

**REVIEW AND RECOMMENDATIONS FOR
REPERMITTING OF ARTIFICIAL REEF
SITES
ADJACENT TO BISCAYNE NATIONAL PARK**

September 1997

Nov. 26, 1997

**Metropolitan Dade County
Department of Environmental Resources Management
Artificial Reef Program**

1. Collaborate with BISC and DERM staff on developing a management plan for the artificial reef sites located off the boundary of Biscayne National park and affecting the FKNMS. This plan will be consistent with and based on FKNMS artificial reef policy being implemented throughout the sanctuary.
2. Allow BISC and DERM access to all information collected by the FKNMS relevant to the development of artificial reef management plans.
3. Participate and assist BISC, and DERM in joint field assessments and monitoring activities related to the artificial reef sites.

E. Additional services and/ or activities not within the general scope of work previously outlined shall be performed only when requested and approved by the three parties to this MOU.

Biscayne National Park

Dade County DERM

Florida Keys NMS

Date

Date

Date

DUPLICATE:
Original in
Museum Archives
BISC-718

Artificial Reef Program Background

The Dade County Artificial Reef Program was established in 1981, and has been administered by the Department of Environmental Resources Management (DERM), along with several other programs whose principal goal was to restore and enhance the values and qualities of coastal resources. Artificial reef materials provide an alternative hard substrate in areas where it does not naturally exist or where bottom habitats had been damaged by past development practices. The artificial reefs provide a stable substrate for attached plants and animals, which together with the man-made materials provide habitat for fish and other larger marine life. However, artificial reef construction in Miami's coastal waters predates the Dade County program by more than five decades.

Artificial reef construction in Dade has a documented history of more than 70 years, beginning in 1920 when an abandoned ship on the Miami River was sunk off the coast to create a new fishing area. This motivation for constructing artificial reefs continued in the 1940s through the efforts of charter boat captains of the "Pier 5" dock on Miami Beach. Pflueger Marine Taxidermy made an enormous contribution, acquiring and sinking 15 large vessels from 1969 to 1980. The Miami Sportfishing Club became involved in artificial reef construction, sinking four large vessels south of Fowey Rocks during the 1970s and early 1980s. During the 1980s, the former Dade Sportfishing Council, R.J. Diving Ventures, and Fish & Game Unlimited of Homestead worked to acquire and deploy 12 large vessels and other artificial reef materials. Dade County, seeking to emphasize restoration and enhancement goals and maximize effectiveness of community resources, began coordinating artificial reef construction approximately 15 years ago. During this period, DERM developed permit applications or assisted other applicants to establish eleven offshore and twelve inshore artificial reef sites, which span the length of Dade's 35 nautical-mile coast (see figure 1). DERM has supervised deployment of an extensive amount of material among these sites, including 38 large vessels, two oil platform structures donated by Tenneco Oil Corporation, thousands of tons of cast concrete materials and natural limestone, specially-designed prefabricated modules, aircraft including the "Spirit of Miami" 727 jet airliner, and U.S. Army surplus military tanks. As a result of these combined efforts, the Dade County program is regarded as the largest (in terms of materials deployed) program of its kind in Florida, which leads the nation in number of established artificial reef sites. More information on the permitting history of Dade County reef sites is compiled in Table 1.

During the last decade, Dade County has coordinated construction of reefs to restore or mitigate impacts to specific hardbottom habitats damaged by dredging or water quality impacts, as well as to provide enhanced recreational opportunities for the recreational

2. Regular meetings will be held between all parties of this agreement to identify mutually agreed upon needs and objectives, and to assess progress in achieving them.
3. Each party to this MOU agrees to develop joint grant proposals to fund any monitoring studies or research needed to further the intent of this agreement.

B. BISC, to the extent resources permit, will:

1. Collaborate with DERM and FKNMS staff on developing a management plan for the artificial reef sites located off the boundary of Biscayne National park and affecting the FKNMS.
2. Allow DERM and the FKNMS staff access to all information collected by BISC relevant to the development of artificial reef management plans such as creel census and boat user data, etc.
3. Participate and assist DERM, and the FKNMS in joint field assessments and monitoring activities related to the artificial reef sites.

C. DERM, to the extent resources permit, will:

1. Collaborate with BISC and FKNMS staff on developing a management plan for the artificial reef sites located off the boundary of Biscayne National park and affecting the FKNMS.
2. Allow BISC and the FKNMS staff access to all information collected by DERM relevant to the development of artificial reef management plans.
3. Participate and assist BISC, and the FKNMS in joint field assessments and monitoring activities related to the artificial reef sites.
4. In addition to agreed upon coordination of all artificial reef activities with other agencies, DERM shall provide BISC and the FKNMS with an annual report summarizing all artificial reef activities undertaken during the previous year, including descriptions of the status of any materials placed, and the results of monitoring or research activities undertaken.
5. DERM shall provide to BISC, and the FKNMS hard or digital copies of any resource maps developed as part of the development of these management plans.

D. The FKNMS, to the extent resources permit, will:

fishing and diving community. By serving as an alternative destination for fishermen and divers, artificial reefs may be used as a management tool to reduce user pressure that otherwise would be directed to natural communities. However, the ability of artificial reefs to attract and support a diverse assemblage of marine life also makes them vulnerable to the potentially adverse effects of unrestrained fishing pressure. For this reason, in 1985 Dade County solicited the South Atlantic Fishery Management Council to establish the Key Biscayne artificial reef site as a Special Management Zone (SMZ) to restrict certain types of fishing gear. In 1990, federal agencies approved the SMZ.

Application for Permits for Previously Approved and New Artificial Reef Sites

By the early 1990s, many of the permits or approvals for artificial reef sites in Dade County had expired, including those for five sites in southern offshore waters. General permits from the U.S. Army Corps of Engineers for these sites were originally obtained by fishing clubs or other private organizations. Due to regulatory requirements related to liability and long term maintenance, the USACE no longer issues artificial reef permits to private organizations. In March 1995, DERM submitted applications to repermit or obtain new permits for a total of 22 artificial reef sites countywide, including sites where earlier permits had been issued to clubs or other private organizations. EAS Engineering, Inc., a local environmental engineering firm, acted as DERM's agent in preparing and coordinating the submission of the applications. The 22 sites were grouped by region into three separate applications: sites in Biscayne Bay and adjoining inshore waters ("inshore"); offshore sites from Broward /Dade County line to Key Biscayne ("north"; and offshore sites south of Key Biscayne ("south"). Table 1 describes these applications in greater detail.

South Site Regulatory Issues

During the late 1980s, the proposed sinking of a large vessel within one mile of Biscayne National Park (BNP) at the Fish & Game Unlimited site drew opposition from the Department of Interior, which cited concerns related to ecological effects of artificial reefs on Park resources and stability of the materials. Although a general permit for artificial reef construction had been issued by the USACE, this permit did not authorize placement of materials within one-mile of Biscayne National Park and other federally protected waters. Following negotiations between Park officials and artificial reef advocates, the vessel was sunk in 150 feet of water with site specific authorization from the USACE. Other artificial reef projects constructed in 1988 at the south sites followed a similar protocol involving coordination between the National Park, DERM, and permit holders.

When the new application for the South Sites was submitted to the USACE by DERM in early 1995, it was forwarded from the local USACE office to the Jacksonville District for processing as a standard permit. The original document was not received, however, so a duplicate application was submitted on September 7, 1995. As required by law, the USACE issued a public notice of this application. Due to intense interest in this

**Joint
Memorandum of Understanding
between**

Biscayne National Park

**Dade County
Department of Environmental Resources Management**

**Florida Keys
National Marine Sanctuary**

Purpose: This Memorandum of Understanding (MOU) define the respective responsibilities of Biscayne National Park (BISC), Dade County Department of Environmental Resources Management (DERM), and the Florida Keys National Marine Sanctuary (FKNMS) in cooperating to develop consistent and scientifically-based policy regarding the planning, management, and conservation of natural and cultural resources as it relates to artificial reefs.

By this MOU, BISC, DERM, and the FKNMS express commitment to the philosophy that wise management of ecosystem resources is a necessary and indispensable public service to society, and that this commitment to scientifically-based resource management should be maintained and enhanced. In order to further this philosophy, the three organizations included in this MOU shall cooperate in promoting the aforementioned provisions as outlined below:

Duration: This MOU shall become effective when executed by all parties and extend for a minimum period of three years, or for the full duration of artificial reef permit that is negotiated between the parties of this MOU, whichever is greater.

Provisions:

A. BISC, DERM, and the FKNMS all agree that joint programs pertaining to artificial reefs will contain the following provisions:

General

1. Each party shall designate one individual to formally represent that agency and execute this agreement.

application, DERM requested extension of the usual 30 day comment period to allow opportunity for additional public review. The comment letters received by the USACE reflected strong support for the repermitting of the artificial reef sites from the fishing and diving community and significant concerns about renewed artificial reef construction from the National Park, some other government agencies, and environmental organizations.

On February 27, 1996, DERM requested that the USACE "deactivate without prejudice" the South Site permit application. This enabled DERM and the interested groups to continue to seek resolution of this matter. An initial meeting was held among representatives of agencies and user groups to discuss issues regarding the continued placement of reef materials adjacent to the Park, and to seek potential areas of consensus. Discussion centered around the proposed artificial reef materials, including: types, criteria for use, stability after placement, longevity, depth of placement, proximity to natural habitat, and proposed quantities of additional materials by artificial reef site. The following proposals were offered at this initial meeting:

- On the R.J. Diving Ventures site, which had been previously developed for scuba diving, vessels and similar materials should be sunk at a depth which permits safe diving yet provide a reasonable distance from the Park boundary. User groups requested a minimum depth of 110 feet. On all other sites, the minimum depth for vessels or high profile (greater than 15 in vertical height) could be deeper. User groups requested a depth of 140 feet.
- DERM, with input from the Park, would develop a planning document for 2 of the 5 existing sites: R.J. Diving Ventures and Fish & Game Unlimited. These 2 sites were identified as highest priority by user groups. The planning process would serve as a mechanism to address Park concerns and facilitate continued enhancement of these 2 sites. The remaining 3 sites would be addressed using a similar process in the future.
- DERM would compile information identifying quantities of previously placed artificial reef materials by site.
- The National Park would identify for DERM those areas of critical or unique natural or historic value and which would require special attention and additional clearance as part of any planned future material deployment.
- Pending the mutual resolution of these issues and with the Park's endorsement, DERM would reactivate the South Site permit application, with any necessary modifications.
- A consistent set of guidelines would be developed for the continued construction of artificial reefs within the boundaries of the Florida Keys National Marine Sanctuary.

Recommendations Submitted by Biscayne National Park

Pursuant to DERM's request for additional information from the National Park, on April 11, 1996, the following recommendations were submitted by Park staff as guidelines for continued artificial reef development:

R. J. Diving Ventures and Fish & Game Unlimited artificial reef sites:



Dade Sportfishing Council- Middle

STRAITS OF FLORIDA

• Sir Scott

- Artificial reef design for the entire site should take a holistic approach in which the objective will be to enhance habitat for the full range of organisms living in live bottom communities, and not target particular species or groups.
- Materials used should be of a sufficient durability to not require replenishment in the foreseeable future.
- All artificial reef material should be clear of live bottom as specified in the 1995 USACE SAJ-50 general artificial reef permit, and a minimum horizontal distance of 200 feet from any hard bottom features.
- The total volume of material placed in this area should be no more than a 10% increase in the total volume placed to date.

R.J. Diving Ventures artificial reef site:

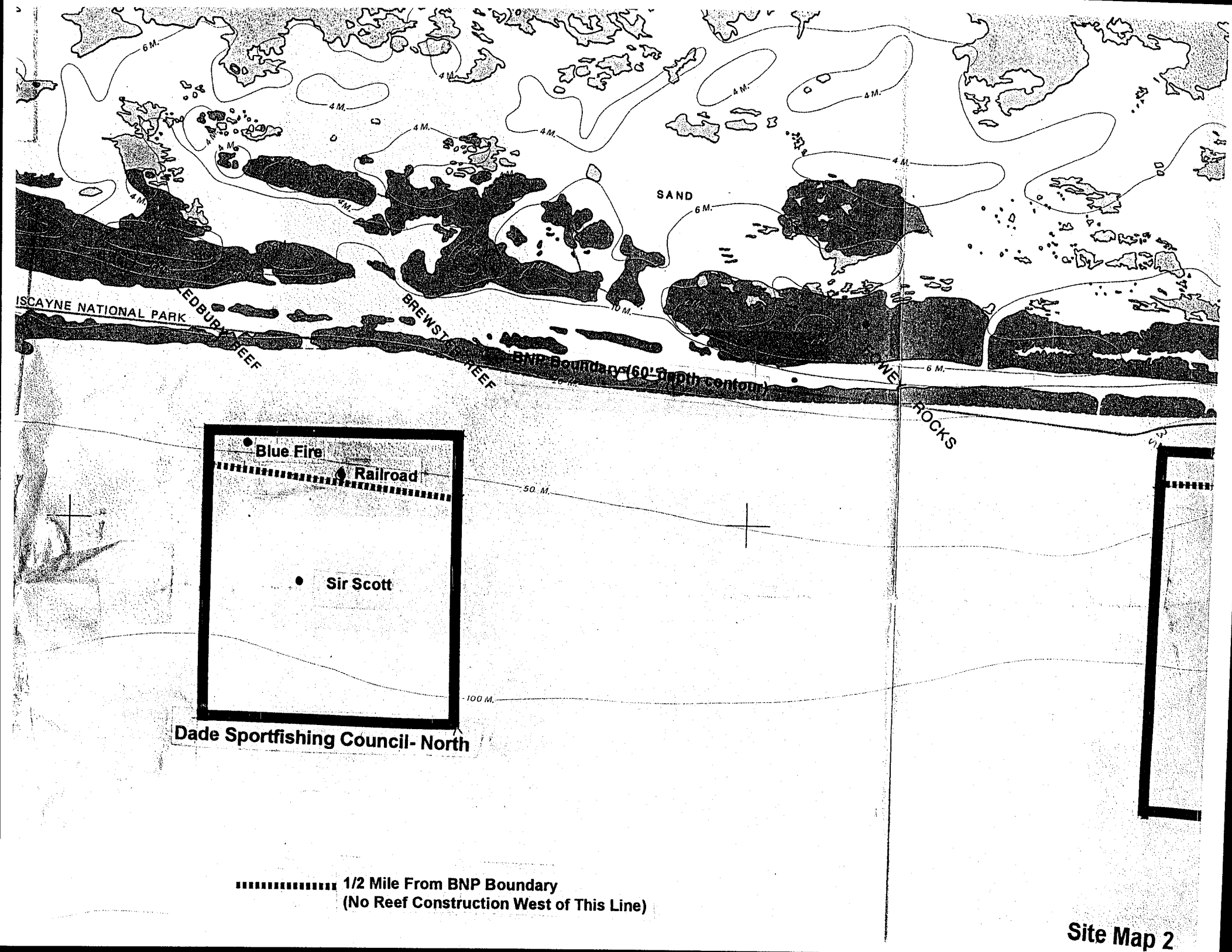
- Only prefabricated and low relief designs should be used in waters less than 150 feet deep.
- Individual sites should be at least ¼ nautical mile from the contiguous 60 foot depth contour (Park boundary) or in no less than 110 feet of water, whichever is the greatest distance from the Park boundary (Conditions of the 1995 USACE SAJ-50 general artificial reef permit prohibit artificial reef development within one nautical mile of Biscayne National Park).

Fish & Game Unlimited artificial reef site:

- Individual sites should be at least ½ nautical mile from the contiguous 60 foot depth contour (Park boundary) or in no less than 150 feet of water, whichever is the greatest distance from the Park boundary (conditions of the 1995 USACE SAJ-50 general artificial reef permit prohibits artificial reef development within one nautical mile of Biscayne National Park).

With consideration of these comments and suggestions expressed by BNP, and input from fishing and diving interests, DERM initiated preparation of a working document intended to identify the key concerns of all parties regarding the repermitting of the south artificial reef sites, and either incorporate them directly, or recommend compromise proposals as necessary.

In May 1997, DERM met with Biscayne National Park staff to present a draft of proposed criteria for new reef construction adjacent to the Park, as well as to better define the overall objectives for future management of the sites. DERM presented a series of proposals (Appendix 1) intended to establish an initial framework for addressing the stated concerns of the BNP, while allowing for the repermitting of the sites. The guidelines recommended allowed for additional reef construction within agreed upon limits with regard to depth, material stability, proximity of natural resources, management objectives, and acceptable material sizes and rates of deployment in the future. To permit BNP staff with adequate time to review DERM's proposed criteria, and provide comment, it was agreed that BNP and DERM would meet following their review to develop more specific proposals.



In July 1997, DERM met with BNP staff again to obtain comments on the draft proposal. In addition to discussions regarding DERM's recommended material placement criteria, a major emphasis was placed on the development of specific management criteria for the sites as a cooperative effort between BNP, the Florida Keys Marine Sanctuary (FKMS), and DERM, to insure that the management plans developed at the BNP sites would be consistent with ecosystem and other management initiatives being developed and implemented within the FKMS and the Park. In order to proceed with achieving the short-term goal of reactivating the permit applications for the south reef sites, while allowing time for the development of broader, scientifically-based management objectives, DERM recommended pursuing two parallel efforts:

1) DERM, BNP, and the FKMS would work to achieve consensus on acceptable criteria and guidelines for future reef construction at the south artificial reef sites. This would allow the permit applications for these sites to be reactivated on an expedited basis incorporating the agreed upon protocols.

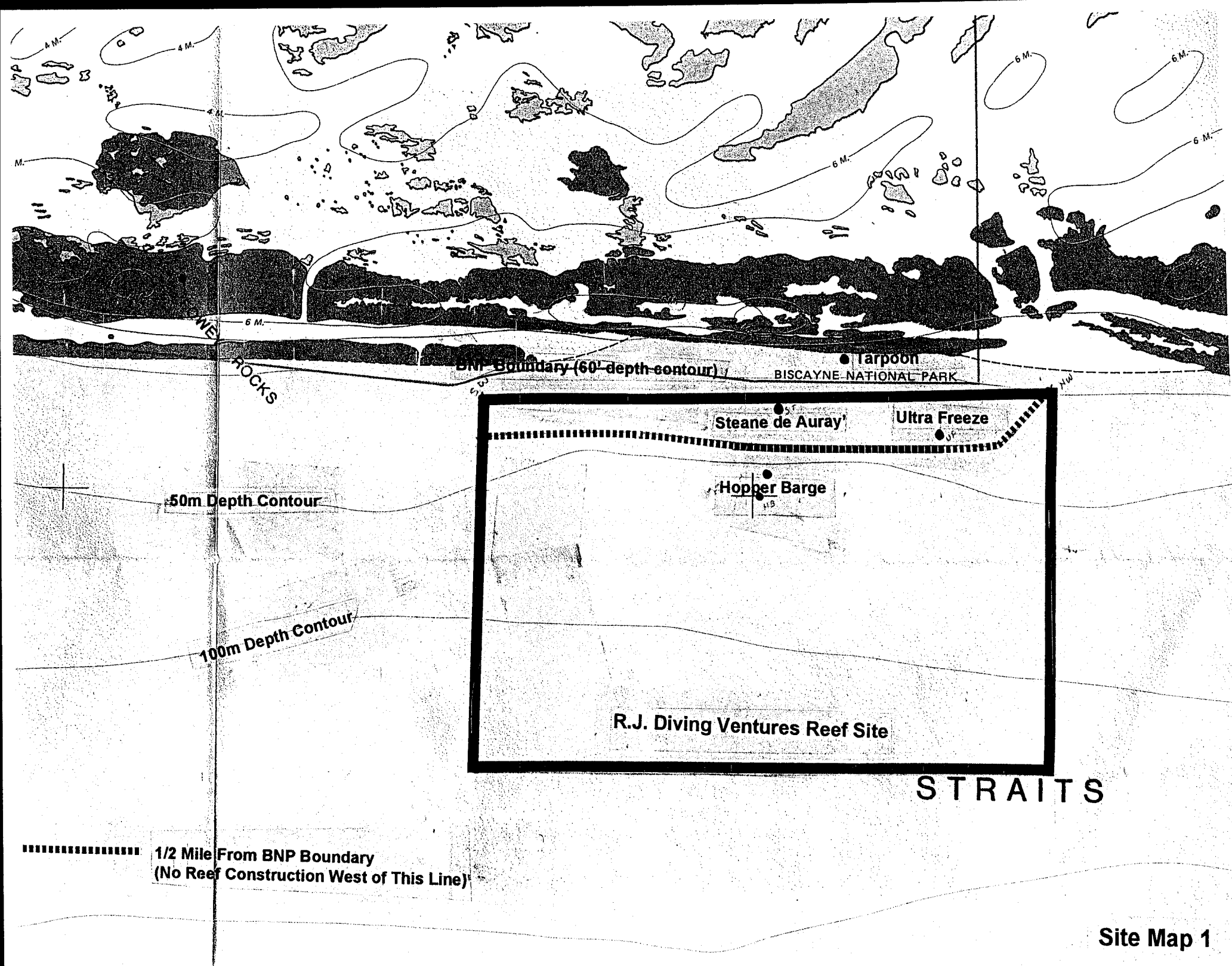
2) DERM, BNP, and the FKMS would cooperatively work to identify policy and management goals for these sites pursuant to the respective responsibilities stated in a jointly executed Memorandum of Agreement. These goals would be specific to the south Dade County reef sites, but consistent with other FKMS policy developed for artificial reefs. These agencies would work to identify existing information relevant to these issues, necessary data gaps, and potential funding sources needed to implement the necessary research needed to develop scientifically-based management objectives.

The following sections contain DERM's recommendations with regard to achieving these objectives. The recommendations presented in Section I (Recommended Criteria for Repermitting and Future Artificial Reef Construction) will apply only to the pending five-year permit for the five south Dade County artificial reef sites.

I. Recommended Criteria for Repermitting and Future Artificial Reef Construction

Based upon the comments and input received to date from BNP and interested recreational user groups, DERM recommends that the following criteria be used to guide artificial reef construction within the sites adjacent to Biscayne National Park over the five-year life of the permit being applied for by Dade County. Two overriding principals were used to develop these recommendations, and were applied without exception in developing each proposal for site repermitting :

- 1) That reasonable levels of new artificial reef construction approximating historical levels of material placement be provided for, and,
- 2) That all criteria developed for artificial reef construction address the protection of the unique physical, cultural, and biological resources of Biscayne National Park as a paramount consideration.



The recommendations below address the key issues and concerns identified by Biscayne National Park staff, DERM, and recreational user groups regarding the repermitting of the south Dade County artificial reef sites. In developing these proposals, DERM has attempted to directly incorporate input received by all parties into the recommendations. Where consensus between parties was not possible DERM has proposed compromise recommendations which may partially achieve the goals of as many parties as possible. s.

□ Applicability of Repermitting Recommendations

At initial meetings between DERM, BNP, and the public, it was requested that draft recommendations be developed for two of the five south artificial reef sites: the Fish and Game Unlimited site, and the R.J. diving Ventures site. The rationale for this would be to develop acceptable guidelines for reef construction at these sites which could then be applied at a later time to the other three sites. DERM recommends that all five (5) sites be included in the development of these guidelines in order to allow future artificial reef activities and long-term management plan development at the south Dade County sites to be addressed in a comprehensive manner.

□ Allowable Artificial Reef Materials

The State of Florida and DERM have placed an increasing emphasis on the use of materials for artificial reef construction which are durable and will provide a stable substrate for the development of complex benthic communities over time. To maintain consistency with this policy, artificial reef materials proposed for use at the south Dade County sites will be limited to the following:

- All materials utilized shall be of sufficient durability to not require replacement in the foreseeable future
- Natural limerock boulder (2-foot average diameter or larger)
- Prefabricated concrete and limestone artificial reef modules designed to simulate natural relief and structure
- Prefabricated steel structures
- Steel ships, barges, or tugs

Biscayne National Park has indicated a preference for reef construction at these sites to use natural materials such as limestone boulders and pre-fabricated artificial reef modules. The use of these materials will be prioritized whenever possible.

□ Stability of Artificial Reef During Storm Events

As stated in the original permit application, a **quantitative stability analysis** will be performed for all materials prior to placement. Based on the documented movement of some materials at the Dade County artificial reef sites during Hurricane Andrew See Attachment 2- Appendix), DERM has conducted these analyses on all reefs

Attachment 1:

**South Dade County Artificial Reef
Site Maps and Materials Listing**

Resource Maps From:

Marszalek, Donald S. (1981-1982). "Florida reef tract marine habitats and ecosystems.(map series) Published in cooperation with the Florida Department of Natural resources, U.S. Department of Interior, Bureau of Land Management; and the University of. Miami, Miami, Florida

constructed since 1992. Based largely on the routine application of this evaluation criterion in Dade County, the 1997 State Legislature modified Chapter 370 of Florida Statutes to require all local governments constructing artificial reefs to provide a stability analysis indicating that the material will remain stable during a twenty (20) year return storm event. To provide a larger margin of safety for the sites adjacent to Biscayne National Park, DERM will increase the design storm event used in the stability model from a 20 year to a 50 year return storm event. Model calculations include a minimum 20% safety factor.

- The model utilized to assess material stability will include or assess the following variables:
 - 50-year storm wave conditions based on existing Corps and NOAA databases and wave hindcasting models
 - wave-induced horizontal velocity at sea floor
 - wave-induced lateral force on artificial reef
 - wave-induced uplift force during maximum drag
 - buoyant force of artificial reef material
 - minimum dry weight of artificial reef material required
 - stability/ depth curves for proposed artificial reef material
- Based on the model results, the material will either be modified (ballasted) or moved to a sufficient water depth to maintain material stability during the design storm.

☐ Annual and Life of Permit Reef Material Quantity Limits

Limitations on the quantities of new artificial reef materials which may be on each individual site as well as in total among the five sites are proposed which would allow replenishment and enhancement of materials currently present on the south artificial reef sites while minimizing potential for unanticipated impact on natural resources.

The recommended quantity limits have been developed based upon quantity and sizes of materials placed historically on all five south sites (date of initial permit issuance to present). Areal coverage (or "footprint") was used as an index of existing and potential artificial reef construction, since volumes of material are not definitively known. Total charted area is calculated based on areas designated on NOAA nautical charts as "Obstruction Fish Haven". To account for protection of hardbottom communities which may be present in the charted area, it is assumed that only 50% of total charted area is actually available for construction. A summary of these statistics is shown in Table 3a and 3b.

Based on the total area of artificial reef materials placed at the five sites since their inception, the average annualized rate of deployment among the five sites adjacent to Biscayne National Park is 120 sq. yds./ year/ site. It is recommended that this historical rate of artificial reef construction activity among the five sites be established as a

developing long-term management principals for these sites based on the recommendations of an interagency work group consisting of representatives of DERM, BNP, and the FKNMS. This will permit the necessary time needed to identify key management concerns, collect and organize data where it exists to support or discount those concerns, develop monitoring or research plans to address any major data gaps, and to pursue additional regulatory or management restrictions at the sites as needed. This effort would be facilitated through the following specific action steps:

- 1) BNP, DERM, and the FKNMS would develop and execute a Memorandum of Understanding (draft copy attached) which would facilitate a cooperative effort to develop comprehensive, scientifically-based management objectives for artificial reef policy within the south Dade County sites and throughout the entire FKNMS.
- 2) The interagency work group shall evaluate the applicability of various types of regulatory or management "zones" used in other portions of the Sanctuary to the south Dade County reef sites. Some of the major concerns expressed by BNP and other agencies regarding artificial reefs such as increased efficiency of fishing due to aggregation could be reduced or eliminated with targeted regulatory controls such as those already in place for the federally-designated Key Biscayne Special Management Zone artificial reef site.
- 3) It is recommended that the target date for the development of a formal management plan document for these sites be set at no later than four years from the date of repermitting of the south Dade County sites. This would permit adequate time to assess the issues in a comprehensive manner, initiate the necessary research or monitoring, and synthesize results prior to the expiration of the permits for these sites.

maximum limit for future reef construction under the new permit. To approximate this historical rate of artificial reef construction under the new five year permit, reef material placement limits averaging 600 sq. yds./ site (120 sq. yds. X 5 years), or no more than 3,000 sq. yds total for all five sites, would be established for the life of the permit.

- No more than 2% of the available artificial reef area (defined as 50% of the Total Charted Area) shall EVER be utilized for the placement of artificial reef material:
Total available area = 13,869,393 sq. yd. x .02 = 277,388 sq. yd.
- No more than 1,400 sq. yd. of artificial reef material shall be placed on any one permitted artificial reef site during a given calendar year
- No more than 3,000 sq. yd. of artificial reef material shall be placed among the permitted artificial reef sites over a five year life of the permit.
- Under these criteria, the maximum area of material placement permitted over the five-year permit would represent 1.1% of the maximum area permitted for reef construction allowed under these recommendations, or 0.02% of the total available area.

□ Site-specific Material Placement Criteria- Minimum Depth/ Proximity of Resources

Site-specific minimum depth limits, and buffer zones from both the BNP boundary, and existing natural resources are proposed to balance concerns related to diving safety and protection of natural resources within the boundaries of the National Park. Those areas excluded from future reef construction due to these limitations are graphically shown on Site Maps 1 through 3 in the Appendix.

- For the **R.J. Diving Ventures** site, all ships, barges, tugs, and other high profile fixed structures (those materials greater than 15 feet in vertical height) shall be placed at least ¼ nautical mile from the contiguous 60 foot depth contour (= Park boundary) or placed in no less than 110 feet of water, whichever is the greatest distance from the Park boundary. This depth will allow materials to be placed within a safe diving depth for recreational divers while maintaining a the maximum buffer possible from the BNP boundary. The vertical profile of all new reef materials shall not exceed the 80' depth contour. A minimum buffer of 200' shall be maintained from any natural resources within the permitted reef site.
- For the **Fish & Game Unlimited, and the three Dade Sportfishing Council sites**, all ships, barges, tugs, and other high profile fixed material (greater than 15 feet in vertical height) shall be placed at ½ nautical mile from the 60 foot contiguous depth contour (= Park boundary) or placed in no less than 150 feet of water, whichever is the greatest distance from the Park boundary. The vertical profile of all new reef materials shall not exceed the 100' depth contour. A minimum buffer of 200' shall be maintained between reef material and any natural resources within the permitted site.

consideration will be the proposed depth limitations for these sites, , which will restrict the placement of materials to no less than 110' at the R.J. Diving Ventures site, and no less than 150' at the remaining four sites. As with natural reef systems off of Dade County, which notably decline in abundance and quality below approximately 130', the development of artificial reef sites specifically for habitat benefits will be limited since the light penetration at these depths is well below the optimum needed to facilitate highly productive epibenthic communities. As a result the principal management objective for these sites will necessarily emphasize diverting user pressure from adjacent natural resources and providing enhanced recreational destinations to the public.

Another factor which complicates the management planning of these sites with regard to future artificial reef construction are the uncertainties associated with the availability of suitable reef materials and/ or funding for their deployment. Unlike the planning process often used in developing management objectives and specific goal for natural areas, the driving force often behind artificial reef construction, particularly those intended primarily as recreational destinations, is the availability of materials and the funding source. Because of this, it is impossible to predict the number, types, and probable locations for future artificial reefs anywhere in Dade County. As a result DERM, would propose that the management objectives developed for these sites be approached in the following way:

- 1) That no attempt be made to be made to specifically define reef construction at individual sites. Rather DERM would propose a "regional" management plan for all five sites, which would use guidelines and limitations such as those recommended in Section I to guide future reef construction.
- 2) That the management planning and future management objectives for these sites evolve and be updated in as permits expire. 3) That DERM, BNP, and the Florida Keys Marine Sanctuary coordinate their efforts as it relates to developing artificial reef policy so as to insure that all perspectives and expertise in this area are included, and to insure consistency among the different management agencies. This would include a cooperative effort among the agencies to assist in the identification and remediation of data gaps regarding the potential positive or negative effects of artificial reefs.
- 4) Future permit applications and permit renewals for these sites shall be subject to the establishment of a management plan that is based on site-specific, scientifically-based information and data supporting the management objectives outlined above.

Identifying a Management Plan Framework for the Sites Adjacent to BNP

As was discussed previously, DERM recommends that the repermitting of the five south Dade County artificial reef sites proceed immediately based on the agreed upon reef construction limitation and guidelines presented in Section I, while concurrently

□ Limitations on the Size and Number of Vessels

In addition to the limitations on the maximum amount of reef material which may be deployed within the sites as presented in Section II above, limitations on the number and size of vessels (ships, tugs, barges, etc.) to be deployed at the sites during the life of the permit was requested by Biscayne National Park. In its initial draft recommendations submitted to BNP in May 1997, DERM prepared its recommendations based on the size of vessels historically deployed among the five sites. It was determined that the median size for all vessels deployed at the south sites was 165'. Based on this median size, DERM recommended the following limitations with regard to vessels:

* Using the historical median size of 165' for vessels previously deployed at the south Dade County sites, a "small" vessel shall be defined as anything less than 165' in length, and a "large" vessel shall be defined as anything greater than the historical median of 165'.

* It is recommended that the maximum number of vessel deployments over the life of the permit shall be no more than one large vessel, or two small vessels per year among the five sites, subject to the material quantity limitation recommended above. Permissible vessel deployments not used within a given year shall not carry over to the following year.

In their comments presented to DERM by BNP in July 1997, the Park agreed that one large or two small vessels per year was acceptable, but recommended that the criterion for defining "large" versus "small" vessels be moved from the historical median of 165', to 80', and that a maximum vessel size of no more than 120' be included in the limitations. Recreational fishing interests were strongly opposed to this recommended revision of the vessel size criterion. This opposition was based on the fact that a) the emphasis on smaller vessels placed in the water depths required by other elements of the plan would make them very difficult to locate for recreational users, and increase user conflicts, b) would preclude the use of vessels as reef material that would otherwise fall within the agreed upon quantity limitations, and c) would make achieving the maximum quantity limitations in the plan impossible if only vessels were used in a given year (i.e.: the area of two 80', or one 120' vessel would be substantially below the annual material quantity limitation of 1,400 sq. yds.).

In considering previous input from all parties, DERM recommends that the large/ small vessel size criterion be established at 120', which is the approximate midpoint between DERM's original recommendation of 165' and the Park's recommendation of 80'.

DERM recommends the following limitations on vessel deployment at the south Dade County reef sites:

intended function of each artificial reef, and where applicable for the entire permitted site. The categories of management objectives identified may include one or more of the following:

- * Marine Habitat Restoration and Mitigation- this includes the use of various types of reef materials, typically natural limerock or pre-fabricated modules to mimic as closely as possible the physical structure of natural reefs. By providing a physical structure and base material comparable to natural reefs, it is possible to develop similar biological communities on these reefs over time. DERM has created reef sites both to restore the physical structure of a natural reef impacted by a dredge in north Dade County, as well as to create new "reef" area at offsite locations to mitigate for other types of impacts to hardbottom areas. These permitted sites are typically constructed exclusively with low-profile natural types of material, in water depths of less than 70' to facilitate better light penetration and associated development of light-dependent epibenthic communities on the materials. This approach has been used in both offshore areas of the County, as well as a general technique for restoring the biological productivity of dredge holes within Biscayne Bay.

- * Habitat Enhancement/ Recreational- While virtually all types of artificial reef materials develop productive biological communities over time, various types of materials such as ships, barges, and other higher profile types of materials are structurally different than low-profile natural reef systems and therefore support a different community structure than low-profile materials, particularly when placed in deeper water depths. These reefs often support higher densities of fish populations than natural reefs, and are therefore often popular as recreational destinations for fishermen and divers. While these aggregations of fish populations at high profile reef sites have been cited as a concern in that it potentially can lead to a more efficient harvest of fisheries resources, others have proposed beneficial functions for these reefs such as facilitating seasonal spawning aggregations of various reef fish species, physical refuge for juvenile reef species, and by providing beneficial structure and biological communities where they otherwise would not exist.

- * Diversion of User Pressure from Natural Reef Areas: Although this category of management objective has not been used extensively in north Dade County where the reef communities are low-profile and widespread, the use of artificial reefs can be effectively used to divert a portion of the intense fishing and diving pressure experienced by many natural reef sites. In north Dade County, most two-tank dive charters will include one tank on a natural reef and one on a selected artificial reef. In areas with heavily used natural dive destinations such as those located south of Key Biscayne and throughout the Florida Keys, a similar diversion of recreational pressure to the artificial reefs could assist in the preservation of unique or particularly sensitive marine resources.

The development of specific management objectives for the artificial reef sites adjacent to BNP must, at least for the duration of the pending permit, include the consideration of the restrictions recommended in section I for the repermitting of these sites. The major

* No more than one vessel in excess of 120', but not to exceed 300' in length, or two vessels less than 120' may be deployed among the five permitted sites in any year. If the annual allowance for vessel deployment is not used in any given year, it will not accrue or carry over to the following year. All vessels shall be deployed in strict accordance with other elements of the plan regarding depth, location and stability.

□ Material Preparation and Deployment

Material preparation and deployment will be in accordance with previously established guidelines intended to limit introduction of contaminants and prevent mechanical impacts to valuable natural resources. Language from the original permit application has been clarified by additional underlined language.

- All reef materials will be prepared according to the requirements established by the Seventh District of the United States Coast Guard, Miami, Florida, and the United States Army Corps of Engineers and inspected prior to deployment by said Federal agencies to certify that they (reef materials) are clean and free of asphalt, creosote, petroleum, other hydrocarbons, toxic residues, and/or loose, free-floating material or other deleterious substances. Materials will also be inspected by DERM pollution control personnel.
- Prior to deployment on a permitted artificial reef site, a biological survey of the bottom will be performed by a DERM biologist to insure that the bottom is clear of pre-existing natural habitat. This survey will also include the examination of the area within a 200-foot radius of the site selected for material placement. Upon completion of the biological survey, DERM personnel shall establish a temporary marker buoy at the center of the inspected site.
- Reef materials will be transported by tug and/or barge to the buoyed location and held at that location by anchor, dynamic positioning by tug(s), and/or tug(s) in combination with anchors. Only at such time as a stable position has been established at the DERM buoyed location will artificial reef materials be deployed. All artificial reef materials shall remain clear of live bottom (as specified in the 1995 USACE SAJ-50 general artificial reef permit), and a minimum horizontal distance of 200 feet from any hard bottom features.

□ Artificial Reef Deployment Protocol

Each proposed deployment of artificial reef material at any of the south Dade County sites will include the following coordination between DERM, Biscayne National Park, and the Florida Keys Marine Sanctuary:

* DERM will notify BNP, the FKMS, and the Corps in writing when any material identified for placement at any of the south Dade County sites has been made. The notification will include the size and type of material, the proposed site for deployment, and an estimated deployment date.

* DERM, in cooperation with BNP, the FKMS, and recreational user groups will identify a specific site, and specific location within that site for deployment. DERM will then conduct the required resource assessments and stability analyses for the proposed project. DERM will provide written copies of these documents, the proposed deployment methodology, and copies of the U.S. Coast Guard material inspection form to the agencies for review prior to deployment. DERM will provide BNP and the FKMS notification when clean-up activities and Coast Guard inspections have been completed to allow for a pre-deployment inspection by their staff if desired.

* DERM will schedule a pre-deployment meeting with all interested agency personnel, the contractor, and project sponsor immediately prior to the scheduled placement of new reef materials to review conditions and allow for material inspections.

□ Post-deployment Responsibilities

Dade County proposes to cooperate with federal agencies to implement additional **post deployment responsibilities** to address long term management concerns.

- Pending the availability of emergency funding, Dade County shall relocate any artificial reef materials which have moved by storm events outside of the boundaries of the permitted artificial reef site, within a 12-month period after the documented movement of said materials.
- Dade County will provide the agencies with an annual report for all activities undertaken among the five artificial reef sites adjacent to Biscayne National Park. These reports will include updates of site maps including the locations of existing and new artificial reef materials, natural resources, and other features of relevance. The report will also summarize other work related to the artificial reef program, including management activities being pursued as outlined in Section II (Interagency Artificial Reef Management Initiatives) below.

II. Interagency Artificial Reef Management Initiatives

This section is intended to address early concerns expressed by BNP regarding the establishment of clearly defined management objectives for the south Dade County artificial reef sites. As part of an effort to better define the future uses of artificial reefs as effective tools for both resource management and to provide recreational opportunities to the public, DERM has already initiated several management planning efforts for all the sites presently permitted to the County. This planning process will focus on both sites and individual artificial reefs with the intent of pre-defining, where possible, the