

***Coral Recovery Performance Measures and Monitoring Worksheet***

**Guidance Document**

*The following will help you successfully fill out the NOAA Restoration Center's Coral Strategy reporting form.*



## Contents

1. Background.....	3
2. General Guidance.....	3
A. Award Period.....	3
B. Worksheet Data Collection.....	3
C. Project Monitoring Parameters.....	3
D. Monitoring.....	4
E. Photo collection.....	4
3. Worksheet Guidance.....	4
A. General Information.....	4
B. Project Timing.....	4
C. Project Photos.....	5
D. Habitat Acres Restored (fill-out all that apply).....	5
E. Restoration Actions.....	6
E1. Erosion Control Techniques.....	6
E2. Invasive Species Removal.....	9
E3. Coral Transplantings.....	12
F. Management and Recovery Actions.....	13
G. Community Participation.....	13
H. Community Enhancement.....	14
I. Additional Project Monitoring.....	15

## **1. Background**

The primary mission of the NOAA Restoration Center is to provide funding and technical expertise to help communities restore coastal habitats. Coral recovery is one of the program's areas of focus, targeting restoration actions such as reducing land based sources of pollution, removing invasive species, and transplanting coral colonies. In order to assess progress toward project goals, the NOAA Restoration Center is collecting pre- and post-implementation information on coral restoration projects. We greatly appreciate your cooperation in this effort!

## **2. General Guidance**

### **A. Award Period**

- i. NOAA can only require monitoring within the duration of the award period. Longer award periods may be established to allow for post-implementation monitoring. Any data or analyses completed outside the award period may be useful to further inform post-implementation results and would be welcome.

### **B. Worksheet Data Collection**

- i. The Coral Recovery Performance Measures and Monitoring Worksheet is designed to be completed by the grantee at the beginning and end of a coral restoration project with the assistance of local NOAA Restoration Center technical monitors and/or representatives from partner organizations.
- ii. The pre-implementation portions of the worksheet should be completed prior to project implementation. The post-implementation portions of the worksheet should be completed at the close of the award period. For some parameters, data collected after the award period would be useful to further inform post-implementation impact.

### **C. Project Monitoring Parameters**

- i. The parameters included in the worksheet are not an exhaustive set of parameters that could be measured, but rather, were developed to contribute to a specific set of program level performance measures that assess progress towards NOAA Restoration Center program goals.
- ii. Grantees are welcome to monitor parameters beyond those outlined within the worksheet and to revisit the parameters in the worksheet on a longer time frame. See 'Additional Project Monitoring' section on pg. 10.

#### **D. Monitoring**

- i. Pre-implementation and post-implementation monitoring techniques should be conducted using the same methods to ensure comparable results are obtained. It is important to establish the monitoring methods prior to data collection. Analyses of the monitoring data should utilize the same statistical techniques. If you are uncertain of the most appropriate monitoring methodologies for a project, please contact your NOAA technical monitor for guidance.

#### **E. Photo collection**

- i. Remember to take before and after photos of your project. For each photo, it is important to write a caption and document the photographer. For further guidance on photos, please visit the following URL:  
[http://www.habitat.noaa.gov/partners/toolkits/restoration\\_center\\_toolkits/outreach\\_resources/Photo\\_Video\\_Guidance.pdf](http://www.habitat.noaa.gov/partners/toolkits/restoration_center_toolkits/outreach_resources/Photo_Video_Guidance.pdf)

### **3. Worksheet Guidance**

#### **A. General Information**

- i. Project Name: Please provide the official project name.
- ii. Project Funding Mechanism: Provide the specific grant program through which your project was funded (e.g., Estuary Habitat Restoration Program, Marine Debris, The Nature Conservancy, Gulf of Mexico Foundation, etc.).
- iii. Award Start and End Date: Enter the official award start date and award end date found in your award file.
- iv. Contact Person, Phone and Email: Provide the contact information (full name, phone number, and email address) for the designated person who will complete the monitoring worksheet.

#### **B. Project Timing**

- v. Pre-Implementation
  1. Anticipated Start and End Date: Please indicate the dates the implementation is intended to begin and end. These dates should reflect the duration of the construction phase (not including monitoring) funded through the award.
- vi. Post-Implementation
  2. Actual Start and End Date: In some cases, delays may change the start and/or end dates of a project. Please indicate the actual start and end dates of project implementation.

### **C. Project Photos**

- vii. Pre-Implementation
  1. Before Photos Submitted? Indicate if pre-implementation photos have been submitted.
- viii. Post-Implementation
  2. After Photos Submitted? Indicate if post-implementation photos have been submitted.

### **D. Habitat Acres Restored (fill-out all that apply)**

The habitat restored includes habitat re-established, rehabilitated, enhanced, created and protected (see further definitions below). Restored areas include the area that was actively restored as a result of the restoration project. This may include the area that was paved or planted, the area where algae were removed or the area where coral attachments occurred. The habitat protected includes the area that was passively protected as a result of the restoration project. This may include an area that was fenced in or an area that was acquired and conserved.

- **Acres Re-established:** Re-establishment is the manipulation of the physical, chemical, or biological characteristics of a site with the goal of returning natural/historic functions to the habitat. Re-establishment may include rebuilding a former coral reef, sea grass bed, or mangrove stand and results in a gain in habitat acres.
- **Acres Rehabilitated:** Rehabilitation is the manipulation of the physical, chemical, or biological characteristics of a site with the goal of repairing natural/historic functions of a habitat. Rehabilitation results in a gain in the function of coral reef and associated ecosystems but does not result in a gain in habitat acres.
- **Acres Enhanced:** Enhancement is the manipulation of the physical, chemical, or biological characteristics of a (undisturbed or degraded) site to heighten, intensify, or improve specific function(s) or to change the growth stage or composition of the vegetation present. Enhancement activities may include habitat management or alteration, and results in a change in coral reef, seagrass, or mangrove stand function but not a gain in habitat acres.
- **Acres Created:** Creation is the manipulation of the physical, chemical, or biological characteristics present a site to develop a component of the habitat that did not previously exist. Creation results in a gain in habitat (coral reef, seagrass bed, or mangrove) acres.
- **Acres Protected:** Protection is the removal of a threat to, or preventing decline of, coral reef, seagrass bed, or mangrove stand conditions by an action in or

near the habitats. Protection activities may include land acquisition or fencing installation, and does not result in a gain of habitat acres or function.

- i. Pre-Implementation
  1. Anticipated Acres Re-established, Rehabilitated, Enhanced, Created and Protected: Please provide the anticipated number of acres re-established, rehabilitated, enhanced, created and/or protected as a result of the restoration project.
  2. Calculation methods: Project grantees can use a combination of the following sources to estimate the number of acres restored and/or protected as a result of the project.
    - a. Existing aerial photographs and maps
    - b. Staff or local expert knowledge
    - c. Field verification
- ii. Post-Implementation
  1. Actual Acres Re-established, Rehabilitated, Enhanced, Created and Protected: Please provide the total number of acres re-established, rehabilitated, enhanced, created and/or protected as a result of the restoration project.
  2. Verification methods: Project grantees can use a combination of the following sources to verify the number of acres restored and/or protected as a result of the project.
    - a. Existing aerial photographs and maps
    - b. Staff or local expert knowledge
    - c. Field verification

**E. Restoration Actions** (fill-out all that apply)

Please check all restoration actions that are planned by clicking on the box next to the action name: In the sections below (E1-E3), please include the requested pre- and post-implementation information for only the restoration actions that apply.

**E1. Erosion Control Techniques:** Fencing, Road/Trail Stabilization, Vegetative Plantings, and Other

- i. **Fencing Installation** Pre-Implementation
  1. Anticipated fencing material to be used: Please provide the fencing material that is planned for the restoration project (e.g., wood, metal, wire, plastic mesh, etc.)

2. Anticipated fencing length and height: Please provide the length and height of fencing planned for installation at the restoration site in feet.
  3. Anticipated post-implementation survey date: Please provide the estimated time (in days after implementation ends) when the post-implementation survey will occur to assess project success. **NOAA recommends 90 days after fence installation to ensure consistency among projects.**
  4. Presence/absence of target species: Please provide presence/absence observations of target species (i.e. the animal that is being fenced out, such as goats, pigs, etc.) at the project site, prior to construction by checking the appropriate box.
  5. Anticipated method to determine the presence/absence of target species: Please describe the methodology to be used to assess presence/absence.
- ii. **Fencing Installation** Post-Implementation
1. Actual fencing material used: Please provide the fencing material that was used at the restoration site (e.g., wood, metal, wire, plastic mesh, etc.).
  2. Actual fencing length and height: Please provide the length and height of fencing installed at the restoration site in feet.
  3. Actual post-implementation survey date: Please provide the time (in days after implementation ended) when the post-implementation survey to assess project success occurred. **The assessment should be conducted 90 days after the fence was installed.**
  4. Presence/absence of target species: Please provide presence/absence observations of target species (i.e. the animal that is being fenced out) at the project site, after construction by checking the appropriate box.
  5. Actual method to determine presence/absence of the target species: Please describe the methodology used to assess presence/absence.
  6. Was the project built as designed? Compare the anticipated and actual values of fencing length and height. Check “yes” if the actual values are equal to, or greater, than the anticipated values. Check “no” if the actual values are less than the anticipated values.
- i. **Road/Trail Stabilization** Pre-Implementation

1. Anticipated stabilization material to be used: Please provide the stabilization material that is planned for the restoration project (e.g., asphalt, gravel, etc.)
  2. Anticipated road/trail length and width: Please provide the length and width of road/trail planned for stabilization at the restoration site in feet.
  3. Anticipated post-implementation survey date: Please provide the estimated time (in days after implementation ends) when the post-implementation survey will occur to assess project success.
- ii. **Road/Trail Stabilization** Post-Implementation
1. Actual road/trail material used: Please provide the stabilization material that was used at the restoration site (e.g., asphalt, gravel, etc.).
  2. Actual road/trail length and width: Please provide the length and width of road/trail stabilized at the restoration site in feet.
  3. Actual post-implementation survey date: Please provide the time (in days after implementation ended) when the post-implementation survey to assess project success occurred.
  4. Was the project built as designed? Compare the anticipated and actual values of road/trail length and width. Check “yes” if the actual values are equal to, or greater, than the anticipated values. Check “no” if the actual values are less than the anticipated values.
- i. **Vegetative Plantings** Pre-Implementation
1. Species of vegetation planned for planting: Please list the scientific name of vegetation that will be planted at the restoration site. This may include terrestrial plantings, seagrass plugs, mangrove seedlings, etc.
  2. Anticipated number of plants: Please provide the anticipated number of plants that are planned to be installed at the restoration site.
  3. Target percent survival of plants: Please provide the percent survival expected of plants after restoration is complete, on the established post-implementation survey date (see below).
  4. Anticipated post-implementation survey date: Please provide the time (in days after implementation ends) when the post-implementation monitoring (e.g., percent survival monitoring) will occur to assess project success. ***NOAA recommends 90 days after planting to ensure consistency among projects.***

5. Anticipated method to determine the survival of plants (% cover):  
Please describe the methodology to be used to assess plant survival.
- ii. **Vegetative Plantings** Post-Implementation
    1. Species of vegetation planted: Please list the species of plants that were planted at the restoration site.
    2. Actual number of plants: Please provide the total number of plants that were planted at the restoration site.
    3. Final percent survival of plants: Please provide the percent survival of plants achieved after restoration on the established post-implementation survey date.
    4. Actual post-implementation survey date: Please provide the time (in days after implementation ended) when the post-implementation survey to assess project success occurred. ***The assessment should be conducted 90 days after planting.***
    5. Actual method to determine survival of plants (% cover): Please describe the methodology used to assess plant survival.
    6. Was the target percent survival achieved? Compare the target and final values of percent survival. Check “yes” if the final value is equal to, or higher, than the target value. Check “no” if the final value is lower than the target value.
  - i. **Other** Pre-Implementation
    1. Please describe the additional planned erosion control techniques: Be sure to include summary information on the design elements.
  - ii. **Other** Post-Implementation
    1. Please describe the completed erosion control techniques: Be sure to include summary information on the final project specifications.
    2. Was the project built as designed? Compare the planned and completed erosion control techniques. Check “yes” if the final project specifications are similar to the project design. Check “no” if the final project specifications are significantly different than the project design.

## **E2. Invasive Species Removal**

- i. Pre-Implementation
  1. Invasive species planned for removal: Please list the scientific names of invasive species that are planned for removal at the restoration site. This could include flora or fauna.

2. Anticipated tons of invasive species removed: Please provide the tons of invasive species material that are anticipated to be removed. 1 metric ton = 1.10 US tons = 1000 kg. = 2204.6 lbs.
3. Baseline percent cover of invasive species: Please provide the percent cover of invasive species present at the restoration site, prior to restoration. Since it can be difficult and time consuming to estimate different species within a plot, percent cover should be calculated as all invasive species within the plot/quadrat.
4. Target percent cover of invasive species: Please provide the percent cover of invasive species expected after restoration is complete, on the established post-implementation survey date. The target percent cover should be estimated as all invasive species within the plot/quadrat.
5. Anticipated post-implementation survey date: Please provide the anticipated time (in days after implementation ends) when the post-implementation monitoring (i.e. percent cover monitoring) will occur to assess project success. **NOAA recommends 90 days after removal to ensure consistency among projects.**
6. Anticipated method to determine cover of invasive species (%): Please describe the methodology to be used to assess invasive species cover.
7. Will sea urchins be used as a bio-control? Please check “yes” or “no.” If yes, please fill-out the information in Section E.
8. Anticipated number of sea urchins to be released: Please provide the anticipated number of sea urchins to be added to the restoration site.
9. Baseline sea urchin density: Please provide the density of sea urchins present at the restoration site, prior to restoration, in number of sea urchins per square meter.
10. Target sea urchin density: Please provide the density of sea urchins expected after restoration is complete, on the established post-implementation survey date, in number of sea urchins per square meter.
11. Anticipated post-implementation survey date: Please provide the time (in days after implementation ends) when the post-implementation monitoring (i.e. density monitoring) will occur to assess project success. **NOAA recommends 90 days after release to ensure consistency among projects.**
12. Anticipated method to determine sea urchin density (# per sq. meter): Please describe the methodology to be used to assess density of sea urchins.

- i. Post-Implementation
  1. Invasive species removed: Please list the scientific names of all (target and non-target) invasive species that were removed at the restoration site.
  2. Actual tons of invasive species removed: Please provide the total metric tons of invasive species material that were removed. 1 metric ton = 1.10 US tons = 1000 kg. = 2204.6 lbs.
  3. Final percent cover of invasive species: Please provide the percent cover of invasive species remaining after restoration, on the established post-implementation survey date. Since it can be difficult and time consuming to estimate different species within a plot, percent cover should be calculated as all invasive species within the plot/quadrat.
  4. Actual post-implementation survey date: Please provide the time (in days after implementation ended) when the post-implementation survey to assess project success occurred. ***The assessment should be conducted 90 days after the invasive species has been removed.***
  5. Actual method to determine cover of invasive species (%): Please describe the methodology used to assess invasive species cover.
  6. Was the target percent cover achieved? Compare the target and final values of percent cover. Check “yes” if the final value is equal to, or lower, than the target value. Check “no” if the final value is higher than the target value.
  7. Were sea urchins used as a bio-control? Please check “yes” or “no.” If yes, please fill-out the information in Section E.
  8. Actual number of sea urchins released: Please provide the total number of sea urchins that were added to the restoration site.
  9. Final sea urchin density: Please provide the density of sea urchins achieved after restoration, on the established post-implementation survey date, in number of sea urchins per square meter. The assessment should be conducted 90 days after the invasive species is removed.
  10. Actual post-implementation survey date: Please provide the time (in days after implementation ended) when the post-implementation survey to assess project success occurred. ***The assessment should be conducted 90 days after the urchins have been released.***
  11. Actual method to determine sea urchin density (# per sq. meter): Please describe the methodology used to assess density of sea urchins.

12. Was the target density achieved? Compare the target and final values of density. Check “yes” if the final value is equal to, or higher, than the target value. Check “no” if the final value is lower than the target value.

### E3. Transplantings

- i. Pre-implementation
  1. Species of planned for transplanting: Please list the scientific name of coral that will be transplanted to the restoration site.
  2. Anticipated number of transplants: Please provide the anticipated number of transplants that are planned for the restoration site.
  3. Target percent survival of transplants: Please provide the percent survival of transplants expected after restoration is complete, on the established post-implementation survey date.
  4. Anticipated post-implementation survey date: Please provide the time (in days after implementation ends) when the post-implementation monitoring (i.e. percent survival monitoring) will occur to assess project success. **NOAA recommends 90 days after transplanting to ensure consistency among projects.**
  5. Anticipated method to determine survival of transplants (%): Please describe the methodology to be used to assess transplant survival.
- ii. Post-Implementation
  1. Species of transplanted: Please list the scientific name of corals that were transplanted to the restoration site.
  2. Actual number of transplants: Please provide the total number of fragments that were transplanted to the restoration site.
  3. Final percent survival of transplants: Please provide the percent survival of transplants achieved after restoration is complete, on the established post-implementation survey date.
  4. Actual post-implementation survey date: Please provide the time (in days after implementation ended) when the post-implementation survey to assess project success occurred. **The assessment should be conducted 90 days after the corals have been transplanted.**
  5. Actual method to determine survival of transplants (%): Please describe the methodology used to assess transplant survival.
  6. Was the target percent survival achieved? Compare the target and final values of percent survival. Check “yes” if the final value is equal

to, or higher, than the target value. Check “no” if the final value is lower than the target value.

## **F. Management and Recovery Actions**

- i. Pre-Implementation
  1. Will this project be addressing any actions in watershed management plans, conservation action plans, or other regional plans? Please check “yes” or “no.”
  2. Will this project be addressing any recovery actions in an Endangered Species Recovery Plan? Please check “yes” or “no.”
  3. If yes, please indicate the name of the plan, the number of actions that are planned, and a description of the planned actions.
  
- ii. Post-Implementation
  1. Were the anticipated actions carried out? Please check “yes” or “no.”
  2. Were the anticipated recovery actions carried out? Please check “yes” or “no.”
  3. If yes, please indicate the name of the plan, the number of actions that were completed and a description of the completed actions.

## **G. Community Participation**

- i. Pre-Implementation
  1. Anticipated number of volunteers: Please provide the number of volunteers you anticipate will assist with this project.
  2. Anticipated number of volunteer hours: Please provide the total number of hours you anticipate the volunteers will spend working on this project.
  3. Please describe the volunteer activities: Be sure to include a brief description of the activities the volunteers will be involved in during the restoration project (e.g., plantings, bagging shell, office work, etc.).
  
- ii. Post-Implementation
  1. Actual number of volunteers: Please provide the actual number of volunteers associated with this project.

2. Actual number of volunteer hours: Please provide the actual number of hours the volunteers spent working on this project.
3. Please describe the completed volunteer activities: Be sure to include a brief description of the activities the volunteers were involved in during the restoration project (e.g., plantings, bagging shell, office work, etc.).

## H. Community Enhancement

### i. Pre-Implementation

1. Are there planned components to this restoration project that will directly benefit the local community, such as education, recreational infrastructure, and/or green infrastructure? Please check “yes” or “no.” If yes, please fill out the information below.
  - a. Education: Check this box if you plan to implement workshops, conduct seminars, install interpretive trails, etc. as part of this project.
  - b. Recreational infrastructure: Check this box if you plan to develop parks or trails, open beach access, create walkways, etc. as part of this project.
  - c. Green infrastructure: Check this box if you plan to install rain gardens, construct wetlands, install bioretention systems, etc. as part of this project.
  - d. Other: Check this box if you plan to implement other community enhancement activities that do not fit into the above categories.
  - e. Please describe the planned community enhancement components: Be sure to include a brief list of the planned community enhancement activities.

### ii. Post-Implementation

1. Were the community enhancement components completed? Please check “yes” or “no.” If yes, please fill out the information below.
  - a. Education: Check this box if you completed workshops, conducted seminars, installed interpretive trails, etc. as part of this project.
  - b. Recreational infrastructure: Check this box if you developed parks or trails, opened beach access, created walkways, etc. as part of this project.

- c. Green infrastructure: Check this box if installed rain gardens, constructed wetlands, installed bioretention systems, etc. as part of this project.
    - d. Other: Check this box if you implemented other community enhancement activities that do not fit into the above categories.
  2. Please describe the completed community enhancement components: Be sure to include a brief list of the completed community enhancement activities.

## **I. Additional Project Monitoring**

- i. Pre-Implementation
  1. Please indicate if additional monitoring activities are planned at the project site: Be sure to include additional variables (water quality, fish/coral population surveys, human dimensions, etc.) that might be monitored, as well as the longer-term timeframe that biological variables referenced in this form might be monitored.
- ii. Post-Implementation
  1. Please indicate if additional monitoring activities were completed at the project site: Be sure to include additional variables (water quality, fish/coral population surveys, human dimensions, etc.) that might be monitored, as well as the longer-term timeframe during which the biological variables referenced in this form were monitored.