

APPENDIX A

Regulatory Impact Review and
Final Regulatory Flexibility Act Analysis

For

Final Endangered Species Act 4(d) Regulations
for Threatened Elkhorn and Staghorn Corals

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EXECUTIVE SUMMARY

The following regulatory impact review and final regulatory flexibility analysis evaluate a proposed action pursuant to section 4(d) of the Endangered Species Act (ESA) that will extend all of the ESA section 9(a)(1) prohibitions to threatened elkhorn (*Acropora palmata*) and staghorn (*A. cervicornis*) corals, with exceptions for:

- Export and take resulting from scientific research and enhancement activities conducted under six specific existing Federal, state, or territorial research permitting programs. Several Federal, state, and territorial natural resource management agencies permit scientific research and enhancement activities, including monitoring and other studies that are directed at, and occur within the geographic areas occupied by, the listed corals. Any export or take resulting from scientific research permitted by these agencies would be excepted by NMFS in the final 4(d) rule from the ESA section 9(a)(1)(A), (B), and (C) prohibitions; and
- Take resulting from certain restoration activities carried out by an authorized (under current laws) Federal, state, territorial or local natural resource agency. Certain Federal, state, territorial, and local government agency personnel, or their designees as applicable, may take elkhorn or staghorn corals without a permit when they are performing specific restoration actions directed at listed corals under an existing legal authority that provides for such restoration. For purposes of this exception, we consider a “restoration activity” to be the methods and processes used to provide aid to injured individuals. The activity that caused the injury would not be excepted by this rule. Through this exception, we are not authorizing any activities which are not currently authorized under an existing statute, rather we are excepting these activities from the section 9(a)(1)(B) and (C) prohibitions for the two listed corals.

The purpose of this final rule is to apply section 9 protections of the ESA to threatened elkhorn and staghorn corals. NMFS has determined this final rule is necessary and advisable to provide for the conservation of these corals. The main impacts of this rule on regulated entities are a requirement to cease activities that may result in take of the species. While take is already prohibited under a patchwork of existing federal, state or local laws or rules, NMFS may now require regulated entities needing federal permits or licenses for proposed projects that will result in take of the corals to implement minor changes to their projects to minimize the impacts of the take. Although we cannot quantify the exact present value of the economic impacts of the final rule, we do not anticipate this final rule will constitute a “significant regulatory action” under Executive Order 12866. It will not have an annual economic impact of \$100 million or more, nor are there expected to be any significant adverse effects on prices, employment, or competition. Measures in this action do not adversely affect the environment, public health or safety, or State, Territorial, Local or Tribal governments or communities, nor do they interfere or create inconsistency with any action of another agency. No effects on the budgetary impact of entitlements, grants, user fees, or loan programs or the rights and obligations of recipients thereof have been identified. The actions in the final rule represent normal management options or practices that mirror or compliment existing federal, state, and local laws; and therefore, do not raise novel legal or policy issues.

There is insufficient quantitative information to certify that this rule will not have a significant adverse economic impact on a substantial number of small entities. The primary impact of the rule on non-federal entities will be a requirement to implement modifications to projects to minimize adverse effects to corals, through the ESA section 7 consultation process; by law, such modifications must result in only minor changes to a proposed project. In addition, the entities that may be affected by these requirements are not solely small entities, nor is there any evidence that small entities would be disproportionately affected by the rule’s requirements. A final regulatory flexibility analysis was conducted and comments are requested to improve the analysis.

ACRONYMS

APA	Administrative Procedure Act
APPS	Act to Prevent Pollution from Ships
ATON	Aids to Navigation
CITES	Convention on International Trade in Endangered Species of Wild Fauna and Flora
CMP	Coastal Management Program
CSIP	Coral Stress Index Protocol
DNER	Puerto Rico Department of Natural and Environmental Resources
DoD	Department of Defense
DOI	Department of Interior
DPNR	Virgin Islands Department of Planning and Natural Resources
DPV	Dynamically Positioned Vessels
EEZ	Exclusive Economic Zone
EFH	Essential Fish Habitat
EPA	U.S. Environmental Protection Agency
ERP	Environmental Resource Permit
ESA	Endangered Species Act
FAA	Federal Aviation Administration
FAAS	Florida Agricultural Statistics Service
FDEP	Florida Department of Environmental Protection
FERC	Federal Energy Regulatory Commission
FKNMS	Florida Keys National Marine Sanctuary
FHA	Federal Highways Administration
FMP	Fishery Management Plan
FRFA	Final Regulatory Flexibility Analysis
FWC	Florida Fish & Wildlife Conservation Commission
GPS	Global Positioning System
HCP	Habitat Conservation Plan
HDD	Horizontal Directional Drilling
ITP	Incidental Take Permit
ITS	Incidental Take Statement
MMPRCA	Marine Plastic Pollution Research and Control Act
MOU	Memorandum of Understanding

NASS	National Agricultural Statistics Service
NEPA	National Environmental Policy Act
NMFS	National Marine Fisheries Service
NPDES	National Pollution Discharge Elimination System
NOAA	National Oceanic and Atmospheric Administration
NOS	National Ocean Service
NRC	National Regulatory Commission
PSSA	Particularly Sensitive Sea Area
RFA	Regulatory Flexibility Act
RIR	Regulatory Impact Review
RNA	Research Natural Area
RMP	Resource Management Plan
RPA	Reasonable and Prudent Alternatives
RPM	Reasonable and Prudent Measures
SCUBA	Self-Contained Underwater Breathing Apparatus
TER	Tortugas Ecological Reserve
TMDL	Total Maximum Daily Load
USACE	U.S. Army Corps of Engineers
USCG	U.S. Coast Guard
USDA	U.S. Department of Agriculture
USDOT	U.S. Department of Transportation
USGS	U.S. Geological Survey
U.S.V.I.	U.S. Virgin Islands

1.0 REGULATORY IMPACT REVIEW

1.1 Introduction

The National Marine Fisheries Service (NMFS) requires a Regulatory Impact Review (RIR) for regulatory actions as required by E.O. 12866. The RIR does three things: (1) it provides a review of the problems and policy objectives prompting the regulatory proposals and an evaluation of the major alternatives that could be used to solve the problem; (2) it provides a comprehensive review of the level and incidence of impacts associated with a regulatory action; and (3) it ensures that NMFS systematically and comprehensively considers all appropriate alternatives so that the public welfare can be enhanced in the most efficient and cost effective way, consistent with applicable law.

The RIR also serves as the basis for determining whether any proposed regulations are a “significant regulatory action” under criteria specified in Executive Order 12866 (E.O. 12866).

1.2 Problems and Objectives

The purpose and need, issues, problems, and objectives of the final ESA 4(d) regulations for threatened corals are discussed in the introductory section of the Environmental Assessment for the final ESA 4(d) rule and are incorporated herein by reference. In summary, the purpose of the final 4(d) rule is to apply ESA section 9(a)(1) prohibitions that are necessary and advisable for conservation of threatened elkhorn (*Acropora palmata*) and staghorn (*A. cervicornis*) corals. The rule is expected to result in a net reduction of the intensity and threats contributing to the decline of these two corals.

1.3 Methodology and Framework for Analysis

This analysis describes the economic activities that would be affected by the promulgation of ESA section 9 prohibitions, with exceptions, to conserve elkhorn and staghorn corals. Some private activities may be affected if they result in a prohibited action. Additionally, extension of the take prohibitions will allow NMFS to include minor project modifications in ESA section 7 biological opinions for federal actions that result in take of the corals. Historical ESA section 7 consultations that involved projects planned in areas where listed corals occur were used to predict future projects with a Federal nexus. The economies and existing regulatory framework are described. Then the impacts of the effects of the final rule are analyzed.

1.4 Description of Affected Economies

1.4.1 Introduction

Elkhorn coral and staghorn coral are found on shallow tropical reefs throughout the Caribbean, including the southwestern Gulf of Mexico, Caribbean coasts of Central and South America, the Bahamian archipelago, and the Greater and Lesser Antilles. In the United States, both species are found in shallow inshore waters of Florida, Puerto Rico, and the U.S. Virgin Islands (U.S.V.I.). See Figure 1 of Environmental Assessment for this rule.

Elkhorn and staghorn corals are major reef-building corals in southeastern Florida and the Caribbean. In addition to the important functions of reef building provided by these corals, these species serve as fish habitat, including essential fish habitat, for species of economic and ecologic importance. Loss of acroporids from these geographic regions may have substantial impacts on many coral reef species and by extension on the composition of reef communities. Both species are currently protected directly and

indirectly by a number of Federal and State statutes and regulations and international treaties and practices that affect economic activities.

1.4.2 Economic Baseline

The impacts of regulations must be evaluated in terms of the benefits and costs of the action measured against a relevant baseline. The baseline is the best assessment of the way the world looks and will look in the absence of the regulation. For this final 4(d) rule, we have characterized the baseline using three sets of information: 1) the relevant regional economies; 2) existing laws and regulations that limit activities and protect corals; and 3) activities that may be affected by the final rule.

1.4.2.1 Relevant Regional Economies

This subsection summarizes key economic information for the areas in which activities may be affected by implementation of the final 4(d) regulation. Understanding the current types and levels of economic activity provides context for evaluating the importance of impacts resulting from the proposed action.

Florida

Florida (State) waters extend 9 nautical miles (10.36 statute miles) off the State's Gulf coast and 3 nautical miles (3.45 statute miles) off its Atlantic coast. Elkhorn and staghorn corals occur in shallow inshore waters off of four Florida Counties: Palm Beach County, Broward County, Miami-Dade County, and Monroe County.

Palm Beach County

Palm Beach County is the northern most county of Florida where elkhorn and staghorn corals are found. It is the largest county in the state by size with a total area of 6,181 km² (2,386 square miles), with 5,113 km² being land and the remaining 1,068 km² (about 17.3 percent) being water, much of which is in the Atlantic Ocean and Lake Okeechobee (U.S. Census Bureau). It has 47 miles of coastline (Figure 2-2).

The U.S. Census Bureau estimates the population of Palm Beach County grew over 12 percent from 2000 to 2005, with approximately 1.27 million people in 2005. The County's population growth has been dominated by in-migration from other parts of the country. From April 1, 2000, to July 1, 2006, it is estimated that there was a natural increase in the population of 6,431 (91,093 births less 88,806 deaths) and net migration of 139,754 (50,948 from net international migration plus 88,806 from net internal migration). Much of the population growth is attributable to the County being a popular destination for retirees. About 21 percent of the County's population was 65 years and over in 2005, as compared to that age group representing about 12 percent of the U.S. population and approximately 17 percent of Florida's population that year.

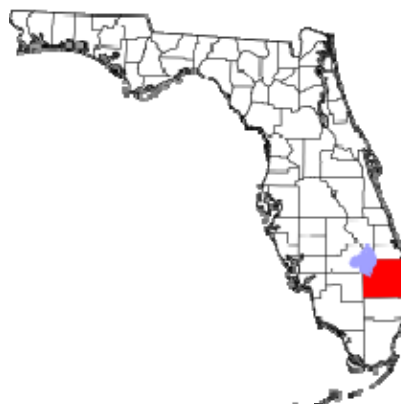


Figure 1. Palm Beach County. *Image Source:* Wikipedia.

Accompanying the increase in population has been an increase in employment. From 2000 to 2004, there was an increase of 77,553 full- and part-time jobs (U.S. Bureau of Economic Analysis). The increases in population and employment have generated increases in demand for homes, commercial and institutional buildings, and infrastructure. Median household income in the county in 2004 was \$44,186 and 10.1 percent lived below poverty, as compared to the statewide median household income of \$40,900 and poverty rate of 11.9 percent.

Table 1 below shows that in Palm Beach County, the major industrial sectors (when sorted by number of employees, then by non-employer firm receipts) are:

- (1) Retail Trade;
- (2) Health Care & Social Assistance;
- (3) Accommodation & Food Services;¹
- (4) Administrative, Support, Waste Management, & Remediation Service;² and
- (5) Construction.

The industrial sectors of “Retail Trade” and “Accommodation & Food Services” are principle components of tourism. According to the September 2005 City Tourism Impact Report for Palm Beach County, a total of 7.22 million travelers visited Palm Beach County in 2004, which supported \$1.51 billion in wages and 7 percent of the jobs, and generated an economic impact of \$2.86 billion.

According to Johns et al. (2003), residents and visitors spent 4.24 million person-days visiting artificial and natural reefs in Palm Beach County during the 12-month period from June 2000 to May 2001. The same study found that, over the same time period, reef-related expenditures generated \$505 million in sales, \$194 million in income, and created 6,300 jobs in the County. When asked what they were willing to pay to maintain the natural reefs in Palm Beach County in their existing condition, natural reef users said they were willing to pay \$42 million annually (Johns et al., 2003). Furthermore, recreational fishers, divers, and snorkelers who use the reefs in the County are willing to pay \$31 million annually to maintain the reefs in their existing condition (ibid).

¹ The Accommodation and Food Services sector comprises establishments providing customers with lodging and/or preparing meals, snacks, and beverages for immediate consumption. Excluded from this sector are civic and social organizations; amusement and recreation parks; theaters; and other recreation or entertainment facilities providing food and beverage services.

² The Administrative and Support and Waste Management and Remediation Services sector comprises establishments performing routine support activities for the day-to-day operations of other organizations. Activities performed include: office administration, hiring and placing of personnel, document preparation and similar clerical services, solicitation, collection, security and surveillance services, cleaning, and waste disposal services.

Table 1. 2005 County Business Patterns for Palm Beach County and Non-Employer Statistics (U.S. Census Bureau)

NAICS Code ^a	Industry Code Description	Non-Employer Firms ^b	Non-Employer Receipts (\$1,000) ^c	Employer Establishments ^d	Number of Employees	Annual Payroll (\$1,000) ^e
11	Agriculture, Forestry, Fishing and Hunting	636	27,851	78	1,398	20,666
21	Mining	18	1,971	24	234	12,828
22	Utilities	48	1,813	30	3,969	412,927
23	Construction	10,593	688,604	4,266	37,576	1,544,242
31	Manufacturing	1,221	74,104	975	15,769	753,088
42	Wholesale trade	2,793	251,624	2,436	19,902	1,052,622
44	Retail trade	7,849	453,732	5,458	73,486	1,831,500
48	Transportation & Warehousing	4,172	215,349	773	8,935	326,350
51	Information	1,577	83,540	738	15,530	770,340
52	Finance & insurance	7,523	603,238	3,175	25,748	1,934,633
53	Real estate & rental & leasing	21,153	1,774,645	2,766	14,731	636,205
54	Professional, Scientific & Technical Services	17,586	946,661	6,746	36,406	2,206,725
55	Management of Companies & Enterprises	0	0	217	16,799	1,268,578
56	Admin, support, waste mgt, remediation services	9,542	291,528	3,000	43,417	1,316,027
61	Educational services	2,106	43,080	469	9,864	301,140
62	Health care & social assistance	9,958	367,559	4,511	65,692	2,630,989
71	Arts, entertainment & recreation	4,906	189,810	796	16,627	453,617
72	Accommodation & food services	1,462	121,315	2,478	54,686	853,655
81	Other services (except public adm.)	16,293	554,540	3,625	23,587	564,578
99	Unclassified establishments	0	0	87	115	2,561
TOTAL		119,436	6,690,964	42,648	484,471	18,893,271

^a The U.S., Canada, and Mexico developed North American Industry Classification System (NAICS) is the new industry classification system, which replaces the U.S. Standard Industrial Classification (SIC) system to provide comparable statistics across the three countries.

^b A "non-employer firm" is defined as one that has no paid employees, has annual business receipts of \$1,000 or more (\$1 or more in the construction industries), and is subject to federal income taxes. Most non-employers are self-employed individuals operating very small unincorporated businesses, which may or may not be the owner's principal source of income.

^c "Receipts" (net of taxes) are defined as the revenue for goods produced, distributed, or services provided, including revenue earned from premiums, commissions and fees, rents, interest, dividends, and royalties. Receipts exclude all revenue collected for local, state, and federal taxes.

^d "Employer establishments" consist of full and part-time employees, including salaried officers and executives of corporations, who were on the payroll in the pay period including March 12. Included are employees on sick leave, holidays, and vacations; not included are proprietors and partners of unincorporated businesses.

^e "Total annual payroll" includes all forms of compensation, such as salaries, wages, commissions, bonuses, vacation allowances, sick-leave pay, and the value of payments in-kind (e.g., free meals and lodgings) paid during the year to all employees.

Additionally, 1.76 million person-days were devoted to recreational fishing on reefs in the County from June 2000 to May 2001 (Johns et al. 2003). Coral reefs are important habitat for species targeted by commercial and recreational fishermen, and fishing is a notable industry sector contributing to tourism and to the economy of Palm Beach County. Within the "Transportation & Warehousing" industry sector,

30 business establishments in the “Charter Fishing & Party Fishing Boat” industry subsector (NAICS Code 4872102) in the County reported annual revenues totaling approximately \$6.2 million (2002 Economic Census, Transportation and Warehousing Subject Series). In 2005, commercial fishermen in Palm Beach County landed a total of 115,813 pounds of shallow water reef fish with a dockside value of \$228,584. See Table 2.

Table 2. 2005 Commercial Landings of Shallow Water Reef Fish, Palm Beach County. Source: NMFS Southeast Regional Office Logbook Data

Group/Species	Pounds	Dollars (\$)
Groupers:	19,331	58,162
Snowy grouper	6,403	18,579
Yellowedge grouper	117	343
Red grouper	960	2,498
Black grouper	996	3,030
Gag grouper	10,493	32,903
Other grouper	362	809
Hinds:	37	89
Rock hind	8	20
Red hind	29	69
Hogfish	671	1,851
Jacks:	38,734	35,077
Almaco jack	992	877
Greater amberjack	37,742	34,200
Sand perch	68	216
Banded rudderfish	7,786	4,708
Scamp	122	371
Snappers:	45,016	124,839
Dog snapper	108	258
Cubera snapper	286	377
Lane snapper	2,863	7,183
Mangrove snapper	3,899	9,147
Mutton snapper	9,545	25,435
Red snapper	105	293
Vermillion snapper	5,003	16,054
Yellowtail snapper	22,694	65,120
Mahogany snapper	2	5
Unclassified snappers	511	967
Triggerfish	4,048	3,271
Total	115,813	228,584

Table 1 also shows that in 2005 there were 4,266 employer establishments in the industry sector of “Construction” with 37,576 employees and an annual payroll totaling approximately \$1.54 billion (2005 County Business Patterns, U.S. Census Bureau). That same year, there were an estimated 10,593 non-employer firms in construction with total receipts of about \$689 million in the county. Employer establishments and non-employer firms involved in “Construction” represent 8.9 percent and 10 percent, respectively, of the total number of employer establishments and non-employer firms operating in Palm Beach County.

Table 3 shows the composition, by industry subsector, of the construction industry sector (i.e., how many establishments and firms are involved in each different type of construction).

Table 3. Composition, by industry subsector, of the construction industry sector (2005 County Business Patterns, U.S. Census Bureau).

NAICS Code	Industry Code Description	Non-Employer Firms	Non-Employer Receipts (\$1,000)	Employer Establishments	Number of Employees
23	Construction	10,593	688,604	4,266	37,576
236	Construction of buildings ^a	1,607	182,311	1,151	9,912
2361	Residential Construction	1,328	152,626	985	7,512
2362	Nonresidential Construction	279	29,685	166	2,400
237	Heavy & Civil Engineering Construction ^b	204	18,943	265	5,161
2371	Utility System Construction	25	1,857	88	2,543
2372	Land Subdivision	64	9,146	97	641
2373	Highway, Street, & Bridge Construction	32	1,227	45	1,715
2379	Other Heavy & Civil Engineering Construction	83	6,713	35	262
238	Specialty Trade Contractors ^c	8,782	487,350	2,850	22,503

^a Subsector 236, "Construction of Buildings," comprises establishments of the general contractor type and operative builders involved in the construction of buildings.

^b Subsector 237, "Heavy and Civil Engineering Construction," comprises establishments involved in the construction of engineering projects (e.g., highways and dams). Construction projects involving water resources (e.g., dredging and land drainage) and projects involving open space improvement (e.g., parks and trails) are included in this subsector. Specialty trade activities are classified in this subsector if the skills and equipment present are specific to heavy or civil engineering construction projects.

^c Subsector 238, "Specialty Trade Contractors," comprises establishments engaged in specialty trade activities generally needed in the construction of all types of buildings.

Of the businesses in the construction industry sector, the majority of employer establishments (67 percent) and non-employer firms (83 percent) are "Specialty Trade Contractors". The remainder of employer establishments and non-employer firms in the construction industry sector are involved in the industry subsectors of "Construction of Buildings" and "Heavy & Civil Engineering Construction," with "Construction of Buildings" being the second largest construction industry subsector. Last, 35 employer establishments and 83 non-employer firms are involved in the industry subsector of "Other Heavy & Civil Engineering Construction" (NAICS Code 2379). This subsector includes marine construction projects such as breakwater, dock, pier, jetty, seawall and harbor construction, and dredging. These establishments and firms represent approximately 0.82 percent and 0.78 percent, respectively, of establishments and firms operating within the construction industry sector as a whole.

Broward County

Broward County has a total area of 3,418 km² (1,320 square miles), with 3,122 km² being land and the remaining 296 km² (about 9 percent) being water (U.S. Census Bureau). Approximately 64 percent of the country's total area lies within the Everglades conservation area, and development is restricted to 410 square miles (Broward County Planning Services Division; Figure 2-3).



Figure 2. Broward County. Image Source: Wikipedia

Broward County is the second most populated county in Florida and is the 15th most populous county in the nation. According to U.S. Census Bureau estimates, the population of Broward County grew 10.1 percent from April 1, 2000, to July 1, 2006, with approximately 1.79 million people in 2006. During that same period, the natural increase in population was 43,623 (142,787 births less 99,164 deaths) and net migration was 120,768 (100,986 net international migration plus 19,782 net internal migration), for a total increase of 164,391 people. The increase in population has resulted in increased demand for homes, retail and commercial buildings and infrastructure. Housing units increased from 741,043 in 2000 to 790,308 in 2005, an increase of less than 7 percent (U.S. Census). Median household income in the county in 2004 was \$43,136 and 11.6 percent of the persons in the county lived below poverty, as compared to the statewide median household income of \$40,900 and the poverty rate of 11.9 percent.

In Broward County, the major industrial sectors (when sorted by number of employees, then by non-employer firm receipts, see Table 4) are:

- (1) Retail Trade;
- (2) Health Care & Social Assistance;
- (3) Accommodation & Food Services;
- (4) Administrative, Support, Waste Management, & Remediation Services; and
- (5) Construction.

The “Retail Trade” and “Accommodation & Food Services” industrial sectors are principle components of tourism and the contribution of tourism to Broward County’s economy is significant. In 2005, the County hosted a record of over 10 million visitors, a 6.3 percent increase from 2004. Tourism generates more than \$8.4 billion annually and employs more than 112,000 people in the County. In 2005, 22 million passengers transited through Fort Lauderdale-Hollywood International Airport, a number that broke the previous year’s record of travelers passing through the facility (Broward County Department of Urban Planning and Redevelopment, 2006).

Port Everglades infuses more than \$2.4 billion annually to the county’s economy (Broward County Department of Urban Planning and Redevelopment, 2006). It handles about 4 million cruise ship passengers and over 26 million tons of cargo annually, and nearly 6,400 cargo and cruise ships call at the port each year (ibid). According to the Broward County Department of Urban Planning and Redevelopment (2006), Port Everglades has been ranked as one of the five fastest growing container ports among the nation’s 20 largest seaports. It handles more than 22.1 percent of Florida’s waterborne imports and exports.

Table 4. 2005 County Business Patterns for Broward County and Non-Employer Statistics (U.S. Census Bureau).

NAICS Code	Industry Code Description	Non-Employer Firms	Non-Employer Receipts (\$1,000)	Employer Establishments	Number of Employees	Annual Payroll (\$1,000)
11	Agriculture, Forestry, Fishing and Hunting	467	20,022	50	100 - 249	*
21	Mining	18	2,536	9	133	11,972
22	Utilities	87	4,369	26	500 - 999	*
23	Construction	15,482	824,796	4,729	45,489	1,915,366
31	Manufacturing	1,791	118,443	1,679	29,655	1,160,990
42	Wholesale trade	4,383	439,736	4,710	41,514	1,976,541
44	Retail trade	11,293	579,188	7,374	102,197	2,625,584
48	Transportation & warehousing	7,821	382,114	1,346	21,480	811,196
51	Information	2,504	106,506	1,117	19,503	1,123,875
52	Finance & insurance	7,825	487,869	3,969	40,480	2,335,984
53	Real estate & rental & leasing	25,240	1,843,848	3,670	18,422	704,456
54	Professional, scientific & technical services	22,385	1,035,758	9,187	41,852	2,212,225
55	Management of companies & enterprises	0	0	273	10,999	983,114
56	Admin, support, waste mgt, remediation services	14,601	386,155	3,869	65,367	1,833,766
61	Education services	2,782	55,593	603	15,046	450,758
62	Health care & social assistance	17,572	544,595	5,496	84,111	3,212,404
71	Arts, entertainment & recreation	6,714	222,151	960	9,728	316,824
72	Accommodation & food services	2,312	155,492	3,568	68,512	1,016,954
81	Other services (except public adm.)	27,791	808,376	4,847	30,422	753,542
99	Unclassified establishments	0	0	140	176	4,134
TOTAL		171,068	8,017,547	57,622	646,067	23,509,177

* Zero in 2005 County Business Patterns

According to Johns et al. (2003), residents and visitors spent 9.44 million person-days visiting artificial and natural reefs in Broward County during the 12-month period from June 2000 to May 2001. The same study found that reef-related expenditures generated about \$2.1 billion in sales, over \$1 billion in income, and created 36,000 jobs in the county over the same time period. When asked what they were willing to pay to maintain the natural reefs in Broward County in their existing condition, natural reef users said they were willing to pay \$83.6 million annually (Johns et al., 2003). Furthermore, recreational fishers, divers, and snorkelers who use the reefs in the county are willing to pay \$126 million annually to maintain the reefs in their existing condition (ibid).

Coral reefs are important habitat for species targeted by commercial and recreational fishermen, and fishing is a notable industry sector contributing to tourism and to the economy of Broward County. In 2002, within the “Transportation & Warehousing” industry sector, there were 26 business establishments in the “Charter Fishing & Party Fishing Boat” industry subsector (NAICS Code 4872102) in the County

(2002 Economic Census, Transportation and Warehousing Subject Series).³ In 2005, commercial fishermen in Broward County landed a total of 14,830 pounds of shallow water reef fish with a dockside value of \$35,370. See Table 5.

Table 5. 2005 Commercial Landings of Shallow Water Reef Fish in Broward County. Source: NMFS SERO Logbook Data.

Group/Species	Pounds	Dollars (\$)
Hinds:	29	54
Rock hind	27	48
Red hind	2	6
Groupers:	4,884	12,944
Snowy grouper	318	883
Red grouper	443	1,105
Black grouper	1,522	4,101
Gag grouper	2,534	6,670
Yellowfin grouper	67	185
Hogfish	556	1,435
Jacks:	937	648
Almaco jack	101	86
Greater amberjack	836	562
sand perch	11	15
Snappers:	7,366	19,156
Lane snapper	183	371
Mangrove snapper	302	742
Mutton snapper	1,177	3,068
Vermilion snapper	356	843
Yellowtail snapper	5,306	14,025
Unclassified snappers	42	107
Triggerfish	1,047	1,118
Total	14,830	35,370

Table 4 also shows that there were an estimated 4,729 employer establishments in the industry sector of “Construction” with 45,489 employees and an annual payroll totaling approximately \$1.92 billion in 2005 (2005 County Business Patterns, U.S. Census Bureau). That same year, there were an estimated 15,482 non-employer firms in construction with total receipts of about \$825 million in the county. Employer establishments and non-employer firms involved in “Construction” represent 8.2 percent and 9.1 percent, respectively, of the total number of employer establishments and non-employer firms operating in Broward County.

Table 6 shows the composition, by industry subsector, of the construction industry sector (i.e., how many establishments and firms are involved in each different type of construction).

³ Annual revenues for this industry subsector are withheld to avoid disclosing data of individual companies in Broward County.

Table 6. Composition, by industry subsector, of the construction industry sector in Broward County (2005 County Business Patterns, U.S. Census Bureau).

NAICS Code	Industry Code Description	Non-Employer Firms	Non-Employer Receipts (\$1,000)	Employer Establishments	Number of Employees
23	Construction	15,482	824,796	4,729	45,489
236	Construction of buildings ^a	2,189	160,369	1,170	10,679
2361	Residential Construction	1,678	123,699	920	6,090
2362	Nonresidential Construction	511	36,670	250	4,589
237	Heavy & Civil Engineering Construction ^b	289	27,072	275	4,276
2371	Utility System Construction	47	1,922	93	1,554
2372	Land Subdivision	104	10,604	95	407
2373	Highway, Street, & Bridge Construction	31	6,112	39	1,389
2379	Other Heavy & Civil Engineering Construction	107	8,434	48	926
238	Specialty Trade Contractors ^c	13,004	637,355	3,284	30,534

^a Subsector 236, "Construction of Buildings," comprises establishments of the general contractor type and operative builders involved in the construction of buildings.

^b Subsector 237, "Heavy and Civil Engineering Construction," comprises establishments involved in the construction of engineering projects (e.g., highways and dams). Construction projects involving water resources (e.g., dredging and land drainage) and projects involving open space improvement (e.g., parks and trails) are included in this subsector. Specialty trade activities are classified in this subsector if the skills and equipment present are specific to heavy or civil engineering construction projects.

^c Subsector 238, "Specialty Trade Contractors," comprises establishments engaged in specialty trade activities generally needed in the construction of all types of buildings.

Of the businesses in the construction industry sector, the majority of employer establishments (69 percent) and non-employer firms (84 percent) are "Specialty Trade Contractors." The remainder of employer establishments and non-employer firms in the construction industry sector are involved in the industry subsectors of "Construction of Buildings" and "Heavy & Civil Engineering Construction," with "Construction of Buildings" being the second largest construction industry subsector. Last, 48 employer establishments and 107 non-employer firms are involved in the industry subsector of "Other Heavy & Civil Engineering Construction" (NAICS Code 2379). This subsector includes marine construction projects such as breakwater, dock, pier, jetty, seawall and harbor construction, and dredging. These establishments and firms represent approximately 1.02 percent and 0.69 percent, respectively, of establishments and firms operating within the construction industry sector as a whole in Broward County.

Miami-Dade County

Miami-Dade County has a total area of 6,297 km² (2,431 square miles), with 5,040 km² being land and the remaining 1,257 km² (about 20 percent) being water (U.S. Census Bureau). Most of the area of water is Biscayne Bay, and another significant portion is the adjacent waters of the Atlantic Ocean. Among its major cities are Miami, Miami Beach, Coral Gables, and Key Biscayne. See Figure 2-3.

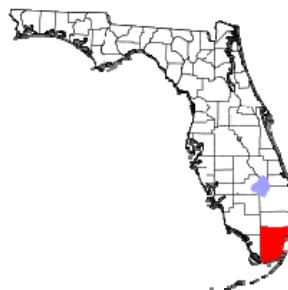


Figure 3. Miami-Dade County. Image Source: Wikipedia.

Miami-Dade County is the most populous county in Florida and the 8th most populous county in the nation. According to U.S. Census Bureau estimates, the population of the County grew 6.6 percent from April 1, 2000, to July 1, 2006, with approximately 2.4 million people in 2006. During that same period, the natural increase in population was 87,668 (204,079 births less 116,411 deaths) and net migration was 66,896 (257,492 net international migration less the 190,596 net internal out-migration). The number of housing units also increased from 852,414 in 2000 to 928,715 in 2005, an increase of about 9 percent. Median household income in 2004 was \$34,682 and 17.1 percent of the persons in the county lived below poverty, in comparison to the statewide median household income of \$40,900 and poverty rate of 11.9 percent.

In Miami-Dade County, the major industrial sectors (when sorted by number of employees, then by non-employer firm receipts (see Table 7) are:

- (1) Retail Trade;
- (2) Health Care & Social Assistance;
- (3) Accommodation & Food Services;
- (4) Administrative, Support, Waste Management, & Remediation Services; and
- (5) Wholesale Trade.

The industrial sectors of “Retail Trade” and “Accommodation & Food Services” are principle components of tourism and tourism is the largest contributor to the City of Miami’s economy. According to the Greater Miami Convention and Visitors Bureau, in 2005, Miami-Dade County hosted 11.3 million visitors who generated over \$106 million in tourist-related sales and \$691 million in state sales tax. Overnight visitors generated an economic impact of \$13.9 billion.

The Dante B. Fascell Port of Miami-Dade ranks as the busiest cruise/passenger port in the world. In 2006, over 3.7 million cruise ship passengers passed through and over 9 million tons of cargo transited through the Port of Miami. The combination of cruise and cargo activity supports about 98,000 jobs and generates an economic impact of \$12 billion. Miami International Airport (MIA) handled 32.5 million passengers in 2006 (MIA website). Among U.S. airports, MIA ranks first in international freight, third in international passengers, and fourth in total freight.

Johns et al. (2003) estimate that residents and visitors spent 9.2 million person-days visiting artificial and natural reefs in Miami-Dade County during the 12-month period from June 2000 to May 2001. The same study found that reef-related expenditures generated about \$1.3 billion in sales, \$614 million in income, and created 19,000 jobs in the county over the same time period. When asked what they were willing to pay to maintain the natural reefs in Miami-Dade County in their existing condition, natural reef users said they were willing to pay \$47 million annually (Johns et al. 2003). Furthermore, recreational fishers, divers, and snorkelers who use the reefs in the county are willing to pay \$47 million annually to maintain the reefs in their existing condition (ibid).

Table 7. 2005 County Business Patterns for Miami-Dade County (U.S. Census Bureau)

NAICS Code	Industry Code Description	Non-Employer Firms	Non-Employer Receipts (\$1,000)	Employer Establishments	Number of Employees	Annual Payroll (\$1,000)
11	Agriculture, Forestry, Fishing and Hunting	1,015	38,961	35	500 - 999	*
21	Mining	38	2,187	29	1,073	62,003
22	Utilities	274	3,944	29	2,500 - 4,999	*
23	Construction	30,690	1,165,256	4,618	38,417	1,482,470
31	Manufacturing	3,669	212,073	2,378	46,621	1,561,117
42	Wholesale trade	7,658	814,973	8,514	67,342	2,884,026
44	Retail trade	16,420	765,506	10,335	118,182	2,870,980
48	Transportation & warehousing	23,596	1,000,767	2,725	51,193	1,936,735
51	Information	3,457	152,330	1,444	21,956	1,283,285
52	Finance & insurance	9,005	561,580	4,728	47,057	2,889,919
53	Real estate & rental & leasing	33,897	2,666,341	4,950	23,462	1,055,582
54	Professional, scientific & tech. serv.	31,153	1,381,648	11,047	60,355	3,488,485
55	Management of companies & enterprises	*	*	291	17,005	1,311,656
56	Admin, support, waste mgt, remediation services	29,597	550,415	3,489	76,326	2,301,355
61	Educational services	3,719	63,432	727	28,162	1,019,920
62	Health care & social assistance	26,415	905,533	7,715	114,198	4,439,517
71	Arts, entertainment & recreation	8,962	280,307	971	12,553	378,867
72	Accommodation & food services	3,906	208,302	4,188	89,680	1,506,700
81	Other services (except public adm.)	62,985	1,270,636	5,895	38,989	884,694
99	Unclassified establishments	*	*	158	100 - 249	*
TOTAL		296,456	12,044,191	74,266	858,080	31,357,311

* Zero in 2005 County Business Patterns

Coral reefs are important habitat for species targeted by commercial and recreational fishermen, and fishing is a notable industry sector contributing to tourism and to the economy of Miami-Dade County. In 2002, within the “Transportation & Warehousing” industry sector, there were 17 business establishments in the “Charter Fishing & Party Fishing Boat” industry subsector (NAICS Code 4872102) in the County (2002 Economic Census, Transportation and Warehousing Subject Series).⁴ In 2005, commercial fishermen in Miami-Dade County landed a total of 175,511 pounds of shallow water reef fish with a dockside value of \$332,611. See Table 8.

⁴ Annual revenues for this industry subsector are withheld to avoid disclosing data of individual companies in Miami-Dade County.

Table 8. 2005 Commercial Landings of Shallow Water Reef Fish in Miami-Dade County. Source: NMFS SERO Logbook Data.

Group/Species	Pounds	Dollars (\$)
Groupers:	14,402	36,261
Snowy grouper	999	2,720
Yellowedge grouper	240	567
Red grouper	5,099	11,563
Black grouper	7,022	18,551
Gag grouper	1,029	2,827
Other grouper	13	33
Red hind	121	232
Hogfish	1,311	3,945
Jacks:	48,030	43,421
Almaco jack	3,230	3,453
greater amberjack	44,800	39,968
Sand perch	2	1
Scamp	304	774
Snappers:	110,222	246,760
Dog snapper	30	71
Cubera snapper	70	203
Lane snapper	1,522	3,216
Mangrove snapper	13,103	26,899
Mutton snapper	10,024	25,886
Red snapper	584	1,286
Vermilion snapper	2,551	6,692
Yellowtail snapper	82,291	182,456
Schoolmaster snapper	1	2
Unclassified snappers	46	49
Triggerfish	1,119	1,217
Total	175,511	332,611

Table 7 also shows that there were an estimated 4,618 employer establishments in the industry sector of “Construction” with 38,417 employees and an annual payroll totaling approximately \$1.48 billion in 2005 (2005 County Business Patterns, U.S. Census Bureau). That same year, there were an estimated 30,690 non-employer firms in construction with total receipts of about \$1.16 billion in the county. Employer establishments and non-employer firms involved in “Construction” represent 6.2 percent and 10.4 percent, respectively, of the total number of employer establishments and non-employer firms operating in Miami-Dade County. Table 9 shows the composition, by industry subsector, of the construction industry sector (i.e., how many establishments and firms are involved in each different type of construction).

Table 9. Composition, by industry subsector, of the construction industry sector in Miami-Dade County (2005 County Business Patterns, U.S. Census Bureau).

NAICS Code	Industry Code Description	Non-Employer Firms	Non-Employer Receipts (\$1,000)	Employer Establishments	Number of Employees
23	Construction	30,690	1,165,256	4,618	38,417
236	Construction of buildings ^a	5,622	290,129	1,317	10,422
2361	Residential Construction	4,601	240,578	1,054	6,278
2362	Nonresidential Construction	1,021	49,551	263	4,124
237	Heavy & Civil Engineering Construction ^b	630	28,338	374	4,800
2371	Utility System Construction	121	3,664	65	974
2372	Land Subdivision Highway, Street, & Bridge Construction	92	9,868	223	1,017
2373	Other Heavy & Civil Engineering Construction	85	2,879	58	2,452
2379		332	11,927	28	357
238	Specialty Trade Contractors ^c	24,438	846,789	2,927	23,195

^a Subsector 236, "Construction of Buildings," comprises establishments of the general contractor type and operative builders involved in the construction of buildings.

^b Subsector 237, "Heavy and Civil Engineering Construction," comprises establishments involved in the construction of engineering projects (e.g., highways and dams). Construction projects involving water resources (e.g., dredging and land drainage) and projects involving open space improvement (e.g., parks and trails) are included in this subsector. Specialty trade activities are classified in this subsector if the skills and equipment present are specific to heavy or civil engineering construction projects.

^c Subsector 238, "Specialty Trade Contractors," comprises establishments engaged in specialty trade activities generally needed in the construction of all types of buildings.

Of the businesses in the construction industry sector, the majority of employer establishments (69 percent) and non-employer firms (80 percent) are "Specialty Trade Contractors". The remainder of employer establishments and non-employer firms in the construction industry sector are involved in the industry subsectors of "Construction of Buildings" and "Heavy & Civil Engineering Construction," with "Construction of Buildings" being the second largest construction industry subsector. Last, 28 employer establishments and 332 non-employer firms are involved in the industry subsector of "Other Heavy & Civil Engineering Construction" (NAICS Code 2379). This subsector includes marine construction projects such as breakwater, dock, pier, jetty, seawall and harbor construction, and dredging. These establishments and firms represent approximately 0.61 percent and 1.08 percent, respectively, of establishments and firms operating within the construction industry sector as a whole.

Monroe County

Monroe County is the southernmost county in Florida and the United States. See Figure 4. It has a total area of 9,679 km² (3,737 square miles), with 2,582 km² being land and the remaining 7,097 km² (about 73 percent) being water (U.S. Census Bureau). The County is made up of the Florida Keys and portions of Big Cypress National Preserve and Everglades National Park. The Florida Keys are a series of islands that extend over 220 miles in length and make up the third largest barrier reef ecosystem in the world and the only one of its kind in the country. The State of Florida has designated the Florida Keys as an Area of Critical State Concern to protect the area's ecological richness, cultural significance, and environmentally sensitive nature (Florida Statute 1986; Florida Administrative Code §28-29, 1975). Over 60 percent of the Keys land mass is owned by the government and the vast majority of public land has been set aside for conservation. The County has only one highway, U.S. Highway 1. Commercial activities and residential development are mostly concentrated along that route (National Research Council, 2002). Among the County's cities are Key West, Key Largo, Big Pine Key, Marathon, and Plantation Key.

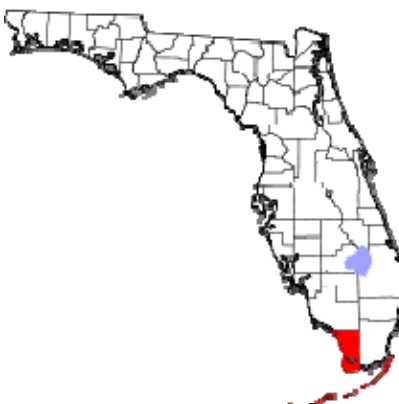


Figure 4. Monroe County. Image Source: Wikipedia.

More than 99.9 percent of the County's population lives on the Florida Keys. According to U.S. Census Bureau estimates, the population of the County fell 6.1 percent from April 1, 2000, to July 1, 2006, with approximately 74,737 million people in 2006. During that period, there was a natural increase in population of 195 (4,642 births less 4,447 deaths) coupled with a net out-migration of 4,668 persons leaving the county (2,612 net international migration less 7,280 net internal out-migration). The number of housing units increased from 51,617 in 2000 to 52,911 in 2005, an increase of 2.5 percent. Median household income in 2004 was \$42,195 and 9.2 percent of the persons in the county lived below poverty, in comparison to the statewide median household income of \$40,900 and poverty rate of 11.9 percent.

In Monroe County, the major industrial sectors (when sorted by number of employees, then by non-employer firm receipts) are:

- (1) Accommodation & Food Services;
- (2) Retail Trade;
- (3) Health Care & Social Assistance;
- (4) Construction; and
- (5) Other Services (except Public Administration).⁵

The industrial sectors of "Retail Trade" and "Accommodation & Food Services" are principle components of tourism and tourism is the major industry of Monroe County. Tourism, directly and indirectly, contributed \$2.2 billion to Monroe County's economy in 2005 (Bennett, 2006). Tourism directly and indirectly created a range of 22,395 to 23,616 jobs, or 54% of Monroe County's employment in that year (Bennett, 2006). The Monroe County Tourist Development Council estimates more than 3.49 million people visited the County in 2003 and 3.2 million visited the Florida Keys in 2006. Of visitors surveyed from March 2005 through February 2006, 80 percent were in the Florida Keys for recreation or vacation purposes. Of those surveyed, about 84 percent reported beach activities, 75 percent viewing wildlife, 57 percent diving and snorkeling, and 30 percent fishing as activities they participated in during their visit (Monroe County Tourist Development Council, Visitor Profile Survey). See Table 10.

⁵ The "Other Services (except Public Administration)" industry sector comprises establishments engaged in providing services not specifically provided for elsewhere in the classification system. Establishments in this sector are primarily engaged in activities such as equipment and machinery repairing, promoting or administering religious activities, grantmaking, advocacy, and providing drycleaning and laundry services, personal care services, death care services, pet care services, photofinishing services, temporary parking services, and dating services.

Table 10. Recreational activities of visitors to the Florida Keys, March 2005 – February 2006. Source: Monroe County Tourist Development Council, Visitor Profile Survey.

Recreational Activity	Frequency	Percent of Responses	Percent of Cases
Diving	548	3.2	18
Snorkeling	1,171	6.8	38.6
Fishing	913	5.3	30.1
Viewing Wildlife	2,260	13.1	74.5
Boating	1,390	8.1	45.8
Beach Activities	2,547	14.8	83.9
Dine Out/Night Life	2,879	16.7	94.9
Museums/Historic Areas	1,659	9.6	54.7
Sightseeing & Attractions	2,727	15.8	89.9
Cultural Events	1,170	6.8	38.5
Total	17,264	100	

The Port of Key West is a small port; however, it serves cruise ships with itineraries in the Eastern and Western Caribbean and the Bahamas. The Key West Chamber of Commerce estimates 881,183 cruise passenger arrivals in the Port of Key West in 2006, up from 656,866 in 2000 (www.keywestchamber.org/cominfo/trends.pdf). In 2006, imports with a value of \$36,283 and exports with a value of \$11.7 million transited through the Port of Key West. There are two commercial airports in the Florida Keys: Key West International Airport and Florida Keys Marathon Airport. Key West International Airport had 276,154 arrivals in 2006, up from 275,386 in 2000 and remains the Keys primary airport for commercial activity. At present, only one commercial carrier, Delta Airlines, serves the Marathon Airport, and on July 13, 2007, the airline announced that it was suspending flights to the airport.

Leeworthy and Wiley estimate for the period of June 2000 through May 2001, the general visitor population spent over 12.1 million person days in Monroe County. According to Johns et al. (2003), residents and visitors spent 5.46 million person-days visiting artificial and natural reefs in Monroe County during the 12-month period from June 2000 to May 2001. The same study found that reef-related expenditures generated about \$504 million in sales, \$140 million in income, and created 10,000 jobs in the county over the same time period. When asked what they were willing to pay to maintain the natural reefs in Monroe County in their existing condition, natural reef users said they were willing to pay \$57.5 million annually (Johns et al. 2003).

Coral reefs are important habitat for species targeted by commercial and recreational fishermen, and fishing is a notable industry sector contributing to tourism and to the economy of Monroe County. In 2005, there were 971 non-employer firms with annual receipts of \$34.5 million in the fishing industry subsector (NAICS 1141), which represent 9.1 percent of all non-employer firms and 5.4 percent of annual receipts for all non-employer firms in the County that year. In 2002, there were 42 business establishments in the “Charter Fishing & Party Fishing Boats” industry subsector (NAICS 4872102) with total annual revenue of about \$5.5 million and 73 employees (U.S. Census, 2002 Transportation and Warehousing Subject Series). That same year there were 23 establishments in the “Excursion & Sightseeing Boats” industry subsector (NAICS 4872101) with total annual revenue of \$17.3 million and 224 employees. In 2005, commercial fishermen in Monroe County landed a total of 2,739,484 pounds of shallow water reef fish with a dockside value of \$5,310,600. See Table 11.

Table 11. 2005 Commercial Landings of Shallow Water Reef Fish, Monroe County. Source: NMFS Southeast Regional Office Logbook Data.

Group/Species	Pounds	Dollars (\$)
Groupers:	564,667	1,385,959
Snowy grouper	72,626	185,802
Yellowedge grouper	53,547	144,165
Red grouper	234,939	512,111
Black grouper	192,705	514,288
Gag grouper	10,390	28,588
Yellowfin grouper	228	581
Other grouper*	232	424
Hinds:	26,352	56,772
Speckled hind	25,092	54,812
Red hind	1,260	1,960
Hogfish	12,787	28,576
Jacks:	638,347	522,532
Almaco jack	16,334	13,130
Greater amberjack	612,877	504,502
Amberjack	9,136	4,900
Sand perch	226	389
Banded rudderfish	2,357	2,749
Scamp	14,303	38,330
Snappers:	1,475,745	3,269,776
Dog snapper	63	115
Blackfin snapper	934	1,849
Cubera snapper	98	115
Lane snapper	4,638	7,734
Mangrove snapper	118,613	205,556
Mutton snapper	128,076	250,699
Red snapper	5,865	14,672
Vermilion snapper	7,069	16,601
Yellowtail snapper	1,210,053	2,771,582
Unclassified snappers	333	849
Schoolmaster snapper	3	4
Triggerfish	4,690	5,491
Wenchman	10	26
Total	2,739,484	5,310,600
* Does not include Warsaw grouper		

The recreational spiny lobster fishery is important to Monroe County as well. About 90 percent of Florida State's annual commercial landings, approximately 5 million pounds, of Caribbean spiny lobster occur off the extreme southeastern portion of the state, especially the Keys. Sharp et al. (2005) estimate approximately \$24 million was spent on recreational lobster fishing in the Florida Keys from the opening of the recreational season through the first Monday in September in 2001. Fishers who resided outside the Keys accounted for about \$22 million (92 percent) of the total monies spent on recreational lobster fishing in the Keys. In addition to the regular recreational season there is the Special Two-Day Sport Season, which occurs on the last consecutive Wednesday and Thursday in July. Those two days are the busiest boating days of the year in the County. From the 1993 through 2001 Special Two-Day Sport

Seasons, the average annual number of lobsters caught in Monroe County represents about 66 percent of the annual statewide total.

Table 12 also shows that in Monroe County there were 359 employer establishments in the industry sector of “Construction” with 1,693 employees and an annual payroll totaling approximately \$55.7 million (2005 County Business Patterns, U.S. Census Bureau). That same year, there were 1,177 non-employer firms in construction with total receipts of about \$8.2 million in the county. Employer establishments and non-employer firms involved in “Construction” represent 9.6 percent and 11 percent, respectively, of the total number of employer establishments and non-employer firms operating in Monroe County. Table 13 shows the composition, by industry subsector, of the construction industry sector (i.e., how many establishments and firms are involved in each different type of construction).

Table 12. 2005 County Business Patterns and Non-Employer Statistics for Monroe County (U.S. Census Bureau)

NAICS Code	Industry Code Description	Non-Employer Firms	Non-Employer Receipts (\$1,000)	Employer Establishments	Number of Employees	Annual Payroll (\$1,000)
11	Agriculture, Forestry, Fishing and Hunting	992	34,476	16	20 - 99	*
21	Mining	5	160	1	0 - 19	*
22	Utilities	9	1,254	2	100 - 249	*
23	Construction	1,177	82,123	359	1,693	55,733
31	Manufacturing	107	5,337	80	338	9,652
42	Wholesale trade	136	15,495	112	480	18,964
44	Retail trade	601	44,847	723	6,422	145,298
48	Trans. & warehousing	393	19,220	141	942	25,076
51	Information	91	3,781	53	504	21,220
52	Finance & insurance	301	28,942	152	953	38,252
53	Real estate & rental & leasing	1,766	154,010	355	1,031	30,557
54	Professional, sci. & tech. services	1,219	68,691	334	1,320	51,592
55	Management of companies & enterprises	0	0	6	91	5,136
56	Admin, support, waste mgt, remediation services	895	33,503	192	796	21,627
61	Educational services	104	2,520	33	222	6,860
62	Health care & social assistance	421	21,970	214	2,373	97,625
71	Arts, entertainment & recreation	866	41,944	135	1,103	24,086
72	Accommodation & food services	255	41,226	523	10,852	210,466
81	Other services (except public adm.)	1,362	43,583	308	1,331	29,204
99	Unclassified establishments	0	0	7	0 - 19	*
TOTAL		10,700	643,082	3,746	30,631	791,348

* Zero in 2005 County Business Patterns

Of the businesses in the construction industry sector, a majority of the employer establishments (61 percent) and non-employer firms (71 percent) are “Specialty Trade Contractors.” The remainder of employer establishments and non-employer firms in the construction industry sector are involved in the industry subsectors of “Construction of Buildings” and “Heavy & Civil Engineering Construction,” with

“Construction of Buildings” being the second largest construction industry subsector. Last, 6 employer establishments and 12 non-employer firms were categorized into the industry subsector of “Other Heavy & Civil Engineering Construction” (NAICS Code 2379). This subsector includes marine construction projects such as breakwater, dock, pier, jetty, seawall and harbor construction, and dredging. These establishments and firms represent approximately 1.7 percent and 1.0 percent, respectively, of establishments and firms operating within the construction industry sector as a whole for Monroe County (see Table 13).

Table 13. Composition, by industry subsector, of the construction industry sector in Monroe County (2005 County Business Patterns, U.S. Census Bureau).

NAICS Code	Industry Code Description	Non-Employer Firms	Non-Employer Receipts (\$1,000)	Employer Establishments	Number of Employees
23	Construction	1,177	82,123	359	1,693
236	Construction of buildings ^a	333	28,020	119	678
2361	Residential Construction	301	26,966	111	632
2362	Nonresidential Construction	32	1,054	8	46
237	Heavy & Civil Engineering Construction ^b	14	1,876	20	196
2371	Utility System Construction	NR	NR	2	0 – 19
2372	Land Subdivision	D	D	10	20 – 99
2373	Highway, Street, & Bridge Construction	NR	NR	2	20 – 99
2379	Other Heavy & Civil Engineering Construction	12	1,488	6	110
238	Specialty Trade Contractors ^c	830	52,227	220	819

^a Subsector 236, “Construction of Buildings,” comprises establishments of the general contractor type and operative builders involved in the construction of buildings.
^b Subsector 237, “Heavy and Civil Engineering Construction,” comprises establishments involved in the construction of engineering projects (e.g., highways and dams). Construction projects involving water resources (e.g., dredging and land drainage) and projects involving open space improvement (e.g., parks and trails) are included in this subsector. Specialty trade activities are classified in this subsector if the skills and equipment present are specific to heavy or civil engineering construction projects.
^c Subsector 238, “Specialty Trade Contractors,” comprises establishments engaged in specialty trade activities generally needed in the construction of all types of buildings.
D Withheld to avoid disclosing data
NR Not Reported

Puerto Rico

Puerto Rico is an archipelago comprised of the main island (Puerto Rico) and several smaller oceanic islands: Mona, Monito, Desecheo, Caja de Muertos, Vieques, and Culebra, and still smaller islands known as the “Cordillera de Fajardo.” Its waters extend 9 nautical miles (10.36 statute miles) off its shore. See Figure 5.



Figure 5. Puerto Rico. Image Source: Central Intelligence Agency.

About one-third of the population lives around the capitol city of San Juan, and over 11 percent of the population in San Juan. Other major municipalities are Bayamón, Ponce, Carolina, Arecibo, Guaynabo, and Mayaguez.

Puerto Rico has coral reef communities of limited distribution surrounding the main island's coast, as well as the islands of Culebra, Desecheo, Mona, Monito, and Vieques (NOAA 2007). Colonies of elkhorn and staghorn coral are found in shallow waters off the main island; however, not near San Juan.

According to the U.S. Census Bureau, the population of Puerto Rico increased about 3 percent from April 1, 2000, to July 1, 2006, with approximately 3.93 million people in 2006. The increase in population has been accompanied by a larger percentage increase in housing units. Housing units increased from about 1.26 million in 2000 to approximately 1.44 million in 2005, an increase of about 14.2 percent. In 2005, median household income in Puerto Rico was \$17,184, as compared the median household income for the U.S. as a whole of \$46, 242.

In Puerto Rico, the major industrial sectors (when sorted by total employees, then by payroll) are:

- (1) Manufacturing;
- (2) Retail Trade;
- (3) Health Care & Social Assistance;
- (4) Construction; and
- (5) Accommodation & Food Services.

Manufacturing dominates the economy of Puerto Rico. In fiscal year 2002, the Manufacturing sector accounted for approximately 42 percent of Puerto Rico's Gross Domestic Product. The value of sales, receipts or shipments from manufacturing was approximately \$58.6 billion. See Table 14. The chemical industry is the largest component of the manufacturing sector, with about a 64 percent share (Government Development Bank for Puerto Rico, 2003), and that in turn is dominated by the pharmaceutical and medicine-manufacturing sector. Food, electronics, and apparel manufacturing are other major manufacturing industries in the Territory.

The industrial sectors of "Retail Trade" and "Accommodation & Food Services" are principle components of tourism. Puerto Rico's coastline attracts tourists, and tourism (including eco-tourism) is a very important industry; it represents about 6 percent of the Territory's Gross National Product (Message of the Executive Director of Puerto Rico Tourism Company, February 9-13, 2006). An estimated 5 million tourists visited Puerto Rico in 2004 (CIA World Fact Book, 2007). It is anticipated that recent changes in passport law, which restrict the places where one may travel without a passport, may cause an increase in the number of U.S. citizens who visit the Territory because no U.S. passport is required to travel there (71 FR 68411).

The eastern coast of Puerto Rico, from Fajardo to Humacao and the offshore islands of Vieques and Culebra have been popular destinations for tourists who snorkel and dive. Another popular snorkeling and diving location is off La Parguera on the southwestern coast. Rincón, a municipality on the west coast, is a popular site for coastal tourism, where tourists engage in surfing, tanning, fishing, snorkeling, and SCUBA diving (Pendleton, 2002).

Table 14. 2002 Economic Census Summary Statistics for Puerto Rico (U.S. Census Bureau).

NAICS Code	Description	Employer Establishments	Sales, Receipts or Shipments (\$1,000)	Annual Payroll (\$1,000)	Paid Employees
21	Mining	44	107,000	18,834	949
22	Utilities	18	369,932	21,040	503
23	Construction	2,683	5,523,472*	1,009,747	67,288
31-33	Manufacturing	2,196	58,580,060	N	N
42	Wholesale trade	2,313	16,172,710	1,009,360	39,316
44-45	Retail trade	11,465	20,422,975	1,655,584	122,435
48-49	Transportation & warehousing	1,071	2,076,573	253,758	13,137
51	Information	462	3,686,792	633,161	19,696
52	Finance & insurance	1,809	10,233,015	1,152,628	36,059
53	Real estate & rental & leasing	1,783	1,698,631	148,334	8,183
54	Professional, scientific & technical services	3,965	2,836,774	701,485	26,197
55	Management of companies & enterprises	94	511,676	79,091	2,237
56	Administrative & support & waste management & remediation service	1,724	2,336,978	88,063	61,703
61	Educational services	306	242,810	74,829	4,647
62	Health care & social assistance	6,464	4,967,317	1,224,260	68,338
71	Arts, entertainment & recreation	369	278,975	45,393	3,115
72	Accommodation & food services	4,133	3,360,226	732,147	63,810
81	Other services (exceptu public administration)	3,324	1,470,563	281,805	18,417
N = Not available					
* value of construction					

Coral reefs are important habitat for species targeted by commercial, recreational and subsistence fishermen, and fishing is a significant industry sector contributing to the economy of Puerto Rico. During the period from 1995 through 2002, commercial fishermen caught an average of 1.6 million tons of fish annually, with 87 percent of the fishermen targeting reef fish and invertebrates, including conch and lobster (NOAA Coral Reef Ecosystem Research Plan). In 2005, domestic landings of shallow water reef fish totaled 771,656 pounds (350,022 kilograms) with a value of \$1,766,337. See Table 15. These landings represent approximately 66 percent of total pounds of fish landed in Puerto Rico that year. In 2005, 173,445 pounds of spiny lobster were landed with a dockside value of \$997,005 and 195,701 pounds of conch were landed with a dockside value of \$498,094 (Fisheries of the United States 2005).

Table 14 also shows in 2002 there were 2,683 establishments in the industry sector of “Construction” with 67,288 employees and an annual payroll totaling approximately \$1 billion (U.S. Census Bureau, 2005). Employer establishments and non-employer firms involved in “Construction” represent 11.1 percent and 6.07 percent, respectively, of the total number of employer establishments and non-employer firms operating in Puerto Rico. Table 16 shows the composition, by industry subsector, of the construction industry sector (i.e., how many establishments and firms are involved in each different type of construction).

Table 15. 2005 Shallow Water Reef Fish Commercial Landings, Puerto Rico. Source: Fisheries of the United States 2005.

Group/Species	Pounds	Dollars (\$)
Goatfish	5,947	11,044
Groupers:	59,265	127,427
Red hind	29,083	59,180
Nassau	2,002	3,109
Other	28,180	65,138
Grunts:	79,795	139,973
Margate	32	64
Other	53,715	72,197
Hogfish	26,048	67,712
Jacks:	35,063	51,499
Bar jack	22,658	32,479
Horse-eye jack	8	8
Other	12,397	19,012
Parrotfish	31,157	45,474
Scup or porgy	12,092	19,275
Snappers:	439,477	1,165,816
Lane	88,274	196,985
Mutton	33,561	75,961
Yellowtail	115,013	264,379
Other	202,629	628,491
Squirrelfish	5,885	8,063
Surgeonfish	0	0
Triggerfish	32,273	48,988
Trunkfish (boxfish)	44,654	81,066
Total	771,656	1,766,337

Of the businesses in the construction industry sector, the majority of establishments (45 percent) are involved in the “Construction of Buildings” industry subsector. The remainder of establishments in the construction industry sector are involved in the industry subsectors of “Specialty Trade Contractors” and “Heavy & Civil Engineering Construction,” with “Specialty Trade Contractors” being the second largest construction industry subsector (31 percent). Last, 12 establishments are categorized into the industry subsector of “Other Heavy & Civil Engineering Construction” (NAICS Code 2379). This subsector includes marine construction projects such as breakwater, dock, pier, jetty, seawall and harbor construction, and dredging. These establishments represent approximately 0.44 percent of the construction industry sector as a whole for Puerto Rico.

Table 16. Composition, by industry subsector, of the construction industry sector in Puerto Rico (2002 Economic Census Summary Statistics, U.S. Census Bureau).

NAICS Code	Industry Code Description	Number of Establishments	Total Employees	Payroll (\$1,000)
23	Construction	2,683	67,288	1,009,747
<u>236</u>	<u>Construction of buildings^a</u>	<u>1,209</u>	<u>31,891</u>	<u>475,162</u>
2361	Residential Construction	924	18,661	253,291
2362	Nonresidential Construction	285	13,230	221,871
<u>237</u>	<u>Heavy & Civil Engineering Construction^b</u>	<u>14</u>	<u>1,876</u>	<u>20</u>
2371	Utility System Construction	NR	NR	2
2372	Land Subdivision	D	D	10
2373	Highway, Street, & Bridge Construction	NR	NR	2
2379	Other Heavy & Civil Engineering Construction	12	1,488	6
<u>238</u>	<u>Specialty Trade Contractors^c</u>	<u>830</u>	<u>52,227</u>	<u>220</u>

^a Subsector 236, "Construction of Buildings," comprises establishments of the general contractor type and operative builders involved in the construction of buildings.
^b Subsector 237, "Heavy and Civil Engineering Construction," comprises establishments involved in the construction of engineering projects (e.g., highways and dams). Construction projects involving water resources (e.g., dredging and land drainage) and projects involving open space improvement (e.g., parks and trails) are included in this subsector. Specialty trade activities are classified in this subsector if the skills and equipment present are specific to heavy or civil engineering construction projects.
^c Subsector 238, "Specialty Trade Contractors," comprises establishments engaged in specialty trade activities generally needed in the construction of all types of buildings.

U.S. Virgin Islands (U.S.V.I.)

U.S.V.I. consists of the main islands of St. Croix, St. John, and St. Thomas, and 54 smaller islands and keys. Combined the U.S.V.I. has a land mass of about 134 square miles (346 square kilometers) and territorial waters that encompass approximately 972 square miles (1,564 square kilometers). U.S.V.I. waters extend 3 nautical miles (3.45 statute miles) off its shore. Elkhorn coral and staghorn coral are found in shallow waters off the three main islands. See Figure 2-7.



Figure 6. U.S.V.I. Image Source: Central Intelligence Agency.

According to the U.S. Census Bureau, the population of the U.S.V.I. increased from 101,809 in 1990 to 108,612 in 2000, about a seven percent increase. From 1990 to 2000, the population of St. Croix increased from 50,139 to 53,234, the population of St. John increased from 3,504 to 4,197 and the population of St. Thomas increased from 48,166 to 51,181. The population increase was accompanied by an increase in the number of housing units, which rose from 39,290 in 1990 to 50,202 in 2000, an increase of over 27 percent in ten years. Median household income of the U.S.V.I. as a whole was

\$24,704 in 2000, compared to the U.S. medium of \$41,994 at that time. The World Factbook estimates the July 2007 population to be 108,448 (www.cia.gov/library/publications/the-world-factbook/geos/rq.html).

In U.S.V.I., the major industrial sectors (when sorted by number of paid employees, then by sales, receipts, or shipments) are (see Table 17):

- (1) Retail Trade;
- (2) Accommodation & Food Services;
- (3) Construction;
- (4) Administrative, Support, Waste management, and Remediation Services; and
- (5) Finance & Insurance.

The industrial sectors of “Retail Trade” and “Accommodation & Food Services” are principle components of tourism. Tourism is the largest contributor to the economy of the U.S.V.I.; it accounts for 80 percent of the Territory’s Gross Domestic Product and employment (CIA World Fact Book, 2007). In 1994, the total number of visitor arrivals was approximately 1.9 million and that number increased to over 2.6 million by 2004. A survey conducted for the Virgin Islands Department of Planning and Natural Resources found that 100 percent of hotel industry participants answered that there would be a significant impact on tourist visits to the U.S.V.I. if the coast/beaches were degraded or fisheries and/or coral reefs declined (U.S.V.I. 2003).

Table 17. 2002 Economic Census Summary Statistics for U.S.V.I. (U.S. Census Bureau).

NAICS Code	Industry Code Description	Establishments	Sales, Receipts or Shipments (\$1,000)	Annual Payroll (\$1,000)	Paid Employees
11	Agriculture, Forestry, Fishing and Hunting	N	N	N	N
21	Mining	1	D	D	0 – 19
22	Utilities	4	D	D	0 – 19
23	Construction	190	285,582*	90,662	3,050
31-33	Manufacturing	63	172,830	27,151	1,058
42	Wholesale trade	74	262,932	27,664	1,028
44-45	Retail trade	680	1,217,466	128,444	6,653
48-49	Transportation & warehousing	106	181,965	34,194	1,134
51	Information	45	183,770	30,285	845
52	Finance & insurance	96	248,229	48,040	1,416
53	Real estate & rental & leasing	192	184,904	26,224	1,152
54	Professional, scientific & technical services	228	360,192	50,235	1,238
55	Management of companies & enterprises	23	30,745	2,183	76
56	Administrative & support & waste management & remediation service	155	135,267	35,834	2,050
61	Educational services	19	5,792	1,668	97
62	Health care & social assistance	203	93,289	24,428	1,232
71	Arts, entertainment & recreation	38	110,039	14,271	662
72	Accommodation & food services	313	331,008	92,357	5,639
81	Other services (exceptu public administration)	185	153,703	34,689	1,307
99	Unclassified establishments	N	N	N	N
TOTAL		2,615	3,672,131	668,329	28,637

D = Data not disclosed
N = Not available
* Value of construction

Coral reefs are important habitat for species targeted by commercial and recreational fishermen, and fishing is an important industry sector contributing to the economy of U.S.V.I. In 2005, domestic landings of shallow water reef fish totaled 1,210,788 pounds (508,253 kilograms) with a value of \$3,896,340. These landings represent approximately 83 percent of total pounds of fish landed in the U.S.V.I. that year (see Table 18). In 2005, 234,212 pounds of spiny lobster were landed with a dockside value of \$1,606,155 and 141,109 pounds of conch were landed with a dockside value of \$764,002.

Table 18. 2005 Landings of shallow water reef fish, U.S.V.I. Source: Fisheries of the United States 2005.

Group/Species	Pounds	Dollars (\$)
Goatfish	4,949	16,415
Groupers:	118,478	65,138
Red hind	0	0
Nassau	0	0
Other	118,478	65,138
Grunts:	97,905	330,838
Margate	0	0
Other	97,059	326,777
Hogfish	846	4,061
Jacks:	51,586	160,464
Bar jack	0	0
Horse-eye jack	0	0
Other	51,586	160,464
Parrotfish	398,069	1,307,229
Scup or porgy	32,731	99,773
Snappers:	286,551	1,223,552
Lane	0	0
Mutton	0	0
Yellowtail	0	0
Other*	286,551	1,223,552
Squirrelfish	6,443	19,347
Surgeonfish	101,387	322,413
Triggerfish	111,843	347,110
Trunkfish (boxfish)	0	0
Total	1,210,788	3,896,340
* does not include silk snapper		

Table 17 also shows that there were 190 establishments in the industry sector of “Construction” with 3,050 employees and an annual payroll totaling approximately \$90.7 million (U.S. Census Bureau, 200?). Establishments involved in “Construction” represent 7.3 percent of the total number of establishments operating in U.S.V.I. Table 19 shows the composition, by industry subsector, of the construction industry sector (i.e., how many establishments and firms are involved in each different type of construction).

Of the businesses in the construction industry sector, a majority of establishments are involved in the “Construction of Buildings” (47.4 percent) and “Specialty Trade Contractors” (46.8 percent) industry subsectors. The remainder of establishments in the construction industry sector are involved in the industry subsector of “Heavy & Civil Engineering Construction” (12.2 percent).

Table 19. Composition, by industry subsector, of the construction industry sector in U.S.V.I. (2002 Economic Census Summary Statistics, U.S. Census Bureau)

NAICS Code	Industry Code Description	Number of Establishments	Total Employees	Payroll (\$1,000)
23	Construction	190	3,050	90,662
236	Construction of buildings ^a	90	1,205	25,412
237	Heavy & Civil Engineering Construction ^b	11	310	11,164
238	Specialty Trade Contractors ^c	89	1,535	54,086

^a Subsector 236, "Construction of Buildings," comprises establishments of the general contractor type and operative builders involved in the construction of buildings.
^b Subsector 237, "Heavy and Civil Engineering Construction," comprises establishments involved in the construction of engineering projects (e.g., highways and dams). Construction projects involving water resources (e.g., dredging and land drainage) and projects involving open space improvement (e.g., parks and trails) are included in this subsector. Specialty trade activities are classified in this subsector if the skills and equipment present are specific to heavy or civil engineering construction projects.
^c Subsector 238, "Specialty Trade Contractors," comprises establishments engaged in specialty trade activities generally needed in the construction of all types of buildings.

1.4.2.2 Existing Laws and Regulations that Limit Activities by Protecting Corals

Introduction

Existing Federal, State, and Territorial laws and regulations directly and indirectly protect elkhorn and staghorn corals and affect economic activities proposed and conducted in areas where elkhorn coral and/or staghorn coral are found. Consequently, a discussion of economic activities must consider which and how activities are currently restricted in areas where either coral is found. For instance, Florida, Puerto Rico, and U.S.V.I. laws prohibit take of these corals in their waters, and these prohibitions must be acknowledged when evaluating the incremental impact of the regulation.

Federal

Endangered Species Act (ESA)

Currently, elkhorn and staghorn corals are listed as threatened species under the ESA, and as listed species, are protected under Section 7 of the ESA (See 71 FR 26852 for listing). Section 7 requires federal agencies to ensure that actions they fund, authorize, or carry out will not jeopardize the continued existence of listed species or adversely modify designated critical habitat. "Action," in this case, is defined broadly to include federal grants, permitting, licensing, or other regulatory actions (16 USC 1536(a)(2)). In general, if a listed species may be present in an action area, the Federal action agency must conduct a biological assessment to determine whether the proposed action may affect listed species. If the action agency's assessment shows, and NMFS concurs, that the proposed action is not likely to adversely affect any listed species or designated critical habitat, then the consultation is concluded.

If the Federal action agency's biological assessment shows that a proposed action may adversely affect a listed species or designated critical habitat, formal consultation and issuance of a biological opinion is required. During the formal consultation process, the action agency supplies NMFS with information that includes descriptions of the proposed action, action area, listed species that may be affected, and how the species may be affected by that action. NMFS has up to 135 days to complete consultation and prepare a biological opinion that contains the analysis of whether or not the proposed action would be likely to jeopardize the continued existence of the species or adversely modify designated critical habitat. If a jeopardy or adverse modification determination is made, the biological opinion must identify reasonable and prudent alternatives (RPAs), if any, that would not jeopardize the continued existence of the listed species or adversely modify designated critical habitat and are economically and technologically feasible. The action agency may choose to implement an RPA, modify the proposed action and consult with

NMFS again, decide not to authorize, fund or otherwise proceed with the action or apply for an exception, a process rarely undertaken.

A biological opinion includes an incidental take statement (ITS) to authorize take resulting from the action. Incidental take is take that is incidental to, and not the purpose of, an otherwise lawful activity.

The ITS also specifies reasonable and prudent measures (RPMs) considered necessary or appropriate to minimize the impact of the anticipated incidental take to the species. However, species listed as “threatened”, such as elkhorn and staghorn corals, do not automatically receive the same protections as endangered species under ESA Section 9. Although listed, take of either elkhorn or staghorn coral is not prohibited in the absence of a 4(d) rule, and consequently, NMFS would not issue an ITS requiring action agencies to implement RPMs to minimize the impact of incidental take.

Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES)

CITES is an international agreement between governments, which applies to international trade. Scleractina species are CITES Appendix II specimens (www.cites.org/eng/app/appendices.pdf). Both elkhorn and staghorn corals are among those species and as such, a permit from the country of origin is required in order to export live or dead specimens of these stony corals. Section 9(c) of the ESA prohibits any person subject to the jurisdiction of the U.S. from engaging in any trade in any specimens contrary to the provisions of CITES or to possess any specimens traded contrary to the provisions of CITES (16 USC §1538(c)).

Magnuson-Stevens Fishery Conservation and Management Act (Magnuson-Stevens Act)

Coral resources are federally managed by regulations implementing the joint Gulf of Mexico and South Atlantic Coral Fishery Management Plan and the Caribbean Coral Fishery Management Plan (Coral FMPs) pursuant to the Magnuson-Stevens Fishery Conservation and Management Act. The management objectives addressed in the Coral FMPs are: 1) develop scientific information necessary to determine feasibility and advisability of harvesting coral; 2) minimize, as appropriate, adverse human impacts on coral and coral reefs; 3) provide, where appropriate, special management for Coral Habitat Area of Particular Concern; and 4) increase public awareness of the importance of sensitivity of coral and coral reefs (49 FR 29607, July 23, 1984).

Presently, NMFS defines “prohibited coral” to include all coral belonging to the order Scleractinia (50 CFR 622.2). No person may fish for, harvest, or possess prohibited coral, including elkhorn or staghorn coral, without a Federal permit in the Caribbean, Gulf of Mexico, or South Atlantic Exclusive Economic Zones (EEZ). The Caribbean EEZ is defined as the portion of the EEZ that is the Caribbean Sea around Puerto Rico and U.S.V.I. (50 CFR 622.4(a) (3)(iv) and 622.7(k)). Moreover, no person may sell or purchase either species if taken from the EEZ; and if either species is sold in Puerto Rico or U.S.V.I., it is presumed to have been harvested in the EEZ unless it is accompanied by documentation showing that it was harvested elsewhere (50 CFR 622.45(a)). A person harvesting live rock under a Federal permit is exempt from the prohibition on taking prohibited coral, however, if such coral settles on live rock (50 CFR 622.41(a)(1)).

Essential fish habitat (EFH) is defined as “those waters and substrate necessary to fish for spawning, breeding, feeding or growth to maturity (16 USC § 1802(10)). NMFS has designated coral substrate as EFH. As such, the Magnuson-Stevens Act requires any Federal agency to consult with NMFS with respect to any action authorized, funded or undertaken, or proposed to be authorized, funded or undertaken by such agency that may adversely affect the coral. NMFS can provide recommendations to avoid or reduce the adverse impacts on EFH; however, Federal agencies are not required to follow those recommendations.

Other federal regulations under the authority of the Magnuson-Stevens Act that directly or indirectly protect corals include the following:

- 50 CFR 622.31(a) prohibits use of explosives (except an explosive in a powerhead) to fish in the Caribbean, Gulf or South Atlantic EEZ.
- 50 CFR 622.31(b) prohibits use or possession of a toxic chemical in a coral area, and prohibits use of a chemical, plant, or plant-derived toxin to harvest a Caribbean coral reef resource in the Caribbean EEZ.
- 50 CFR 622.31(c)(1) prohibits use of a fish trap in the South Atlantic EEZ, and (c)(2) which currently limits the use of a fish trap in the Gulf EEZ and will ban the use of a fish trap in the Gulf EEZ after February 7, 2007.
- 50 CFR 622.32(f) prohibits use of a power-assisted tool in the Caribbean EEZ to take a Caribbean coral reef resource or in the Gulf or South Atlantic EEZ to take prohibited coral.
- 50 CFR 622.33(B)(4)(i) requires any prohibited coral taken as incidental catch in the EEZ to be returned immediately to the sea in the general area of fishing. In fisheries where the entire catch is landed unsorted, such as scallop and groundfish fisheries, unsorted prohibited coral may be landed ashore; however, no person may sell or purchase such prohibited coral.
- 50 CFR 622.34(d) prohibits fishing for any species and anchoring by fishing vessels in the Tortugas marine reserves.
- 50 CFR 622.34(j) prohibits fishing with bottom longline, bottom trawl, dredge, pot, or trap in the West and East Flower Garden Banks HAPC.
- 50 CFR 622.4(a)(3)(i and v) require an individual who takes or possesses fish or other marine organisms with an allowable chemical in a coral area a Federal allowable chemical receive a permit if not landed in Florida; and for those that do, appropriate Florida permits and endorsements.
- 50 CFR 622.4(a)(3)(iv) requires a Federal permit to take or possess Gulf and South Atlantic prohibited coral or Caribbean prohibited coral only as scientific research activity, exempted fishing, or exempted educational activity.
- 50 CFR 622.41(a)(2)(ii) prohibits individual aquaculture from being placed over naturally occurring reef outcrops, limestone ledges, coral reefs, or vegetative areas.

Rivers and Harbors Act

The Rivers and Harbors Act (RHA; 33 USC §§ 401 et seq.) authorizes the U.S. Army Corps of Engineers (USACE) to issue permits for dams or dikes in intrastate waters of the U.S. (section 9) and construction or other work, such as docks/piers and aquaculture structures, in or affecting navigable waters (section 10). In issuing these permits, USACE conducts a “public interest balancing,” which can include evaluation of benefits and detriments of a project to fish and wildlife values, such as corals. As a general matter, adverse impacts to coral reefs and coral reef systems are considered to be detrimental to the public interest, and the USACE findings for Section 10 permits must document how these impacts have been avoided. Through this evaluation, USACE requires applicants to avoid and minimize impacts to corals by altering the design of a project or by imposing mitigation actions (e.g., relocation and monitoring of corals).

The Rivers and Harbors Act also authorizes the U.S. Coast Guard (USCG) to protect U.S. navigable waters. Navigable waters are those waters that at some time in the past, present or future are used to transport interstate or foreign commerce. Under 14 USC § 81, USCG is charged with establishing, maintaining, and operating aids to navigation to serve the needs of U.S. armed forces and maritime commerce, and when those aids are electronic, air commerce as well when requested by the Federal Aviation Administration. Some of these aids to navigation are found in areas where elkhorn coral and/or

staghorn coral occur. For example, USCG maintains navigational aids in the Florida Keys National Marine Sanctuary (FKNMS) that are intended to help ships avoid grounding on coral reefs. Protection of navigable waters also includes regulating bridge-related activities. In general, a bridge cannot be constructed across any navigable water(s) until USCG has approved the location and construction plans.

Clean Water Act

Sections 303(c), 304(a), and 402 of the Clean Water Act (CWA) provide the authority for the Environmental Protection Agency (EPA) to issue water quality standards and National Pollution Discharge Elimination System (NPDES) permits. Section 303(c) of the CWA gives the primary responsibility for the development of water quality standards to the States and Territories, with oversight and approval by EPA. EPA also has the authority to issue Federal water quality standards when necessary to meet the requirements of the CWA. Additionally, section 304(a) of the CWA authorizes the EPA to publish water quality criteria to serve as scientific guidance to the States and Territories for the development of regulatory water quality standards. Lastly, section 402 of the CWA establishes the NPDES permitting program, which requires a permit for any point source discharge of a pollutant (other than dredge and fill material) into the waters of the U.S. EPA issues these permits unless they have delegated their authority to a State or Territory, in which case EPA retains oversight, review, and rescission responsibility.

Although sewage is defined as a pollutant under the CWA, sewage from cruise ships and other vessels is exempt (Congressional Research Service, 2005)⁶. EPA regulations implementing the NPDES permit program provide that “discharges incidental to the normal operation of vessels” are excluded from regulation and thus from permit requirements (40 CFR §122.3(a)). Section 311 of the CWA (33 USC §§2701-2720) applies to cruise ships and bans discharge of oil or hazardous substances in harmful quantities into or upon U.S. navigable waters, or into or upon the waters of the contiguous zone, or which may affect natural resources in the EEZ. USCG regulates the uptake and discharge of vessel ballast water under the authority of the CWA, and its regulations prohibit such uptake or discharge in areas within or that may directly affect marine sanctuaries, marine preserves, marine parks or coral reefs (33 CFR 151.2035(a)).

Section 404 of the CWA established the permitting program to regulate excavation and the discharge of dredged and fill material into U.S. waters. EPA and USACE jointly administer the Dredge and Fill Permitting Program. The CWA Section 404(b)(1) Guidelines establish the environmental standards used by the EPA and USACE in the review of permit applications. The Guidelines specifically recognize coral reefs as a special aquatic site that deserves a high level of protection (Subpart E, Section 230.44). Similar to the process described under the RHA, EPA or USACE require project modifications or mitigation measures through the permit review process.

In 1999, the USACE and EPA released a joint Field Memorandum entitled Special Emphasis Given to Coral Reef Protection under the CWA; Marine Protection, Research and Sanctuaries Act, Rivers and Harbors Act, and Federal Project Authorities (www.epa.gov/owow/wetlands/guidance/coral.html). The Memorandum states the “[a]gencies should be particularly careful to consider potential direct, indirect, and cumulative impacts to coral reefs...” Consequently, the EPA and USACE may deny a permit on the basis of significant impacts to corals, even if compensatory mitigation is proposed.

Section 401 of the CWA requires any applicant for an USACE permit to obtain a certification or waiver from the state agency that regulates water pollution in order to discharge dredged or fill materials. The state agency reviews the effect of the discharge on water quality standards.

⁶ As stated elsewhere in the Environmental Assessment, studies have linked coral diseases to human sewage. Sewage discharged from cruise ships is like that which is discharged from terrestrial sewage outfall pipes.

Clean Water Act; Comprehensive Environmental Response, Compensation, and Liability Act and Oil Pollution Act of 1990

The CWA, Comprehensive Environmental Response, Compensation, and Liability Act (42 USC §§ 9601 et seq.), and Oil Pollution Act of 1990 (33 USC §§ 2701 et seq.) mandate that parties that release hazardous materials or oil into the environment are responsible not only for the cost of cleaning up the release, but they are also responsible for restoring any injury to natural resources that results from the actual or threatened release, or from response actions. These provisions are applied to address impacts to coral reefs from release incidents.

Ocean Dumping Act

The Ocean Dumping Act prohibits any person from dumping, or transporting for the purpose of dumping, sewage sludge or industrial waste into ocean waters without a permit (16 USC §1411b). No permits can be issued to dump radiological, chemical, and biological warfare agents, high-level radioactive waste, and medical waste (16 USC §1412). The EPA has responsibility for regulating the dumping of all material except dredged material; and in the case of dredged material (see above).

Coastal Zone Management Act

The Coastal Zone Management Act (CZMA) encourages states to preserve, protect, develop, and where possible, restore or enhance valuable natural coastal resources, which include coral reefs. Participation by the states is voluntary, but to encourage participation, the act makes federal financial assistance available to any coastal state or territory that is willing to develop and implement a comprehensive coastal management program. A state with a coastal zone management program, which has been approved by NOAA Ocean and Coastal Resource Management, can deny or restrict any activity that is inconsistent with that plan. Florida's Coastal Management Program was approved in 1981, Puerto Rico's in 1978, and U.S.V.I.'s in 1979. Both elkhorn and staghorn corals are protected by the CZMA through these States' coastal zone management plans. Moreover, consistent with the provisions of section 307(c)(3) of the CZMA, the USACE may not issue any permits or authorizations under section 404 of the CWA (33 USC § 1344), section 103 of the MPRSA (33 USC § 1413), or section 10 of the RHA (33 USC § 403) that do not have a State CZMA consistency determination. Similarly, the EPA will not designate an ocean dumping site under MPRSA section 102 without meeting the requirements of the CZMA.

National Marine Sanctuaries Act

The National Marine Sanctuaries Act (16 USC §§ 1431 et seq.) authorizes the Secretary of Commerce to designate any discrete area as a national marine sanctuary and promulgate regulations implementing the designation (16 USC §1433). NOAA National Ocean Service (NOS) manages and protects the Sanctuaries for their habitats, ecological value, threatened and endangered species, and historic, archeological, recreational and aesthetic resources.

The Florida Keys National Marine Sanctuary (FKNMS) is comprised of 9,660 square kilometers (2,900 square nautical miles) of coastal waters off the Florida Keys. The following are some of the pertinent activities that are regulated throughout the FKNMS (15 CFR 922.163):

- Moving, removing, taking, harvesting, damaging, disturbing, breaking, cutting, or otherwise injuring, or possessing (regardless of where taken from) any living or dead coral or coral formation, or attempting any of these activities.
- Exploring for, developing, or producing minerals or hydrocarbons.
- Drilling into, dredging, or otherwise altering the seabed of the Sanctuary, or engaging in prop-dredging; or constructing, placing or abandoning any structure, material, or other matter on the seabed of the FKNMS is prohibited, except as an incidental result of lawful activities.

- Discharging or depositing, from within the boundary of the FKNMS, any material or other matter.
- Operating a vessel in such a manner as to strike or otherwise injure coral, seagrass, or any other immobile organism attached to the seabed, including, but not limited to, operating a vessel in such a manner as to cause prop-scarring.
- Having a vessel anchored on living coral other than hardbottom in water depths less than 40 feet when visibility is such that the seabed can be seen.
- Possessing or using explosives, except powerheads, or releasing electrical charges.

The FKNMS is divided into five management zones: Wildlife Management Areas, Ecological Reserves, Sanctuary Preservation Areas, Existing Management Areas, and Special Use/Research Only Areas. There are 27 Wildlife Management Areas; 20 of them are managed by the U.S. Fish and Wildlife Service, and the remaining seven are managed by NOS, Florida Department of Environmental Protection (FDEP), and Monroe County⁷. There are two Ecological Reserves: Western Sambo Ecological Reserve and Tortugas Ecological Reserve. Both of the reserves are no-take zones and are managed by NOS Florida Keys National Marine Sanctuary; however, the Tortugas Ecological Reserve is divided into two sections, each with a different set of regulations. There are eighteen Sanctuary Preservation Areas that protect popular shallow coral reefs, and these areas are managed by NOS, FDEP, and Monroe County⁸. It is illegal to touch or stand on dead or living coral or anchor on living or dead coral or any attached organism in any of the Ecological Reserves or Sanctuary Preservation Areas. Moreover, fishing by any means or removing, harvesting, or possessing any marine life is prohibited in the Ecological Reserves and Sanctuary Preservation Areas. There are 21 Existing Management Areas of which 15 are managed by FDEP, four by the Fish and Wildlife Service, and two by NOS⁹. Finally, there are four Special Use Areas, which are managed by NOS, FDEP, and Monroe County¹⁰. Four areas are found in the vicinity of Conch Reef, Tennessee Reef, Looe Key (Hawk Channel patch reef), and Eastern Sambo Reef. Four permits are available for activities in the FKNMS: General Permit, Survey/Inventory of Historical Resources Permit, Research/Recovery of Sanctuary Historical Resource Permit, and Special-Use Permit.

Antiquities Act

⁷ The 27 Wildlife Management Areas are: Bay Keys, Boca Grande Key, Woman Key, Cayo Agua Keys, Cotton Key, Snake Creek, Cottrell Key, Little Mullet Key, Big Mullet Key, Crocodile Lake, East Harbor Key, Lower Harbor Keys, Eastern Lake Surprise, Horseshoe Key, Marquesas Key, Marvin Key, Mud Keys, Pelican Shoal, Rodriguez Key, Dove Key, Tavernier Key, Sawyer Keys, Snipe Keys, Upper Harbor Key, East Content Keys, West Content Keys, and Little Crane Key.

⁸ The 18 Sanctuary Preservation Areas (SPAs) are: Alligator Reef, Carysfort/South Carysfort Reef, Cheeca Rocks, Coffins Patch, Conch Reef, Davis Reef, Dry Rocks, Grecian Rocks, Easter Dry Rocks, The Elbow, French Reef, Hens and Chickens, Looe Key, Molasses Reef, Newfound Harbor Key, Rock Key, Sand Key, and Sombrero Key. Six of the SPAs are found in State waters: Cheeca Rocks, Eastern Dry Rocks, Hens and Chickens, Newfound Harbor Key, Rock Key, and Sand Key.

⁹ Two of the Existing Management Areas are the Key Largo National Marine Sanctuary and Looe Key National Marine Sanctuary, which are managed by NOS. The 4 Existing Management Areas managed by the U.S. Fish and Wildlife Service are the Great White Heron National Wildlife Refuge, Key West National Wildlife Refuge, Crocodile Lakes National Wildlife Refuge, and National Key Deer Refuge. There are 15 Existing Management Areas within the FKNMS that are managed by the FDEP. They are: Bahia Honda State Park, Curry Hammock State Park, Fort Zachary Taylor State Historic Site, Indian Key State Historic Site, John Pennkamp Coral Reef State Park, Key Largo Hammocks State Botanical site, Lignumvitae Key State Botanical Site (includes Shell Key State Preserve, Long Key State Recreation Area, San Pedro State Underwater Archaeological Site, Windley Key State Geological Site, Biscayne Bay and Carl Sound Aquatic Preserve, Coupon Bight Aquatic Preserve, and Lignumvitae/Indian Key Aquatic Preserve.

¹⁰ The four Special-Use/Research Only Areas are: Conch Reef, Eastern Sambo, Looe Key, and Tennessee Reef.

The Antiquities Act authorizes the President of the United States to declare by public proclamation historic landmarks, historic and prehistoric structures, and other objects of historic or scientific interest to be national monuments (16 USC § 431). Elkhorn and staghorn corals are found in two national monuments located in the U.S.V.I.: Buck Island Reef National Monument (BINM) in St. Croix and Virgin Islands Coral Reef National Monument (VINM) in St. John, which are managed by the National Park Service. The following activities are prohibited in BINM: extraction of corals; dredging and filling; fishing of any kind; boat operation that damages underwater features; anchoring other than in deep sand bottom areas (36 CFR 7.73). The following activities are prohibited in VINM: extraction of corals; fishing other than for bait; dredging and filling; boat operation that damages underwater features; anchoring except in emergency situations (36 CFR 7.46).

National Park System Act

The National Park System Act authorizes the Secretary of the Department of the Interior to recommend areas to Congress for inclusion in the National Park system, and authorizes the Secretary to administer designated parks, including through promulgation of regulations. Virgin Islands National Park (VINP) on St. John comprises more than half of the island of St. John and almost 9 square miles of water surrounding the island. Collecting coral, dead or alive, and dredging, excavating, or filling operations are prohibited and anchoring is restricted (36 CFR 7.74).

The Dry Tortugas National Park is managed by the National Park Service, in collaboration with the FDEP. Both spearfishing and lobstering are prohibited in the park; however, sport fishing is allowed. Snorkeling, diving, and swimming are allowed, while personal watercraft are banned. In January 2007, a Research Natural Area (RNA) was established in the park, and it is a 46-square mile no-take, no-anchor marine reserve. The RNA is adjacent to the Tortugas Ecological Reserve (TER), and combined they represent the largest no-take marine reserve in the continental United States.

Biscayne Bay National Park includes approximately 173,000 acres in Dade County, and is about 22 miles long. The park extends from shore about 14 miles to the 60-foot contour. The Park contains approximately 72,000 acres of coral reefs. Under existing rules for the Park, several areas are closed year-round to public entry to protect sensitive resources and wildlife. Beaching or anchoring of vessels is prohibited in several areas of the Park.

National Wildlife Refuge Administration Act

The National Wildlife Refuge Administration Act directs the U.S. Fish and Wildlife Service manage the Refuge System as a national system of lands and waters devoted to conserving and, where appropriate, restoration of fish, wildlife, and plant resources and their habitats (15 USC § 668dd). The law also declared that compatible wildlife-dependent recreational uses are acceptable activities on refuges. Some of the deepest occurring elkhorn coral are found at the Navassa National Wildlife Refuge (Margaret Miller pers. comm.). Navassa is an uninhabited, open-ocean island with significant coral reef resources, and was designated a National Wildlife Refuge in 1999. It is closed to visitation by the public (www.fws.gov/caribbean/PDF/navassa.pdf).

Water Resources Development Act

The Water Resources Development Act (33 USC §§ 2201 et seq.) authorizes the construction or study of USACE projects and applies to all features of water resources development and planning, including environmental assessment and mitigation requirements. For example, the Act required USACE to construct its 1986 Dade County shoreline protection project so as to minimize the adverse effects on coral reefs.

Act to Prevent Pollution from Ships (APPS) as amended by the Marine Plastic Pollution Research and Control Act (MPPRCA)

The APPS, as amended by the MPPRCA, protects coral reefs by requiring all U.S. ships and all ships in U.S. navigable waters or the EEZ to comply with the International Convention for the Prevention of Pollution from Ships (33 USC §§ 1901 et seq.). Under the regulations implementing APPS as amended by MPPRCA, the discharge of plastics, including synthetic ropes, fishing nets, plastic bags, and a biodegradable plastic, into the water is prohibited. Discharge of floating dunnage, lining, and packing materials is prohibited in the navigable waters and in areas offshore less than 25 nautical miles from the nearest land. Food waste or paper, rags, glass, metal, bottles, crockery and similar refuse cannot be discharged in the navigable waters or in waters offshore inside 12 nautical miles from the nearest land. Finally, food waste, paper, rags, glass, and similar refuse cannot be discharged in the navigable waters or in waters offshore inside three nautical miles from the nearest land. USCG has the primary responsibility of enforcing regulations under the APPS, and the APPS applies to all vessels, including cruise ships, regardless of flag, operating in U.S. navigable waters and the EEZ.

The Lacey Act

The Lacey Act, as amended in 1981 (16 USC §§ 3372 et seq.), prohibits the trade of fish, wildlife, or plants taken in violation of any foreign, state, tribal or other U.S. law. For example, it is a violation of the Lacey Act for a retail store in New York to sell either elkhorn or staghorn coral taken illegally from Florida or other waters.

Florida

Oceans and Coastal Resources Act

The Oceans and Coastal Resources Act states that the coral reefs of southeast Florida and the barrier reef of the Florida Keys are a national treasure and must continue to be protected (Florida Statute §161.72(e)). Both the FDEP and Florida Fish & Wildlife Conservation Commission (FWC) are authorized to promulgate regulations under this act (Florida Statute §161.75).

Florida law prohibits taking, attempting to take, or otherwise destroy, or sell or attempt to sell any hard or stony coral (Order Scleractinia) in state waters, with exceptions for permitted scientific research, educational purposes and aquaculture (Chapter 68B-42.009 of the Florida Administrative Code; <http://fac.dos.state.fl.us/faconline/chapter68.pdf>). It also prohibits possession of such fresh, uncleaned or uncured coral. Any person who willfully violates the above prohibitions is subject to fines (section 253.04 of Florida Statutes). Any person in possession of elkhorn or staghorn coral legally harvested outside of Florida waters or the U.S. EEZ adjacent to state waters and entering Florida in interstate or international commerce must establish the chain of possession from the initial transaction after harvest, by appropriate receipt(s), bill(s) of sale, or bill(s) of lading, and any customs receipts, and to show that such species originated from a point outside Florida waters or the U.S. EEZ adjacent to state waters and entered the state in interstate or international commerce (68B-42.009(2)(a)).

The Florida Aquatic Preserve Act

One of the goals of the Florida Aquatic Preserves Act (18 Florida Administrative Code 258) is to preserve, promote, and utilize indigenous life forms and habitats, including hard corals. The Florida Aquatic Preserve Act implemented a system of protected areas within Florida, such as Biscayne Bay Aquatic Preserve.

Biscayne Bay Aquatic Preserve was established in 1974 and it encompasses 69,000 acres of State submerged lands. The preserve extends from Miami-Dade County to Monroe County. The Act establishing Biscayne Bay Aquatic Preserve restricts dredge and fill activities and alteration of physical conditions, and discharge of wastes that substantially inhibit the purposes of the preserve.

Coupon Bight Aquatic Preserve is the southern most aquatic preserve located in the lower half of the Florida Keys. It is a shallow semi-enclosed basin approximately 3.5 kilometers (2.2 miles) long and 2.5 kilometers (1.6 miles) wide with an average depth near the center of 1.8 meters (6 feet). Its waters have been designated as Outstanding Florida Waters, and as such, the FDEP cannot issue permits for direct pollutant discharges, which would lower existing water quality, and indirect discharges, which would significantly degrade that water body.

John Pennekamp Coral Reef State Park

The John Pennekamp Coral Reef State Park in Monroe County encompasses 178 nautical square miles of coral reefs, seagrass beds, and mangrove swamps and is contained within the FKNMS. Florida Statute §258.083 states it is unlawful for any person, firm, or corporation to (1) bring into or transport through any part of the state, including its waters, any coral or other material taken from the subsoil or seabed of any portion of the John Pennekamp Coral Reef State Park adjacent to or in the vicinity of the state which has been taken in violation of any law or regulation of the Federal Government, or (2) destroy, damage, remove, deface, or take away any coral, rock or other formation or any part thereof, of any portion of the John Pennekamp Coral Reef State Park adjacent to or in the vicinity of the state in which such action is in violation of any law or regulation of the Federal Government. The Park's management plan requires protection of the park's marine resources from among other things, all dredging, filling, and other construction activity by outside sources, and requires installation and maintenance of channel markers and mooring buoys to reduce anchor and boating impacts.

Florida Administrative Code, Chapter 18-21

Chapter 18-21 of the Florida Administrative Code prohibits installation of telecommunication lines that originate from or extend into federal waters on or under submerged lands within Biscayne Bay Aquatic Preserve, Biscayne Bay National Park, and Monroe County. Moreover, the law requires conduits for telecommunication lines to be directionally drilled under nearshore benthic resources, including the first reef and any other more inshore reefs off Southeast Florida, to the maximum extent practicable and to punch out in a location that avoids or minimizes the impacts to benthic resources such as seagrasses and live bottom communities including corals and sponges. The same chapter also requires that activities on submerged sovereignty lands be designed to minimize or eliminate any adverse impacts on fish and wildlife habitat, and other natural or cultural resources, with special attention and consideration given to endangered and threatened species habitat.

Florida's Coastal Zone Management Act of 1978

Florida's Coastal Zone Management Act of 1978 authorized the development of a comprehensive state Coastal Management Program (CMP) based on existing Florida Statutes and regulations. Florida's CMP is comprised of 23 statutes, which are administered by nine State agencies and five water Districts. The Federal CZMA and Florida law requires Federal agencies and applicants to provide a detailed description of proposed Federal activities that may affect the State's coastal resources, and the State's Department of Community Affairs coordinates the review of such activities to ensure that they are consistent with the State's CMP and Coastal Zone Management Act.

Section 403.061 of the Florida Statutes is part of the State's CMP and it authorizes FDEP to identify water bodies worthy of special protection because of their natural attributes. These waters are designated as "Outstanding Florida Waters", and the designation is intended to protect existing good water quality. FDEP cannot issue permits for direct pollutant discharges to Outstanding Florida Waters, which would lower existing water quality, and indirect discharges, which would significantly degrade that water body. Waters with the Outstanding Florida Water designation in which elkhorn and staghorn corals occur are: (a) in Palm Beach County: John D. MacArthur Beach State Park; (b) in Broward County: John U. Lloyd Beach State Recreation Area, and North Beach; (c) in Miami-Dade County: Biscayne National Park, ITT/Hammock, and Biscayne Bay; (d) in Monroe County: Dry Tortugas National Park, Key West

National Wildlife Refuge, National Key Deer National Wildlife Refuge, Bahia Honda State Park, Bill Baggs Cape Florida State Recreation Area, Hugh Taylor Birch State Recreation Area, Long Key State Recreation Area, Fort Zachary Taylor Historic Site, Indian Key State Historic Site, Indian Key State Historic Site, Key Largo Hammock State Botanical Site, Windley Key Fossil Reef State Geological Site, San Pedro Underwater Archaeological Preserve, Coupon Bight, Curry Hammock, North Key Largo Hammock, Port Bougainville, and Biscayne Bay.

FDEP regulates activities that involve alteration of surface water flows through the Environmental Resource Permit (ERP) Program. The purpose of the ERP Program is to ensure that construction activities do not degrade water quality, cause flooding, or degrade habitat for aquatic or wetland dependent wildlife. Activities requiring permits involve, but are not limited to involving, the following: 1) solid waste, hazardous waste, domestic waste, and industrial waste facilities; 2) mining; 3) docking facilities and attendant structures and dredging that are not part of a larger plan of residential or commercial development; navigational dredging conducted by government entities, except when part of a larger project that a Water Management District has the responsibility to permit; systems located in whole or in part seaward of the coastal construction control line; seaports; and smaller, separate water-related activities not part of a larger plan of development, such as boat ramps, mooring buoys, and artificial reefs. Similar to the process described under the Federal RHA, the state of Florida requires project modifications and mitigation measures for corals through the ERP permit review process.

Pollution Discharge Prevention and Control Act

The Pollution Discharge Prevention and Control Act (28 Florida Statutes §§ 376.011 et seq.) prohibits the discharge of pollutants into or upon any coastal waters, estuaries, tidal flats, beaches, or lands adjoining the seacoast of the state. Pollution is defined as the presence in the outdoor atmosphere or waters of the state any one or more substances or pollutants in quantities which are or may be potentially harmful or injurious to human health or welfare, animal or plant life, or property or which may unreasonably interfere with the enjoyment of life or property, including outdoor recreation.

Florida and Cruise Ship Industry MOU

In 2001, the State of Florida entered into a Memorandum of Understanding (MOU) with the cruise ship industry through the International Council of Cruise Lines and related organizations. Under the MOU, cruise lines must eliminate wastewater discharges in Florida waters within 4 nautical miles of the State's coast, report hazardous waste off-loaded in the U.S. by each vessel on an annual basis, and submit to environmental inspections by USCG (Congressional Research Service, 2005).

Monroe County Code of Ordinances

The Monroe County Code of Ordinances does not permit dredging of hard bottom communities to construct a boat ramp (section 9.5-349(1)(7)). Docking facilities may be permitted which terminate over hardbottom communities where the water depth at the terminal platform is at least 4 feet above the top of all corals at mean low water and access to open water is continuous (section 9.5-349(m)(5)). Water access walkways are not permitted when designed to terminate over hardbottom communities (section 9.5-349(n)(1)(f)).

Puerto Rico

The Act for the Protection, Conservation and Management of Coral Reefs in Puerto Rico (Law 147)

Law 147 authorizes Puerto Rico's Department of Natural and Environmental Resources (DNER) to take all measures needed for the protection, conservation, and management of coral reefs and coral communities throughout the territorial waters of Puerto Rico (12 LPRA 241c). These measures include

adopting a program for the protection, conservation and management of coral reefs. Among the program's tasks is to identify every source of environmental pollution harmful to coral reefs and coral communities and to recommend the control measures necessary to prevent said pollution and any negative impacts on these coral resources.

Law 147 also requires an Environmental Impact Statement for every project that may cause a negative impact on coral reefs, coral communities and associated marine systems. It also requires the Planning Board and DNER to draft zoning regulations to limit the development of residential, recreational, and tourist projects to areas free from adverse and detrimental impact on coral reefs, coral communities, and associated marine life (12 LPRA § 241e).

Law 147 authorizes DNER to create reserves, reef recovery and ecologically sensitive areas and identify them with buoys or other floating markers; identify those reef formations and coral communities that may be impacted by vessels that have run aground or been anchored, and prepare maps identifying coral reef sites. DNER can impose fines on any person for: 1) extracting, removing, mutilating, or otherwise destroying or damaging any coral reef or reef community or portions thereof; 2) offering for sale, exchange, donation, or otherwise trafficking in or disposing of live or dead coral reef or live or dead portions thereof and organisms deemed attractive for aquariums and ponds; 3) polluting, depositing solid or liquid waste or using any chemical substance on coral reefs and coral communities or portions thereof or on associated ecosystems, such as marine grasslands; and 4) fishing, snorkeling, or skin diving in reef recovery areas, marine reservations and other duly identified areas (12 LPRA §241f). There are exceptions for scientific, educational, and management purposes (12 LPRA § 241g). The law also authorizes DNER to undertake all pertinent measures against owners or captains of vessels that run aground on coral reefs so as to have them restore said system (12 LPRA § 241d).

Law 137

Law 137 directs the DNER to designate priority areas as marine reserves, including a minimum of 3 percent of the insular platform within three years (2003). Marine reserves are defined as areas where all extractive activities are prohibited in order to help recover depleted fishery resources and protect biodiversity; such reserves can protect *Acropora* sp. by preventing impacts from fishery gear. To date, three marine reserves have been established: Luis Peña Channel Marine Reserve, Isla de Desecheo Marine Reserve, and Tres Palmas Marine Reserve. The Luis Peña and Desecheo Reserves are entirely no-take, Tres Palmas has a no-take zone, and all have mooring buoys to protect benthic habitats. Elkhorn coral and/or staghorn coral are found in the following protected areas: Isla de Mona Natural Reserve (Mona Island), Arrecifes de Guayama Natural Reserve (off the municipality of Arrojo on the south coast), Arrecifes de la Cordillera Natural Reserve (off the municipality of Fajardo on the east coast), Tres Palmas Marine Reserve (off the municipality of Rincón on the west coast), Punta Guaniquilla Natural Reserve (north of Boquerón Bay off the municipality of Cabo Rojo on the southeast coast), Canal Luis Peña Natural Reserve (Culebra Island), Isla de Desecheo Marine Reserve (Desecheo Island), and La Parguera Natural Reserve (off the municipality of Lajas on the south coast).

Fishery Law 83 of 1936

Fishery Law 83 of 1936 prohibits harvest or take of corals or live rock for commercial purposes, except under permit, and use of poisonous substances when fishing. The territory prohibits fishing by means of explosives in its maritime waters (12 LPRA §57), and it is illegal to transport or sell articles derived from rare or endangered species as designated by the DNER (12 LPRA §107d).

Law 57

Desecheo Island Marine Reserve was established by Law 57. The reserve is a closed to general entry and can only be visited with special permission for scientific research.

Resolution PU-002 under Law No. 75 of 1975, as amended: Organic Law of the Puerto Rico Planning

The majority of natural reserves and state forests have been designated through this resolution and its extensions. The following natural reserves occur within the marine environment and may contain acroporids

BoardPiñones, Punta Petrona, Ceiba and La Parguera Natural Reserve
Arrecifes de Guayama, Caja de Muertos, Boquerón, Laguna de Joyuda and Arrecifes de la Cordillera
Río Espíritu Santo Natural Reserve
Guánica State Forest
Natural Reserve Las Cabezas de San Juan, Fajardo
Isla de Mona and Monito Natural Reserve
La Parguera Natural Reserve
Hacienda La Esperanza, Manatí Natural Reserve
Vieques Bioluminescent Bays Natural Reserve
Pantano Cibuco, Vega Baja Natural Reserve
Cueva del Indio Natural Reserve
Las Cabezas de San Juan Natural Reserve
Tourmaline Natural Reserve
Boquerón Natural Reserve
Pantano Cibuco Natural Reserve
Canal Luis Peña Natural Reserve
Punta Guaniquilla Natural Reserve

U.S. Virgin Islands (U.S.V.I.)

The Endangered and Indigenous Species Act of 1990

The Endangered and Indigenous Species Act of 1990 (12 Virgin Islands Code §105) mandates that no person may take, catch, possess, injure, harass, kill or attempt to take, catch, possess, injure, harass, or kill, or sell or offer for sale, or transport or export, whether or not for sale, any indigenous species, including live rock, which includes elkhorn and staghorn coral; except that persons holding valid fishing or hunting licenses, scientific or aquarium collecting permits, or indigenous species retention permits, may operate within the scope and under the terms and conditions expressed in those licenses and permits. To date, there have been no permits issued to collectors to take either elkhorn or staghorn coral in the U.S.V.I.

St. Croix East End Marine Park

The U.S.V.I. established the St. Croix East End Marine Park in 2002 to protect territorially significant marine resources, promote sustainability of marine ecosystems, including coral reefs, and to conserve and preserve significant natural areas for the use and benefit of future generations. The park surrounds the entire east end of St. Croix and encircles Buck Island Reef National Monument and is managed by the Virgin Islands Department of Planning and Natural Resources. The park encompasses an area of approximately 60 square miles (155 square kilometers). Moving, removing, taking, harvesting, damaging, disturbing, breaking, cutting, or otherwise injuring, or possessing any living or dead coral or coral formation or attempting any of these activities is prohibited throughout the park, except when permitted (Virgin Islands Code, Title 12, Chapter 1, Section 98-4). The following activities are also regulated or prohibited in the St. Croix East End Marine Park (ibid):

- Drilling into, dredging, or otherwise altering the seabed of the Park, or engaging in prop dredging; or constructing, placing or abandoning any structure, material, or other matter on the seabed of the Park, except as an incidental result of otherwise allowed activities.
- Discharging, depositing, placing or abandoning, or allowing the discharge, deposit, placement or abandonment of, any natural or man-made material that a person or vessel has brought into the Park from outside the Park.
- Operating a vessel in such a manner as to strike or otherwise injure coral, seagrass, or any other immobile organism attached to the seabed, including, but not limited to, operating a vessel in such a manner as to cause prop scarring.
- Operating a vessel outside officially marked channels that creates a wake within 100 yards of navigational aids that indicate emergent or shallow reefs or operating in such a manner as to endanger marine resources.
- Anchoring a vessel in hardbottom or coral communities¹¹.

Other Marine Parks and No-Take Zones

The taking of any living organism or part thereof is prohibited in The Cas Cay/Mangrove Lagoon Marine Reserve and Wildlife Sanctuary, St. Thomas, the St. James Marine Reserve and Wildlife Sanctuary, St. Thomas, and the Salt River Bay Marine Reserve and Wildlife Sanctuary, St. Croix (12 VIC § 906).

U.S.V.I. law (12 VIC § 906) states that sand, rock, mineral, marine growth and coral, natural materials or other natural products of the sea, excepting fish and wildlife, shall not be taken from the shoreline without first obtaining a coastal zone permit, and no permit shall be granted unless it is established that such materials or products are not otherwise obtainable at reasonable cost, and that the removal of such materials or products will not significantly alter the physical characteristics of the area or adjacent areas on an immediate or long-term basis.

International

The FKNMS falls within a Particularly Sensitive Sea Area (PSSA), as designated by the International Maritime Organization. A major benefit of this designation, which became official in December 2002, is that it provides international recognition of the voluntary “Areas To Be Avoided” by vessel operators and no-anchoring zones on the Tortugas Bank.

As stated previously, the Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES) is an international agreement between governments, which applies to international trade.

¹¹ The above does not list all prohibited activities, such as the prohibition of the sale of any consumer item or the conduct of any commercial activity, except as authorized by special permit.

Scleractina species are CITES Appendix II specimens (www.cites.org/eng/app/appendices.pdf). Both elkhorn and staghorn corals are among those species and as such, a permit from the country of origin is required in order to export live or dead specimens of these stony corals.

1.4.2.3 State and Local Government, and Private Activities Affected by the 4(d) Rule

Certain activities carried out by state or local governments, or private entities that do not require ESA section 7 consultation may be affected by the final rule if the activities result in a violation of the ESA section 9 prohibitions extended in this rule. Although there may be other activities that affect corals, only those activities affected by the final rule are discussed.

Commerce in Live and Dead Specimens

Growth in the international trade of live stony corals (Order Scleractina) increased approximately 375 percent during the 1990s from about 200,000 units (one unit equals one saleable piece of coral) in 1990 to 750,000 units in 1999 (Government of Western Australia, 2006). The U.S. imports 60 to 80 percent of the live coral and 95 percent of the live rock and coral substrate in international trade each year (Bruckner, 2000). Federal, state and territorial regulations prohibit harvest or possession of elkhorn or staghorn coral in all U.S. waters, and the Lacey Act prohibits trade of illegally obtained specimens. There is no evidence of trade of live *A. palmata* or *A. cervicornis* specimens taken from foreign waters and imported into the U.S. for aquaria or other uses. The final 4(d) rule would reinforce and add to prohibitions on coral harvest and trade activities in the U.S. by specifically prohibiting these activities for elkhorn and staghorn corals.

As stated above, international agreements and Federal and State/Territorial laws limit the sale of elkhorn and staghorn coral skeletons. Sales of elkhorn and staghorn coral skeletons as curios and as components of artistic creations are evidenced on the Internet and in retail stores and other outlets; however, they appear to be predominantly species taken from Pacific waters.¹² The 4(d) rule would prohibit the trade of elkhorn and staghorn skeletons, unless accompanied by documentation that the specimen was collected prior to listing and in accordance with all other applicable laws.

Marine Freight and Passenger Transportation

More than 40 percent of the world's shipping commerce transits through the Florida Straits each year (NOAA, NOS, April 2006). From 1984 to 2002, ten large ship groundings occurred in the Florida Keys and Tortugas. Large vessel groundings have also damaged coral reefs in Puerto Rico and the U.S.V.I. Anchor drops from large cruise and other vessels damage coral. Coral reef damage caused by large ships anchoring in the Florida Keys and Tortugas occurred at least 17 times from 1997 to 2002. The final 4(d) rule would reinforce prohibitions on vessel groundings and anchor drops in coral reefs that impact elkhorn and staghorn corals.

Snorkeling and Diving

As evidenced by the regional economies described above, coral reefs are a tourist attraction and site for snorkeling and SCUBA diving, and both elkhorn and staghorn corals are directly impacted by these activities. Divers and snorkelers who visit coral reef ecosystems can physically damage reefs in areas

¹² Black coral skeletons, not elkhorn and staghorn coral skeletons, are the coral skeletons of choice when making jewelry. A March 23, 2007, article in the St. Petersburg Times identified an artist who created a chandelier with green turbo shells and staghorn coral. The artist's website claims many corals are no longer available in her designs.

where activities are heavily concentrated. Novice snorkelers or divers may stand on or kick the corals causing breakage, though there are no studies to document the frequency of this damage. The final 4(d) rule will prohibit take that results from snorkeling and diving.

Boating and Fishing

Recreational boaters' anchors and boat groundings cause physical damage to elkhorn and staghorn corals. The anchor damage is proportional to the weight of the anchor and length of the anchor chain. The shallow habitat of elkhorn coral makes it especially likely to be present at grounding sites, and certain populations near high boat traffic areas (particularly recreational boat traffic) are suffering somewhat chronic damage from repeated groundings.

From 1980 to 1998 there were 2,412 known vessel groundings in the FKNMS, and 551 of those were in 1994. Approximately 60 to 90 small vessel (vessels less than 30 meters) groundings on coral reefs are reported annually to the State of Florida (FWC Law Enforcement records); however, it is likely two to three times that number go unreported. These smaller scale groundings damage individual colonies but are less likely to impact the framework or topography of the reef than large vessel groundings. Similar activities occur in Puerto Rico and the U.S.V.I.

In a recent study of 63 offshore coral reef and hard-bottom sites in the Florida Keys, Chiappone et al. (2005) quantified the impacts of lost fishing gear to coral reef sessile invertebrates. In general, the factors affecting the impacts of lost fishing gear include sessile invertebrate density, the density of lost fishing gear, and gear length. While lost hook-and-line fishing gear is ubiquitous in the Florida Keys, it was estimated that less than 0.2 percent of the available milleporid hydrocorals, stony corals, and gorgonians in the habitats studied were adversely affected in terms of colony abrasions and partial mortality. Conversely, trap gear can have a substantial impact on the delicate branching morphology of elkhorn and staghorn corals. In a 2007 survey of acroporids, the most documented human-related impact was entanglement in trap rope (M. Chiappone pers. Comm.)

1.4.2.4 Federal Activities Affected by the 4(d) Rule

All federal actions are subject to the requirements of ESA section 7, as will be discussed in greater detail below. As such, all federal actions (i.e., authorized, funded or carried out by federal agencies) that may result in violation of the prohibitions extended through the 4(d) rule will be affected by the proposed action. Federal actions undergoing consultation may involve third party permittees or grantees, that may consist of private individuals, businesses, or governmental entities seeking to implement a project. Applicants in turn may hire contractors to perform the actual project work. These non-federal parties may be affected by the final rule. Federal activities that may adversely affect the corals are discussed below and organized in terms of the federal agency conducting, funding, or authorizing the activity. The following discussion provides the foundation for our discussion of economic impacts of the final rule in subsequent sections.

US Army Corps of Engineers

The US Army Corps of Engineers (USACE) is responsible for carrying out and permitting the majority of actions with the potential to affect the areas in which the corals and their proposed critical habitat occur (see Table 21; 402 of 548 consultations). USACE civil works districts undertake projects to maintain navigation channels and water infrastructure, conduct environmental restoration, and maintain flood control. USACE regulatory districts grant permits for private activities in navigable waterways under section 404 of the CWA and section 10 of the RHA.

Dredging and Disposal

Dredging is the removal of material from the bottoms of water bodies, and is most often done to deepen, widen or maintain navigation corridors, anchorages, or berthing areas. It is also done to mine sand to use as fill for land reclamation and other construction projects. Dredging for navigation purposes may also involve disposal of dredge spoil material within the marine environment. There are four basic types of dredge equipment typically used in the range of the two corals and affected area: hopper dredges, hydraulic cutterhead dredges, hydraulic suction dredges, and bucket/clamshell dredges. Dredging and disposal, regardless of the method used, produces mechanical, turbidity, and sedimentation impacts. These impacts can result in direct removal, sedimentation that can smother the corals, and turbidity that can substantially reduce light-penetration, which deprives corals' zooxanthellae of the light they require for photosynthesis, leading to bleaching or die-offs. Additionally, increased respiration and mucus production has been observed in corals from exposure to turbidity and sedimentation at moderate levels for extended periods (Telesnicki and Goldberg 1995). Secondary impacts can result from the vessel and equipment used. The vessel may ground in coral habitat or drag its anchor, therefore crushing the corals. Pipelines used in transporting dredged material can drag and crush the corals.

Maintenance Dredging and Disposal

Maintenance dredging is the same as discussed above, only the purpose is to maintain existing channels, ports, and marinas for safe navigation, rather than creating new ones. Typically, the species will not be present in the footprint of the dredging, because the substrate is composed of unconsolidated sediment. However, the sedimentation effects on the corals of dredging and disposal would be the same as discussed above.

Beach Nourishment/Bank Stabilization

Beach nourishment and bank stabilization include placement of sandy material on a beach through overland hauling or dredging of offshore sand deposits. In either case, there is the potential for sediment to become suspended in the water column, which could be carried offshore and be deposited on corals or their habitat. If the corals were present within the area impacted by the project, they could be adversely affected. Sediments can smother corals and reduce water clarity, which deprives corals' zooxanthellae of the light they require for photosynthesis.

Construction (USACE permitted activities - docks, piers, private dredging, private disposal, private shoreline stabilization, aquaculture, oil and gas pipelines, cables)

Generally, the USACE permits construction in the waters of the U.S. Docks and piers provide permanent and/or temporary mooring locations for vessels. This category includes single-family home docks and large vessel berthing. Piles driven into the substrate support the framework and the decking. They can be fixed above the water or can be floating and are typically made of concrete or treated wood. Private dredging and disposal is the same as discussed above, only the responsible entity is not the USACE; it is third party who receives a permit from the USACE. Similarly, private shoreline stabilization is the same as discussed above for beach renourishment/bank stabilization, with a third party applicant. Oil and gas pipelines and cables are placed on the seafloor. The pipe or cable is fed from a lay vessel and allowed to drop to the seafloor. The cable or pipe can be secured to the seafloor or covered with boulders or concrete mats to prevent movement and for protection of the cable or pipe.

All of the above mentioned activities can impact the corals if the corals are present in the footprint of the project. In addition to direct removal, sedimentation and turbidity can be caused by the activities and have the adverse effects discussed above.

Aquaculture is permitted by the USACE and NMFS and is the farming of aquatic organisms including fish, mollusks, crustaceans, and aquatic plants with some sort of intervention in the rearing process to

enhance production, such as regular stocking, feeding, protection from predators, etc. There is no evidence of aquaculture operations that involve the sale of live rock or other aquacultured elkhorn or staghorn coral in Puerto Rico and the U.S.V.I. However, Florida law allows for the sale of aquacultured live rock that may have elkhorn and staghorn corals settled on it (68B-42.008 and 68B-42.009(2)(c) of the Florida Administrative Code). Similarly federal regulations allow for the possession of corals harvested on permitted live rock (50 CFR 622.41); this activity only occurs in Florida. According to the Florida Agricultural Statistics Service, in 2005, there were six Florida aquaculture operations with sales of live rock and with combined net sales of \$341,000 (USDA, NASS, FASS)¹³. While the 4(d) rule would prohibit sales of live rock in Florida that includes elkhorn or staghorn corals, there is no evidence of, this activity within the past 10 years. However, we expect that the prohibition on take will result in reinitiation of consultation on USACE's and NMFS' live aquaculture permitting program to account for the possibility of take, and identification of potential project modifications (RPMs) such as those discussed in the next section.

Maintenance Construction (USACE permitted activities - docks, piers, private dredging, private disposal, private shoreline stabilization, aquaculture, oil and gas pipelines, cable)

Maintenance construction involves all of the activities discussed above in the section on construction activities, only the activity is undertaken to maintain an existing structure.

Department of Defense (DOD)

Military Installations

DOD operates several military installations in and near areas of coral reef ecosystems, such as Key West, Puerto Rico, and the U.S.V.I. Homestead Air Force (Reserve) Base is located about ten miles from Biscayne National Park and Naval Air Station Key West is located on Boca Chica Key, which is 5 miles from Key West. The development and maintenance of military installations adjacent to and in coastal waters involves many of the construction activities already discussed. The DOD may need to build and maintain navigation channels, marinas, and ports. They may need to construct docks or stabilize their shoreline. Lastly, DOD regulates discharges to surface waters from their installations. The effects to the corals are discussed above and below in the dredge and disposal, USACE permitted activities, and discharges to navigable waters sections.

Ship/Vessel/Aircraft Operations

The military conducts ship, vessel, and aircraft operations in and over the coastal waters of the U.S. DOD maintain areas of water to conduct training exercises. According to the DOD Coral Reef Protection Implementation Plan, it is "DOD policy to avoid, where possible, adversely impacting coral reefs during training exercises and routine operations. Consistent with essential national security and mission requirements, DOD carefully plans maritime exercises and routine operations so as to avoid physical damage to coral reefs from ships and landing craft, and biological impairment from oil and fuel spillage, chemical/ hazardous waste releases, and excessive noise." As discussed above in dredging and disposal, ships and vessels may ground or drag their anchors, and crush the corals that lie in their path. Ammunition may also land on or near the species and crush it.

Environmental Protection Agency

The EPA is responsible for promulgating water quality criteria, reviewing state water quality standards, listing impaired water bodies, issuing or delegating authority to the states for National Pollutant

¹³ Net value of sales equal gross value of sales less the value of rock purchased for growing live marine animals and/or plants on.

Discharge Elimination System (NPDES) permits, and identifying Total Maximum Daily Loads (TMDLs) for waterbodies resulting from point and non-point source pollution. Sewage, cruise ship and industrial effluent, storm water and agricultural runoff, river discharge, and groundwater are sources of nutrients, sediments, turbidity, and contaminants that may adversely affect corals. Two components of discharges from land are nitrogen and phosphorus (nutrients). Nutrifaction (excess nutrients) from ocean outfall discharges contribute to algal and bacteria blooms that smother or shade the species. Runoff from coastal developments (oils and grease from roadways and parking lots, herbicides and pesticides from landscaping, stormwater discharges) further degrade water quality with the addition of contaminants and turbidity. Cruise ships are exempted from discharge requirements of the CWA; however, they cannot discharge untreated sewage within 3 miles of shore in the U.S. generally, and 4 nautical miles from shore in Florida. All of these factors could result in adverse effects on the species by decreased recruitment, impaired health, disease, and mortality.

Federal Aviation Authority (FAA)

Similar to the construction and maintenance of military installations, the FAA authorizes the construction and maintenance of airports. Construction activities could lead to run-off causing sedimentation, turbidity, and contamination.

Federal Energy Regulatory Commission (FERC)/Nuclear Regulatory Commission (NRC)

FERC and NRC consult with the Services on relicensing of private, municipal, and state energy projects. The operation of power plants often requires the uptake of cooling waters, which are released at a higher temperature than ambient. Elkhorn and staghorn corals exist near their maximum temperature tolerances of 25 to 29° C. If cooling waters are released higher than 29° C and prolonged exposure to elevated temperatures causes the corals to bleach, it may lead to mortality. Existing state and territorial water quality standards for thermal discharges require that thermal discharge be minimal above ambient.

Federal Highway Authority/US Department of Transportation

The FHWA/USDOT provides funding to state Departments of Transportation (DOTs) for road and bridge construction projects. Similar to the construction projects discussed above, bridge and road repair can directly impact the species if they are present in the footprint of the construction. They can also be affected by sedimentation and turbidity associated with the construction.

National Marine Fisheries Service

NMFS approves and implements Fisheries Management Plans (FMPs), which contain conservation and management measures designed to prevent overfishing and rebuild overfished stock, and to protect, restore, and promote the long-term health and stability of each fishery. Different fisheries use different gear types, which are authorized by regulations implementing the FMPs, of which many can impact corals. Elkhorn and staghorn corals are especially vulnerable to damage due to their branching morphology. Bottom-tending gear (including trawls and traps) can drag over the species and dislodge them from their attachment point. The colony or fragment can be crushed or abraded, causing mortality. Additionally, derelict lines, buoys, and associated gear can become entangled on the species, abrading tissue and eventually eroding the skeleton, causing the colony to break. Lastly, as discussed above, vessels can impact the species by grounding or poor anchoring practices.

National Oceanic and Atmospheric Administration/Department of Interior *Research*

NOAA and DOI Services are responsible for conducting and permitting research activities including monitoring and other studies that are directed at, and occur within the geographic area occupied by, the listed corals. Research activities may include the collection of the species for laboratory studies or the manipulation of the species in the field. Either activity may result in the mortality of or harm to the species. However, typically these permit programs allow research activities while limiting, to the maximum extent practicable, the amount of resources collected or impacted that will still yield sufficient data to support the research objectives.

Resource Management

NOAA and DOI are responsible for managing lands specifically for wildlife and natural resources. Specifically, they are responsible for National Marine Sanctuaries, National Estuarine Research Reserves, National Parks, National Monuments, and National Wildlife Refuges. These different areas are created and maintained for various purposes from strict resource protection to human use. The development of management plans is necessary for each of these protected areas. Protected areas' resource management plans are diverse in the activities that they cover. Overall, impacts to the species would arise from the direct human use of the protected area, such as boating, fishing, SCUBA diving and snorkeling, and construction. Additionally, in some cases water quality is regulated specifically for the protected area. Impacts to the species from water quality regulation would be the same as those discussed above. Specifically for diving and snorkeling, impacts would arise from the person breaking the species due to poor buoyancy control. Indirect impacts could arise from the boats the divers/snorkelers use to access the reefs.

US Coast Guard (USCG)

Response to Oil Spills and Vessel Groundings

The USCG is responsible for implementing the Oil Pollution Act through responding to oil spills and vessel groundings (that present the risk of an oil spill). Additionally, the USCG can recover the costs incurred through the removal of discharges of oil, including costs of prevention, minimization or mitigation of substantial threats of discharges. The coral species may be impacted by the actual oil spill or vessel grounding. Additionally, the USCG's response to the incident could impact the species. The method of removal of the oil could be detrimental to the species depending on the properties of the oil and the hydrodynamics of the system. The removal of a grounded vessel in a reef environment could impact the species if care is not taken to identify an egress path to avoid the species if present.

Aids To Navigation (ATONs)

The USCG is responsible for maintaining safe navigation in the waters of the U.S. To accomplish this goal, they install and maintain ATONs including channel lights, buoys, and permanent pilings. The potential impact of these activities would be from direct placement of an ATON on the species.

Anchorage

Sections 4 (a) and (b) of the Ports and Waterways Safety Act authorized the USCG to direct the anchoring of vessels through the designation of special anchorage areas. Anchorages have the potential to impact the species if the anchorage is located directly in the reef habitat. Anchorages that are located near the species habitat have the potential to incidentally impact the species if the anchored vessel becomes free from its anchor and grounds on the reef.

1.5 Economic Impacts of Alternatives

The following section describes each of the alternatives and describes how their implementation would impact affected economies. This analysis takes into consideration the information presented in Section 1.4.2.4. Key assumptions included in the analysis are indicated throughout.

1.5.1 Preferred Alternative

This action will implement a 4(d) rule that extends all of the ESA Section 9(a)(1) prohibitions to elkhorn and staghorn corals, with limited exceptions.

Section 9 (a)(1) of the ESA prohibits, except as provided in sections 6(g)(2) and 10 of the Act, any person subject to the jurisdiction of the United States (U.S.) to:

- (A) Import any endangered species into, or export of any such species from the U.S.;
- (B) Take any such species within the U.S. or the territorial sea of the U.S.;
- (C) Take any such species upon the high seas;
- (D) Possess, sell, deliver, carry, transport, or ship, by any means whatsoever, any such species taken in violation of subparagraphs (B) and (C);
- (E) Deliver, receive, carry, transport, or ship in interstate or foreign commerce, by any means whatsoever and in the course of a commercial activity, any such species;
- (F) Sell or offer for sale in interstate or foreign commerce any such species; or
- (G) Violate any regulation pertaining to such species or to any threatened species of fish or wildlife listed pursuant to section 4 of the ESA and promulgated by the Secretary pursuant to the authority provided by the ESA.

Section 9(b)(1) specifies that the provisions of section 9 (a)(1)(A) and (a)(1)(G) do not apply to any species which was held in captivity or in a controlled environment on: (A) December 28, 1973, or (B) the date of the publication in the Federal Register of the final regulation adding the species to the list of threatened and endangered species; provided, that such holding and any subsequent holding or use of the species is not in the course of a commercial activity.

The exceptions to the prohibitions included in the final 4(d) rule are for:

- Export and take resulting from scientific research and enhancement activities conducted under six specific existing Federal, state, or territorial research permitting programs. Several Federal, state, and territorial natural resource management agencies permit scientific research and enhancement activities, including monitoring and other studies that are directed at, and occur within the geographic areas occupied by, the listed corals. Any export or take resulting from scientific research permitted by these agencies would be excepted by NMFS in the final 4(d) rule from the ESA section 9(a)(1)(A), (B), and (C) prohibitions; and

- Take resulting from certain restoration activities carried out by an authorized (under current laws) Federal, state, territorial or local natural resource agency. Certain Federal, state, territorial, and local government agency personnel, or their designees as applicable, may take elkhorn or staghorn corals without a permit when they are performing specific restoration actions directed at listed corals under an existing legal authority that provides for such restoration. For purposes of this exception, we consider a “restoration activity” to be the methods and processes used to provide aid to injured individuals. The activity that caused the injury would not be excepted by this rule. Through this exception, we are not authorizing any activities which are not currently authorized under an existing statute, rather we are excepting these activities from the section 9(a)(1)(B) and (C) prohibitions for the two listed corals.

Scientific research and enhancement activities are excepted from the ESA section 9(a)(1)(A) prohibition on export because a researcher export samples collected in the U.S. to a colleague in a foreign country. Under this exception, researchers would not be required to obtain an ESA 10(a)(1)(A) permit for export of elkhorn or staghorn samples or specimens. In contrast, the exception to the ESA section 9(a)(1)(A) prohibition is not provided in the restoration activities exception, because of the narrow scope of the excepted activities (i.e., reattaching fragments in the area of injury).

Prohibiting Import or Export of Elkhorn or Staghorn Coral

The ESA defines “import” to mean to land on, bring into, or introduce into or attempt to land on, bring into, or introduce into, any place subject to the jurisdiction of the U.S., whether or not such landing, bringing, or introduction constitutes an importation within the meaning of U.S. custom laws (16 U.S.C. 1532(k)).

There are existing restrictions and prohibitions on the importation and exportation of elkhorn and staghorn corals. Both live and dead elkhorn and staghorn corals are CITES Appendix II specimens; therefore, CITES, and thus section 9(c) of the ESA, requires a permit from the country of origin in order to export these stony corals. In the U.S.V.I., the Endangered and Indigenous Species Act of 1990 (12 Virgin Islands Code §105) mandates that no person may export, whether or not for sale, any indigenous species, which includes elkhorn and staghorn corals.

Subject to the exception described above, the preferred alternative would prohibit importation or exportation of elkhorn or staghorn coral. Reports on the coral trade provide no evidence of current imports and exports of these corals. Consequently, the ESA section 9 import/export prohibition is expected to have a negligible impact on existing international trade activities¹⁴.

Antiques can be imported into the U.S. if accompanied by documentation that shows the article is at least 100 years old and has not been repaired or modified with any part of a listed species since December 28, 1973. Such antiques must enter through a U.S. Customs Service port. If the antique contains a species listed under the CITES, the shipment must be accompanied by a Pre-Convention Certificate.

ESA section 10(a)(1)(A) allows NMFS to permit the import or export of listed species for scientific purposes to enhance the propagation or survival of the affected species, including, but not limited to, acts necessary for the establishment and maintenance of experimental populations. The final 4(d) rule would allow scientific researchers to export without an ESA section 10(a)(1)(A) permit, either of the listed corals for the purposes of scientific research or enhancement activities conducted under six specific existing Federal, state, or territorial research permitting programs (including CITES permits for research purposes only).

¹⁴ Section 9(b)(1) states that the provisions in subsections (a)(1)(A) and (a)(1)(G) of that section do not apply to any fish or wildlife that was held in captivity or a controlled environment on either December 28, 1973, or the date of the publication in the Federal Register of a final regulation adding such species to any list pursuant to subsection (c) of section 4 of the ESA, provided that the holding or use of the fish or wildlife is not in the course of a commercial activity.

Prohibiting Take of Elkhorn or Staghorn Coral within the U.S., Its Territorial Sea and on the High Seas

Take as defined by the ESA means to harass, harm, pursue, hunt, shoot, wound, kill, trap, capture, or collect or to attempt to engage in such conduct. Costs of the preferred alternative arise from the modification of actions to comply with the take prohibition. As discussed in greater detail below, the categories of actions that may result in take are those that result in the mortality or physiological distress. These actions may include, but are not limited to: physical removal, abrasion, or breakage; deposition of sediment; elevation of nutrient concentrations; elevation of turbidity; and elevation of sea surface temperature. This 4(d) rule will prohibit taking of elkhorn or staghorn coral.

Section 10(a)(1) of the ESA authorizes NMFS, under some circumstances, to permit the taking of a species otherwise prohibited pursuant to section 9 if (A) such taking is for scientific purposes or to enhance the propagation or survival of the affected species, including, but not limited to, acts necessary for the establishment and maintenance of experimental populations; or (B) any taking otherwise prohibited if such taking is incidental to, and not the purpose of, the carrying out of an otherwise lawful activity.

This 4(d) rule will except from the section 10(a)(1)(A) permit requirement elkhorn and staghorn coral research and restoration activities that are otherwise authorized or permitted by certain existing laws. No provision of this 4(d) rule will provide exceptions to the section 10(a)(1)(B) permits (also known as an incidental take permit or ITP). However, we did not identify any private activity that would involve incidental take that would require an ITP because the activities and take would be covered by a section 7 consultations and ITS. For example, although live rock production is a private activity that may result in incidental take, this activity required authorization by the USACE, which would be subject to section 7 consultation.

Section 7 Impacts

Certain assumptions were made to conduct the analysis. Table 20 presents a summary of key assumptions applied to this analysis.

Table 20. Key assumptions applied to the estimation of costs of the final 4(d) rule.

Key Assumptions Applied to the Section 7 Impacts Analysis	
Key Assumption	Effect on Cost
No added administrative costs of consultation between listing and 4(d) rules.	-
The presence of other listed species has no influence on consultation.	+
Past 10 year consultation history is indicative of next 10 year consultation projection.	?
All future consultations are expected to be formal.	+
All project modifications are required.	+
-: This assumption may result in underestimate of real costs. +: This assumption may result in an overestimate of real costs. ?: This assumption has an unknown effect on real costs.	

The listing of the two corals initiated the federal action agency responsibility to conduct consultation under ESA section 7. The final 4(d) rule will not result in additional consultations. Rather, the final rule will require NMFS to identify RPMs necessary or appropriate to minimize the impact of incidental take predicted to result from proposed federal actions. Based on our experience with section 7 consultations for other species, the incremental administrative costs of identifying RPMs will be negligible, compared

to the analytical requirements and associated costs already required by the listing and the duty to ensure the action does not jeopardize the corals. Hence, we assume that there will be no additional administrative costs of consultation associated with the final rule. Similarly, we are unable to forecast if any of the costs stemming from this rule would actually have been part of the baseline due to the requirement to consult for other listed species affected by the same activity. Therefore, to be conservative, we assume that other listed species have no effect on the costs of this final rule.

In the absence of the 4(d) rule, ESA section 7 requires federal agencies to consult with NMFS on proposed actions to determine whether they are likely to jeopardize the continued existence of the listed corals, and if so, proposes reasonable and prudent alternatives (RPAs) that would avoid the jeopardy result. NMFS will also be required to issue an ITS during ESA section 7 consultation for any project that will take listed corals. An ITS must specify those reasonable and prudent measures (RPMs) that NMFS considers necessary or appropriate to minimize the impacts of incidental take. The ITS also sets forth the terms and conditions (including but not limited to reporting requirements) that must be complied with by the Federal action agency or any applicant to implement the RPMs. “Jeopardy opinions” would include both RPAs and RPMs.

ESA section 7 consultations that result in an ITS with RPMs and implementing terms and conditions may result in increased costs for the action agency and any project applicant over and above the costs of the currently required ESA section 7 consultation. However, RPMs along with the terms and conditions that implement them cannot alter the basic design, location, scope, duration and timing of the action and may only involve minor changes (50 CFR 402.14(i)(2)). During consultation, NMFS and the action agency may agree to changes in the project to avoid or reduce the impact of actions resulting in take of listed species (harm avoidance measures).

To determine the impacts of the final rule, we first must estimate the type and number of possible federal actions in the future that will require consultation because they may affect the corals. We then characterize the impacts of potential RPAs, RPMs and their implementing terms and conditions, and harm avoidance project modifications, from an evaluation of the project modifications we would potentially require based on the types of projects that may affect listed corals. Lastly, we must take into consideration the identity of the parties (e.g., individuals, businesses, governments) that may be affected by the final rule because they will be required to implement the project modifications identified through the ESA section 7 consultation process.

A query of NMFS’ Public Consultation Tracking System (PCTS) was conducted to identify past activities that required ESA section 7 consultations that, if proposed in the future would trigger consultation because they “may affect” elkhorn or staghorn corals. This technique has been used consistently in evaluating section 7 impacts. We believe this approach produced a reasonable estimation of future federal actions because many past actions were routine and implemented repeatedly. The PCTS database contains information dating from 1997, producing a consultation history spanning 10 years. The query was limited to the U.S. range of the species (i.e., Palm Beach, Broward, Miami-Dade, and Monroe Counties, Puerto Rico, and the U.S.V.I). The database contained varied entries to identify the activity conducted; in many cases, different entries actually represented the same activity. Therefore, the numerous entries in the “Type of Activity” field were categorized into general themes (herein referred to as Category of Activity). Whether these consultations were formal or informal was based on the species affected at the time of consultation and not whether they would have been formal or informal due to the corals’ listing. Because we have identified all of these activities as having the potential to adversely affect the species, and to avoid underestimating impacts, we assume that all of the projected future actions will require formal consultations. Therefore, we combined the numbers of formal and informal consultations to estimate the total number of future consultations. Based on extrapolating the consultation history of the past 10 years to the future, Table 21 summarizes numbers of consultations that may affect the listed corals over the next 10 years. The category of activity is followed by the federal action agency,

and the fourth column indicates if the affected party is the federal agency or a third party either authorized or funded by a federal agency.

Table 21. Numbers of future consultations by action category and action agency that may affect elkhorn or staghorn corals. Also indicated is whether the activity is carried out by the federal action agency or a third party permittee or grantee.

Category	Agency	# of Consults	Fed/ NonFed
Beach Nourishment/Bank Stabilization	USACE	27	Both
Construction (docks, piers, private dredging, private disposal, shoreline stabilization, aquaculture, oil and gas lines, cables)		333	NonFed
Dredging and Disposal		23	Fed
Maintenance Construction (docks, piers, private dredging, private disposal, shoreline stabilization, aquaculture, oil and gas lines, cables)		13	NonFed
Maintenance Dredging and Disposal		6	Fed
Military	DOD	20	Fed
Ship/Vessel/Aircraft Operations		34	Both
Discharges to navigable waters	EPA	28	NonFed
Water quality standards, NPDES, TMDLs		1	Both
Airport Repair/Construction	FAA	0	NonFed
Power Plant Operations	FERC/NRC	2	NonFed
Bridge Repair	FHA/USDOT	19	Fed
Fishery management	NMFS	23	Fed
Research	NOAA/DOI	1	Both
Resource Management		17	Fed
ATONs	USCG	1	Fed
TOTAL		548	

DoD – Department of Defense, TMDL – Total Maximum Daily Load, FAA – Federal Aviation Administration, FERC – Federal Energy Regulatory Commission, NRC – National Regulatory Commission, FHA – Federal Highway Administration, USDOT – U.S. Department of Transportation, DOI – Department of the Interior, ATON – Aids to Navigation

Although we have made the assumptions discussed above to be conservative, it is likely that this is an overestimation of the number of future formal consultations. This is because the low abundance of the

species makes it unlikely that the corals will be present in all future action areas. It is also impossible to predict the precise locations of the action areas for future consultations, thus the assumption that the corals will be adversely affected by every future federal action identified in this document, likely results in an overestimate of section 7 impacts.

Section 7 Project Modifications

As stated above, ESA section 7 consultation costs of this rule result from project modifications (i.e., RPMs or harm avoidance measures). In section 1.4.2.4., federal activities that may be affected by this rule were described, and ways in which they affect the two corals were identified. In this section, we describe potential project modifications that will lessen the impact of the activities on the corals. We also indicate which project modifications NMFS would expect to require, if any, for each category of federal activity, or whether a project modification would be a requirement based on the specifics of the proposed project (i.e., the size and scope). We also discuss whether a particular project modification is currently a requirement under another authority (Table 22). We also characterize the potential cost of each project modification to the extent practicable, given the current lack of information regarding the scope and precise location of future projects.

Project Relocation

In many cases a proposed project will have direct impact on the coral species because they occur in the footprint of the project. For example, the corals may occur in the area identified for a proposed dredge project or in the direct path of a proposed stormwater outfall. In such cases, NMFS would likely require project relocation. The goal would be to avoid all impacts to the listed corals. Project relocation may not always be feasible; therefore it would not necessarily be a requirement if listed corals were to be impacted by a proposed federal action. Similarly, it is not currently a requirement of any other regulatory agency. The exact cost of project relocation would be dependent on the specific project and the distance to the new project location. Therefore costs associated with this project modification cannot be determined.

Coral Relocation and Monitoring

In cases where a proposed project cannot be relocated to avoid impacts to the two species, NMFS would expect to require the relocation of corals away from the project area and subsequent monitoring. For example, if the species is present in the area identified for dredged material disposal, NMFS would likely require the corals to be relocated and monitored for up to 6 months to document survival and condition. This project modification would likely be a requirement for projects that have direct impacts to the two corals. This project modification is also currently required as a condition of all USACE permits that have direct impacts to corals. Approximate cost of coral relocation and monitoring will vary depending on the number of corals to be relocated, the distance to a suitable relocation site, and other specifics of the individual project. However, in general personnel and operations, based on federal agency cost estimates are approximately \$8-15K per day (T. Moore pers. Comm.).

Conditions Monitoring

Many projects may have indirect effects on the two species. For example, though not in the direct footprint of a dredging project, corals may be affected by a sediment or turbidity plume downstream. To ensure that the corals are not adversely affected by projects such as these, the corals and environmental conditions should be monitored. The specific parameters monitored will depend on the specifics of the project. Corals should be monitored using an accepted protocol for stress. Other environmental parameters could include turbidity, sediment load and rate, nutrients, and temperature. NMFS would likely require this project modification; many regulatory authorities also require various monitoring programs. The approximate cost to conduct this project modification would be approximately \$3.5-6K

per day for personnel, boats, gas, and equipment (D. Gilliam and T. Moore, pers comms.). Costs will vary with project size and location, and distance from shore.

GPS and DPV protocol

Various projects involve the use of vessels to conduct their operations (i.e., various coastal construction projects). To reduce the secondary impacts from these projects (i.e., anchor damaging or groundings), NMFS may recommend the use of Global Positioning System (GPS) and Dynamically Positioned Vessels (DPVs). DPVs use GPS coupled with thrusters located at different points around the vessels to continuously update and maintain position. This capability, known as “station keeping,” ensures the proper location of the vessels without the need for anchors. This project modification would likely be required if the proposed project required operations in an area of known acroporid occurrence and no other project location could be identified. Additionally, station keeping is not currently required by any regulatory agency. Station keeping has been used in deep water applications (i.e., oil and gas operations), but the cost associated with this project modification is unknown for shallow water applications.

Diver Assisted Anchoring/Mooring Buoy Use

As stated above, secondary impacts to the two species can occur from vessel operation (i.e., anchor damage or groundings). In cases where mooring a vessel is necessary, NMFS would expect to require the use of existing mooring buoys or the use of a diver to assist placement of the anchor on the seafloor. The cost associated with this project modification would be the addition of a diver (typically \$300-1000 per day) to the vessel crew, if a mooring buoy was not available.

Pipe Collars/Cable Anchoring

Several projects use pipelines or cables (i.e., oil and gas, telecommunications, dredge and disposal). If the path of the pipe or cable cannot be relocated to completely avoid reef habitat or to use existing gaps in reefs, they should be anchored to the substrate to avoid secondary impacts from the pipe or cable dragging during storm events. This project modification is expected to be a NMFS requirement and is currently required by the USACE and state agencies. Collars cost approximately \$1,200 per anchor and are typically placed every 20 meters.

Table 22. Matrix of the activities and the potential project modifications identified through the section 7 consultation process. Modifications NMFS would likely require (shaded modification title) and modifications currently required by other federal, state, or territory authority (shaded X) are identified.

		Project Modification															
		Project Relocation	Coral Relocation and Monitoring	Conditions Monitoring	GPS and DPV protocol	Diver Assisted Anchoring Mooring Buoy Use	Pipe Collars/Cable Anchoring	Sand Bypassing	Shoreline Protection Measures to Reduce Frequency of Beach Nourishment Events	Upland or Artificial Sources of Sand	HDD/Tunneling	Live Rock Inspection/Relocation	Water Quality Standard Modification	Sediment and Turbidity Control Measures	Cooling Power Plant Cooling Waters before Release	Fishing Gear Maintenance	Diver Education
Category of Activity	Airport Repair/Construction		X	X										X			
	Anchorage	X															
	ATONs	X															
	Beach Nourishment/Bank Stabilization	X	X	X		X	X	X	X	X				X			
	Bridge/Road Repair	X	X	X		X								X			
	Construction	X	X	X	X	X	X		X	X	X	X		X			
	Discharges to navigable waters	X		X									X	X			
	Dredging and Disposal	X	X	X	X	X	X							X			
	Fishery management	X														X	
	Maintenance Construction	X	X	X	X	X	X		X	X				X			
	Maintenance Dredging and Disposal	X		X	X	X	X							X			
	Military Installations	X	X	X	X	X	X		X	X	X		X	X			
	Power Plant Operations	X		X											X		
	Research																
	Resource Management					X							X	X			X
	Ship/Vessel/Aircraft Operations																
Water quality standards, NPDES, TMDLs	X											X					

Sand Bypassing/Backpassing

The conventional means for handling sand accretions at inlets or to provide sand to upstream depleted beaches is to periodically dredge large volumes of sand and then place it in bulk on the beach. As an alternative to conventional beach renourishment events, sand bypassing plants use hydraulic or mechanical means to move the sand across the inlet in smaller quantities over longer periods of time from an accreting area updrift to the eroded downdrift area. The material is placed on the beach immediately downdrift from the obstruction. This mechanical means serves to replace the natural littoral movement of sand. The beach that receives the sand then serves as a feeder beach and delivers sand to downdrift beaches (NOAA-Coastal Services Center 2006). As with bypassing, sand backpassing is the mechanical transport of sand from an accreted stable beach to an eroded beach, but instead the sand is moved from a down current beach to an up current beach against the natural littoral movement of sand. Either of these methods of beach nourishment could be used to reduce the potential impacts to the two corals from conventional beach renourishment events. Whether NOAA would require these project modifications is a function of the details of the proposed project. Sand bypassing/backpassing is not currently required by other regulatory agencies. According to the Report from the Southeast Florida Coral Reef Initiative Maritime Industry and Coastal Construction Impacts Workshop (TetraTech 2007), “sand bypassing costs estimated for several different alternatives at Port Everglades in Broward County range from around \$10 to \$16 per cubic yard, excluding the cost of construction. According to a California Beach Restoration Study drafted in 2002, backpassing costs typically run \$1.50 per cubic yard.” Although the cost to implement a project modification may be high, it could actually constitute a savings over time because future beach renourishment events would not be necessary.

Shoreline Protection Measures to Reduce Frequency of Beach Nourishment Events

In addition to the project modifications identified above, other recommendations would be the use of techniques to reduce the frequency of nourishment events. Many erosion control programs now incorporate innovative shoreline protection measures (dune restoration, artificial reef-like breakwaters, etc.) Whether NOAA would require these project modifications is a function of the details of the proposed project. These modifications are not currently required by other regulatory agencies. The potential costs of these project modifications are varied due to the specifics of structure to be constructed (i.e., breakwater, submerged fencing, groin field, dune stabilization). It is feasible that ultimately the construction of these structures could provide a cost savings by not having to renourish as often.

Upland or Artificial Sources of Sand

To reduce the impact from dredging sand from offshore as the source for beach renourishment, we would recommend the use of upland or artificial sources (i.e., recycled glass). Whether NOAA would require these project modifications is a function of the details of the proposed project. These modifications are not currently required by other regulatory agencies. The costs associated with this project modification are varied due to location of the sand source.

HDD/Tunneling

In cases where pipeline or cables can not be relocated to utilize existing gaps on the reef, we might recommend the use of Horizontal Directional Drilling (HDD) or tunneling. These techniques are trenchless construction methods that allow cables and pipelines to be installed underground resulting in no, or minimal, surface disturbance. Whether NOAA would require these project modifications is a function of the details of the proposed project. The state of Florida currently requires the use of directional drilling in the southeast Florida reef tract and telecommunication cables are prohibited in Biscayne Aquatic Preserve, Biscayne National Park, and Monroe County, Florida (F.A.C. 18-21). The cost associated with these techniques is approximately \$1.4-\$2.5 million per mile (TetraTech 2007).

Live Rock Inspection/Relocation

Live rock production has the potential to have elkhorn or staghorn corals recruit onto the substrate. However, this has not been observed in the last ten years (K. Nedimeyer pers. comm.). As discussed previously, NMFS permits live rock operators to harvest prohibited corals, of which elkhorn and staghorn are two. Additionally, the USACE permits the live rock operation location on the seafloor. Through reinitiation of section 7 consultation on the federal action of permitting the live rock operation and location, NMFS would consult with itself and the USACE. Potential project modifications that could result from that consultation might include a requirement require that live rock producers do a visual survey of their rock prior to harvest to determine if either species is present. In the unlikely event that the listed corals were to recruit onto the live rock, NMFS may require the removal of the colony from the rock and its donation to an existing acroporid coral nursery. Implementation of project modifications might require amendment of NMFS' fishery management regulations. There will be minimal cost associated with this project modification because the live rock producers currently harvest their rock via diving. Additionally, because coral nurseries there currently exist near the areas in which live rock production occurs, the cost of transport will be minimal. While the presence of elkhorn or staghorn coral could increase the sale price of live rock, as stated above this is unlikely and has not occurred for the past 10 years.

Water Quality Standard Modification

Existing discharges to the corals' habitat are resulting in adverse effects on the species by decreased recruitment, impaired health, disease, and mortality. Whether these discharges are currently in compliance with existing water quality standards is unknown. However, presuming that the current discharges are in compliance and to reduce the impact of discharges on the species, the water quality standards may need to be revised. Specifically, standards for nutrients, sediments, turbidity, and contaminants may need to be addressed. This project modification would be a result of a consultation on EPA water quality standards. Costs associated with this project modification are unknown due to the unknown scope and extent to which the standards might need to be modified.

Sediment and Turbidity Control Measures (silt curtains)

NMFS may require projects which involve any sedimentation or turbidity (i.e., dredging and disposal, shoreline stabilization) to use sediment and turbidity control measures. Typically these consist of silt curtains to contain the sediment or turbidity plume. This project modification would likely be a NMFS requirement and is currently required by regulatory agencies (i.e., USACE, state of Florida). One example of costs associated with implementing this project modification is \$43K per mile (Broward County Beach Renourishment Segment II project). However, the costs vary depending on location and material being dredged.

Cooling Power Plant Cooling Waters before Release

The cooling waters from power plants can be released at temperatures above the tolerance maximum for the two species. However, existing regulations require thermal discharges to be minimal above ambient; existing facilities in Florida, Puerto Rico, and the U.S.V.I. have thermal limits. If new power plants were proposed, thermal limits for discharges would need to be evaluated considering the two corals, if present within the thermal plume; NMFS would likely require that the discharge could not raise the ambient temperature so that it exceeded the thermal tolerances of the species. The costs associated with this project modification are unknown because the specifics the plant operations are unknown.

Fishing Gear Maintenance

The legal placement of traps typically does not cause damage to corals; however, if traps are not properly maintained, they can become mobile and damage the species. NMFS would require that the trap fisheries ensure that gear does not become derelict, either from abandonment or storm mobilization. This can be accomplished through collection of traps prior to major storms. Although NMFS understands that this cannot always be accomplished due to the unpredictability of storm timing and tracks, a good-faith effort must be made. This project modification is also in the interest of the trap fishery because it prevents the loss of their gear and the necessity for replacement. This project modification is not currently required by any regulatory authority. The costs associated with this project modification are a function of the fisherman's time and gas required for the collection of the traps. However, it is possible that the costs would be offset by the reduction of lost traps.

Diver Education

Various resource management agencies have the authority to manage diving activities within their jurisdictions as a function of their resource management plans. To reduce the effect of diver impacts on the two species, NMFS would likely require that the agencies implement a diver education program on the sensitivity of these two species to diver impacts. This project modification is not currently required by any other regulatory authority. The costs associated with this project modification would be the administrative cost of agency personnel creating the program and minor costs to participants to attend the program.

Estimated Costs of the Final 4(d) Rule

In the absence of the final rule, section 7 consultation is currently conducted, but NMFS cannot require project modifications unless the action jeopardizes the continued existence of the species; these project modifications, or RPAs, must avoid jeopardizing the species existence. Because the section 7 consultation requirement is already required due to the listing of the species for every federal action that may affect either of the two coral species, the 4(d) rule will not result in additional consultations. Rather, the final rule will require NMFS to identify RPMs necessary or appropriate to minimize the impact of incidental take predicted to result from proposed federal actions. Based on our experience with section 7 consultations for other species, the administrative costs of identifying RPMs will be negligible compared to the analytical requirements and associated costs already required by the listing and the duty to ensure the action does not jeopardize the corals. Hence, we assume that there will be no additional administrative costs of consultation associated with the final rule. The costs of RPAs are part of the baseline cost and we assume all administrative costs associated with the section 7 consultation are included in the baseline cost as well. Consequently, the costs associated with the promulgation of this rule derive from the implementation of project modifications resulting from section 7 consultation to reduce the impact of incidental take, or RPMs.

While the costs associated with project modifications can be characterized, no total cost of this rule can be identified (

Table 23). Although we have a projection of the number of future consultations (albeit an overestimation), the lack of information on the specifics of project design limits our ability to forecast the exact type and amount of modifications required. For example, NMFS will likely require the relocation and monitoring of all elkhorn and staghorn colonies within the direct footprint of all future projects. We do not know the location of future action areas and whether the species will be present. Without this information it is impossible to estimate the number of days necessary to relocate and monitor an unknown number of corals.

Even given the above, the estimation of future consultations (Table 21) indicates that the majority of consultations are likely to be USACE permitted or conducted actions (402 of 548 consultations). Based on the historical consultation record, most of these actions could have a third party applicant; as such the affected party would be a private entity because they must implement the project modifications. However, as Table 22 and Table 23 show, the majority of the project modifications that NMFS will likely require for these actions (i.e., coral relocation and monitoring, conditions monitoring) are currently required by other regulatory agencies. Other project modifications that NMFS will likely require for every action in a specific category of activities, that are not currently required by another regulatory agency would typically involve few consultations per year (less than 8), or have a relatively minor associated cost (i.e., diver-assisted anchoring).

Some project modifications that may be recommended in cases of a large impact to the species have the potential for high costs (i.e., project relocation). It is reasonable to expect that these project modifications would only be required as RPAs issued for a jeopardy opinion, rather than RPMs issued to reduce the impact of incidental take. This rule adds the requirement for NMFS to issue RPMs for prohibited take; RPAs are currently required for jeopardy opinions due to the listing of the corals species. Hence, the costs associated with RPAs are not a cost of the final 4(d) rule.

Lastly, we note the distribution of potential future economic impacts among the affected economies, described in section 1.4.2.1. The majority of the projected future consultations will occur in Florida (327), followed by Puerto Rico (123) and U.S.V.I. (43). Therefore, it is expected that the bulk of the costs of this rule will involve projects conducted in the larger economy of Southeast Florida rather than the smaller economies of Puerto Rico and the U.S. Virgin Islands.

Table 23. Summary of costs associated with specific project modifications. Shaded rows indicate project modification is currently required by another regulatory agency.

Project Modification	Cost	Unit
NMFS Likely Required		
Coral Relocation and Monitoring	\$8-15K	Per Day
Conditions Monitoring	\$3.5-6K	Per Day
Pipe Collars/Cable Anchoring	Undeterminable	
Sediment and Turbidity Control Measures	~\$43K	per mile
Cooling Power Plant Cooling Waters before Release	Undeterminable	
Diver Assisted Anchoring/Mooring Buoy Use	\$300-1000	Per Day
Diver Education	Administrative cost	
Water Quality Standard Modification	Undeterminable	
NMFS Case Dependent		
HDD/Tunneling	1.39 -2.44M	Per Mile
Fishing Gear Maintenance	Cost of gas and time to retrieve traps. Ultimately a potential cost savings of reduction in lost traps.	
GPS and DPV protocol	Undeterminable	
Live Rock Inspection/Relocation	Negligible	
Project Relocation	Undeterminable	

Sand Bypassing/Backpassing	\$1.5-16	Per Cubic Yard
Shoreline Protection Measures to Reduce Frequency of Beach Nourishment Events	Undeterminable but ultimately a potential cost savings	
Upland or Artificial Sources of Sand	Undeterminable	

Potential Economic Benefits of the Proposed Action

As stated previously, both elkhorn and staghorn corals are major reef builders and provide significant economic benefits to society. The preferred alternative may generate economic benefits because the prohibitions are expected to provide for the species' conservation by addressing stressors and threats currently contributing to the decline in abundance of the corals. It is expected that the implementation of the final rule will assist in maintaining the species' current status by prohibiting many activities contributing to the species' decline. Tourism is important to all the regional economies where these corals are found. A survey conducted for the Virgin Islands DPNR found that 100 percent of hotel industry participants answered that there would be a significant impact on tourist visits to the U.S.V.I. if the coast/beaches were degraded or fisheries and/or coral reefs declined (U.S.V.I. 2003). Johns et al. (2003) estimated that direct use of natural reefs in four counties of South Florida (Broward, Miami-Dade, Monroe, and Palm Beach) by both residents and visitors from June 2000 to May 2001 was equivalent to 18.4 million person-days of snorkeling, SCUBA diving, fishing and viewing coral reefs from glass-bottom boats. This use brought in over \$2.7 billion in output/sales, and further generated over \$1.2 billion in income that supported over 43,000 full-time and part-time jobs. As discussed in each of the regional economies above, Johns et al. (2003) found that survey respondents would spend millions of dollars in each county to maintain the reefs at their current state.

Coral reefs also provide shoreline protection by dissipating the force of waves that is a major source of erosion and loss of land (NOAA 2004). Monetizing the economic benefit of shoreline protection would derive from the elimination or reduction of replacement costs of coastal structures and buildings potentially impacted by a major storm. In 2005, the coast of Mexico north of Cancun was impacted by Hurricane Wilma. Wave height was recorded just offshore of the barrier reef at 11 m; wave height at the coast was observed to be 3 m (B. van Tussenbroek pers. comm.). There would have been significantly greater damage to coastal structures had the 11 m waves not been dissipated by the reef.

Coral reefs are home to 25 percent of all fish species and home to many commercial and recreational fishing species. Specifically, elkhorn and staghorn corals are preferentially used as habitat for many reef species due to their complex branching morphology. In 2005, 82 percent of the total national catch in pounds of spiny lobster was taken from Florida waters where these corals are found. Over 3 million pounds of shallow water reef fish were landed by commercial fishermen in the Florida counties where these species occur, with a dockside value of approximately \$5.9 million in 2005. That same year, 771,656 pounds of shallow water reef fish were landed in Puerto Rico with a dockside value of about \$1.8 million and over 1.2 million pounds were commercially landed with a dockside value of about \$3.9 million in the U.S.V.I.

1.5.2. Considered But Rejected Alternatives:

The following three alternative actions were considered but rejected:

No-Action Alternative

The no-action alternative would generate no direct cost or benefit beyond the status quo. As currently listed species, both elkhorn and staghorn corals are protected under section 7 of the ESA. However, the status quo is expected to result in larger takes of these species than the other alternatives and the resulting likelihood of smaller future annual incomes generated directly and indirectly from person-days of

snorkeling, SCUBA diving, fishing, and viewing coral reefs, and smaller other benefits because of continuing losses of these species.

Implementation of a 4(d) Rule with Exceptions for Restoration, Scientific Research and Activities Conducted under an Approved RMP

This alternative would implement a 4(d) rule that extends all of the ESA Section 9(a)(1) prohibitions to elkhorn and staghorn corals, with exceptions for:

- Export and take resulting from scientific research and enhancement activities conducted under six specific existing Federal, state, or territorial research permitting programs. Several Federal, state, and territorial natural resource management agencies that permit scientific research and enhancement activities, including monitoring and other studies that are directed at, and occur within the geographic areas occupied by, the listed corals, would be excepted from the ESA section 9(a)(1)(A), (B), and (C) prohibitions; and
- Take resulting from certain restoration activities carried out by an authorized (under current laws) Federal, state, territorial, or local natural resource agency. Certain Federal, state, territorial, and local government agency personnel, or their designees as applicable, may take elkhorn or staghorn corals without a permit when they are performing specific restoration actions directed at listed corals under an existing legal authority that provides for such restoration. For purposes of this exception, we consider a “restoration activity” to be the methods and processes used to provide aid to injured individuals. The activity that caused the injury would not be excepted by this rule. Through this exception, we are not authorizing any activities which are not currently authorized under an existing statute, rather we are excepting these activities from the section 9(a)(1)(B) and (C) prohibitions for the two listed corals; and
- Take resulting from activities conducted in accordance with a federal, state, territorial, or local RMP. An RMP prescribes broad, multiple-use guidance for managing public lands and waters. Examples of RMPs include fishery management plans and national marine sanctuary management plans. Under this alternative, in addition to exceptions for direct take of corals (i.e., scientific research and enhancement or restoration activities), exceptions to the ESA section 9(a)(1)(B) and (C) prohibitions for incidental take¹ are included. Incidental take that results from activities conducted under an RMP is excepted only if a RMP specifically manages for the conservation of elkhorn and staghorn corals; provides a net conservation benefit to both species; and is approved by NMFS according to specific criteria.

This alternative would add an exception to the final 4(d) rule; specifically, it would remove the section 10(a)(1)(B) permit requirement for activities that incidentally take elkhorn coral and/or staghorn coral when conducted in accordance with an NMFS-approved resource management plan (RMP).

Although this alternative would not require those whom are engaged in RMP-approved activities that may incidentally take elkhorn or staghorn corals to implement RMPs resulting from section 7 consultation or apply for an ITP and monitor and report their incidental take, it would reduce the ability of NMFS to monitor and minimize incidental take of these species and could result in greater take of these species. This in turn may reduce the quality and quantity of goods and services that derive from these coral reefs, and the income generated from direct and indirect use of the corals would be less than the income associated with the preferred alternative.

¹ “Incidental take” refers to takings that result from, but are not the purpose of, carrying out an otherwise lawful activity conducted by a Federal agency or its applicant (50 CFR 402.22).

Implementation of All Section 9(a)(1) Prohibitions Without Exceptions

This alternative would not include the two exceptions of the final 4(d) rule. First, under this alternative, agency personnel or their designees would be required to obtain a section 10(a)(1)(A) permit before engaging in elkhorn or staghorn coral restoration activities. Second, an individual would be required to obtain a section 10(a)(1)(A) permit before engaging in scientific research activities conducted under an existing Federal, State, or Territorial research-permitting program involving either coral.

Any person desiring to obtain a section 10(a)(1)(A) permit (also known as a scientific permit) must provide the information required in 50 CFR 222.308(b).

It is estimated that the average time burden to complete the application is 40 hours. At least 90 days are needed for processing of a scientific permit application (50 CFR 222.308(b)(14)). An average of 10 hours is expected to complete the annual permit report. The skills required are the life science skills of a research scientist with expert knowledge of elkhorn coral and/or staghorn corals.

The time necessary to submit and review an application for a scientific permit may be detrimental to elkhorn and staghorn corals if these corals require emergency (quick response) actions to protect them, as a result of natural and technological disasters or other events that may have injured or stranded them. In turn, loss of coral reef may affect residents and tourists who make direct use of coral reefs and others who benefit indirectly from these reefs. It is also reasonable to expect that the time and process required to obtain a section 10 permit may deter or delay beneficial scientific research on the corals.

1.5.3 Comparison of Costs and Benefits of Final Rule and Alternatives

Table 24 compares the costs and benefits of the final rule and the three considered but rejected alternatives.

Table 24. Comparison of cost and benefits of regulatory options.

Regulatory Option	Costs	Benefits
No Action (Status Quo)	Expected loss of future annual income due to loss of corals.	
Section 9(a)(1) Prohibitions, with 2 Exceptions (Preferred Alternative)	Federal action agencies and any project applicant completing ESA section 7 consultations with NMFS must comply with RPMs;	Expected increase of annual income generated directly and indirectly from person-days of snorkeling, SCUBA diving, fishing and viewing coral reefs, plus other benefits, such as shoreline protection.
Section 9(a)(1) Prohibitions, with 3 Exceptions	Same costs of implementing the final 4(d) rule LESS: costs required to obtain a section 10(a)(1)(A) permit or implement RPMs under an ESA section 7 consultation by entities acting pursuant to approved RMP.	Smaller increase of annual income than final 4(d) rule expected due to potentially larger incidental take, but larger increase expected than for the no-exceptions rule.
Section 9(a)(1) Prohibitions, with No Exceptions	Same costs of implementing the final 4(d) rule PLUS: costs of section 10(a)(1)(A) permit process (average 40 hours to complete and submit application plus at least 90 days for processing of a scientific permit application and average of 10 hours to complete the annual permit report).	Smaller increase of annual income than final 4(d) rule expected due to potential delays in emergency responses and deterrence or delay of beneficial research.

1.6 Determination of Significant Regulatory Action

Pursuant to E.O. 12866, a regulation is considered a "significant regulatory action" if it: (1) has an annual effect on the economy of \$100 million or more or adversely affects in a material way the economy, a sector of the economy, productivity, competition, jobs, the environment, public health or safety, or state, local, or tribal governments or communities; (2) creates a serious inconsistency or otherwise interferes with an action taken or planned by another agency; (3) materially alters the budgetary impact of entitlements, grants, user fees, or loan programs or the rights and obligations of recipients thereof; or (4) raises novel legal or policy issues arising out of legal mandates, the President's priorities, or the principles set forth in E.O. 12866.

The proposed action will not meet the \$100 million threshold, nor are there expected to be any significant adverse effects on prices, employment or competition. The primary impact of the rule on non-federal entities will be a requirement to implement modifications to projects to minimize adverse effects to corals, through the ESA section 7 consultation process; by law, such modifications must result in only minor changes to a proposed project. 50 CFR 402.14(i)(2). Additionally, for many of the expected future consultations, most of the project modifications that NMFS would likely require are currently required by other regulatory agencies, and thus are not a cost of this rule.

Measures in this action do not adversely affect the environment, public health or safety, or state, local, or tribal governments or communities, nor do they interfere or create inconsistency with any action of another agency, including state fishing agencies. No effects on the budgetary impact of entitlements, grants, user fees, or loan programs or the rights and obligations of recipients thereof have been identified. The actions in the proposed action represent normal management options or practices and, therefore, do not raise novel legal or policy issues.

Since the proposed regulatory action will not meet any of the conditions listed above, it is determined that the final rule would not constitute a "significant regulatory action" under E.O. 12866.

2.0 FINAL REGULATORY FLEXIBILITY ANALYSIS

2.1 Introduction

The purpose of the Regulatory Flexibility Act (RFA) is to establish a principle of regulatory issuance that agencies shall endeavor, consistent with the objectives of the rule and applicable statutes, to fit regulatory and informational requirements to the scale of businesses, organizations, and governmental jurisdictions subject to regulation. To achieve this principle, agencies are required to solicit and consider flexible regulatory proposals and to explain the rationale for their actions to assure that such proposals are given serious consideration. The RFA does not contain any decision criteria; instead, the purpose of the RFA is to inform the agency, as well as the public, of the expected economic impacts of alternatives to the proposed action and to ensure that the agency considers alternatives that minimize the expected impacts while meeting the goals and objectives of the proposed action and applicable statutes.

The following Final Regulatory Flexibility Analysis (FRFA) has been prepared pursuant to section 604 of the RFA to provide information to the public about the impacts of the proposed action and significant alternatives to the proposed action. Each item in section 604(a)(1)-(5) of the RFA has been addressed: (1) a description of the reasons why action by the agency is being considered; (2) a succinct statement of the objectives of, and legal basis for, the final rule; (3) a description and where feasible an estimate of the number of small entities affected by the final rule; (4) a description of the projected reporting, record-keeping, and other compliance requirements of the final rule, including an estimate of the classes of small entities which will be subject to the requirements of the report or record; and (5) identification, to the extent practicable, of all relevant Federal rules which may duplicate, overlap, or conflict with the final rule. An FRFA must also describe significant alternatives to the final rule which accomplish the stated objectives of applicable statutes and which minimize any significant economic impact of the final rule on small entities. Analysis of these factors is based on the impacts analysis developed in the Regulatory Impact Review in section 1.0 of this document.

2.2 Reasons why action by the agency is being considered

The purpose and need, issues, problems, and objectives of the final ESA 4(d) regulations for threatened corals are discussed in the introductory section of the Environmental Assessment for the final ESA 4(d) rule and are incorporated herein by reference. In summary, the purpose of the final 4(d) rule is to apply ESA section 9(a)(1) prohibitions that are necessary and advisable for conservation of threatened elkhorn (*Acropora palmata*) and staghorn (*A. cervicornis*) corals. The rule is expected to result in a net reduction of the intensity and threats contributing to the decline of these two corals. While existing laws prohibiting impacts to corals apply to elkhorn and staghorn corals, no existing laws or regulations specifically address negative impacts to, or provide for the conservation of, elkhorn and staghorn corals.

2.3 Objectives and legal basis for final rule

Under section 4(d) of the ESA the Secretary of Commerce is required to issue regulations he deems necessary and advisable for the conservation of species listed as threatened. The final 4(d) rule represents the regulations necessary and advisable to provide for the conservation of threatened elkhorn and staghorn corals. The final 4(d) regulations would apply the take prohibitions enumerated in section 9(a)(1) of the ESA in most circumstances to the two listed threatened species.

2.4 Description and estimate of the number of small entities to which the final rule may apply

This rule will affect small entities, including small businesses, small nonprofit organizations, and small governmental jurisdictions, that engage in activities that would be prohibited by the final rule. The consultation record indicates that applicants for federal permits or funds in past consultations have included small entities. However, our consultation database does not track whether the recipient is a small entity, so it is impossible to determine accurately the number of grantees or permittees that may be small entities. For example, marine contractors have been the recipients of USACE permits for dock construction; some of these contractors may be small entities. In addition, recent consultation history indicates that small governmental jurisdictions (population less than 50,000) have applied for permits to undertake beach renourishment activities.

A number of existing federal, state, or local laws prohibit take, possession, or sale of, and/or damage to, corals. Puerto Rico and U.S.V.I. law prohibit the take and sale of elkhorn and staghorn corals. Florida law prohibits take of these corals, with an exception provided for corals that attach to rock placed by aquaculture operations that have the appropriate permits from the state, NMFS, and USACE. Florida law allows sales of elkhorn or staghorn corals skeletons with proof that the specimens were not taken illegally and sales of live rock that may contain elkhorn or staghorn coral that settled on and attached to that rock. There is anecdotal evidence that Florida shell shops (NAICS 453220) have sold dead specimens of these species, and this rule does not preclude sales of dead specimens obtained legally before listing. There is no historical evidence of any live rock operations selling live rock with these species attached in the past 10 years of observations reported by live rock producers. There is also no historical evidence of international trade of either of these species. However, reasonable and prudent measures may be necessary or appropriate to minimize the impact of the incidental take of activities on the two listed corals.

The proposed action will not require small entities, such as small non-profit organizations or institutions, which engage in restoration actions and/or scientific research directed at either of these species that fit within the exceptions, to obtain an ESA section 10(a)(1)(A) permit. However, the rule will require other small entities permitted or funded by federal agencies to comply with RPMs identified by NMFS in ESA section 7 consultation, if the entities' actions may incidentally take either of these species.

A review of historical ESA section 7 consultations involving projects where these corals are found is described in section 1.5 of this document. It is anticipated that, on average, approximately 44 Federal projects with non-federal grantees or permittees will be affected by implementation of the final 4(d) rule annually. Historically, these projects have involved pipeline installation and maintenance, mooring construction and maintenance, dock/pier construction and repair, marina construction, bridge repair and construction, new dredging, maintenance dredging, NPDES/water quality standards, cable installation, beach nourishment, shoreline stabilization, reef ball construction and installation, and port construction. See Table 21.

Small businesses in the tourist industry may benefit from the rule with increased direct and indirect use of coral reefs. See section 1.4.2.1 for Johns et al. (2003) estimates of income benefits derived from coral reef use.

There is no indication that affected project applicants would be limited to, nor disproportionately comprised of, small entities. Similarly, there is no evidence that small entities would be placed at a competitive disadvantage compared to large entities. As described in the RIR, project modifications are based on the type of permitted action and its associated impacts on corals, and not on the nature or size of the project applicant.

There is also no indication from our analysis that the final rule will significantly reduce profits or revenue for small entities. As stated above, the nature of the changes small entities may be required to make to their proposed projects to reduce impacts to corals are limited by the ESA in that they cannot alter the

basic design, location, scope, duration and timing of the action and may only involve minor changes (50 CFR 402.15(i)(2)).

Although we have presented the above discussed results based on our analysis, we encourages all small businesses and other small entities that may be affected by this rule to provide comment to improve this analysis.

2.5 Description of projected reporting, record-keeping, and other compliance requirements of the rule, and professional skills necessary for the preparation of any report or record

The preferred alternative will apply all of the prohibitions of section 9(a)(1) of the ESA to elkhorn coral and staghorn coral with exceptions for restoration and scientific research activities. See section 1.5.1 of the RIR for a detailed description of the preferred alternative. As discussed above, the primary compliance requirement of the final rule involves implementation of mandatory project modifications to reduce the impact of federally-permitted actions on the corals. There are no record-keeping requirements associated with the final rule. Reporting requirements would only consist of the duty to report any incidental take of the corals that results during the course of an action covered by a section 7 consultation, and to report the results of implementing RPMs. No particular professional skills are necessary for preparation of reports or records.

2.6 Identification of all relevant Federal rules which may duplicate, overlap or conflict with the final rule

Federal laws and regulations that directly and indirectly protect the two species of coral are described and listed in section 1.4.2.2 of the RIR. No Federal rules or laws duplicate or conflict with the final rule. Existing Federal rules and laws overlap with the final rule only to the extent that they provide protection to natural resources or corals generally. While existing laws prohibiting impacts to corals apply to elkhorn and staghorn corals, no existing laws or regulations *specifically* address negative impacts to, or provide for the conservation of, elkhorn and staghorn corals.

2.7 Description of significant alternatives

Discussion of the expected impacts of the alternatives considered in this action is contained in the RIR (section 1.5 of this document) and is incorporated herein by reference. A summary of the alternatives considered but rejected follows.

Alternative A: No-action alternative

This alternative would not change the status quo. It is rejected because under section 4(d) of the ESA the Secretary of Commerce is required to adopt regulations that he deems necessary and advisable to provide for the conservation of species listed as threatened, and this alternative provides no conservation benefit for the corals. This alternative would not prohibit take of the corals, thus NMFS would not impose RPMs on federal agencies or project applicants during section 7 consultation. While this alternative would not include the costs of implementing these project modifications, it is also expected to result in a loss of annual income generated directly and indirectly from recreational use of coral reefs, because abundance of elkhorn and staghorn corals is expected to continue to decline under this alternative.

Alternative B: Implement a 4(d) rule that extends all of the ESA Section 9 prohibitions to elkhorn and staghorn corals, with the same exceptions as the final rule plus an exemption for activities included in NMFS-approved Resource Management Plans.

In addition to the exceptions from the ESA section 9 prohibitions for conservation research and restoration included in the preferred alternative, this alternative would except incidental take from the take prohibitions where such take results from activities managed under a NMFS-approved management plan. This alternative would have the same costs of implementing section 7 RPMs as the preferred alternative. Persons engaged in activities covered by an approved management plan would not be required to obtain an ESA section 10 incidental take permit. This alternative is expected to result in increased take of these species, and thus smaller annual incomes generated from small businesses, such as those in the tourism sector, that rely on resident and visitor use of coral reefs.

Alternative C: Implement a 4(d) rule that extends all of the ESA Section 9 prohibitions to elkhorn and staghorn corals, with no exceptions.

In addition to the same requirements for implementation of section 7 RPMs as the preferred alternative, this alternative would require scientists excepted from the section 9 prohibitions by the preferred alternative to obtain an ESA section 10 research permit. This alternative would also require Federal, State, Territorial, and Local governments or their designees to acquire an ESA section 10 permit for restoration activities directed at listed corals, even when emergency actions are warranted to save either listed coral as a result of a natural or technological disaster or other event that has injured these corals. The resulting increase in mortality of these corals could reduce revenues received from small businesses that benefit from resident and tourist use of coral reefs.

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