METHODOLOGY FOR PREPARING CUMULATIVE IMPACT SECTIONS OF PROJECT REVIEWS AND ASSESSMENTS IN MIAMI-DADE, BROWARD, PALM BEACH AND MARTIN COUNTIES, FLORIDA

A PROJECT OF
THE SOUTHEST FLORIDA CORAL REEF INITIATIVE (SEFCRI)
MARITIME INDUSTRY AND COASTAL CONSTRUCTION IMPACTS (MICCI)

METHODOLOGY FOR PREPARING CUMULATIVE IMPACT SECTIONS OF PROJECT REVIEWS AND ASSESSMENTS IN MIAMI-DADE, BROWARD, PALM BEACH AND MARTIN COUNTIES, FLORIDA

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for

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Acronyms and Abbreviations

AOI	Area of Impact
CEQ	Council on Environmental Quality
CES	Center for Environmental Studies
CUES	Center for Urban and Environmental Solutions
EFH-HAPC	Essential Fish Habitat-Habitat Areas of Particular Concern
ERP	Environmental Resource Permit
FAU	Florida Atlantic University
FDEP	Florida Department of Environmental Protection
FWC	Fish and Wildlife Conservation Commission
GIS	Geographic Information System
JCP	Joint Coastal Permit
LAS	Local Action Strategies
MICCI	Maritime Industry and Coastal Construction Impacts
NEPA	National Environmental Policy Act
NOAA	National Oceanographic and Atmospheric Administration
OPPAGA	Office of Program Policy Analysis and Government Accountability
SEFCRI	The Southeast Florida Coral Reef Initiative
USCRTF	U.S. Coral Reef Task Force
VEA	Valued Environmental Attributes
WMD	Water Management District

Executive Summary

The primary focus of this project is to provide environmental managers and regulators a methodology to address cumulative impacts sections in project reviews and assessments. The proposed methodology consists of an Assessment Flowchart (Appendix A), an Assessment Tool (Appendix B) and Users' Instructions for using the Tool (Appendix C), which are intended to be used by reviewers from regulatory agencies. The Assessment Flowchart illustrates the steps of the proposed process. The Assessment Tool consists of seven worksheets which need to be completed before an Adjusted Cumulative Impact Rating is calculated in Worksheet 8. The Users' Instructions give the user step-by-step guidance on how to use the tool.

Our recommendations include: 1) developing a comprehensive resource database to review the cumulative impacts of past, present and foreseeable coastal construction projects; 2) establishing measurable goals, baselines and benchmarks against which to evaluate the individual and cumulative impacts of maritime industry and coastal construction projects, 3) optimizing intergovernmental coordination while considering projects' cumulative effects; and 4) conducting additional research on theoretical and applied issues before the full potential of cumulative impact assessment can be realized for marine ecosystems.

The focus of the cumulative impact assessment should be on how the proposed action will affect the resource and whether the action will move closer to, or farther away from, the goals for that resource. Moreover, efforts should not stop with the assessment (scoping and analysis), but should be combined with proactive, long-term management planning. Field testing viable methods and continued review of this Tool will be essential to ensure that modifications and guidance are provided as the methodology is refined. Thus, this Tool should be viewed as the first step in developing a reliable methodology.

Introduction

In 2002, the U.S. Coral Reef Task Force (USCRTF) adopted the "Puerto Rico Resolution," which calls for the development of Local Action Strategies (LAS) by each of its seven members (U.S. states, territories and commonwealths). These LAS are locally-driven roadmaps for collaborative and cooperative action among federal, state, territory and non-governmental partners. They identify and implement priority actions needed to reduce key threats to valuable coral reef resources. The goals and objectives of the LAS are linked to those found in the U.S. National Action Plan to Conserve Coral Reefs, adopted by the USCRTF in 2000. From the thirteen goals identified in the National Action Plan, the USCRTF prioritized six threat areas as the focus for immediate local action: over-fishing, land-based sources of pollution, recreational overuse and misuse, lack of public awareness, climate change and coral bleaching and disease. Additional focus areas were identified in some jurisdictions, and the impacts of the maritime industry and coastal construction were added for Florida. With guidance from the USCRTF, the Florida Department of Environmental Protection (FDEP) and the Florida Fish and Wildlife Conservation Commission (FWC) coordinated the formation of a team of marine resource professionals (state, regional and federal), scientists, non-governmental organization representatives and other coral reef stakeholders.

This team, named the Southeast Florida Coral Reef Initiative (SEFCRI) Team, gathered to develop local action strategies targeting coral ecosystems in Miami-Dade, Broward, Palm Beach and Martin counties. This region was chosen because it is an intensely-developed coastal region where reefs are being negatively impacted. Even though local reefs are exhibiting the same signs of degradation that have been documented in other parts of the world, there is still no coordinated public education or management plan for reefs located north of the Florida Keys National Marine Sanctuary. The general health and condition of the nearshore coastal habitats of southeast Florida have been, and continue to be, impacted by multiple anthropogenic and natural stressors. Various activities and processes, which are ongoing in the coastal regions of the state, have been documented to cause negative impacts to coastal habitats.

The Marine Industry and Coastal Construction Impacts (MICCI) Focus Team (one of four focus teams of the SEFCRI Team) worked to develop LAS to address and overcome threats associated with coral habitats, which include, but are not limited to: coastal development and increased nutrient; physical destruction from boat groundings, dredging activities, placement of municipal and utility infrastructure; and water quality degradation and habitat losses associated with beach nourishment projects. The cumulative impacts from these activities impair the resiliency of coastal reef habitats, making them more susceptible to anthropogenic and natural perturbations. [1]

Environmental assessment can be a subjective process, especially when the data are incomplete. Permitting agencies may have to draw conclusions based upon available evidence when information on the habitat functions and values lost over time are not well-documented. In such cases, they must use the best available data and "best professional reasonable judgments." Cumulative impact assessment is imprecise without adequate data to prove (a) what ecological relationships and environmental conditions existed prior to development, and (b) that

[1] Source for the above three paragraphs: DEP Solicitation No. 2006059C, Attachment C Scope of Services

development caused observable changes in species abundance or environmental quality.

Under most regulatory systems for coastal development, environmental impact assessments focus mainly on the specific ecological consequences of a specific project, rather than the collective impact of projects over time. The cumulative impact of development must be considered in agency regulatory decisions. Nevertheless, for environmental factors to influence permit decisions, site-specific resource impacts must be documented, including possible future impacts, such as climate change. Thus, the principal advantage to cumulative impact assessments using this approach is that it can help resource managers to understand better the contribution of site-specific environmental impacts to declines in habitat quality within marine ecosystems.

At the federal level, the Executive Office of the President Council on Environmental Quality (CEQ) published *Considering Cumulative Effects Under the National Environmental Policy Act* (CEQ 1997). This guidance document summarized the two basic methods of assessing cumulative impacts under the National Environmental Policy Act (NEPA): 1) The **impact assessment approach,** an extension of environmental impact assessments, in which cumulative effects of combined actions are evaluated relative to thresholds of concern for resources or ecosystems, and 2) The **planning approach,** an extension of regional or comprehensive planning, in which the allocation of cumulative stresses on the resources or ecosystems within a region are optimized. The report states:

> *Although the impact assessment approach more closely parallels current NEPA practice, an optimizing approach based on a community-derived vision of future conditions may be preferable in the absence of reliable thresholds for the resources, ecosystems, and human communities of concern. In fact, the planning approach to cumulative effects analysis is becoming more common within agencies and intergovernmental bodies as they embrace the principles of ecosystem management and sustainable development (CEQ 1997).*

The approaches complement one another and provide a more thorough methodology. “One that satisfies the NEPA mandate to merge environmental impact assessment with the planning process” (CEQ 1997).

Florida Legislature’s Office of Program Policy Analysis and Government Accountability (OPPAGA) has recommended an integrated planning approach at the state, regional and local levels. As a result, OPPAGA issued guidance titled *Cumulative Impact Consideration in Environmental Resource Permitting*. This guidance is applicable to Environmental Resource Permitting (ERP) programs administered by the Florida Department of Environmental Protection and Florida’s water management districts (WMDs) (OPPAGA 2001).

OPPAGA concluded that:

- "The cumulative impact consideration is conceptually justified because, despite regulatory efforts, surface waters and wetlands continue to be degraded or lost.
- Weaknesses in design and implementation limit the cumulative impact consideration's effectiveness.
- A consistent, equitable and practical methodology for considering cumulative impacts at the individual project level is not available.
- Changes to the process would add clarity and certainty in applying the consideration, but would not address fundamental problems" (OPPAGA 2001).

Based on those findings, OPPAGA recommended that the legislature, regulatory agencies and local governments adopt an integrated land use planning approach to proactively address cumulative impacts to surface waters and wetlands.

A single, generally accepted, comprehensive environmental assessment methodology for cumulative impacts does not exist. The definition of cumulative impact assessment has evolved over time, increasingly relying upon concepts derived from environmental planning and management. The ideal cumulative impact assessment encompasses a comprehensive mix of reviewing permits, monitoring, modeling, planning and management while drawing upon the concepts of pollution prevention, regional risk assessment and management, sustainable development, ecosystem management and health and integrated resource management (Vestal et al. 1995). However, such an approach would likely be costly and time-consuming.

While cumulative impact methodologies exist for terrestrial habitat impacts, their application to marine habitat assessments is not clear and has not been tested. Thus, the primary focus of this project is to provide environmental managers and regulators a process and methodology to address cumulative impacts sections in project reviews and assessments.

The purpose of the next section is to introduce the proposed methodology. This document should be viewed as the first step in developing a reliable methodology. Field testing viable methods and continued review will be essential to ensure that modifications and guidance are provided as the methodology is refined.

Proposed Methodology

Based on the previous considerations and findings from the literature review, a checklist approach is proposed to determine the cumulative impact of past, present and foreseeable marine and coastal projects on marine resources[2]. The methodology was determined most appropriate because it is simple, comprehensive and can be tailored specifically to marine resources. Furthermore, the methodology is cost-effective.

The proposed methodology consists of an Assessment Flowchart (Appendix A), an Assessment Tool (Appendix B) and Users' Instructions for using the Tool (Appendix C), which are intended to be used by reviewers from regulatory agencies, consultants and permit applicants. The chart and tool are designed to:

- Be practical and facilitate the decision making process.
- Be adaptable and applicable to a wide array of projects.
- Compile all inputs and provide an estimate of the overall impact on marine resources.
- Provide a transparent, verifiable process for project managers, regulatory officials, and stakeholders.
- Result in a consistent review process among varying agencies and projects.
- Act as a supplement to existing regulatory review processes.

The methodology consists of eight steps which involve filling out the worksheets in the tool and determining various scores to arrive at the Adjusted Cumulative Impact Rating. The information incorporated into each spreadsheet should come from the submitted project application documents. In some cases, it might not be possible to answer all the questions for a given project. In these cases, the reviewer should note if more data is needed or the question is not applicable. The next sections summarize the information included in the tool's worksheets. A detailed guidance on how to use the tool is included in Appendix C.

Step 1 - Worksheet 1: Project Summary

The assessment process starts by completing a project summary form. The Project Summary worksheet includes the following information (Worksheet 1, Appendix B):

- Project name
- Application number
- Assessment area name/number
- Baseline condition
- Impact site
- Impacted area size

[2] When determining whether a project should fall under this analysis the following should be answered. Would this project require a cumulative impact review by a federal, state or local agency – if so then the checklist should be utilized. For example, projects under the FDEP ERP jurisdictions that would require standard general or individual permits would need review, as would Joint Coastal Permits (JCP's) from FDEP Beaches and Coastal Systems. The U.S. Army Corps of Engineers is required to evaluate the cumulative effects of potential projects pursuant to NEPA in an environmental assessment.

- Special designations (Essential Fish Habitat-Habitat Areas of Particular Concern [EFH-HAPC], Aquatic Preserve, etc.)
- Geographic boundary
- Temporal scale
- Assessment area description
- Significant nearby features
- Functions
- Value/sensitivity of the affected resource or ecosystem
- Uniqueness
- Mitigation for previous permit/other historic use
- Anticipated habitat utilization based on literature review
- Anticipated utilization by listed species
- Issues and concerns

Step 2 - Worksheet 2: Past, Present and Foreseeable Projects

One must review the impact of past, present and foreseeable projects on marine resources at the proposed project location. A preliminary database has been developed to store relevant information about past projects. The database submitted with this document provides examples of projects to demonstrate the database's use. The database includes the following information:

- Specific location (latitude/longitude)
- Project description (e.g., dredging of port access)
- Project methods (e.g., hopper dredge, horizontal drilling)
- Expected impacts (e.g., sand burial, physical damage, increased turbidity)
- Impacted habitats (e.g., acres of hardbottom; includes direct and indirect)
- Impacted organisms (e.g., fish, crustaceans, mollusks; life history)
- Protected species impacted (e.g., staghorn and elkhorn coral, sea turtles, manatees, Johnson's seagrass)
- Relevant designations (e.g., EFH-HAPC, Aquatic Preserve)
- Preventative measures used during project implementation (e.g., lighting, observers)
- Mitigation methods (e.g., coral transplantation, artificial reefs)
- Impact/damage reports (e.g., loss of corals, burial of hardbottom habitats)
- Date of impact report
- File/report location (e.g., URL, library location)

After using the Projects Database to review past, present and foreseeable projects, a score is determined based on the average current rating of these projects (Worksheet 2, Appendix B). Worksheet 2 includes the following information:

- Project designation (e.g., past, present, or foreseeable)
- Project name
- Location
- Brief description
- Methods

- Cumulative impact rating
- Current rating
- Justification for inclusion in analysis
- Data source

The utility of this worksheet will be realized after several projects and CIRs have been added to the database.

Step 3 - Worksheet 3: General Evaluation

Evaluate the project's general information and determine a general evaluation score based on the following information (Worksheet 3, Appendix B):

- Project's anticipated area of impact (AOI)
- Number and relative significance of past, present and foreseeable projects within the proposed project's AOI
- Project's proximity to other past, present and foreseeable projects
- Degree to which impacts are highly uncertain or involve unique or unknown risks
- Degree to which the action establishes a precedent for future actions with significant impacts or represents a decision in principle about a future consideration
- Potential for individually insignificant but cumulatively significant impacts
- Threshold levels

Step 4 - Worksheet 4: Environmental Evaluation

Evaluate the project's environmental and risk characterization information and determine an environmental evaluation score based on this information. The environmental evaluation section includes questions such as (Worksheet 4, Appendix B):

- To what degree are endangered or threatened species and their critical habitat, as defined under the Endangered Species Act of 1973, adversely affected?
- Is there a potential for contradiction with federal, state or local environmental protection laws (e.g., Executive Order 13089)?
- Has any recent NEPA analysis of similar or nearby actions by federal or non-federal agencies identified important cumulative impact issues?
- Has the impact of past known or recorded events been significant, such that the importance of the resource is defined by past loss, past gain or investments needed to restore the resource?

Step 5 - Worksheet 5: Risk Characterization Evaluation

Evaluate the project's risk characterization (Worksheet 5, Appendix B) by determining a ranking of the potential impacts stressors have on the South Florida coastal ecosystem's Valued Environmental Attributes (VEAs). VEAs are defined as attributes that have particular ecological importance and/or societal relevance and value. VEAs should be defined operationally (i.e., selected for specific ecosystems and environmental goals) and should be amenable to measurement or prediction. VEAs may be structural (e.g., habitat quality) or functional (e.g., rates of primary production). Selection of VEAs is partially a function of the nature of the stressors of concern; i.e., some properties of the ecosystem may be known to be vulnerable to one stressor but not to another. Other criteria for selecting VEAs include natural variability of the VEA, requirements of particular legislation or regulations and availability of data and knowledge about the specific VEA that can be used for assessment. One must identify ecosystem attributes that can be used to evaluate the condition resulting from projected cumulative stressors.

Finally, the suite of selected VEAs must encompass a diversity of organizational scales and avoid the tendency to focus only on species. Examples of keystone VEAs for the South Florida region are presented in Table 1 below.

Table 1. Keystone VEAs for the South Florida Region.

Attached Organisms	Mobile Organisms	Estuarine Plant Communities
Stony Corals Soft Corals Zoanthids Hydrocorals Sponges Bryozoans Tube Worms Mollusks Macroalgae Others	Marine Mammals Sea Turtles Fishes Pelagic fish-complex (e.g., Jacks) Reef-fish complex (e.g., Grunts, Snappers, Groupers) Burrowing fish Bait fish Ornamental fish Echinoderms Mollusks Crustaceans Worms Others	Seagrasses Salt Marshes Mangroves

The scoring for each project would be conducted on a numerical scale using the best data available. The score obtained for each project-stressor-VEA combination can be used to determine initial threshold values for project evaluation. For example, a project that has an expected high impact on more than 50% of the VEAs considered may be subject to further scrutiny, damage minimization procedures and mitigation requirements. A project's VEAs are scored using the Risk Characterization worksheet (Appendix B).

Some factors that require consideration when scoring or ranking a specific stressor-VEA combination include:

- Severity of the expected impacts
- Spatial extent and duration of the expected impacts
- Recovery potential of the affected VEAs
- Commercial, recreational, scientific or societal value of the impacted VEAs
- Historical condition and abundance of the VEAs
- Previous disturbance history of the VEAs
- Existing scientific knowledge of the stressor-effect relationship
- Level and risk of mitigation proposed
- Alternative methodologies available
- Cost-benefit analysis of the proposed activity

Step 6 - Worksheet 6: Social, Economic and Cultural Impact Evaluation

Evaluate social, economic and cultural information to provide a measure of the proposed activity's potential impact on the human systems in the area. Determine a social, economic and cultural score based on this information. Including such information in the review process might be beyond the scope of some agencies so we have taken this into account. The scoring will be adjusted if this worksheet in not used. To obtain social, economic, and cultural information, the following questions are asked (Worksheet 6, Appendix B):

- To what degree will public health and safety be affected?
- To what degree will the human environment be impacted?
- Will the proposed action affect, directly or indirectly, any natural, cultural, social or economic resources; or ecosystems of regional, national or global public concern?
- Do other activities (federal or non federal) in the region have social, economic, cultural, ecological or other environmental effects similar to those of the proposed action?

Step 7 - Worksheet 7: Data Sheet

Summarize the data used to conduct the evaluations in worksheets 1 – 6 by completing the Data Sheet (Worksheet 7, Appendix B). The worksheet should be stored with the project permit application and other relevant information that can be referred to for future project evaluations.

Step 8 - Worksheet 8: Cumulative Impact Rating

Calculate the project's Adjusted Cumulative Impact Rating based on the scores determined in Steps 2-6. Then, use this rating to decide whether to submit the project for agency action or require the applicant to make changes (Worksheet 8, Appendix B).

Recommendations

Improvements on the proposed methodology will require the following:

1. Developing a comprehensive resource database to review the cumulative impacts of past, present and foreseeable coastal construction projects. Therefore, an updateable database is recommended to serve as a location to catalogue, search and store various materials stemming from the review of past, present and proposed marine construction projects. This database would be utilized for agency and public access and should consists of:

    - Past projects, maps, reports, etc.
    - Updated scientific literature review.
    - Geographic information system (GIS) tools such as maps of projects and overlays. (These tools should be linked to individual projects in the database).
    - Lessons learned from previous projects.
    - Modeling tools and applications.
    - Other relevant baseline data/resource characterization information collected in a scientifically approved, reproducible and verifiable manner.

2. Establishing measurable goals, baselines and benchmarks against which to evaluate the individual and cumulative impacts of maritime industry and coastal construction projects on the Southeast Florida marine ecosystem. To improve cumulative impact assessment, coastal permitting and zoning processes should become more oriented toward ecosystem-based environmental planning and regulation, instead of the project-by-project approach which is currently practiced. To facilitate this goal, the process of assessing cumulative impacts needs to be made both manageable and understandable to users in order to secure consensus on outcomes from a broad constituency of stakeholders.

3. Optimizing intergovernmental coordination while considering projects' cumulative effects on Southeast Florida's marine ecosystem. Individuals who review coastal project applications face this challenge. Agencies should dedicate resources so adequate and essential reviews can be conducted on all projects.

4. Conducting additional research on theoretical and applied issues before the full potential of cumulative impact assessment can be realized for marine ecosystems.

The appropriate federal, state and local agencies should work together to implement these recommendations. Also, the public and regulated community should have access to the recommendations and provide input. The focus of the cumulative impact assessment should be on how the proposed action will affect the resource and whether the action will move closer to, or farther away from, the goals for that resource. Assessment should be combined with proactive, long-term management planning. This methodology is not intended to be the final accepted method for assessing cumulative impacts but rather the first step towards developing a final methodology.

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Appendix A: Assessment Flowchart

Appendix B: Assessment Tool

Appendix C: Users' Instructions