Management Plan For
The Puget Sound Commercial
Geoduck Fishery

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GLOSSARY

Bed - A relatively contiguous dense assemblage of geoducks which may be few to several hundred acres.

Bed, Commercial - A major bed which is suitable for harvest based upon technical, economic, and environmental criteria.

Bed, Major - A geoduck bed of more than 5 acres with at least 0.04 geoducks/sq. ft.

DNR - Department of Natural Resources.

DOE - Department of Ecology

MHW - Mean high water, 4.2-14.0 feet above MLLW in Puget Sound

MLLW - Mean lower low water, 0 ft. tide level.

MSY - Maximum sustainable yield, the maximum annual harvest which can be taken each year, year after year, without damaging the clam stocks.

Optimal Yield - The maximum sustainable yield adjusted for relevant environmental, economic and social factors and which produces the greatest net benefit to the citizens of the state.

RCW - Revised Code of Washington, state laws passed by the legislature.

Recruitment - The entry of new clams into the harvestable population. It is those clams which are spawned, grow and survive to replace clams lost to natural mortality and to fishing.

SEPA - State Environmental Policy Act of 1971 (RCW 43.21).

Shoreline Master Plan - Plan for county shoreline use as mandated by the Shoreline Management Act and included in WAC 173-19.

SMA - Shoreline Management Act of 1971 (RCW 90.58).

Tract - A defined section of a commercial geoduck bed which is leased for geoduck harvest.

WAC - Washington Administrative Code, departmental regulations

WDF - Washington Department of Fisheries.

INTRODUCTION

This is the combined commercial geoduck fishery management plan of the Washington Departments of Fisheries (WDF) and Natural Resources (DNR). These agencies have major responsibilities for management of commercial geoduck harvest. Each Department has prepared a plan for its harvest management program. Preparation of these plans was closely coordinated to avoid duplication of work and to insure consistency. It was logical, then, to combine the two plans into one document so that the public could better understand the state's programs.

This plan consists of three sections and an appendix. The first part states the management procedures and policies which will be used to guide tract selection, interagency coordination, tract auctions, harvest monitoring and enforcement. The second section, prepared by WDF gives background information on geoduck biology, and the fishery, and management objectives. The third section prepared by DNR, discusses the Department's marine land management objectives and their relationship to management of commercial geoduck harvest. The fourth section of the plan is the appendix. This contains background material and program documents which will need periodic updating.

Management of the geoduck fishery is not static. Changes in the market demands and economics affect the fishery and its management as does knowledge of the biology and population dynamics of the geoduck resource, and the fluctuating social and political climate. Given this situation, this document is intended as a flexible outline for the management of the geoduck fishery. Changes and improvements are anticipated and will be made through the mutual consent of the co-managers of the fishery - the Departments of Fisheries and Natural Resources.

Geoducks (Figure 1) have long been known as a sport clam in Puget Sound. It was not until recently, however, that the real commercial potential of this resource became known. Discoveries of high subtidal geoduck abundance in the early 1960's prompted the Department of Fisheries to conduct surveys over the next several years. On the basis of the survey findings and recommendations, the legislature enacted a geoduck commercial harvest program to be managed jointly by the Department of Fisheries (WDF) and the Department of Natural Resources (DNR).

DNR and WDF have complimentary authorities and responsibilities for management of commercial geoduck harvest. DNR has responsibility for management of the subtidal marine lands where commercial geoduck harvest is permitted. RCW 79.01.570 gives the DNR authority to enter into leases or harvest agreements for geoduck harvest. The law gives the Department authority to cancel or suspend leases and harvest agreements for violations of their provisions or for violation of WDF licensing or harvesting provisions under Title 75 RCW.

WDF has responsibility for management of the geoduck fishery and for insuring that geoduck harvest does not injure the marine environment. RCW 75.24.100 enpowers the Director of the Department of Fisheries, with the approval of the Commissioner of Public Lands, to issue licenses for geoduck harvesting. The initial legislation restricted this harvesting to no closer than 1/4 mile from shore, to below -10' MLLW, and to divers using hand-held gear. The law generally gives the Director of the Department of Fisheries the authority to control the intensity and methods of harvest for protection of the resources and habitat. Revised legislation adopted in 1979 now allows harvest to within 200 yards of shore or beyond the -18' MLLW contour, whichever is farther.

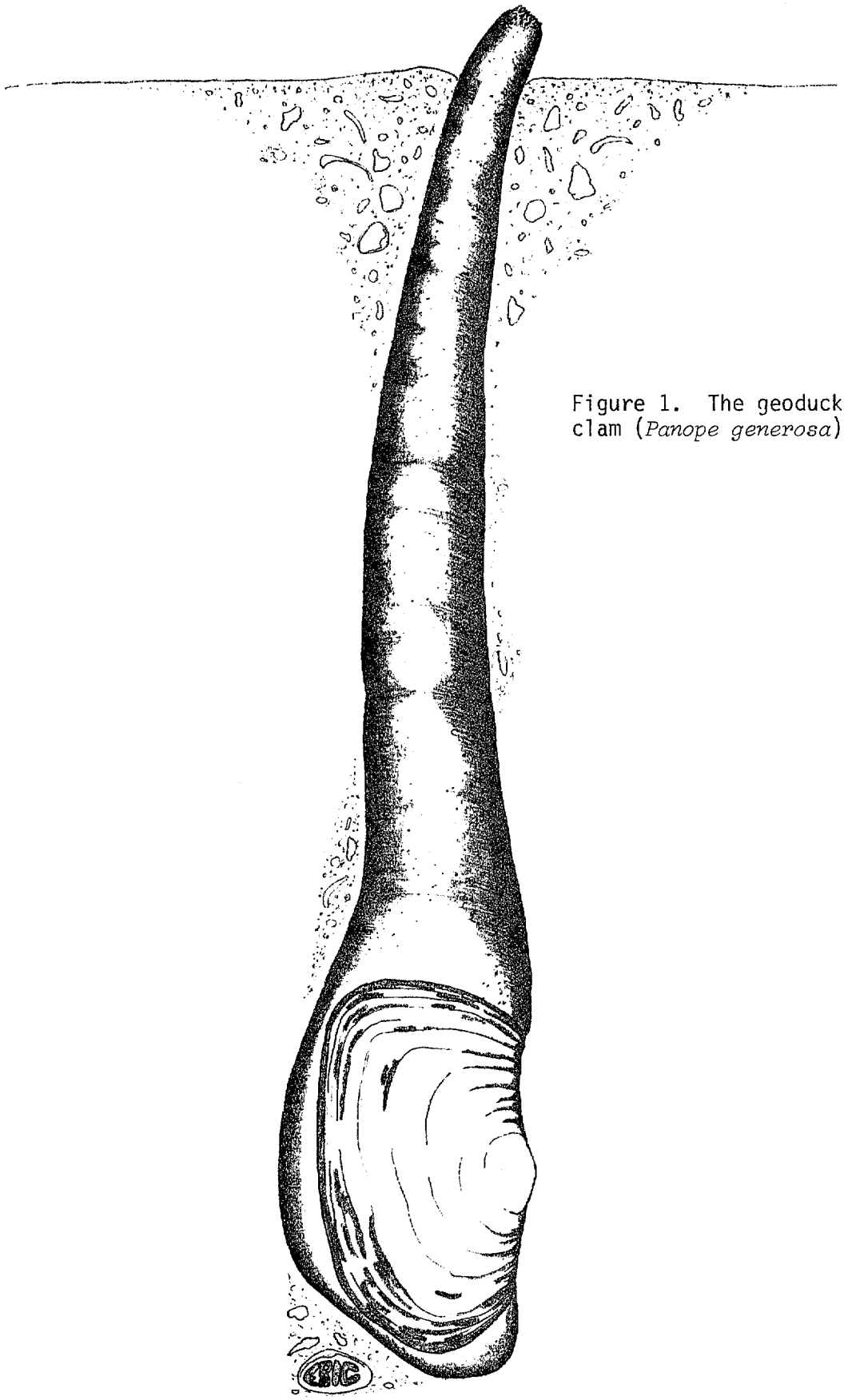

Figure 1. The geoduck clam (*Panope generosa*).

SECTION I - MANAGEMENT PROCEDURES AND POLICIES

A. Identification and Allocation of Geoduck Beds for Eventual Harvest

1. The Department of Fisheries will provide the Department of Natural Resources with an updated list of geoduck beds in Puget Sound suitable for commercial harvest. These beds must meet the following criteria:
   a. Beds are further from shore than 200 yards (from MHW) and deeper than -18 feet (0 ft. - MLLW) (RCW 75.24.100).
   b. Geoducks must be of commercial abundance and quality.
   c. Substrate is suitable for harvest.
   d. Beds are free from pollution and certifiable by the Department of Social and Health Services.
   e. No known spatial or environmental conflicts exist which would preclude harvest.
   f. Harvest will not create long term, adverse impacts to surrounding environment or to important habitats.

2. The Department of Natural Resources will allocate these beds for future geoduck harvest. It is assumed that all geoduck beds meeting these criteria will eventually be harvested. DNR will maintain maps in Appendix A of this plan showing the areas in Washington which are allocated for commercial harvest of geoducks. The maps will be updated as necessary to reflect discovery and addition of new beds, and reevaluation and deletion of previously allocated beds.

3. The Department of Natural Resources will maintain as Appendix B of this plan a summary of the current environmental information on each tract. This summary will be updated as new information becomes available.

4. The maps and environmental summaries will be circulated by DNR to interested agencies. These agencies will be encouraged to inform DNR of any potential conflicts with geoduck harvest at these sites and to prevent pollution or other damage of these beds.

5. The Departments of Fisheries and Natural Resources will not allow uses under their control other than commercial geoduck harvest to occur within the geoduck beds shown in Appendix A unless the use will not conflict with this harvest or unless the Departments determine that the public benefits of the use out weighs the loss of the geoduck harvest. The alternative use will be required to pay for the value of the resource withdrawn from use (see WAC 332-30-125(7)). DNR will not normally approve leases for activities which might pollute or destroy commercial geoduck beds.

6. The Departments of Fisheries and Natural Resources will encourage local governments to require adequate point and non-point source pollution controls for development near allocated geoduck beds and especially those which the Department or Social and Health Services has identified as being at risk (see Appendix B).

B. Selection of Geoduck Beds for Harvest

1. Each year the Department of Fisheries will propose sufficient geoduck beds as to supply the optimal sustainable yield for harvest. These beds will be selected from Appendix A. The Optimum Sustainable Yield (see Appendix C) is the Maximum Sustainable Yield of the geoduck population on the allocated beds. Estimates of the maximum and optimum sustainable yields of geoducks will be adjusted as necessary to reflect improved information on the populations dynamics and the geoduck resource in Puget Sound. WDF is responsible for estimating the sustainable yield and for setting the annual harvest.

2. In selecting the geoduck beds for harvest, WDF and DNR will ask the advice of representatives of the geoduck industry and of interested

agencies, groups, and individuals. The following factors will be considered in selecting beds for harvest.

a. Providing sufficient stocks to meet the optimum sustainable yield.
b. Rotation of harvest around Puget Sound for the convenience of the industry, for the ease of enforcement, and to distribute the impacts of the fishery on the environment and the shoreline communities.
c. Clustering of the tracts, when possible, to concentrate the fishing activities into a single, discrete area to facilitate enforcement.
d. Offering a variety of geoduck types and qualities during the lease period to meet current market demands.
e. Convenience of landing areas both for the industry and for enforcement.
f. Other factors which are determined to be important.

3. DNR and Fisheries will establish a tentative three year harvest schedule as Appendix D of this paper. This schedule will provide the industry and local government with a list of when and where harvest will take place. It will also ensure sufficient lead time for a careful environmental analysis of the proposed tracts as well as coordination between the involved agencies and discussions with the local community. Because of the potential for changes in the fishery, markets, and knowledge of the resource, this schedule must remain flexible and relatively general.

C. Interagency Coordination and Environmental Assessment

1. At least six months prior to auctioning of the geoduck tracts for lease Departments of Fisheries and Natural Resources will meet with local officials to propose specific geoduck beds for harvest. The Departments will request the assistance of the county in providing local comment on the proposal and in scheduling a public meeting.

The county will also be asked to review the proposed harvest tracts and note any environmental or use conflicts, and to determine the necessity of shoreline or other permits. The Departments will propose the harvest tracts to the county well in advance of their lease and will provide sufficient time for the environmental assessment and for permit application and approval before the leasing of any tracts for harvest.

2. WDF will summarize the existing environmental information on the proposed tracts. These summaries will then be distributed to the county, interested state and federal agencies (see Appendix E), and interested groups with a request for written comments to be submitted within 30 days.

3. WDF divers will resurvey the harvest beds to refine estimates of geoduck abundance, to evaluate the preharvest condition of the tracts including the substrate, the abundance and importance of the associated flora and fauna, and the presence of any biologically significant areas such as spawning and nursery areas for other important organisms. These surveys will also address the questions derived from public and agency input and from permit requirements. This survey information will be summarized including recommended limitations on harvest operations to protect the geoduck resource and surrounding habitats.

4. A public meeting will be held near the proposed harvest site. Notice of this meeting will be given to local newspapers, to interested local, state, and federal agencies, and to the geoduck industry. At the meeting, DNR and WDF will review the available information about the geoduck resource, harvest operations and potential environmental impacts. The audience will be asked to point out concerns about the proposed harvest and to suggest necessary actions for minimizing adverse impacts. A mailing list will be started to keep interested individuals informed of the progress of the proposal.

5. DNR will prepare an environmental checklist (e.g., Appendix F) and threshold determination. This will be circulated to interested agencies, be placed on file with the local library, and be sent to interested individuals upon request.
6. Upon issuance of the necessary permits and SEPA compliance, DNR will advertise and lease the tracts for geoduck harvest. The advertisement, invitation to bid, and DNR harvest agreement will contain the conditions on harvest arrived at in 3 and 4 above.

7. The Department of Fisheries and Natural Resources will schedule additional public meetings as necessary or as part of the permit review process.

8. Shortly before harvest begins, DNR and WDF will inform the local community and local agencies about harvest procedures and restrictions, about tract boundary marking, and about whom to contact in case of questions or complaints during harvest. If requested, a neighborhood meeting will be held to present this information and to discuss the anticipated harvest and what shoreline residents may expect.

D. Conditions During Harvest

1. Harvest is limited to only approved tracts leased from the Department of Natural Resources and licensed by the Department of Fisheries. These tracts will be marked by sightlines and buoys as necessary to delineate the tract boundaries when viewed both from the water and from the shore. Vessel operators must have DNR tract maps sightline photographs on board the harvest vessel when harvesting. These photographs and maps are available to shoreline residents upon request to DNR.

2. Landing of harvested geoducks will only be allowed at sites approved by DNR. Whenever possible, landing sites will be approved for the convenience of the harvester. However, other factors will be considered

such as accessibility for enforcement personnel, interference of use by the general public and disturbance of the local community.

3. Harvest will be managed so as not to interfere with military exercises or with other navigational uses.

4. WDF and DNR will limit harvest by limiting the acres of geoduck tracts leased for harvest, the number of divers permitted per tract, and the hours and days of operation. In selecting the hours and days of harvest, WDF and DNR will consider the needs of the geoduck industry and the effects of harvest upon local citizens. When necessary, additional limitations may be imposed via the DNR harvest agreement to deal with special, site specific situations.

5. Harvest on any set of tracts will be limited to a fixed period, currently 12 months. The lease period will be set by DNR with the approval of WDF to meet industry needs while ensuring adequate control over harvest, effective enforcement, and compatibility with local needs.

6. Noise levels onshore due to harvesting will not exceed DOE noise standards, local noise ordinances, (if any applicable), and DNR contract conditions (see Appendix G).

E. Monitoring and Enforcement

1. Fisheries Patrol Officers (FPOs) shall be assigned specifically to the geoduck fishery with funding provided by DNR from geoduck lease revenue.

2. FPOs will monitor and enforce compliance with Fisheries laws and regulations, DNR contract conditions, and shoreline permit requirements.

3. DNR harvest agreements provide that violations of any provision including WDF regulations, may result in suspension or termination of the agreement.

4. FPOs and DNR compliance personnel will monitor weighing and reporting of catch.

5. FPOs will respond to and investigate reports of illegal or improper harvesting activities.

F. Post-harvest Evaluation of the Harvest Tracts

Harvest tracts will be re-inspected following completion of harvest. These post-harvest evaluations will be conducted as deemed necessary by the Department of Fisheries based upon its experience with similar harvest tracts, knowledge of the harvest operations of the tract, permit requirements, and the availability of personnel. These evaluations will assess the effects of harvest, compliance with harvest conditions, and suitability of the tract for reharvest. On selected tracts, detailed post-harvest evaluations will be made and recovery of the tracts monitored.

G. Fisheries Research

The Department of Fisheries maintains an ongoing research activity to study the geoduck. Appendix H contains a summary of current research. This will be updated each biennium.

SECTION II - DEPARTMENT OF FISHERIES

INTRODUCTION

In 1969, the Washington State legislature authorized the commercial harvest of subtidal geoduck clams after surveys by the Department of Fisheries had demonstrated the presence of a major resource. The Washington Department of Fisheries (WDF) and Natural Resources (DNR) were designated as the co-managers of the fishery.

Since commercial fishing begin in 1970, the geoduck fishery has become the largest clam fishery on the West Coast. In 1979, over 6.7 million pounds of clams were landed in Washington with a wholesale value of over $3.9 million. The fishery is now an important source of jobs, income, and food. It also represents a strong economic justification for maintaining the high water quality of Puget Sound, which is essential to this and many other fisheries.

Despite many benefits to the state, the geoduck fishery has been source of some controversy. One aspect of this controversy is the shoreline residents' concern about noise and commotion on the water and about the environmental effects of geoduck harvesting. Others have philosophical concerns about the commercial utilization of marine resources versus their preservation.

On the other hand, the fishing industry seeks steady, reliable access to more and better geoduck stocks. They argue that this is needed for a stable, viable industry and to meet market demands. Industry is thus concerned about any actions which would limit the availability of the product, their access to it, or limit their operations.

WDF is charged with the responsibility of preserving, protecting, and managing the food fish and shellfish resources of the state, and of protecting the marine environment. Consistant with this responsbility and for the purpose of conservation, WDF is further directed to maintain the economic well-being and stability of the commercial fishing industry. Given these responsibilities, WDF and DNR as co-managers of the fishery must balance the interests of the citizens and of the industry, while providing for the conservation of the resource.

The geoduck resource does not recognize arbitrary boundaries such as county lines. Full utilization of the resource for the benefit of all the citizens of the state depends upon management of the resource on a statewide basis as a single unit. Present management is based upon the assumption that all of the identified geoduck beds which are suitable for harvest, consistent with protection of the resource and the marine environment, are available for harvest.

Failure to adequately address local and citizen concerns could ultimately lead to a piece meal management of the fishery. Under the Shoreline Management Act the counties may require permits for substantial projects in the shoreline area. Through the permit process the county may approve, condition, or prohibit a project. In many cases the action taken depends upon the perceived impact of the project locally and citizen reaction. By demonstrating the ability and willingness to address local interests and needs, WDF and DNR hope to alleviate local concerns and obviate the counties from exerting management controls over the fishery through the shoreline permits.

Currently, two counties require shoreline permits for geoduck harvest. Other counties may require permits upon review of their shoreline master plans under the revised DOE guidelines. WDF does not contest the propriety of the counties to require such permits. The hope is that each proposed harvest operation be weighed upon its actual environmental effects both in the water and on shore, as well as the benefits derived for all the state's citizens.

Goals and Objectives of Plan

The goals of geoduck management are to protect the geoduck resource, the associated organisms and the environment; to manage the fishery on the basis of the optimum yield in the best interest of all the citizens of the state; to provide for a stable, orderly fishery; and to minimize any social conflicts resulting from the fishery.

To achieve these goals this management plan attempts to: (1) ensure adequate review of the potential effects of harvest upon the clam stocks, the associated flora and fauna, and the marine habitat prior to final tract selection; (2) establish a schedule for this review; (3) establish a mech-

anism to allow citizen, government, and industry input into allocation of the geoduck resource; (4) in concert with DNR and DOE, encourage greater consistency and certainty in shoreline permit requirements with the hope that access to the geoduck stocks will be secured; (5) provide greater consistency and predictability in management; and (6) provide for the effective enforcement necessary to proper resource management.

Implementation of Plan

This plan will be implemented through adoption of its basic elements into the regulations of the Department of Fisheries as appropriate. The management plan and the codified procedures will then be the basis for future management and resource allocation decisions. Copies of the plan will be distributed to the interested parties, agencies, and libraries in those counties which have commercial geoduck resources.

This plan has been prepared in close cooperation with the Department of Natural Resources to ensure that it is complementary to their plan for management of the subtidal geoduck beds.

SUMMARY OF GEODUCK BIOLOGY

Distribution and Abundance

Geoducks are large burrowing clams found from Alaska to California with the center of abundance in Puget Sound. On occasion they are found on intertidal beaches and are quite abundant subtidally. Geoducks have been observed in depths to 180 feet and in variety of substrates, predominantly sand and mud.

In 1967, WDF began extensive, ongoing surveys of the subtidal clam resources in Puget Sound. The geoduck survey results have been published as WDF Technical Report 13 and Progress Report 36, 63, 95, 112, and 137. Areas most likely to have geoduck beds suitable for commercial harvest were studied. Geoducks were observed to be widely and abundantly distributed subtidally throughout Puget Sound (commercial geoduck beds are shown in Appendix A). Within the areas surveyed, beds larger than 5 acres with more than 0.04 geoducks/sq. ft. are classified as major beds. Those major beds where harvest will not cause long term adverse environmental damage and which are free from pollution; protected from excessive wind, waves or currents; in substrates and depths where harvest would be economically feasible; and in legally fishable waters (over 200 yards from shore (MHW) or in water more than 18 feet deep) are classified as commercial. Table 1 summarizes the results of these surveys. The identified commerical beds are shown in Appendix A.

Table 1. Results of geoduck surveys conducted since 1967.

	Acres	Geoducks (million pounds)
Puget Sound - subtidal	57,6000*	
Harvestable depths (-18 to -60 ft.)	88,000*	
Observed geoduck beds	33,799	
Major and commercial beds	19,545	280 million
Commercial beds	8,378	165 million
Annual harvest from commercial beds	200-300	5 million**

*McLellan, Peter M. 1954. An area and volume study of Puget Sound, Washington. Univ. of Washington Dept. of Oceanography Tech. Rept. 21 39 pp.
**Harvest is currently around 5 million pounds annually, based upon a maximum sustainable yield of 3 percent. This estimate is under review and may be adjusted.

Life History

Geoducks are perhaps the largest burrowing clam in the world. Geoducks in Puget Sound average two pounds each and sometimes exceed ten pounds. The life history of the geoduck begins in the spring when spawning adults release millions of gametes into the water where fertilization occurs. For 4 to 5 weeks, the larval clams drift with the currents and may be transported far from the parental beds. Upon settling to the bottom, the clams begin to burrow into the substrate. They burrow deeper as they grow, usually to 2-3 feet deep but as much as 6 feet. Burrowing ceases in 3 to 4 years and loses its digging ability. Geoducks feed on planktonic algae drawn in via their long necks (siphons). They grow rapidly, attaining sexual maturity (about 100 mm long) in 3-4 years and harvestable size (about 1.5 pounds) in 4 to 10 years (Figure 2). Geoducks are very long lived. The average age is 38-57 years and with some clams reaching 130 years.

The limiting factor in geoduck production is the slow rate at which new members are recruited into the population to replace those lost to harvesting. Although the clams grow rapidly, it may take 30 to 50 years for a harvested population to be replaced naturally. To speed replacement and thus increase the potential production of geoducks, WDF is developing methods to artificially culture small geoducks and plant them on harvested beds.

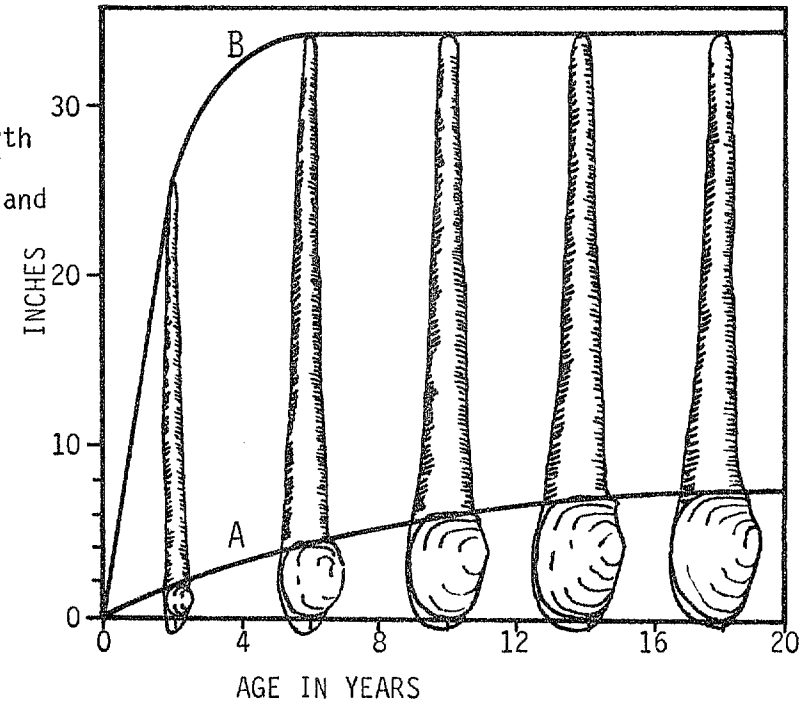

Figure 2. Geoduck growth showing the relation of shell length (curve A) and burrow depth (curve B) to age.

SUMMARY OF GEODUCK FISHERY

Harvest Gear and Methods

Geoducks are commercially harvested from subtidal beds by divers using hand-held water jets. Most divers use HOOKA gear, and are supplied with air through hoses from compressors on the work boat. Most of the boats are 30-40 feet long and operated with a crew of 2-3 divers and a tender to operate the pumps and compressors. The water jet used to harvest the clams (Figure 3) is a nozzle consisting of a short length of pipe (about 18 inches long) with 5/8-inch diameter tip the digging end and a shut-off valve on the other. Water pressure (40-60 lb./sq. in.) is supplied from pumps on board the boat.

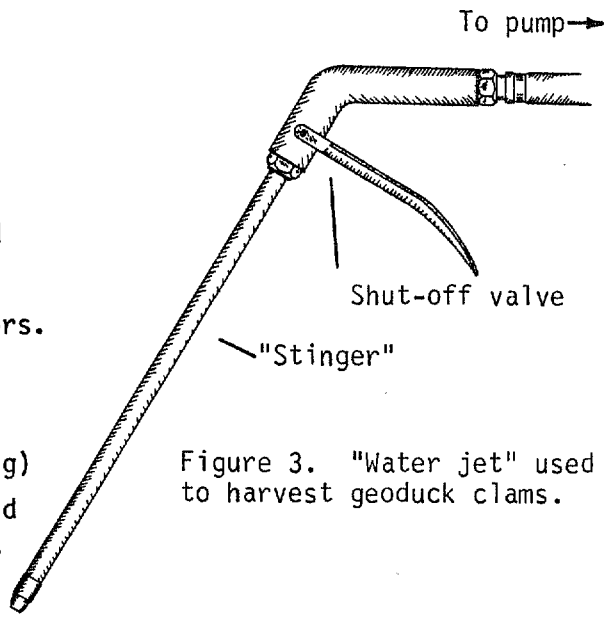

Figure 3. "Water jet" used to harvest geoduck clams.

To harvest the geoducks, the water jet is inserted alongside the geoduck, which is located by its "show" (neck extended out of the substrate) or by feeling for the depressions in the substrate left when the neck is withdrawn. Water from the nozzle liquifies the substrate around the clam, allowing the geoduck to be pulled out. Harvest is accomplished with minimal disruption of the substrate, as only a small depression is left (Figure 4), with minimal damage to other organisms. The effects of harvest are discussed in the environmental checklist, Appendix F.

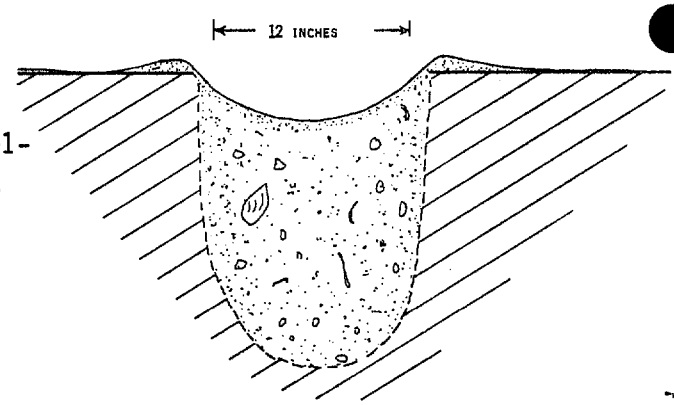

Figure 4. A typical geoduck harvest hole.

An experienced diver harvesting a good bed can dig a geoduck in 15-30 seconds and may harvest up to 2,000 pounds per day under ideal conditions.

The most desirable clams have large necks and light colored meat. The harvested clams are placed into mesh bags which, when full, are pulled to the surface by the tender. The clams are unloaded at marinas and boat ramps approved by DNR. Upon landing, the clams are weighed and the catch reported on a WDF shellfish receiving ticket. The clams are then transported to a processor or to fresh markets.

Geoduck Fishery Production

After the opening of the fishery in 1970, the industry was limited by lack of adquate markets. Domestic markets were generally limited to seafood restaurants and markets, and roadside stands. Despite considerable effort to develop a domestic market, the industry did not become more than marginally profitable until the mid-1970's, when fresh geoduck necks were successfully marketed in Japan. The effect of opening this market was to dramatically increase harvest, as shown in Table 2, and to increase demand for more product. It should be noted that geoduck is a luxury item for the Japanese and its sales depend upon economic conditions in Japan and Japanese-U.S. foreign exchange rates. In addition, competition for this market is developing from British Columbia and there are attempts to start a geoduck fishery in Alaska.

Table 2. Commercial geoduck harvest from Puget Sound (as reported to WDF).

Year	Pounds	Year	Pounds
1970	82,236	1976	5,365,898
1971	610,250	1977	8,646,746
1972	493,140	1978	7,089,656
1973	463,994	1979	5,204,773
1974	803,358	1980	4,168,869
1975	2,372,271		

The primary market is for geoduck necks airfreighted to Japan. These must be of very high quality and have very white meat. A growing market exists in some major cities with oriental communities for live geoducks. These clams must also be of high quality and must also be large and very fresh. Only a

small proportion of the clams are sold locally. Geoduck meat which is not suitable for these markets is generally sold as chopped meat at relatively low prices.

The geoduck fishery is the largest clam fishery on the West Coast. In 1979 the value of processed geoducks landed in Washington was about $3.9 million. While 3 or 4 small independent operators work in Puget Sound, supplying mostly live market clams, virtually all of the processed clams have been handled by one company. In 1981 a Canadian processor leased 2 tracts in Puget Sound and is now shipping the clams to Victoria for processing.

Presently about 12 boats engaged in the fishery and about 35 divers. The industry also employs around 100 people in processing and support activities. In addition to payrolls and business taxes, the industry pays about $500,000 per year to the state for the harvested clams, half of which is retained by DNR while the rest is allocated to the East Capitol Building Fund. An annual fee of $100 is required for each tract harvested and a $50 license fee for each diver. In addition, a 2 percent tax is assessed by the Department of Revenue on the value of the geoducks landed.

The potential for expansion of the fishery in Puget Sound is limited by the size of the resource. Presently those geoduck beds which are shallow enough for harvest, which are environmentally suitable for harvest and which are free from pollution are being utilized to their maximum capability. Expansion of the fishery would depend upon technological changes allowing harvest in deeper water or allowing utilization of geoducks from beds which are not now certified for harvest. The most promising possibility for expansion is the artificial reseeding of harvested beds and less productive beds. Reseeding could offset the slow rate of natural reseeding and could double or triple the volume of the geoduck fishery in Puget Sound.

JURISDICTION OVER GEODUCK FISHERY

The Department of Fisheries is the manager of the food fish and shellfish of the state and is, therefore, responsible for managing the geoduck resource. Most geoducks, however, dwell in subtidal bedlands belonging to the state and managed by the Department of Natural Resources. The fishery has thus been established (RCW 75.24.100) under the co-management of the two agencies and is operated under a combination of WDF and DNR laws and regulations (pertinent WDF laws and regulations are presented in Appendix I).

Role of Department of Fisheries

WDF's role is defined through its legislative mandate "...to preserve, protect, perpetuate and manage the food fish and shellfish in the waters of the state and... for the purpose of conservation...maintain the economic well-being and stability of the commercial fishing industry..." (RCW 75.08.212).

In practice, WDF is generally responsible for protection of the marine environment and the fisheries resource. RCW 75.24.100 further defines WDF's role in the geoduck fishery. The Director of Fisheries may issue licenses for commercial geoduck harvest, limit the amount of fishing effort and gear to protect the resource, its habitat and to achieve sustained yields, and may limit the type of gear and its use to prevent waste, destruction or permanent damage to the bottom or adjacent shellfish populations. Harvest is also prohibited within 200 yards of shore (MHW) or in less than 18 feet of water.

The function of WDF includes surveying and inventorying the clam resources, selecting the beds for harvest, determining the annual sustainable yield to be harvested each year, setting the allowable fishing effort and monitoring the effects of harvest on the geoducks, the substrate, and the associated flora and fauna. WDF is also responsible for enforcing the laws and regulations of the Department, and for studying the biology, ecology, and population dynamics of geoducks.

Role of Department of Natural Resources

DNR manages the state's ownership interests in the marine bedlands which include the geoduck clams. RCW 79.01.570 gives DNR authority to enter into

leases or harvest agreements for geoduck harvest. The Department may cancel or suspend leases and harvest agreements for violations of their provisions or for violation of WDF licensing or harvesting provisions under Title 75 RCW.

DNR cooperates with WDF in designating tracts for harvest, tract marking, and enforcement. DNR has developed its own management plan for geoduck harvest which explains the Department's authorities, policies, and activities in detail.

Other State Agencies

Various other agencies have authority or potential authority to affect the management of the geoduck fishery. These include the state Departments of Social and Health Services (DSHS) and Ecology (DOE). DSHS is required to ensure that the clams are safe for human consumption. Without DSHS certification, a tract will not be authorized for harvest. DSHS certification will not be granted if the clams or the water do not meet shellfish sanitation standards or if the presence of sewage outfalls, marinas, or other activities present a high risk of potential pollution.

The Department of Ecology has broad responsibilities, which include administration of noise and water quality standards, protection of the water from pollution, and administration of the Shoreline Management Act and the State Environmental Policy Act (SEPA).

Federal Agencies

At the present time, no federal authorities are involved with geoduck harvest except in site specific cases such as harvest user near federal wildlife refuges.

Local Government

Local government has a major role in management of the shorelines within its jurisdiction, including subtidal areas. The Shoreline Management Act of 1971 (SMA) reaffirms this role and provides a mechanism for controlling shoreline management. Under the SMA guidelines, each county develops its own Shoreline Master Plan for use of the shorelines which is then adopted into the

regulations of the Department of Ecology (WAC 173-19). A project or devlopment which exceeds the criteria specified in the Master Plan must attain a substantial development permit. Through this permit local government may approve, approve with conditions, or prohibit a project.

The intent of the SMA and the local plans has been primarily to control construction type projects along the shorelines and has been a major tool for limiting uncontrolled and inappropriate development. Guidance has not been provided to the counties concerning control of ongoing fishing activities such as geoduck harvest and considerable variation exists between counties in their approach to the harvest of clams from the subtidal waters of the state. Presently, the counties are revising their master plans to specifically address the question of aquaculture, especially geoduck and subtidal clam harvest, under the guidance of DOE. The Departments of Fisheries and Natural Resources have prepared management plans for the subtidal clam fisheries to assist the counties in these revisions and to demonstrate their willingness and ability to accomodate local interests in allocating and managing the geoduck resources of the state. It is hoped that if the local and environmental concerns can be adequately addressed by the state managers of the fishery that the counties will not need to intervene in the management of the fishery locally.

MANAGEMENT OF GEODUCK FISHERY

Management Goals

The goals of geoduck management are to:

1. Protect the geoduck resource and the marine environment. Harvest is limited to sustainable levels and only harvest methods and gear that do not unnecessarily damage the substrate, the surrounding habitat or organisms on the geoduck beds are allowed. WDF also attempts to protect the beds from pollution and from damage due to human activities.
2. Encourage a stable orderly fishery. Harvest is allowed at the highest level possible consistent with protection of the clam resource. WDF and DNR try to provide a relatively constant supply of geoduck clams for harvest each year and to give the industry as much freedom as possible to control its own production and to meet varying market demands.
3. Manage the fishery for the maximum benefit of all the citizens of the state. WDF encourages the fishery as a source of food, jobs, trade, and income to the state. As co-manager with DNR, WDF's policies and regulations must allow the full and fair compensation of the state for the clams harvested.
4. Minimize adverse impacts of the fishery on shoreline residents and communities. By limiting harvest close to shore, by limiting hours and days of operation, and by limiting fishery effort WDF has attempted to not only improve management of the fishery but also to reduce onshore impacts. By improving communication between citizens, local government, and the agencies, future conflicts will hopefully be reduced.
5. Provide effective enforcement. It is essential that any management policy be enforcable if the above goals are to be achieved. Thus management policies must allow effective enforcement and avoid policies and regulations which provide opportunities or incentives for illegal or undesirable activities.

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Present Management

The geoduck fishery has been managed on a limited entry basis from its inception. In most fisheries of the world, management policies have been developed after the fact to deal with problems of overharvest, excessive gear, and too many fishermen. To control these problems fisheries managers often recommend some sort of effort control with allocation of harvest rights. The geoduck fishery was initiated on this basis to avoid the problems of overfishing, to encourage orderliness and stability in the industry, and to control the rate of harvest.

Geoduck management is severely complicated by the nature of the diver fishery, the value of the product, and the required compensation to the state for clams harvested, all of which create enforcement problems. These factors provide both incentive and opportunity to harvest illegally or to under-report the catch, thus avoiding payments to the state and harvesting in excess of the allocated yield. Therefore, the management policy must be compatible with effective enforcement to ensure protection of the resource and the environment.

Geoduck management is summarized below:

1. Harvest is only permitted from tracts designated by WDF and leased from DNR.
2. Harvest is prohibited within 200 yards of shore (extreme high water) or in less than 18 feet of water.
3. Harvest is limited to divers using hand-held suction or water jet gear.
4. Harvest is limited to the optimal yield of the geoduck stock. Optimal yield is equal to the maximum sustainable yield of the commercial beds.
5. Harvest if controlled by limiting the size of the harvest tracts and the amount of fishing effort.
6. A tract license for each lease holder, a validation for each diver working, and a diver's license for each diver are required for the harvest of geoducks.

SECTION III: DEPARTMENT OF NATURAL RESOURCES

MANAGEMENT OBJECTIVES

The Department of Natural Resources has management responsibility for a vast area of state-owned marine tidelands, bedlands, and harbor areas, and freshwater shorelands and bedlands. The Department exercises its control over land use of state-owned lands through leases, use easements, permits, deeds, interagency coordination and applied research. Unlike state-owned uplands which are managed for economic return, aquatic lands are managed as a public trust for a variety of economic, recreational and natural process activities. To guide its management programs, the Department has identified five objectives:

1. Provide space for a variety of recreational and economic activities;
2. Provide for navigational needs which are of benefit to the general public;
3. Insure adherence to the environmental standards of other agencies;
4. Maintain the productivity and environmental quality of the aquatic lands while continuing to provide for the needs of the public; and
5. Compensate the public for withdrawal of lands by private and public activities which reduce the use options of the general public.

In addition to these, the legislature has authorized the Department to "foster" certain uses of the aquatic lands and this directive is taken here as a sixth aquatic land management objective:

6. The Department of Natural Resources shall foster the commercial and recreational use of the aquatic environment for production of food, fibre, income, and public enjoyment from state-owned lands under its jurisdiction and from associated waters.

The test of whether this geoduck management plan is successful is in how well these objectives are achieved. The Department has defined these objectives in a report titled "The Department of Natural Resources' Marine Land Planning Program", February 10, 1981. The following outline explains what actions are required to achieve these objectives in management of geoduck harvest. Most of these actions have been incorporated into the procedures outlined in Section I of this plan.

Objective 1. Provide space for a variety of recreational and economic activities.

A. DNR has adopted the following administrative policies in regard to use of space for this type of use:

1. Utilization of renewable resources is a preferred use of aquatic lands. (WAC 332-30-160(1))
2. Tidelands, shorelands and beds of navigable waters, especially valuable now and in the foreseeable future for renewable resource activities . . . . shall be so designated and protected from conflicting human uses which limit their utility for this purpose. (WAC 332-30-160(5))
3. Harvesting must be conducted in such a manner as to . . . minimize insofar as possible conflicts with other users of the water area . . . . (WAC 332-30-160(7))

B. Areas in Washington suitable for commercial geoduck harvest are limited by legal, environmental and technical constraints to approximately 8,400 acres in Puget Sound. This comprises only about half of the area where geoducks have been found in commercial abundance. Geoducks have been found in some density on about 34,000 acres of subtidal lands.

C. WFD and DNR have determined that restricting harvest to designated tracts is the best way to control harvest rate and to assure proper reporting of catch.

D. Commercial geoduck harvest under this plan will be a low intensity, intermittent use of marine bedlands. Approximately 10-15 boats will be used for the entire fishery and tracts will be harvested once every 20 to 50 years.

E. Reservation and use of the known commercial geoduck beds for commercial harvest will not result in any conflicts of statewide concern over use of marine land space.

F. Local conflicts over use of marine land space may occur. DNR will use the procedure stated in Section I to identify and resolve local space conflicts.

Objective 2. Provide for navigational needs which are of benefit to the general public.

A. A geoduck bed has been found in the Port Townsend harbor area but harvest there would not interfere with navigation.

B. Geoduck beds have not been found in major vessel traffic lanes.

C. Geoduck beds do occur in ferry and tug boat routes, in narrow channels, in military training areas and in areas used by commercial and sport fishermen. Except for military training areas, conflicts with these uses are very difficult to evaluate at the statewide level.

D. Geoduck harvesters' use of public boat ramps, if not controlled, may obstruct the general public's use.

E. There are no predictable adverse effects on navigation from commercial geoduck harvest which should be controlled through statewide operation standards. The procedure stated in Section I will be used to identify and resolve any local navigational conflicts.

Objective 3. Insure adherence to the environmental standards of other agencies.

A. DNR has adopted the following administrative policies in regard to coordinating with the environmental standards of other agencies:

1. Other governmental agencies, local, state and federal, administer laws and regulations which also govern activities on aquatic lands. In order to benefit from the expertise and experience of these agencies, the Commissioner of Public Lands seeks the advice of the Marine Resources Advisory Committee. (WAC 332-30-100(1))

2. The Department will insure that its allocations, leases, uses and activities are consistent with local [shoreline] programs. (WAC 332-30-100(1))

3. Harvesters must comply with all applicable federal, state, and local rules and regulations. Noncompliance may result in lease suspension or cancellation upon notification. (WAC 332-30-157(6))

B. DNR has reviewed the shoreline master programs of those counties with commercial geoduck beds. Three counties have regulations which could be interpreted to severely restrict geoduck harvest. King County has a

regulation which covers mechanical harvest of shellfish. Mechanical harvest is prohibited in conservancy environments and sites harvested by mechanical means must be rehabilitated within seven days. County staff have told DNR that geoduck harvest would not be interpreted as mechanical but there is no definition of mechanical harvest in the program.

Kitsap and Clallam Counties have master program regulations which cover both mechanical and/or hydraulic clam harvesting and require that trenches be refilled to within 3" of the original ground level. Geoduck harvest makes holes rather than trenches. Test digging in Hood Canal showed that holes were refilled to within 3-4" of the ground surface. The 3" standard for trench refilling was borrowed from a non-scientific recommendation made for intertidal mechanical clam harvest in Port Susan. Geoduck harvest is an entirely different operation in a different environment. These counties will be re-evaluating their shoreline management regulations and policies on aquaculture in compliance with new Department of Ecology (DOE) guidelines.

No comments were received from either county during the review period for this plan. DNR is still unsure how to manage geoduck harvest to be consistent with those shoreline programs or what effect their regulations will have on geoduck harvest.

C. Interdepartmental coordination during plan development has revealed no environmental standards other than those discussed above which might conflict with execution of this plan.

D. To insure that DNR management continues to respond to other agencies' environmental standards, DNR will follow the procedures contained in Section I.

Objective 4. Maintain the productivity and environmental quality of the aquatic lands while continuing to provide for the needs of the public.

A. The Department has adopted the following administrative policy in regard to protection of the environment from and for commercial geoduck harvesting:

1. Harvesting must be conducted in such a manner as to have . . . insofar as possible a minimal impact upon the environment. (WAC 332-30-160(7))

2. The Department will work with other agencies through development and implementation of management plans to insure that commercial shellfish beds are kept free of pollution . . . . (WAC 332-30-160(11))
3. The boundaries of clam tracts offered for lease shall be established and identified to avoid detrimental impacts upon significant beds of aquatic vegetation or areas of critical biological significance . . . . (WAC 332-30-157(2))
4. Commercial clam beds on aquatic lands shall be managed to produce an optimum yield. (WAC 332-30-157(1))
5. The methods of harvest may only be those as established by law and certified by the department of fisheries. (WAC 332-30-157(3))

B. The Department's experience with past commercial geoduck harvest has revealed few significant impacts even at the site level. Concern has been expressed about possible impacts on seals and waterfowl near Protection Island, noise near residential areas, and occasional obstruction of public boat ramps. The Department will conduct detailed site level environmental investigations to identify potential environmental impacts in advance of tract auction. The procedure for site evaluation is stated in Section I.

C. The DOE has reviewed the known commercial geoduck beds for proximity to flora and fauna identified in the Washington Coastal Areas of Major Biological Significance (1981 update). This data is contained in Appendix B and will be available at the beginning of detailed site investigations prior to tract auction.

D. The Department has determined that the harvest program will not have a significant impact on the state's environment.

E. State law charges the WDF with responsibility for assuring a sustained yield of geoducks and for preventing harvest methods from injuring associated flora and fauna.

F. Commercial geoduck beds are, by definition, those which have water quality good enough to allow harvest. Many beds between Tacoma and Seattle and north have been eliminated from consideration for harvest due to water pollution. The Department of Social and Health Services (DSHS) has reviewed the commercial beds for potential pollution problems and their findings have been entered in the table in Appendix B. Some areas have been identified as having a potential for pollution from intensive upland development. Section I states which actions the Department will take to prevent pollution of commercial geoduck beds.

G. DNR defines "optimum yield" to be the maximum sustainable yield achievable from the allocated commercial geoduck beds. The marine land allocations for geoduck harvest as described in Section I will take into consideration gross environmental and social restrictions on harvest. From the resource contained in the allocated beds, WDF will calculate the maximum sustainable yield during each harvest period. As stated in Section I, harvest ceilings will then be applied to limit harvest to the desired amount.

Objective 5. Compensate the public for withdrawal of lands by private and public activities which reduce the use options of the general public.

A. DNR has adopted the following administrative procedure in regard to insuring adequate compensation from commercial geoduck harvest:

1. Surveillance methods will be employed to insure that trespass as well as off-tract harvesting is prevented. (WAC 332-30-157(4))
2. Harvesters must comply with all lease provisions. Noncompliance may result in lease suspension or cancellation upon notification. (WAC 332-30-157(5))
3. The boundaries of clam tracts offered for lease shall be established and identified to . . . prevent unauthorized harvesting. (WAC 332-30-157(2))

B. In the past, the Department has tried several different methods for assuring adequate compensation to the state. However, the industry has grown rapidly and is highly competitive. Geoducks are a valuable

commodity and can be stolen by divers working at night or under conditions of poor visibility during the day or by underreporting catch from authorized areas. This has put a lot of pressure on those in the industry and on the state and there will be a continued need for adjustments on both sides. The Department recognizes the need to stabilize bidding and reporting procedures and will make every effort to do this.

C. The basic tool for control of geoduck harvest is the tract system. Specific tracts are approved for harvest for limited time periods. Tracts are offered through a competitive bidding process. Tract boundaries are set by DNR in cooperation with WDF. Shoreline residents have expressed concern that boundaries be identifiable from shore so they can tell whether harvesters are trespassing.

D. Section I describes particular actions the Department will take to assure adequate compensation.

Objective 6. The DNR shall foster the commercial and recreational use of the aquatic environment for production of food, fibre, income and public enjoyment from state-owned lands under its jurisdiction and from associated waters.

A. DNR has adopted the following administrative regulations in regard to fostering commercial geoduck harvest:

1. The Department will foster renewable resource utilization through research and development work, public education, land use allocation and resource inventory. (WAC 332-30-160(2))
2. Commercial harvesting of wild stocks of shellfish shall be encouraged on aquatic lands. Harvesting must be conducted in such a manner as to provide an optimum yield of the crop within the harvestable resource base, to minimize insofar as possible conflicts with other users of the water area and to have insofar as possible a minimal impact upon the environment. (WAC 332-30-160(7))

3. The Department will work with other agencies through development and implementation of management plans to insure that commercial shellfish beds are kept free of pollution and that as much as possible of the resource base is available for harvesting. (WAC 332-30-160(11))
4. Enhanced productivity of commercially and recreationally important species of aquatic life shall be encouraged on aquatic lands. (WAC 332-30-160(10))

B. The major obstacle to increasing yield from geoduck beds is the speed with which harvested beds are repopulated. The WDF now estimates that under natural conditions, 20 to 50 years may be required for crop replenishment and growth to commercial size.

C. WDF conducts inventories of the geoduck resource which contribute to the allocations made by DNR under Section I of this plan.

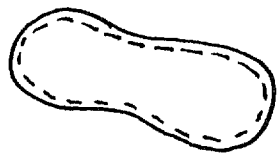
D. WDF is conducting research on techniques for replanting harvested geoduck beds. When replanting becomes economically feasible, DNR will begin a program to routinely replant commercial beds.

APPENDIX A

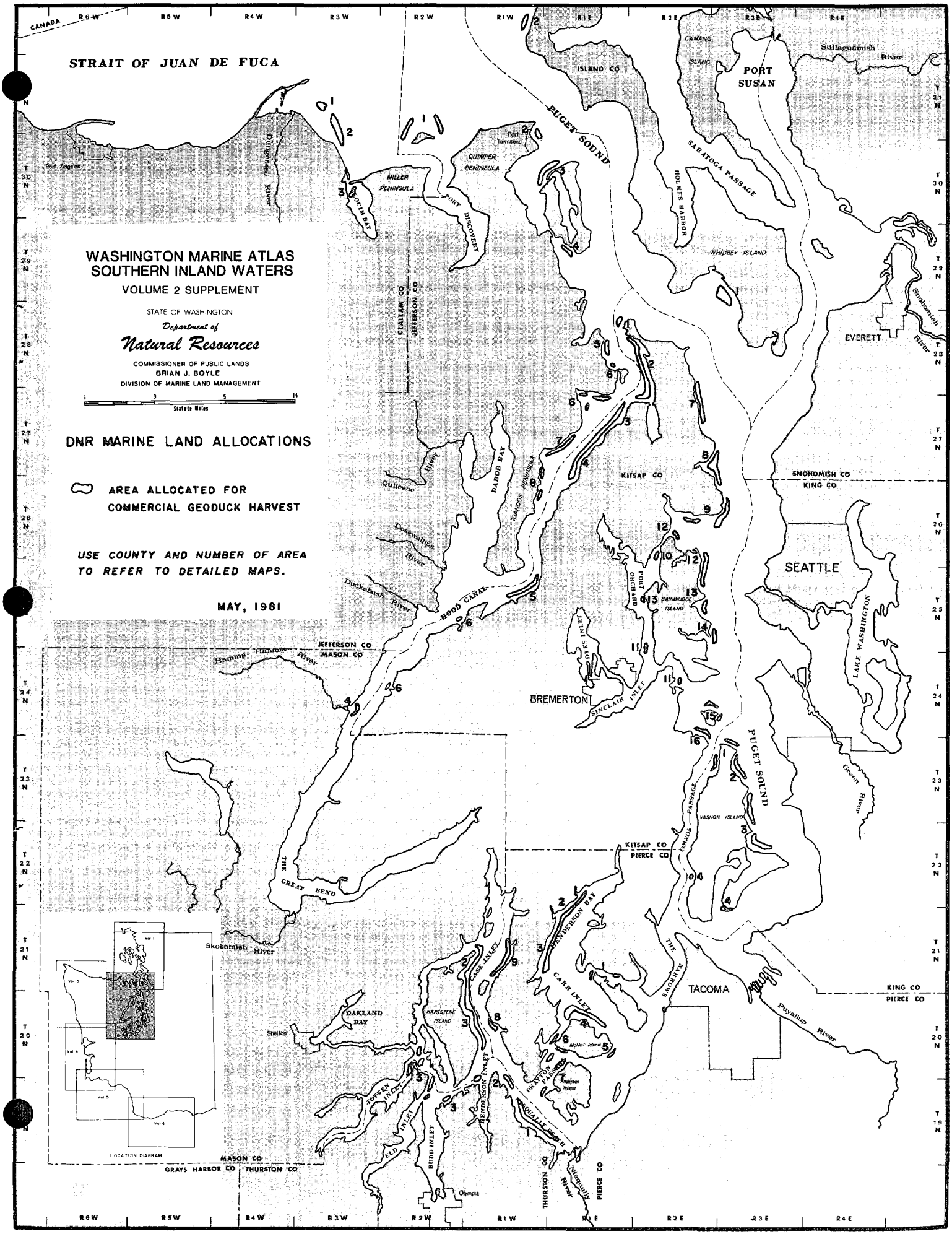
DNR Marine Land Allocations for Commercial Geoduck Harvest

DNR marine land allocations are made to reserve and protect certain marine areas for designated uses. Areas are allocated on the basis of general surveys which consider environmental, social and economic suitability. Allocations are made for regional planning purposes only. Site specific conditions or information found during specific project evaluations may restrict or even prevent use of any particular site for the allocated use.

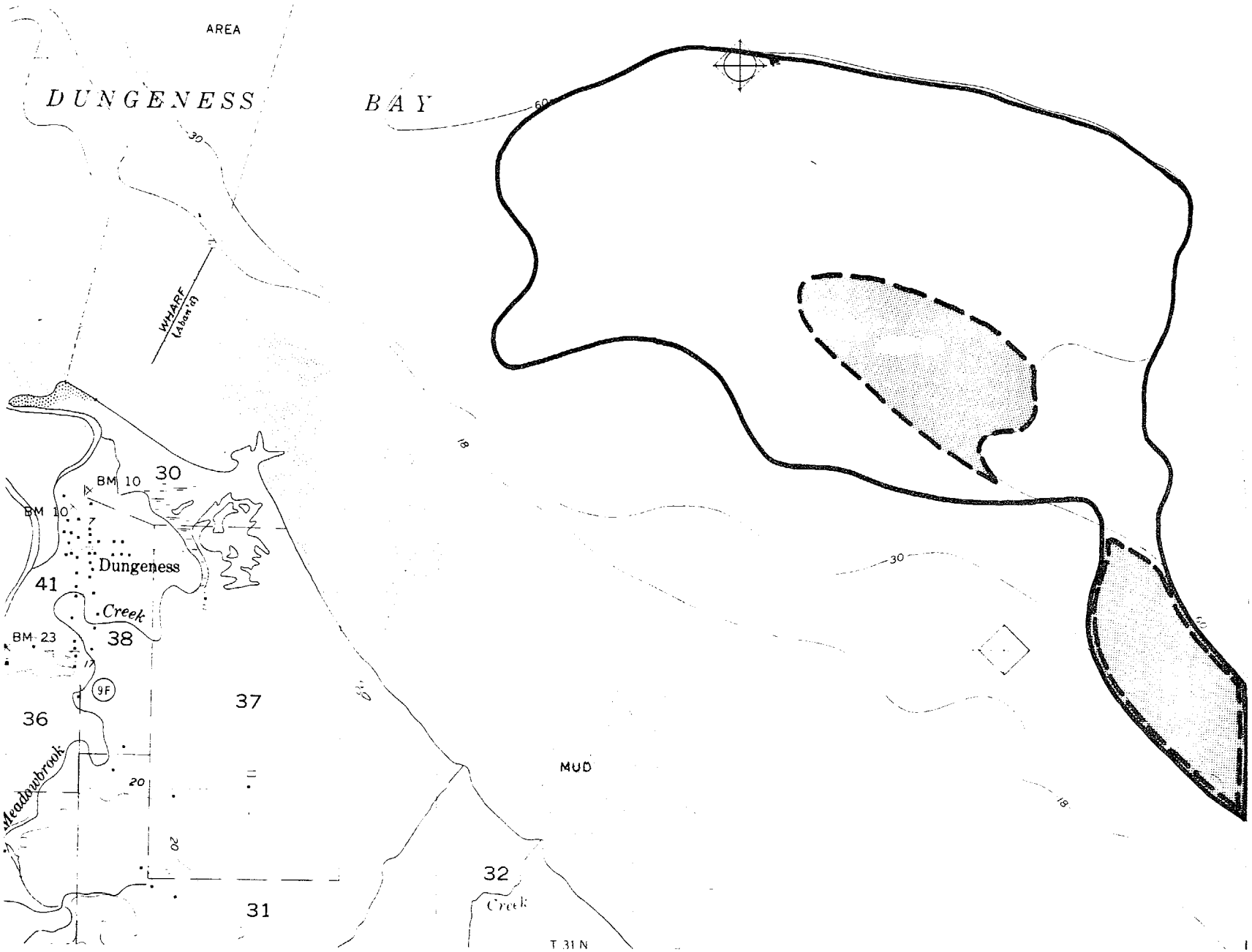
This appendix consists of one area map of southern Puget Sound and a series of detailed site maps. The area map shows the general locations of all geoduck beds allocated for commercial harvest. The site maps are taken from the Washington Coastal Zone Atlas. These maps will be revised as needed. Areas allocated for commercial geoduck harvest are shown on the detailed site maps by the following symbol:



with funds obtained from the National Oceanic and Atmospheric Administration, and appropriated for Section 306 of the Coastal Zone Management Act of 1972

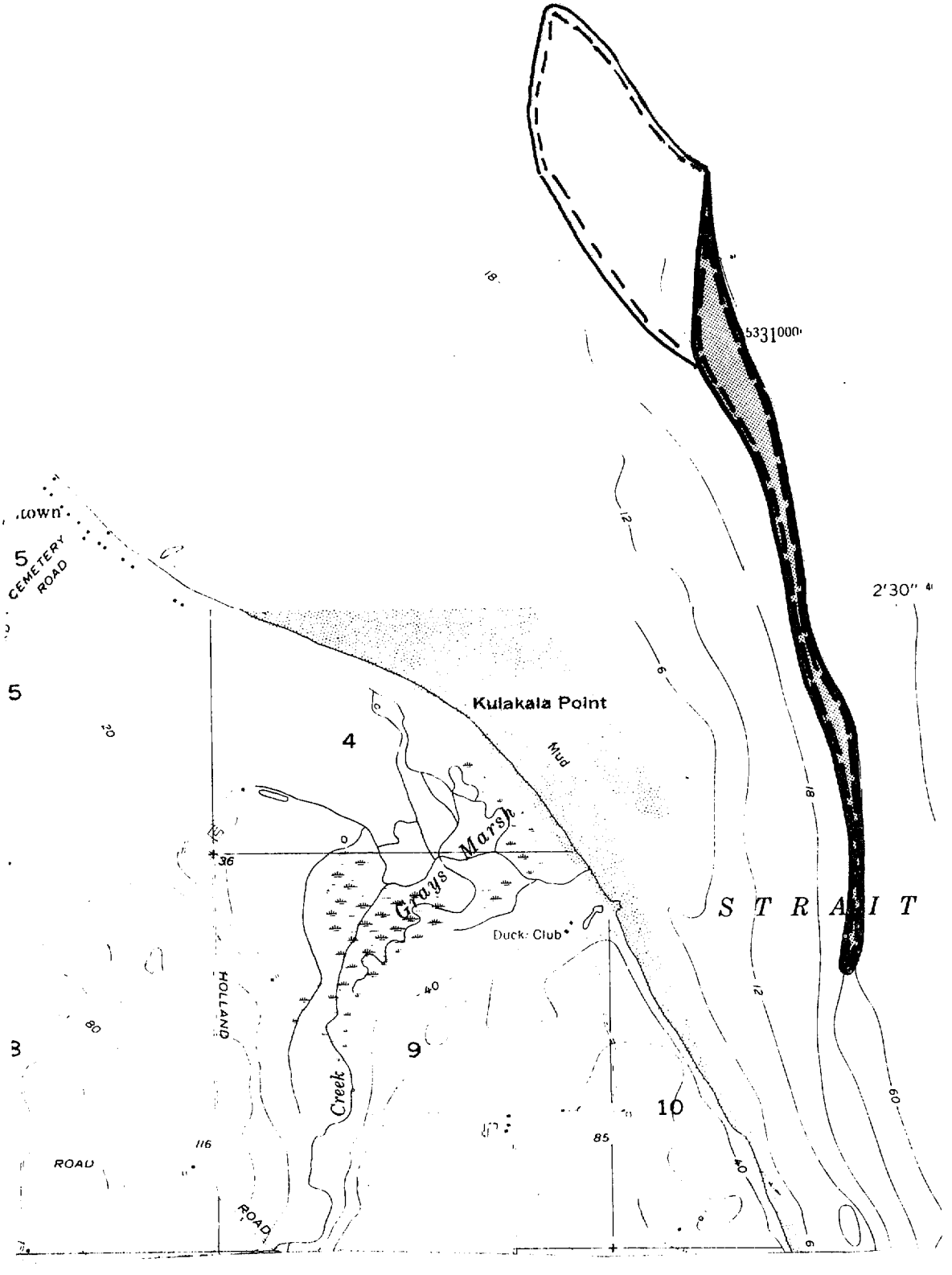


DNR Marine Land Allocations
Commercial Geoduck Harvest
Clallam County 1



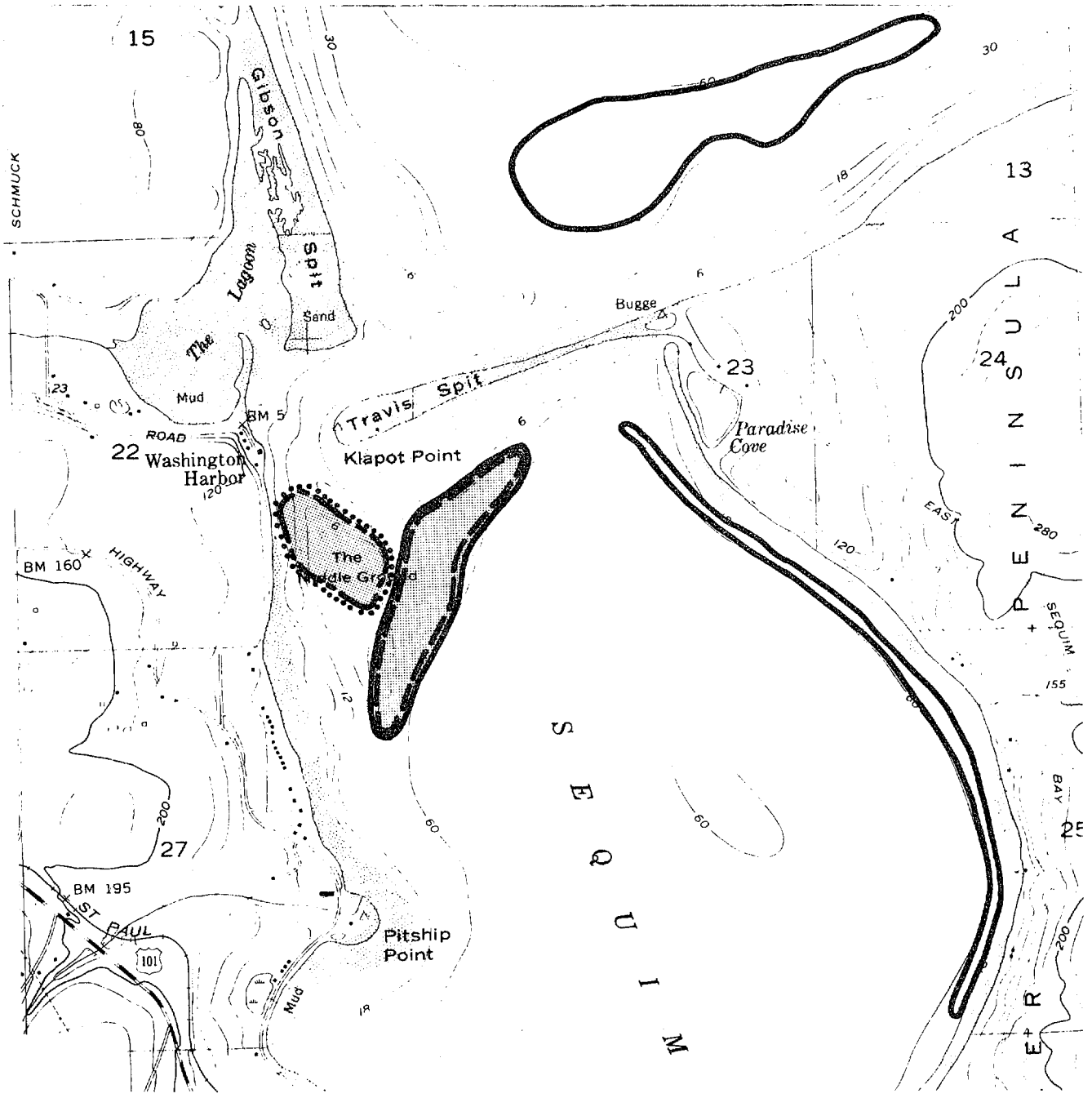
May, 1981

DNR Marine Land Allocations
Commercial Geoduck Harvest
Clallam County 2



May, 1981

DNR Marine Land Allocations
Commercial Geoduck and Subtidal Clam Harvest
Clallam County 3



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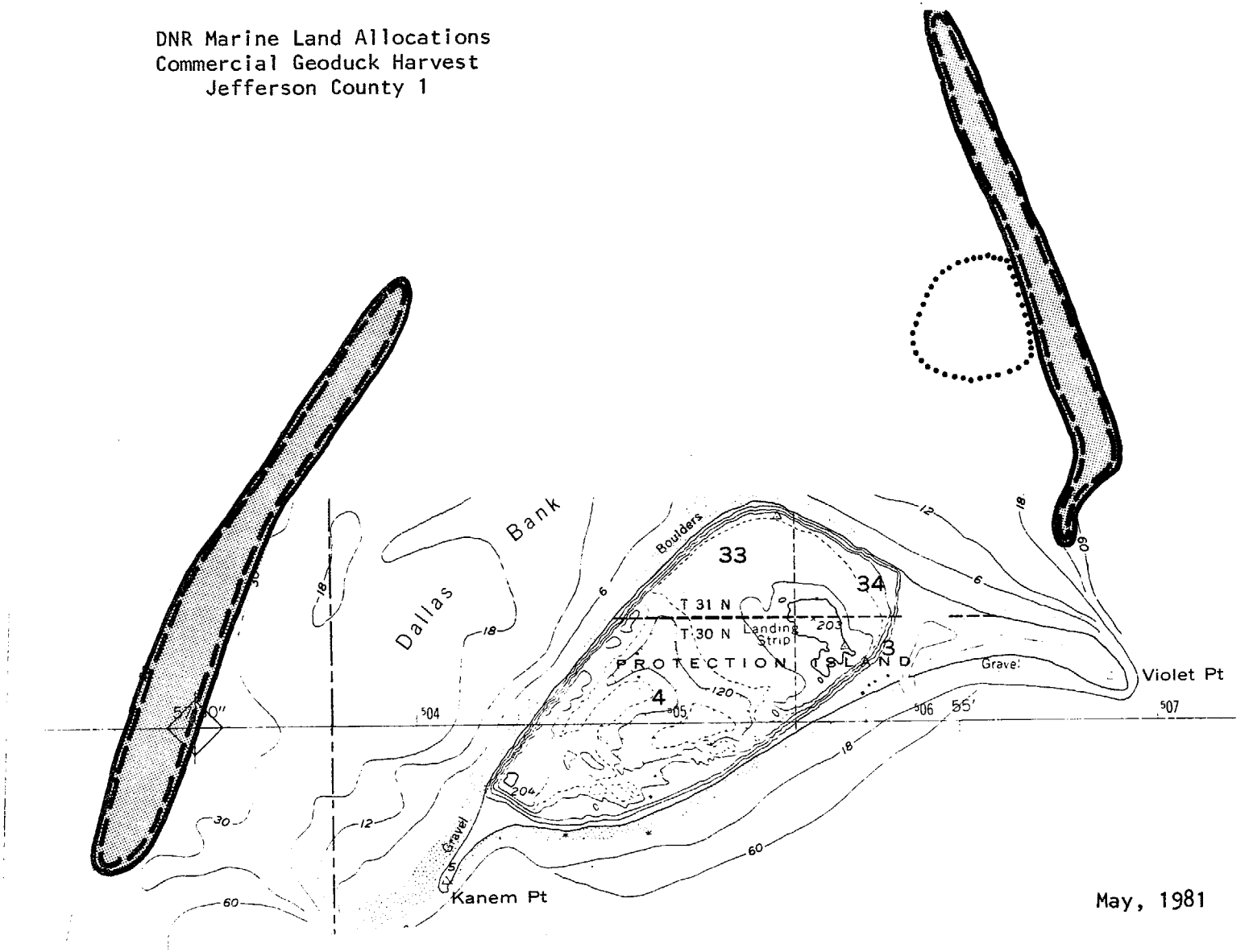
DNR Marine Land Allocations
Commercial Geoduck Harvest
Jefferson County 1



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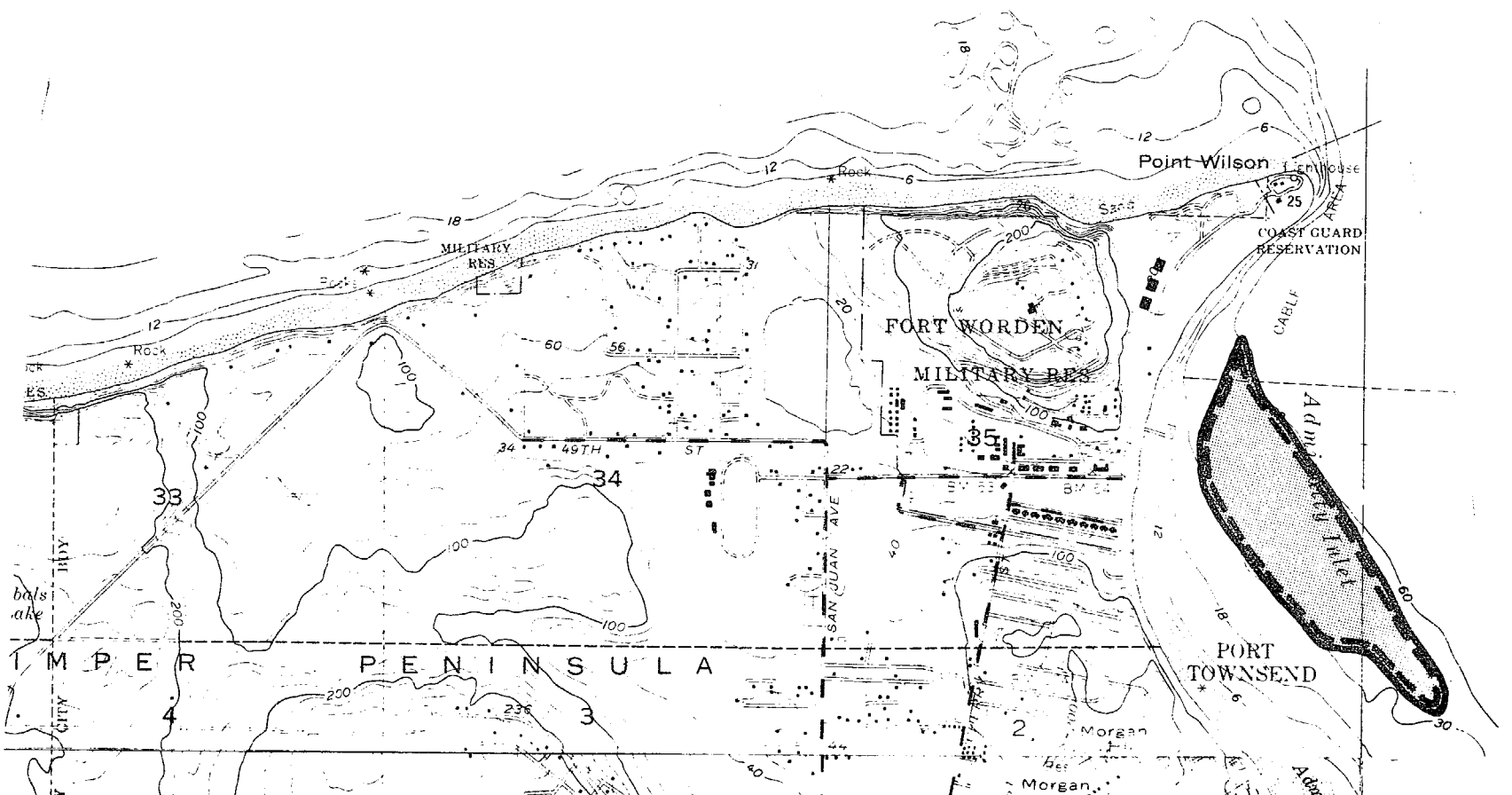
DNR Marine Land Allocations
Commercial Geoduck Harvest
Jefferson County 2



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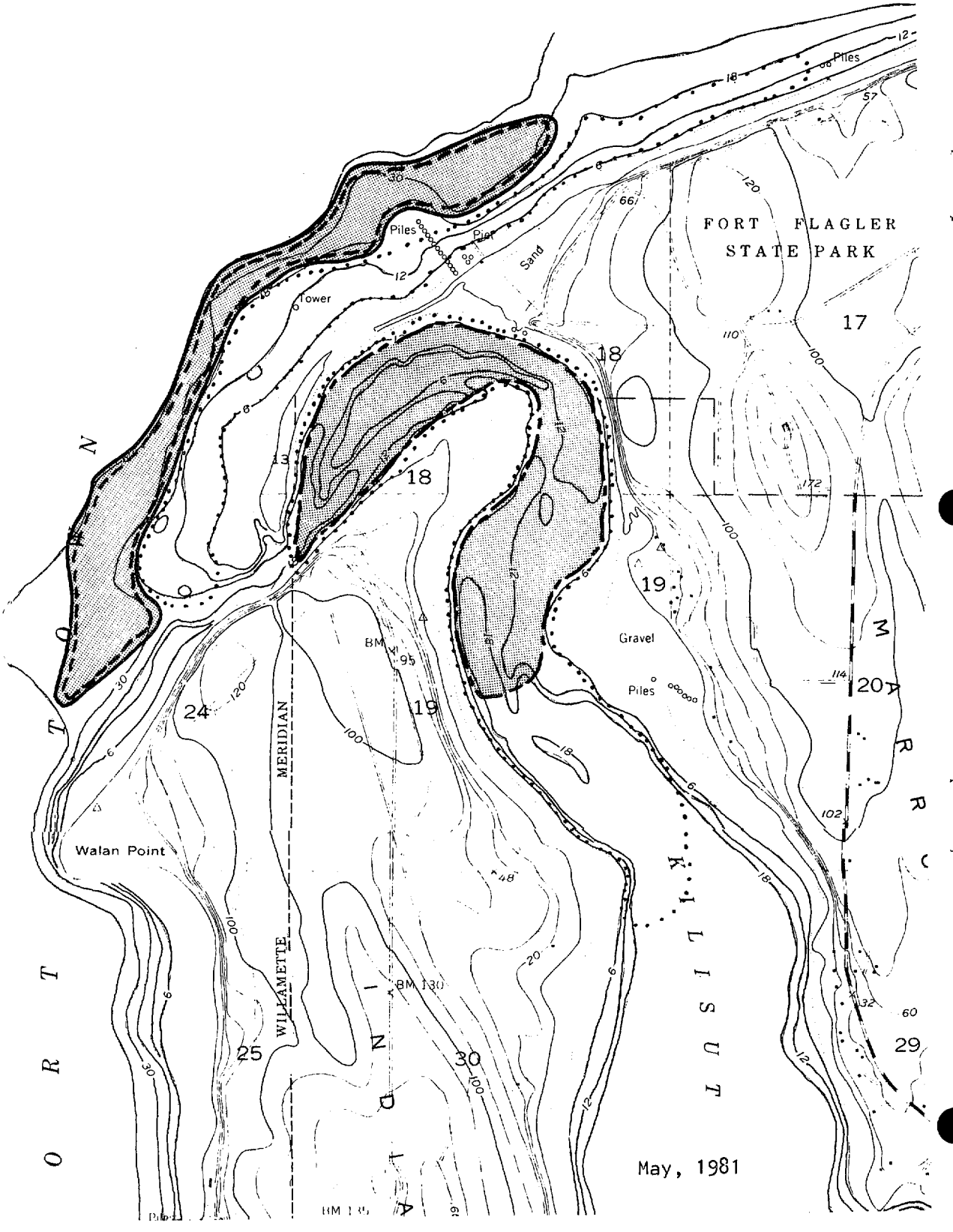
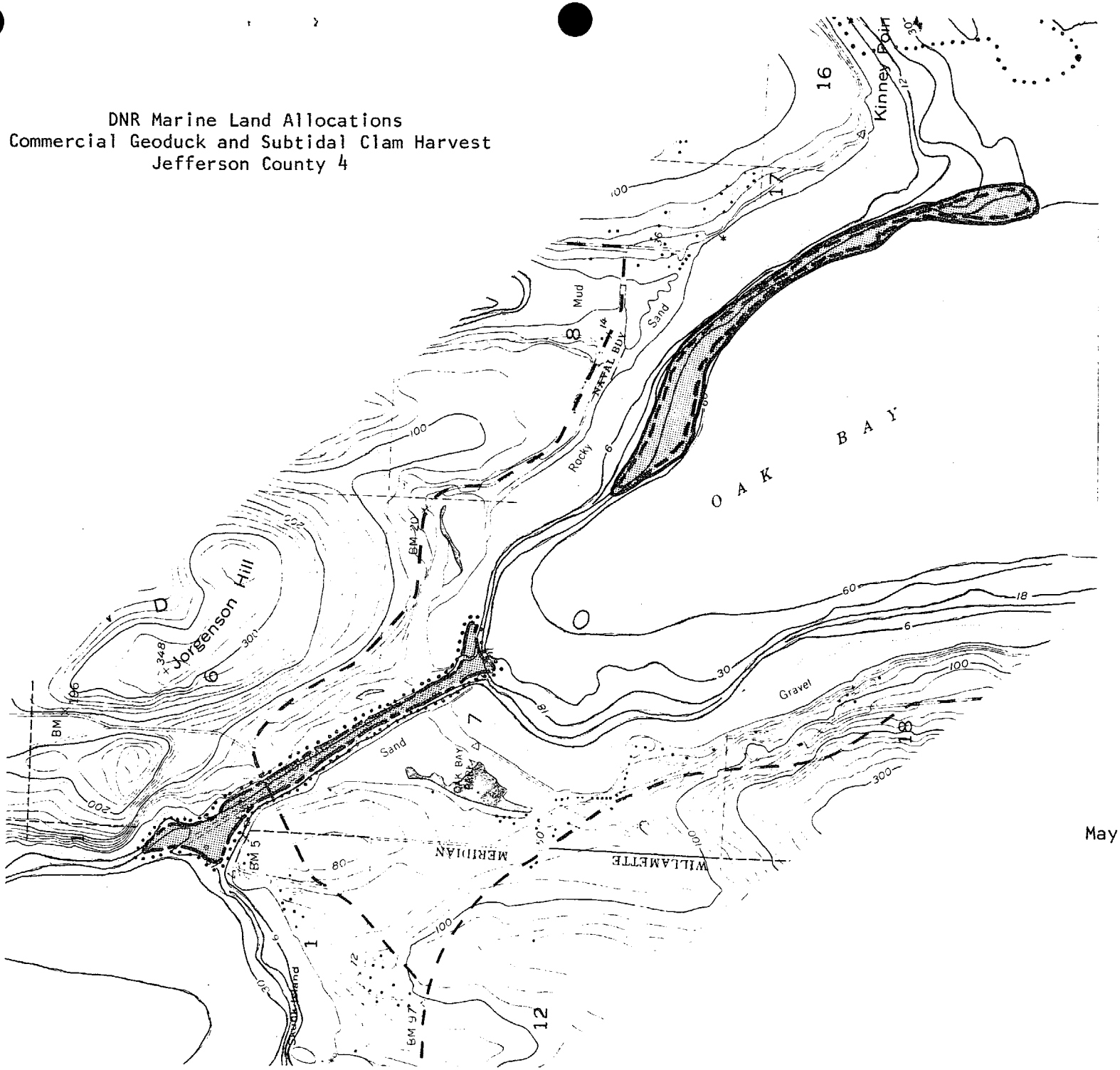
DNR Marine Land Allocations
Commercial Geoduck and Subtidal Clam Harvest
Jefferson County 3

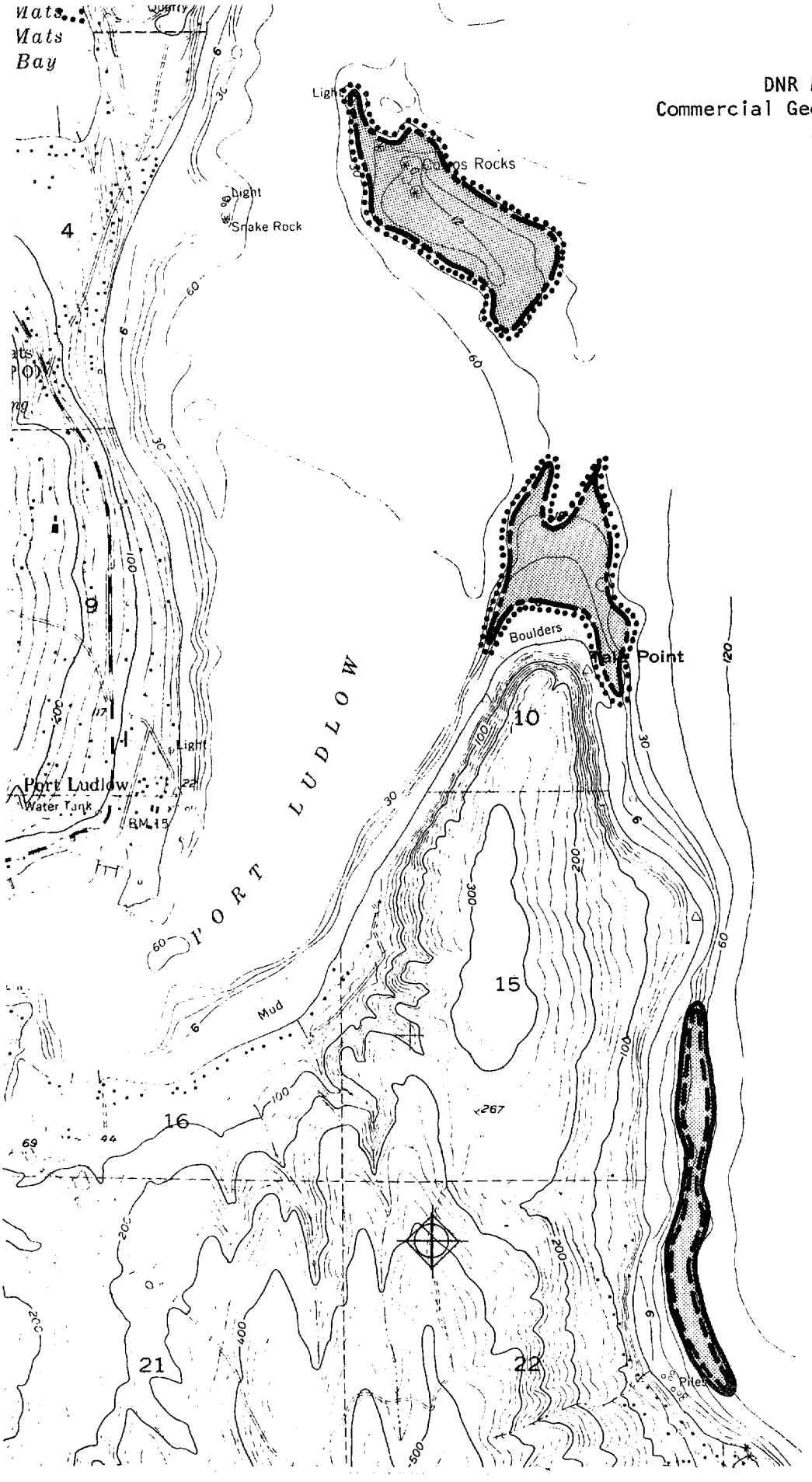


DNR Marine Land Allocations
Commercial Geoduck and Subtidal Clam Harvest
Jefferson County 4



May, 1981

DNR Marine Land Allocations
Commercial Geoduck & Subtidal Clam Harvest
Jefferson County 5

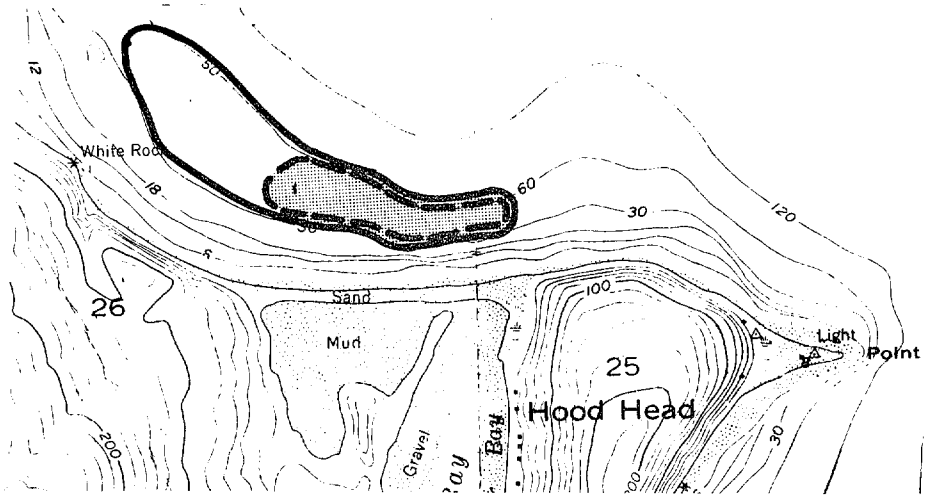


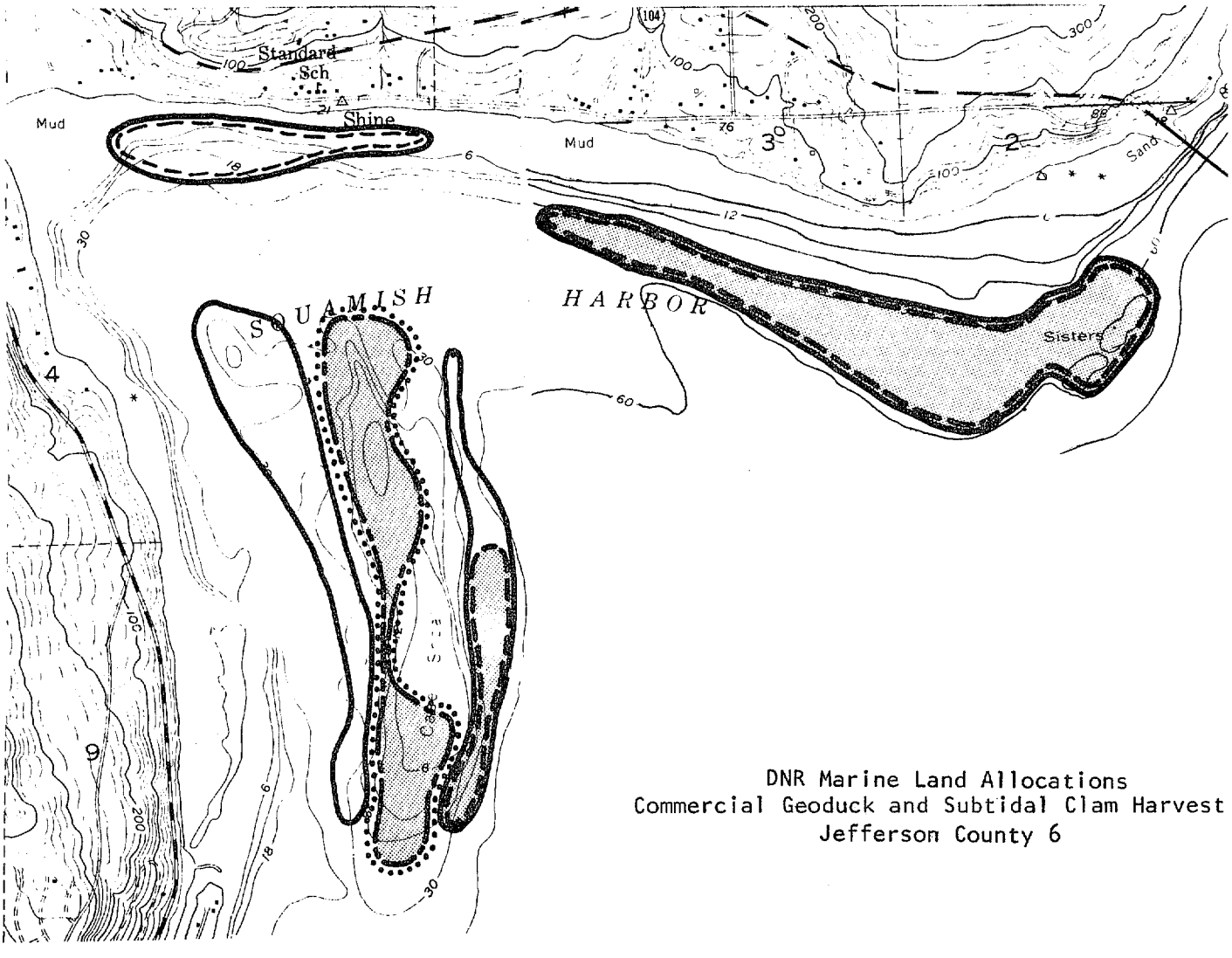
May, 1981

MANAGEMENT PLAN FOR THE PUGET SOUND COMMERCIAL GEODUCK FISHERY

WA-W8

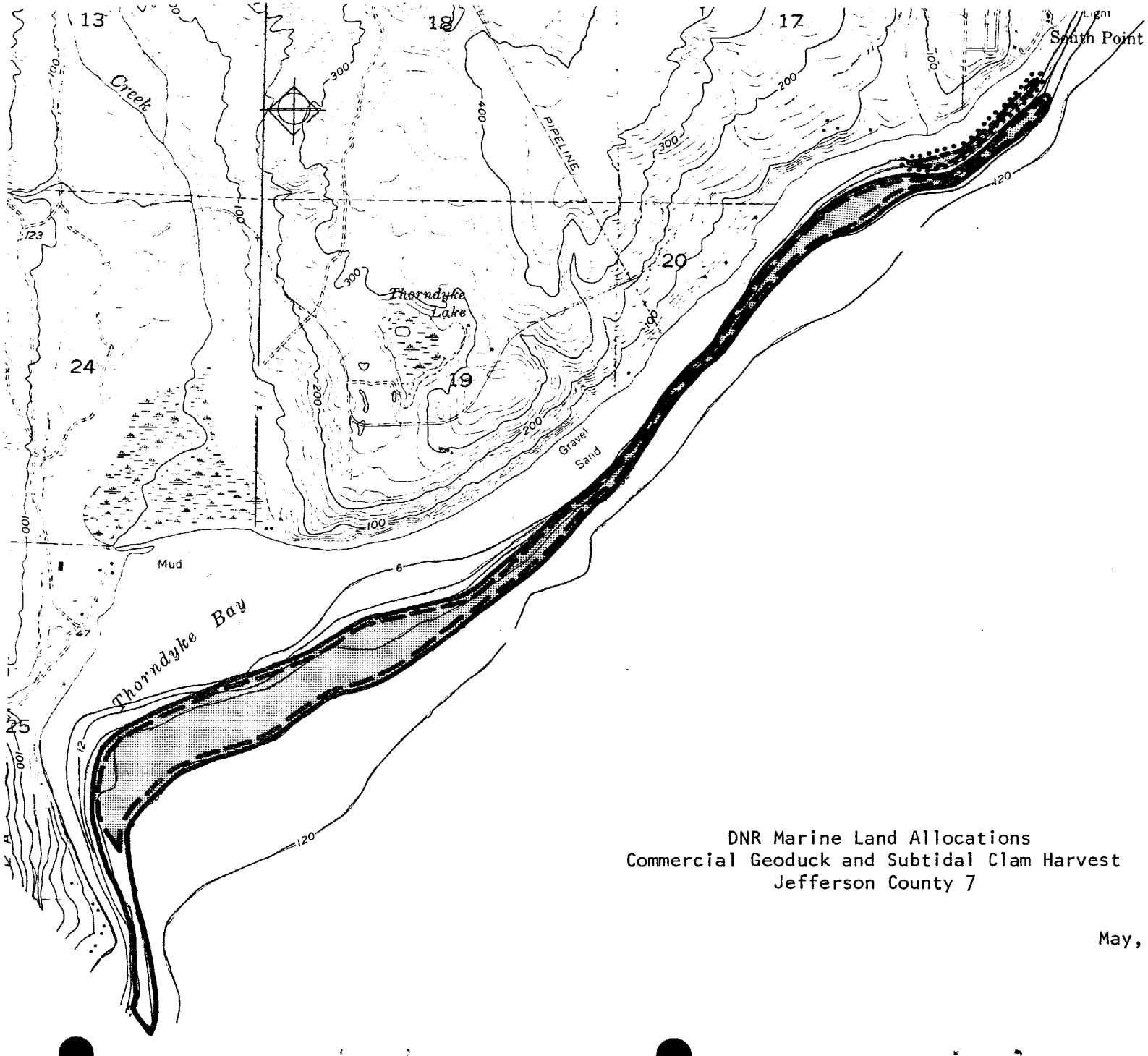
WASHINGTON DEPT. OF NATURAL RESOURCE
AND WASHINGTON DEPT. OF FISHERIES





DNR Marine Land Allocations
Commercial Geoduck and Subtidal Clam Harvest
Jefferson County 6

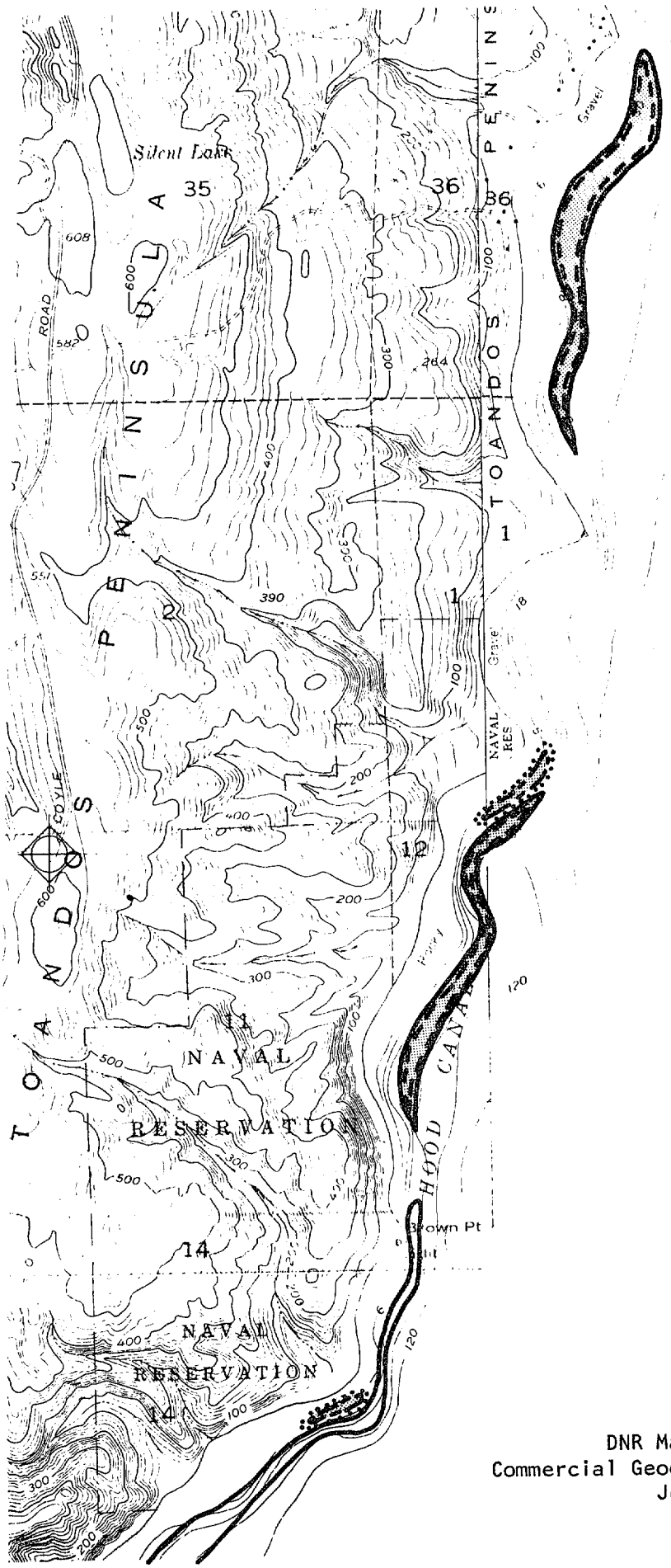
May, 1981



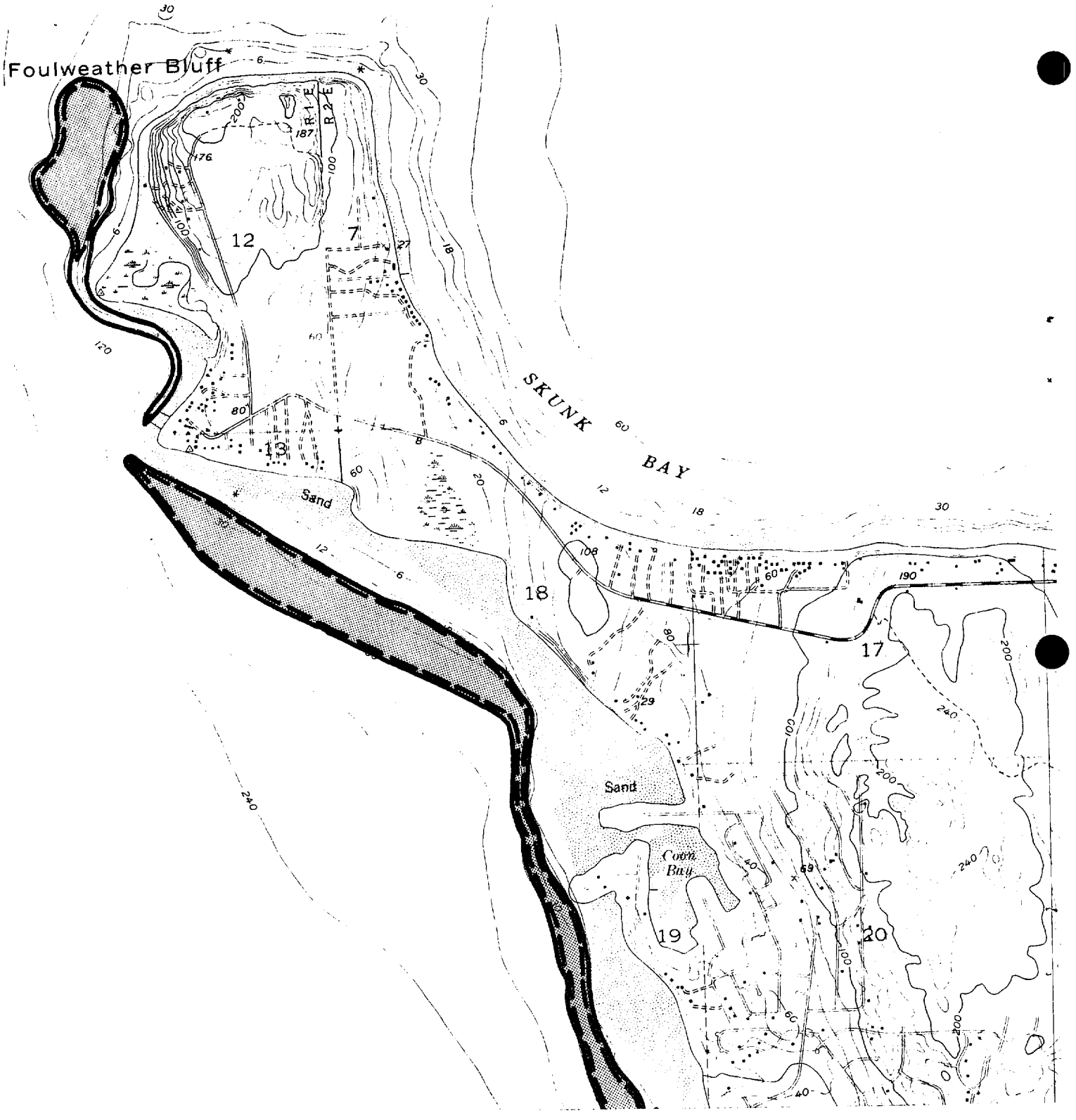
DNR Marine Land Allocations
Commercial Geoduck and Subtidal Clam Harvest
Jefferson County 7

May, 1981

May, 1981



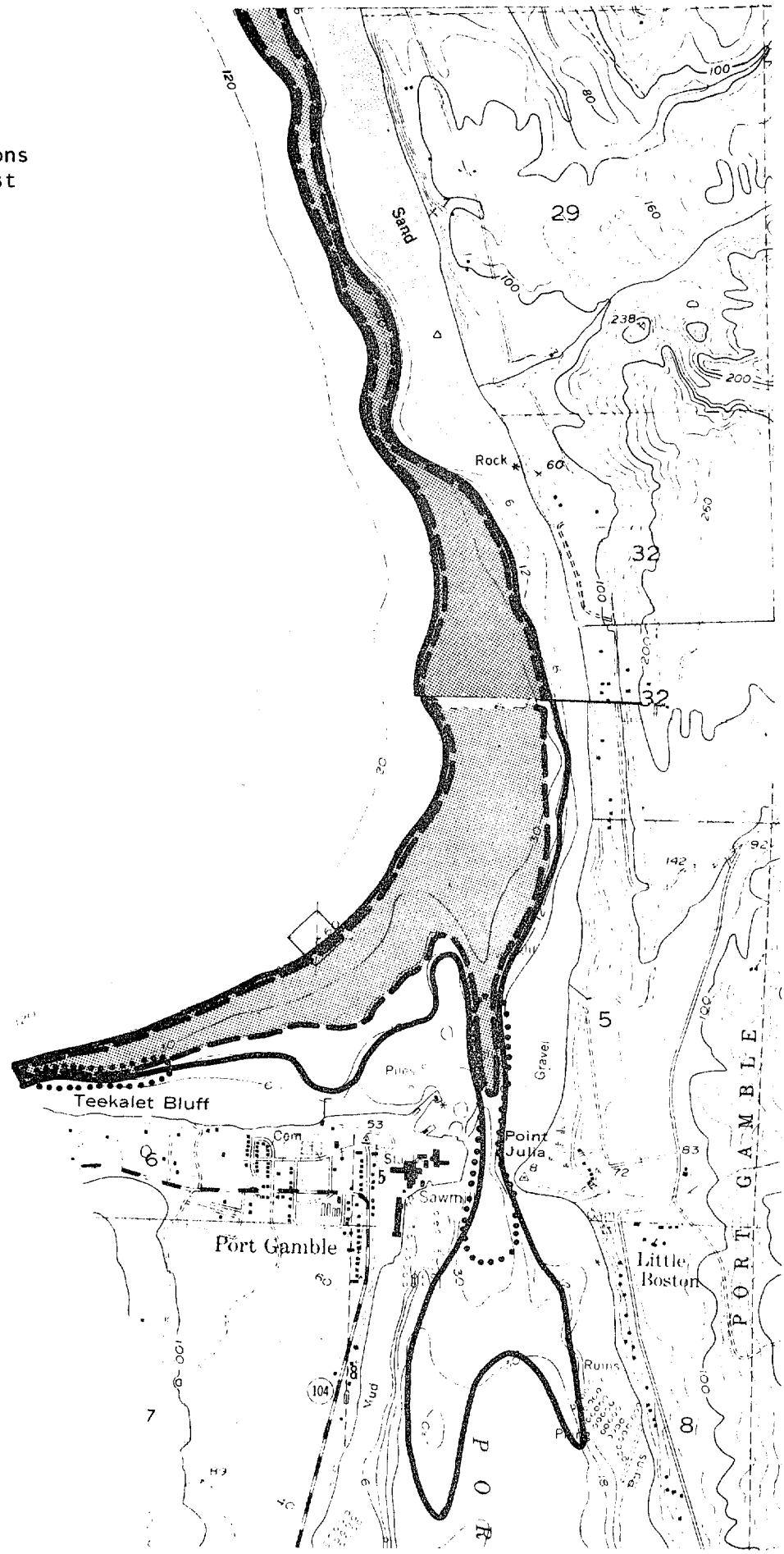
DNR Marine Land Allocations
Commercial Geoduck and Subtidal Clam Harvest
Jefferson County 8



DNR Marine Land Allocations
Commercial Geoduck Harvest
Kitsap County 1

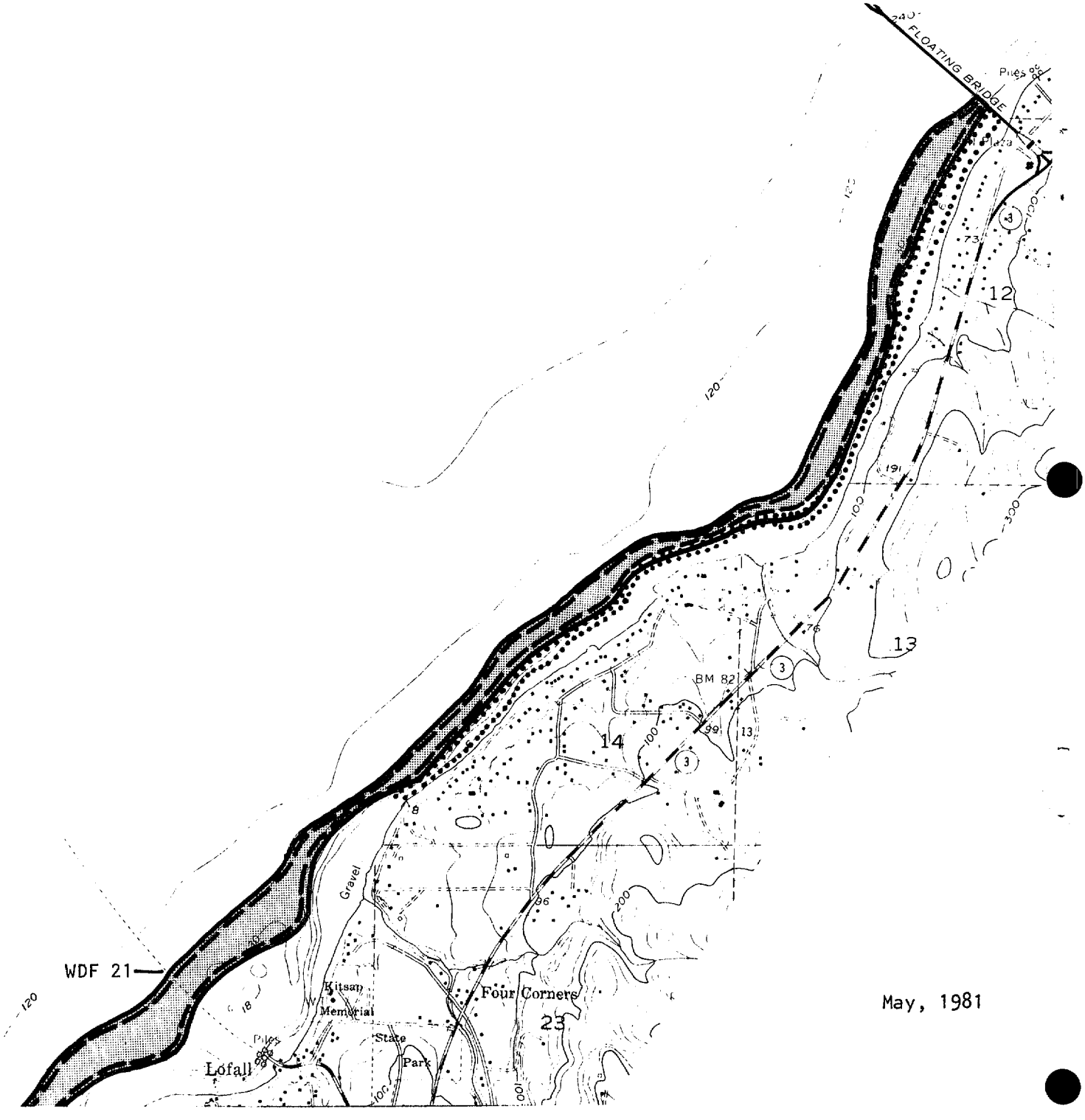
May, 1981

DNR Marine Land Allocations
Commercial Geoduck Harvest
Kitsap County 2



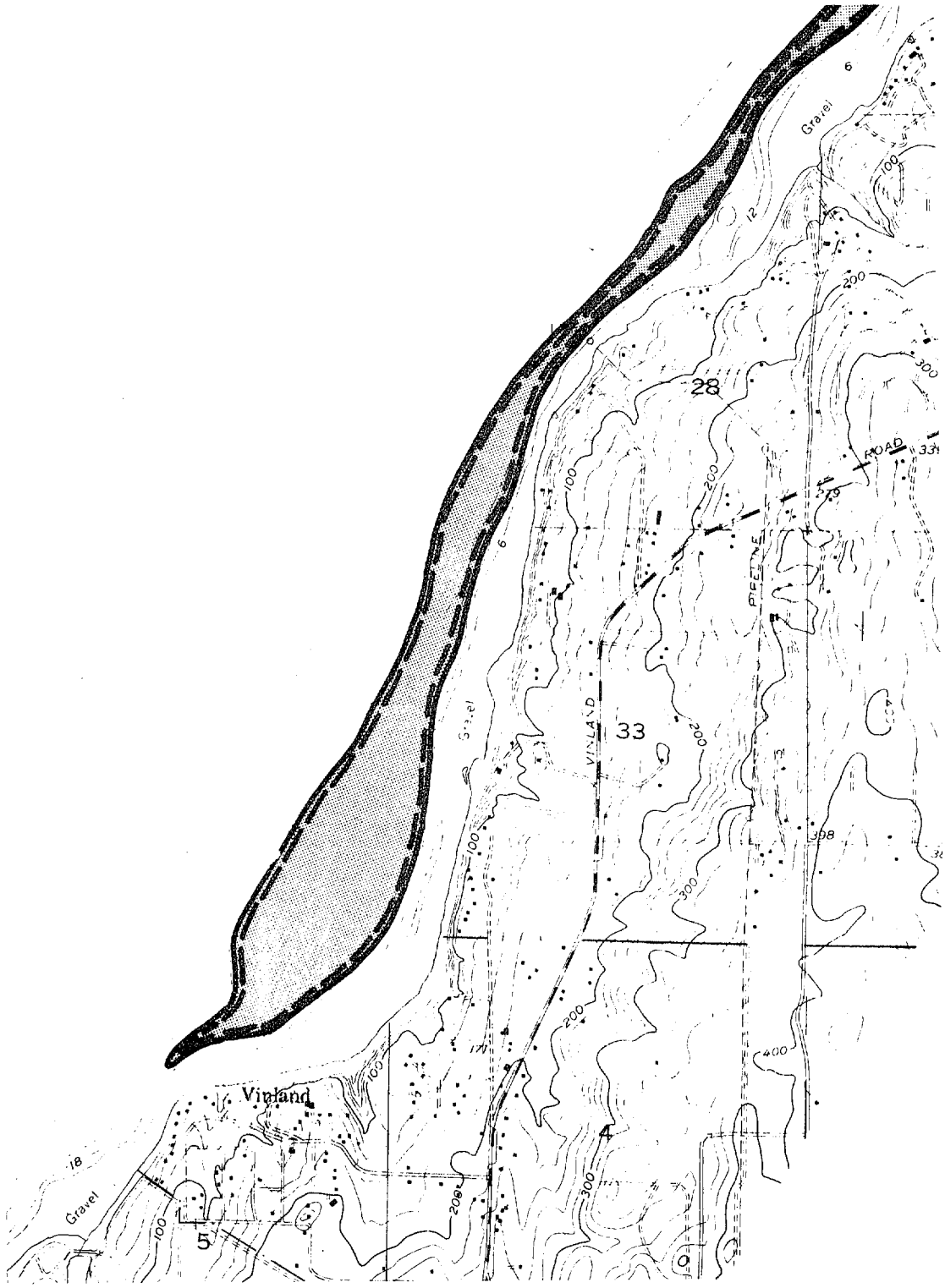
May, 1981

DNR Marine Land Allocations
Commercial Geoduck Harvest
Kitsap County 3



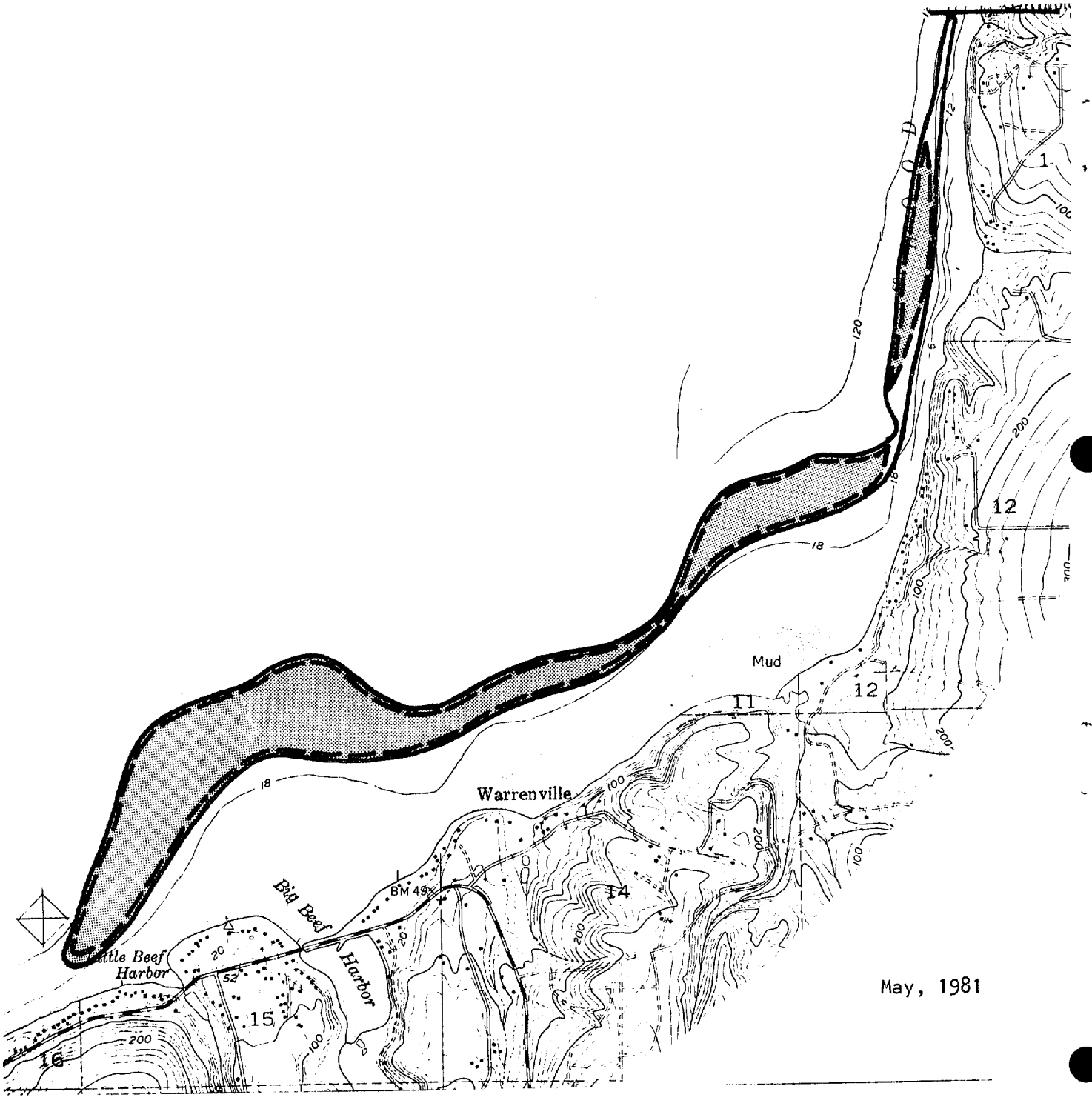
May, 1981

DNR Marine Land Allocations
Commercial Geoduck Harvest
Kitsap County 4



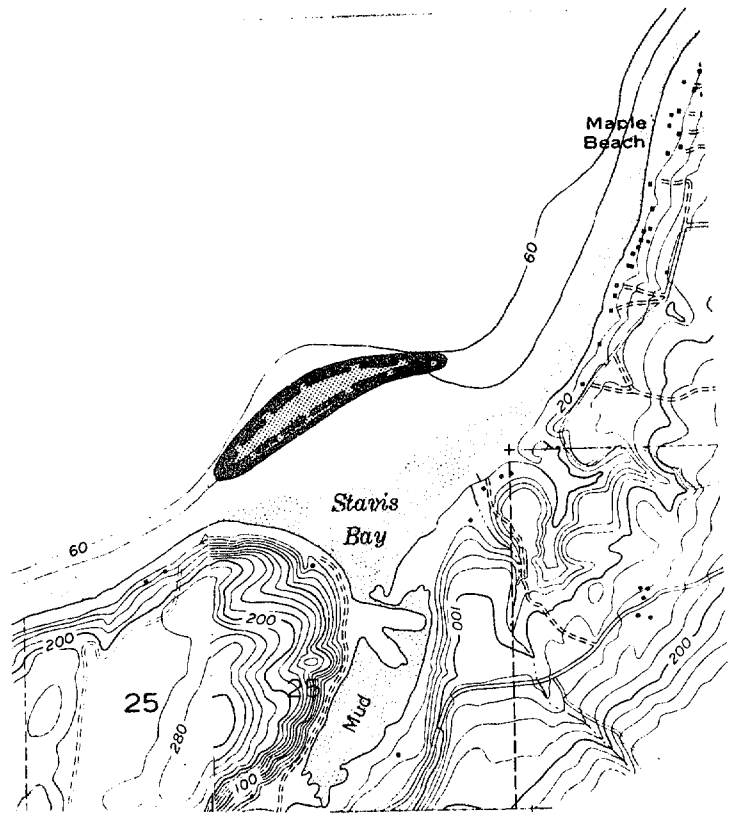
May, 1981

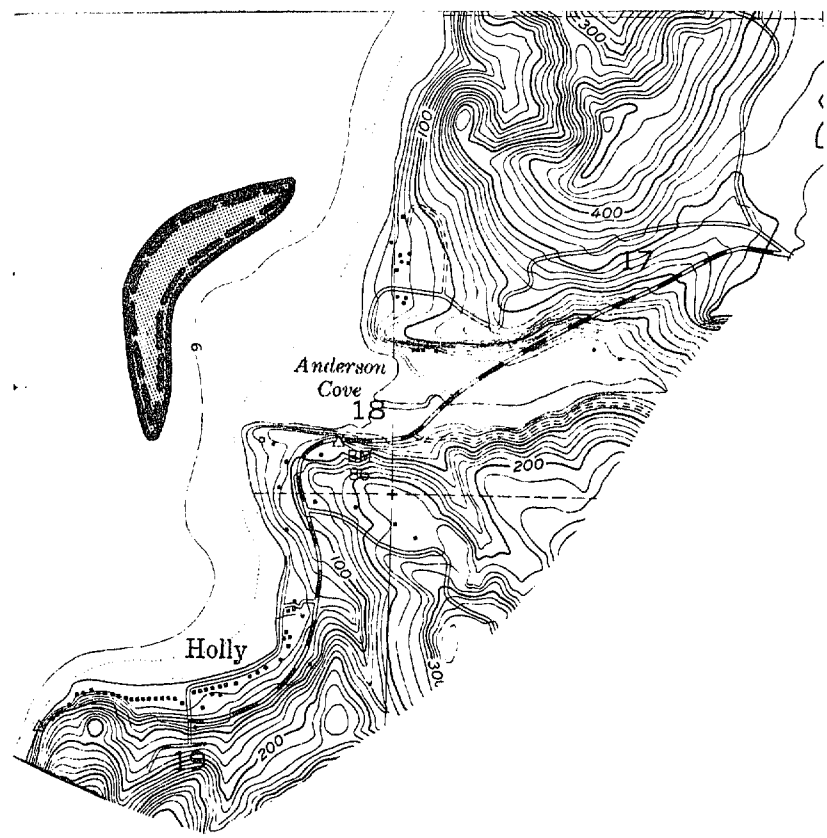
DNR Marine Land Allocations
Commercial Geoduck Harvest
Kitsap County 5



May, 1981

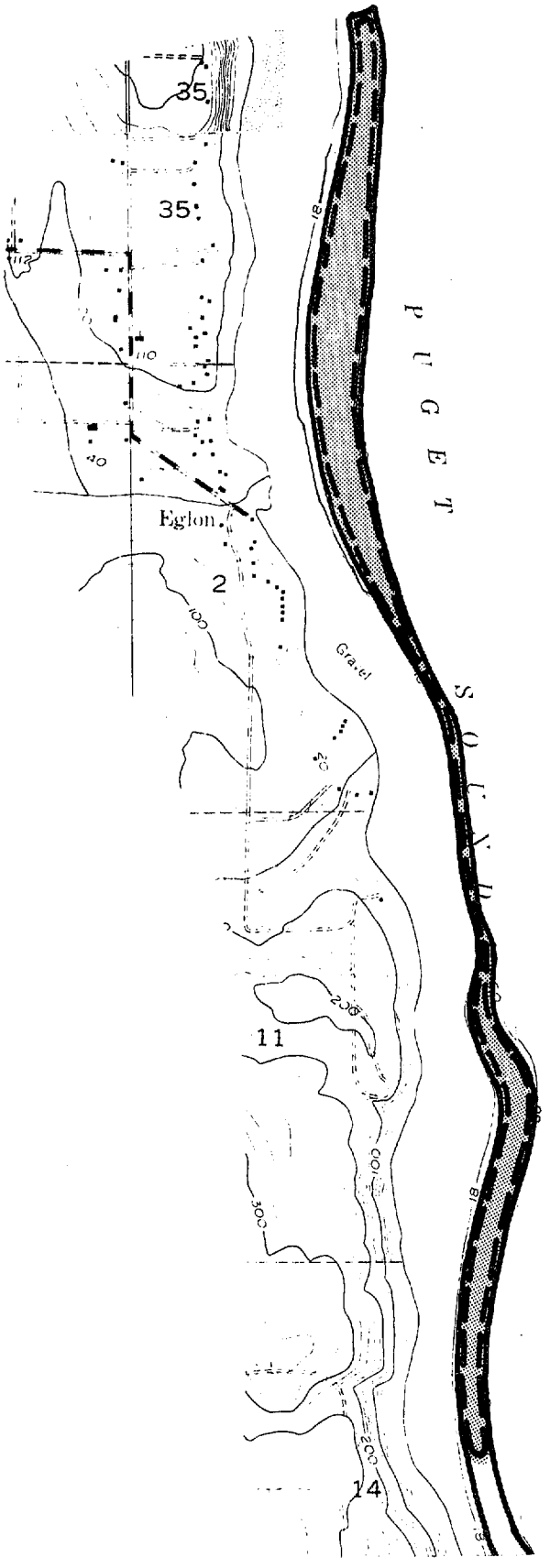
DNR Marine Land Allocations
Commercial Geoduck Harvest
Kitsap County 6



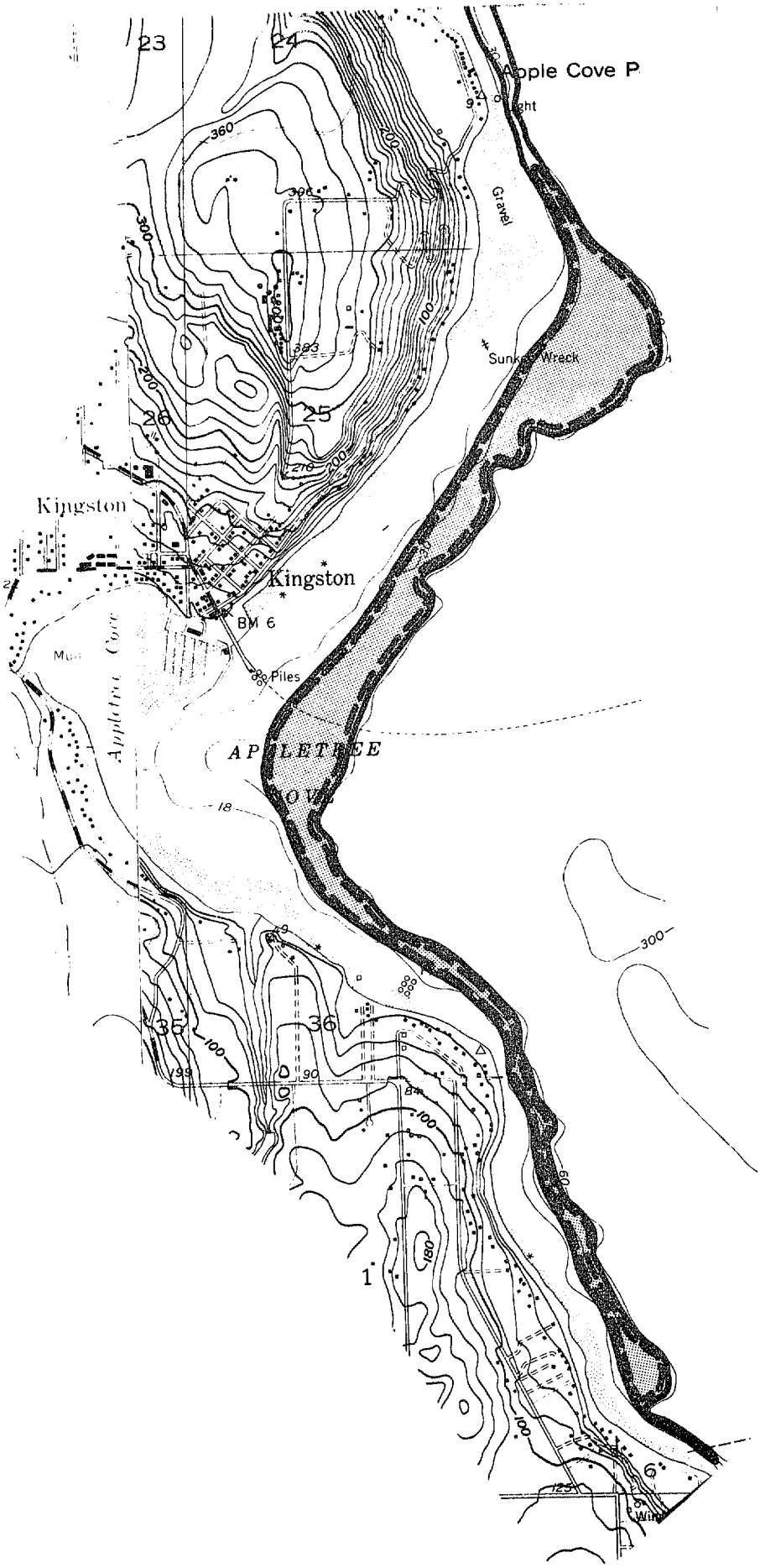


May, 1981

DNR Marine Land Allocations
Commercial Geoduck Harvest
Kitsap County 7



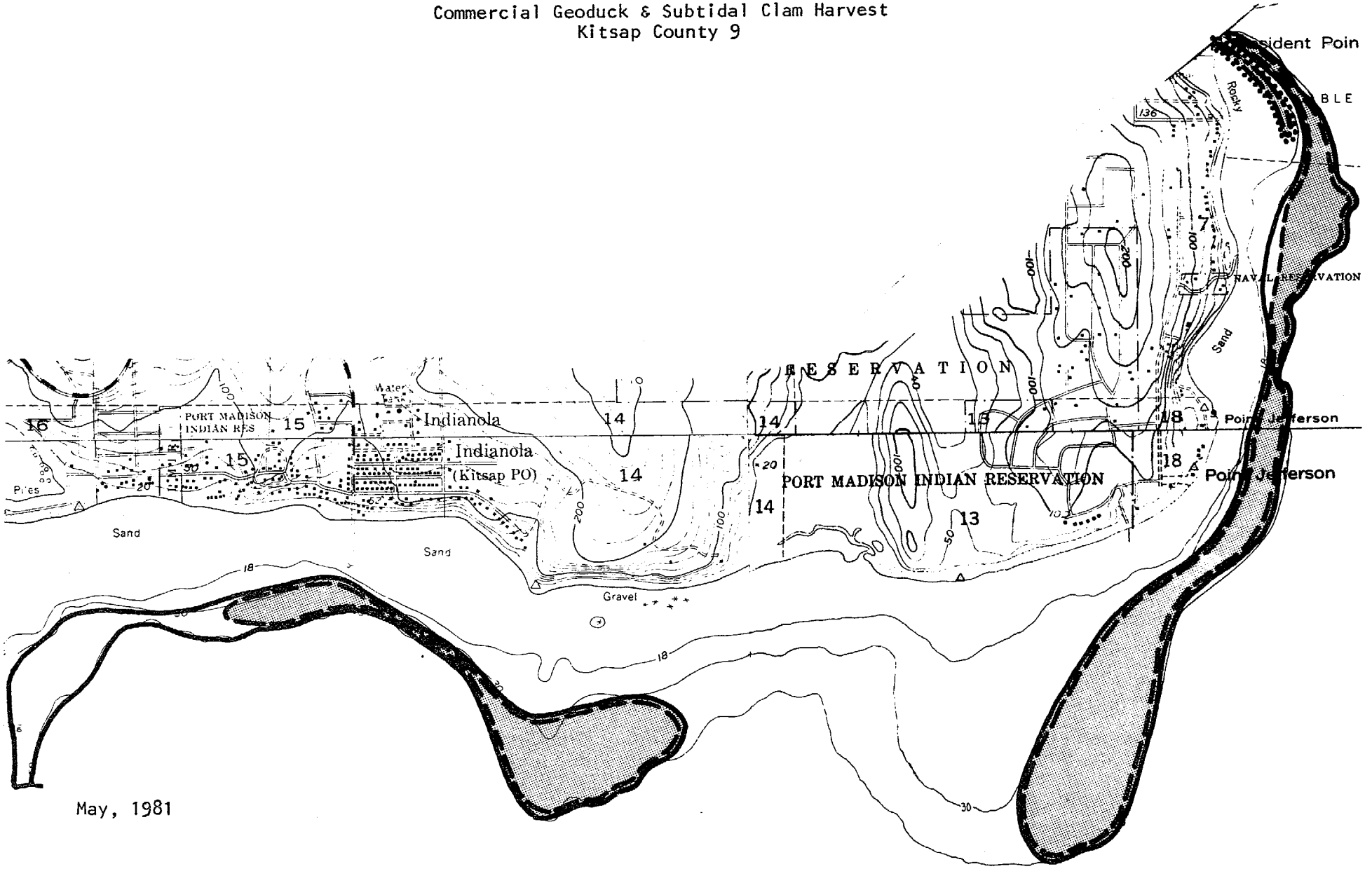
May, 1981



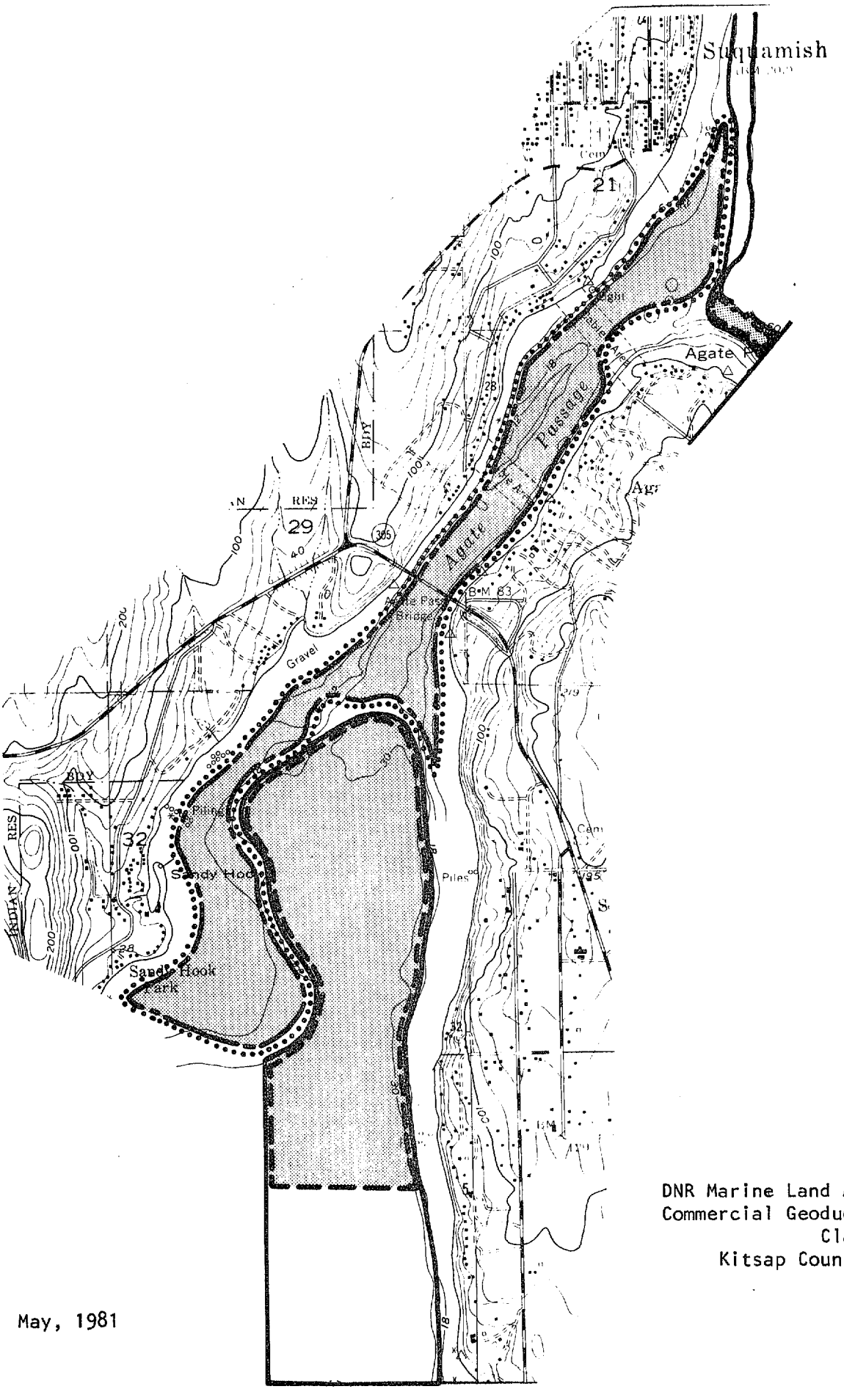
DNR Marine Land Allocations
Commercial Geoduck Harvest
Kitsap County 8

May, 1981

DNR Marine Land Allocations
Commercial Geoduck & Subtidal Clam Harvest
Kitsap County 9

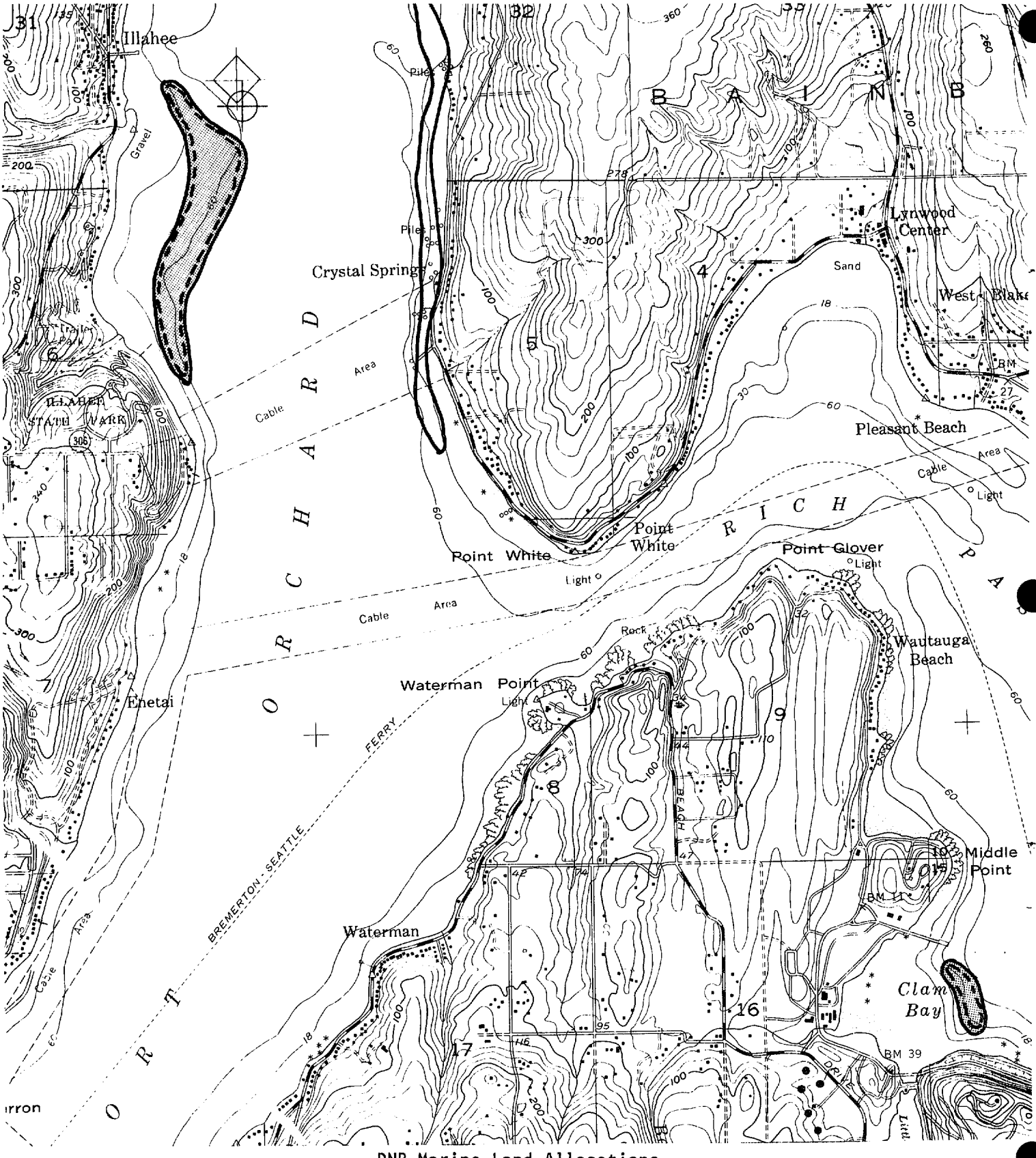


May, 1981



DNR Marine Land Allocations
Commercial Geoduck & Subtidal
Clam Harvest
Kitsap County 10

May, 1981

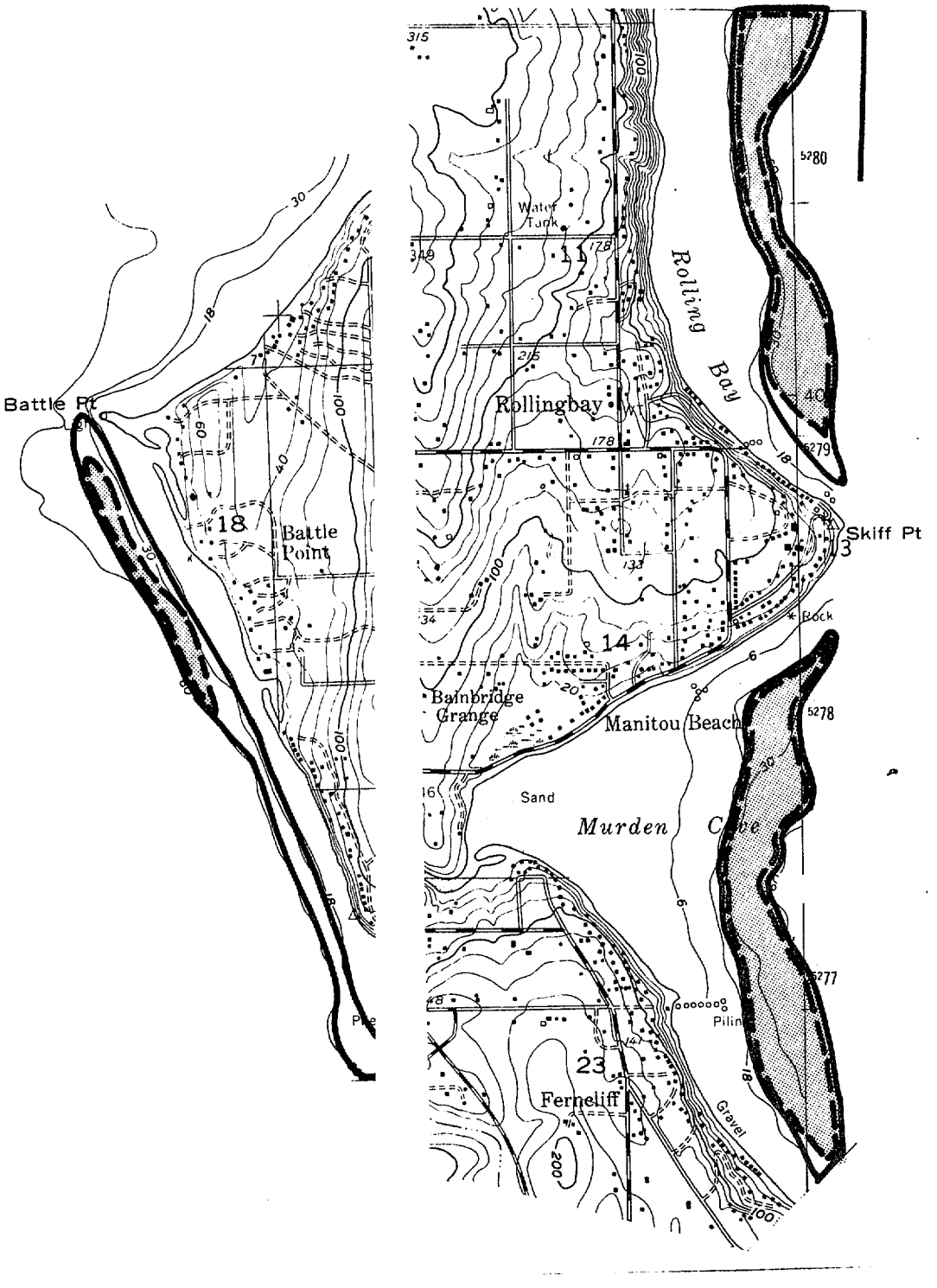


DNR Marine Land Allocations
Commercial Geoduck Harvest
Kitsap County 11

May, 1981

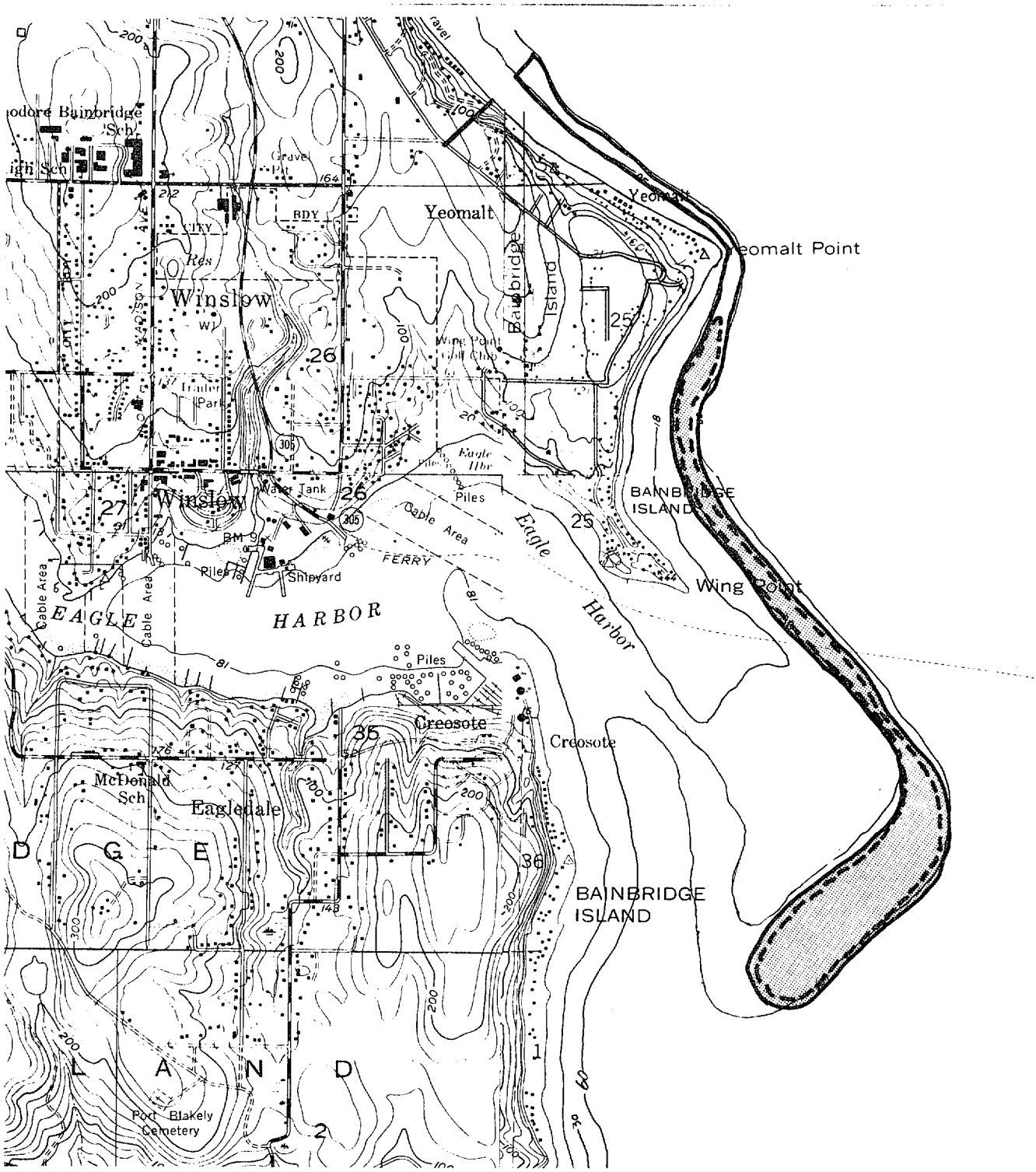
DNR Marine Land Allocations
Commercial Geoduck Harvest
Kitsap County 12

May, 1981



DNR Marine Land Allocations
Commercial Geoduck Harvest
Kitsap County 13

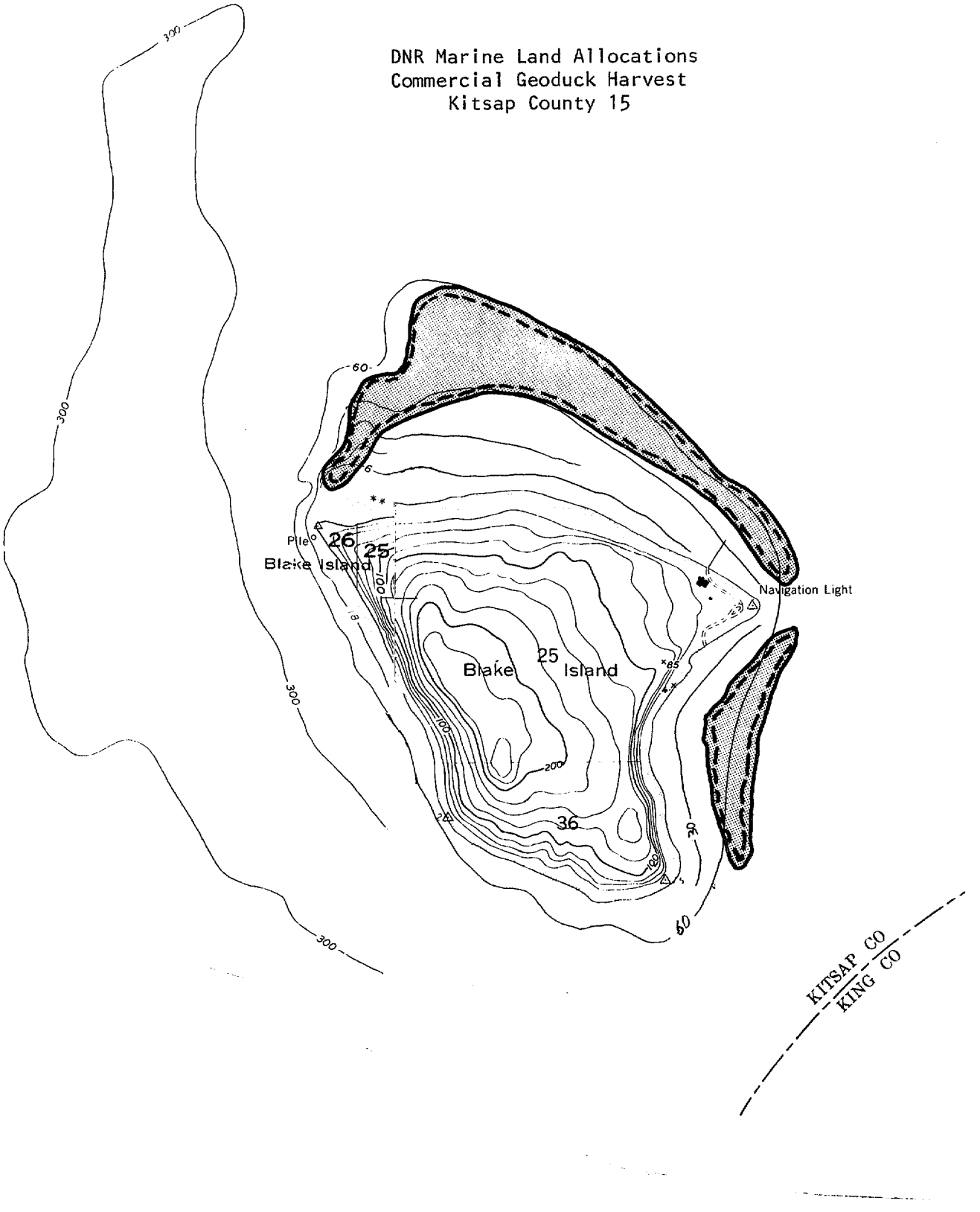
May, 1981



DNR Marine Land Allocations
Commercial Geoduck Harvest
Kitsap County 14

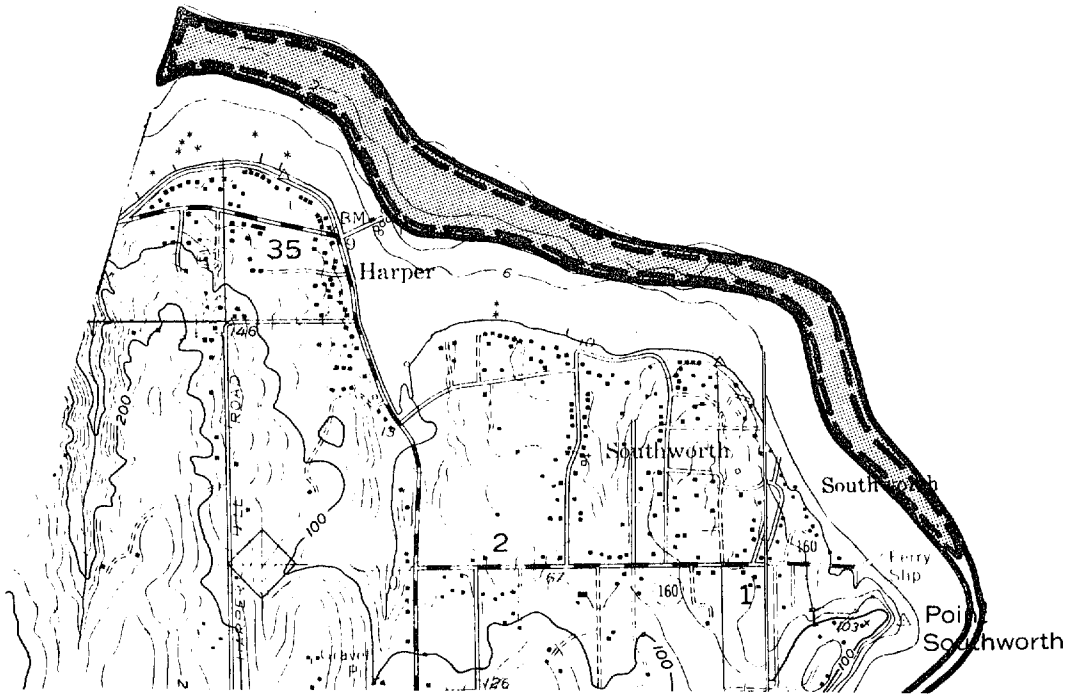
May, 1981

DNR Marine Land Allocations
Commercial Geoduck Harvest
Kitsap County 15



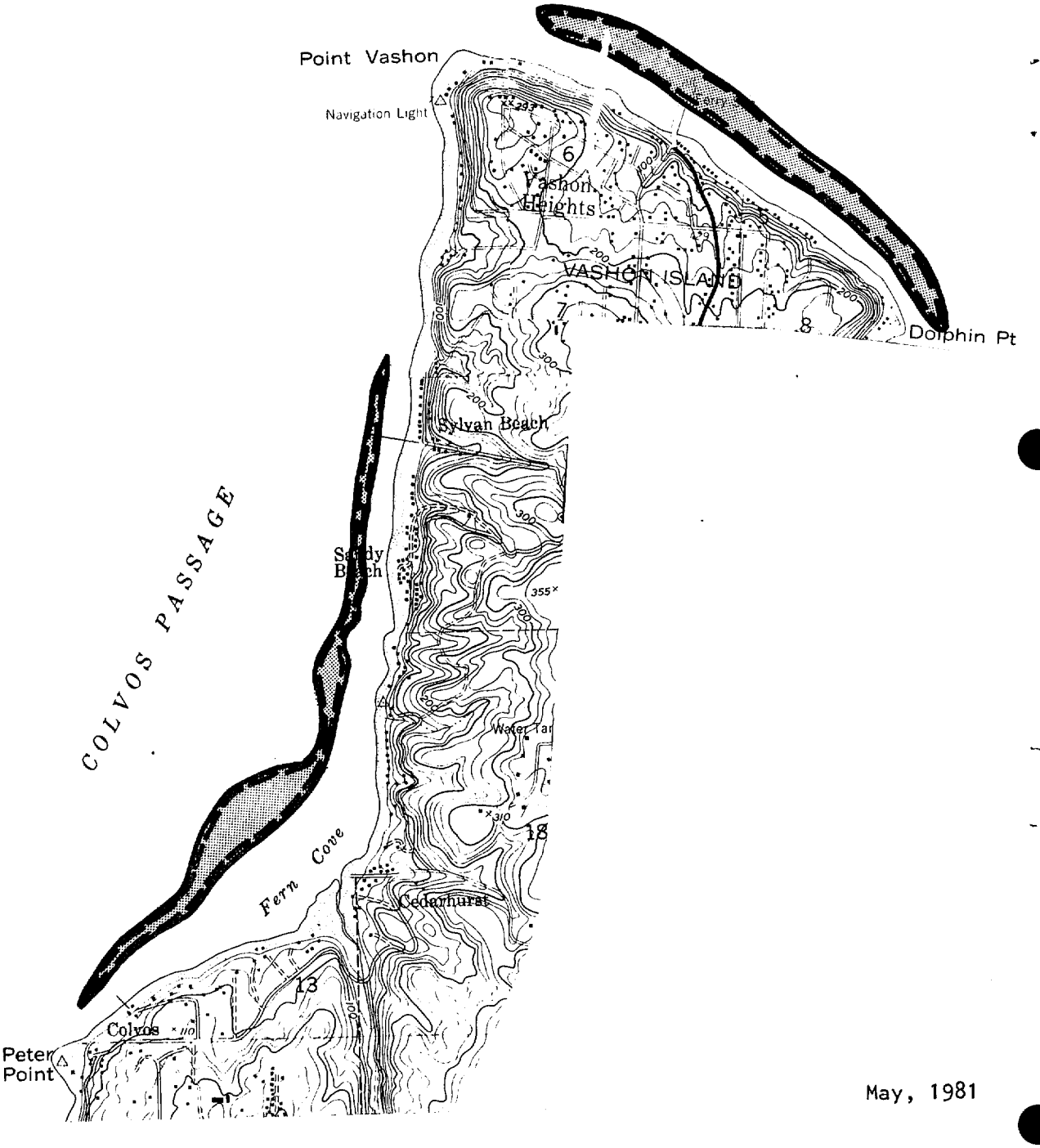
May, 1981

DNR Marine Land Allocations
Commercial Geoduck Harvest
Kitsap County 16



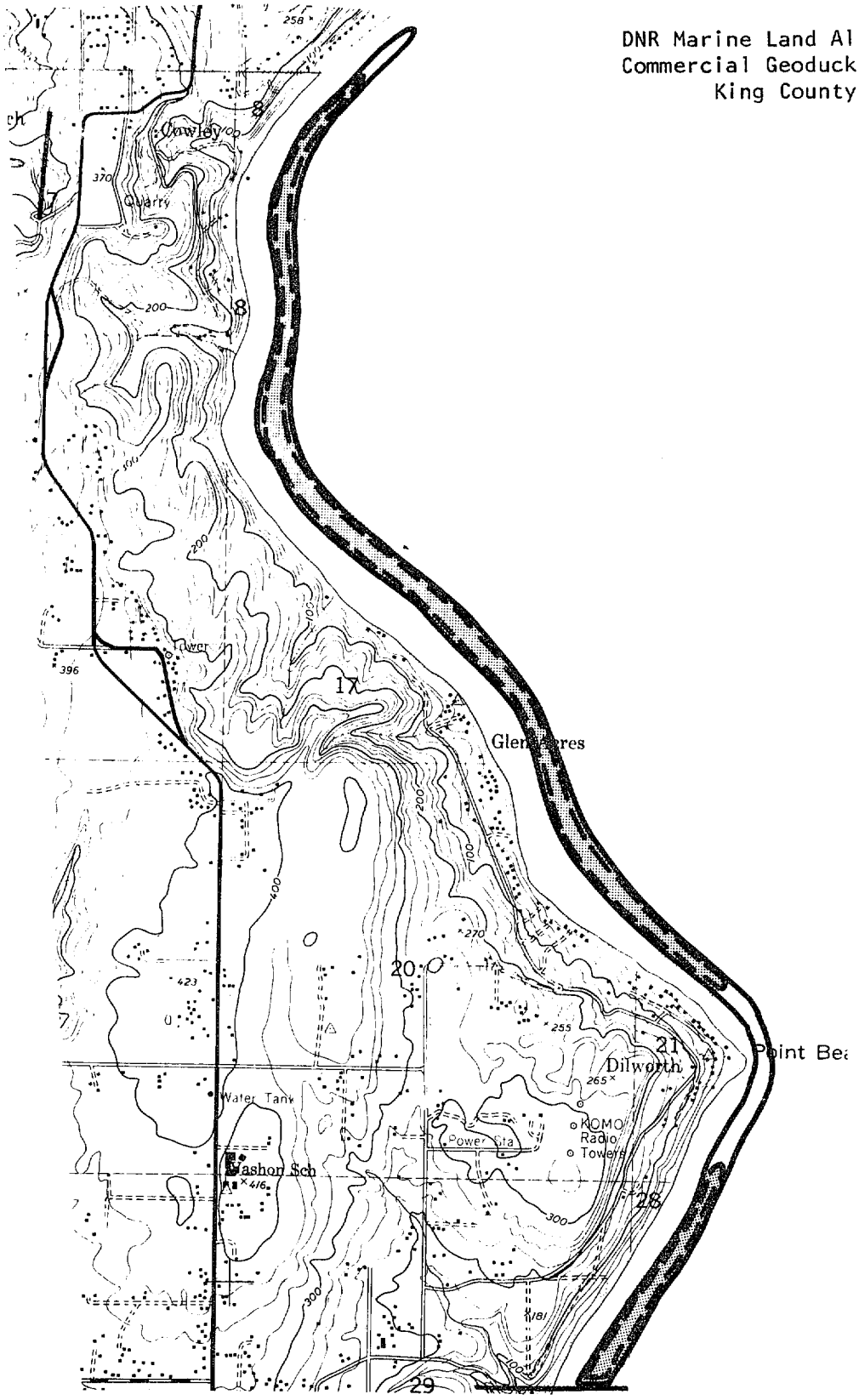
May, 1981

DNR Marine Land Allocations
Commercial Geoduck Harvest
King County 1



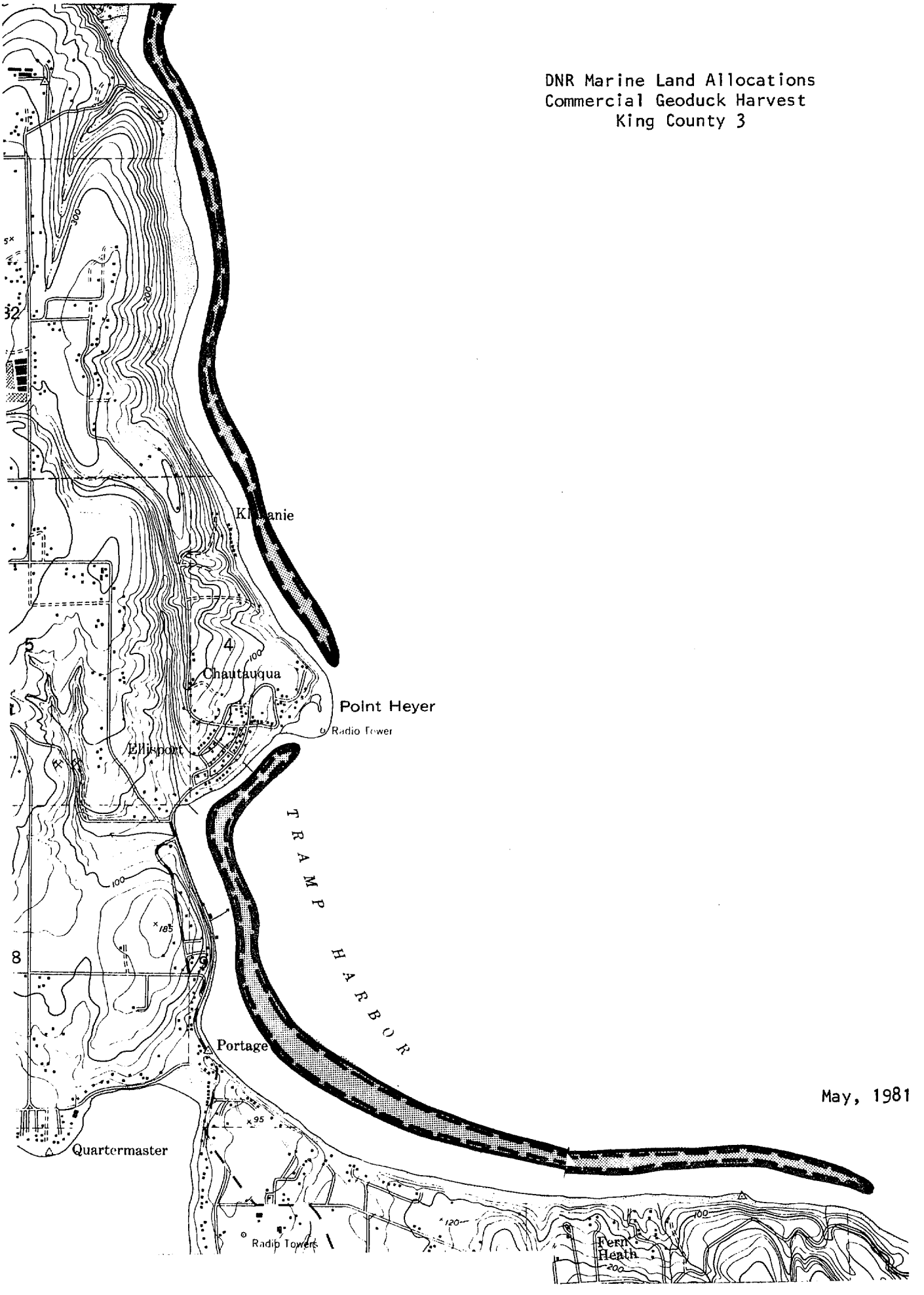
May, 1981

DNR Marine Land Allocations
Commercial Geoduck Harvest
King County 2

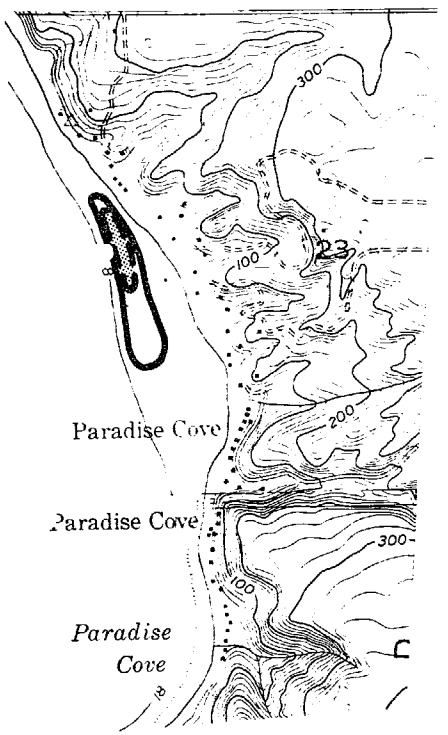


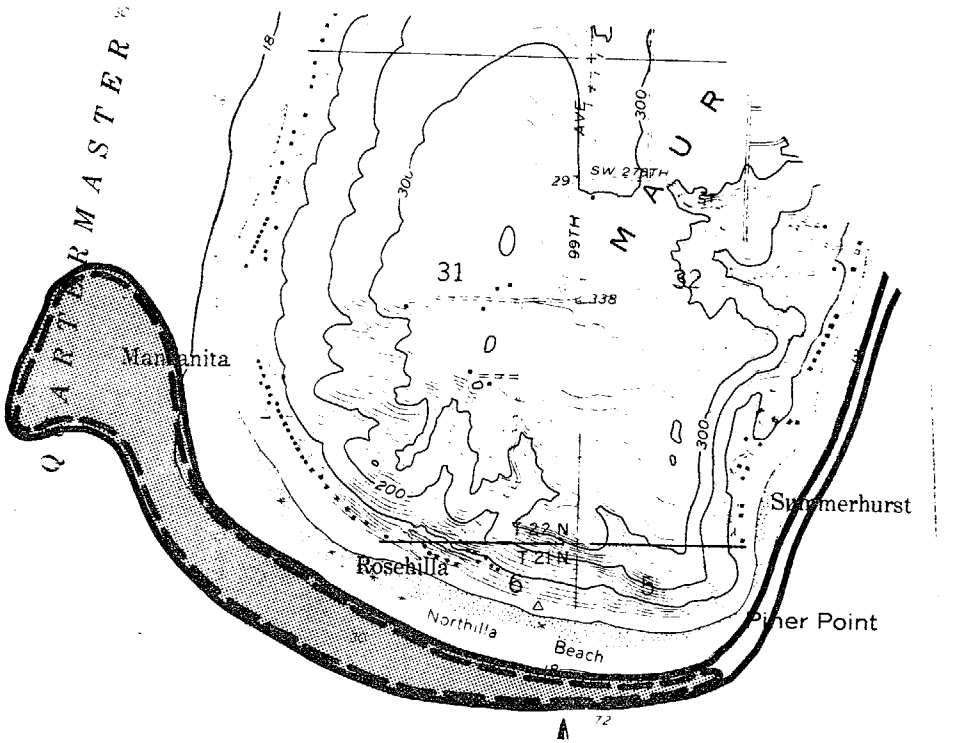
May, 1981

DNR Marine Land Allocations
Commercial Geoduck Harvest
King County 3



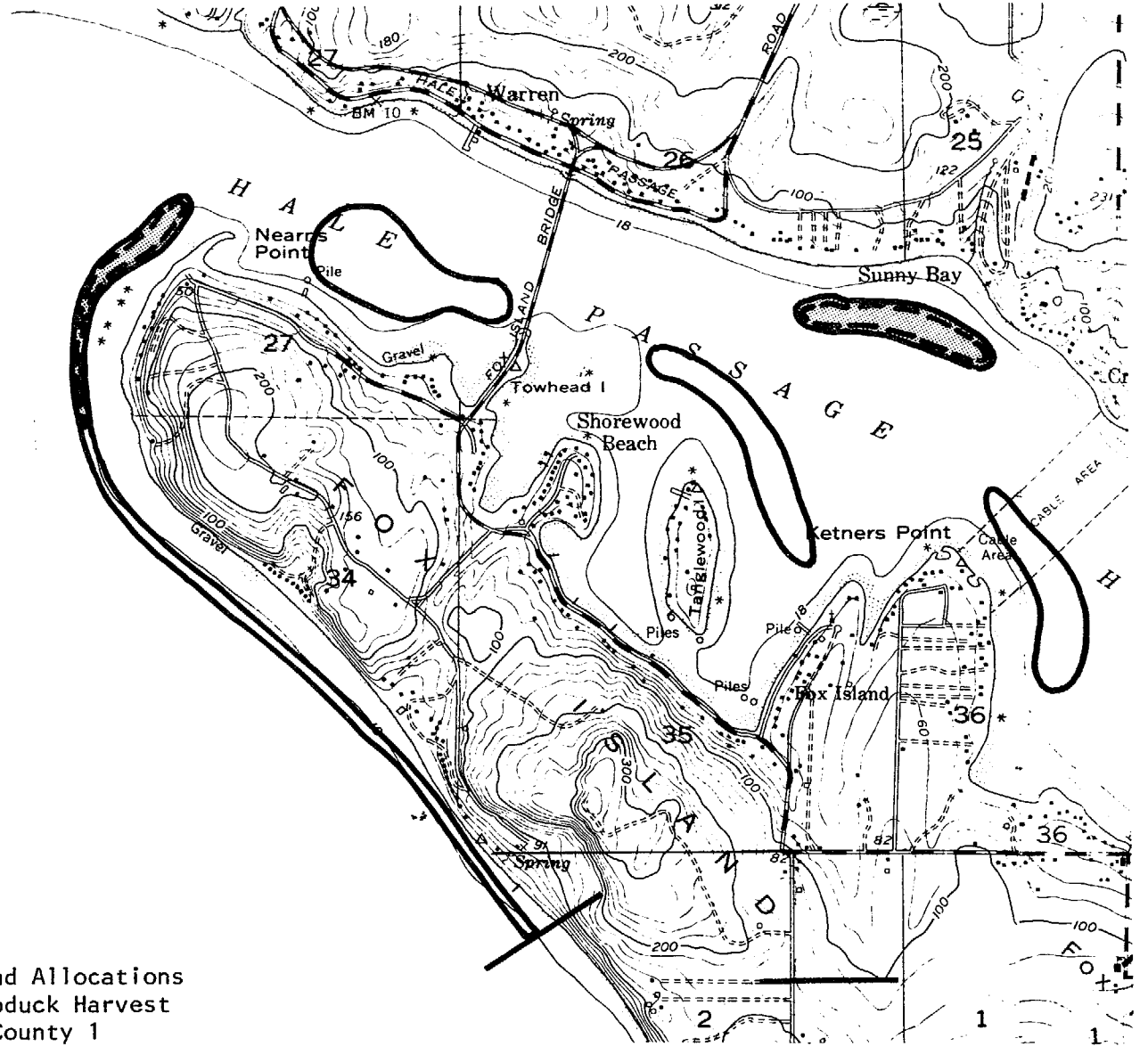
May, 1981





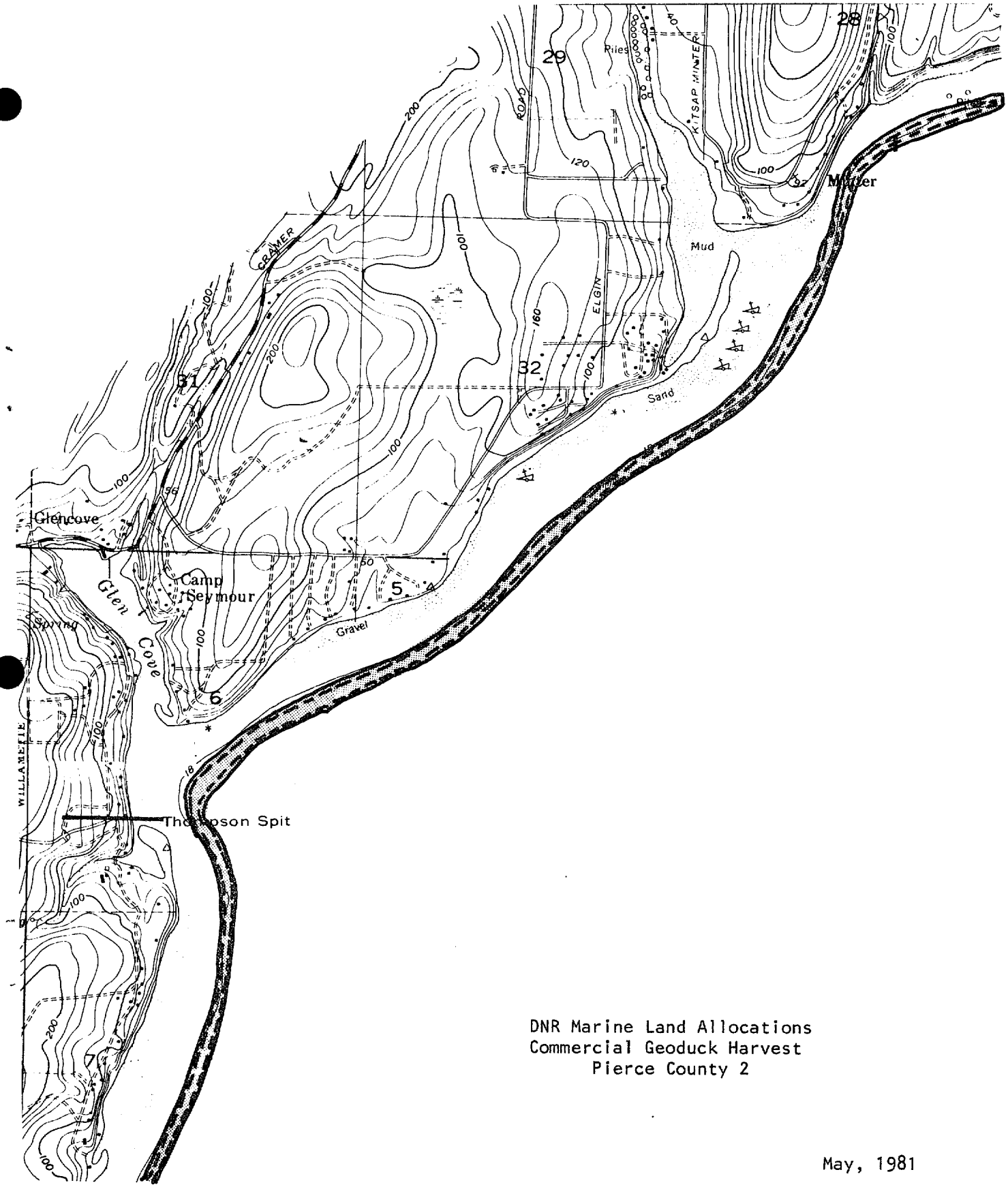
DNR Marine Land Allocations
Commercial Geoduck Harvest
King County 4

May, 1981



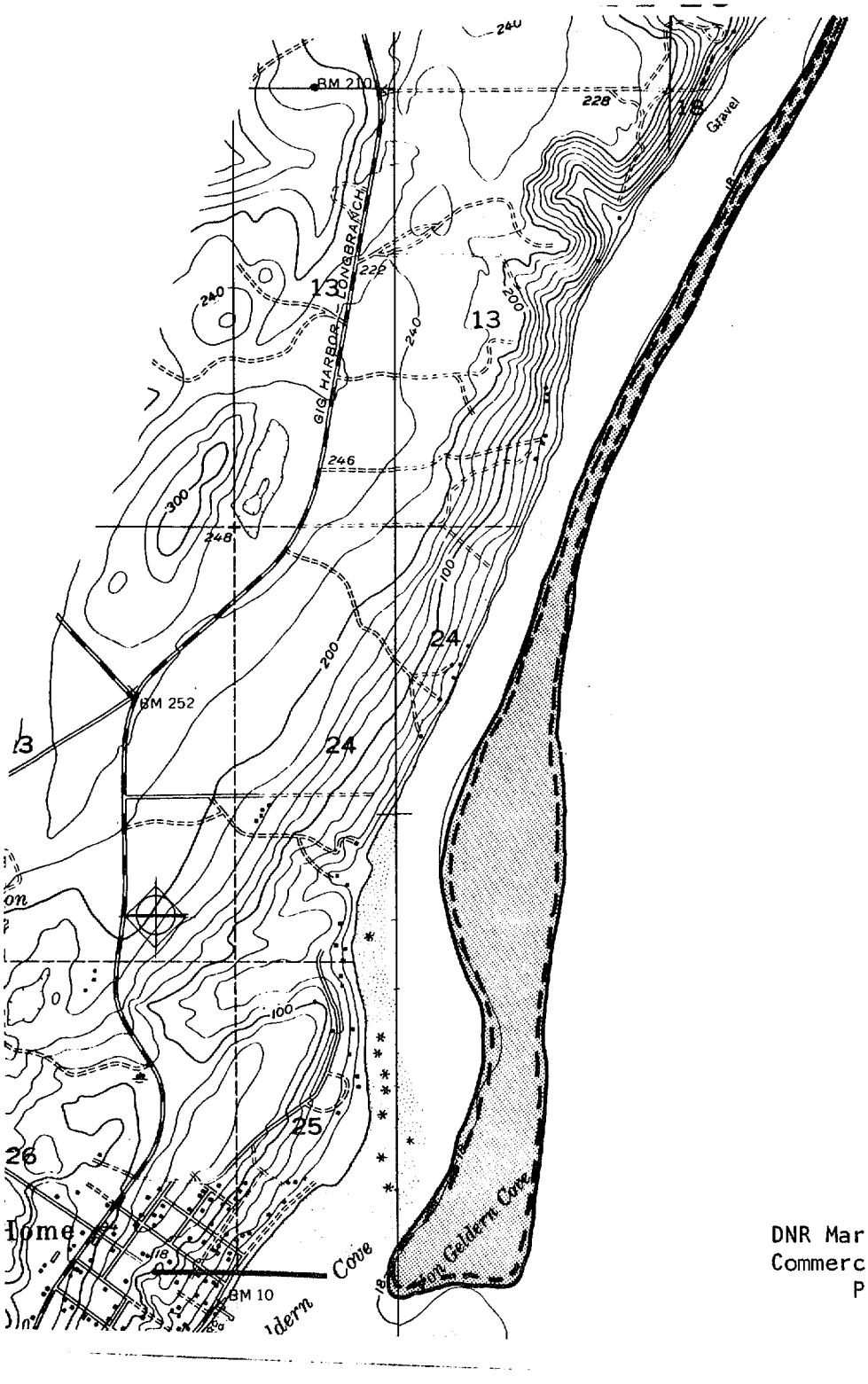
DNR Marine Land Allocations
Commercial Geoduck Harvest
Pierce County 1

May, 1981



DNR Marine Land Allocations
Commercial Geoduck Harvest
Pierce County 2

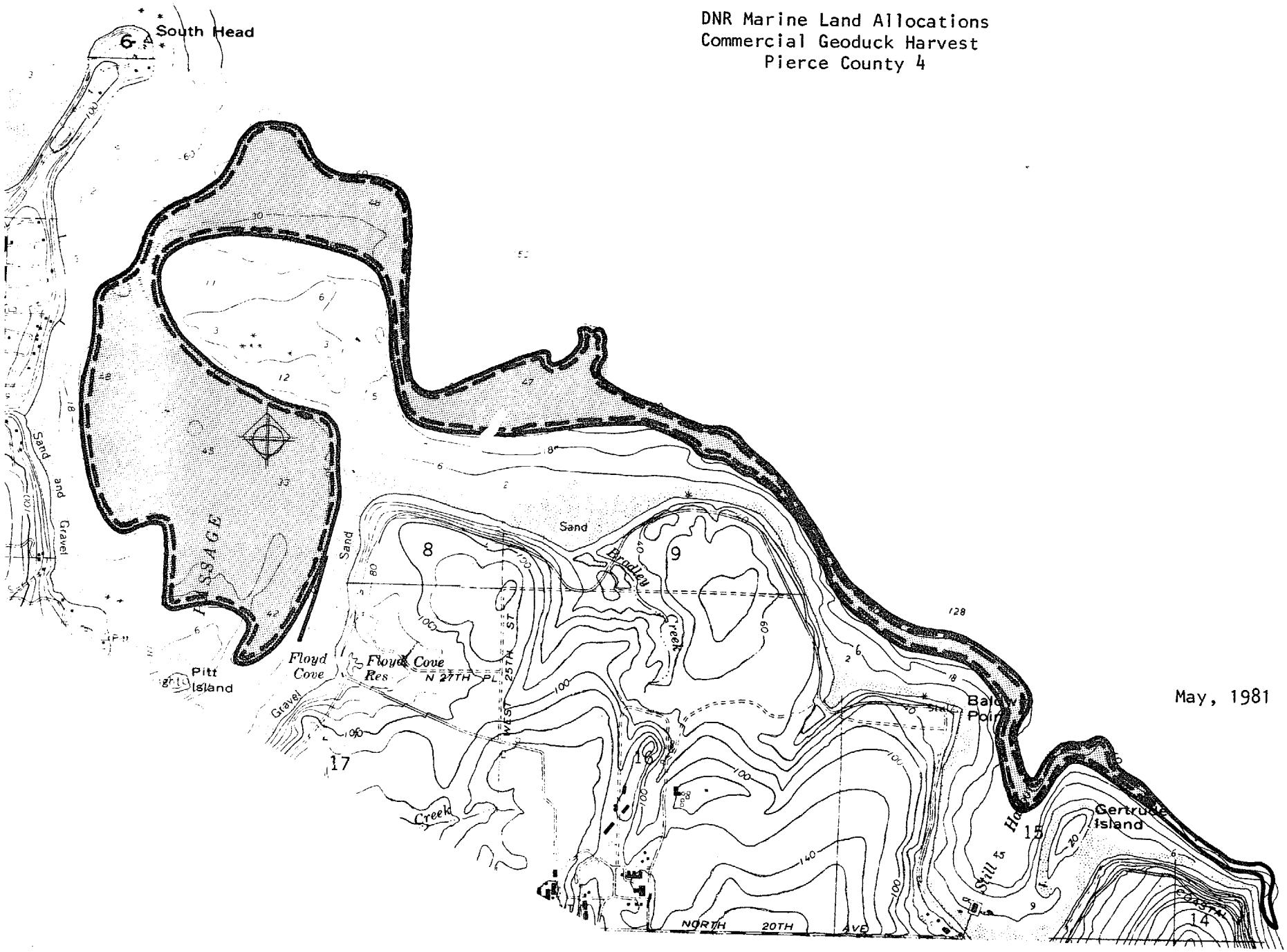
May, 1981



DNR Marine Land Allocations
Commercial Geoduck Harvest
Pierce County 3

May, 1981

DNR Marine Land Allocations
Commercial Geoduck Harvest
Pierce County 4



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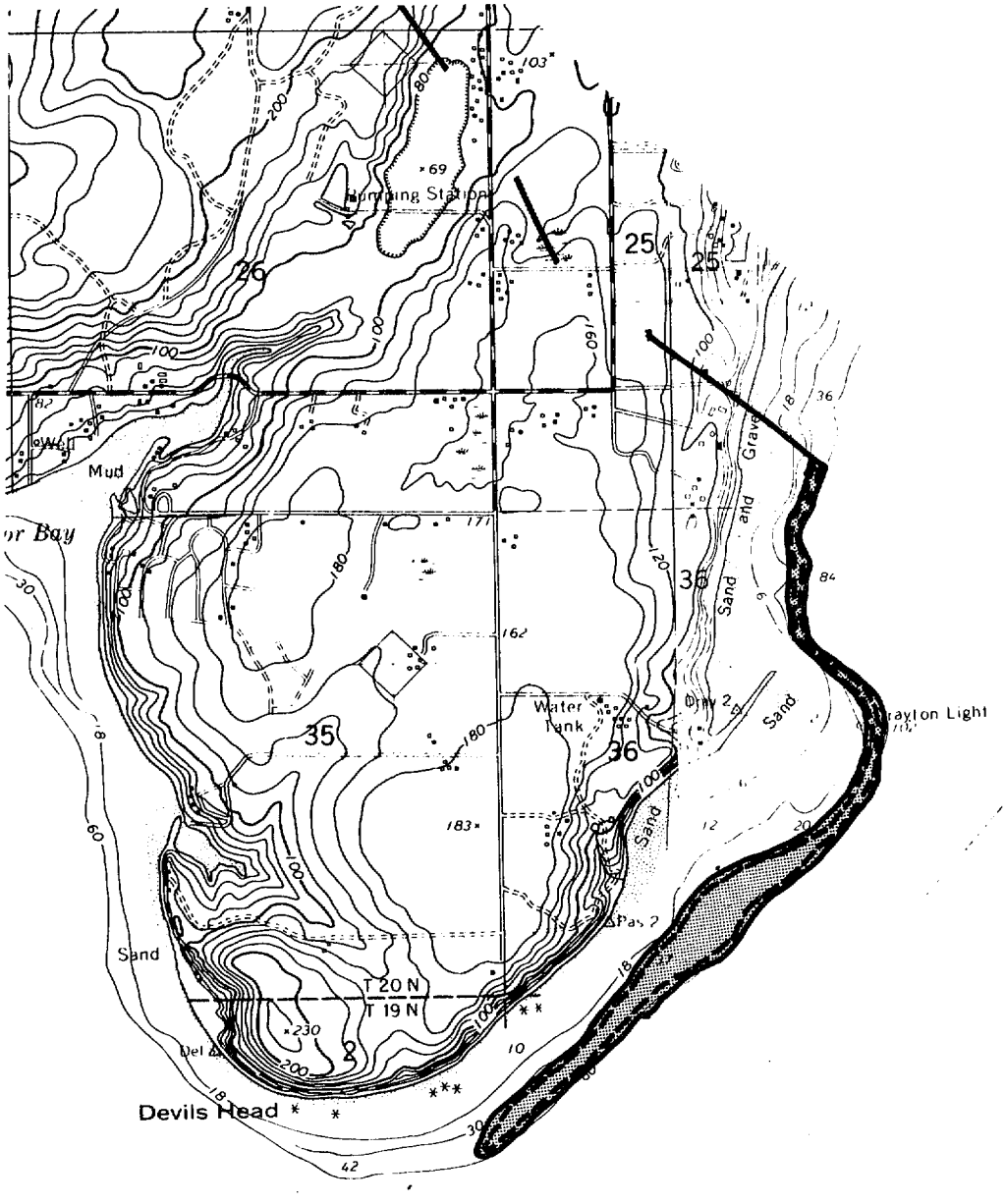
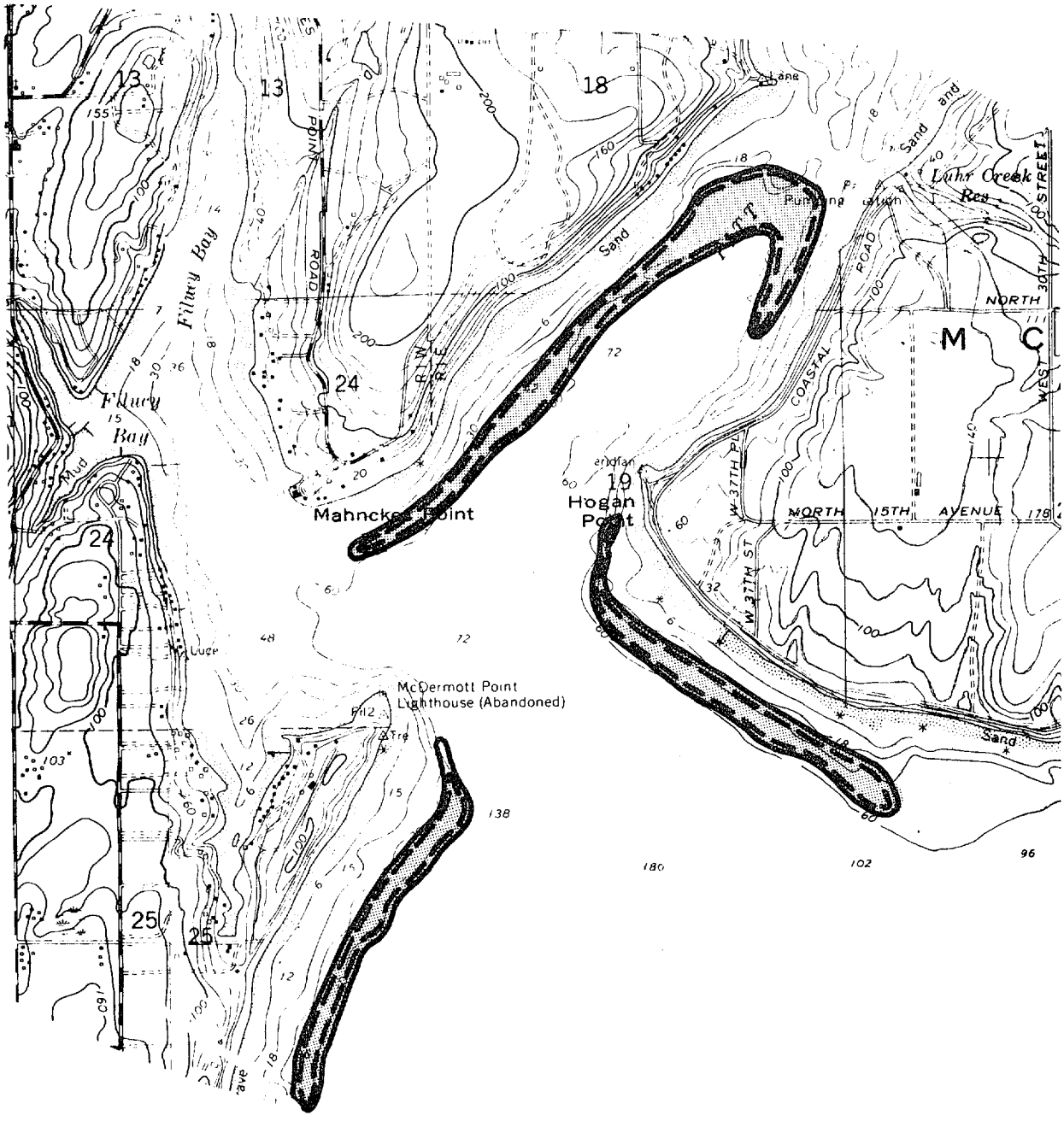


DNR Marine Land Allocations
Commercial Geoduck Harvest
Pierce County 5

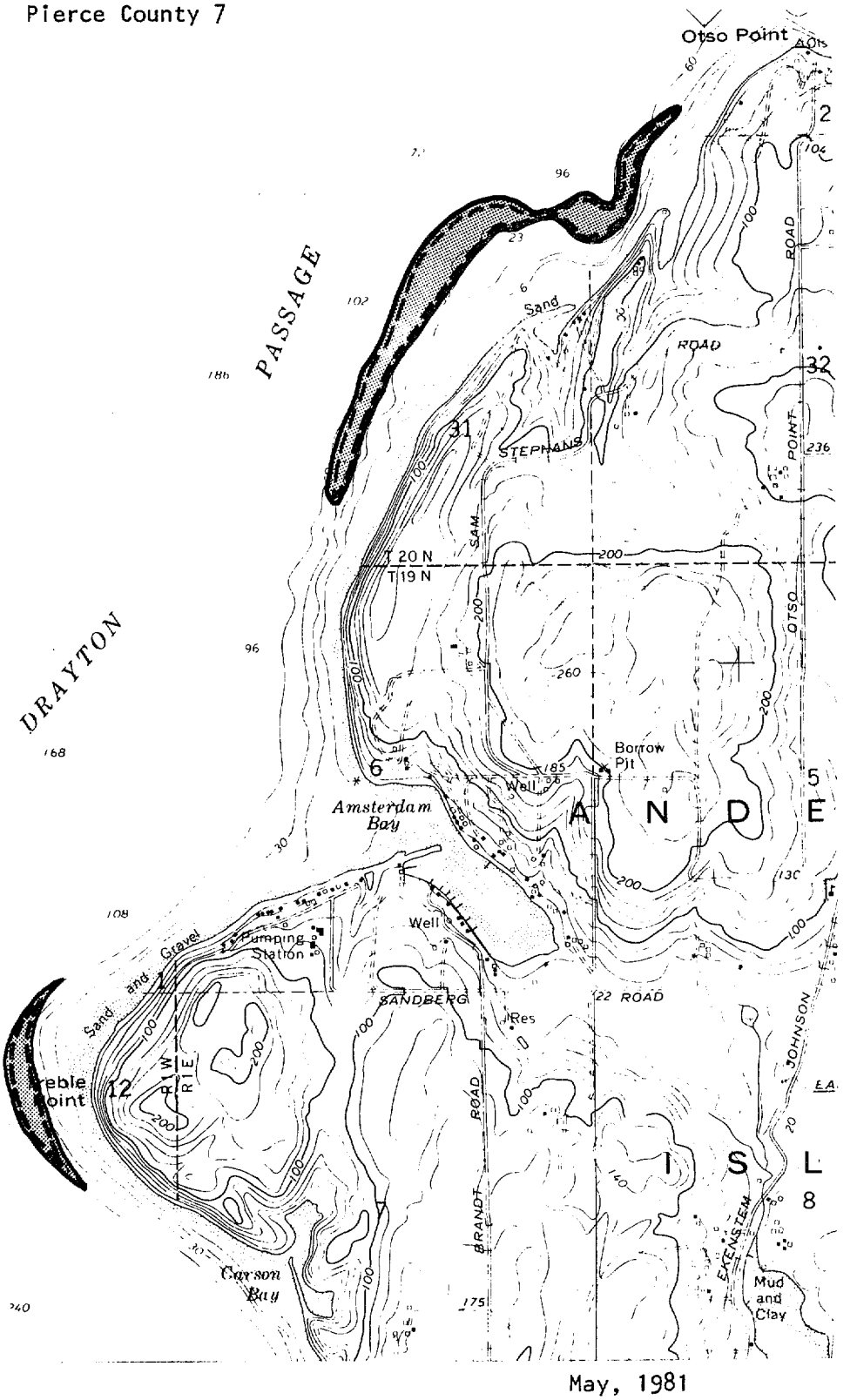
May, 1981



DNR Marine Land Allocations
Commercial Geoduck Harvest
Pierce County 6

May, 1981

DNR Marine Land Allocations
Commercial Geoduck Harvest
Pierce County 7



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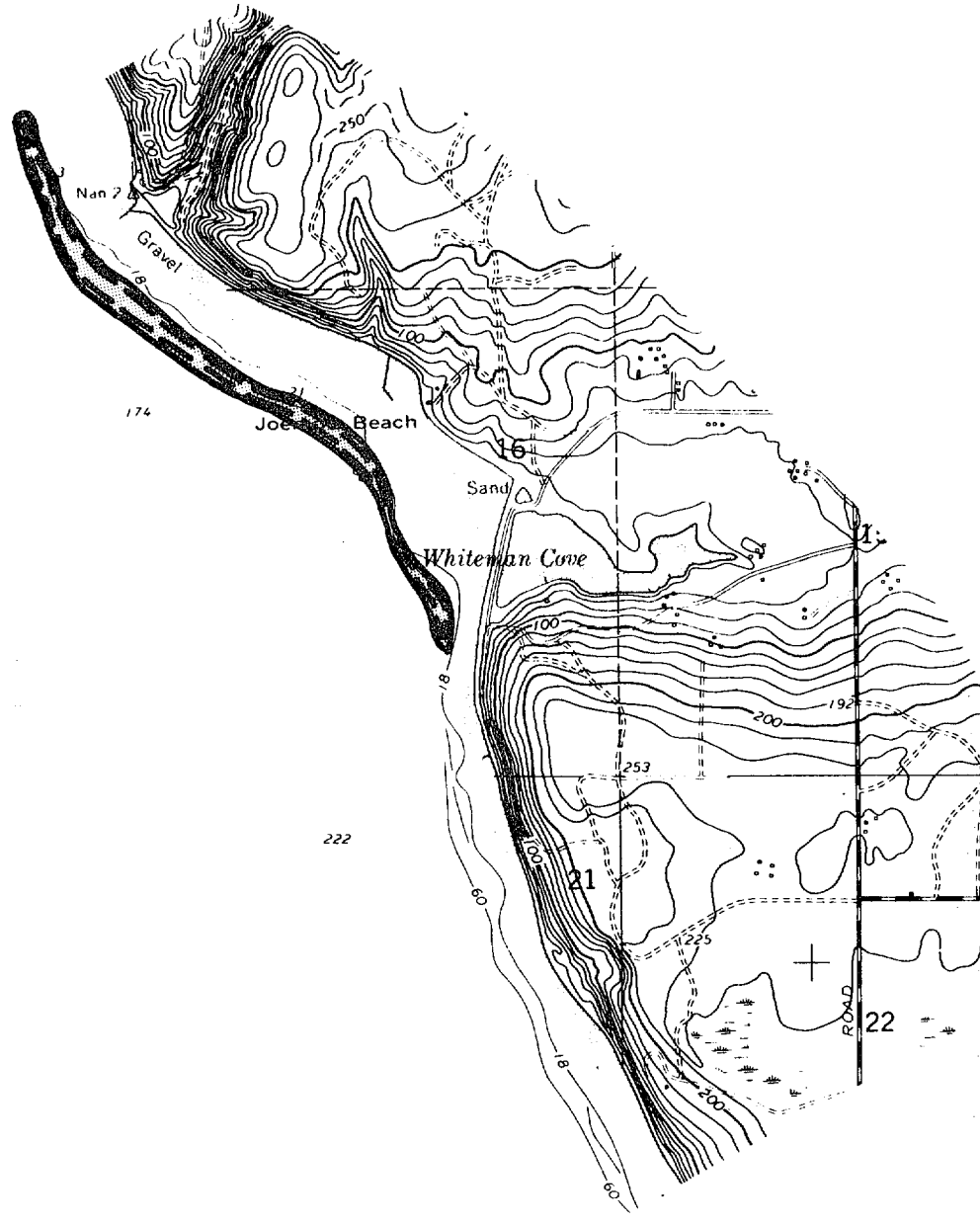


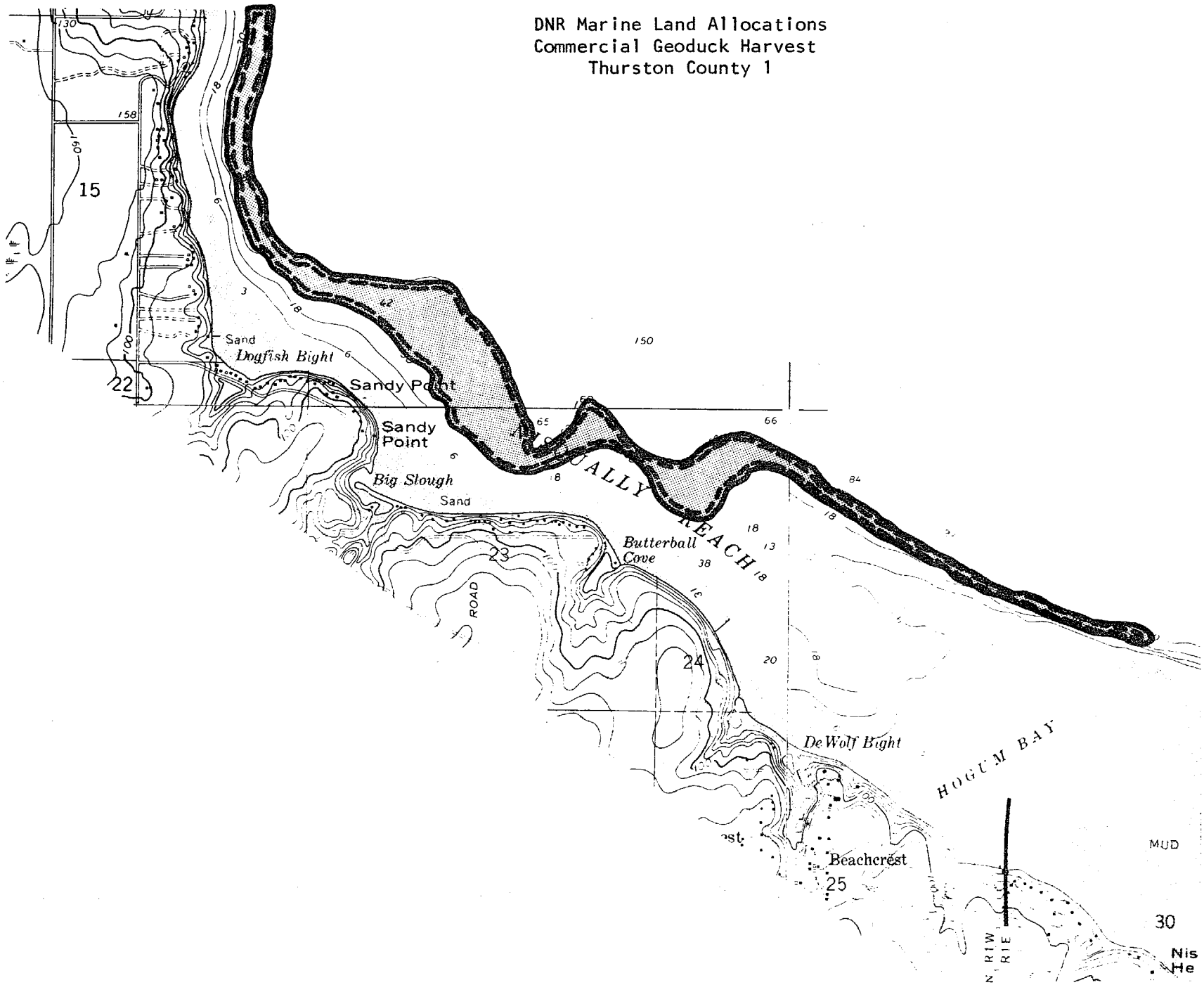
DNR Marine Land Allocations
Commercial Geoduck Harvest
Pierce County 8

May, 1981

DNR Marine Land Allocations
Commercial Geoduck Harvest
Pierce County 9

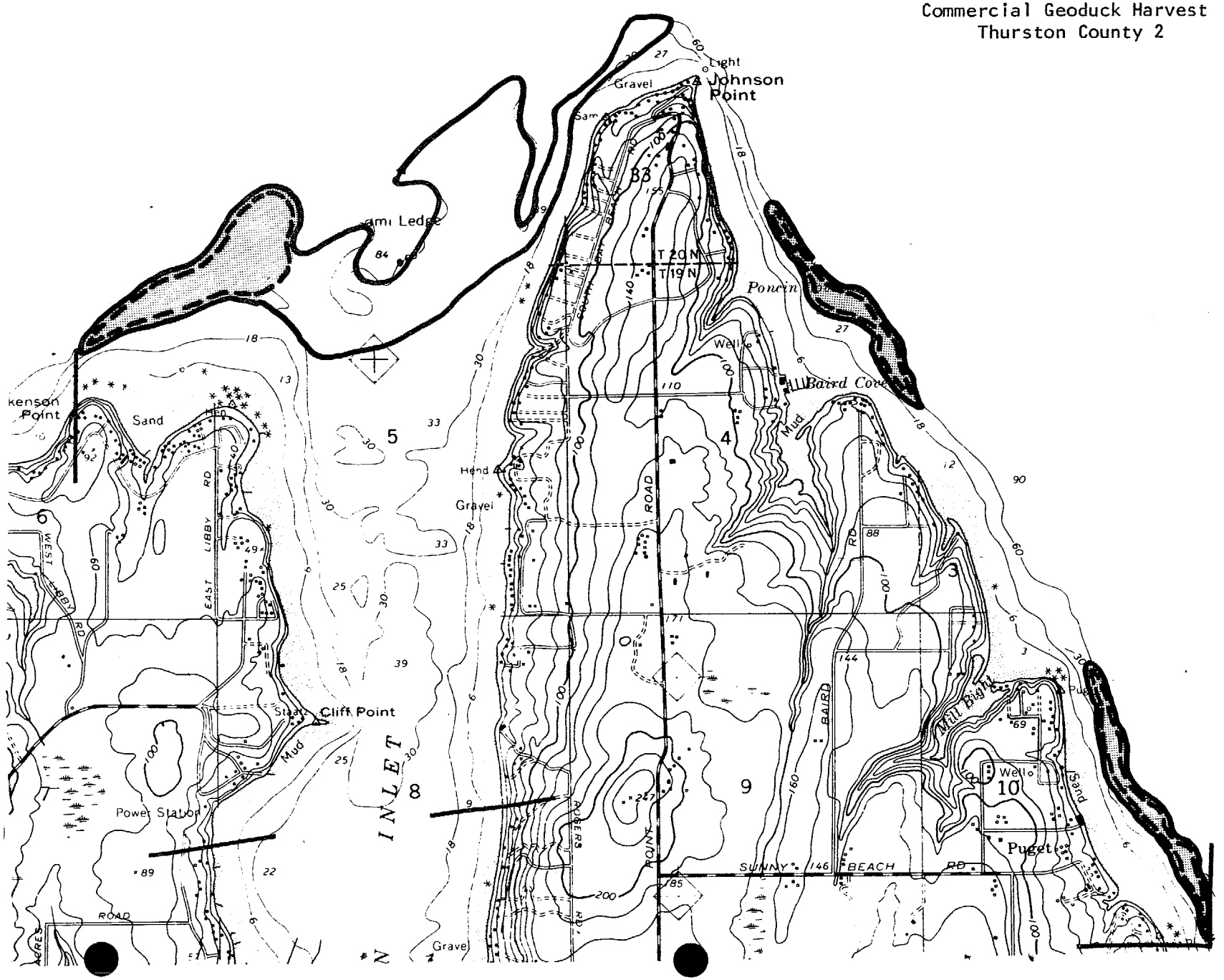
May, 1981

DNR Marine Land Allocations
Commercial Geoduck Harvest
Thurston County 1



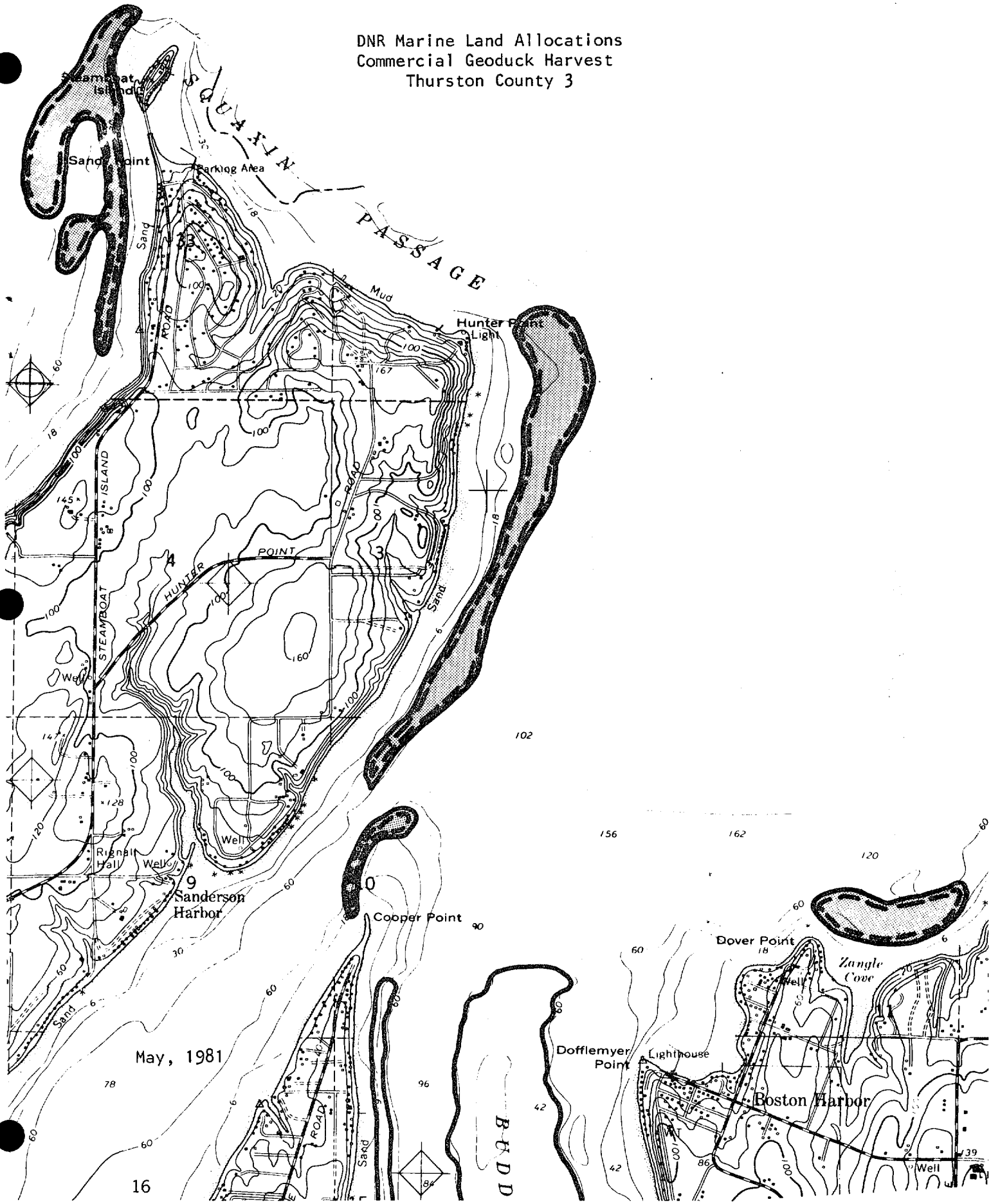
May, 1981

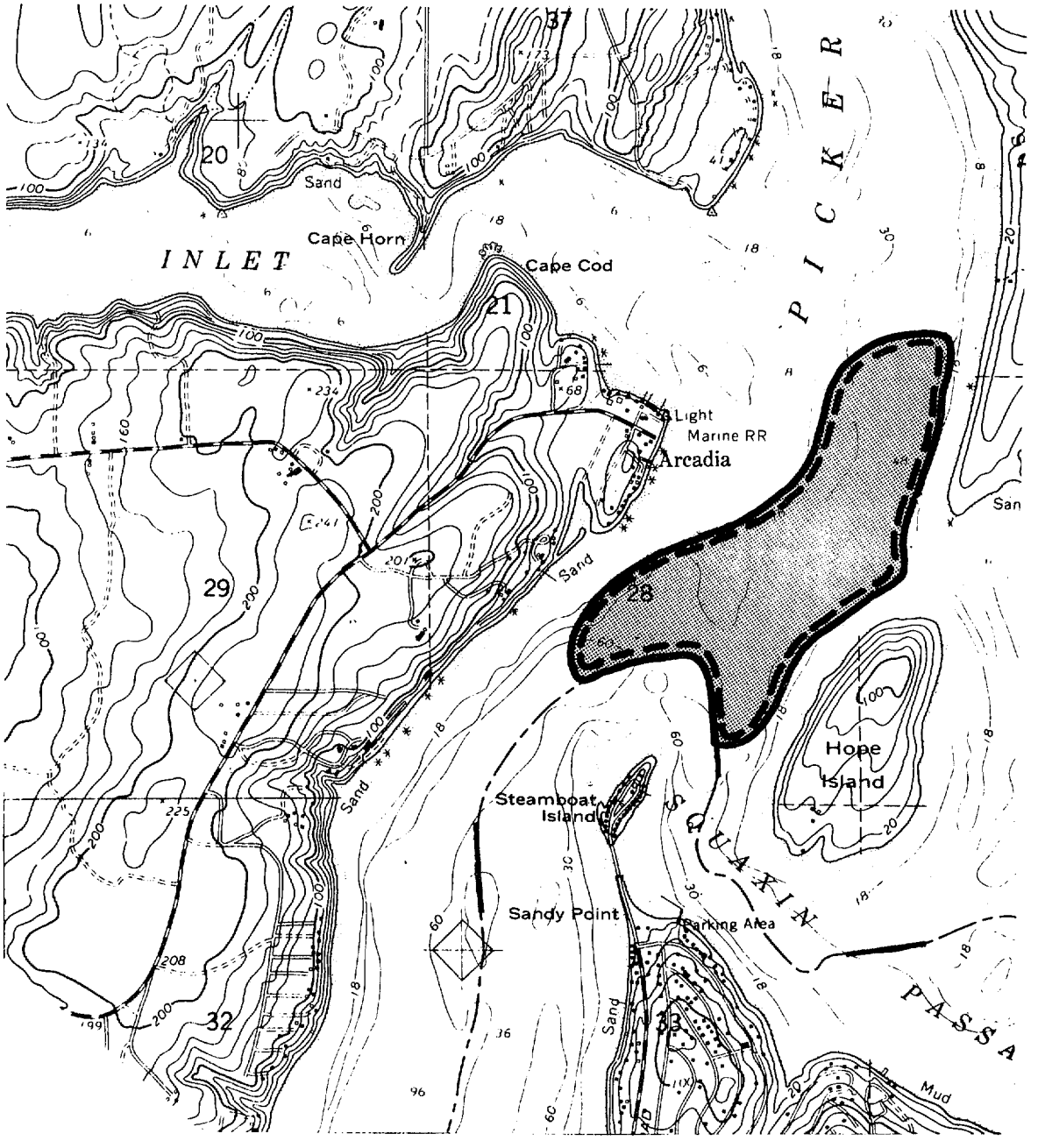
DNR Marine Land Allocations
Commercial Geoduck Harvest
Thurston County 2



May, 1981

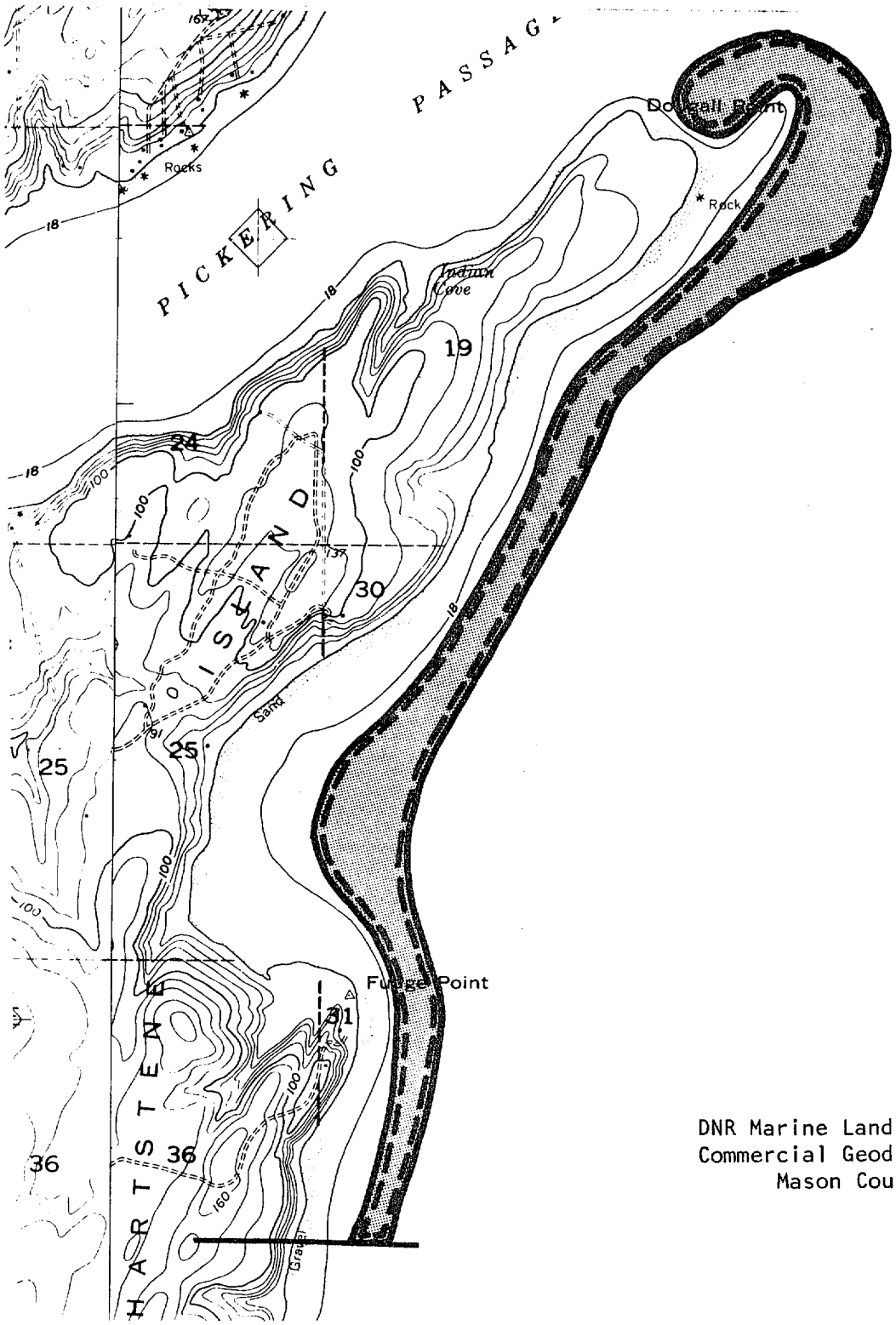
DNR Marine Land Allocations
Commercial Geoduck Harvest
Thurston County 3





DNR Marine Land Allocations
Commercial Geoduck Harvest
Mason County 1

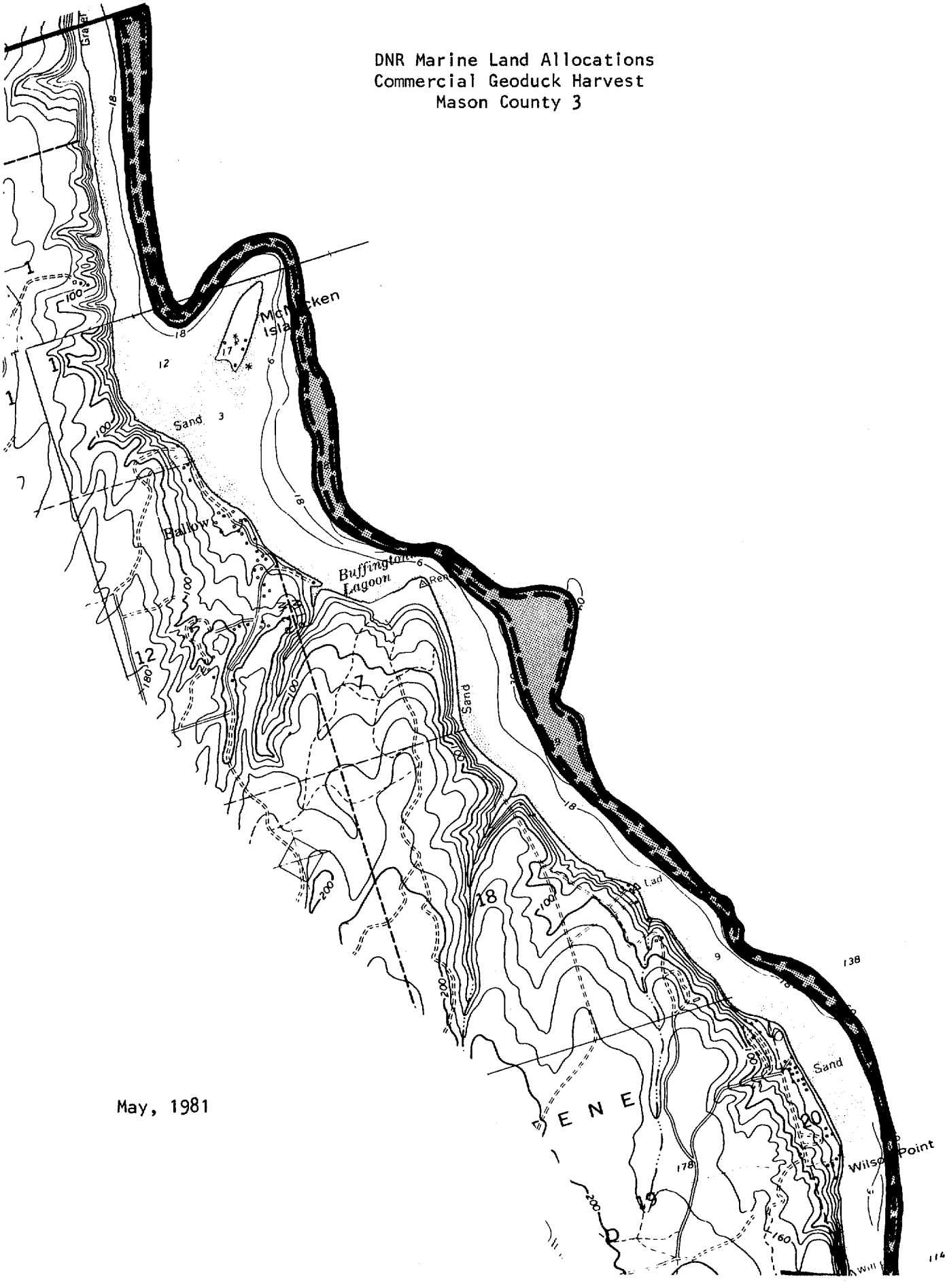
May, 1981



DNR Marine Land Allocations
Commercial Geoduck Harvest
Mason County 2

May, 1981

DNR Marine Land Allocations
Commercial Geoduck Harvest
Mason County 3



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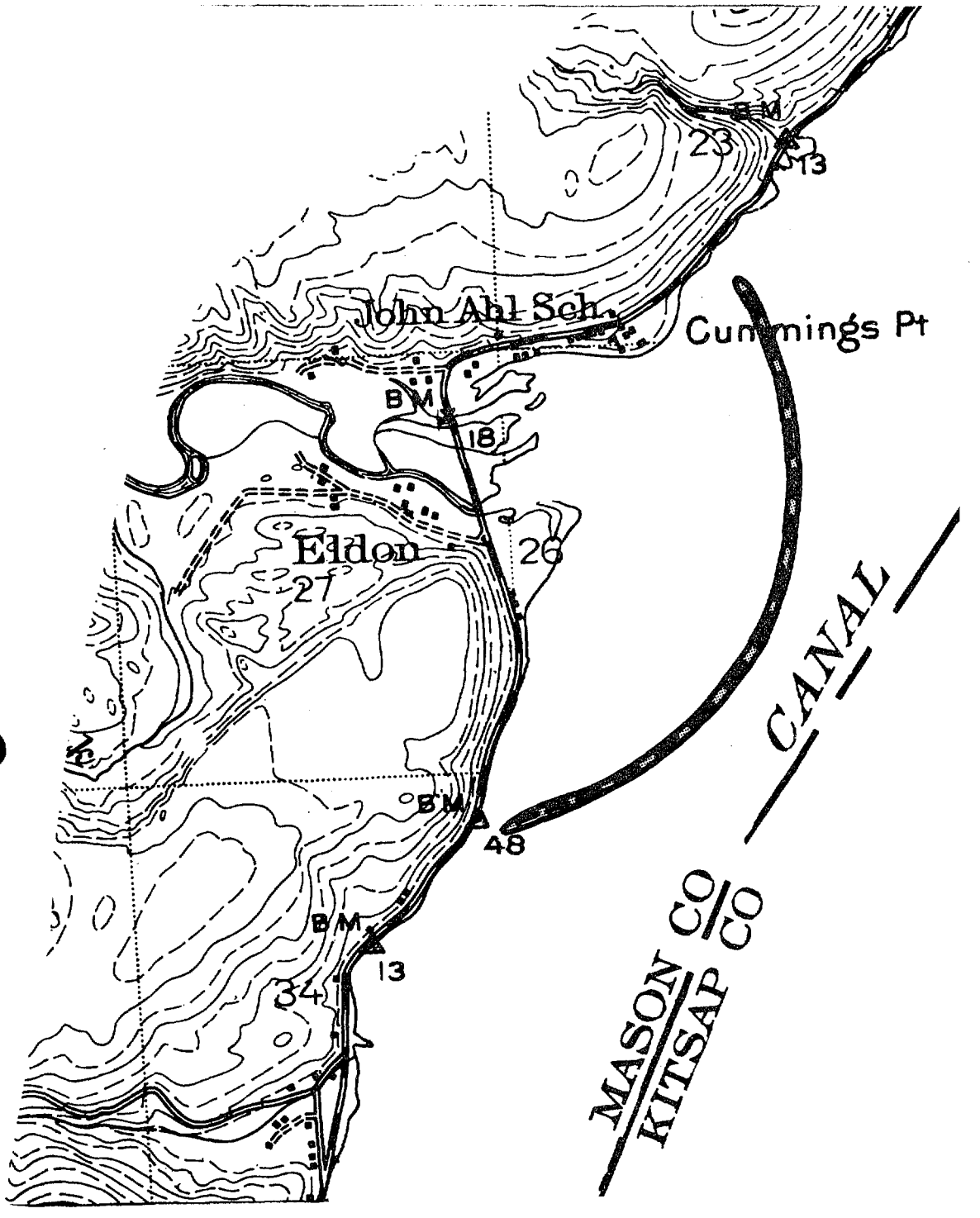
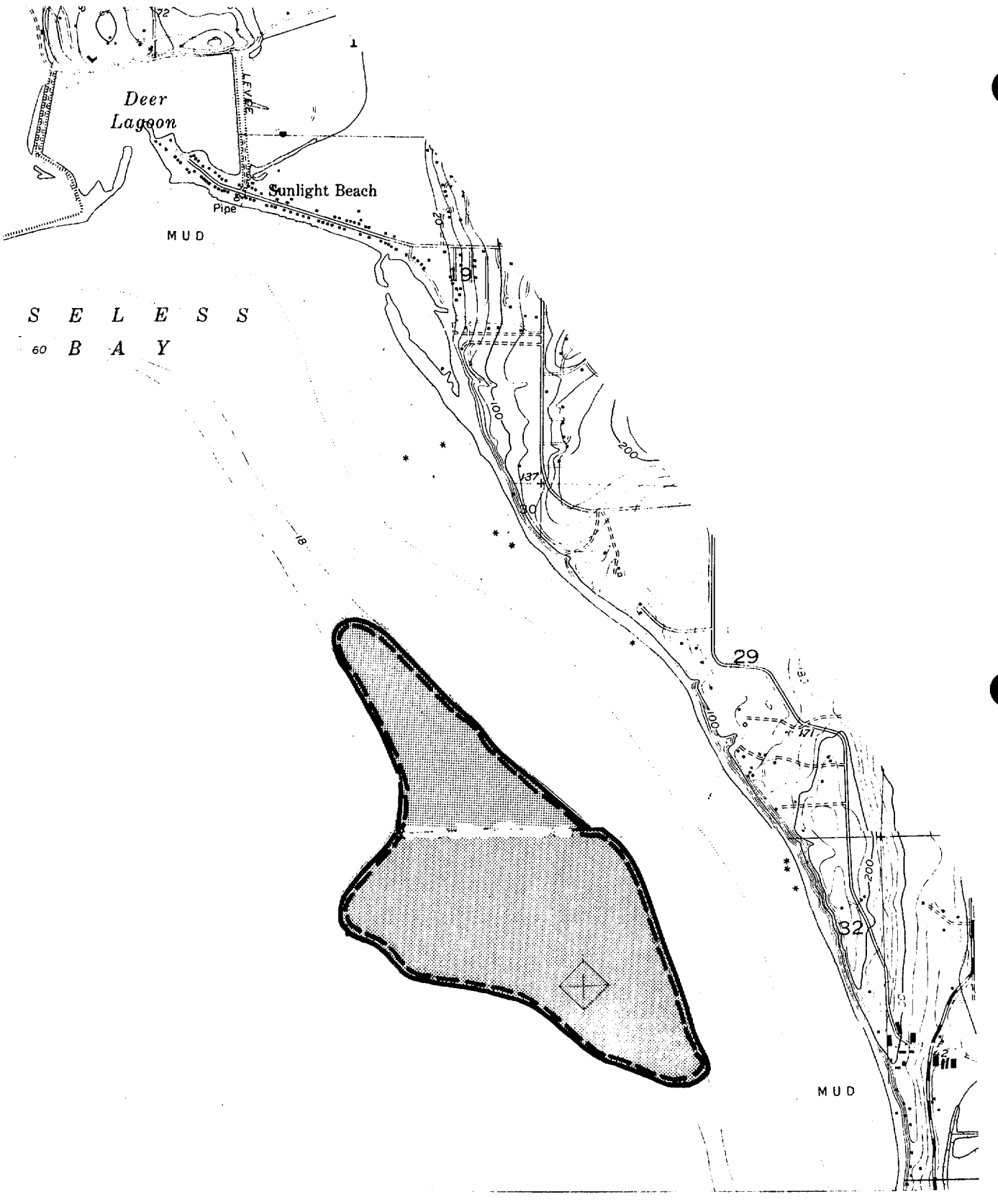


DNR Marine Land Allocations
Commercial Geoduck Harvest
Mason County 4

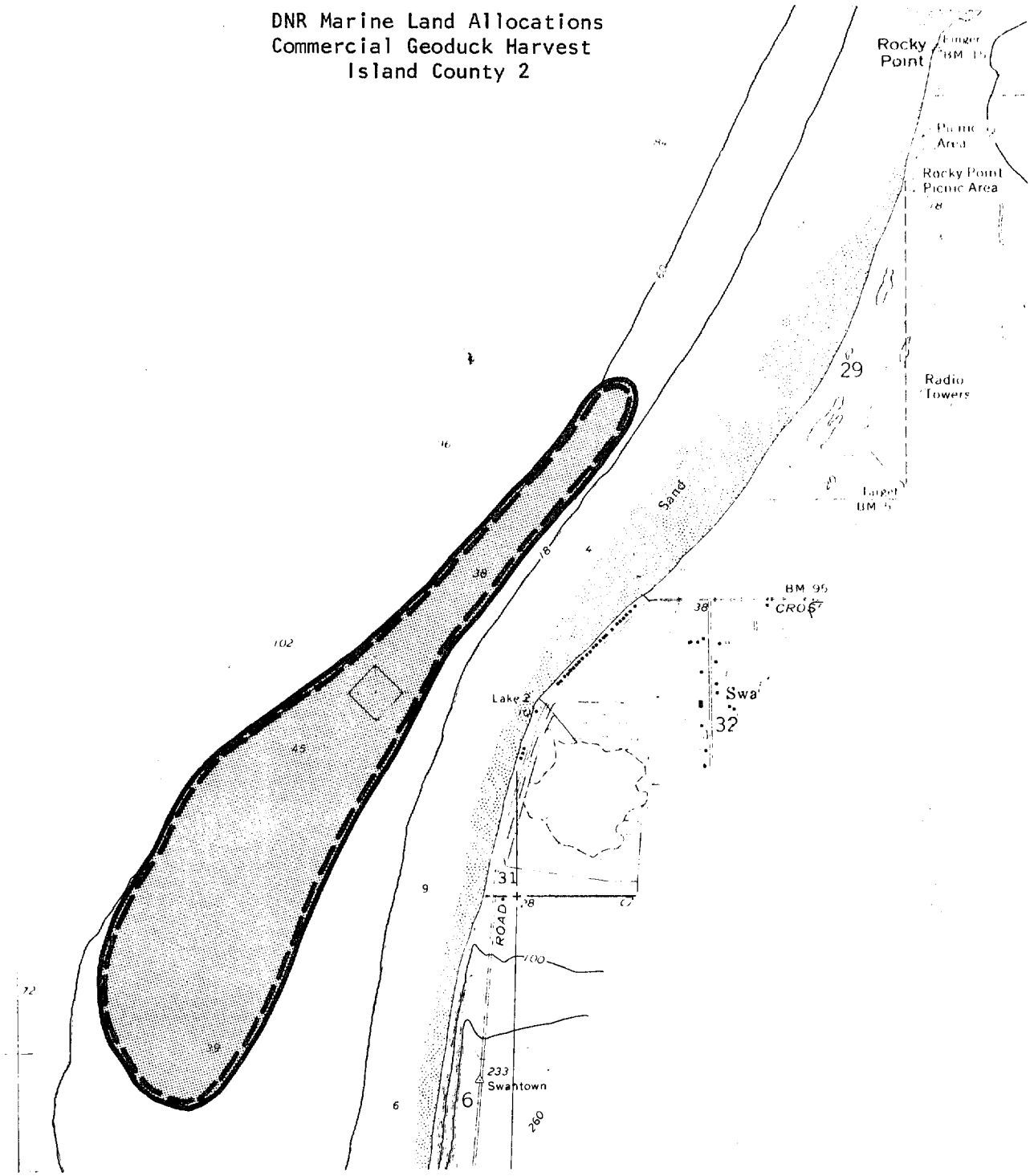
May, 1981



DNR Marine Land Allocations
Commercial Geoduck Harvest
Island County 1

May, 1981

DNR Marine Land Allocations
Commercial Geoduck Harvest
Island County 2



May, 1981

Commercial Geoduck Bed Data

DNR Map	Tract Name	Area (Acres)	LBS. X 10^6	Avg. Wt.	Flora and Fauna* Species	Season	Comments
Clallam 1	Dungeness	390			F 19	W Sp	Area is certifiable.
					B 13	W Sp F	Area is important for many species.
					B 16	W Sp F	
					B 17	W F	
					B 19	W F	
					B 21	W	
					P 3	W Sp S F	
					P 1	W Sp S F	
					I 14	W Sp S F	
					I 33	W Sp S F	
					B 7	W Sp F	
					B 12	W Sp F	
					B 14	Sp F	
					B 22	Sp F	
					B 50	Sp S F	
					B 20	W F	
					B 26	W	
					B 27	W	
Clallam 1 & 2	Kulakala	80	6.8	2.1	Same as above		Area is important for many species.
	Jamestown	40					
Clallam 3	Sequim Bay	54	0.9	3.9	F 78	F?	Nearby beds certified.
					F 66	W Sp	Marina under consideration nearby. Intensive development could cause pollution problems.
					33		
Jefferson 1	Protection Is.	170	2.2	1.7	M 2	W Sp S F	This area is a seal and bird sanctuary.
					P 3		
					B 50	W Sp S	
					B 28	S	
					B 68	S	
					B 36	S	

053301

*Key to flora and fauna at end of this appendix.

APPENDIX B

COMMERCIAL GEODUCK BED DATA

DNR Map	Tract Name	Area (Acres)	LBS. X 10^6	Avg. Wt.	Flora and Fauna Species	Season	Comments
					B 10	S	
					B 47	S	
	Dallas Bank	116	1.4	1.9	Same as above		Same as above.
Jefferson 2	Hudson Pt.	88	0.7	1.4	B 21	W	
					B 24	W	
					B 28	W	
					B 26	W	
					B 29	W F	
					B 30	W F	
					B 50	W Sp F	
					36		
Jefferson 3	Killisut Hbr.	182	3.3	2.1	B 21	W	
	Marrowstone	118	1.9	1.7	B 24	W	
					B 28	W	
					B 26	W	
					B 29	W F	
					B 30	W F	
					B 50	Sp S F	
					F 19	W S F	
					F 66	W S F	
					F 75	W Sp	
					36		
Jefferson 4	Oak Bay	75	0.7		B 76	Summer	
Jefferson 5	Tala Pt.	34	0.6	1.5			
Jefferson 6	Hood Head	15	0.2	1.4			
	Pt. Hannon	35	1.4	1.8			
	Sisters	86	1.1	1.2	I 14	W Sp S F	
					M 8	W Sp S F	
	Shine	36	0.8	1.2	Same as above		
	Case Shoal	42	0.2	1.1	Same as above		

COMMERCIAL GEODUCK BED DATA

DNR Map	Tract Name	Area (Acres)	LBS. X 10^6	Avg. Wt.	Flora and Fauna Species	Season	Comments
Jefferson 7	South Point	55	0.3	1.6			
	Thorndike Bay 1, 2, 3	116	0.7	1.7	M 8	W Sp S F	
					39		
Jefferson 8	Brown Point	30	0.5	1.4			
		55	0.7	1.2	B 76	Summer	
?	Dosewallips	4	0.4	1.7			
?	Duckabush	6	0.3	2.3			
Kitsap 1	Foulweather Bay	40	0.5	1.5	F 2	Sp S	
	Coon Bay N.	135	1.6	2.0	I 14	W Sp S F	Intensive upland development
					F 66	W Sp	could degrade water quality.
					F 19	W Sp	
Kitsap 2	Coon Bay S.	125	3.3	1.8	Same as above		Same as above
	Port Gamble	320	5.4	1.1	Same as above		Sewer discharge in this area.
Kitsap 3	Hood Canal Bridge	46	1.2	1.5	F 66	W Sp	Intensive upland development could degrade water quality.
	Lofall N	20	0.4	1.2	F 66	W Sp	Same as above
Kitsap 3 & 4	Lofall	125	1.6	1.5	F 66	W Sp	Same as above
Kitsap 4	Vineland	180	3.5	1.8			
Kitsap 5	Warrenville	117	0.8	1.3	I 38	W Sp S F	Same as above
	Big Beef	40	0.4	1.7			I 14 area, all seasons, west of Big Beef Harbor.
Kitsap 6	Stavis Bay	6	0.1	2.2	F 66	W Sp	
					M 8	W Sp S F	
	Anderson Cove	9	0.2	2.1	M 8	W Sp S F	
					I 38	W Sp S F	

COMMERCIAL GEODUCK BED DATA

DNR Map	Tract Name	Area (Acres)	LBS. X 10^6	Avg. Wt.	Flora and Fauna Species	Season	Comments
Kitsap 7	Apple Cove Pt. N.	190	5.4	1.5			Intensive development could impact water quality.
Kitsap 8	Appletree Cove	314	4.9	1.8			Sewer outfall nearby.
Kitsap 9	President - Jefferson Pts.	182	2.6	1.8			
	Indianola	36	0.6	1.6	F 66	W Sp	
Kitsap 10	Agate Pt.	75	1.2	1.8	F 66 F 75		
	Agate 20, 21, 22	156	2.0	2.3	Same as above		
Kitsap 11	Illahee	60	2.9	1.7			
	Clam Bay	5	0.1	2.0			Near salmon pens.
Kitsap 12	Skiff Point N.	35	1.1	1.9			
	Agate Pt.	See Kitsap 10 above					
Kitsap 13	Fletcher Bay	?	?	?	F 41		
	Skiff Point N.	See Kitsap 12 above					
	Skiff Point S.	24	0.4	1.8			
	Yeomalt Pt.	174	2.3	1.7			
Kitsap 14	Tyhee Shoal	195	3.2	1.6			Ferries, some pollution.
Kitsap 15	Blake Island	71	0.9	1.4			
	Blake Island E.	30	0.5	1.5			
Kitsap 16	Pt. Southworth	158	0.6	1.4			
King 1	Fern Cove	142	2.8	1.4			Intensive upland development could degrade water quality
	Dolphin Pt.	52	0.9	1.6			Same as above
King 2	Aquarium	65	1.0	1.3			Same as above
	Vashon	150	2.2	1.5			Same as above

COMMERCIAL GEODUCK BED DATA

DNR Map	Tract Name	Area (Acres)	LBS. X 10^6	Avg. Wt.	Flora and Fauna Species	Season	Comments
King 3	Vashon	(Same as King 2)					
	Point Heyer	184	2.1	1.6			Same as above
King 4	Rosehilla	85	1.2	1.2	F 75	W F	Same as above
	Camp Sealth	6	0.1	1.3	F 66	W Sp	
Pierce 1	Sunny Bay	28	0.5	2.2			
	Fox Island	56	0.5	2.7			
Pierce 2 & 3	Glen Cove	360	2.7	2.5	M 8	W Sp S F	Intensive upland development
	Von Gelden	62	0.1	2.5	I 5	W Sp S F	could degrade water quality.
					I 6	W Sp S F	
					I 11	W Sp S F	
					F 41	W Sp S F	
Pierce 4	Pitt Passage 1-6	263	2.2	2.1	B 76	S	Near Gertrude Island
	McNeil Island	34	0.6	1.9	M 2	W Sp S F	Near Gertrude Island, seal sanctuary
	Still Harbor	80	1.2	1.9			
Pierce 5	McNeil Island Penn.	57	1.4	1.9			
Pierce 6	SW McNeil Island	60	1.1	2.5			
	Pitt Island	90	5.6	2.5			
	Drayton Harbor	170	7.0	2.0			
Pierce 7	Otso Point	68	1.9	2.0	I 30	W Sp S F	
	Treble Pt.	28	1.6	2.2	I 38	W Sp S F	
Pierce 8	Whitman Cove	44	0.6	2.4			
Pierce 9	Herron Island	335	7.7	2.7			
Thurston 1	Nisqually Reach	28	1.8	2.0	I 30	W Sp S F	
	Sandy Point	65	2.0	1.9	I 38	W Sp S F	
	Dogfish Bight	83	2.6	2.3	B 16	W Sp S F	At Nisqually
					M 8	W Sp S F	Delta nearby.
					B 17	W Sp F	
					B 19	W F	

COMMERCIAL GEODUCK BED DATA

DNR Map	Tract Name	Area (Acres)	LBS. X 10^6	Avg. Wt.	Flora and Fauna Species	Season	Comments
Thurston 2	(Same as Thurston 1)						
	Johnson Point	28	1.3	2.1			Marine nearby, potential boat traffic problems.
	Dickerson Point	88	4.1	2.9			
Thurston 3	Dover Point	36	2.7	3.1			Intensive upland development could degrade water quality in all these areas.
	Cooper Point	6	0.3	3.0			
	Hunter Point	175	6.3	3.1			
	Steamboat Island	76	1.8	3.5			
Mason 1	Arcadia	32	0.5	3.5	F 66	W Sp	
Mason 2	Dougall Point	220	9.3	2.2			Sewer outfall nearby.
Mason 3	McMicken Island W.	60	1.1	2.1			
	McMicken Island S.	72	1.8	2.1			
	Buffington Lagoon	65	4.3	1.6			Intensive development could deteriorate water quality.
	Wilson Point	101	5.4	2.8			
Mason 4	Hamma Hamma	4	0.1		I 14	W Sp S F	
					M 8	W Sp S F	
					I 38	W Sp S F	
					I 8	W Sp S F	
Island 1	Useless Bay 1-8	343	4.4		I 14	W Sp S F	
Island 2	Pt. Partridge	130	1.0	1.1			

KEY TO FLORA AND FAUNA *

Birds

B-1	Common Loon
B-2	Arctic Loon
B-3	Red-throated Loon
B-5	Horned Grebe
B-6	Eared Grebe
B-7	Western Grebe
B-8	Double-crested Cormorant
B-12	Western Canada Goose
B-13	Black Brant
B-14	White-fronted Goose
B-15	Snow Goose
B-16	Mallard
B-17	Pintail
B-18	Green-winged Teal
B-19	American Wigeon
B-20	Northern Shoveler
B-21	Canvasback
B-22	Greater Scaup
B-23	Lesser Scaup
B-24	Common Goldeneye
B-25	Barrow's Goldeneye
B-26	Bufflehead
B-27	Oldsquaw
B-28	Harlequin Duck
B-29	White-winged Scoter
B-30	Surf Scoter
B-31	Black Scoter
B-35	Parasitic Jaeger
B-36	Glaucous-winged Gull
B-37	Western Gull
B-47	Pigeon Guillemot
B-48	Marbled Murrelet
B-50	Rhinoceros Auklet
B-51	Tufted Puffin
B-53	Northern Phalarope
B-54	Great Blue Heron
B-55	Whimbrel
B-62	Least Sandpiper
B-63	Dunlin
B-64	Short-billed Dowitcher
B-66	Western Sandpiper
B-67	Sanderling
B-68	Black Oystercatcher
B-69	Semipalmated Plover
B-70	Killdeer
B-71	Black-bellied Plover
B-72	Surfbird
B-75	Belted Kingfisher
B-76	Northern Bald Eagle

Fish

F-2	Lingcod
F-7	Pacific Halibut
F-9	Rock Sole
F-10	Dover Sole
F-19	Pacific Cod
F-20	Pacific Hake
F-22	Walleye Pollock
F-23	Wolf-Eel
F-24	Pacific Ocean Perch
F-41	Longnose Skate
F-66	Pacific Herring
F-75	Surf Smelt
F-76	Longfin Smelt
F-78	Capelin

Invertebrates

I-3	Red Sea Urchin
I-5	Ocean Pink Shrimp
I-6	Northern Pink Shrimp
I-8	Spot Shrimp
I-11	Coonstripe Shrimp
I-14	Dungeness Crab
I-30	Octopus
I-34	Sea Scallop
I-35	Rock Scallop
I-38	Oysters

Mammals

M-2	Harbor Seal
M-3	Northern Fur Seal
M-8	River Otter
M-9	Dall Porpoise

Marine Plants

P-1	Sea Grasses
P-2	Green Algae
P-3	Brown Algae
P-4	Red Algae

△ Important multispecies areas. **

* Information on flora and fauna was obtained from data collected for the report, Washington Coastal Areas of Major Biological Significance, June, 1981 update.

**Numbers in triangles refer to descriptions in Table 2 in above referenced report.

APPENDIX C.
Maximum Sustainable Yield

Maximum sustainable yield (MSY) describes the maximum productive capacity of a population in terms of the maximum harvest which can be removed annually. This production includes the growth of the population biomass (total weight of all individuals within the population) through the creation of new meat, shell, progeny, etc. Harvest at MSY provides the greatest long term yield possible from a fishery (Figure 1). Harvest at less than MSY does not utilize the full potential of the resource to provide food for human consumption, while harvest in excess of the MSY will lead to a decline in the size of the population and in the resource available for harvest.

The productive potential of a population is primarily determined by the rate at which biomass in created through the growth of clams within the population and through the entry of new clams into the population, and by the rate at which biomass is lost due to mortality. The primary factors determining the maximum sustainable yield are:

Rate of Growth The rate of growth is the annual increase in the weight of an individual or cumulatively of the population. The rate of growth reaches a maximum at some intermediate age (Figure 2) which for Puget Sound geoducks is between 8 and 14 years. Clams of this age will gain more weight per year than either very young clams or old mature clams.

Presently the geoduck population is dominated by very old clams which have ceased growing and are no longer contributing to increased biomass. In geoducks growth almost ceases after about 20 years of age, however, the average age of geoducks in Puget Sound is around 45 years and clams as old as 130 years have been observed. Thus the bulk of the population consists of old clams which have ceased growing. At MSY the old slow growing clams will have been removed by repeated harvest and the population will be dominated by younger fast growing clams. Thus the individual clams and the population as a whole will be accumulating weight and biomass more rapidly.

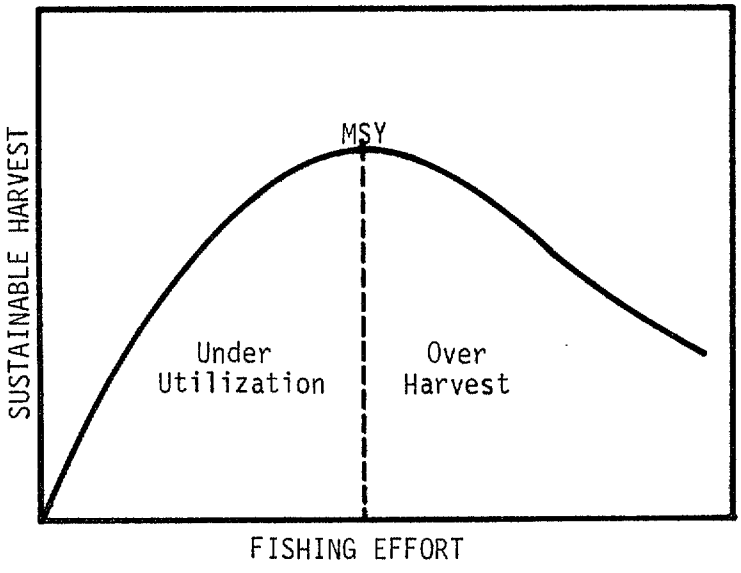


Figure 1. In any fishery the long term harvest increases with increased fishing effort up to a maximum point (the maximum sustainable yield, MSY). Beyond this point increased fishing effort will cause a decline in the population and in the harvest.

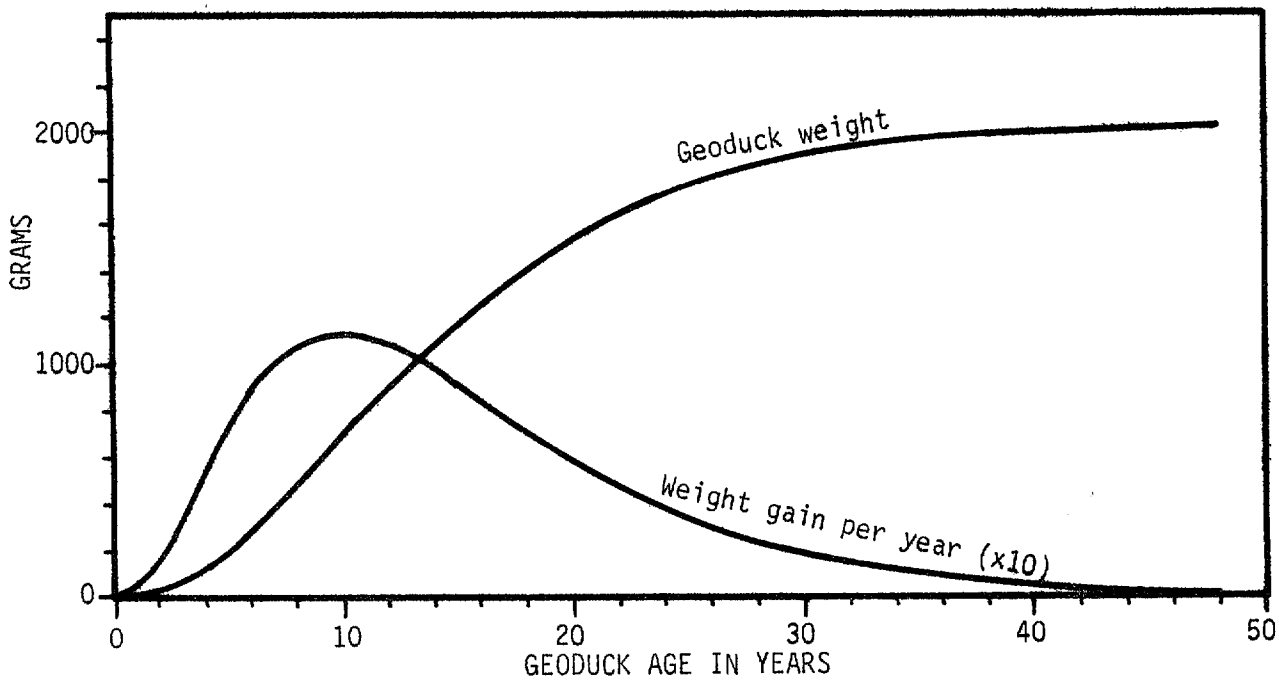


Figure 2. Geoduck growth. Individual geoduck clams grow very slowly after about 20 years of age and thus contribute little new biomass to the population. The greatest growth of geoducks occurs between the ages of about 8 and 14 years. Populations dominated by these younger clams could support a greater annual harvest than could an old, slow growing population.

Rate of recruitment. Recruitment is the entry of new individuals into the harvestable size classes. The recruits are the clams which have been spawned and have settled, grown, and survived to reach harvestable size. The recruits eventually replace those individuals which are lost to disease and predation or which are harvested. In geoducks the rate of recruitment is the limiting factor in production with 30-50 years being needed for a harvested area to be fully repopulated.

Rate of mortality. Natural mortality is the loss of clams to disease, predation and other natural causes. Mortality in clams is very high during the larval stages but after they become well established in the substrate the rate of mortality is relatively constant and, in the case of geoducks, is quite low.

Every year each clam is exposed to predation or disease. The older a clam must grow before reaching harvestable size, the greater the possibility that it will die before it can be harvested. By harvesting younger clams, not only are they growing more rapidly, but clams are harvested which would otherwise have been lost to disease, predation, etc.

At MSY these biological factors reach a maximum. The rate of biomass accumulation is at its biological maximum for the prevailing environmental conditions and the annual biomass gains from growth and recruitment exceed that lost to mortality. Therefore, a biomass surplus is accumulated which can be removed by fishing without reducing the sustaining population. If fishing only removes this surplus (as in Figure 3) harvest will be in equilibrium with production and this rate of harvest can be maintained indefinitely as long as the environment remains constant.

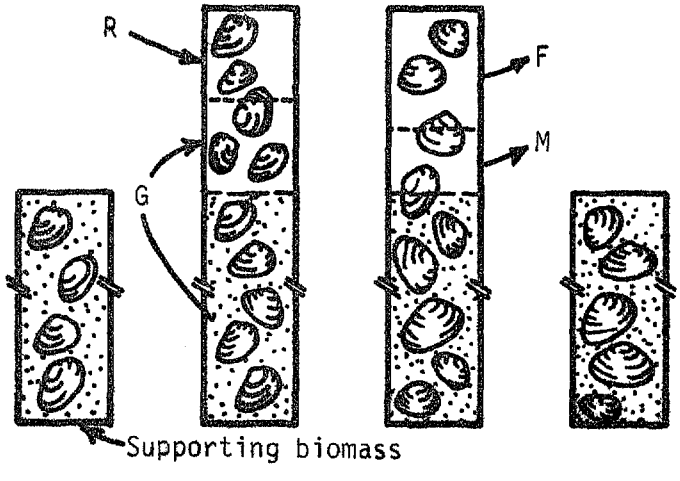


Figure 3. Sustainable yield. If growth (G) of clams in the harvestable population and recruitment (R) of new individuals into the population exceeds the loss of biomass to mortality (M), a biomass surplus will accumulate. If only this surplus is removed by fishing (F) each year such that G + R = M + F, then F is the sustainable yield which can be harvested year after year without reducing the biomass of the population supporting harvest.

Calculation of MSY

A number of methods have been developed for mathematically estimating the MSY of a population and have been tested in fisheries around the world. The particular method actually used to estimate the MSY of a population depends upon the characteristics of the species and the fishery, the amount and type of available information and data, and the degree of accuracy needed. In estimating the MSY for geoducks, the yield model of W.E. Ricker* has been used, both for Puget Sound and in British Columbia.

Until recently, information has not been available for detailed estimates of the MSY, for geoducks in Puget Sound. Estimates of the allowable harvest have been made and then adjusted as new information has become available. Initially, it was assumed that the production of geoducks as limited by their growth rate and that a geoduck bed could be harvested every 8 years (about 8 years is required for geoducks to reach harvestable size). As more information has become available, this estimate has been revised.

The rate of recruitment has since been shown to be the limiting factor in geoduck production. Current harvest is at about 3 percent of the harvestable crop which provides a 33 year rotation period to allow harvested beds to be repopulated.

* The Ricker model (Ricker, W. E. 1975. Computation and Interpretation of Biological Statistics of Fish Populations. Bull. Fish. Res. Board Can. 191: Pg. 238-248) provides an estimate of the maximum sustainable harvest of Equilibrium Yield (Y_E) for a given recruitment. The model is:

$$Y_E = \sum_{t=t_R}^{t=t_\lambda} \frac{F_t B_t (1 + e^{(G_t - Z_t)})}{2}$$

where:

t = time or age of the fish
t_R = age when fish enters fishery
F_t = instantaneous rate of fishing
Z_t = instantaneous rate of mortality
t_λ = maximum age of the fish
B_t = biomass of the stock
G_t = instantaneous rate of growth

Recent studies have provided information which allows a more thorough evaluation of the MSY for geoducks in Puget Sound. Most of this information is based on the recently acquired ability to determine the age of the clams by counting the internal growth rings in the geoduck shell. The age of the clam is determined by counting these rings just as in counting the rings of a tree. This aging ability has allowed estimates of growth, mortality, and historical growth patterns to be made and has established that geoducks are very long lived (to 130 years). The results of this analysis is currently being prepared for publication and is undergoing thorough review both inside and outside the department. The final analysis will serve as the basis for establishing the allowable harvest of geoducks from Puget Sound. Future adjustments and refinements in the MSY will be appended to this plan as necessary.

Optimum Yield

Maximum sustainable yield is the maximum productive capacity of a population and has traditionally been the objective of fisheries harvest management. Its usefulness, however, is limited because it only considers the biological productive capacity of the target population and does not allow consideration of the economics of the fishery, or the technological limitations, or of the impacts of the fishery on the community (e.g., employment, trade, tax revenues, community impacts, etc.), or upon other organisms and the marine environment. A much more flexible objective is the optimum yield (OY) which is the maximum sustainable yield adjusted for relevant, economic, technological, social and environment factors. In the geoduck fishery the optimum yield is defined as the harvest which provides the greatest net benefit to all the citizens of the state.

In the geoduck fishery 19,545 acres of "major" geoduck beds have been discovered with a population of approximately 280 million pounds. Based upon an MSY estimated of 3 percent, 8.4 million pounds could be harvested annually if this entire population was available for harvest. However, because of economic, technological, social and environmental factors only 8,378 acres are suitable for harvest, or about 165 million

pounds. These beds are classified as "commercial" and have been allocated for commercial geoduck harvest by the Department of Natural Resources. The MSY from these beds alone is then estimated to be 5 million pounds per year (3 percent of 165 million pounds). This is the Optimum Yield of geoducks in Puget Sound and is the WDF harvest goal. As estimates of the MSY are refined or as new commercial beds are discovered, necessary adjustments in the OY will be made.

Application to geoduck harvest.

Harvest at OY requires the sequential harvest of all the commercial geoduck beds such that the last bed is harvested just as the first bed is ready for reharvest. Thus at any one time all commercial beds will be at various stages of recovery ranging from just harvested to ready for reharvest.

If the individual tracts are completely harvested (clear cut), reharvest will occur 33 years later on the average. In reality not all the geoducks on a tract are harvested. Often less than 50 percent of the geoducks are taken from a tract and reharvest may be possible in less than 30 years.

The factor limiting the production of clams from Puget Sound is the extremely slow rate at which geoducks recruit. If the promising efforts at artificially rearing geoducks prove economically feasible, WDF and DNR will eventually reseed harvested geoduck beds with hatchery reared seed clams. In this case the MSY of the stock will be limited by the time it takes for clams to grow to harvestable size (about 4 to 10 years) which should allow the annual harvest to be increased 2 to 3 times with reharvest as frequent as every 10 years.

APPENDIX D

Three Year Commercial Geoduck Harvest Plan

Auction Date	Harvest Term	Location
5/81	6/81 - 5/82	Thurston County (Hunter Point)
10/81	6/82 - 5/83	King and Pierce Counties
	1/83 - 12/83	Pierce County
	1/84 - 12/84	Kitsap County

APPENDIX E.

Agencies to be Notified of Harvest Plans

The following agencies and groups will be notified of all geoduck harvest proposals and of any revisions or updates of the geoduck management plan.

Supervisor
Shorelands Division
Department of Ecology PV-11
Olympia, WA 98504

Inter-Agency Coordinator
Department of Game GJ-11
Olympia, WA 98504

Supervisor, Shellfish Program
Food and Housing Section
Dept. of Social and Health Services
LD-11
Olympia, WA 98504

Chief, Research & Long-Range Planning
Wash. St. Parks and Recreation Comm.
KY-11
Olympia, WA 98504

Coastal Zone Coordinator
National Marine Fisheries Service
P.O. Box 4332
Portland, OR 97208

Division of Ecological Services
U.S. Fish and Wildlife Service
2625 Parkmont Lane, Bldg. B-3
Olympia, WA 98502

All counties having identified commerical geoduck beds.

All current holders of DNR geoduck harvest tract leases.

Other individuals and groups upon request.

Other agencies will be notified as necessary. These would include the following agencies which own property adjacent to commerical geoduck tracts or which operate in the waters adjacent to and over these tracts:

U.S. Coast Guard

U.S. Navy

U.S. Army

Native American Tribes

STATE OF WASHINGTON
DEPARTMENT OF NATURAL RESOURCES
BRIAN J. BOYLE, COMMISSIONER OF PUBLIC LANDS

ENVIRONMENTAL CHECKLIST

Application No. N/A

Project Title Lease of state-owned subtidal bedlands for the commercial harvest of geoducks

Area King Co. - Tramp Harbor
Pierce Co. - Carr Inlet/Fox Island

District/County

Legal Subdivision

Sec. ____ T. ____ R. ____ W.M.

I. BACKGROUND

1. Name of Proponent: Department of Natural Resources
2. Address and Phone Number of Proponent:
   Public Lands Building
   Olympia, WA 98504
   (206) 753-3703
3. Date Checklist Submitted: N/A
4. Agency Requiring Checklist: DNR
5. Name of Proposal, if applicable:
   Same as above
6. Nature and Brief Description of the Proposal (including but not limited to its size, general design elements, and other factors that will give an accurate understanding of its scope and nature):
   See attachment
7. Location of Proposal (describe the physical setting of the proposal, as well as the extent of the land area affected by any environmental impacts, including any other information needed to give an accurate understanding of the environmental setting of the proposal):
   See attachment
8. Estimated Date for Completion of the Proposal:
   Tracts will be leased for one (1) year starting January 1, 1982
9. List of all Permit, Licenses or Government Approvals Required for the Proposal (federal, state and local -- including rezones):
   Dept. of Fisheries - tract license & personal diving license; Department of Social & Health Services - certification of geoduck harvest area as being safe from domestic sewage or other sources of health related pollutants
10. Do you have any plans for future additions, expansion, or further activity related to or connected with this proposal? If yes, explain:
    Yes, select tracts are leased annually based upon a management system of rotational harvest from a set acreage of commercially harvestable geoduck beds
11. Do you know of any plans by others which may affect the property covered by your proposal? If yes, explain:
    No.
12. Attach any other application form that has been completed regarding the proposal; if none has been completed, but is expected to be filed at some future date, describe the nature of such application form:

II. ENVIRONMENTAL IMPACTS
(Explanation of all "yes" and "maybe" answers are required)

	Yes	Maybe	No
(1) Earth. Will the proposal result in:			
(a) Unstable earth conditions or in changes in geologic substructures?			X
(b) Disruptions, displacements, compaction or overcovering of the soil?	X		
(c) Change in topography or ground surface relief features?		X	
(d) The destruction, covering or modification of any unique geologic or physical features?			X
(e) Any increase in wind or water erosion of soils, either on or off the site?			X
(f) Changes in deposition or erosion of beach sands, or changes in siltation, deposition or erosion which may modify the channel of a river or stream or the bed of the ocean or any bay, inlet or lake?			X

Explanation: See attachment.

	Yes	Maybe	No
(2) Air. Will the proposal result in:			
(a) Air emissions or deterioration of ambient air quality?		X	
(b) The creation of objectionable odors?			X
(c) Alteration of air movement, moisture or temperature, or any change in climate, either locally or regionally?			X

Explanation: Engines powering the auxiliary equipment will contribute a very minor increase of air emissions. No significant deterioration of ambient air quality would occur.

	Yes	Maybe	No
(3) Water. Will the proposal result in:			
(a) Changes in currents, or the course of direction of water movements, in either marine or fresh waters?			X
(b) Changes in absorption rates, drainage patterns, or the rate and amount of surface water runoff?			X
(c) Alterations to the course or flow of flood waters?			X
(d) Change in the amount of surface water in any water body?			X
(e) Discharge into surface waters, or in any alteration of surface water quality, including but not limited to temperature, dissolved oxygen or turbidity?	X		
(f) Alteration of the direction or rate of flow of ground waters?			X

APPENDIX F
ENVIRONMENTAL CHECKLIST (EXAMPLE)

	Yes	Maybe	No
(g) Change in the quantity of ground waters, either through direct additions or withdrawals, or through interceptions of an aquifer by cuts or excavations?			X
(h) Deterioration in ground water quality, either through direct injection, or through the seepage of leachate, phosphates, detergents, waterborne virus or bacteria, or other substances into the ground waters?			X
(i) Reduction in the amount of water otherwise available for public water supplies?			X

Explanation: Diver harvest of geoducks by water jets temporarily increases turbidity in the immediate vicinity. Changes in dissolved oxygen and temperature do not occur. Suspended material settles out fairly rapidly.

(4) Flora. Will the proposal result in:

(a) Change in the diversity of species, or numbers of any species of flora (including trees, shrubs, grass, crops, microflora and aquatic plants)?			X
(b) Reduction of the numbers of any unique, rare or endangered species of flora?			X
(c) Introduction of new species of flora into an area, or in a barrier to the normal replenishment of existing species?			X
(d) Reduction in acreage of any agricultural crop?			X

Explanation: Eelgrass, due to its photosynthesis requirements, rarely occurs in areas below the minus 18 to 20 foot contour. This would be the fringe area having a limited number of plants and densities. Due to the selective nature of geoduck harvesting eelgrass or kelp would not be impacted. No eelgrass or kelp was found in the proposed harvest areas.

(5) Fauna. Will the proposal result in:

(a) Changes in the diversity of species, or numbers of any species of fauna (birds, land animals including reptiles, fish and shellfish, benthic organisms, insects or microfauna)?	X		
(b) Reduction of the numbers of any unique, rare, or endangered species of fauna?			X
(c) Introduction of new species of fauna into an area, or result in a barrier to the migration or movement of fauna?			X
(d) Deterioration to existing fish or wildlife habitat?			X

Explanation: See attachment.

(6) Noise. Will the proposal increase existing noise levels? X

Explanation: See attachment.

	Yes	Maybe	No
(7) Light and Glare. Will the proposal produce new light or glare?			X

Explanation: Geoduck harvesting is authorized only from sunrise but not before 6:00 am to ½ hour before sunset and thus, light and glare will not be a significant impact.

(8) Land Use. Will the proposal result in the alteration of the present or planned land use of an area?			X

Explanation: Geoduck harvesting is a temporary use and will only be permitted for one year in these tracts.

(9) Natural Resources. Will the proposal result in:

(a) Increase in the rate of use of any natural resources?	X		
(b) Depletion of any nonrenewable natural resource?			X

Explanation: Commercial harvesting will increase the use of geoducks; however, such stocks are being managed on a renewable, sustained yield basis.

(10) Risk of Upset. Does the proposal involve a risk of an explosion or the release of hazardous substances (including, but not limited to oil, pesticides, chemicals or radiation) in the event of an accident or upset conditions?		X	

Explanation: The risk of a fuel spill from a geoduck harvesting boat is no more or less than any other powered pleasure craft or commercial fishing boat.

(11) Population. Will the proposal alter the location, distribution, density, or growth rate of the human population of an area?			X

Explanation:

(12) Housing. Will the proposal affect existing housing, or create a demand for additional housing?			X

Explanation:

(13) Transportation/Circulation. Will the proposal result in:

(a) Generation of additional vehicular movement?			X
(b) Effects on existing parking facilities, or demand for new parking?			X
(c) Impact upon existing transportation systems?			X
(d) Alterations to present patterns of circulation or movement of people and/or goods?			X
(e) Alterations to waterborne, rail or air traffic?		X	
(f) Increase in traffic hazards to motor vehicles, bicyclists or pedestrians?			X

Explanation: Geoduck boats engaged in harvesting will temporarily alter the travel of waterborne craft in the manner of a slight detour. Harvesting will not be permitted on Sundays.

	Yes	Maybe	No
(14) **Public Services.** Will the proposal have an effect upon, or result in a need for new or altered governmental services in any of the following areas:			
(a) Fire protection?			X
(b) Police protection?			X
(c) Schools?			X
(d) Parks or other recreational facilities?		X	
(e) Maintenance of public facilities, including roads?			X
(f) Other governmental services?			X

Explanation: Use of local marinas or boat launch ramps to unload geoduck catch daily will be controlled so that recreational boat access is not significantly impeded.

	Yes	Maybe	No
(15) **Energy.** Will the proposal result in:			
(a) Use of substantial amounts of fuel or energy?			X
(b) Demand upon existing sources of energy, or require the development of new sources of energy?			X

Explanation:

	Yes	Maybe	No
(16) **Utilities.** Will the proposal result in a need for new systems, or alterations to the following utilities:			
(a) Power or natural gas?			X
(b) Communications systems?			X
(c) Water?			X
(d) Sewer or septic tanks?			X
(e) Storm water drainage?			X
(f) Solid waste and disposal?			X

Explanation:

	Yes	Maybe	No
(17) **Human Health.** Will the proposal result in the creation of any health hazard or potential health hazard (excluding mental health)?			X

Explanation:

	Yes	Maybe	No
(18) **Aesthetics.** Will the proposal result in the obstruction of any scenic vista or view open to the public, or will the proposal result in the creation of an aesthetically offensive site open to the public view?		X	

Explanation: See attachment

	Yes	Maybe	No
(19) **Recreation.** Will the proposal result in an impact upon the quality or quantity of existing recreational opportunities?	X		

Explanation: See attachment

	Yes	Maybe	No
(20) **Archaeological/Historical.** Will the proposal result in an alteration of a significant archaeological or historical site, structure, object or building?			X

Explanation:

III. SIGNATURE

I, the undersigned, state that to the best of my knowledge the above information is true and complete. It is understood that the lead agency may withdraw any declaration of nonsignificance that it might issue in reliance upon this checklist should there be any willful misrepresentation or willful lack of full disclosure on my part.

Proponent: Thomas L. Willick

Title: Shellfish Program Mgr.

Date: 8-19-81

Approved by: [illegible]

Title: [illegible]

Date: [illegible]

I. BACKGROUND

6. Nature and Brief Description of Proposal

Diving surveys initiated in 1967 by the Washington Department of Fisheries have demonstrated that a substantial stock of subtidal geoducks exist in Puget Sound and the Strait of Juan de Fuca (Goodwin 1973). A limited-entry commercial fishery started in 1970 to harvest this previously unexploited resource. Landings from this fishery have averaged about 5,736,000 lbs. per year for the years 1974-79. The primary market for these large clams is Japan.

The Department of Natural Resources (DNR) annually leases by auction specific tracts of subtidal land for the commercial harvesting of geoducks. The Revised Code of Washington (RCW 75.24.100) authorizes the harvest of subtidal geoduck stocks from State-owned beds of navigable water lying below the -18 foot tide level and more than 200 yards offshore from mean high tide. These boundaries are recent revisions to the law; prior to 1979 leasable geoduck beds had to be deeper than -10 feet and at least 1/4 mile offshore.

Commercially harvestable geoduck stocks are completely beyond the reach of sport clam diggers and only obtained occasionally by SCUBA divers for personal use. Tracts will be leased for a period of one year. Each lease is controlled through close coordination between the Department of Fisheries and Department of Natural Resources. Survey of the tracts by Fisheries has determined that the quantities and size of geoducks are suitable for commercial harvesting, as are substrates and water depths.

All commercial harvesting will be done by divers using hand operated water-pressurized nozzles. The most efficient method of diving is with surface-supplied air pumped by a low pressure compressor. Air is supplied through a flexible hose to a face mask worn by the diver. Diving support vessels vary with each harvester, but are usually 20 to 40-foot inboard boats. The number of divers working on the bottom at one time is normally limited to two per boat due to hose control problems.

The present approach to managing the geoduck fishery involves the concentration of relatively small tracts in a common geographical area. This greatly enhances the State's ability to properly enforce the laws pertaining to the fishery. Geoduck beds are divided into tracts whose boundaries are identified by sight lines to landmarks and/or posts if landmarks are absent. Where feasible, reference buoys will be placed at the -18 foot contour or 200 yards from mean high water, whichever is further seaward. Harvesting outside the designated tracts is illegal and proven violations are subject to suspension of operations. Geoduck harvesting is authorized only from sunrise (but not before 6:00 a.m.) to 1/2 hour before sunset and is not permitted on Sunday.

7. Location of Proposal

The location of the proposed geoduck harvesting tracts are shown on the attached vicinity maps. Site-specific information on geoduck size and relative abundance, water depths, and substrate composition is available through the Department of Natural Resources.

II. ENVIRONMENTAL IMPACTS

(1) Earth

The fishery is restricted to divers who harvest the clams one at a time with hand operated water jets. The action of the water jet is to loosen the substrate material around the clam until it can be removed from the bottom by the diver. The water jet produces a small hole in the substrate for each geoduck harvested. Immediately after harvest, the holes are partially filled with an emulsion of loose substrate particles and water. A typical hole produces by the water jet is shown in Figure 1. Experienced divers can harvest several hundred geoducks each day, thus producing an equal number of small holes in the substrate.

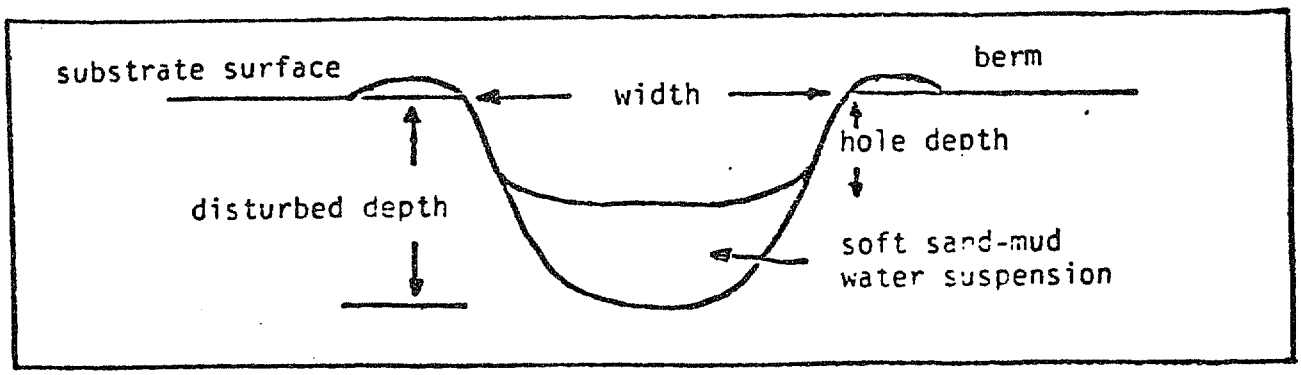


Figure 1. Diagrammatic side view of a typical geoduck harvest hole immediately after harvest.

Goodwin (1978) has done a study to assess the effects of geoduck harvesting in an experimental site in Hood Canal. The harvested area was noted as obviously different in appearance with an uneven substrate surface. Harvest holes were evident throughout and a large amount of old clam shell and shell fragment had been uncovered by the action of the water jet.

The holes made in the substrate by the water jet were studied to determine size, sediment characteristics and refill time. Measurements were taken of the diameter at the surface (average = 37.3 cm), the depth the substrate was disturbed by the jet (average = 46.2 cm), and the depth from the surface to the bottom of the hole (average = 8.2 cm). This latter measurement indicates that all but 3-4 inches of the hole is immediately filled by an emulsion of loose material. After 4 days the holes had filled in considerably more and decreased the disturbed depth. In effect, this means that the substrate within the holes was becoming compact.

Results of the sediment analysis revealed that harvesting does not significantly affect the substrate in the harvested area as a whole but does affect the substrate composition in the harvest holes. The percentage of finer sediments (silt and clay) was less in the harvest holes. The action of the water jet put fines into suspension which were carried away resulting in fewer fines in the harvest holes compared to the undisturbed area nearby.

In regards to refill time, the harvest holes in Hood Canal began filling in within a few days and were completely filled and had lost their identity after seven (7) months. In another study conducted in Agate Pass, refill time for geoduck harvest holes varied from 9 days to 5 months. The primary factors appeared to be the strength of the tidal currents and the substrate composition. Holes in sandy substrate with swift currents in the area filled in rapidly.

(5) Fauna

Geoduck abundance will obviously be reduced in the tracts proposed for harvesting. However, the harvestable stocks are being managed as a renewable resource. Harvestable is emphasized because there exists a considerable population of geoducks in Puget Sound and the Strait of Juan de Fuca that are either unobtainable with present methods (generally deeper than 60 feet) or are not authorized for harvest (shoreward of 200 yard limit). The latest estimate of acreage and geoduck population in all areas surveyed prior to 1979 is 33,799 acres with 117,653,000 geoducks. However, these figures are based on the previously established boundary of 1/4 miles; reducing this boundary by a little over one half the distance may double the acreage and numbers of geoducks. Even at that, these figures are believed to be very conservative since they do not include geoduck beds in the deeper waters nor geoduck populations within 200 yards of shore. Of the approximate 34,000 acres surveyed to date, 2,800 acres have been found to be commercially harvestable taking into account clam abundance, size and quality; water depths; substrate; exposure to wind and waves; and water quality. With revised boundaries the harvestable acreage may increase to 5,000 - 6,000 acres. The total harvestable acreage is being managed on a rotational basis so that a certain acreage can be harvested while the remainder is left fallow to repopulate.

Goodwin (1978) has also studied the potential effects of geoduck harvesting on associated benthic organisms. The dominant animals forms associated with geoduck beds are normally those that are buried in the sand and mud (benthic), rather than those that move about or are attached to the surface. The benthic organisms in terms of numbers and weight in the study area were dominated by clams (*Transenella* sp. and *Macoma inconspicua*), ghost shrimp (*Callianassa* sp.) and various kinds of polychaetes. The epifauna, at least during daylight hours, was dominated by crabs and various species of soles and flounders.

The benthic data, being variable, complex and difficult to analyze, did indicate a slight reduction in the numbers and weights of small organisms retained on a 1 mm mesh. Possibly these organisms, like the fine sediment, were carried away by current action. Overall no major decreases in standing crops of benthic organisms were observed.

The proposed geoduck harvesting sites were evaluated in respect to possible impact on critical marine habitats. Based on field surveys, the county's Coastal Zone Atlas and DNR's Marine Atlas, no critical habitats are present in the harvest locations. Surf smelt spawning occurs on the intertidal beaches near Rosehilla and Piner Point but this activity would not be impacted by geoduck harvesting conducted 200 yards offshore. Pacific herring also utilize Quartermaster Harbor for spawning with some spawning activity occurring near Rosehilla and Piner Point but due to the shallow water depth of this activity geoduck harvesting will have no effect.

(6) Noise

The geoduck harvesting operation involves two primary sources of noise, that from the vessel itself and that generated by pump or compressor engines placed on board the vessel to power the water jets and the life support system. (Auxiliary equipment.)

Engine noise emanating from the support vessel itself would be minimal since the engine is shut off once the vessel is in position. The only engine noise would occur upon entering or leaving an area and when repositioning the vessel. Engine noise levels (usually a result of inboard or inboard/outboard exhausts) would be the same as any other similar watercraft on Puget Sound.

The noise levels generated by the auxillary equipment placed on the vessels presents a less defined situation. In most cases the auxillary equipment is placed in the hold to provide more working space on deck. If located on deck it is usually well shielded and, in either case, the equipment is usually well muffled. The necessity of maintaining communication with the divers and adequate working conditions requires good muffling systems.

The noise levels resulting from various geoduck boats have been determined by on-site monitoring. The highest noise levels observed resulted from one particular boat to which the auxillary equipment was housed above board. Maximum noise levels of 58-61 dBA were measured 100 feet from the boat. Contrasted to that, another geoduck boat with equipment in the hold generated maximum noise levels of 53-55 dBA, again measured about 100 feet from the boat.

With just this data, it is possible to predict approximately the noise levels occurring on the adjacent shorelines where, in some cases, private residences are located. At distances farther than 100 feet from a boat, the noise levels will be reduced by 3 to 6 dBA for every doubling of distance. Over water of a semi-turbulent nature the reduction would be about 4.5 dBA. Thus, after the noise had traveled a minimum distance of at least 200 yards to the shoreline, the noise level would be reduced by the following increments.

Distance (in feet)	Noise Level (dBA) Boat 1	Boat 2
100	58.0 - 61.0	53.0 - 55.0
200	53.5 - 56.5	48.5 - 51.5
400	49.0 - 52.0	44.0 - 47.0
600 (200 yds)	46.7 - 49.7	41.7 - 44.7
800	44.5 - 47.5	39.5 - 42.5
1600	40.0 - 43.0	35.0 - 38.0

When Boat 1 was not operating, the background noise level on the shoreline was measured and found to be in the range of 39-41 dBA at its most consistent level. The difference between background and operating noise levels in this case is then 5-10 dBA. This degree of noise level increase is enough to be noticeable particularly when the boat operates continuously in one location for an extended period of time. In comparison, Boat 2 with a noise output of 0-5 dBA over background levels would be much less noticeable and, at times, may not even be discernable.

It has been determined, from studies compiled by the Environmental Protection Agency, that most people will tolerate a small increase in the ambient sound level without compliant (up to 5 dBA). Increases greater than 5 dBA may cause complaints particularly if the increased level is causing interference with sleep or communication. Increases above 10 dBA are likely to cause complaints. The extent of noise level increases presently resulting from the operation of existing geoduck boats is such that complaints would not generally be expected, notwithstanding the exceptional cases. Furthermore, geoduck boats are considerably below the maximum permissable environmental noise standard of 55 dBA applicable to residential or recreational shoreline areas (refer to WAC 173-60). The fact that harvesting is restricted to daylight hours and Monday through Saturday only also minimizes the impact of any noise level increases. The DNR harvest contract currently specifies noise levels no greater than 50 dBA and is considering the feasibility of greater restrictions for the new harvest areas.

(18) Aesthetics

Geoduck harvesters commonly use boats of 20 to 40-foot size which typically remain anchored in roughly the same location during a day's operation. Over the one year period allotted harvesting in these geoduck beds, boats may be situated anywhere within the tract boundaries. No more than one boat will be permitted in each tract. If tracts are combined under common ownership, then two boats can operate over the total area.

It is difficult to assess the visual impact attributable to the presence of geoduck boats. However, due to the size and spacing of the tracts, some boats would only be visible as distant objects.

The overall visual impact is not expected to be significant because (1) geoduck boats are commercial fishing boats and as such, are generally an acceptable and frequent sight on marine waters, and (2) geoducks boats will only be present for a period of one year.

(19) Recreation

Sport salmon fishing occurs near the Fox Island, Sunny Bay, Manzanita, Piner Point, Elgin and Minter Creek tracts. There is also some non-salmon sport fishing in these same areas in addition to Glen Cove and Carr Inlet tracts. By limiting harvest to one vessel per tract and a safe zone of 300 feet around the vessel only a small part of the available fishing area will be impacted. On Sundays all the area will be available. For these same reasons there will be only limited impact on commercial salmon harvest near Elgin, Minter Creek, Pt. Heyer and Robinson Point geoduck tracts; and on the commercial bottom fishing near Pt. Heyer, Robinson Point, Manzanita, Piner Point and Sunny Bay. At times, high concentrations of salmon sport fishermen utilize the Fox Island and Sunny Bay areas. To further reduce possible user conflict in this area, no harvesting will be permitted on Saturday, Sunday, Memorial Day, 4th of July, and Labor Day.

LITERATURE CITED

Goodwin, C.L. Subtidal Geoducks of Puget Sound, Washington, Wash. Dept. of Fisheries Tech. Rept. No. 13, August, 1973.

Goodwin, C.L. Some Effects of Subtidal Geoduck (Panope generosa) Harvest on a Small Experimental Plot in Puget Sound, Washington, Wash. Dept. of Fish. Progress Rept. No. 66, May 1978.

APPENDIX G*
SAMPLE GEODUCK HARVEST AGREEMENT

STATE OF WASHINGTON
DEPARTMENT OF NATURAL RESOURCES
BRIAN J. BOYLE, Commissioner of Public Lands

AGREEMENT: Commercial Harvest of Geoduck Clams from Beds of Navigable Waters

AGREEMENT NO. _____

THIS AGREEMENT, made by and between the State of Washington, acting by and through the Department of Natural Resources, hereinafter called the "State" and _____, hereinafter called the "Permittee".

WITNESSETH, that for and in consideration of Two Thousand Dollars ($2,000.00) paid at time of bid opening as a deposit to be applied at the Permittee's option to the bonus bid or royalty payment or surety bond and in consideration of the bonus bid in the sum of _____ _____ and _____/100 Dollars ($_____) to be paid to the Commissioner of Public Lands, one twelfth (1/12) ($_____) to be paid on or before _____, 19____, with one twelfth (1/12) ($_____) due on or before the 1st of each succeeding month for twelve (12) consecutive months, or until paid in full, plus royalty as hereinafter set forth, and in consideration of the covenants hereinafter contained, the State conveys and lets unto the Permittee the right to commercially harvest geoduck clams, not to exceed _____ pounds, from the _____ _____ tract or parcel of the bed of navigable waters situated in _____ County, State of Washington, as follows:

The _____ Geoduck Tract, as shown on the official map on file in the office of the Commissioner of Public Lands at Olympia, Washington, and as per Exhibit "A" attached hereto.

1. Term: This agreement shall commence _____, 19____ and continue for twelve consecutive months, ending _____, 19____.

   An extension of the harvest agreement up to two months to accomplish 192 working days will be allowed. The extension will be granted for mitigating circumstances on a case-by-case basis. The Department requires immediately notification of those days where conditions or problems prevent or limit the working day. No extensions will be granted for time lost due to enforcement action resulting in tract, vessel, or operator suspension.

2. Royalty: The Permittee shall pay to the Commissioner of Public Lands, of the State of Washington, a royalty of three (3) cents for each and every pound of whole geoduck clams harvested. Payment of said royalty shall be made monthly, not later than the fifteenth (15th) of the month following the calendar month of harvest.

3. Reporting: Said royalty payment shall be accompanied by completed copies of the State of Washington, Department of Natural Resources, monthly Geoduck Removal Statement showing the fish ticket numbers, total numbers and poundage of geoduck clams harvested from each tract, by each harvest vessel, together with date of sale.

4. Penalty: If complete report of harvest, and royalty payment is not made by the fifteenth (15th) of the month following the month of harvest, or bid payment is not received by the first (1st) of each month, all harvesting activities may be suspended. A penalty of 1% per month will be charged for all overdue accounts. If royalties, bid payment and penalties have not been paid prior to thirty (30) days following the month of harvest, the harvest agreement may be cancelled, and the surety bond forfeited.

5. Operator: The term operator in this agreement shall mean the Permittee, its agents, employees or representatives or any person or entity contracting with or harvesting for the Permittee including but not limited to divers, harvesters, tenders and vessel operators.

*Terms and conditions of this contract are changed periodically to respond to management needs or site-related environmental concerns.

6. Termination: The Permittee may cancel or extend, for the term of shutdown, this agreement if any governmental agency shall impose a shutdown period which exceeds thirty successive days, when such shutdown is not caused by any actions of the Permittee or its operators. Upon no fault termination of the agreement the Permittee shall be reimbursed by the State for the prorated unused portion of the bonus bid, less any royalties due the State.

7. Compliance: (1) The Permittee and its operators shall comply with applicable laws and regulations of any Federal, State and Local authority affecting the premises and the use thereof, and in particular, shall abide by the statutes and license requirements, rules and regulations promulgated by the State of Washington, Department of Fisheries, in connection with the commercial harvest of geoduck clams, and all applicable commercial diving safety standards and regulations promulgated and implemented by the Federal Occupational Safety and Health Administration. Violations of such regulations by the Permittee and its operators shall be cause for suspension or cancellation of this agreement.

(2) In the event that said Permittee and its operators are found engaging in off-tract harvesting, or fail to report all geoducks harvested, this agreement will be subject to suspension or cancellation. Should the suspension or cancellation be contested, an opportunity will be offered for a hearing before a hearings officer, designated by the Commissioner of Public Lands, under the Administrative Procedures Act. (RCW Chapter 34.04) See RCW 79.01.570.

Any off-tract harvesting will be conclusively presumed to be with the knowledge and consent of the Permittee. Permittee is responsible for assuring that only properly licensed or approved divers and operators are allowed to harvest on his tract. The Permittee will also be responsible hereunder for notifying all persons harvesting on the above described tract or parcel on Permittees behalf, the location of tract boundaries, required on vessel documents, approved off-loading point(s), harvest reporting requirements, hours and days of operation, contract provisions and instructions, the applicable statutes and licensing requirements, rules and regulations promulgated by the State of Washington, Department of Fisheries and the Federal Occupational Safety and Health Administration.

(3) The Permittee shall cause to have efficient operating noise abatement devices installed and properly maintained on all equipment during harvesting operations. Such equipment shall be maintained and operated in such a manner as to not exceed 50 dBA at 200 yards. Temporary waivers may be granted in special circumstances, but in no case, will noise levels exceed the Department of Ecology noise standards contained in WAC 173-60.

(4) Permittee shall provide for approval by the Department of Natural Resources designated off-load location(s) for said tract. If deemed in the best interest of the Public or the State off-load location(s) can be disapproved for the tract or for specific vessels and/or operators. Permittee and its operators will off-load harvested geoducks only at the approved off-load point(s). Failure to utilize approved off-load point(s) shall be a basis for suspension or cancellation of this agreement and/or disapproval of vessel(s) and/or operators.

(5) The Department of Natural Resources shall have the right to disapprove harvest vessels and/or operators for violations of Fisheries regulations, contract provisions or actions deemed not in the best interest of the public or the State. In the event that the said Permittee, continues to allow disapproved vessels and/or operators to continue to harvest after notification of disapproval, then this harvest agreement will be subject to suspension or cancellation.

(6) The State can require operators to provide legible dive time and harvest data for all harvesting activities.

(7) Documents specified by the State as necessary for the Permittee and its operators to be knowledgeable of the harvest area, harvest operations and reporting procedures including but not limited to maps and sight line photos of the harvest limits shall be onboard the harvest vessel at all times during harvesting or transport of geoducks.

(8) Without prior State approval only one specific vessel can harvest on the above noted tract on any specific day. Without prior State approval, the specific vessel(s) harvesting on said tract shall not work on any other tract in the same day. This includes harvest activities prior to or after harvest activities on said tract.

(9) The State can require validation of harvest quantities and/or designated off-load times.

(10) Not exclusive of other remedies, the State may charge the Permittee up to three times the geoduck value (based on average weight, total estimated commercial poundage available, bid plus royalty) for off-tract harvest.

(11) Department of Natural Resources and Fisheries personnel or designated agents shall have the right to check vessels, vehicles, scales, nozzles, logs, records, and to make such investigations and to secure or receive any material or information necessary to determine that the contract provisions of this agreement are being carried out. If the Permittee or its operators fails to submit or to cooperate with requests or investigations, then this harvest agreement will be subject to suspension or termination or disapproval of harvest vessels and/or operators.

Violations of the aforementioned contract provisions by the Permittee or its operators shall be cause for suspension or cancellation of this agreement, and/or suspension or cancellation of approval of harvesting vessels and/or operators, and/or disapproval of off-load locations in total or for specific vessels and/or operators.

8. Audit: The Permittee and its operators shall keep an accurate record and account of all geoducks harvested from the above noted tract, and the Department of Natural Resources and Fisheries shall have the right to inspect the books and accounts of the Permittee or its operators in the interest of the State, make such investigations and secure or receive any other material or information necessary to determine whether or not the State is receiving full payment for the geoduck clams harvested. Said Permittee hereby covenants and agrees to make available such books and accounts for such State inspections during business hours.

9. Liability: The Permittee will protect, save and hold harmless the State, its authorized agents and employees, from all claims, costs, damages or expenses of any nature whatsoever arising out of or in connection with the use of the area described in this agreement, including any damages which may be incurred as a result of a determination by Federal, State, or Local Government Agencies, that permits are required for harvesting activities.

10. Equipment: Harvesting equipment must be presented to the Department of Fisheries for inspection and approval, or be in conformance with the provisions of WAC 220-52-019.

11. Assignment: This agreement, or any portion thereof, may not be assigned, mortgaged, sublet or otherwise transferred without the prior written consent of the State. Failure to obtain written approval of any assignment defined in this agreement shall be grounds for cancellation.

12. No Partnership: The State is not a partner nor a joint venturer with the Permittee in connection with the business carried on under this agreement and shall have no obligation with respect to the Permittee's debts or other liabilities.

13. Notices: Any notice required or permitted under this agreement shall be given when actually delivered or when deposited in the United States mail addressed as follows: To the State: Department of Natural Resources, Public Lands Building, Olympia, Washington 98504. To the Permittee: At the address given by the Permittee in the signature block or as shown on later official documents of record with this agreement.

14. Bond: As a guarantee of the full and faithful performance of this agreement including but not limited to payment of bonus bid, and for the payment of all royalties due the State, the Permittee shall deliver at the time of signing this agreement a cash deposit, surety bond or other security acceptable to the State in the amount of _____ and _____/100 Dollars ($_____) in favor of the "State." If harvest production causes monies owed to the State (royalties plus bonus bid) to exceed the State's equity (residual tract value and bid payments) additional bonding as specified by the State and/or reduction in harvest rate and/or additional payments may be required.

15. Breach of Agreement: In the event the Permittee or its operators violates or breaches any terms of the agreement, the State shall in addition to other remedies, have the right to suspend operations of the Permittee. The State may also terminate this agreement, and the Permittee shall have no further rights under this agreement. Upon such termination, the State shall enter a forfeiture of the agreement, and the payment made in connection therewith or any bonds required by this agreement may be forfeited upon order of the State, and the State may recover damages from the Permittee. Any misreporting of harvest or harvesting outside the boundaries of the aforementioned geoduck tract by the Permittee or its operators will be considered, by the State as a breach of agreement. RCW 79.01.570.

16. Remedies: Any remedy exercised by the State hereunder shall not be deemed exclusive. The State may pursue any and all other remedies available to it under the law.

This agreement is made and accepted subject to all rights of navigation.

The Permittee expressly agrees to all covenants herein, and binds himself or themselves for the payments and royalties as hereinbefore set out.

Executed this _____ day of _____ 19 _____.

STATE OF WASHINGTON
DEPARTMENT OF NATURAL RESOURCES

_____
BRIAN J. BOYLE
Commissioner of Public Lands

Signed this _____ day of _____ 19 _____.

_____
Permittee

_____
Address

App. No. _____
021829

APPENDIX H

Future Research Plans

Department of Fisheries

1. Resource Surveys

   WDF is conducting on-going surveys of the commercial geoduck resource in Puget Sound. Most of the shallow water areas of Puget Sound have been surveyed and these activities will be decreasing.

2. Enhancement

   WDF is continuing to artificially rear geoduck larvae at its shellfish laboratory at Point Whitney on Hood Canal. Techniques have been developed for spawning and growing the larvae. Future activities include improvement of the laboratory grow-out capabilities and expansion of rearing activities with the intent to supply geoduck clams to reseed harvested beds. Research is under way to improve the methods and success of reseeding and to reduce the cost of growing and planting the small clams. If successful, the artificial reseeding of commercial beds will allow a doubling or tripling of geoduck harvest.

3. Harvest Effects

   Through monitoring of harvested beds, WDF is developing additional information on the effects of harvest on the substrate and nearby environment and on their recovery.

Department of Natural Resources

1. Resource Surveys

   DNR is presently developing a method for assessing the deep water geoduck stocks using a sled-mounted closed circuit TV camera. This will allow an inventory of geoduck stocks in water too deep for diver surveys and will allow an estimate of the overall geoduck abundance and distribution in Puget Sound.

2. Enhancement

   DNR has conducted limited research on the grow-out stage of geoduck culture. When WDF culture techniques are developed to allow large scale reseeding, DNR will reseed harvested geoduck beds and intertidal beaches.

75.24.100 Geoduck clams, harvesting for commercial purposes——License——Gear——Director may impose limitations——Compliance with federal law (OSHA). (1) The director of fisheries may at his discretion and with the approval of the commissioner of public lands issue licenses for the harvesting of geoduck clams for commercial purposes from specific tracts of beds of navigable waters of the state of Washington for which harvest rights have been granted by the department of natural resources except that he may not authorize harvesting for commercial purposes on bottoms which are shallower than eighteen feet below mean lower low water (o.o. ft.), or which lie in an area bounded by the line of ordinary high tide (mean high tide) and a line two hundred yards seaward from and parallel to said line of ordinary high tide. If the director shall determine that the numbers of units of gear are sufficient to harvest the known available crop and that additional units of gear might prove damaging to the resource or its habitat, he may suspend the issuance of such additional licenses for the balance of any given year or until he determines there is need for additional units of gear to achieve a sustained harvest. All harvesting shall be done with hand held, manually operated water jet or suction device guided and controlled from under water by scuba or other diver. The director shall also determine from time to time the effect of each type or unit of gear upon the geoduck population or the substrate they inhabit and he may require modification of the gear or cessation of its use if he determines that it is being operated in a wasteful or destructive manner or that its operation tends to cause permanent damage to the bottom or adjacent shellfish populations.

(2) Any person, including the person's agents or representatives, who is issued or currently holds a license under subsection (1) of this section shall comply with all applicable commercial diving safety standards and regulations promulgated and implemented by the federal occupational safety and health administration established under the federal occupational safety and health act of 1970 as such law exists on May 8, 1979 (84 Stat. 1590 et seq.; 29 U.S.C. Sec. 651 et seq.). Violations of these safety standards and regulations shall be deemed to be violations of this subsection: *Provided*, That for the purposes of this section and RCW 79.01.570 all persons who dive for geoducks are deemed to be "employees" as defined by the federal occupational safety and health act. Violations of this subsection are grounds for suspension or cancellation of the license upon ten days written notice to the licensee and following a hearing on the matter. In no event shall a license be suspended or canceled if the violation has been corrected within ten days. If there is a substantial probability that a particular violation of the commercial diving standards could result in death or serious physical harm to any person engaged in harvesting geoduck clams, the license shall be suspended immediately until the violation causing the probability of death or serious physical harm has been corrected: *Provided further*, That for the purposes of this subsection, if the licensee is the holder of a tract license and contracts with another entity for the harvesting of geoducks, the license shall not be suspended or canceled if the licensee terminates its business relationship with such entity until compliance with this subsection is secured. [1979 1st ex.s. c 141 § 1; 1969 ex.s. c 253 § 1.]

Liberal construction——1969 ex.s. c 253: "The provisions of this act shall be liberally construed." [1969 ex.s. c 253 § 5.] This refers to RCW 75.24.100, 75.28.280, 75.28.281 and 75.28.287.

Severability——1969 ex.s. c 253: "If any provisions of this 1969 amendatory act, or its application to any person or circumstance is held invalid, the remainder of the act, or the application of the provision to other persons or circumstances is not affected." [1969 ex.s. c 253 § 6.] This applies to RCW 75.24.100, 75.28.280, 75.28.281 and 75.28.287.

75.28.280 Clam farm license——Exception, geoducks. A license is required for each and every clam farm of one or more tracts of land being operated for commercial purposes on privately owned or leased tidelands and on leased beds of navigable waters in the state, except that a license under this section is not required for subtidal geoduck harvest tracts for which the required harvest rights and licenses have been obtained pursuant to other provisions of law. The fee for said license is fifteen dollars per annum, and shall be paid for each and every year in which clams are removed from the clam farm for purposes of sale. A separate license is required for each clam farm being operated within each of the following clam districts; northern Puget Sound district, southern Puget Sound district, Grays Harbor district, and Willapa Harbor district; said districts are to include the waters, beds, shores, beaches, and tidelands of, northern Puget Sound, southern Puget Sound, Grays Harbor, and Willapa Harbor, respectively, as geographically defined by the director of fisheries under appropriate regulations. [1979 1st ex.s. c 141 § 3; 1969 ex.s. c 253 § 3; 1955 c 212 § 8; 1955 c 12 § 75.28.280. Prior: 1951 c 271 § 26; 1949 c 112 § 70; Rem. Supp. 1949 § 5780-508.]

Construction——Severability——1969 ex.s. c 253: See notes following RCW 75.24.100.

75.28.283 Geoducks or clams——Licenses for harvesting. It is unlawful for any person to harvest clams or geoducks or to utilize any vessel with commercial hand held geoduck harvesting gear on any aquatic lands designated under RCW 75.28.286 without first obtaining the licenses required by RCW 75.24.100 as now or hereafter amended and 75.28.287 as now or hereafter amended. Use or the mere presence of the gear in the water outside the licensed tract is prima facie evidence of a violation of this section. [1979 1st ex.s. c 141 § 6.]

75.28.286 Geoducks——Designating state aquatic lands for harvesting. The department of natural resources shall designate the areas of aquatic lands owned by the state of Washington which will be available for geoduck harvesting by licensed geoduck harvesters in accordance with RCW 79.01.124. [1979 1st ex.s. c 141 § 5.]

75.28.287 Tract license for harvesting geoducks——Diver's license——License for mechanical and/or hydraulic device used taking clams——Displaying licenses. (1) A geoduck tract license is required for each subtidal geoduck tract for which harvest rights have been granted by the department of natural resources for the commercial harvest of geoducks. The fee is one hundred dollars per annum.

(2) Every diver engaged in the commercial harvest of geoduck or other clams shall obtain a nonassignable personal commercial fishing license. The fee is fifty dollars per annum.

(3) A license is required for each and every mechanical and/or hydraulic device operated for the purpose of taking clams other than geoduck clams for commercial purposes from tidelands and beds of navigable waters of the state of Washington, the fee for which license shall be three hundred dollars per annum.

Evidence of issuance of the licenses required by this section shall be prominently displayed by numbers, codes, or symbols upon the vessel used in geoduck or clam harvesting activities before engaging in the harvesting activities in a manner prescribed by the director of fisheries in rules promulgated under chapter 34.04 RCW. [1979 1st ex.s. c 141 § 4; 1969 ex.s. c 253 § 4.]

Construction——Severability——1969 ex.s. c 253: See notes following RCW 75.24.100.

Geoduck clams, harvesting for commercial purposes——License: RCW 75.24.100.

75.28.288 Geoduck harvesting——Penalties for violations. (1) In addition to the penalties prescribed in RCW 75.08.260 and 75.28.380, the director of fisheries may revoke all geoduck personal commercial fishing licenses or geoduck tract licenses or both held by a person if within any five-year period after May 8, 1979:

(a) That person is convicted or has an unvacated bail forfeiture for two or more violations of the geoduck licensing or harvesting provisions of this title; or

(b) The department of fisheries receives a report from the department of natural resources of two or more violations by the person of the lease or harvesting agreement under chapters 79.01 or 79.20 RCW where the department of natural resources suspended or canceled the lease or harvesting agreement under RCW 79.01.570.

The director of fisheries shall not issue any geoduck personal commercial fishing license or geoduck tract license for a period of one year after the revocation to a person who has had a license revoked under this section except as provided under subsection (3) of this section.

(2) If, within any five-year period after May 8, 1979, any holder of a tract license permits any person to harvest geoducks on that tract, each violation by that person of the geoduck licensing or harvesting provisions of this title resulting in: (a) Either conviction or unvacated forfeiture of bail; or (b) a suspension or cancellation of the lease or harvesting agreement by the department of natural resources under RCW 79.01.570; shall be imputed to the holder of a tract license for the purpose of computing the number of the tract holder's violations under subsection (1) of this section.

(3) Appeals from revocations under this section shall be taken pursuant to the judicial review provisions of chapter 34.04 RCW. If the revocation of a license is determined to be invalid, the department of fisheries shall reissue a license or licenses to that person. [1979 1st ex.s. c 141 § 7.]

WAC 220-52-019 GEODUCK CLAMS--GEAR. It is unlawful to take, fish for or possess geoduck clams taken for commercial purposes from any of the tidelands of the state of Washington: PROVIDED, That pursuant to RCW 75.24.100, validations for the use of hand-held manually operated water jet or suction devices for harvesting geoduck clams for commercial purposes may be obtained from the director of fisheries subject to the following conditions:

(1) All harvesting methods and types of water jet and suction devices used in the taking or harvesting of geoduck clams must be approved by the director of fisheries prior to their use, except that water jet devices meeting the following requirements are approved for use:

(a) The water jet must have an automatic spring-triggered shut-off valve or a manual valve capable of being operated from full flow to completely off within one-half turn.

(b) The device must consist of not more than one jet, the nozzle of which shall not exceed 5/8 inch inside diameter.

(c) It is unlawful in the commercial harvest of geoducks for through-hull fittings for water discharge hoses connected to the harvest gear to be below the surface of the water. Any through-hull fitting connected to the harvest gear which is above the surface of the water must be visible at all times.

(2) One geoduck validation must be physically present on board the harvest vessel for each and every geoduck personal commercial fishing license in use. It is the responsibility of the holder of the harvest agreement to issue validations only to divers authorized to harvest on the specific tract or tracts. It is the responsibility of the holder of the harvest agreement to ensure that the required number of validation cards are on board the harvesting vessel engaged in geoduck harvesting.

(3) It is unlawful to take, fish for or possess geoduck clams taken from one-half hour before official sunset to official sunrise or to 6:00 a.m. whichever is later. It is unlawful to take, fish for or possess geoduck clams taken on Sunday.

(4) It is unlawful to harvest geoduck clams with any instrument that penetrates the skin, neck or body of the geoduck.

(5) It is unlawful to retain any shellfish other than geoduck clams during geoduck harvesting operations unless the operator is licensed for the taking of clams other than geoduck clams as provided for in RCW 75.24.100. It is unlawful to take, fish for or possess sea cucumbers during geoduck clam harvesting operations, or possess sea cucumbers on a vessel that has geoducks aboard.

(6) It shall be unlawful for more than six divers to harvest geoducks at any one time on a single geoduck tract. It shall be the responsibility of the holder of the harvest agreement to assure that no more than six divers are harvesting at one time.

(7) At all times when geoduck harvest is occurring, copies of the official geoduck tract map and complete tract boundary identification documents or photographs as issued by the department of natural resources for the specific tract must be on board the vessel.

(8) No processing of geoducks is permitted on board the harvest vessel.

(9) It shall be unlawful to take, fish for or possess geoduck clams for commercial purposes except those taken within boundaries of subtidal tracts for which geoduck harvest agreements have been issued

by the department of natural resources or from subtidal tracts which were leased from the department of natural resources prior to June 30, 1979 for geoduck harvest.

(10) It shall be unlawful to harvest from bottoms which are shallower than 10 feet below mean lower low water (0.0 feet), or which lie in areas bounded by the line of ordinary high tide (mean high tide), and a line 1/4-mile seaward from and parallel to said line of ordinary high tide on subtidal tracts which were leased for geoduck harvest prior to June 30, 1979.

(11) It shall be unlawful to harvest from bottoms which are shallower than 18 feet below mean lower low water (0.0 feet), or which lie in areas bounded by the line of ordinary high tide (mean high tide), and a line 200 yards seaward from and parallel to said line of ordinary high tide on subtidal tracts for which geoduck harvest agreements have been issued after June 30, 1979. (81-33, 6/10/81)

WAC 220-52-01901 VALIDATIONS. (1) Numbered validations will be issued only to holders of valid subtidal geoduck harvest agreements issued by the department of natural resources and persons who hold current geoduck tract licenses issued by the department of fisheries. The validation will be issued for each licensed tract.

(2) The number of validations to be issued to each holder of a harvest agreement shall be determined by the director of fisheries based upon the number of individual geoduck tracts for which harvest agreements have been issued by the department of natural resources, their total acreage, past geoduck production, present number of nozzle licenses held for the operation, and other factors as deemed appropriate by the director of fisheries.

(3) The number of geoduck validations held by the holder of the harvest agreement may be adjusted from time to time as deemed necessary by the director of fisheries and when changes in leases occur.

(4) The geoduck validation will expire at the end of each calendar year, provided that the director may issue temporary validations for restricted time periods. In the event a validation is lost, a new validation will be issued upon receipt of a signed affidavit from the holder of the harvest agreement attesting to the loss. Any request to assign or transfer a validation from one holder of a harvest agreement to another must be made in writing. No validation will be assigned or transferred without the written approval of the director of fisheries.

(5) The holder of the harvest agreement is held responsible for notifying each diver to whom he provides a validation of all the laws and regulations of the state of Washington department of fisheries pertaining to commercial geoduck harvest. The holder of the harvest agreement and/or diver may be held criminally or civilly liable for violation of the applicable rules and regulations of the department of fisheries. Any violations by either the holder of the harvest agreement and/or the diver can result in suspension and a cancellation of the validation subject to the holder's right to opportunity for a hearing as specified in chapter 34.04 RCW. The director of fisheries may refuse to issue a validation to any holder of a harvest agreement who has failed to comply with these regulations.

(6) Applications for geoduck validations must be made on forms provided by the department of fisheries.

(7) At all times when geoduck harvest is occurring, the geoduck personal commercial fishing license and validation card for each and every diver who is harvesting or attempting to harvest geoducks from that tract and evidence of the geoduck tract license for the specific tract must be prominently displayed on board the vessel. (220-52---p 5)

(80-123, 10/17/80) (33-81)

APPENDIX J.

Pertinent DNR Laws and Regulations

RCW 79.01.570 Geoduck harvesting——Leases, agreements, regulation. (1) The department of natural resources may enter into leases or harvesting agreements for the harvesting of geoducks. The department of natural resources may place terms and conditions in the leases or harvesting agreements as the department deems necessary. The department of natural resources may enforce the provisions of any lease or harvesting agreement by suspending or canceling the lease or harvesting agreement or through any other means contained in the lease or harvesting agreement. The department of natural resources may cancel any lease or harvesting agreement upon receiving a report from the department of fisheries of the person's second violation of the geoduck licensing or harvesting provisions under Title 75 RCW. Any lessee may terminate a lease entered into pursuant to this subsection if actions of a governmental agency, beyond the control of the lessee, its agents or its employees, prohibit harvesting, for a period exceeding thirty days, during the term of the harvesting agreement. Upon termination of the lease, the lessee shall be reimbursed by the lessor for the cost paid on the lease less the value of the harvest already accomplished by the lessee on the leasehold.

(2) After May 8, 1979, all leases of state lands or harvesting agreements under this title for the purpose of harvesting geoduck clams shall require the lessee and the lessee's agent or representatives to comply with all applicable commercial diving safety standards and regulations promulgated and implemented by the federal occupational safety and health administration established under the federal occupational safety and health act of 1970 as such law exists on the effect date of this act (84 stat. 1590 et seq.;29 U.S.C. sec. 651 et seq.): Provided, That for the purposes of this section and RCW 75.24.100 as now or hereafter amended all persons who dive for geoducks are deemed to be employees as defined by the federal occupational safety and health act. All leases shall provide that failure to comply with these standards is cause for suspension or cancellation of the lease: Provided further, That for the purposes of this subsection if the lessee is the holder of a tract license and contracts with another entity for the harvesting of geoducks, the lease shall not be suspended or canceled if the lessee terminates its business relationship with such entity until compliance with the subsection is secured.

WAC 332-30-157 Commercial clam harvesting. (1) Commercial clam beds on aquatic lands shall be managed to produce an optimum yield.

(2) The boundaries of clam tracts offered for lease shall be established and identified to avoid detrimental impacts upon significant beds of aquatic vegetation or areas of critical biological significance as well as prevent unauthorized harvesting.

(3) The methods of harvest may only be those as established by law and certified by the department of fisheries.

(4) Surveillance methods will be employed to insure that trespass as well as off-tract harvesting is prevented.

(5) Harvesters must comply with all lease provisions. Noncompliance may result in lease suspension or cancellation upon notification.

(6) Harvesters must comply with all applicable federal, state and local rules and regulations. Noncompliance may result in lease suspension or cancellation upon notification.

(7) If appropriate, the department may secure all necessary permits prior to leasing.

WAC 332-30-160 Renewable resources. (1) Utilization of renewable resources is a preferred use of aquatic lands.

(2) The department will foster renewable resource utilization through research and development work, public education, land use allocation and resource inventory.

(3) Depending on the activity involved and the stage of commercial development, all necessary permits may be secured by the department for specific sites and activities before the sites are offered for lease.

(5) Tidelands, shorelands and beds of navigable waters, especially valuable now and in the foreseeable future for renewable resource activities (such as aquaculture, natural resource harvesting or electrical energy production), shall be so designated and protected from conflicting human uses which would limit their utility for this purpose.

(7) Commercial harvesting of wild stocks of shellfish shall be encouraged on aquatic lands. Harvesting must be conducted in such a manner as to provide an optimum yield of the crop within the harvestable resource base, to minimize insofar as possible conflicts with other users of the water area and to have insofar as possible a minimal impact upon the environment.

(10) Enhanced productivity of commercially and recreationally important species of aquatic life shall be encouraged on aquatic lands.

(11) The department will work with other agencies through development and implementation of management plans to insure that commercial shellfish beds are kept free of pollution and that as much as possible of the resource base is available for harvesting.