recreation and the Thrillcraft and High Speed Boating Sections of this report.

Impact on Kapapa Island: Kapapa Island supports a small colony of nesting seabirds, a few snails, and a limited amount of vegetation including a rare species. Although offshore islands are generally set aside for marine birds, Kapapa has not been designated a bird sanctuary; the only rule that applies states that seabirds cannot be harassed. Wedgetailed shearwaters nest in burrows and are particularly susceptible to harassment.

About 75 people use Kapapa Island throughout the year. There are five campsites, and generally, if these are full, any new arrivals will not stay overnight. There is often no one on the island. The island is traditionally used by fishermen as a layover point, particularly night fishers. It is only accessible by boat, and even then, only to people who know the area well, which helps prevent overcrowding on the island. Although people generally clean up after their use, a few do not. The area is maintained through cooperation and thoughtfulness, and most people would like to keep it that way. Since there are no toilet facilities, some parts of the island have residues of toilet paper and human excrement. Another problem is that people sometimes bring their dogs who chase and kill ground nesting birds, which is illegal and harmful for the birds.

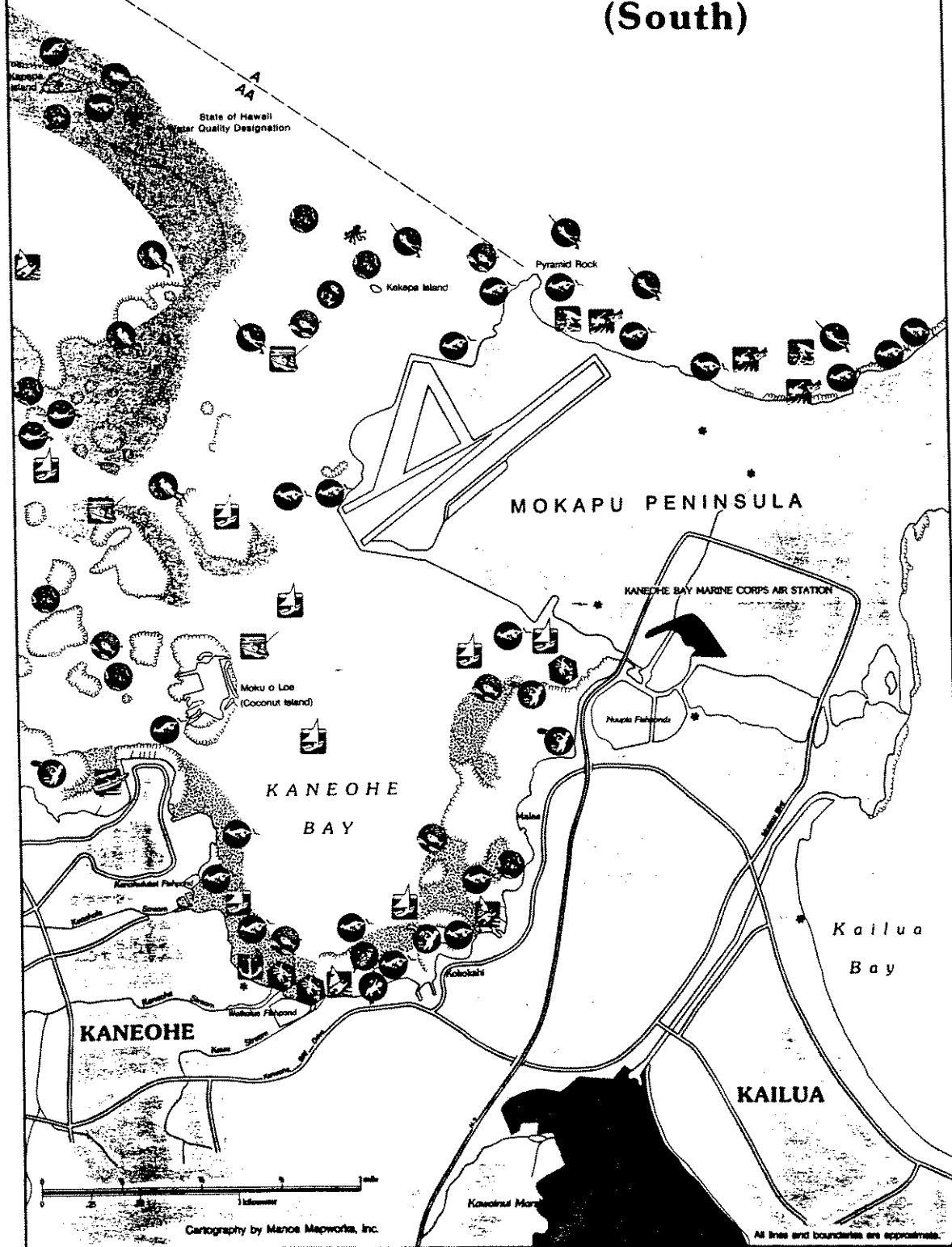
AQUATIC RESOURCES AND FISHPONDS (North)



KEY TO SYMBOLS

	Anchorage
	Aquarium Fish Collecting
	Aquatic Recreation
	Body Surfing
	Board Surfing
	Crabbing
	Canoe Paddling
	Excursion Boating
	Gillnetting
	Lobster
	Octopus (He'e)
	Pole and Line Fishing
	Sailing
	Shell Collecting
	Sport Diving
	Shark
	Spear Fishing
	Seaweed (Limu)
	Trapping
	Trot-Bottom Fishing
	Torch Fishing
	Thrownetting
	Fishing Grounds / Hawaiian Anchovy Areas (Nehu)
	State of Hawaii Water Quality Designation
	Rare Species
	Wetland Areas

AQUATIC RESOURCES AND FISHPONDS (South)



4.9.4.C. Conceptual Solutions. The Task Force sought to reach a compromise with the need to allow recovery of the resource, the option of restocking fish in the Bay, and the desire to not limit fishing access beyond what is needed for commercial and subsistence for food and recreation. The Task Force evaluated whether gill netting issues should be addressed later by a separate body, a proposed Kane'ohe Bay Fishery Advisory Panel, or through changes in fishing regulations and enforcement. Many good fishing regulations exist and should be adequately monitored and enforced before the need for further restrictions can be evaluated. Restocking alone cannot solve low fish abundance if fisheries regulations and enforcement do not limit the amount of fish taken while the Bay is recovering. Ultimately, limitations on size and number of fish taken may be necessary for the species being replenished.

Kapapa Island: This area is somewhat self-policing, but sometimes this is not sufficient. Island users would like better cooperation among other users, but do not want the area overrun with tourists or enforcement officers. They would prefer a local, non-governmental solution.

4.9.5. Fishpond Restoration and Stock Enhancement. Hawaiian fishponds represent a rich, cultural heritage of incomparable spiritual and social value. Hawaiian fishponds are on the verge of extinction. They must be preserved as cultural resources, historic sites, and marine buffer zones and for their potential economic and ecological benefits. Many former fishponds have been filled and degraded, due to the improper understanding of natural systems and their role in the coastal zone. Traditional Hawaiian culture provided a means to maintain a balance between harvesting and protecting coastal resources. In addition to restoring a part of Hawaiian tradition, fishponds could provide an important means of restoring some fish populations of Kane'ohe Bay to former levels of abundance.

The most unique of the fishery resources in Hawaii are the fishponds along the shore. They are distinctly Hawaiian structures not found elsewhere in the Pacific. Built entirely by hand, construction required a huge labor force to carry rocks to the site and fit them together without the aid of mortar or clay. The engineering was remarkable and their legacy lives on into modern day.

4.9.5.A. Fishpond Degradation. After the "Great *Mahele*" in 1848, fishponds were classified as land became available for private ownership. Agricultural development was among the first factors responsible for their degradation (Devaney *et al.*, 1982, Chapter 2). The ponds in Kane'ohe Bay were also disturbed in the 1930's when the Navy dredged portions of the Bay and dumped material into coastal fishponds. Further filling of fishponds for housing development took place during the 1940's.

Urbanization of the area began in the 1960's, bringing further erosion and pollution to the region. A major problem has been the deposition of silt from urbanized areas. Toxic organic chemicals and heavy metals can bind to silt and can contaminate the ponds. This may prevent the consumption of fish raised in such ponds particularly in the southern end of the Bay. Measurements from Nu'upia ponds indicate that polycyclic aromatic hydrocarbons and lead are among the toxics; these are derived primarily from fossil fuels and lubricating oil. Levels of contamination in fish and sediments will have to be evaluated before extensive development for aquaculture.

4.9.5.B. Fishpond Analysis. The fishponds are a testimonial to the Hawaiians' ability to manage land and water resources. *Kuapa*-style, or walled, shoreline ponds have a freshwater intake from mountain streams and saltwater intake from the ocean, creating a brackish water environment. Nutrients from upland taro patches were carried into fishponds through the *'auwai* system. These nutrients promoted algal growth that in turn fed the herbivorous fish raised in the ponds. Some ponds, like He'eia Fishpond, are sophisticated in design and function. Nurseries, sluice gates, and double-walled construction are some of the unique characteristics in He'eia pond. Each pond has its own distinctive features.

Of the approximate 300 original *kuapa* ponds in Hawaii, only 90 remain. In a 1901 survey, Cobb estimated a per annum fish production ratio of 2,000 pounds per acre of fishpond: an annual yield of 1,360,000 pounds per year in the Kane'ohe Bay area alone, based on a total of 680 acres of fishponds. Additionally, the high nutrition level and the safe nurseries contributed to the great abundance of fish in the Bay itself,

Of the more than 30 fishponds that once existed in the Kane'ohe Bay area, five fishponds are still intact within the Bay, and eight others on Mokapu Peninsula (see Maps 7A and 7B):

Within the Bay

He'eia
Kanhuluiwi
Kahouna (Kahalu'u)
Moli'i
Waikalua

Mokapu Peninsula

Nu'upia Ponds (4)
Halekou
Kaluapuhi
Heleloa
Pa'akai

Of these, only three are in operation: Kahouna, He'eia, and Moli'i. He'eia is under restoration. The Mokapu ponds have been altered by military fill activities and roadway construction. They are within KMCAS, eligible for listing on the National Register of Historic Places and designated habitat to protect endangered species of Hawaiian birds under a joint management agreement with State DLNR and FWS. Nu'upia is the principal O'ahu nesting site for Hawaiian stilt, especially the eastern fishponds. As such, the KMCAS fishponds are not currently available for aquaculture. The KMCAS fishponds are also Hawaiian ceded land.

Federal, state, and local jurisdictions all overlap in the land use regulations of coastal ponds. At the federal level, the U.S. Army Corps of Engineers (USCOE) administers permits for activities in fishponds involving construction of piers, pilings, docks, ramps, floats, and moorings; the laying of pipes or cables underwater; dredging and filling; and construction of riprap, revetments, groins, breakwaters, levees, and other structures. USCOE jurisdiction extends to the mean high water mark in fishponds and to non-tidal water areas that are wetlands. The standards or procedures of several other federal environmental laws must be satisfied as part of the USCOE permit process.

At the state level, all five fishponds along the shoreline of Kane'ohe Bay addressed in this report are classified "AA" by the Department of Health Water Quality Standards (see Section 3.4). They are also subject to the Conservation District Use regulations, guidance in the State Plan, the regulations of the Hawaii Coastal Zone Management Program, and the Special Management Area regulations. The City and County's three-tiered planning and zoning ordinances also apply to fishponds.

4.9.5.C. Conceptual Solutions for Fishponds. Protecting all remaining recognizable Hawaiian fishponds is essential. However, protection must be carefully defined. The protection measures will vary from pond to pond. Each case should be carefully reviewed and specific recommendations developed. Some ponds may be suitable for aquaculture again. Those unsuitable for aquaculture should serve as wildlife refuges and cultural and historic sites, and provide educational opportunities. All ponds may have economic value for educational tourism.

Options for fishponds usage should include: (1) research to evaluate the safety of fish consumption by humans and the feasibility of stock enhancement to restore fish populations; (2) stock enhancement experiments in conjunction with pilot restocking efforts; (3) restoration of ponds for food production; (4) encouragement of community involvement and cooperation in the restoration; (5) development of educational programs associated with each fishpond, both for the general public and through the public school system; (6) limited educational tourism to supplement revenues for pond maintenance and promote a better understanding of the Hawaiian heritage among visitors; and (7) wildlife habitat.

Creation of a new Conservation District subzone (F=Fishpond) for all existing fishponds in Kane'ohe Bay should encourage the development of regulations specific to preservation and use of the fishponds. Desirable features of this subzone should include a reasonable buffer around a pond and allow operators to develop storage areas and other multiple uses in and around the fishpond to enhance economic feasibility relating to raising fish and baitfish and educational and cultural uses.

Proposals for mass culture of important food fishes such as mullet (*ama'ama*), threadfin (*mo'i*), milkfish (*awa*), goatfish (*kumu*), and lobster include: providing stock enhancement (both research and applied) and supplying nursery stock to Hawaiian fishponds around Kane'ohe Bay, providing fry for periodic release to selected portions of the Bay, donating fry to local fishponds, marketing fry to skipjack (*aku*) fishermen for bait, providing an opportunity for some recovery of anchovy (*nehu*) populations in the Bay, and researching artificial spawning of important food fish.

Recognizing the importance of the fishponds to traditional Hawaiian culture means respecting their traditional value. Restoration efforts must be approached carefully to ensure sensitive areas of unique cultural or religious significance are not disturbed. Restoration should be closely coordinated with the Office of Hawaiian Affairs, which has formed a fishpond *hui*, DLNR's Aquaculture Development Program and Historic Preservation Division, the Department of Health, fishpond owners, and fishpond managers.

Other Stock Enhancement: Other stock enhancement efforts, promoted by local institutions and community members, are proposed in Kane'ohe Bay using aquaculture ponds which are not former Hawaiian fishponds. There are twelve such ponds at the Mariculture Research Training Center in northern Kane'ohe Bay and five more at Coconut Island in the central Bay.

4.10. WATER USE RECOMMENDATIONS

4.10.1. Mediated Plan for Management of Commercial Recreation. The entire mediated plan for commercial water recreation is presented. It is modified slightly for clarification in response to public comments.

General

A. Criteria: The following plan was derived during mediated sessions in which commercial, community and State agency representatives developed limits on commercial recreational use of the Bay to meet the following criteria:

1. Reduce conflict;
2. Retain rural character of Kane'ohe Bay;
3. Safety;
4. Protect reefs and submerged lands;
5. Preserve the public interest;
6. Consistency with AA class waters; and
7. Provide a fair opportunity for commercial recreation: consistent with the other criteria.

B. Management Concepts:

1. Limit number of permits of each type of operation;
2. Limit capacity of each permit by number of customers, by number and capacity of vessels, and by amount and type of equipment;
3. Specify area of the Bay in which each operation is allowed; and
4. Establish community protection provisions in the commercial operations and in the permit renewal process.

Number of Permits

A. Full Service Recreational Permits

1. Commercial jet skis and high speed activities are incompatible with AA class waters. However, as several operators are already in business in Kane'ohe Bay and have made substantial investments, those operators' use of jet skis and high speed towing will be grandfathered until their businesses are sold or terminated through attrition. Owners or shareholders of record of permits which allow the use of jet skis and high speed towing as of the effective date of the rules implementing these provisions may transfer any interest in the business for up to one year following the effective date of the implementation of the same rules. Afterwards, any transfer or combination of transfers of a majority interest or greater by the owners or shareholders of full service recreational permits designated of record on the effective date of the rules implementing these provisions, shall automatically void the use of jet skis and high speed towing activities, reverting the permit to a snorkel tour. The purpose of this constraint is to bring commercial use within Kane'ohe Bay into compliance with the protected uses of AA waters without imposing undue financial hardship on existing businesses.
2. There shall be four full service permits allowed in AA waters within Kane'ohe Bay consisting of those existing operations of record with legal commercial boat loading access to Bay waters through public pier loading permits, or appropriately zoned private land grandfathered until the businesses are sold or terminated, as discussed above.
3. Permittees shall be allowed to load to full permit capacity of the primary vessel at the pier daily; no shuttling shall be allowed to exceed permit or vessel capacity. There shall be no full service permits allowed to businesses/persons without pier loading permits, or from private lands where such use does not conform with land use laws.
4. Full service ocean recreation permits may only be issued to those with demonstrated legal access for commercial marine operations to the Bay, either by possessing pier loading permits or by access from private lands where the legality of such access is demonstrated by certification from the appropriate zoning and conservation land management authority.

B. Large Snorkeling Tour Permits

1. There shall be three large snorkeling tour permits in Kane'ohe Bay. Snorkel operations may tour the Bay, stop and engage in snorkeling at designated areas during designated times, and conduct other non-motorized activities at designated commercial locations of the Bay, subject to vessel size, capacity, and equipment constraints.
2. Snorkel tour permits may only be issued to those with demonstrated legal access for commercial marine operations to the Bay, either by possessing pier loading permits or by access from private lands where the legality of such access is demonstrated by certification of the appropriate zoning and conservation land management authority.

C. Small Sail and Snorkel Tours -

There shall be no more than three small sail and snorkel tour permits in Kane'ohe Bay.

D. Tours and Glassbottom Boats

1. There shall be one tour/glassbottom boat permit in Kane'ohe Bay that shall provide for touring the Bay without stopping other than for glassbottom viewing, and shall not be used in conjunction with full service or other operations to exceed permit capacities.
2. Tour permit holders must have legal access for commercial marine operations to the Bay by valid pier loading permit.

E. Ramp Permits

1. There shall be no passenger carrying ramp permits.
2. There shall be no more than ten commercial recreation ramp launching permits issued for He'eia Kea Harbor.
3. Recipients of commercial recreation ramp launching permits must be associated with full service recreational permits. There shall be no more than two commercial ramp launching permits for each central Bay (70 customer capacity operation) sand flat permit, and three each for the Checker Reef permit(s) (150 customer capacity permits). These permits may be issued to other than the full service recreation permit holder based on service or charter contracts for services provided by others to the permit holder. If existing sub-contractors providing service to an ORMP permit holder have their permit revoked or otherwise give up the permit, a replacement permit may be issued per existing policies.
4. There shall be no additional commercial recreation pier loading permits allowed at He'eia Kea Harbor.

F. Not for Profit and Educational Tours

1. Tours made at a price or fee not to exceed direct operating costs (labor and fuel) of the tour for bonafide educational institutions and State of Hawaii registered not-for-profit ((501(c)(3)) institutions may be made during regular allowed days of operation to the designated commercial areas.
2. The number of not-for-profit passengers taken shall not count against daily permit limits, but are subject to maximum vessel/permit (70 or 150 maximum) capacity limitations. Not-for-profit passengers and regular paying commercial passengers/commercial tours may not be mixed on the vessel at the same time.
3. Not-for-profit tours, including not-for-profit passengers, shall not include thrillcraft or any type of high speed towing activities.
4. Abuse of the above limits shall be cause for immediate permit revocation.

Capacity and Location of Operations by Permit Type

A. Full Service Recreation Permits in the Vicinity of the Sand Flat in the Central Bay

1. These areas are offshore of the sand flat southeast of the sand bar, and two permits are to be allowed for this zone (see Map 6).
2. One primary host vessel is authorized per permit, with a maximum vessel capacity of 70 passengers, and a daily limit of 70 customers per permit.

3. Employed equipment limits are three jet skis, two runabouts of six or less passenger capacity, two equipment barges (passenger capacity of 20 or less) for waiting jet ski riders and for conducting non-motorized activities such as snorkeling and canoeing, and one administrative (service) jet ski for each full service recreational permit. Other non-motorized permitted equipment is also authorized as needed, including kayaks, canoes, wind surfers, small sailing vessels, and individual water sports equipment. No other types of motorized equipment are allowed.
4. Area allowed for non-exclusive commercial use is to be 1,000 feet long measured parallel to the edge of the sand flat. Non-motorized commercial use may be made of the sand flat to a limit of 300 feet seaward of the inner edge of the sand flat, and anchoring and jet ski circles are confined to a zone extending from 200 to 600 feet on the landward side of the inner edge of the sand flat. High speed towing may only take place between two patch reefs, which are west (landward) of the commercial designated area of the sand flat and east (seaward) of the seaward edge of the ship channel. High speed/towing operations may not take place within 200 feet of the sand flat.

B. Full Service Permits Vicinity of Checker Reef

1. Two permits are authorized in deep water south of Checker Reef. The permitted areas exclude use of the channel between the back side of Coconut Island and He'eia Kea in the central Bay.
2. No more than two host vessels with an aggregate total registered vessel capacity of 150 passengers are allowed for each full service Ocean Recreation Management Plan (ORMP) Permit at Checker Reef. Upon sale or transfer or combination of transfers or greater ownership interest to a person not a partner/owner/shareholder of record on the date these rules are effective, the number of allowed host vessels per permit shall be changed to one, with a maximum passenger capacity of 150. Each ORMP full service permit has a daily permit capacity limit of 150 customers per day.
3. Employed equipment per permit is limited to six jet skis, three runabouts with a capacity of six passengers or less, two equipment barges (passenger capacity of 20 passengers or less) for waiting jet ski riders and for conducting non-motorized activities such as diving, snorkeling, and paddling. One administrative (service) jet ski is also authorized. Other non-motorized equipment is permitted as needed including kayaks, canoes, wind surfers, small sailing vessels, and individual water sports equipment. No other types of motorized equipment are allowed.
4. The area allowed for non-exclusive commercial use is the same as presently configured in State Department of Transportation ORMP rules, except that host vessel must be moored with bow and stern anchoring 30 feet or more off of the reef on the south and west edge of Checker Reef, in the area extending from the old metal structure on the east to the western-most limit of existing commercial use, not obstructing the channel of use passing to the southwest of the reef. No vessel may anchor above the reef or reef edge. High speed operations must take place in deep water 200 feet or more from any reef edge (see Map 6).

C. Full Service ORMP Permit at Kualoa, Outside of AA Waters

1. One permit shall be allowed in this area, only if the associated operational and supporting activities on the land meet all applicable land use laws and zoning ordinances.
2. This permit allows operations directly from the shore without a host or supporting vessel. The area of water operations is not to exceed a size of 27.6 acres and may not

extend seaward beyond a distance of 1,035 feet from shore, per current ORMP regulations.

3. Equipment used may not exceed the inventory established on the moratorium date, July 1, 1990, as reflected in the Department of Transportation's Harbors Division Boating Branch records.
4. Maximum customer capacity is recommended to be established through the Conservation District Use Application permit process, including a review of the certified shoreline and equipment allowed. An interim capacity is recommended not to exceed 150 customers per day.

D. Summary of the Total Capacities and Equipment for Full Service Permits in Kane'ohe Bay

Total customer capacity in Kane'ohe AA waters is set at 440, including two operations totaling 140 at the sand flat, two operations totaling 300 at Checker Reef; 22 jet skis, and ten runabouts (see Map 6). Outside of AA waters, one operation totaling a maximum of 150 customers with six jet skis is authorized.

E. Large Snorkel Tours

1. Three snorkel tour ORMP permits are authorized. If an operator's associated pier loading permit is revoked, or if commercial boat passenger loading access over private lands violates a land use law or zoning ordinance, the operator's snorkel ORMP permit shall be voided or constrained to the limit required to meet land use and zoning laws.
2. No more than the existing number of pier loading permits for snorkel tour operations shall be granted.
3. Locations:
 - a. All stops for other than snorkeling shall be in the commercial area of the sand flat southeast of the sand flat. There is a two hour limit on stops at the sand flat. Only non-motorized equipment may be used for recreation.
 - b. The water stops for commercial snorkeling include: one area in the North Bay and one area in the central Bay (see Map 6).
 - c. Each permit shall authorize a permit capacity of 70 commercial customers per day, or the number allowed and approved for loading from private lands, but not greater than 70. The daily limit shall not be applied to special tours for schools and bonafide not-for-profit organizations (registered with the State). Not-for-profit or educational tours must be taken at cost to not be counted against aggregate daily totals. Commercial and non-profit tours may not be combined.

F. Small Sail/Snorkel Tours Loading From He'eia Kea Small Boat Harbor

1. The number of small sail/snorkel ORMP permits is not to exceed three.
2. Allowable vessel registered capacity per permit shall be 35 passengers, and the small sail/snorkel ORMP permit limit is 35 customers /passengers per day.
3. Stopping for other than snorkeling is authorized only at the designated commercial area of the sand flat for periods not to exceed one hour daily (see Map 6).
4. The loss/revocation of associated pier loading permit shall be cause to revoke or void the small sail/snorkel ORMP permit.

G. Tour/Glassbottom Boats that Operate Without Stopping Other than at Point of Origin

1. Only one permit is authorized.
2. Vessel and permit capacity is limited to 70 passengers per outing.
3. No stopping or transferring of passengers to other vessels or disembarking of passengers to submerged or shoreline lands shall be allowed at other than the point of origin.

H. Transition.

1. During the initial offering of permits under this plan, incumbent permit holders of record on October 1, 1991, shall have right of first refusal in the permit category in which they are presently operating, as modified by this Master Plan, to be exercised during a specific period of time.
2. One ORMP permit shall be allowed per commercial operation. Permits not claimed in the initial offering shall be declared null and void, and the total number of permits allowed in Kane'ohe Bay shall be diminished.
3. Administrative rules implementing these provisions managing commercial recreation in Kane'ohe Bay shall be published and heard within one year of approval of this plan.
4. The provisions of this plan shall be effective one year from adoption of implementing administrative rules.
5. The moratorium on equipment and vessel changes used in commercial operations shall remain in effect until the adoption of rules pursuant to this plan, other than replacement of existing equipment at equal or smaller capacity.

I. Incumbent permit holders of record are:

1. Full Service Operators:
 - a. Morning Star Cruises/Kane'ohe Bay Enterprises, James A. Hogg
 - b. Mid Pacific of Hawaii, Siegfried Schuster
 - c. Dina Morita and Associates/Windward Sea Yacht Charters, Bruce Morita
 - d. Club Kona, Joseph Pickard
 - e. North Bay Wave Runners/Boat Leasing Company, Ralph Schraeder
2. Large Snorkel Tour Operations
 - a. All Hawaii Cruises, Gabriel Siu
 - b. Kualoa Ranch, John Morgan
 - c. North Bay Boat Club, Ralph Schraeder
3. Small Sail/Snorkel Tours
 - a. Dreamer Charters, Donald R. Marcell
 - b. Captain Leo's Bay Adventure, Leo Williams/new owner
 - c. Hawaii Blue Water Sailing, Bill Chambers

4. Tour/Glassbottom Boats

- a. Kane'ohe Bay Cruises, Siegfried Schuster
- b. North Bay Boat Club

5. Ramp Launching Permits

- a. Pacific Quest Divers, Zane Bilgrave (1)
- b. T & T, Inc., Ernest Makainai (7)
- c. Aneole Okakai Marine, John Benson (2)
- d. Club Kona, Joseph Pickard (2)
- e. Aquaholics Divers, Peter Cooper (1)

J. Community and Public Interest Protection Provisions

1. Annual Permit Renewal

- a. An application for permit renewal shall be publicized for public and government agency comment 30 days before action on the renewal. City and County of Honolulu, Department of Land Utilization, and State Department of Land and Natural Resources comments shall be solicited during this period.
- b. Criteria for renewal:
 - i. The applicant shall have no record of violations of capacity or equipment provisions of the permit, violations of weekend ban, or of pollution laws;
 - ii. The applicant shall have no record of repeated unsafe practices or of persistent operations outside of designated areas; and
 - iii. The applicant shall have no zoning violations associated with, or attributable to the business, or supporting businesses, of the permitted operation.
- c. Environmental monitoring shall be conducted to evaluate the impacts of jet ski/high speed boating on reef communities, water quality, and physical structure of reefs. This monitoring is to be integrated with other monitoring programs recommended in the Kane'ohe Bay Master Plan.
- d. Proof of sewage pump-out contract is required for the life of the permit, and each base vessel is to be fitted with U.S. Coast Guard approved marine head facilities appropriate to the number of passengers and record of pump-outs for prior periods.
- e. The Boating Branch shall be responsible for submitting the Conservation District Use Application and associated environmental assessment (EA) for the commercial use of submerged lands as noted in the plan.
- f. Vessel captains will submit each week to the harbormaster a daily log of operations, to include identifying information, number of passengers, fuel or sewage spills, pumping out and refueling, incidents on the water, times of departure and arrival at the pier or operating area.

4.10.2. Thrillcraft and High Speed Boating Recommendations

RECOMMENDATIONS	IMPLEMENTATION
1. Registration of a recreational vessel shall include the owner/operator passing a test covering common courtesy, common sense, characteristics of different boat operations, and rules of the road. (Statewide implementation suggested).	BB
2. Extend existing slow-no wake restrictions to include areas within 200 feet of Central Reef shallows, the latter defined as areas having a depth less than or equal to 5 feet mean lower low water. This replaces the arbitrary zone "H."	BB
3. Implement a 25 knot speed limit within the triangular area encompassing the most congested region of the central Bay seaward of the three following apices: red nun buoy N-20 NE of Coconut Island, red pole marker adjacent to the patch reef and opposite channel buoy 11, and He'eia Harbor and landward of the slow-no wake zone on the lagoon side of the central reef shallows. (Map 6).	BB
4. Make no further expansion of launching ramps at He'eia Kea Harbor and develop launching ramps for small boats elsewhere in the Bay to reduce congestion at He'eia and on the waters.	BB USCOE
5. Prohibit the operation of any watercraft by any person with a blood alcohol level of 0.10 or greater.	BB USCG
6. Ban non-commercially recreational thrillcraft from Kane'ohe Bay.	BB

4.10.3. Mooring and Berthing Recommendations. (See Map 6).

RECOMMENDATIONS	IMPLEMENTATION
1. Expand proposed mooring area "A" shoreward to the 5 foot depth contour around the patch reef and along the fringing reef to include vessels already moored in that location (20 acres). (Map 6).	BB
2. Delete proposed mooring area "B."	BB
3. Establish a new mooring area "C" off Mikiola in a water area bounded by a line drawn across the opening in the fringing reef and along the 5-foot depth contour of the fringing reef, including vessels already moored at this location, but excluding mooring in the access channel area (30 acres). (Map 6).	BB
4. Establish a new mooring area "D" in a water area bounded by a line drawn across the mouth of the inlet north of the Kane'ohe Yacht Club and along the 5-foot depth contour of the fringing reef (15 acres). (Map 6).	BB

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| 5. Require all moorings to be single point to allow vessels to always face into the wind. | BB |
| 6. Require all currently moored vessels to obtain a permit and moor within the designated areas. | BB/PSD |
| 7. Exempt vessels moored to private piers, skiffs moored on fringing reefs or mud flats, vessels moored outside the areas, which have a CDDA permit or USCOE permit for that location, vessels moored in privately dredged channels fronting private residences as authorized by permit, and temporarily anchored vessels permitted for 3-30 days or 60 days if an extension is authorized. | BB |
| 8. Enforce prohibition of live-aboards on moored vessels in Kane'ohe Bay. | BB/PSD |
| 9. Require U.S. Coast Guard approved marine sanitation device on any temporarily anchored vessel in Kane'ohe Bay. | BB/PSD |
| 10. Allow no new mooring permits for sites "C" or "D" unless the applicant can demonstrate acceptable public or private land access to the shoreline, including adequate parking. | BB
DLNR
USCOE |

4.10.4. Fishing, Diving and Picnicking Recommendations

RECOMMENDATIONS	IMPLEMENTATION
1. Increase on-site enforcement of fishing regulations	DLNR
2. Provide stiffer penalties that would serve more effectively as a deterrent to illegal activity and <u>enforce them</u> .	DLNR
3. Improve public awareness of regulations through an education, campaign, to include an outreach to both the public and the judiciary.	DLNR
4. Study the decline in abundance of Bay resources, overfishing, and what, if anything, needs to be done. Research how to best protect the resources.	DLNR Kane'ohe Bay Fishing Panel
5. Conduct research studies to: a) determine when and where to place closed seasons, if necessary, for species not presently covered by regulations, with special attention to protecting spawning seasons; b) evaluate the need to protect inshore nursery and reproductive areas for both estuarine and reef communities; c) evaluate the impact of <i>nehu</i> netting on the Bay ecosystem; d) evaluate means of stock enhancement for depleted species; and e) determine which toxics exist in the bay and their effect on reproduction of indigenous species.	DLNR/HIMB
6. Modify regulations to protect resources, as determined by studies.	DLNR (Two-year grace period).

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| 7. Intensify monitoring of resource abundance and resource use (catch and effort); and environmental conditions (water quality and toxics). | DOH/DLNR |
| 8. Establish a Kane'ohe Bay Fishing Panel to monitor fishing in Kane'ohe Bay. Members must represent the diverse fishing interests that coexist in this area, and at least one representative of DLNR and the State Legislature. The Panel would serve as a watchdog group, which would attempt to detect and resolve fisheries management issues as they develop. | DLNR/OHA/
Representative of
Local Fishing
Community |
| 9. Defer the decision on an allowable net length for gill nets fishing in Kane'ohe Bay to the newly formed Fishing Panel. | Kane'ohe Bay
Fishing Panel
DLNR |
| 10. Establish rules of conduct for Kapapa Island, post a sign on the island explaining the rules and organize periodic clean-ups. | DLNR/Kane'ohe
NB/
Kahalu'u NB/
Friends of He'eia |
| 11. Resolution of conflict between tour activities and fishing is addressed in the mediated agreement on Commercial Recreation. | Commercial
Recreation
Agreement |

4.10.5. Fishpond and Stock Enhancement Recommendations

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| RECOMMENDATIONS | IMPLEMENTATION |
| 1. Protect all remaining fishponds in Kane'ohe Bay from further degradation and intrusion. | OSP/DLNR/OHA |
| 2. Government should assist by improving monitoring of activities on land or sea near the ponds which could negatively impact water quality. | HIMB/DOH |
| 3. Reinforce walls of deteriorating ponds and remove intrusive plants (beneficial plants should be left intact), using construction methods that preserve the ponds' character without slowing the restoration process. | DLNR/OHA/
USCOE |
| 4. Restore water and sediment quality in those ponds unsuitable to raise fish because of environmental degradation. While restoration is being accomplished, use these ponds as historic sites and interpretive tools for education (including education regarding the impacts of pollution). | Owners/DLNR/
USCOE/KMCAS |
| 5. Reevaluate existing laws regulating the dredging and modification of fishponds when stream assessment and pollution levels are better understood. | DLNR/USCOE/
DOH |
| 6. Implement stricter water quality monitoring regulations, especially in heavily populated areas and stream estuaries. | DOH |

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| 7. Cooperate with pond owners in efforts for protection or restoration since many or all of the ponds are privately owned; many of the recommendations discussed above are already feasible if work is done in cooperation with present owners. | DLNR/Owners |
| 8. Create a new Conservation subzone "F=Fishpond" and designate all existing fishponds in Kane'ohe Bay, including a reasonable buffer, Fishpond subzone. | BLNR/DLNR-Land Management and Historic Preservation Div/OHA/HSL |
| 9. Evaluate whether a new land use subzone classification is necessary to allow operators to develop multiple uses in and around the fishpond to enhance economic feasibility. | DLNR |
| 10. Once protection is ensured, evaluate the optimal usage of each pond. Options included stock enhancement, pilot restocking efforts, restoration of ponds for food production, community involvement and cooperation in restoration, educational programs, and limited educational tourism to raise revenues and promote a better understanding of the Hawaiian heritage among visitors. | Fishpond Master Plan
OSP/DLNR |
| 11. Encourage production of bait fish, <i>limu</i> , and shellfish depending on the viability and water quality of each individual pond. | DOH/DLNR/
Owners |
| 12. Develop and distribute educational material including posters and flyers to inform local people of <i>kapu</i> seasons, harmful fishing techniques, local fishes, and information on fishponds. | OHA/DLNR/DOE
UH SEA Grant Program |
| 13. Support proposals for mass culture of important food fishes, including mullet, <i>moi</i> , <i>awa</i> , <i>kumu</i> , and lobster for stock enhancement, nursery stock, baitfish, etc. at the Mariculture Research Training Center and Coconut Island ponds. | DLNR/HIMB |
| 14. Offer incentives to current pond owners in the form of tax shelters and rollbacks if they restore their pond as an historic site, or utilize it for fish production. Tax incentives will have to be in the form of law. Implementing legislation is a high priority. | HSL/DLNR |
| 15. Managers of government-owned ponds should offer long-term, low-cost leases to prospective aquaculture farmers. Make funds available through grants and low interest loans to operators of both government and privately owned ponds. | HSL/DLNR |
| 16. Encourage pond keepers to diversify and develop multiple use facilities including a research component, educational interpretation, fish market, and tourism to enhance economic feasibility. | OHA/DLNR/Pond Keepers |

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| 17. Offer educational classes in state-of-the art technology to farmers to assist in fish production and harvesting proficiency. Techniques used in other countries should be explored and tested. | DLNR/UH Sea Grant |
| 18. Support other restocking efforts not using Hawaiian fishponds. | DLNR-DAR/HIMB |
| 19. Since the Bishop Estate has expressed interest in the development of a master plan for all of their fishponds, mount a collaborative effort among the Estate, government, and private parties. | Bishop Estate/
DLNR/OHA |
| 20. Request that the Federal Government return jurisdiction over the ponds (ceded land) to the Office of Hawaiian Affairs, State of Hawaii, for the purposes of achieving the recommendations adopted by the Task Force. | Office of the
Governor/KMCAS |

4.11. LONG RANGE PLANNING COMMITTEE ISSUES. Much of the analysis of the need for long range planning resulted from developing of issues and resolutions in the Land Use and Water Use Committees. The Long Range Planning Committee focused on the details to implement these proposed actions.

4.11.1. Establishment of a Kane'ohe Bay Regional Council. Extensive discussion took place over proposed options for future management of Kane'ohe Bay. The recommendation for a Kane'ohe Bay Regional Council seeks a middle ground between improvements to existing management systems (which are considered to be insufficient at providing solutions to the unique and demanding issues) and a Kane'ohe Bay Authority (which potentially duplicates current regulatory functions).

Functions of the Kane'ohe Bay Regional Council. A council should provide a regional mechanism for proactive programs, increased public participation in planning, and conflict resolution. With the division of authority and responsibility for activities in and near the Bay among various government agencies, the Council should serve as a catalyst to unite different groups in pursuing the resolution of Bay related issues. The intent is for the Council to address issues dealing with the waters of the Bay as well as with land-based issues that affect the Bay as the Task Force has done. In addition to environmental concerns, issues of public domain and access, and Hawaiian affairs should be addressed by the Council. The Council should review and contribute to the formulation of all regulations affecting the Kane'ohe Bay region and should facilitate in dissemination of this information to the public.

The Council should serve as an information clearing house for all projects, initiatives, and actions that have the potential to impact the Bay. The Council should publish a summary of all such proposed or on-going actions to be disseminated, not less than quarterly, to appropriate agencies, community groups, and interested private citizens. This summary should include public notice of projects relevant to Kane'ohe Bay, and applications for land use permits and variances. Appropriate staff support for the Council's director should be required for this effort. This summary should help overcome the current lack of information and resultant disjointed and uninformed efforts on the part of both government and the public that commonly occur and which prompted the formation of the present Task Force. The Council should publish annual summary reports, and hold public Council meetings periodically. The Council could also provide advisory opinions on proposed projects to regulatory agencies.

Structure of Kane'ohe Bay Regional Council. The Council director should be a full-time, paid position, to be publicly advertised and approved by Council members. The qualification of the director should be based on the individual's educational background or equivalent experience in administration and planning commensurate with oversight of such a body. Council members should be certified by the sponsoring agency as voluntary (non-paid) positions and nominated by or represent:

- the Kane'ohe Neighborhood Board,
- the Kahalu'u Neighborhood Board,
- the Kane'ohe Bay Commercial Operators Association,
- the Kane'ohe Bay Fishing Panel,
- a recreational boater association
- the Marine Corps Air Station, Kane'ohe Bay,
- the University of Hawaii, Hawaii Institute of Marine Biology, and
- the Office of Hawaiian Affairs.

The sponsorship for the Kane'ohe Bay Regional Council is divided between the Office of State Planning (OSP) and the State Department of Land and Natural Resources (DLNR). The Task Force recommends that OSP administer the implementation of the Master Plan at least until responsibilities, administrative procedures, structure, and enabling legislation have been formalized. After its implementation, DLNR should be the sponsoring agency due to its purview over submerged lands, fish, wildlife, and the Conservation District; and the transfer of the Department of Transportation's boating functions to occur on July 1, 1992. As the sponsoring agency, it should provide financial and administrative support and coordinate efforts of the Council among appropriate agencies and offices. The Task Force recognizes the necessary involvement of the State Departments of Health, Land and Natural Resources, Transportation, and Education; Office of Hawaiian Affairs; and other agencies in review and implementation of actions relating to Kane'ohe Bay and its watersheds.

The present Task Force should be retained to serve as an interim Council for a period of one year or until a permanent Council has been appointed and a permanent staff have been retained. The responsibilities of the interim Council should include review of legislation to be drafted by the staff of OSP for the upcoming legislative session.

4.11.2. Increase Public Information and Education Programs. Many situations affecting the Bay appear to result from lack of information and education. Laws, rules, and regulations covering land-based clearing, grubbing, and grading operations; boating operations; water safety; environmental protection; natural resources conservation and other controls already exist, but are generally poorly enforced. While more enforcement is needed and strongly encouraged, dissemination of information and education can help bridge the gap between the current and the ideal situations.

The Task Force strongly recommends educational programs that focus on encouraging public participation in controlling pollution, promoting compliance with boating and fishing regulations, and enhancing user enjoyment of the Bay. Programs should be designed for all ages and be implemented through the Friends of He'eia State Park, University of Hawaii, Department of Education, volunteer and special interest groups, commercial recreation businesses, the Hawaii Visitor's Bureau, community organizations, and other such means. Proactive support and participation by the State Legislature would provide a much needed catalyst.

4.11.3. Preservation and Enhancement of Traditional Cultural Values

Fishponds. The Task Force recommends the development of a Kane'ohe Bay fishpond master plan. The fishpond master plan should identify, review, and recommend the most appropriate uses of and means to preserve all remaining fishponds within Kane'ohe Bay (see Maps 7A and 7B). The fishpond master plan should incorporate the efforts of the various interests currently exploring the use of ponds within the Bay.

in developing the fishpond master plan, a number of elements should be addressed but not limited to:

Water quality - waters flowing into the ponds should not be excessively contaminated with sediment, herbicides, pesticides, or other deleterious substances;

Cultural impacts - cultural interests of the Hawaiian population and others should be adequately considered;

Regulations - federal, state, and local laws and regulations should be satisfied;

Ownership - owners and cooperating interests of the various fishponds should be active participants;

Expertise - appropriate experts with relevant expertise should be involved;

Alternative uses - alternative uses of fishponds, such as raising fish, raising bait,

raising restock broods, serving as wildlife management areas, and providing opportunities for education, should be considered;

Accessibility - access, control, and liability issues should be addressed; and

Restoration - proposed structural modifications or improvements to any pond should be fully coordinated with DLNR's Historic Preservation Division, OHA, other interested Hawaiian groups, and the U.S. Army Corps of Engineers and should include the U.S. Fish and Wildlife Service (USFWS), U.S. Navy, DLNR, and FWS, as appropriate. Hazardous water pollution should also be evaluated and eliminated in ponds selected for food production.

The fishpond master plan for fishponds should be developed as soon as possible. A master plan should be developed by an *ad hoc* committee is included in the separate Appendix volume.

There are development proposals that could adversely impact the public benefits of fishponds. Examples of high priority considerations include:

Kualoa Pond should not be used as a siltation basin;

He'eia and Kahoua (Kahalu'u) Ponds are suited for interpretive and educational purposes, with concurrent use as bases for operation for traditional canoeing practices and values;

Li'i Pond and He'eia Pond are in maricultural production and may need support and protection to help retain this status; and

Nu'upia Ekahi Pond, currently used as part of a wildlife management area, may also be useful for other purposes. This should be investigated with the federal and state agencies that jointly manage the Nu'upia Ponds under a cooperative agreement.

Canoeing: Canoeing encompasses several activities: recreational canoeing, organized racing, and major sailing canoes such as the Hokulea. These activities have great cultural significance and require access to and use of waterfront areas for public gatherings for their operation. Kualoa must remain recognized as an extremely significant cultural area, in its context as the home of major Hawaiian sailing canoes. Sites other than including the areas adjacent to the fishponds, should also be considered for use in related activities. Many of these locations are identified in the Public Open Space and should be considered as important for public access (see Map 3).

The following recommendations are offered as a conceptual starting point:

To perpetuate our unique Hawaiian ocean heritage, appropriate fishponds of Kane'ohe should be preserved and developed to promote: traditional aquaculture, fishing and fisheries management, canoe construction and repair, Hawaiiana classes, ocean recreation and boating safety, public access and community gatherings, and wildlife management.

To establish these sites for future generations, a large canoe house (30 feet by 70 feet) should be constructed at an appropriate site. Construction and fund raising could be formed by interested groups including canoe clubs, youth sports leagues, and Hawaiian clubs. An annual canoe race from pond to pond is another idea for raising

funds which would also build public support. This may permit the moving of the Hokulea to a more culturally appropriate site.

Surfing: To promote the Hawaiian sport of surfing, the Task Force requests that the State initiate negotiations with the Marine Corps Air Station, Kane'ohe Bay, to allow surfing at the Pyramid Rock/North Beach area under an access pass/permit system similar to the fishing access permit system currently in effect. This area is recognized as being outside of the watershed that drains into the Bay and inside the He'eiahupua'a.

4.11.4. Improvement of Information Data Base- Monitor, Review, and Conduct Research Relevant to Management Needs. Some of the issues identified by the Task Force are important to master planning, but are characterized by a lack of sufficient data upon which to make sound recommendations or decisions. Although Kane'ohe Bay has been studied for over 40 years, most studies have been directed toward basic research rather than towards applied management needs. Therefore, several programs are recommended to allow management decisions to be made with greater acuity than currently possible.

Water Quality: Water quality monitoring in the Bay has been fragmented and almost entirely limited to the effects of sewage-borne nutrients. Much of the information relevant to management interests was collected nearly two decades ago as part of a series of studies which addressed the need for diversion and the response of the Bay to the sewage diversion in the late 1970's. Monitoring is not being conducted currently for the purpose of determining impacts or changes in the health of the Bay, nor to pinpoint the origin of known or potential pollutants. The effects of urbanization and various land uses, including golf courses, in the Kane'ohe watershed have also not been adequately evaluated for potential impacts to water quality or the biota of the Bay.

Basic research is needed on the amounts of nutrients, sediments, pesticides, and other toxicants entering the Bay and on the impact and lethal tolerances of biota to these pollutants. Management decisions should be based, in part, on identification of pollutants and their sources, estimates of tolerable levels of pollutants, and development of mitigation strategies. Specific recommendations are in the Water Quality Recommendations, Section 4.8.3.

Fisheries: Credible long-term commercial and recreational fisheries catch data within Kane'ohe Bay and surrounding waters are lacking. Much anecdotal data are available, and there is general agreement that fisheries have declined, but there have been few management oriented studies in Kane'ohe Bay, despite its perceived importance as a commercial, recreational, and subsistence fishing area. Important research and monitoring needs include reliable long-term and complete landings data (creel censuses), stock assessments, and habitat evaluations. Stock enhancement programs should be expanded to other important food species. Studies of the combined effects of pollutants on rates of reproduction and survival are also needed.

Commercial (and high-use, non-commercial) Recreation Activities: While social and general planning assessments of the impacts of commercial and public recreation operations have been adequately addressed, ecological and biological impacts of these activities could not be quantitatively evaluated for lack of sufficient information. These activities have been alleged to reduce water quality and damage coral and other marine biota, but no studies are available to confirm or deny these concerns. Specific data collection and analyses are needed to identify the environmental impacts of commercial activities and high-use, non-commercial activities on reef structures, biotic communities, and water quality. Management decisions require information on desired degree of concentration and threshold tolerances of these activities, recovery rate from effects, and whether such activities must be contained to preclude the spreading of negative effects.

Integrated Management Program: Particular research needs for an integrated management program include: semi-annual monitoring of the benthos (particularly coral reefs), fish populations, and water quality within Kane'ohe Bay. Sampling designs should be

coordinated to include stream, estuarine, and coral reef components of the Bay. Other elements to be co-sampled should include sedimentation rates, rainfall, and known sewage spills. Sediments and biota should be analyzed for chlorinated pesticides, metals (especially lead, copper, and zinc), and hydrocarbons. Guidelines on sampling design, frequency, quality control, etc., should be established to ensure that monitoring programs for Kane'ohe Bay are compatible with and complementary to other statewide and global methodologies.

Coordination of Monitoring: The formal coordinated monitoring effort should be conducted and periodically reviewed by DOH, DLNR, NOSC, USGS, and HIMB. Because of its location and research focus in Kane'ohe Bay, HIMB should be funded to coordinate such a program under the service role specified in its organizational objectives. Sponsorship of HIMB in this effort could be through DLNR, DOH, the UH Environmental Center, other appropriate State agencies, or other sources. The UH Environmental Center should be the central repository for all data and information (including monitoring data not coordinated by HIMB or not collected in Kane'ohe Bay).

4.11.5. Annual Review of Implementation. The Kane'ohe Bay Regional Council supported by the sponsoring agency should annually convene a public meeting, including itself, government officials, and State agency representatives. This meeting would provide an update on the status and consistency of implementation actions recommended by the Kane'ohe Bay Task Force Master Plan. This should include reports on monitoring and studies as well as actions of the appropriate City and State agencies.

4.11.6. Future Kane'ohe Bay Task Forces. A new Task Force should be reconvened in 1998 to consider protected area status and to review and evaluate the results and actions proposed in the Master Plan in light of new data and analyses, changing circumstances, changing environmental pressures on the Bay, and changing public needs.

4.11.7. Protected Areas Status for Kane'ohe Bay. Formation of the Task Force to develop a master plan of Kane'ohe Bay is based on the recognition of its unique qualities and values and significance. The Task Force strongly recommends that Kane'ohe Bay be recognized as a resource of local, national, and global significance, and that it be afforded, all or in part, protected area status with the primary goal being to attain effective management and conservation.

The public trust requires that the rights to enjoy the Bay carries with it the responsibility to protect the unique natural resources for future generations. Protected status does not preclude multiple uses of Kane'ohe Bay. Protected status at the federal level could provide a mechanism for management and long term protection of Kane'ohe Bay as an entire ecosystem, rather than merely targeting isolated activities or protecting only certain resources.

Protected Area Status Options: Protected status designations to be considered should include, but not be limited to:

- National Marine Sanctuary (NOAA);
- National Estuarine Research Reserve (NOAA);
- Hawaii Natural Areas Reserve; and
- Hawaii Marine Life Conservation District.

DLNR should coordinate with NOAA and perform a comparative analysis of the options for protected area status to ensure that decisions regarding designations are made in an informed manner. DLNR should submit the report to the Kane'ohe Bay Regional Council by a target date.

National Marine Sanctuary Program: The review process for nominations for the National Marine Sanctuary (NMS) site evaluation list will begin in November, 1992. This will be the first time that the NMS site evaluation list has been opened in eight years, and if Kane'ohe Bay is not nominated now, the next opportunity to do so may be a decade or more away. Therefore, the Task Force recommends that Kane'ohe Bay be nominated for the National Marine Sanctuary site evaluation list when it opens.

It is emphasized that nomination of Kane'ohe Bay for inclusion into the NOAA National Marine Sanctuary (NMS) Program does not result in an automatic achievement of such status, and there would be ample opportunity through this forum to address the pros and cons of inclusion into this or other programs. The NOAA Sanctuary program is extremely flexible in accommodating a variety of joint Federal-State management options, and could provide a much needed steady source of funding for monitoring, education, and enforcement.

Protected Area Status Process: The public must be meaningfully involved in any planning and management efforts. Protected area status will require additional funding to establish and maintain management programs needed to monitor, educate, enforce, and administer such areas.

The federal agency (NOAA) must consult with State agency officials should federal protection planning be pursued. Selection, evaluation, and confirmation processes require public meetings and hearings. Federally funded protection can largely defray the high costs to the State of Bay management, while at the same time accommodating the level of Bay and resource governance desired by the State.

Even if Kane'ohe Bay is not immediately afforded protected status, recognizing the Bay's uniqueness is important. If federally protected status is not pursued or is denied, the extensive studies of the Bay required for site evaluation would be of great value to the State. All rules, regulations, legislation, or other actions directed toward the Bay should fully consider the significance of this irreplaceable resource.

Submerged Lands: No leases for commercial uses of submerged lands in the immediate nearshore area should be granted anywhere in Kane'ohe Bay. This is intended to protect public interests by ensuring that submerged lands in Kane'ohe Bay remain unencumbered by commercial leases and conform to state land use and AA water quality designations.

4.11.8. Planning. The State of Hawaii should continue to develop a clearly defined ocean and coastal resources policy. To the extent possible, this should include development of specific ocean and coastal priority use areas.

The delineation of priority use areas should consider the relationship between the uses and the ability of a particular area to support those uses with the concept of area dependency. For example, SCUBA diving and glassbottom boats depend on areas that have coral reefs and marine life available for observation, whereas jet skiing and water skiing do not. Similarly, traditional cultural activities depend on access to fishponds and other features of historic, cultural, or archaeological significance whereas housing developments and sedimentation basins do not.

The Task Force has sought to apportion the time and use of discrete areas of the Bay by vastly different activities without a clearly defined priority use area delineation. The high impact commercial uses that have been grandfathered in the Bay are not construed to be in the best public interest of public domain policy, and ultimately should evolve to low impact uses. Overall State water use policy should be developed and considered in future decisions regarding the management of Kane'ohe Bay.

4.12. SUMMARY OF LONG RANGE PLANNING RECOMMENDATIONS. The Task Force recommends eight programmatic actions to protect and enhance the long term well being of the Bay. Implementation of these recommendations will require either funding or other legislative action.

RECOMMENDATIONS

IMPLEMENTATION

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| 1. Create a Kane'ohe Regional Council to provide a mechanism for proactive information gathering, public dissemination, planning, and conflict resolution, to include increased public access, education, and involvement in the planning process for the Bay. | OSP or DLNR |
| 2. Increase public information and education programs to reduce non-compliance, lack of awareness, and conflict on Bay issues. | FOH
UH/DOE/com. rec
bus./HVB/DBED |
| 3. Preserve and enhance Hawaiian cultural resources, including developing a Master Plan for Kane'ohe Bay fishponds. | OHA/DLNR Historic
Preservation Division, and
other interested parties. |
| 4. Develop an improved data base, including environmental monitoring, analysis, and timely public review of environmental quality of the Bay. | UH/HIMB coordinate with
DOH, DLNR, NOSC, USGS |
| 5. Conduct annual public reviews of status of Kane'ohe Bay and progress in implementation of recommended actions. | DLNR |
| 6. Reconvene future Task Force in 1998, for re-evaluation of goals and attainment of objectives based on updated information, and to consider protected status for the Bay. | OSP/OSP |
| 7. Consider alternatives for protected status for parts or all of the Bay. | DLNR/OSP/Kane'ohe Bay
Regional Council in
consultation with other
state, federal and county
agencies. |
| 8. Pursue public access to surfing areas off Mokapu Peninsula with the KMCAS. | Kane'ohe Bay Regional
Council/KMCAS |

CHAPTER 5 - IMPLEMENTATION

Pursuant to Act 208, the Task Force recommends guidelines to state agencies for the adoption and implementation of policies and administrative rules. However, many of the recommendations of the Task Force require State legislative or City and County Council action beyond mere rule making to establish new laws or ordinances. Further, some recommendations are Task Force requests for specific actions by specific agencies.

The recommendations of the Kane'ohe Bay Master Plan are in Table 3. Many require legislation to fund the implementing actions as well as legislative and agency support to institutionalize supportive management structures.

Many of the long range planning recommendations require financial commitments. State agencies have established regulations and controls, but have had difficulty in implementation and enforcement due to lack of resources. Clearly, if adequate resources are not provided, the objectives of this or any master plan will not be achieved. Appropriate government agencies must request the needed support, the State Legislature needs to authorize and appropriate the needed support, and the Governor must release the funds to supplement existing controls and develop new initiatives.

With the ever-increasing demands for State-sponsored programs conflicting with a universal public desire to reduce the tax burden, new methods of raising revenues must be explored. These could include user fees, more active solicitation of federal and private grants, more enforcement with concomitant higher penalties for non-compliance impact fees and greater involvement of non governmental organizations. The Task Force recommends that the appropriate State agencies review and implement innovative means to fund programs to manage and protect Kane'ohe Bay.

Implementation of the Master Plan should also be viewed as a statewide priority, not only in terms of its diverse and highly recognized values of Kane'ohe Bay, but also in terms of the opportunity to apply similar planning initiatives elsewhere in Hawaii, based upon the Kane'ohe Bay Master Plan experience. Task Force recommendations to sustain fishery resources, regulate commercial recreation, and set land use priorities should be useful to planners throughout the State.

The remainder of this chapter evaluates possible responsibilities and activities of each county, state, and federal agency and non-governmental organization in fulfilling the recommendations of the Master Plan. These recommendations are offered as a tool to help organize the functional responsibilities of the governmental agencies and other organizations.

Table 3. Summary of the Recommendations of the Kane'ohe Bay Master

Planning Task Force. The lead agency or organization responsible for implementing each recommendation is noted in parenthesis.

PROPOSED LAND USES

Proposed State Land Use District Changes (OSP/LUC)

1. Kane'ohe-Kawa Stream Confluence (Bayview): from Urban to Conservation.
2. Pu'u Pohakea: from Urban to Conservation.
3. He'eia Meadowlands: from Urban to Conservation.
4. He'eia State Park (Lae O Ke Alohī): from Urban to Conservation.
5. He'eia Kea Valley: from Urban to Conservation.
6. Mauka Waihe'e Valley: from Urban to Conservation.
7. Waihe'e Streambelt: from Urban to Conservation.
8. Kahalu'u "Regional Park" Site: from Urban to Conservation.
9. Waihe'e Marsh: from Urban to Conservation.
10. Haiamoa Streambelt: from Urban to Conservation.
11. Expanded Waiahole Beach Park: from Agriculture to Conservation
12. Waiahole Streambelt: from Agriculture to Conservation
13. Waikane Watershed: from Agriculture to Conservation
14. Hakipu'u Streambelt: from Agriculture to Conservation
15. Kualoa Regional Park: from Agriculture to Conservation

Public Open Space and Access Recommendations

16. A new major shoreline park at Kokokahi-Bayview, including a finger pier and public ramp for small sailboats. (C&C)
17. Restore the wetlands and estuarine confluence of Kane'ohe and Kawa streams to reduce runoff and pollutants. (C&C)
18. A pedestrian trail along Kane'ohe stream connecting urban Kane'ohe with Ho'omaluhia Park and Likeke Trail. (DPR)
19. Finger piers at King Intermediate School and He'eia State Park (Lae O Ke Alohī) for public access and education. (DLNR)
20. Connect He'eia Kea Harbor, He'eia State Park (Lae O Ke Alohī), and He'eia Kea valley for pedestrian access. (DLNR)
21. Extend He'eia State Park into He'eia Kea Valley to preserve public open space and provide additional parking and pier related facilities. (DLNR)
22. Improve "Kahalu'u Regional Park" site for small boat access and develop boating regulations for the flood control lagoon. (DPR)
23. Establish a streambelt along Waihe'e stream to protect water quality in the Bay and prevent flooding. (DLNR)
24. Add land *makai* of Kamehameha Highway to the "Kahalu'u Regional Park" and provide interpretive boardwalks through marsh, estuarine, and mangrove areas. (DPR)
25. Establish a streambelt along Haiamoa stream to protect water quality in the Bay. (DLNR)
26. Improve Waiahole Beach Park and expand it towards Waikane to provide public access. (DPR)
27. Establish a streambelt along Waiahole stream to protect water quality in the Bay. (DLNR)
28. Preserve in public open space the entire undeveloped Waikane stream watershed to protect water quality in the Bay. (OSP/LUC)
29. Create a streambelt along Hakipu'u stream to protect water quality in the Bay. (DLNR)
30. Permanently solve the shoreline erosion at Kualoa Regional Park. (DPR)

Water Quality Control Recommendations

31. Fund renovation of the existing Sanitary Sewer Collection System before funding extension of the system. (DPW)
32. Eliminate infiltration to the Sanitary Sewer System and illegal connections between storm drains and sanitary sewers. (DPW)
33. Identify and replace defective segments of gravity sewer lines with seepage of sewage above the groundwater table. (DPW)
34. Install a "can" type pump station and 8-inch force main at He'eia Pier to eliminate existing cesspools and provide for bilge and sanitary pump-out of boats. (BB)
35. Accelerate the original completion date to convert the Kane'ohe Sewage Treatment Plant (STP) to a pumping station. (DPW)
36. Stringently enforce the moratorium on new construction in the service area of the Kane'ohe STP. (DPW)
37. Require dry sewer lines for all new construction in the unsewered portions of Kane'ohe Bay watersheds. (DGP)
38. Continually advise the Hawaii Institute of Marine Biology (HIMB) of all line breaks, proposed by-pass incidents, unplanned sewage discharges into the Bay, and furnish the results of related monitoring. (DPW)
39. Require that swimming pools no longer discharge directly into Kane'ohe Bay but rather connect to the Kailua STP to allow proper treatment of the drain water. (DOH)
40. The City and County Department of Public Works should be responsible for managing wastewater disposal from Individual Wastewater Systems (IWS) based upon guidelines developed in cooperation with the State Department of Health (DOH).
41. Undertake engineering and monitoring studies of the behavior of septic tank/leach field systems in various Hawaiian soils. (UH)
42. Increase the minimum lot size for septic systems from 10,000 to 15,000 square feet until performance of leach fields in Hawaii is clarified by engineering studies. (DGP)
43. Require the outermost boundary of leach fields be 100 or more feet away from any waterway. (DPW)
44. Prohibit use of "treatment" IWS to permit construction of residences on lots smaller than 15,000 square feet because the requirement to operate the treatment system is not and cannot be enforced. (DGP)
45. If a treatment plant, rather than a pump station, is installed at He'eia Kea Harbor, secondary treatment and dechlorination should be required. (BB)
46. Identify and replace failing cesspool systems by requiring private firms engaged in the pumping to keep records and report such pumping to the oversight authority. (DPW)

Water Quality Monitoring Recommendations

47. Provide stable legislative support for a comprehensive monitoring program of the Bay and its streams. (HSL)
48. Assign primary responsibility for environmental monitoring to the new State Department of Environmental Protection, if created, and establish clear lines of responsibility among the new and existing agencies. (DOH)
49. The lead agency should coordinate the design of environmental monitoring protocols with HIMB, DOH, the UH Environmental Center (EC), the Department of Land and Natural Resources (DLNR), and professional statisticians.
50. Assign a full-time aquatic toxicologist to the staff of the lead agency, who would design, prioritize, and implement data collection in consultation with HIMB, EC, the U.S. Geological Survey, and others. (DOH)

51. Establish and monitor annually permanent transect sites and coordinate chemical monitoring of fresh water, marine water, bottom sediments and biota with studies for aquatic community structure and biodiversity. (HIMB)
52. Manage all collected monitoring data in a central database to be maintained indefinitely, kept current and accessible to the public. (HIMB, EC)
53. Review and analyze the monitoring database on a regular schedule by qualified scientists and technicians. (DOH, EC, HIMB)

Recommendations to Control Erosion and Sedimentation

54. Add staff, and establish staff training, and strengthen standards, procedures, and fines to improve enforcement of grading ordinances. (DPW)
55. Revise grading ordinances to control sediment transport and specify permissible control measures under various conditions. (DPW, DGP, DLU)
56. Preserve and where possible, expand existing wetlands, and prohibit the construction of new offsite wetlands to replace destruction of existing natural wetlands. (DLNR, HSL, DOH, USCOE)
57. Apply U.S. Soil Conservation Service techniques to minimize soil erosion in Kane'ohe Bay watersheds. (DPW)

Education Recommendations

58. Establish and promote the use of cost-free hazardous waste collection for households, do-it-yourself mechanics, and subsistence farmers. (DPW)
59. Include Kane'ohe Bay in public education projects. (DOE)
60. Emphasize that substances not normally hazardous to humans (oils, paints, cleansers, solvents, batteries, litter, etc.) can be environmentally damaging. (DOH)
61. Combine incentives with education to recruit public participation in voluntary clean-up efforts. (DPW)
62. Provide signage at He'eia Kea Harbor and other primary access points to the Bay on proper sanitation and litter control. (BB)

Stream Recommendations (CWRM)

63. Maintain low population densities in watersheds not serviced with public sewer facilities (e.g. do not develop these watersheds). (DGP)
64. Prohibit further channelization of streams, and where consistent with public safety, restore the natural stream-banks of channelized streams. (DPW)
65. Establish a 100-foot riparian buffer zone, where possible, on both sides of He'eia, Haiamoa, Watahole, Waikane, and Hakipu'u streams, and prohibit further housing in this area. (DGP)
66. Install infiltration devices, install appropriately sized siltation ponds, and expand existing wetlands to reduce sediment pollution in Kane'ohe and Kawa streams. (DPW)
67. Maintain stream baseflow by planned allocation of water resources within reach of the Kane'ohe Bay watersheds. (BWS)
68. Prohibit further reduction of surface water flow into Kane'ohe Bay. (BWS)
69. If possible, increase the current median flow of Kane'ohe Bay streams. (BWS)
70. Initiate immediately an appropriate gaging program for Kane'ohe Bay (and greater windward O'ahu) streams. (USGS)
71. Initiate immediately studies on the role of freshwater in nearshore marine habitats. (UH)
72. Supplement the 1988 Board of Water Supply Environmental Impact Statement to address issues identified above. (BWS)

Golf Course Recommendations

- 73. Develop a policy on golf course projects, addressing the cumulative effects on Kane'ohe Bay. (LEG/C&C)
- 74. Require golf course projects to conform to statewide environmental standards for location, design, construction, management, and monitoring. (C&C/LUC)
- 75. Do not permit the Bayview golf course to expand. (C&C)
- 76. Relocate the He'eia Kea (Nanatomii) golf course to a more environmentally suitable site. (OSP)
- 77. Prohibit golf course development in the Waikane stream watershed. (OSP/LUC/DLNR)

WATER USES

General Commercial Recreation Recommendations (BB/DLNR)

- 78. Permit existing levels of commercial jet ski and high speed boating activities until existing businesses are sold or terminated through attrition.
- 79. Owners or shareowners of record may transfer any interest in their businesses for up to one year following the effective date of implementation of the rules governing commercial recreation in Kane'ohe Bay.
- 80. Subject to keeping the same vessel size, capacity, and equipment constraints, there will be four full service commercial recreation permits allowed in class AA waters in Kane'ohe Bay consisting of those existing operations of record with legal commercial boat loading access to Bay waters through public pier loading permits, or appropriately zoned private land "grandfathered" until the businesses are sold or terminated. Permittees will keep the same vessel size, capacity, and equipment constraints for their permit renewal.
- 81. Permittees will be allowed to load to full permit capacity at He'eia Kea Harbor daily, but no shuttling will be allowed to exceed permit or vessel capacity.
- 82. Subject to vessel size, capacity, and equipment constraints, there will be three large snorkeling tour permits in Kane'ohe Bay, allowing operators to tour the Bay, stop at designated areas and times, and engage in snorkeling or other non-motorized activities at designated commercial locations in the Bay.
- 83. Issue snorkel tour permits only to those with demonstrated legal access for commercial marine operations to the Bay, either by possessing pier loading permits or access through appropriately zoned private land.
- 84. There will be one tour/glassbottom boat permit in Kane'ohe Bay, to provide touring of the Bay without stopping, other than for glassbottom viewing, and shall not be used in conjunction with full service or other operators to exceed permit capacities.
- 85. Limit glassbottom boat and permit capacity to 70 passengers per outing.
- 86. The glassbottom boat tour permit holder must have legal access for commercial marine operations to the Bay by valid pier loading permit.
- 87. No topping or transferring of passenger to other vessels or disembarking other than at the point of origin will be allowed.
- 88. There will be no more than three small sail/snorkel tour permits in Kane'ohe Bay.
- 89. There will be no new passenger carrying ramp permits.
- 90. There will be no more than ten commercial recreation ramp launching permits issued for He'eia Kea Harbor, and recipients must be associated with full service recreational permits.
- 91. There will be no additional commercial recreation pier loading permits allowed at He'eia Pier.

Educational Touring Recommendations (BB/DLNR)

92. Tours made at a price or fee not to exceed direct operating costs (labor and fuel) of the tour for bona fide educational institutions and State of Hawaii registered not-for-profit (501(c)(3)) institutions may be made during regular allowed days of operations to the designated commercial areas.
93. The number of not-for-profit passengers taken will not count against the daily commercial permit limits but are subject to maximum vessel permit (70 or 150) capacity limitations.
94. Not-for-profit and regular paying commercial passenger/commercial tours may not be mixed on the vessel at the same time.
95. Not-for-profit tours shall not include thrill craft or any type of high speed towing activities.

Commercial Recreation Recommendations at the Sand Flat (commonly known as the Sand Bar) (BB/DLNR)

96. Two full service permits are authorized in a designated zone near the vicinity of the sand flat in central Kane'ohe Bay, measuring 1,000 feet long, parallel to the edge of the sand flat.
97. One primary host vessel (capacity of 70 passengers) and a daily limit of 70 customers per permit is authorized.

Commercial Recreation Recommendations at Checker Reef (BB/DLNR)

98. Two full service permits are authorized in a designated zone in deep water south of Checker Reef, and excludes the use of the channel between the landward side of Coconut Island and He'eia Kea, in the central Bay.
99. No more than two host vessels with an aggregate total registered vessel capacity of 150 passengers are allowed for each permit at Checker Reef. Upon sale or transfer or a combination of transfers or greater ownership interest to a person not a partner/owner/shareholder of record on the date these rules are effective, the number of allowed host vessels per permit will reduce to one with a maximum passenger capacity of 150. Each full service permit will have a daily capacity limit of 150 customers.

Equipment Recommendations (BB/DLNR)

100. Employed equipment for each full service permit is limited to three jet skis (six jet skis for the Checker Reef permits), two runabouts (three runabouts for the Checker Reef permits) with a capacity of six passengers or less, two equipment barges with a capacity of 20 passengers or less, one administrative jet ski, and non-motorized equipment consisting of kayaks, canoes, windsurfers, small sailing vessels, and individual water sports equipment.
101. High speed/towing operations may not take place within 200 feet of any sand flat or reef edge.

Commercial Recreation Recommendations at Kualoa

102. One full permit shall be allowed at Kualoa outside class AA waters (BB), provided that the associated operational and supporting activities on land meet all applicable land use laws and zoning ordinances. (DLNR/DGP)
103. The Kualoa permit allows operations from shore without a host or supporting vessel, and the area of operations is not to exceed a size of 27.6 acres, nor extend seaward beyond a distance of 1,035 feet from shore. (DLNR/BB)
104. Equipment for the Kualoa permit may not exceed the inventory established on the moratorium date of July 1, 1990 as reflected in the Department of Transportation Boating Branch records. (BB)

105. Maximum customer capacity for the Kualoa permit shall be set through the Conservation District Use Application process, including a review of the certified shoreline and equipment allowed. An interim capacity is recommended not to exceed 150 customers per day. (BB/DLNR)

Recommendations on Total Capacities for Commercial Recreation (BB/DLNR)

106. Total customer capacity in Kane'ohe Bay AA waters is set at 440 including two operations totalling 140 at the sand flat and two totalling 300 at Checker Reef. Total corresponding equipment capacity is 22 jet skis and ten runabouts. Outside AA waters the total capacity in Kane'ohe Bay is 150 customers and six jet skis.

Recommendations on Commercial Snorkel Tours (BB/DLNR)

107. Three large commercial snorkel tour permits are authorized. A snorkel permit will be voided or constrained to the limit required to meet land use/zoning laws if commercial boat passenger loading access over private lands is in violation of land use law or zoning ordinance.
108. No more than the existing number of pier loading permits for snorkel tour operations will be granted.
109. All stops for other than snorkeling will be in the commercial area of the sand flat southeast of the sand flat, and there will be a two hour limit on stops at the sand flat where only non-motorized equipment may be used for recreation.
110. The water stops for large snorkeling include one North Bay area and one central Bay area.
111. Each large snorkeling permit will authorize a permit capacity of 70 commercial customers per day, or the number allowed and approved for loading from private land, but not greater than 70.
112. The number of small sail/snorkel commercial permits in not to exceed three.
113. Allowable vessels registered capacity per small sail/snorkel permit shall be 35 passengers and a daily limit of 35 customers.
114. Stopping is authorized only at the designated area of the sand flat for periods not to exceed one hour daily.
115. The loss/revocation of associated pier loading permit will be cause to revoke/void the small sail/snorkel commercial recreation permit.

Transition Period recommendations for Commercial Recreation (BB/DLNR)

116. Incumbent permit holders of record on October 1, 1991 will have the right of first refusal in the permit category in which they are presently operating. Permits not claimed in the initial offering will be declared null and void and the total number of allowed permits in Kane'ohe Bay will be diminished accordingly.
117. Administrative rules implementing these provisions shall be published and heard within one year of approval of the plan, and the provisions will be effective one year from adoption of implementing rules.
118. The moratorium on commercial equipment and vessel changes will remain in effect until the adoption of rules pursuant to this plan, other than replacing existing equipment at equal or smaller capacity.

Community and Public Interest Protection Provisions Regarding Commercial Recreation (BB/DLNR)

119. Each commercial permit will be renewed annually, including agency and public notification for comment 30 days prior to action on the renewal.
120. Criteria for renewal includes no record of violations of capacity, equipment, weekend bans, or pollution laws; no record of repeated unsafe practices or persistent operations outside of designated areas; and no zoning violations

- attributable to the businesses or supporting businesses of the permitted operation.
121. Environmental monitoring shall be conducted to evaluate the impact of recreation activities to be integrated with other monitoring programs recommended for Kane'ohe Bay in the plan.
 1. Proof of sewage pump-out contract is required for the life of the permit, and each base vessel is to be fitted with U.S. Coast Guard approved marine head facilities appropriate for the number of passengers and record of pump-outs for prior periods.
 123. The Boating Branch of the State Department of Transportation will be responsible for submitting the CUDAs and associated environmental assessments for the commercial use of submerged lands as approved in the plan.
 124. Vessel captains will submit to the harbor master each week a daily log of operations to include: identifying information, number of passengers, fuel or sewage spills, pump-outs and refueling, incidents in the water, time of departure and arrival at the pier, and operating areas.

Recommendations on Public High Speed Recreational Boating (BB)

125. Adequate education of recreational boaters is mandatory. At a minimum registration of a recreational vessel should be accompanied by a testing process leading to issuance of a license. Testing should provide provisions of common courtesy, common sense, characteristics of different boat operations, as well as knowledge of the rules of the road.
126. Existing slow-no wake restrictions should be extended to include areas within 200 feet of Central Reef shallows (defined as having a depth less than or equal to 5 feet MLLW).
12. A 25 knot speed limit should be implemented within the triangular area encompassing the most congested regions of the central Bay. The apices of this area are the red nun buoy northeast of Coconut Island (Moku o Loe; N-20), the pole marker at the patch reef off Kahalu'u Point (and opposite buoy C-11), and He'eia Kea Harbor. The seaward limit of the zone should extend along the *mauka* edge of the barrier reef system.
128. Non-commercial recreational thrillcraft shall be banned from Kane'ohe Bay.

Recommendations on Public Mooring and Anchoring Areas (BB/DLNR)

129. Existing Department of Transportation Mooring Area "A" is to be retained, but the boundary is to be adjusted shoreward to follow the 5 foot depth contour around the patch reef and along the fringing reef, to include the vessels presently moored at this location (20 acres).
130. Existing BB Mooring area "B" is to be deleted from further use (30 acres).
131. Establish a new mooring area "C" in the Mikiola area bounded by a line drawn across the opening in the fringing reef and running along 5 foot depth contour (except for the access channel) to include vessels now moored there (about 20 acres).
132. Establish a new mooring area "D" bounded by a line drawn across the mouth of the inlet north of the Kane'ohe Yacht Club and running along the 5 foot depth contour, including the vessels now moored there (about 15 acres).
133. All vessels permanently moored will be required to obtain a permit and moor within one of the designated areas.
134. Exemptions include vessels moored to private piers, skiffs moored on the fringing reef or mud flats, vessels outside of a designated area having an approved CDUA or Corps of Engineers permit for the location, and permitted vessels moored in privately dredged channels fronting private residences.

- 135. Temporary permits for anchoring more than 72 hours but less than 30 days or 60 days with an extension will be required, but will allow anchoring outside a designated mooring area except at the sand flat.
- 136. Living aboard any vessel permanently moored in Kane'ohe Bay is prohibited.
- 137. Staying aboard a temporarily anchored vessel in Kane'ohe Bay is only permitted if the vessel is equipped with a U.S. Coast Guard approved marine sanitation device.
- 138. No new mooring permits shall be issued for designated mooring areas "C" or "D" unless the applicant can demonstrate he or she has acceptable public or private land access to the shoreline including adequate parking.

Fishing, Diving, and Picnicking Recommendations

- 139. DLNR should improve enforcement of fishing regulations.
- 140. Provide stiffer penalties to deter illegal activities. (DLNR)
- 141. Improve public awareness of regulations through an education campaign. (DLNR)
- 142. Study the decline in abundance of Bay resources, overfishing, and what, if anything, needs to be done. Research best methods to protect the resources. (DLNR/HIMB)
- 143. Conduct research on when and where to place closed seasons, if necessary, for species not presently covered by regulations, with special attention to protecting spawning seasons; inshore nursery and reproductive areas of estuarine and reef communities; impacts of *nehu* netting of the Bay ecosystem; and techniques for stock enhancement for depleted species. (DLNR)
- 144. Modify regulations to protect resources, as determined by the studies. (DLNR)
- 145. Intensify monitoring of resource abundance, nutrients and toxics including resource use (catch and effort) and environmental conditions, such as water quality. (DOH/HIMB)
- 146. Establish a Kane'ohe Bay Fishing Panel to serve as a watchdog group and to monitor fishing in Kane'ohe Bay. The members must represent the diverse fishing interests that coexist in this area. The panel would attempt to detect and resolve fisheries management issues as they develop. (OSP/DLNR)
- 147. Defer regulations on gill net fishing in Kane'ohe Bay to the Fishing Panel. (DLNR)
- 148. Establish rules of conduct for Kapapa Island focusing on litter control, human sanitary waste procedures, and control of pets; post a sign on the island explaining the rules. (DLNR)
- 149. Organize periodic clean-ups of Kapapa Island. (NGO's)

Recommendations on Fishponds and Stock Enhancement

- 150. Protect all remaining fishponds in Kane'ohe Bay from further degradation and intrusion. (OSP)
- 151. Create a new Conservation District subzone ("F"= fishpond) and designate all existing fishponds, including a reasonable buffer, fishpond subzone. (OSP/DLNR)
- 152. Evaluate the need for a new land use subzone to allow operators to develop multiple uses of their fishponds. (DLNR)
- 153. Cooperate with pond owners in efforts to protect or restore fishponds. (DLNR)
- 154. Reinforce the walls of deteriorating fishponds and remove intrusive plants using construction methods that preserve the pond's character without slowing the restoration process. (OWNERS)
- 155. Implement stricter water quality monitoring regulations in populated areas and streams near fishponds. (DOH)
- 156. Restore water and sediment quality in fishponds to the highest quality feasible, and commensurate with end uses proposed by the recommended Fishponds Master Plan. (Owners, DLNR, USCOE, KMCAS)

157. Reevaluate existing laws that regulate dredging and modification of fishponds, after stream quality and pollution levels are better understood. (DOH, USCOE, DLNR)
158. Once protection is ensured, evaluate the optimal usage of each pond. (DLNR/OHA)
159. Support other re-stocking efforts not presently using Hawaiian fishponds. (DLNR)
160. Support proposals for mass culture of important food fishes. (DLNR)
161. Encourage bait fish, *limu* and shellfish production depending upon viability and water quality of each pond. (DLNR, Owners, DOH)
162. Offer farmers educational classes on state-of-the-art mariculture production. (DLNR, UH Sea Grant)
163. Improve the monitoring of land and sea activities that could impact pond water quality. (DOH, HIMB)
164. Diversify and develop multiple use facilities at fishponds. (Pond Keepers, OHA, DLNR)
165. Offer low cost leases, loans, and grants to farmers interested in mariculture development of government ponds. (DLNR, HSL)
166. Offer tax incentives to current pond owners to restore ponds as historic sites or for fish production. (HSL, DLNR)
167. Develop and distribute educational material, including posters and flyers, to inform people of kapu seasons, harmful fishing techniques, local fishes, and information on fishponds. (DLNR)

Increased Public Access to Federally Controlled Lands

168. Pursue public access to surfing areas on Mokapu Peninsula with the Marine Corps Air Station, Kane'ohe that is outside of the watershed boundary for Kane'ohe Bay. (LEG/OSP)
169. Request the Federal government to return jurisdiction of the Nu'upia Pond complex (Ceded Lands) to the State of Hawaii. (HSL, Office of the Governor, KMCAS)

LONG RANGE PLANNING

170. Create a Kane'ohe Regional Council to provide a mechanism for proactive information gathering, public dissemination, planning, and conflict resolution, to include increased public access, education, and involvement in the planning process for the Bay. (DLNR, HSL)
171. Increase public information and education programs to reduce non-compliance, lack of awareness, and conflict-on-Bay issues. (DLNR)
172. Preserve and enhance Hawaiian cultural resources including developing a master plan for Kane'ohe Bay fishponds. (DLNR, Bishop Estate, Private Parties)
173. Develop an improved database including environmental monitoring, analysis, and timely public review of environmental quality of the Bay. (HIMB/DOH)
174. Conduct annual reviews of the status of Kane'ohe Bay and progress on implementing recommended actions. (OSP)
175. Reconvene future Task Forces, starting in the year 1998, for re-evaluation of goals and attainment of objectives based upon updated information and community values. (OSP)
176. Consider alternatives for protective status for parts or all of Kane'ohe Bay. (DLNR, OSP)

5.1. The Role of the County Level Government. The Kane'ohe Bay Task Force has no official county planning jurisdiction. The actions are recommended for City and County consideration consistent with the overall plan.

Although County level government agencies were not represented as voting members on the Task Force, two County officials served in an ex-officio capacity. Further effort was made to solicit and obtain feedback from the City and County of Honolulu. There was also substantial involvement and representation by the Kane'ohe and Kahalu'u Neighborhood Boards, which provide advice and other services to the City and County. Many key recommendations of the Task Force will need support and action by the City Council and several City and County agencies. The proposed responsibilities of each County government entity are summarized below and are keyed to the list of recommendations (see Table 3.)

Honolulu City Council (C&C). The City Council is requested to play a key role by supporting the proposed modifications to the State District Land Use Designations, the proposed public open space and access recommendations, and supporting the Task Force plan for use of the Bayview lands (at the confluence of Kane'ohe and Kawa streams). Although much of the Bayview area is already in (City and County) ownership, Council is requested to change the zoning as necessary to permit park and preservation activities at the site. The Council may also need to effect other zoning changes to support specific public open space and access recommendations, fund specific proposals identified below for County agencies, and install essential pollution mitigation measures. The Council is requested to reaffirm its support and, if necessary, strengthen its commitment to conform to the population and land use goals of the General Plan and the Ko'olaupoko Development Plan for the Kane'ohe region. Council endorsement of the Task Force's Master Plan would also be important in soliciting the cooperation and support of County, State and Federal agencies.

City and County Department of General Planning (DGP). The Department of General Planning (DGP) is requested to support and implement the zoning and public access recommendations. In addition, DGP in consultation with the Department of Land Utilization (DLU) and Department of Public Works (DPW) would be responsible to increase the minimum residential lot size from 10,000 to 15,000 square feet to allow leaching fields for septic tank systems. The DGP may need to support the population density restrictions in effect for areas of the Kane'ohe region not presently serviced by the county sewer system. The DGP, along with DLU, would need to carefully review documentation and decide whether existing commercial recreational activity in the Kualoa region conforms to applicable County zoning and land use ordinances. If not, DGP and DLU may have to take remedial action to ensure that activities on site are consistent with City and County ordinances and laws.

City and County Department of Land Utilization (DLU). In addition, DLU is requested to strictly enforce the present moratorium on new construction in the service area for the Kane'ohe Sewage Treatment Plant (STP) until all faulty collection lines have been replaced and the STP is converted to a pumping station. This includes not processing or permitting expanded housing developments during the moratorium period. DLU is requested to support of requirements for new developments outside of areas serviced by sewers to install "dry" sewer lines, in anticipation of their eventual hook up to an improved sewerage system for Kane'ohe. Through the Special Management Area (SMA) and Shoreline Setback ordinances, DLU would need to ensure that low population densities are maintained in unserved areas; prohibit housing along the proposed 100-foot wide stream buffer zones, wetlands, and in flood prone areas; and ensure that commercial recreational activities at Kualoa, and land based operations of commercial tour businesses conform to SMA and other land use/zoning ordinances.

City and County Department of Public Works (DPW). In addition to the recommendations regarding sewers and stream buffer zones, DPW is requested to support or implementation of other recommendations. DPW would need to approve and specify alignments for a pedestrian trail along Kane'ohe stream between Ho'omaluhia and the confluence of Kane'ohe and Kawa streams. DPW would also need to support the streambelt designations by denying further grading, grubbing, or channelization work in the Kane'ohe

Bay region. DPW would play a key role in ensuring that the existing Kane'ohe sewer collection system is upgraded/repared before entertaining proposals to expand the system, which includes replacement of defective gravity sewer segments and elimination of illegal sewer connections to the City and County storm drain system. DPW would need to support acceleration of the conversion of the Kane'ohe STP to a pump station to allow the other public interest recommendations for the area to be implemented. DPW would also need to implement procedures to require swimming pools to be drained into the sewage collection system and be discharged through the Kailua STP and Mokapu ocean outfall. The Task Force also recommends that DPW assume responsibility to manage individual waste system (IWS) approvals, specifications, and inspections.

DPW would also be responsible for enforcing the minimum lot size of 15,000 square feet for septic tank leach fields and maintaining records of monthly logs for firms involved in the pump out of cesspools. In addition, more stringent soil erosion control practices would need to be developed and enforced by DPW, including devoting greater attention to the need to control sediment transport off construction sites. Greater emphasis on the use of wetlands and sedimentation basins, and other water infiltration devices will be needed in lieu of further channelization of streams, which should no longer be allowed in the Kane'ohe Bay region. DPW would also need to help develop "cost-free" hazardous waste collection procedures at individual households. Finally, DPW would need to keep the University of Hawaii's Institute of Marine Biology (HIMB) more promptly advised of all partially or untreated discharges of sewage into the environment of Kane'ohe Bay and the Mokapu outfall. The overall goal of these actions would be to reduce sediment load, freshwater discharges during floods, and sewage load to Kane'ohe Bay and other coastal waters.

City and County Board of Water Supply (BWS). BWS is requested to support the recommendations regarding a streambelt along Waihe'e stream and refrain from additional water supply exploration, testing and pumping that decreases the stream baseflow within each of the Kane'ohe Bay watersheds. If possible, BWS should implement actions that maintain and increase baseflows for all Kane'ohe streams through planned allocations within each watershed.

City and County Department of Parks and Recreation (DPR). DPR is requested to support and implementation for the pedestrian trail along Kane'ohe stream between Ho'omaluhia and the Kawa-Kane'ohe stream confluence. In addition, DPR, in consultation with Ho'omaluhia Park staff, will need to designate a trail alignment through the park to connect with the Likeke trail further upland from the park. DPR will also need to support development of Kahalu'u Regional Park and its expansion to include nearby marsh, estuarine, and mangrove areas as proposed by the Task Force.

Finally, DPR should continue to strive to solve the chronic beach erosion problem at Kualoa Regional Park.

5.2. The Role of the Hawaii State Government

Hawaii State Legislature. The Task Force requests continued support for its recommendations from the Hawaii State Legislature. The Legislature would need to authorize and appropriate funds for the Interim Kane'ohe Regional Council (the existing Task Force), as well as a permanent Kane'ohe Regional Council. In addition, the Legislature may need to sanction the formation of a Kane'ohe Fishing Panel and will need to authorize the reconvening of future a task force, beginning in 1998. The Legislature would need to appropriate funds to develop a Master Plan for the fishponds of Kane'ohe Bay. The Task Force requests legislative support for water quality, fisheries, coral reef, and other environmental research proposed in the Master Plan. The Legislature is asked to authorize increased funding for individual State agencies that implement other provisions of the Master Plan. Through resolutions, the State Legislature could also pass its support for Task Force recommendations to the City and Council of Honolulu for their independent action.

Office of State Planning. Land use district amendments recommended by the Task Force have been forwarded to OSP for consideration. Through the Five Year Boundary Review process, OSP could petition the LUC to adopt specific changes in land use designations. OSP is requested to develop a policy on golf course development in the Kane'ohe Region in conjunction with its statewide effort. OSP is requested to assist in the implementation of the Master Plan.

Land Use Commission. The State LUC will be responsible to approve or disapprove requests for the Kane'ohe Bay Land Use District Boundary changes brought before it by OSP, or other agencies, or intervenors.

State Board of Land and Natural Resources (BLNR), Commission on Water Resources Management (CWRM), and Department of Land and Natural Resources (DLNR) (including the Divisions of Conservation and Resources Enforcement, State Parks, Water Resource Management, Aquatic Resources, Forestry and Wildlife, and Historic Preservation, and the Office of Conservation and Environmental Affairs). DLNR would be a key agency in implementing many of the land use recommendations of the Task Force. The Board of Land and Natural Resources and applicable DLNR divisions are requested to support the Task Force recommendations: redesignating the Bayview Park area to Conservation District, supporting park and wetlands development, establishing finger piers at He'eia State Park and King Intermediate School, mauka extension of He'eia State Park and trail system, expanding and protecting of wetlands, prohibiting further channelization of streams, supporting the establishment of 100-foot wide stream buffer zones, and prohibiting housing development within the buffer zone and flooding zone of streams.

The State Commission on Water Resource Management (CWRM), in cooperation with DLNR, is requested to establish a streambelt along Waihe'e, Halamoa, Waiahole, Waikane and Hakipu'u streams, and establish wetlands protection near Kahalu'u Regional Park, expand and protect other wetlands, prohibit further channelization of Kane'ohe streams, work with the U.S. Geological Survey and BWS to expand the network of stream gaging stations, and establish a policy on riparian buffer zones and development activity within them.

DLNR would also be a key agency in implementing many of the water use recommendations of the Task Force, ensuring that commercial recreation activities at Kualoa and elsewhere conform to Conservation District Use (CDU) criteria and regulations. In addition, DLNR is requested to determine if current commercial recreation activities conform to CDU criteria and regulations, and take corrective action as necessary. DLNR would need to support the proposed monitoring and research activities for marine resources in Kane'ohe Bay, assign staff, develop budgets, support bills during the legislative process, and implement much of the research. DLNR would also need to establish new CDU permits for individual moorings in the areas the Task Force proposes for boat moorings.

DLNR is requested to improve enforcement of existing fishing regulations by adding necessary manpower and establishing stiffer penalties for illegal activities. Specifically, DLNR would need to evaluate the causes, including overfishing, for the steady decline of fishery resources in Kane'ohe Bay and to take action towards solving these problems. DLNR would need to establish closed seasons and identify and protect important spawning and nursery areas for fisheries. DLNR may need to develop rules of conduct for Kapapa Island, participate in planning and protection of remaining Hawaiian fishponds, and support the designation of a new Conservation District "F" for fishponds. Working with the Office of Hawaiian Affairs, DLNR's Historic Preservation and Aquatic Resources Divisions would need to evaluate and designate appropriate activities for each fishpond. DLNR's Aquaculture Development Program is requested to provide technical assistance and financial support for fishery restocking efforts within the Bay and its fishponds and to develop mass culturing of important food fishes to be released into Kane'ohe Bay.

DLNR is requested to work with the State Department of Education, Boating Branch, and other agencies to develop educational materials on the values of Kane'ohe Bay and the fishing, boating, and development activities harmful to its natural and cultural resources.

Finally, the Task Force requests DLNR to work with other State and Federal agencies to seek the appropriate protective status for Kane'ohe Bay.

Some aspects of the Master Plan relate to regulatory functions within DLNR, particularly those land uses in the State Conservation District. Before their implementation, a Conservation District Use Application must be approved by the BLNR. This will ensure compliance with State Environmental and County Coastal Zone Management (special management area) requirements. This process will also allow for public hearings on commercial land uses that have not before been approved by the BLNR.

State Department of Transportation Harbors Division, Boating Branch (BB). The Boating Branch (BB) is requested to implement recommendations on commercial recreation, including permits, designated locations, times, reporting procedures, monitoring, and enforcement. BB is requested to approve and implement finger pier development at King Intermediate School and He'eia State Park, in consultation with DLNR. BB is requested to institute a boating education program as part of the vessel registration procedures, in cooperation with the U.S. Coast Guard and its auxiliaries. BB is requested to designate the new boat mooring areas "C" and "D," deleting the existing mooring area "B," and expand the existing mooring area "A." In cooperation with the DLNR, BB is requested to install a new can pumping station and force main at He'eia Kea Harbor, or upgrade to secondary treatment and dechlorination of sanitary waste, and require bilge and sanitary pump out of boats using the harbor. BB is requested to post signs on proper sanitation and litter control practices for both public and commercial recreation, in consultation with DLNR. BB is requested to collect commercial customer user fees to fund research and monitoring of commercial recreation impacts in Kane'ohe Bay. (Note: Boating Branch is scheduled to be transferred to DLNR as of July 1, 1992).

State Department of Health (DOH). DOH is requested to oversee the environmental monitoring program for Kane'ohe Bay in consultation with DLNR, HIMB, and other UH departments; establish the position of toxicologist to provide technical direction for data collection and analysis, and provide ready public access and timely review of all environmental monitoring data. DOH should assist in developing policy to encourage a minimum lot size and distance from waterways for septic tank leaching fields and prohibiting construction of individual waste systems on lots smaller than 15,000 square feet. DOH should encourage the City and County to establish a policy to establish and promote a "cost-free" hazardous waste collection system for individual households and help to sponsor voluntary clean-up efforts of parks and waterways.

State Department of Education (DOE). DOE is requested to incorporate information on Kane'ohe Bay in its educational materials for schools and help support finger pier development and marine-oriented education at King Intermediate School and He'eia State Park, in cooperation with the staff of Friends of He'eia State Park, Ho'omaluhia Park, and Kualoa Park.

Office of Hawaiian Affairs (OHA). OHA is requested to participate in the development of a master plan study for Hawaiian fishponds in Kane'ohe Bay. OHA may also wish to provide input during establishment of riparian buffer zones, protection of streams, and expansion and protection of wetlands. OHA may also wish to solicit cooperation from the KMCAS on providing increased public access to surfing sites, fishponds, and other cultural resources on Mokapu peninsula. OHA may also wish to evaluate the transfer of the jurisdiction of the Nu'upia Pond Ekahi from the KMCAS to OHA.

5.3. The Role of the Federal Government

Marine Corps Air Station, Kane'ohe Bay (KMCAS). KMCAS is requested to coordinate its active environmental monitoring and research program at Mokapu with the DOH and HIMB, as part of developing an integrated research and monitoring program for the whole of Kane'ohe Bay. Given the extent to which it restricts public access to lands and waters surrounding Mokapu Peninsula, KMCAS is requested to work with the community and State and County governments by participating in planning and management, and providing additional public access to areas it controls, especially to surfing areas and fishponds for traditional uses, compatible with other federally mandated wildlife protection for endangered Hawaiian waterbirds.

U.S. Geological Survey (USGS). USGS is requested to work with DLNR and BWS to restore a more comprehensive stream gaging program for Kane'ohe Bay. USGS also needs to coordinate with others (i.e., DOH, HIMB, EC, and CWRM) in developing a comprehensive environmental monitoring program for Kane'ohe Bay.

U.S. Army Corps of Engineers (USCOE). USCOE is requested to cooperate with County and State permitting agencies to establish finger piers at He'eia State Park and King Intermediate School. The USCOE is also requested to ensure its permitting policies are consistent with possible State sponsored restrictions against further channelization of Kane'ohe Bay streams. The USCOE is requested to help find an acceptable solution to the shoreline erosion problem at Kualoa, and consider federal support of harbor development elsewhere on O'ahu to relieve congestion in Kane'ohe Bay, at He'eia Kea Harbor in particular, with consultation and support by the local sponsor. USCOE is requested to cooperate with State regulatory agencies in issuing general permits or modification of general permits to establish, delete, or modify the mooring areas in Kane'ohe Bay, as proposed in the Master Plan. The USCOE is also requested to reaffirm or strengthen its existing policies on protecting all wetlands, fishponds, and streams in Kane'ohe Bay against further modification or development.

U.S. Environmental Protection Agency (USEPA). EPA is requested to help sponsor some of the environmental monitoring proposed for Kane'ohe Bay. EPA will also be asked to coordinate with the USCOE to ensure that Section 10 and 404 permit policies in Kane'ohe Bay conform to the Master Plan.

U.S. Fish and Wildlife Service (FWS). FWS is requested to play an advisory role similar to that of EPA, with respect to federal permits. In addition, FWS is requested to work with DLNR in implementing measures to protect, restore, and expand wetlands in Kane'ohe Bay to benefit fish and wildlife resources.

National Oceanic and Atmospheric Administration (NOAA). NOAA's National Marine Fisheries Service is requested to play a similar role to that of the FWS with respect to federal permits and coastal wetlands as stated above. NOAA's Office of Sanctuaries and Coastal Resources is requested to provide support for environmental monitoring and marine research for Kane'ohe Bay, and evaluate the feasibility of establishing a federal sanctuary (estuarine or marine) for Kane'ohe Bay, in consultation with OSP, DLNR, and other agencies. NOAA's Sea Grant Program at the University of Hawaii is requested to help establish marine educational programs and materials.

U.S. Soil Conservation Service (SCS). SCS is requested to provide technical advice and perhaps sponsor educational or training programs on controlling soil erosion on sloping wet tropical watersheds, in cooperation with DLNR and DPW.

U.S. Coast Guard (USCG). USCG is requested to participate in boating education and training classes in cooperation with BB. In addition, USCG is requested to strengthen its inspection and enforcement program for pollution control and sanitary waste disposal requirements for commercial and non commercial vessels in Kane'ohe Bay.

5.4. Other Organizations

University of Hawaii (UH). The University of Hawaii's Institute of Marine Biology (HIMB), Environmental Center (EC), and perhaps other research institutions and departments are requested to continue participating in future planning and management of Kane'ohe Bay, including membership in the Kane'ohe Regional Council and Kane'ohe Fishing Panel. HIMB is requested to coordinate research activities and conduct much of the water quality and marine research and monitoring proposed by the Task Force for Kane'ohe Bay. HIMB should work with DLNR and NOAA in conducting research on fisheries, and in conducting annual transect surveys of coral reefs in the Bay. HIMB should also participate with others to scope out the protocols for water quality and environmental monitoring, data management, analyses, and retrieval for Kane'ohe Bay, in cooperation with DOH. HIMB should also conduct research or monitoring of the effects of commercial recreation on marine resources in cooperation with BB, DOH, DLNR, EPA, and NOAA.

The UH Engineering Department and Water Resources Research Center is requested to sponsor or conduct research on leach field and septic tank characteristics in wet tropical soils, and investigate new designs to minimize seepage and pollution of groundwater and coastal waters.

Neighborhood Boards and Kane'ohe Residents. The Kahalu'u and Kane'ohe Neighborhood Boards are expected to maintain vigilance to ensure the implementation of the Master Plan in continuance of their active role in the Kane'ohe region and large responsibility in obtaining State support for the Task Force and Master Plan initiative. In addition, the Boards and residents are also expected to help sponsor periodic clean-ups of shorelines, parks, and Kapapa Islands, and participate actively in fishpond, stream, and wetlands planning, restoration, and protection.

Friends of He'eia State Park. The Friends of He'eia State Park are requested to conduct expanded educational programs on Kane'ohe Bay, working in cooperation with the DOE, Ho'omaluhia, Kualoa, and HIMB. He'eia State Park, due to its central Bay location, proximity to He'eia Kea Harbor, HIMB, and King Intermediate School, should serve as the key State sponsored facility to educate the general public on values, status, and future needs of Kane'ohe Bay.

CHAPTER 6 - PRELIMINARY ENVIRONMENTAL IMPACT ASSESSMENT (EIA)

6.1. Introduction and Summary. The environmental consequences of the Master Plan are evaluated in this chapter. Normally an EIA is prepared for an individual development proposal that could cause environmental impacts. Normally such an EIA is sponsored by a single agency or proponent, and the scope of the analysis includes a comparison of the impacts to the environment with and without a project. Various alternate means to achieve the development objectives are also evaluated and compared. If the assessment leads to a conclusion that the proposed action will lead to a net increase in significant adverse impacts to the environment, a more complex assessment, an environmental impact statement is prepared and processed.

The Master Plan does not conform to the typical type of "project" assessed using the EIA process. First, implementation of the Master Plan will be the responsibility of many agencies and organizations, although several of these will have substantially more responsibilities. Second, the Master Plan focuses on activities that control development, pollution and the causes of other environmental impact. In a sense, it serves as a mitigation plan in lieu of the "without project" alternative, and also promotes other public benefits. The Master Plan would reduce the level of impacts from what would result if there was no Master Plan. Third, the "without project" (no action) alternative, if allowed to proceed, would likely result in significant adverse impact, but the proposed action will likely not result in any significant adverse impacts. Thus, the conclusion reached in this preliminary EIA is that acceptance of the Master Plan does not require preparation of an environmental impact statement. The Master Plan is the first step and a blueprint for subsequent actions that will need to be taken individually by various agencies and organizations. The need for follow up EIS's should be again evaluated by these entities on a case-by-case basis for each action before its implementation.

6.2. Incorporation by Reference. The remainder of the Master Plan covers in sufficient detail several of the topics that are usually described in an EIA. These various sections are incorporated by reference as specified in the preliminary EIA.

6.3. Purpose and Need for the Master Plan. As a comprehensive document, the Kane'ohe Bay Master Plan examines the current and future uses of the Bay for three purposes to:

- protect the unique natural resource of the Bay for the continued enjoyment of the general public;
- resolve conflicting use problems between the users of the Bay; and
- assess the environmental and ecological impacts of activities on the Bay.

The Master Plan describes the need to provide specific recommendations and opportunities to benefit the general public and control activities or processes harmful to Kane'ohe Bay and surrounding watersheds. The Master Plan includes recommendations on: changes in state land use designations; public open space and public access; wastewater management; water quality monitoring; soil erosion and sediment control; public education on pollution abatement; stream protection; golf course development; caps on commercial recreation activity; opportunities for educational tours; caps on commercial recreation at popular destinations; community and public interest provisions over commercial recreation; high speed boating and thrillcraft limits; additional mooring areas; fishing, diving, picnicking and surfing opportunities; litter control; fishpond protection, restocking and restoration; and long range planning initiatives.

6.3. Alternatives Including the Proposed Action

6.3.1. The Proposed Action: The Master Plan. The proposed action is summarized in the executive summary and the recommendations in Table 3, in Chapter 5. There are 176 recommendations.

6.3.2. Other Feasible Alternatives. Other alternatives are described in Chapter 4, within the individual headings of conceptual solutions and alternatives. Each working group of the Task Force endeavored to evaluate a range of opportunities, then select the option most supported by the group as a whole. For example, Table 5 describes the various options for commercial recreation evaluated by the Water Use Committee in mid-1991. A similar analysis of the various options for fisheries management was also addressed by the committee. Alternatives were also analyzed during the evaluation of controls over thrillcraft, high speed boating limits, sites to moor larger vessels, and alternative sites for commercial recreation activities. In addition, the proposed land use, public open space access evaluations each covered up to 15 different sites.

Other than specific reference to the "without project" alternative, several Master Plan issues did not lend themselves to broader treatment of alternatives. However, this EIA describes several scenarios other than the proposed action to offer a basis to compare the Master Plan to more lenient and more stringent options. These are described in Table 4.

6.3.3 Comparison Among Alternatives

The proposed action and other scenarios are also compared in Table 4 for the following alternatives:

- the proposed action (the Master Plan);
- the "without project" (no action) alternative;
- the environmentally preferred alternative (a hypothetical minimal impact scenario); and
- a pro-development alternative (a hypothetical maximal impact scenario).

Although these last two are hypothetical scenarios, they help to illustrate the range of possible futures in Kane'ohe Bay with and without regional cooperation and intervention.

The comparison illustrates that the proposed action -- the recommended Master Plan -- will result in net improvement of environmental conditions and socio-economic opportunities in Kane'ohe Bay compared to the "without project" alternative. The comparison also indicates there are stricter management options to control activities and development than those recommended in the Master Plan. The comparison also indicates that in the absence of existing controls, conditions in Kane'ohe Bay could also get worse. The proposed action attempts to achieve a balance in the need to protect the natural and cultural resources of the Bay without overly restricting free choice and livelihood of many residents and workers who rely on Kane'ohe Bay. The compromises embodied in the Master Plan represent a consensus among the Task Force members and the recognition of each to achieve a common ground and outcome acceptable to all.

6.4. Description of the Affected Environment (Environmental Setting). Chapters 2 and 3 describe the important natural and cultural resources in Kane'ohe Bay and give a historical perspective on how the Bay has changed over the past century. During the initial phase of Task Force deliberations, a systematic effort was made to identify the Bay resources, uses, functions, and activities of particular importance to the Master Plan development. Table 2 is an "impact" matrix which lists the major Kane'ohe Bay resources along one axis, against a list of major issues or activities which affect the resources along the other axis. The Task Force concentrated on those combinations of resources and activities which were believed to result in significant adverse environmental impacts or other socio-economic issues.

The significant environmental resources, attributes, and issues of particular consequence or concern to the Task Force included: water quality, streams, wetlands, shorelines, reefs, islands, fish diversity and abundance, debris and solid waste, "protecting the public interest," public access at boat ramps, public parking, restricted access to military lands, public access to shorelines, public safety, fishponds, rural character, research, educational opportunities, aesthetic values, and property values.

6.6. Environmental Consequences of the Alternatives Including the Proposed Action.

Environmental impacts of the "without project" alternative are covered in Chapter 4, under the heading of "problems" or issues. In general, a continued lack of coordinated action will result in declining opportunities or increasingly unsafe conditions for picnicking, camping, fishing, diving, mooring, paddling, surfing, sailing, motor boating, waterskiing, and public open space access. Degradation of important natural and cultural resources including water quality, streams, wetlands, estuaries, coral reefs, the lagoon, offshore islands, fishponds, and fishery values including nurseries or spawning areas would continue. Implementation of the Master Plan would stem or reverse the above patterns. Economic impacts of the alternatives are described in the Appendix in the separate volume.

Impacts of the Master Plan are expected to be predominantly beneficial. A few expected impacts may be adverse, for example, the installation of finger piers, establishment of new mooring areas, and relocation of some commercial and other recreational boating activities. Greater public access to certain shoreline, reef, or upland areas may cause some littering, pollution, and vandalism, but these are expected to be minor. The replacement of sewers and the construction of parks, sedimentation basins, or water infiltration systems may cause impacts, but all of these actions have been designed to include mitigation to prevent them from becoming significant.

6.6.1. Indirect and Cumulative Effects. The proposed action (implementation of the Master Plan) will also result in beneficial indirect effects, such as Bay ecosystem and water quality recoveries, stable fishery levels, public pride and ownership of a valued resource, stable job opportunities for residents, improved social well-being, and community involvement and participation. Successful implementation of the Master Plan could serve as a model for other communities desiring to see quality of life and community values equivalent to economic development goals and opportunities. In contrast, lack of concerted action would lead to erosion of cultural and community values and interest, and reduced quality of life, including recreational opportunities. The cumulative impact of continued piecemeal escalation of pollution, commercial recreation, golf course development, IWS proliferation, stream channelization, haphazard mooring areas, thrillcraft, and high speed boating would result in significant adverse impacts to Bay resources and public benefits.

6.6.2. Unavoidable and Avoidable Impacts. Most of the current trends towards deteriorating environmental quality are reversible, and implementation of the Master Plan would reduce the present level of impacts. Among the unavoidable adverse impacts have been heavy freshwater kill of the reefs, soil erosion, and sedimentation in Kane'ohe Bay, burial of many lagoon reefs, the channelization of streams, and the filling of wetlands and fishponds for development. The Master Plan places a great deal of emphasis on preventing or controlling these types of impacts. Other severe impacts in the Bay over the past few decades include litter, water quality pollution, eutrophication, crowding at recreational areas, overfishing, and erosion of public access to shoreline and upland areas. However, these impacts can be reversed or eliminated through the imposition of land use policies and controls, enforcement of environmental regulations, pollution abatement projects, more enforcement of fishing regulations and expanded catch reporting procedures, and implementing other recommendations of the Master Plan.

6.6.3. Mitigation and Monitoring. The Master Plan is essentially a mitigation and monitoring program to protect Kane'ohe Bay and restore many of the valued resources and opportunities. A well coordinated and funded environmental monitoring program is proposed to establish baselines, ascertain trends, and institute appropriate resource management action. The long range planning component of the Master Plan addresses the need to monitor in more detail.

6.6.4. Comparison of Impacts Among the Various Alternatives. Table 4 summarizes the major adverse consequences attributed to "no action" and compares them to the consequences of implementing the Master Plan or other scenarios. This tabular comparison clearly describes the most probable futures for each of the four alternatives and presents the major differences in impacts expected by each of the options. The comparison indicates that either the no action, or maximal impact scenario will result in significant adverse impacts to the environment of Kane'ohe Bay, while approval of the Master Plan will itself not contribute additional adverse impacts but would eliminate or reduce a host of impacts.

Controls. The proposed action is completely consistent with the following plans and policies of the State of Hawaii and City and County of Honolulu:

- State Plan (revised version, 1989) - (Chapter 226, HRS)
- State Functional Plans:
 - Conservation Lands Functional Plan (1984)
 - State Historic Preservation Functional Plan (1984)
 - State Recreational Functional Plan (1984)
 - State Tourism Functional Plan (1984)
 - State Transportation Functional Plan (1984)
 - State Water Resources Development Functional Plan (1984)
- State of Hawaii Water Quality Criteria and Standards (Chapter 54A, HRS)
- State of Hawaii Coastal Zone Management Act (Chapter 205A, HRS)
- State of Hawaii Environmental Impact Statement Requirements (Chapter 343, HRS)
- City and County of Honolulu General Plan
- City and County of Honolulu Development Plan for Ko'olaupoko
- City and County of Honolulu Special Management Area and Shoreline Setback Ordinances.

The Master Plan is consistent with the policies and goals of the City and County zoning ordinances, the State Land Use Law (Chapter 205, HRS), the State Conservation District Use Law law and regulations (Chapter 183, HRS), and the State Department of Transportation regulations implementing the Ocean Recreation Management Plan. However, some revisions to the regulations, designations, and zoning for land and water areas will be required to conform to the Master Plan. These have been articulated in the recommendations, shown on the maps, and elaborated upon in Chapter 5.

The Master Plan is also consistent with the implementing regulations of various Federal laws, including the Clean Water Act, Coastal Zone Management Act, the National Historic Preservation Act, Endangered Species Act, Fish and Wildlife Coordination Act, National Environmental Policy Act, and the Marine Protection Research and Sanctuaries Act. Some aspects of the Master Plan would require Federal regulatory agency cooperation and support of State and County actions.

Table 4. Comparison among alternatives including the proposed action, for the Master Plan of the Kane'ohe Bay Task Force. The numbers in the left column correspond to those of Table 1, which lists all recommendations of the Master Plan.

	PROPOSED ACTION	NO ACTION SCENARIO	MINIMAL IMPACT SCENARIO	MAXIMAL IMPACT SCENARIO
LAND USE CHANGES				
Nos. 1 - 15	Fifteen land parcels reclassified from Urban or Agriculture to Conservation to protect various community and environmental values.	The fifteen parcels remain as urban or agricultural use. Increasing the feasibility of development, resulting in loss of public values.	Same as the proposed action.	None of the parcels are redesignated, eventually paving the way for urban or agricultural development on each, including housing and golf courses.
OPEN SPACE AND PUBLIC ACCESS				
Nos. 16 - 30	Acquisition or protection designated for fifteen areas to promote new or expanded parks, trails, recreational and educational piers, small boat access, streambeds, and watershed protection.	The fifteen areas are left unprotected, opening up the possibility of crowding at existing public access sites, lost opportunities due to private development, increased flooding, sedimentation and eutrophication.	Same as the proposed action.	Same as the no action scenario, plus incidents where some of the government land parcels are sold to private development for golf courses and housing, rather than saved for public use.
WASTEWATER MANAGEMENT				
Nos. 31 - 46	Various improvements to sewerage and treatment of sewage; controls over septic tanks, research on leaching at He'eia Kea Harbor, and prompt notification of partially or raw sewage discharges.	Expansion of the STP service area at the expense of more rapid renovation of the sewage collection system. Urban sprawl allowed by IWS installation without adequate enforcement and operation.	Restrict all further urban development in Kane'ohe Bay until collection system first restored followed by improvements to treatment and expansion of the system.	Same as no action scenario plus gradual deterioration of the Bay's water quality and enforcement because limited staff are assigned to evaluate an ever-expanding number of residential projects.
WATER QUALITY MONITORING				
Nos. 47 - 53	A coordinated program for research, monitoring, analysis, storage, retrieval, and accessibility of water quality data geared to improved management of Kane'ohe Bay.	Monitoring and research continues haphazardly by individual institutions without coordination with others and coherency. Much is not relevant to improving the management of the Bay.	Same as the proposed action plus added funding and acceleration of monitoring and research due to Federal assistance and intervention.	Same as the no action scenario plus the failure to obtain financial support for management oriented research.

	PROPOSED ACTION	NO ACTION SCENARIO	MINIMAL IMPACT SCENARIO	MAXIMAL IMPACT SCENARIO
SOIL EROSION AND SEDIMENTATION CONTROL				
Nos. 54 - 57	Additional staff and training for enforcement and better regulations. More effective measures to control sediment transport and soil erosion.	Continued limitations on enforcement and design of grading, grubbing, and soil erosion control measures leading to deteriorating water quality.	Moratorium on all further upland or large scale land clearing in the Bay until effective plans for sediment transport and erosion control are established.	Same as no action scenario except that enforcement actions are further diluted by a flood of new development proposals for housing and golf courses.
PUBLIC EDUCATION ON POLLUTION				
Nos. 58 - 62	Education focusing on cost-free hazardous waste collection, classroom materials to educate students on Kane'oh'e Bay, voluntary clean-up and signs for proper sanitation and litter control.	Public education would not emphasize opportunities for community involvement, pollution control, values of Kane'oh'e Bay. King Intermediate, the state's largest "waterfront" school would continue to lack a marine science program.	Same as the proposed action plus mandatory education program, recycling and waste collection and separation.	Declining quality of the Bay caused by increased litter and pollution and resulting in less community interest in Bay education and protection.
STREAM PROTECTION				
Nos. 63 - 72	Various measures to protect streams and surrounding low watersheds: maintaining low population levels in rural areas, prohibiting stream channelization and further reduction of streamflow, establish riparian buffer zones, protect wetlands; develop effective runoff control techniques; and monitor freshwater influences in Kane'oh'e Bay.	Development along individual streams will continue to encroach on stream courses, such as at Waie'e, causing flooding problems and the need for subsequent channelization, eventually causing deterioration of streams and Bay water quality.	Same as the proposed action plus relocation of all existing structures from existing flood plains and floodways.	All streams in the Bay watersheds are gradually channelized to provide more land for housing and golf courses. Kane'oh'e Bay is eventually transformed into another suburb of Honolulu.
GOLF COURSE RESTRICTIONS				
Nos. 73 - 77	The three active golf course proposals are not permitted to proceed, and a policy on golf course development including assessment of cumulative impacts and the need for conformance to statewide environmental standards,	One or more of the three planned golf course developments proceeds, causing soil erosion, sedimentation and eutrophication. A statewide golf course policy is developed but is not tailored specifically to the Bay.	The same as the proposed action plus a permanent ban on all future private golf course development in Kane'oh'e Bay.	Golf course developments continue to be approved on a piecemeal basis, based upon an impact fee schedule. Water quality impacts and Bay ecosystem deterioration worsen with time.

	PROPOSED ACTION	NO ACTION SCENARIO	MINIMAL IMPACT SCENARIO	MAXIMAL IMPACT SCENARIO
CAPS ON COMMERCIAL RECREATION ACTIVITY				
Nos. 78 - 91	Limits on the levels of all commercial recreation; speed limits for boats; phase down for thrillcraft; designation of specific areas; limitations on shuttling, passenger levels, and equipment; and glassbottom boat activity and levels.	Moratorium is lifted, leading to increased competition between various operators and conflicts with the public over the use of popular areas. Reduced community values and degradation of the Bay environment from commercial recreation.	All commercial thrillcraft banned immediately. All commercial recreation activity is phased out of Kaneohe Bay, as equipment is removed from service, and companies fold or relocate. Many tourists and a few residents are denied easy access to the Bay.	Levels of commercial recreation activities are allowed to increase over present levels due to economic and political pressure, hastening the demise of Bay ecosystems and its value to residents.
EDUCATIONAL TOURS BY COMMERCIAL OPERATORS				
Nos. 92 - 95	Non-profit educational tours are facilitated by not counting educational passenger levels against those set for paying customers. Controls established to prevent abuses, including the requirement to not mix educational and full paying tours.	Present level non-profit educational tours would continue but may be assigned lower priority by commercial operators fighting to stay in business.	All commercial tour operators would be required to devote a portion of their time and resources to support non-profit educational opportunities.	Educational and full paying customers mixed on tours, leading to potential abuses and higher levels of overall activity but with lower proportion of educational participants.
COMMERCIAL RECREATION CAPS AT POPULAR DESTINATION SITES				
Nos. 96 - 118	Limitations on activities at the sand flat, Checker Reef, and Kualoa, the latter subject to land use, agency review and approval.	Crowding and conflicts at the sand flat continue, denying high quality recreational experiences for all participants. Deterioration of Bay ecosystems.	All commercial activities are banned at the three popular areas without any transition period. Commercial activity moves to other sites less popular to residents.	Lack of adequate enforcement of existing ORMP permits leads to additional activity, more conflicts, and deteriorating water quality, aesthetics, and ecosystems.
COMMUNITY AND PUBLIC INTEREST PROVISIONS FOR COMMERCIAL RECREATION				
Nos. 119 - 124	Community and public interest provisions added to ORMP permits including the need for annual permit renewals, public input, monitoring, record keeping on violations, logs of visitor levels, sewage pump-outs and vessel traffic. CDUA permits are also required via application through DOT.	Lack of adequate public scrutiny continues, including poor trend analysis, impact assessment, and management decisions based upon inaccurate or inadequate information. Monitoring is poorly financed and haphazard. Government regulations respond only to crises or incidents.	Same as the proposed action plus the mandatory financing of all environmental monitoring programs by the commercial operators (e.g., the commercial users pay).	No organized monitoring or financing program, very limited public or government oversight. Public is left to solve problems on an ad hoc basis as activity levels increase.

	PROPOSED ACTION	NO ACTION SCENARIO	MINIMAL IMPACT SCENARIO	MAXIMAL IMPACT SCENARIO
NON-COMMERCIAL HIGH SPEED BOATING AND THRILLCRAFT CONTROLS				
Nos. 125 - 128	Boater education is tied to passing an exam as part of boat registration procedures. Slow no-wake provisions at central reef and 25 knot speed limits in the central Bay. Ban on all non-commercial thrillcraft.	Continuation of traffic safety problems and boat operation by inexperienced and discourteous operators. Sanitation and pollution problems continue. Thrillcraft activity continues at the present designated site.	Same as the proposed action plus the need for boaters to take educational classes and pass an exam to obtain a boating operator's license.	Thrillcraft operators continue at another designated site in the Bay. Gradual loss of enforcement presence, common sense, and courtesy on the Bay's waterways. Rules of the road give way to increasing public safety hazards in Bay areas.
MOORING AREAS FOR LARGER BOATS				
Nos. 129 - 138	Two new and one expanded mooring areas are established and one existing area is dropped. All existing boats must moor in those areas and obtain CDUA and USCOE permits. Controls over temporary anchorages, live-aboards, and stay-aboards. Small skiffs on shallow flats are exempted. Total cap on moorings (equal to existing boat moorings).	New mooring areas proliferate at the expense of other uses. within inappropriate sites. Moorings are less aggregated and spread out in many areas. No controls over sanitation, anchor damage and aesthetic impacts.	Same as the proposed action.	Same as the no action scenario plus greater levels of moored boats and corresponding impacts.
FISHING, DIVING, PICNICKING, AND DIVING				
Nos. 139 - 150	Recommendations include greater access to surfing sites at Mokapu Peninsula, expanded enforcement and stiffer penalties for fishing infractions, public awareness campaign, research and monitoring of the decline of fisheries, evaluation of fisheries management schemes (closed seasons) and establishing a Kane'ohe Fishing Panel to evaluate gill net controls and provide other advice.	Public opportunities for recreational fishing and diving will decline, while fishing pressure and the use of gill nets increase. Research remains poorly funded and data collection on recreational fishing remains inadequate. No advisory fishing panel.	Same as the proposed action, plus recreational fishermen are required to be licensed and report their catch. Restrictions imposed on gill nets, and closure areas established. Existing regulations are revised to improve enforceability and all fishery regulations are better enforced.	Uncontrolled fishing, lack of licensing of recreational fishermen, and expanded use of gill nets significantly reduces the populations of all valued fishes in the Bay. Confrontations between fishermen and other users increase. No enforcement of fishing regulations.

	PROPOSED ACTION	NO ACTION SCENARIO	MINIMAL IMPACT SCENARIO	MAXIMAL IMPACT SCENARIO
FISHPOND PROTECTION AND RESTORATION				
Nos. 151 - 167	Remaining fishponds protected from further degradation and all are placed within a Conservation subzone F (fishponds). Cooperation with owners enhanced to promote restoration, restocking, mass culture of fish, public education, and cultural use.	Only some fishponds will be protected, while others continue to degrade. Those not protected by a special subzone are more likely to be subject to conversion to marinas, sedimentation basins, etc.	Same as the proposed action, plus all are declared national historic sites or monuments to pave the way for federal funding of restoration, education, cultural, and other compatible public uses.	Some fishponds remain in urban and agricultural use and are eventually filled or destroyed for marinas, sedimentation basins, housing, etc. Most cultural values and aquaculture potential are lost.
INCREASED PUBLIC ACCESS TO FEDERALLY CONTROLLED LANDS				
Nos. 168 - 169	Increased public access to surfing sites and fishponds on the KMCAS. Jurisdiction for the fishponds transferred to the State of Hawaii.	Continued lack of general public access to surfing sites off Mokapu. Continual loss of cultural and mariculture use of the Nu'u'ula fishponds.	Same as the proposed action.	Public access to fishponds and surfing sites on Makapu Peninsula is further reduced. Confrontation between the Hawaiian groups and the KMCAS increases.
LONG RANGE PLANNING				
Nos. 170 - 176	Kane'ohe Regional Council is established. Increased public information, awareness and educational activities. Cultural resources are enhanced via a Master Plan for Kane'ohe Bay fishponds. The data base for Bay management is improved. Annual public reviews on progress in implementing the Master Plan. Future Task Forces in 1998 and beyond. Alternative protection status for Bay are evaluated.	Protection and development activity in the Bay will continue on an individual piecemeal basis. Cumulative impacts and long range goals will not be addressed. Planning direction for the Bay changes constantly, after each large scale development proposal. The future vision changes constantly.	Kane'ohe Bay Authority is established with overriding regulatory and management controls concentrated in a single accountable agency located in the Bay region. All activities conform to a zoning plan and include rules and procedures for development and other uses. A full range of management functions (monitoring research, enforcement education, etc.), funded by fees collected from users.	No overall vision, no regional oversight, no regional advisory groups, and no master planning for cultural resources, research and other needs. Planning initiative is lost and becomes reactive and responsive to crises and public and political pressure (for example, flood, fish kills, infectious disease, coral reef kills, etc.). Crisis management.

6.6.6. Necessary Approvals and Permits. Chapter 5 covers the actions to implement the Master Plan, and the specific regulatory and procedural requirements for each State, County, and Federal agency are listed. In addition, Director of the Office of State Planning must approve the Master Plan before it can be implemented.

6.7. Public Involvement. Appendix A summarizes the letters received from the general public during the development of the Master Plan by the Task Force and its committees and subcommittees. In addition, Chapters 1 and 2 present important information on how public involvement was solicited and used for Master Plan development. The Task Force convened 21 public meetings, while its committees convened an additional 16 meetings and numerous other subcommittee and ad hoc committee meetings. Collectively, several hundred residents participated in the Task Force meetings and also provided input at committee, subcommittee, and ad hoc committee meetings. Copies of the draft of the Master Plan were made available for public inspection at the Office of State Planning in Honolulu, He'eia State Park, Kane'ohe Library, and Kualoa-He'eia Ecumenical Youth (KEY) office, for ten days before the public meeting held on January 13, 1992, in Kane'ohe. Comments at the public meeting focused on clarifying or correcting details of the Master Plan. Concerns were also raised on limits placed on daily customer levels for commercial recreation, proposed allocation of concessions, and the need to strengthen the section on fishpond restocking and public access to federally controlled lands. Copies of the final Master Plan are to be distributed to the public.

6.8. Unresolved Issues. There are no major unresolved environmental issues regarding the Master Plan at this time. The public concerns raised at the meeting of January 13, 1992, are addressed in the final version of the Master Plan, which was revised based upon public comments and other suggestions. Although State of Hawaii government agencies are expected to strongly support the Master Plan, statements or commitment of support will also be needed from key County agencies, and Federal regulatory and environmental agencies.

6.9. Determination and Conclusion. Approval of the Master Plan of the Kane'ohe Bay Master Planning Task Force will not result in significant adverse impacts to the environment. In comparison to the most probable future of Kane'ohe Bay without the Master Plan initiative, the environmental conditions of Kane'ohe Bay are expected to worsen. Hence, the Master Plan will, for the most part, result in beneficial environmental and socio-economic impacts. Therefore, preparation of a State of Hawaii environmental impact statement for the Master Plan is not recommended or needed.

Implementation of some of the Master Plan recommendations may cause some adverse impacts to the environment. The lead agencies or sponsors of those activities may need to reassess the environmental consequences of these individual actions during their detailed planning, design and implementation in accordance with the State of Hawaii EIS or National Environmental Policy Act procedures.

Table 5. Description of the initial alternative commercial recreation plans developed by the Kane'ohe Bay Master Planning Task Force, its committees, sub-committees, and commercial operators in mid-1991.

PARAMETERS	ALTERNATIVES				
Identification	# 1	# 2	# 3	# 4	Status Quo
	TF High	TF Low	Commercial Operators (see Attach A)	(Minimal Impact) (see Attach B)	
Numbers	4 HI-3LO	5HI-3LO	7+glassbottom		
Permits	7 Total	8 Total	8 Total	3 Total	12 +
Capacity Each Operator	130	60	Individual	60	Unltd.
Total on Bay	700	480	690 (+70 w/ glassbottom) & annual ave. not over 395/day	180	690+
Activities					
Fixed Base	YES	YES	YES	NO	YES
Motor/Thrill	YES	YES(NO)	YES	NO	YES
Non-motor	YES	YES	YES	NO	YES
Snorkel	YES	YES	YES	YES	YES
Glassbottom	YES	YES	YES	YES	YES
Swimming	YES	YES	YES	YES	YES
Scuba	YES	YES	YES	YES	YES
Community Protection					
Annual License Renewal	YES	YES	YES	YES	YES
Public Input	YES	YES	YES	YES	NO
Daily Log (filed monthly with Harbormaster)	YES	YES	YES	YES	NO
Monitor Environment	YES	YES	YES	YES	NO
Sanitary Device Required	YES	YES	YES	YES	NO
Shuttling	NO	NO	To capacity	NO	YES
CDUA required	YES	YES	YES	YES	NO
Use submerged lands	YES	YES	YES	YES	YES
Transition					
Number of Years	2	2		2	N/A
Transitional capacity					N/A
Moratorium extended until new rules take effect	YES	YES	YES		NO
Phase out of thrillcraft and motorized towing in 5 years	YES	YES	NO		NO
Permit Renewal after Dec. 31, 1992, requires an approved CDUA	YES	YES	YES via Boating Branch application		NO

Attachment A: Amendments to Alternative 3 Proposed by Commercial Recreation Interests

1. Public review for permit renewal.
2. Provisions for monitoring and protection of reef ecosystems in the vicinity of commercial and non-commercial operations by all users.
3. Restriction on transferability of permits, so long as permits can be transferred to the immediate family living in the state or employees who have worked for the company for at least three years and are still employed.
4. Restrictions on shuttling to not exceed present permit limits.
5. Mandatory provisions of approved waste holding tank and pump-out arrangements on commercial "host" vessels.
6. Filing of a Conservation District Use Application (CDUA) by the Boating Branch (BB) to implement the use of specified submerged lands with associated day use moorings for commercial operations.
7. Continued weekend and holiday ban as presently existing so long as the same is upheld by the courts of law.
8. Agree to operate under one commercial operating permit and maintain the limits on the quantity of equipment up to proposed capacity levels and the capacity presently permitted at He'eia Kea Harbor for vessels to carry.
9. Use of present designated areas by the commercial operators for mooring, jet skiing, snorkeling, and other ocean recreational activities as presently permitted by existing State and Federal laws, rules, and regulations. Operating area adjustments can be made, so long as the operators involved have a right to participate in the decision to relocate and so long as the same does not hurt them economically.
10. The commercial operations on Kane'ohe Bay are similar to other industries where there is a diverse range in the size of each operation. The smallest operator has a vessel capacity of 31, and the largest a vessel capacity of 293. In a meeting with the majority of commercial operators present, each operator established a maximum capacity, which would not be exceeded during a calendar year period, for their respective operation: to take into consideration the seasonal fluctuations of the industry yet take into account the concerns of the community.

<u>Operator</u>	<u>Maximum</u>	<u>Average</u>
Mid Pacific of Hawaii	180	100
Morning Star Cruises	130	100
Nautique	150	75
North Bay Boat Club	130	70
Club Kona	50	25
Kualoa*	50	25
Total	690	395

* Kualoa was not present at the meeting and the maximum and average figures were estimated by the other operators present.

Although the maximum capacity is 690, it would be highly improbable that all operators would reach the maximum level on the same day, but allows the commercial operators to reach the daily average of 395, which would be the more realistic figure to base a decision.

11. Jet ski operations will be further limited to operate more than 70 yards from the sand flat area.

Attachment B: Amendments to the Minimal Impact (Alternative 4) Option for Commercial Use Proposed to the Kane'ohe Bay Master Task Planning Force

Amendment language reads as follows:

1. No permits for commercial operations in Kane'ohe Bay would be renewed after December 31, 1992, unless the State of Hawaii, Department of Transportation has submitted a Conservation District Use Application (CDUA) to the State of Hawaii, Department of Land and Natural Resources for a permanent fixed mooring(s) for use by low impact commercial permit holders.
2. No commercial thrillcraft (jet skis and motorized towing) would be allowed to operate of Kane'ohe Bay after December 31, 1994.
3. The commercial permit holders of record (as listed in the April 25, 1991 Water Use Committee report) would be allowed to continue to operate with a low impact permit as described in the Alternative submitted by John Reppun, Task Force Member, at the Kane'ohe Bay Master Plan Task Force meeting on May 15, 1991 (Alternative #4). As holders of permits cease doing business, or as majority interest in companies holding their permit changes, the permit would return to the State and be retired, until the number of permits is reduced to 6.
4. The location of commercial operations would be subject to locational restrictions.
5. A moratorium of commercial operations shall be in effect on Sundays and three holidays: Memorial Day, Fourth of July, and Labor Day.

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ACRONYMS USED IN THIS REPORT

AICUZ - Air Installation Compatible Use Zone APZ - Air Accident Potential Zone
BB - (State) Boating Branch
BLNR - (State) Board of Land and Natural Resources
BWS - (City and County) Board of Water Supply
C&C - City and County of Honolulu
CDUA- Conservation District Use Application
CWRM - (State) Commission on Water Resource Management
DAR - (State, DLNR) Division of Aquatic Resources
DBED - (State) Department of Business and Economic Development
DGP - (City and County) Department of General Planning
DLNR - (State) Department of Land and Natural Resources
DLU - (City and County) Department of Land Utilization
DOA - (State) Dept of Agriculture
DOB - (City and County) Building Department
DOE - (State) Department of Education
DOEnv - (State, proposed) Department of the Environmental Protection
DOH - (State) Department of Health
DOT - (State) Department of Transportation
DP - Development Plan
DPR - (City and County) Department of Parks and Recreation
DPW - (City and County) Department of Public Works
EA - Environmental Assessment
EC - (University of Hawaii) Environmental Center
EIS - Environmental Impact Statement
EPA - (United States) Environmental Protection Agency
FWS - (United States) Fish and Wildlife Service
HAEP - Hawaii Association of Environmental Professionals
HESL - (University of Hawaii) Hawaii Environmental Simulation Laboratory
HIMB - (University of Hawaii) Hawaii Institute of Marine Biology
HSL - (State) Hawaii State Legislature
HVB - (State) Hawaii Visitor's Bureau
IWS - Individual Wastewater System
KMCAS - Marine Corps Air Station, Kane'ohe Bay
mgd - million gallons per day
MHI-MRI - Main Hawaiian Islands Marine Resources Investigation
NDS - Naval Defensible Sea
NMS - National Marine Sanctuary
NOAA - (United States) National Oceanic Atmospheric Administration
NOSC - Naval Oceanic Systems Center
NPS - (United States) National Park Service
OHA - (State) Office of Hawaiian Affairs
ORMP - Ocean Recreation Management Plan
OSP - (State) Office of State Planning
PSD - (State) Public Safety Department
SCS - (United States) Soil Conservation Service
SLUC - State Land Use Commission
SMA - Special Management Area
STP - Sewage Treatment Plant
UH - University of Hawaii
USCG - U.S. Coast Guard
USCOE - U.S. Army Corps of Engineers
USEPA - U.S. Environmental Protection Agency
USGS - U.S. Geological Survey

APPENDIX A - Public Involvement

Participants at Kane'ohe Bay Task Force Committee, Sub-Committee and Other Meetings (in addition to contributors listed on page vi).

Eugene Akazawa
 Jimmy Akiona
 Clint Anderson
 Roy Anderson
 Jim Anthony
 Tom Arizumi
 Jim Bassett
 John Bay
 John Benson
 Brian Benton
 John Brack
 A. E. Brum
 Sherryl Buechet
 Eadean Buffington
 Ronald Burley
 Lisa Carter
 Shirley Cavanaugh
 John Cazinha
 Art Chang
 Dawn Chang
 Paul Chang
 David Cheng
 Damien Ching
 Ernie Choy
 M.S. Chun
 Athline Clark
 Linda Colburn
 Carol Conrad
 John Corbin
 Olani Decker
 Walt Diehl
 Bob Diffley
 Murray Duclos
 Peter DeVries
 James Drorbaught
 Mayfield Drorbaught
 Willie Dung
 Calvin Eaton
 Richard Eichor
 Roger Evans
 Florence Fanning
 Harold Fanning
 Susan Fristoe
 Uli Frowein
 Gloria Gaines
 Natani George
 F.H. Goldsmith
 Watson Goldsmith
 Gretchen Gould
 R.E. Green
 T.K. Gross
 Eric Gutnther

Clayton Hanagami
 Douglas Hasegawa
 Jeff Haun
 Carolyn Heinrich
 L.L. Henry
 Kim Hoff
 Gordon Hong
 Dean Ihara
 Ko Isayama
 Marcus Ishiki
 Naomi Johnson
 Charles Kaeo
 David Kailio
 Steve Kaiser
 Mel Kalahiki
 Randy Kalahiki, Sr.
 Bernie Kaluhiwa
 Jerry Kaluhiwa
 Liko Kaluhiwa
 Mahi Kaluhiwa
 Rocky Kaluhiwa
 Matt Kamo
 Warner Kanuelo
 Hiroshi Kato
 George Kawelo
 Warren Kawelo
 Hiroku Keanu
 Marion Kelly
 Fritz King
 David Klaproth
 Mary Lou Kobayashi
 Keith Krueger
 Todd Kuwaye
 Scott Lasatter
 Denis Lau
 June Lau
 Lynn Lee
 Pat Lee
 Sharon Lewis
 Rosemary Limpahan
 Gabriel Lin
 Jim Liu
 Bernadette Lono
 Kem Lowry
 Bob Lucas
 Arnold Lum
 Nuala Maddox
 Kalani Makaaia
 Ernest Makainai
 Annette Mante
 Jon Matsuoka
 Y. Matsushima

Lola Mench
 Carl Mento
 Matt Milton
 Clay Minter
 Johanne Mitchell
 Arlene Miyake
 Richard
 Montgomery
 David Moody
 John Morgan
 William Moore
 Bruce Morita
 Gail Nakamoto
 Guy Nakamoto
 Bob Nakata
 Alan Nakoa
 Pejuu Neion
 Pepi Nieva
 Gordon Nong
 Richard Nunas
 Terry O'Halloran
 Gary Omori
 Dawn Ornella
 Henry Oshima
 Chuck Partin
 Josephine Patacsil
 Tazuko Pataray
 Timothy Paul
 Walter Paulo
 Donna Perry
 Thomas Perry
 Louise Peterson
 Mary Protherae
 Donovan Reame
 Ernest Reese
 David Reinhardt
 L.M. Ryan
 David Rhoads
 Scott Saigon
 Frank Sandoz
 Fritz Sandry
 Gary Santos
 Sig Schuster
 Toshiko Schuster
 Jim Schwenker
 Clifford Seno
 R. Sherer
 Vincent Shigekuni
 Paul Shinkawa
 Edna Shoup
 Gabriel Siu
 Albert Souza

Michael Stroup
Ray Sweeney
Ray Tabata
Mark Terada
Mark Toerge
Walter Toerge
H. K. Trask
Rich Tsujimura

J. Tully
Richard Tyler
Roy Vierra
Louis Watson
Carol Whang
Leo Williams
William Wolf
Donna Wong

Tom Woo
Stan Wright
Ralph Wrolu
Wallace Yamamoto
Keith Yokuna
Clyde Yoshioka
Bob Young
Jeanie Young