

# CWG Review 1: Spring 2015

## Tier 1 Information:

### 1. Management Action

**N-117: Improve impact minimization and mitigation activities for unavoidable impacts to resources to reduce and offset lost ecosystem function; including the use of non-traditional mitigation strategies.**

This revised RMA is a combination of the following original RMAs:

- **N-117:** Revise coastal permitting process to establish a 'no net loss of coral from development projects' practice to minimize impacts of development on reef systems.
- **N-132:** Improve compliance/enforcement of mitigation projects by monitoring results to hold agencies/project sponsors accountable.
- **S-12:** Promote alternative mitigation activities (for example, transplanting nursery-grown corals) to offset functional degradation or temporary loss of resources
- **S-105:** Mandate the relocation of various viable benthic organisms (e.g. corals, octocorals, and sponges) from areas to be dredged (or lost due to other activities) in order to minimize impacts.

### 2. Intended Result (Output/Outcome)

*What is the end product/result of this management action?*

- The intended result of this management action is twofold:
  - To further minimize permitted impacts to natural resources/communities due to coastal construction projects via the recommendation to expand and improve mitigation practices by mandating the relocation of various viable benthic organisms (e.g. corals, octocorals, and sponges) from areas to be impacted by dredge and fill projects or other permitted activities.
  - Improve the mitigation process (inclusive of permitting, implementation/construction, monitoring and compliance) to better ensure the success of mitigation projects.
  - Additionally, this management action is intended to minimize impacts to natural resources / communities due to coastal construction projects via the recommendation to mandate relocation of various benthic organisms (e.g. corals, octocorals, and sponges) from areas to be impacted by dredge and fill projects or other permitted activities.
  - Comprehensive ecosystem planning to avoid, minimize and mitigation for unavoidable impacts including non-traditional mitigation strategies like outplanting nursery organisms (echinoderms, corals, etc. ), relocation of benthic organisms, hazard removal and water quality improvements. Revise reef mitigation process for permitted and non-permitted activities to improve permit compliance, enforcement of compensatory mitigation measures and accountability of project proponents.

### 3. Duration of Activity

*Is this a discrete action or a recurring activity? Explain.*

- Implementation of this recommended management action will be a recurring activity.
  - Coastal development, and by extension the maintenance of coastal developments, is ongoing and the best suited minimization or mitigation method will need to be determined on a project by project basis.
  - There are recurring incidences of hardbottom and coral reef impacts that must be mitigated according to Florida Rule and statute (373.414, F.S., 62-345, F.A.C.).
  - The permitting process for mitigation projects should be continually improved based on lessons-learned.
  - Alternative mitigation methods should be adaptively managed and continuously improved such that information from past projects can be utilized to improve the success of future projects.

### 4. Justification

*What issue or problem will this management action address? Explain.*

- The current state statute requires 100% replacement of lost ecosystem function but it doesn't even come close with current boulder mitigation as those artificial reefs do not recruit like natural reef and do not recruit within the monitoring time period
- Applications for coastal construction permits frequently include proposals to construct artificial reefs using limestone boulders as compensation for impacts to hardbottom and coral reefs. However, in instances dealing with a temporary loss or a partial (functional) loss, the use of alternative mitigation strategies may be more appropriate to offset project-related impacts to resources. In some cases, alternative mitigation strategies may also be appropriate to offset permanent and / or direct impacts. Alternative mitigation strategies would be those that may not directly replace lost ecosystem services but would improve the overall health of the system such as improved water quality. Alternative mitigation strategies may be appropriate where the amount of mitigation required is not feasible, that is, if 10s of acres of mitigation reef needs to be installed and outplanted there may not be enough material to outplant the entire 10 acres, it may be more of a benefit to create 5 acres and implement a nursery that can grow additional material to outplant at that site.
- Mitigation activities that are completed for permitted impacts typically contain success criteria and monitoring requirements to ensure success (i.e., replacement of ecological functions). However, it is necessary to apply lessons-learned from previously permitted projects to continually improve mitigation, including monitoring protocols, metrics of success, and accountability for project success/failure (i.e., compliance and enforcement).
- Coastal construction projects are required to minimize impacts, but more can be done to minimize impacts. In some cases organisms that could be transplanted elsewhere are left within the impact area and are lost due to construction activities. It would be cost prohibitive to require all benthic organisms to be relocated prior to each coastal construction project. Benthic organisms do not always survive transplantation, and the long-term survivorship of organisms after transplantation cannot be guaranteed. However, in situations where a construction activity will result in total mortality of all organisms remaining within the project footprint, then transplantation will substantially increase survivorship relative to the no-action scenario. Moreover, the employment of tried-and-true transplantation methods and individuals with experience / expertise in transplantation can greatly improve success.

## **5. Potential Pros**

*What are the potential advantages associated with this management action?*

- Greater minimization of impacts and improved success of mitigation projects may result in "no net loss of corals" and may achieve a loftier goal of reducing and replacing the loss of ecological functions (not just coral mortality) resulting from permitted and unpermitted impacts to hardbottom and coral reefs. However the removal of organisms to be transplanted is a minimization effort and could be counted on the front end of assessment equations, but the replanting of that material would not also count on the backend of the equation for mitigation.
- An adaptive approach to continually improving the mitigation process will enhance the success of individual mitigation projects and will increase the proportion of mitigation projects that are successful.
- Alternative mitigation strategies, such as the transplantation of corals-of-opportunity and nursery-raised corals to unpermitted damaged natural reef sites, can restore the ecological functions of natural hardbottom/reef areas. Corals (and other organisms e.g. octocorals and sponges) transplanted onto bare substrates (e.g., artificial reefs or damaged / barren natural reefs) can also enhance the recruitment (directly or via chemical attraction of larvae) in the areas of transplantation. Reef fish will also be attracted by more complex micro-relief of benthic organisms, which provide them shelter.
- Reduced mortality of benthic organisms within impacted areas. Salvaging organisms from impact areas can improve populations by maintaining genetic diversity and the number of reproductive individuals. When benthic organisms are transplanted, they will provide some of the same functions of the ecosystem that was lost due to unavoidable project-related impacts. Furthermore, organisms transplanted onto bare substrates (e.g., artificial reefs or barren natural reefs) can enhance the recruitment of corals and fish because larval settlement can be influenced by chemical cues emitted by living organisms on the reef. Transplantation of corals within the project footprint will supply more fragments for coral nurseries, which can be used to repair injury sites.

## 6. Potential Cons

*What are the potential disadvantages associated with this management action?*

- Nursery grown corals may hide the black market and would need to be restricted to only be used in mitigation.
- Alternative mitigation methods may not be applicable in certain situations; the appropriateness of any proposed mitigation activities should be evaluated on a project-by-project basis, considering the resource to be impacted and the type of impacts.
- If larger benthic organisms (e.g., corals) have higher survivorship, then requiring smaller size classes to be transplanted from impact areas may reduce survivorship of transplanted individuals; however, it is important to consider that while the proportion of transplanted individuals that survive may be lower than previous projects, the overall number of individuals salvaged from impact areas will be greater.
- Requiring additional transplantation (i.e., different types of benthic organisms or greater size range of organisms) from impact areas may be cost prohibitive in some circumstances. If a permittee ensures that all permit-required transplantation efforts are completed but is unable to salvage all benthic organisms suitable for transplantation, then it may be advisable to allow trained volunteers to transplant additional organisms prior to construction.
- Transplantation requires a substantial time commitment to 1) locate organisms within the impact area to transplant 2) assess their condition 3) collect and 4) relocate those organisms that are suitable for relocation (i.e., free from disease). It is also necessary to identify suitable transplantation sites / repositories for relocated organisms and to prepare the substrate for transplants. It may also be difficult to define appropriate survivorship / performance measures.
  - Currently, nurseries are limited in species reared and size classes offered, therefore that industry will need to be developed in order to handle the demand that large-scale projects would generate.
  - It is important that more corals, octocorals, and sponges are removed from the area of impact and used to more aptly replicate the lost ecosystem services and function. Therefore projects should require the removal of hard corals 10cm and greater, and the transplantation of octocorals and large sponges (x. *muta*). For smaller footprint projects the size requirement may be lowered.

## 7. Location

*County/Countries: Miami-Dade, Broward, Palm Beach, Martin, Other?*

- Focused on SEFCRI region but could be applied statewide

*Relevant Habitats: Coral reef, seagrass, watershed, etc.?*

- The management action could be applied to multiple habitat types within the SEFCRI region, but it is most applicable to hardbottom and corals reef resources.

*Specific Location: City, site name, coordinates, etc.?*

- This action would be a state-wide initiative.

## 8. Extent

*Area, number, etc.*

- This management action is large-scale and long-term.

## 9. Is this action spatial in nature?

- No

## Tier 2 Information:

### *WHY?*

#### 1. Strategic Goals & Objectives to be Achieved

Refer to the [SEFCRI Coral Reef Management Goals and Objectives Reference Guide](#).

- MICCI Issue 1 Goal – Protect coral systems from impacts associated with projects in and around the reef tracts of southeast Florida.
  - Obj 1 – Review, revise, implement and enforce existing regulations.
  - Obj 2 – Avoid and minimize impacts to coral reef ecosystems from dredge and fill activities. Reduce the areal extent of project-related impacts. MICCI Issue 2 Goal – Change coastal construction practices in ways that protect marine and estuarine habitats.
- MICCI Issue 2 Goal – Change coastal construction practices in ways that protect marine and estuarine habitats.
  - Obj 1 – Demonstrate avoidance and minimization of impacts to resources at the project planning stage.
- MICCI Issue 3 Goal – Develop and implement marine habitat restoration.
  - Obj 3 – Evaluate and promote environmentally appropriate artificial reef construction that does not adversely affect natural marine habitats.
- MICCI Conservation Goal C – Minimize and where possible eliminate habitat destruction from maritime industry and coastal construction activities.
- LBSP FL Priorities Goal C4 Obj 4 – Improve consistency and level of enforcement of current rules and regulations.
- Other Strategic Management Goal A1 – Ecosystem-based approach to management.
- Other Strategic Management Goal A4 Obj 3 – Create consistent standards and best management practices for restoration and compensatory mitigation projects.

## 2. Current Status

*Is this activity currently underway, or are there planned actions related to this recommendation in southeast Florida? If so, what are they, and what is their status.*

- Alternative mitigation strategies, such as the transplantation of corals-of-opportunity and nursery-raised corals, have begun to be incorporated into FDEP coastal construction permits, when applicable.
- For some projects, the Florida Department of Environmental Protection requires permittees to minimize impacts by removing organisms within the impact area. However, typically only corals are transplanted; this management action would improve those practices by encouraging the removal of multiple taxa from impacted areas to future minimize impacts from coastal construction projects.

## 3. Intended Benefits (Outcomes)

*What potential environmental benefits or positive impacts might this management action have?*

- Alternative mitigation strategies, such as transplanting corals to damaged natural reef sites, can improve the ecological function of natural hardbottom/reef areas. Organisms transplanted onto bare substrates (e.g., artificial reefs or barren natural reefs) can jump start the recruitment of corals and fish because larval settlement can be influenced by chemical cues emitted by living organisms on the reef.
- Coastal construction projects are required to first avoid and then minimize impacts, but more can be done to continue efforts to minimize impacts. In some cases organisms that could be transplanted elsewhere are left within the impact area and are lost due to construction activities. This management action would reduce the mortality of benthic organisms within areas impacted by coastal construction projects. Salvaging organisms from impact areas can improve populations by maintaining genetic diversity and the number of reproductive individuals. When salvaged benthic organisms are transplanted, they will provide some of the same functions of the ecosystem that was lost due to unavoidable project-related impacts. Furthermore, organisms transplanted onto bare substrates (e.g., artificial reefs or barren natural reefs) can enhance the recruitment of corals and fish because larval settlement can be influenced by chemical cues emitted by living organisms on the reef.

*What potential social/economic benefits or positive impacts might this management action have?*

- By minimizing impacts to resources and enhancing other areas by transplanting organisms that would have otherwise been lost, this management action would assist in the maintenance of ecosystem functions provided by hardbottom and / or coral reef associated organisms (e.g., sponges, octocorals, and corals).
- Transplanted corals may make mitigation and natural reefs more attractive to divers.
- Improved function of mitigation reefs may improve fishery yields.

*What is the likely duration of these benefits - short term or long-lasting? Explain.*

- The benefits of minimizing / mitigating impacts to coral reefs are long-lasting; some corals grow very slowly but can live for centuries.

#### **4. Indirect Costs (Outcomes)**

*What potential negative environmental impacts might this action have?*

- There has been some debate about the risk of transmitting diseases by transplanting nursery raised corals to natural sites; to minimize the potential transmission of disease, it is typically recommended that organisms with visible signs of disease not be transplanted.

*What potential negative social/economic impacts might this action have?*

- Applicants that have typically mitigated for project-related unavoidable impacts by constructing boulder reefs may require additional information about potential alternative mitigation activities before agreeing to implement these activities.
- Companies may have to be trained and educated on what are appropriate alternative mitigation strategies and when these new strategies can be employed.
- Alternative mitigation may not be the best option for certain impacted areas.
- The financial cost of alternative mitigation and the relative functional gain associated with mitigation activities will need to be compared to boulder reef creation on a project-by-project basis; in some cases, alternative mitigation activities may not be as cost effective as traditional mitigation (i.e., the construction of boulder reefs).
- There may be increased costs associated with the removal and transplantation of additional benthic organisms from impact areas.

*What is the likely duration of these negative impacts - short term or long-lasting? Explain.*

- Potential financial impacts of employing alternative mitigation strategies are expected to be short-term, as methodology and technology improve, the implementation of alternative mitigation is expected to become less expensive.
- Any additional costs for minimization via transplantation of benthic organisms from the impact area would be incurred on a project-by-project basis, but overall costs are expected to be short-term. If minimization is required by many permits, perhaps more efficient, cost-saving techniques will be developed.

#### **5. Risk**

*What is the threat of adverse environmental, social, or economic effects arising from not implementing this action?*

- If improved mitigation strategies are not implemented, then ecosystem functions will be lost, which can result in economic and social losses due to lack of resources for public users, including divers and fisherman.
- Permitted projects will continue to not even come close to the 100% replacement of lost function that they are required by law to achieve.
- If organisms that could be transplanted elsewhere are left within the impact area, they will be lost due to construction activities, resulting in the loss of the natural range of population age/size class structure, and potentially reproductive individuals from the population that may reduce genetic diversity and biodiversity.

#### **6. Relevant Supporting Data**

*What existing science supports this recommendation? (Provide citations)*

- The use of alternative mitigation strategies (e.g., coral transplantation) is supported by literature, including:
  - Abelson, Avigdor; Artificial reefs vs coral transplantation as restoration tools for mitigating coral reef deterioration: benefits, concerns, and proposed guidelines; Bulletin of Marine Science, Volume 78, Number 1, January 2006, pp. 151-159(9)
  - Monty, Jamie A.; Gilliam, David S.; Banks, Kenneth; Stout, David K.; and Dodge, Richard E., "Coral of Opportunity Survivorship and the Use of Coral Nurseries in Coral Reef Restoration" (2006). Oceanography Faculty Proceedings, Presentations, Speeches, Lectures. Paper 31.
  - Forrester, G. E., Ferguson, M. A., O'Connell-Rodwell, C. E. and Jarecki, L. L. (2014), Long-term survival

and colony growth of *Acropora palmata* fragments transplanted by volunteers for restoration. *Aquatic Conserv: Mar. Freshw. Ecosyst.*, 24: 81–91. Doi: 10.1002/aqc.2374

- Baruch Rinkevich, Management of coral reefs: We have gone wrong when neglecting active reef restoration, *Marine Pollution Bulletin*, Volume 56, Issue 11, November 2008, Pages 1821–1824
- Helen T. Yap, Local changes in community diversity after coral transplantation, *Mar Ecol Prog Ser*, Vol. 374: 33–41, 2009, doi: 10.3354/meps07650

## 7. Information Gaps

*What uncertainties or information gaps still exist?*

- While methods for transplanting corals have been widely studied, additional studies could improve protocols and develop BMPs for transplanting corals in SE FL.
- BMPs for minimization (i.e., removing and transplanting organisms) will need to be developed; specifically, information the appropriate size and types of taxa that are to be removed should be refined – this is currently being addressed by FWC and a workgroup of experts.

## WHEN?

### 8. Anticipated Timeframe for Implementation

*How long will this recommendation take to implement?*

- 0 - 2 years

### 9. Linkage to Other Proposed Management Actions

*Is this activity linked to other proposed management recommendations?*

- Yes

*If so, which ones, and how are they linked? (e.g., is this activity a necessary step for other management actions to be completed?)*

- Yes, this action was previously combined with the following:
- **N-117:** Revise coastal permitting process to establish a ‘no net loss of coral from development projects’ practice to minimize impacts of development on reef systems.
- **N-132:** Improve compliance/enforcement of mitigation projects by monitoring results to hold agencies/project sponsors accountable.
- **S-12:** Promote alternative mitigation activities (for example, transplanting nursery-grown corals) to offset functional degradation or temporary loss of resources
- **S-105:** Mandate the relocation of various viable benthic organisms (e.g. corals, octocorals, and sponges) from areas to be dredged (or lost due to other activities) in order to minimize impacts.

## WHO?

### 10. Lead Agency or Organization for Implementation

*What agency or organization currently has/would have authority? Refer to the [Agencies and Actions Reference Guide](#).*

- Florida Department of Environmental Protection

### 11. Other Agencies or Organizations

*Are there any other agencies or organizations that may also support implementation? Explain.*

- USACE, FWC, NOAA, NMFS and other agencies and organizations with expertise in mitigation reefs, coral nurseries, and transplantation could support the implementation of this management action.

### 12. Key Stakeholders

*Identify those stakeholders most greatly impacted by this management action, including those from whom you might expect a high level of support or opposition. Explain.*

- Stakeholders involved in coastal construction activities (including permittees and regulatory agencies).



## HOW?

### 13. Feasibility

*Is there appropriate political will to support this? Explain.*

- Expanded/Improved mitigation strategies and alternative mitigation has been proposed and utilized for various construction projects and has recently gained support within the Department.
- Political support for permit requirements to minimize impacts via transplantation of additional benthic organisms will likely depending upon the scope / scale of project and the anticipated costs of minimization.

*What are the potential technical challenges to implementing this action? Has it been done elsewhere?*

- Technical expertise is needed to successfully implement and monitor the success of mitigation activities.
- BMPs for removing and transplanting organisms from impact areas will need to be developed; specifically, information the appropriate size and types of taxa that are to be removed should be refined; FWC is working on this.

### 14. Legislative Considerations

*Does the recommendation conflict with or actively support existing local, state, or federal laws or regulations? Explain.*

- This regulation does not conflict with any laws or regulations. State laws currently require minimization and mitigation for unavoidable impacts to resources. This management action would provide applicants additional options for mitigation.

### 15. Permitting Requirements

*Will any permits be required to implement this action? Explain.*

- This is incorporated into permits, the recommendation itself does not require a permit

### 16. Estimated Direct Costs

*Approximately how much will this action likely cost? (Consider one-time direct costs, annual costs, and staff time, including enforcement.)*

- Promotion of alternative mitigation by regulatory agencies will not require a substantial amount of money.

*Will costs associated with this activity be one-time or recurring?*

- One time cost to develop and implement new mitigation standards. The minimization component of this management action will require recurring activities on behalf of the project sponsor or contractor: i.e., removal of organisms from multiple project-areas over time.

*If recurring, approximately how long will staff time and annual costs be necessary to implement the management action?*

- The initial costs of implementing this recommendation at the regulatory level should be minimal.

### 17. Enforcement

*Does this require enforcement effort?*

- No

### 18. Potential Funding Sources

*Identify potential funding organizations/grant opportunities, etc.*

- FDEP/USACE-RD would fund the start-up costs of initiating this action, but permittees would be responsible for funding minimization and mitigation on a project-by-project basis.

### 19. Measurable Outcomes/Success Criteria/Milestones

*How will the success of this recommendation be measured? How will you know when the intended result is achieved?*

- The number of projects using alternative mitigation can be counted. The status / success of specific projects utilizing alternative mitigation methods can be quantified using the number of transplanted organisms, their growth and survival.
- The number of organisms salvaged from impacted areas and their survival post-transplantation could be measured.
- The success of mitigation is defined as the replacement of ecological functions provided by natural resources / communities that were lost or degraded due to anthropogenic impacts, including but is not limited to impacts resulting from permitted construction projects and unpermitted events such as accidental groundings and improper anchoring.

## **SEFCRI/TAC Targeted Questions:**

### **1. TAC - Is the recommendation likely to achieve the intended result? Explain.**

#### *Tier 1 – #2 (Intended Result - Output/Outcome)*

- Nurseries and increased impact minimization activities could reduce net coral loss and are worthy actions to pursue.
- Defining appropriate mitigation and monitoring and then holding permitted activities accountable for the success of the mitigation is a problem which needs to be addressed.
- Any additional discussion on alternative mitigation activities or any discussion on mitigation is good. Ultimately this MA will achieve its intended result only if more appropriate mitigation activities are being conducted which actually begin to compensate for loss services.

### **2. TAC - Is the recommendation sufficient to address the identified issue or problem? Explain.**

#### *Tier 1 – #4 (Justification)*

- -

### **3. TAC - Is the recommendation technically achievable from a science or management perspective? Explain.**

#### *Tier 2 – #8 (Anticipated Timeframe for Implementation) and Tier 2 - #13 (Feasibility)*

- -Yes it is technically achievable

### **4. SEFCRI Team, PPT & Other Advisors - Has this been done (by SEFCRI, other agencies or organizations in the SEFCRI region)? Explain.**

#### *Tier 2 – #2 (Current Status)*

- Looking at transplanting more species and size classes is a work in progress

### **5. SEFCRI Team, PPT & Other Advisors - Is this recommendation a research or monitoring project? (Recommendations should be turn-dirt management actions, not the step you take before a management action). Explain.**

- A bit of research may be inherent in developing best practices

### **6. SEFCRI Team, PPT & Other Advisors - If either of the following applies to this management action, provide feedback on which information submitted by the Community Working Groups may be more appropriate, or if entries should be merged. Explain.**

- There are different viewpoints for an individual management action (i.e. two working group members provided separate information, as indicated by a '/' marking between them).
- Information submitted for this and other draft management actions is sufficiently similar that they might be considered the same.

### **7. SEFCRI Team, PPT & Other Advisors - Non-agency Question: Is the recommendation technically achievable from your stakeholder perspective? If not, do you have suggestions that would allow this to become technically achievable from your stakeholder perspective? Explain.**



*Tier 1 - #5 (Potential Pros), Tier 1 - #6 (Potential Cons), Tier 2 - #3 (Intended Benefits), Tier 2 - #4 (Indirect Costs) and Tier 2 - #12 (Key Stakeholders)*

- Yes

**8. SEFCRI Team, PPT & Other Advisors - Agency Question: Is the recommendation technically achievable from a management perspective? If not, do you have suggestions that would allow this to become technically achievable from your agency's management perspective? Explain.**

*Tier 2 – #10 (Lead Agency or Organization for Implementation) and Tier 2 - #11 (Other Agencies or Organizations)*

- Yes, With mitigations options dwindling, new alternatives are constantly being explored. The biggest challenge with using alternative or outside-the-box mitigation options is that they need to provide functional lift when plugged in to mitigation assessment tools, and this can't be done currently with a number of alternatives that regulatory agencies would like to use. Outplanting nursery corals is currently being proposed as part of a combination mitigation plan for the Port Everglades Expansion project.
- FWC has template mitigation relocation recommendations for corals and octocorals, in which we recommend relocation based on size and species. The FWC provides those recommendations to DEP and USACE for all permit applications that we review. DEP and USACE are the permitting agencies for dredging activities and they would need to require relocations as permit conditions. FWC also provides the same relocation recommendations for beach nourishment, communication cable, and pipeline projects.