Science Evaluation

Bucket 2 – Council Selected Restoration Component

PROPOSAL TITLE

Recovery and Restoration of Deep-Water Coral Habitats in the Gulf of Mexico

LOCATION

Gulf of Mexico continental slope, broad region southeast of Louisiana Mississippi delta in the vicinity of Deepwater Horizon oil spill.

SPONSOR(S)

USGS, BOEM, Penn State Univ., Temple Univ., Univ. of Birmingham

TYPE OF FUNDING REQUESTED (Planning, Technical Assistance, Implementation)

Implementation

REVIEWED BY:

DATE:

5 January, 2015

Best Available Science:

These 6 factors/elements help frame the reviewers answers to A, B and C found in next section:

1. Have the proposal objectives, including methods used, been justified using peer reviewed and/or publicly available information?

- (●) YES
- ( ) NO
- ( ) NEED MORE INFORMATION

Comments

Given little work has been done in baseline ecological conditions and restoration methods for deep water coral habitats prior to the DWH incident, a majority of the work referenced has been performed since the DWH incident. The PI and co-PI's have been involved in NRDA and GoMRI supported projects and are either authors or co-authors in approximately 16 of 22 referenced publications relating directly to work performed relating to assessment of deep water coral habitats effected by the DWH incident. The limited work in similar habitats and coral reef response to climate change are referenced. It is clear the PI and co-PI's are leveraging all work performed to date. The methodologies proposed e.g. eDNA, RNA sequencing, carbon dating, bathymetric/environmental characterization for deep-sea coral habitats and statistical methods have adequately referenced.

2. If information supporting the proposal does not directly pertain to the Gulf Coast region, are applicant's methods reasonably supported and adaptable to that geographic area?

- (●) YES
- ( ) NO
- ( ) NEED MORE INFORMATION

Comments

The proposal references background work performed in the northern GoM in and around the sites effected by DWH primarily supported by NRDA and GoMRI. Little work has been performed on deep water corals, hence the referenced work has been performed in the Gulf Coast Region subsequnet to the DWH spill. The methodologies proposed which include eDNA, sequencing, carbon dating, and statistical methods are standard methodologies. The

3. Are the literature sources used to support the proposal accurately and completely cited?

- (●) YES
- ( ) NO
- ( ) NEED MORE INFORMATION

Comments

The literature cited is comprehensive and covered all aspects of the proposal including natural and anthropogenic effects (almost exclusively from DWH), ocean observations and monitoring, response techniques and restoration of deep water coral habitats.

4. Are the literature sources represented in a fair and unbiased manner?

- (●) YES
- ( ) NO
- ( ) NEED MORE INFORMATION

Comments

Approximately half of the references cited recent work specifically on the DWH effected sites. The remainder of the references were related to methodologies in assessing health and age of corals and statistical methods. The discussion of specific proposal objectives which cited the reference literature were unbiased and presented objectively.

5. Does the proposal evaluate uncertainties and risks in the scientific basis for the proposal, including any identified by the public and Council members?

- (●) YES
- ( ) NO
- ( ) NEED MORE INFORMATION

Comments

Due to the deep water environment making observations complex requiring specialized equipment, complex ecosystem and the fact restoration of deep water coral species has not been attempted to date, there are risks and uncertainties which are addressed in the proposal.
Since this work is a continuation of work performed under NRDC and GoMRI, Objectives 1 and 2 (observe and document temporal change and establish observation and monitoring) have little risk and uncertainty. There is some risk in Objective 3 (developing rapid response techniques) in being able to develop and execute an effective rapid response

6. Does the proposal evaluate uncertainties and risks in achieving its objectives over time? (e.g., is there an uncertainty or risk that in 5-10 years the project/program will be obsolete or not function as planned given projections of sea level rise?)

- ○ YES
- ◉ NO
- ○ NEED MORE INFORMATION

Comments

Given this proposal addresses deep water coral habitats, there are no temporal uncertainties inherent in the proposal. This proposal, if successful will provide guidelines for the management and to responding to future events.

Based on the answers to the previous 6 questions, and giving deference to the sponsor to provide within reason the use of best available science the following three questions can be answered:

A. Has the applicant made a reasonable determination that the proposal is based on science that uses peer-reviewed and publicly available data?

- ◉ YES
- ○ NO
- ○ NEED MORE INFORMATION

Information Needed:

B. Has the applicant made a reasonable determination that the proposal is based on science that maximizes the quality, objectivity, and integrity of information (including, as applicable, statistical information)?

- ◉ YES
- ○ NO
- ○ NEED MORE INFORMATION

Information Needed:

C. Has the applicant made a reasonable determination that the proposal is based on science that clearly documents and communicates risks and uncertainties in the scientific basis for such projects?

- ◉ YES
- ○ NO
- ○ NEED MORE INFORMATION

Information Needed:

Science Context Evaluation

A. Have other methods been discussed and reasons provided to why the method is being selected (e.g., scientifically sound; cost-effectiveness)?

The methods proposed are all standard e.g. Coral heath and age methodologies and Ocean observing sensors (ADCP, CTD, CDOM and sediment traps) are standard oceanographic sensors. The proposal is leveraging existing 3D seismic, backscatter and bathymetry data to identify potential habitats. Collection methodologies are prioritized based on having the least impact to the samples and surrounding habitat. Restoration or deep water coral has not been attempted, as a

B. Has your agency/vendor/project manager conducted a project/program like the one proposed?

Yes.

C. Is there a risk mitigation plan in place for project objectives? (captures risk measures as defined under best available science by the Comprehensive Plan and Act)

The proposal does not explicitly identify a risk mitigation plan. As stated, the risks identified include the development of successful restoration techniques and damage occurring from sampling methods. The stated risk mitigation with regard to the restoration is evolving techniques based on annual results. The other protions of the proposal in documenting temporal change in the deep water coral community is a continuation of previous work, hence propose limited or no risk. The ocean observation to include the placement of long term oceanographic sensors and ROV operations, while pose

D. Does the project/program consider consequences with implementation? (captures risk measures as defined under best available science by the Comprehensive Plan and Act)

The project adequately considers implementation with respect to the specific science objectives. This includes the oceanographic sensor deployment, ROV operations, impact of harvesting and replenishing coral samples and restoration techniques (i.e. deployment and recovery of concrete slabs). What is not addressed is implementation of a program executing techniques developed as resulting from the proposed program. Program implementation which needs addressing is the operational infrastructure required in responding to an event e.g. ROV/UUV operations, genetic testing

E. Does the project/program have clearly defined goals?

The stated goals are to support restoration and conservation of deep-sea coral habitats and adjacent ecosystems by understanding the health, biodiversity, recovery and resilience of deep-sea corals and adjacent habitats exposed to anthropogenic and natural stressors and to restore and protect living marine resources associated with deep-sea coral habitats. The proposal is complete in that it covers all aspects of the stated goals including assessment of effected and pristine ecosystems, the development of markers to identify effected species, long-term environmental monitoring,

F. Does the project/program have clearly defined objectives?

The program identifies clearly defined objectives aligned with the stated goals covering the full spectrum of deep-sea coral management from understanding natural and anthropogenic effects, characterizing the surrounding environment, determining effective response methods and restoration. Specifically:

1. Document temporal change in deep-sea coral structure and function in order to track long-term responses to natural

G. Does the project/program have measures of success? (captures statistical information requirement as defined by the Comprehensive Plan and Act)

Although not stated explicitly in the proposal, the measure of success is long-term sustainment and health of deep-sea coral habitats by understanding the natural and anthropogenic temporal effects and surrounding oceanographic conditions sustaining the habitats, ability to identify effected species and the ability to effectively restore unhealthy coral populations.

H. Is a monitoring program in place to determine project goals, success and help adaptive management (if applicable)? (captures statistical information requirement as defined by the Comprehensive Plan and Act)

The plan is primarily a research project, as a result does not indicate a monitoring plan and metrics for success. The proposal posses all the components for understanding deep water coral habitats, determine if a population is impacted and responding e.g. Obj 1 (document temporal change to track long-term responses to natural and anthropogenic disturbances); Obj 2 (develop environmental baseline); Obj 3 (develop genetic markers to determine lethal and sub-leathal exposure) and Obj 4 (develop restoration techniques). While the proposal presented a solid science plan

I. Does the project/program consider recent and/or relevant information? (captures statistical information requirement as defined by the Comprehensive Plan and Act)

The effects of oil and dispersants on coral habitats have been studied and are well know and adequately referenced and considered in the proposal. The program builds on NRDA and GoMRI supported programs in developing an active monitoring, response and restoration activities.

A specific example is the program will use existing transcriptomic data from coral species from acidification, oil and

J. Has the project/program evaluated past successes and failures of similar efforts? (captures the communication of risks and uncertainties in the scientific basis for such projects as defined by the Comprehensive Plan and Act)

The program builds on work performed by NRDA and GoMRI funded studies on the impact and effects of the 2010 DWH incident. Minimal work had bee done previously in deep water coral environments. Adequately addressed was leverage techniques used for restoration of coral species in shallow water environments. What is unique in the proposed work is the ability to study a control environment of similar depth environments that were not effected by the DWH spill.

Please summarize any additional information needed below:

The proposal clearly has involved all stakeholders which includes academia (Penn State Univ., Temple Univ., Univ. of Birmingham), government agencies including USGS (SESC, LSC, SPCMSC, PCMSC), BOEM (Herndon, VA and New Orleans, LA) and NOAA OER. The program clearly leverages previous work supported by NRDA and GoMRI.

The proposal adequately addresses the science behind the proposed work but it is not clear how results are going to implemented. Specifically, is BOEM going to use results to define stand-off distances for drilling activity and are the