Naval Base Coronado Natural Resource Management: SCI Grassland Restoration, SCI Fire Management Plan Implementation, SCI Rare Plant Surveys and NBC Sensitive Species Habitat Management

AUGUST 23, 2013

I. Purpose and Requirement:

Naval Base Coronado (NBC), including Naval Auxiliary Landing Field, San Clemente Island (SCI), provides habitat for several federally listed plant and animal species. Management of the species is done with the intent of providing conditions suitable for recovery of these species while simultaneously allowing for Navy operations, including military training, to occur without impediments. The purpose of this agreement is to provide for improved management of natural resources on NBC in four areas: a) restoration of native grasslands on SCI; b) implementation of the SCI Fire Management Plan through fuel moisture monitoring; c) surveying and monitoring of sensitive plant species across under-surveyed areas of SCI; and d) management of sensitive plant species occurring on NBC through implementation of habitat improvements in areas which support these species but are also subject to frequent human activity.

II. Working Conditions:

Field workers on San Clemente Island must be prepared to work for extended periods in hot, cold, dusty, windy, and/or damp, foggy conditions. Weather can rapidly change over short periods of time and can vary widely across the island and with elevation. Vegetation is largely maritime desert scrub and grasslands. Prickly Pear and Cholla cactus are ubiquitous. Due to the varying topography, travel through such terrain must include the highest concern for personnel safety, and strict adherence to any island restrictions and Natural Resources Office Staff direction. Surveys must be made into very steep, sheer canyons that may be accessed only by helicopter or boat.

III. General Requirements:

In addition to possessing the skills necessary to fulfill all requirements of this Scope of Work, the Cooperative Ecosystem Studies Unit Member shall possess the following specialized expertise:

a) **Knowledge of SCI plant species, including endemic species, other native plants, and non-native species.** Experience identifying plants using floras and herbarium specimens, as well as field recognition skills for all sensitive species. Ability to prepare and maintain herbarium specimens. Knowledge of the phenology and reproductive strategies of SCI species.

b) **Knowledge of plant propagation and culture.** Experience developing innovative techniques to propagate species for which no known protocols exist. Ability to test different propagation methods using robust experimental design. Ability to report propagation techniques and results to the scientific community.

c) Ability to interpret results of genetic research. Academic background sufficient to understand the results of complex analyses on the genetics of SCI plants and apply results to develop seed collection and propagation strategies.

d) Expertise sufficient to obtain permit under ESA. Botanical background and expertise sufficient to enable the Cooperator to meet rigorous standards of the U.S. Fish and Wildlife Service and obtain a 10(a)(1)(A) permit to collect seed and vegetative material from federally listed plants on SCI.

e) Expertise in Channel Islands ecology. Knowledge of the different plant communities on SCI. Ability to identify all federally listed species (including wildlife) on SCI. Familiarity with the habitats of all SCI listed species.

f) Ability to work independently. Capability of working on projects in a remote setting without direct on-site supervision or assistance.

g) The Cooperator must have experience collecting and processing voucher specimens for deposit into recognized herbaria.

h) The Cooperator must have experience mapping plant communities in southern California and be able to produce maps using ArcView and/or Arc/Info GIS software.

IV. Statement of Work:

The proposed work will be on-the-ground actions on Naval Base Coronado (NBC) and San Clemente Island (SCI). The overall project objective is to implement natural resources and ecological restoration management actions that are prescribed in the NBC Complex Integrated Natural Resources Management Plan (INRMP). Achieving these objectives involves five main Tasks.

Services Required:

Task 1. SCI Grassland Restoration:

Background:

During the past century, more than 100 introduced plants have become established on SCI. Many are adapted to intensive grazing by herbivores and readily invade disturbed areas. Grazing animals, primarily goats, were resident in large numbers on San Clemente Island (SCI) through most of the 20th century with their removal occurring during the 1980's. The long history of overgrazing by sheep, pigs and goats and the ground disturbing activities associated with human occupation of the island has severely reduced and limited the abundance of native grasslands on SCI. The removal of grazing animals has provided an opportunity to allow grasslands to recover. However, grassland

restoration, both on SCI and the mainland, remains a difficult task, due primarily to a lack of understanding of the requirements for establishing a healthy sustainable grassland. The purpose of this Agreement is to refine grassland restoration techniques and to test various treatments and management techniques within a native grassland on SCI, given the unique constraints on SCI such as availability of water, site access, and rapid changes in vegetation cover due to the removal of herbivores from SCI

Restoration Services:

During the 2013-2014 growing season, the Cooperator shall perform seeding, mechanical weed control and herbicide application treatments within a 300 square meter grassland restoration site. The Cooperator shall also provide monitoring of the site for one year. The Cooperator shall design the study to assess the effects of at least three environmental factors: use and timing of herbicide application, supplemental watering, and mowing. Emphasis shall be placed on an establishing an experimental design and analysis that can determine significant differences among the various treatments. Past effort has been hampered by an inability to distinguish between treatment and environmental effects such as annual precipitation. A description of treatment and monitoring methods and a schedule of activities shall be included in the work plan. Monitoring data shall be collected in a manner that will yield statistically sound results.

Because of the nature of military training on SCI, unexploded ordnance (UXO) may be found across the island. The Navy has been actively working on development of a program to ensure worker safety on the island with regard to UXO. Among the measures being considered is a requirement to have trained UXO monitors present during all ground disturbing activities. The Cooperator must follow allow UXO protocols established by the Navy on SCI.

Task 2: SCI Fire Management Plan Implementation:

Background:

The SCI Wildland Fire Management Plan recommends that fire season should be declared when live fuel moisture reaches, or drops below 20%. To support technical recommendations of the plan, the Cooperator shall monitor live fuel moisture levels consistent with this protocol through the period of performance of this Agreement.

The moisture content of living fuels plays a significant role in fire initiation and spread in these fuels; however, we presently cannot model plant moisture content using actual SCI data. Using live fuel moisture data from elsewhere in San Diego County will over-predict fire behavior on SCI. We can, however, monitor live fuel moisture content, associate it with observed fire behavior or compare it to elsewhere in the county, and develop fire season and fire management guidelines specific to SCI. The dry weight measurement is preferred because it only responds to changes in the amount of water present in the fuel and not the fuel physiology (Pyne *et al*. 1996). Fluctuations in live fuel moisture are a function of the amount of water available to the plant as well as its geographic location

within the plant community. Unlike dead fuel moisture, the fluctuation in live fuel moisture is a seasonal phenomenon. Consequently, live fuel moisture measurements will be more influenced by long-term environmental conditions than dead fuel moisture. How to sample for live fuel moisture is described in the 1979 Countryman and Dean publication "Measuring Moisture Content in Living Chaparral: A Field User's Manual."

Restoration Services:

The Cooperative Ecosystem Studies Unit Member shall conduct fuel moisture sampling according to the following protocol; however, because fuel moisture data have been collected on SCI thus far only as a pilot project, the Cooperator shall also assess the current elements of the protocol including sampling locations and provide recommendations for improvements in the sampling protocol to reflect conditions over the entire island.

a) **Site Selection**. Sampling sites shall consist of those established previously and depicted in Figure 1 below. Alternate sites may be substituted based on the mutual agreement of the Cooperator, installation biologist and COR if the original sites appear to be unrepresentative or otherwise problematic after further sampling is conducted. Climatic variation, including microclimates, is the primary parameter to consider in setting the boundaries of sampling areas. The sampling locations chosen should be large enough so that the sampling itself does not adversely affect the shrubs due to repeated sampling, yet small enough that micro climate does not change within the sampling area. An ideal sampling area should be less than 2500 m2 (0.25 hectares ~ 0.6 acres), and an acceptable sample size should consist of at least two plants per sampling area.

b) **Number of Sites**. The Cooperative Ecosystem Studies Unit Member shall conduct sampling at four sites on a monthly basis.

c) **Site Characterization.** Prior to the onset of data collection, the Cooperative Ecosystem Studies Unit Member shall characterize each site by determining the slope, aspect, approximate shrub size, cover, density, and distribution of shrub species. In addition, the Cooperator shall take representative photographs and GPS measurements at each site for future reference. If not already completed, the Cooperative Ecosystem Studies Unit Member shall mark each site with inconspicuous flagging and rebar to signal the approximate boundaries of the sampling locations.

d) **Species Selection**. The Cooperative Ecosystem Studies Unit Member shall sample from a shrub species that draws down fuel moisture quickly in the summer and is common to other locations, so that data may be shared. For example, the USFS uses chamise on the Angeles National Forest, as does the county of Los Angeles. Purple sage *(Salvia* sp.*),* black sage *(Salvia mellifera),*California sagebrush, manzanita *(Arctostaphylos* sp.*),* and hoaryleaf ceanothus *(Ceanothus crassifolius)* are used at other sites in southern California, but not nearly to the

extent as chamise. California sagebrush (*Artemisia californica*) is recommended at SCI to support regional comparisons. Additionally, a boxthorn site (*Lycium californicum*) and a coyote brush site (*Baccharis pilularis*) shall be chosen. A high amount of military training activities occur near boxthorn communities, therefore live fuel moisture percentages shall be determined for this species. Coyote brush is cited in the SCI Wildland Fire Management Plan under key issues as an “emerging fuel hazard”, therefore additional information on fuel moisture content of this species will prove valuable for wildland fire management.

e) **Field Techniques**

1) After a site has been selected and flagged for sampling, field personnel shall browse in a pseudo-random fashion through the sampling area clipping branchwood with foliage from new growth and old growth on the shrub species being sampled. Branchwood sampled should be no larger than 1/8 inch in diameter.

2) Since the fuel moisture is expected to vary vertically, most samples should be taken from the upper limbs of each shrub. Care shall be taken so that no more than two new growth and two old-growth clippings are taken from any single shrub. The Cooperative Ecosystem Studies Unit Member shall ensure that field personnel are trained to distinguish the difference between old growth and new growth during a "sampling orientation." *Lycium* has a very short window in which the two are separated. *Baccharis* and *Artemisia* are separated for a longer period of time, but not necessarily all year.

3) Altogether 6 samples shall be taken at each site: three old-growth branch wood and three new growth branch wood, or if not distinguishable, just six samples. After the samples have been collected, crews shall place them in an ice chest for transport to the laboratory. The ice chest shall be kept cool enough to keep the samples from physiologically decomposing (approximately 15 degrees C), but not so cold such that the samples re damaged by freezer burn.

4) The branchwood from the old and new growth shall be placed in two separate sampling containers. Each container should have already been weighed in the lab to the nearest 0.1 g. Polypropylene sampling bottles rated up to at least 130 degrees C should be used for storing and weighing the samples. The use of these bottles is recommended in place of traditional paint cans because of their improved seal. Each bottle should be labeled individually, making sure to label both the bottle and its associated cap. Sample material should be loosely arranged within the container because compressing the sample will bias the results.

5) Countryman and Dean recommend weighing three old growth and new growth samples, each containing at least 25 to 35 grams of sample dry. Since

the mass of the sample dry is only known after the experiment, this roughly translates into approximately 3/4 of a one quart paint can during the middle summer months.

F: Laboratory Techniques:

a) The Cooperative Ecosystem Studies Unit Member shall weigh and place each sample in the drying oven within two to three hours of collection. All samples should be collected between 11:00 AM and 3:00 PM in the spring and 11:00 AM and 2:00 PM in the fall. The Cooperator shall not collect samples if the shrubs are wet from rain, dew, or fog. Prior to departure from each site, the Cooperator shall record the following observations: (a) wet and dry bulb temperature from a sling psychrometer; (b) percent cloud cover; and (c) condition of the fuels (a descriptive list should be provided enumerating available choices).

b) Upon arrival at the laboratory, the Cooperative Ecosystem Studies Unit Member shall weigh and record each collection bottle to the nearest 0.1g making sure that there is no accumulated dirt on the exterior of the bottle during weighing. The Cooperator shall unscrew the bottle cap and place only the bottle inside of the mechanical drying oven. The caps can be set aside. As mentioned above, the oven should be preheated for at least one hour to between 103 degrees C and 105 degrees C prior to inserting the samples. The samples shall be allowed to dry for at least 15 hours prior to removal from the oven. Upon removal from the oven, the Cooperator shall seal the bottles immediately to prevent them from absorbing the moisture present in the laboratory. The Cooperator shall reweigh the dried samples only after the containers have sufficiently cooled in order to prevent additional error. The Cooperator shall weigh and record each sampling bottle to the nearest 0.1g after cooling.

H. Logistic Arrangements. Field personnel will need 6 bottles per site/one site per day. Sampling teams of two people may work best. A sampling day, covering one site is should require only 1.5 hours (45-60 minutes to collect samples from each site, the remaining time for lab work and transit time). Each group will also be responsible for returning to the lab the following day to remove the samples from the oven and re-weigh them.

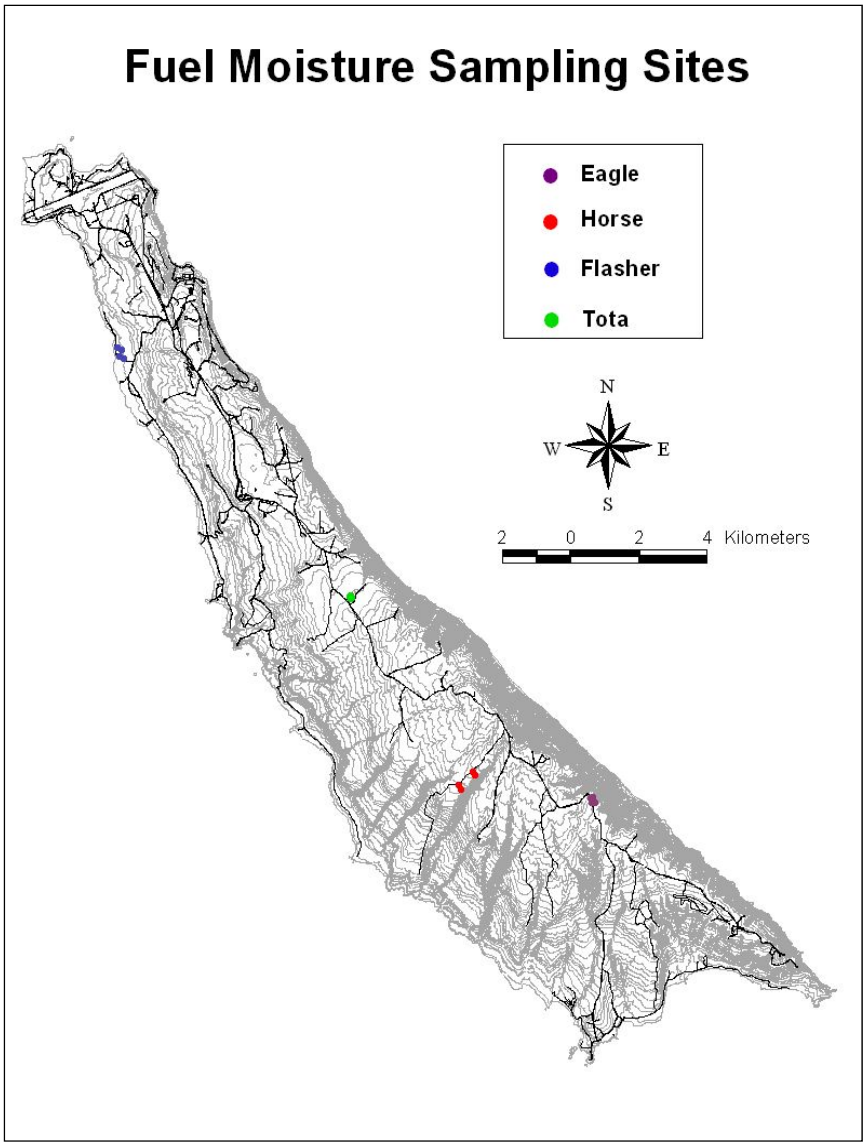

Figure 1

Task 3: SCI Rare Plant Survey:

Over forty plant species endemic to San Clemente Island or the Channel Islands occur on San Clemente Island. Six of these are federally listed as endangered, and others are under consideration for listing by the US Fish and Wildlife Service. The US Navy, in accordance with the Endangered Species Act, is required to protect these species and their habitats. The purpose of this Agreement is to locate, map and collect data on federally listed, proposed and candidate plant species and other sensitive plant species that occur on San Clemente Island, and to develop an experimental design for monitoring all Training Areas and Ranges (TARs) that have Threatened or Endangered plant species in or adjacent to them in accordance with

Conservation Measures TAR-M-1 and AVMC-M-2 of the San Clemente Island 2008 Biological Opinion FWS-LA-09B0027-09F0040 (SCI BO).

1. Objective:

The objective of this Agreement is to:

a. Locate and map populations, record species associates and habitat characteristics, and determine the distribution and abundance of all federally endangered, proposed for listing, candidate and other rare plant species that occur on San Clemente Island including those in and adjacent to AVMAs, the IOA, and TARs, as stated in Conservation Measures TAR-M-1 and AVMC-M-2 of the SCI BO.

b. Collect and process voucher specimens of vascular plant species that are currently missing from the San Clemente Island herbarium.

2. Study Area

The study area shall encompass all of San Clemente Island, including, but not limited to, all of the canyons on both sides of the island and the upper and lower marine terraces in areas not previously sampled during the Kellogg study (1994) and Junak et. al. studies (1998, 2006). Access to certain isolated areas may be via foot, or boat. The Cooperator shall not access Impact Areas 1 and 2, and other areas off limits due to the potential presence of UXO unless explicitly authorized by the Navy. Maps of these areas will be provided to the Cooperator upon contract award. Impact Areas 1 and 2 are expected to remain off limits throughout the period of performance, but other off limits areas may become accessible following UXO clearance.

Restoration Services:

a) The Cooperative Ecosystem Studies Unit Member shall conduct rare plant surveys beginning in the 2013-2014 growing season. If weather conditions in 2013-2014 are not favorable for plant growth, surveys may be extended into the 2014-2015 growing season. All surveys shall be completed by December 2016.

b) The Cooperative Ecosystem Studies Unit Member shall survey the project area on foot at least three times to coincide with the appropriate blooming period to identify all rare plants that may occur within the project area.

c) The Cooperative Ecosystem Studies Unit Member shall focus surveys in the appropriate areas for the rare plant species / subspecies / varieties likely to occur within the project area as determined by habit, soils, slope and aspect.

d) The Cooperator shall use all available data on past surveys (Junak, S et. al. 1998, 2003) to continue existing data sets.

e) Specific Data Collection Requirements (includes GPS data collection):

i. The location of all rare plant occurrences shall be mapped using a **sub 0.5 meter** global positioning unit.

ii. Each rare plant species / subspecies / variety found within the project area shall be photo-documented in order that both form and diagnostic characteristics are illustrated.

iii. The Cooperative Ecosystem Studies Unit Member shall compile a list of all plant species observed within the project area while conducting rare plant surveys.

f) Specific Graphics Requirements (figures, photo-documentation, maps, including GIS generated graphics, etc.):

i. The Cooperative Ecosystem Studies Unit Member shall create a GIS map depicting locations of all rare plants found during the survey, the **survey area** and the survey routes all of which are overlain on an aerial photograph. Individual plants shall be mapped as points. Occurrences of groups of plants shall be mapped as polygons with the plant density within the polygon indicated on the map. Two color copies and two electronic copies (on CD-ROM) of the GIS map shall be submitted to the NTRs.

ii. Two color hard copies and two electronic copies (on CD-ROM) of the photo-documentation depicting the form and diagnostic features of each rare plant species / subspecies / variety found within the project area shall be submitted to the NTRs.

TABLE 1: SENSITIVE PLANT SPECIES TO BE SURVEYED

i. The Cooperative Ecosystem Studies Unit Member shall submit two copies of a work plan to each of the NTRs at least 30 days prior to the start of fieldwork done under this Agreement. The work plan may be submitted either as a hard copy or in electronic format. The work plan shall include the following: (1) a schedule of the approximate dates during which fieldwork will be conducted; (2) locations in which sensitive plant species surveys will be conducted; (3) a brief description of sampling and mapping methods; (4) an example of a field form to be used to collect data for sensitive plant species and, (5) a list of data to be included in the attribute table for all GIS data.

ii. The Cooperative Ecosystem Studies Unit Member shall collect data on sensitive species that is equivalent to data recorded on a "Native Species Field Survey Form" from the California Natural Diversity Database for each sensitive species documented. With this data the Cooperator shall prepare a table listing each rare plant species / subspecies / variety that occurs within the project area and, for each species / subspecies / variety listed with population size, range, distribution and distribution patterns, etc. Two electronic copies (on CD-ROM) of the table shall be submitted to the NTRs.

iii. Final Survey Report discussing findings and survey area by species. The report shall also include detailed methodologies of data collection with the long-term goal being the ability for a future contract to follow the methods and continue onto un-surveyed areas in the future using this methodology. The Table and all GIS maps and photos with GIS tags shall be included in this document and shall be submitted to the NTRs.

Task 4: Sensitive Plant Species Habitat Improvement Naval Base Coronado

Background:

Naval Base Coronado is composed of many Naval installations in the San Diego area as well as San Clemente Island. The properties that will be addressed under this Agreement include Naval Air Station North Island (NASNI), Naval Amphibious Base (NAB) Coronado, the Silver Strand Training Complex (SSTC) (which includes all training areas on the Silver Strand and the area formerly known as the Naval Radio Receiving Facility [NRRF]), and Naval Outlying Landing Field Imperial Beach (NOLF IB). (These areas are hereinafter referred to as the "Study Area"). Because of its coastal location and low level of disturbance relative to similarly situated non-Federal property, the Study Area supports a disproportionate number of federally listed and other sensitive flora and fauna, including the California least tern (*Sterna antillarum browni*), western snowy plover (*Charadrius alexandrinus nivosus*), salt marsh bird's beak (*Cordylanthus maritimus* ssp. *maritimus*) and Nuttall's lotus (*Lotus nuttallianus*).

Over the past decade, management of botanical resources within the Study Area has focused on the eradication of highly invasive non-native plant species, which threaten native plant communities and the wildlife they support, and revegetation of disturbed areas using native species. Though these activities have presumably benefited sensitive plant species, the nature and magnitude of their impact cannot be discerned with certainty. Development and implementation of a comprehensive plan to manage and monitor sensitive plant species within the Study Area is vital to improvement of their management. It is particularly important to the Navy mission because the U.S. Fish and Wildlife Service has expressed interest in proposing two of the sensitive plant species (Nuttall's lotus and Brand's phacelia) for federal listing. The ability to manage healthy populations of this and other sensitive plant species and document

their stability will help the Navy to avoid the constraints that would result from federal listing.

Restoration Planning Services Required:

This objective is to implement management strategies for federally listed and other sensitive plant species within the study area. The plan will cover 2 species considered rare by the California Native Plant Society (CNPS): Nuttall's lotus and Brand's phacelia. CNPS has assigned all of the aforementioned species (hereinafter referred to as "focal species") the highest level of rarity for extant species; the species have been determined to be rare or endangered in California and throughout their respective ranges.

The Cooperative Ecosystem Studies Unit Member shall develop management strategies for improving available existing occupied habitat for Brand's phacelia and Nuttall's lotus. Both species favor disturbed habitats such as mowed areas, trails and picnic sites in sandy sites. Potential management strategies may include mowing, hand removal of completing plants, herbicide control of other species or out-planting of species that favor growth of either of these species, Target weeds will include *Carpbobrotus* spp, schismus and red stem filaree. The Cooperative Ecosystem Studies Unit Member shall develop a long-term plan for future work designed to promote these two species. All herbicide applications and exotic removal work will include all practical precautions to avoid sensitive native species, minimize and avoid potential resulting erosion issues, and clean-up of any resulting debris.

Table 1: Deliverables and Due Dates

Item (Quantity)	*Number of copies*	*Due Date*
Work plan [for all project elements] (1)	Draft – 4 electronic copies Final – 4 hard copies and 4 electronic	Draft – 15 October 2013 Final – 2 weeks after receipt of comments
Progress Reports (7)	Submitted electronically	January 15 2014 and every 90 days thereafter
Grassland Report	Draft – 4 hard copies & 4 electronic copies Final – 4 hard copies & 4 electronic copies within the Compilation of Deliverables	Draft – Nov 15 2014. Navy comments back to cooperator NLT than Dec 15, 2014 Final – Jan 15 2015
Fire Plan Implementation	Draft – 4 hard copies & 4 electronic copies Final – 4 hard copies & 4 electronic copies within the Compilation of Deliverables	Draft – Nov 15 2014. Navy comments back to cooperator NLT than Dec 15, 2014 Final – Jan 15, 2015
SCI Plant Survey	Draft – 4 hard copies & 4 electronic copies Final – 4 hard copies & 4 electronic copies within the Compilation of Deliverables	Draft – Feb 15 2015. Navy comments back to cooperator NLT than March 15 2015 Final – April 15, 2015
NBC Sensitive Species management	Draft – 4 hard copies & 4 electronic copies Final – 4 hard copies & 4 electronic copies within the Compilation of Deliverables 4 electronic copies	Draft – Feb 15 2015. Navy comments back to cooperator NLT than March 15 2015 Final – April 15, 2015

C. GIS & Electronic Data Requirements:

It is the responsibility of the Cooperative Ecosystem Studies Unit Member to ensure that all electronic deliverables are fully compatible and functional based on the current applications used by the Navy Marine Corps Intranet (NMCI).

Text, Spreadsheet, and Database Files:

The Navy standard desktop computing software is Microsoft Office 2010. Final Reports and other text documents shall be provided in Microsoft Word 2010 and/or Adobe Portable Document Format (PDF) readable with Adobe Acrobat X unless other mutually agreeable formats are determined. Adobe PDF files and Microsoft Word documents should include a complete linked table of contents and all mention of tables or figures within the text of the report should be linked directly to the referenced table or figure. Spreadsheet files shall be provided in Microsoft Excel 2010 format. Database files shall be provided in Microsoft Access format, unless specified otherwise, as approved by the NTR. Prior to database development, the Cooperative Ecosystem Studies Unit Member shall provide the Government with a Technical Approach Document for approval, which describes the Cooperative Ecosystem Studies Unit Member's technical approach to designing and developing the database. All text, spreadsheet, and database files shall be delivered on CD-ROM, DVD or other electronic media as approved by the NTR. All graphics used for reports and CD covers shall be delivered in Adobe Photoshop (PSD) format. All hard-copy reports must be submitted bound in a "D" type three ring binder. The binder shall have clear exterior pockets suitable for document labels and interior pockets suitable for storing additional paper sheets. Both spine and front cover will be labeled.

Geospatial Data, Maps, Drawings, and Sketches:

Data Standards:

Data standards facilitate the development, sharing, and use of geospatial data. The Cooperative Ecosystem Studies Unit Member shall ensure that all geospatial data delivered is consistent with the Spatial Data Standards for Facilities, Infrastructure and Environment (SDSFIE), reference (b), unless otherwise directed by the NTR. The Cooperative Ecosystem Studies Unit Member shall use SDSFIE v3.0. Geospatial data shall be delivered in a single file geodatabase format, unless otherwise directed by the NTR, that is compatible with Oracle using ArcGIS 10.0, or higher, and must be importable to an Oracle 10g multi-user geodatabase using ArcSDE 10.0, or higher. Digital map files (.mxd files) shall be delivered in ArcGIS 10.0 format and the associated data layers shall be sourced by a relative file pathway to the file geodatabase. In addition, all geospatial data delivered by the Cooperative Ecosystem Studies Unit Member shall adhere to the following criteria:
(1) precise geographic coordinates in decimal degree format with four decimal

precision;
(2) units of nautical miles (nm) for expansive marine areas and statute miles (mi) for expansive land areas;
(3) reference the GRS 1980 spheroid and the North American Datum 1983 (WGS-84);
(4) contain a projection file, if appropriate, based on format;

Metadata Standards:

The term "metadata" is defined as data about data. The term is often used to refer to information that allows either: (1) discovery of data, (2) understanding the provenance and quality of the data, or/and (3) analysis of the data via a set of machine readable instructions that describe the data and its relationships. The Cooperative Ecosystem Studies Unit Member shall provide metadata in accordance with Content Standard for Digital Geospatial Metadata (CSDGM), reference (c), the current US Federal metadata standard. The University shall ensure that metadata is provided for all geospatial data delivered, including data furnished by the Government, a third party, or generated as a result of this project, and is compliant with current Federal Geographic Data Committee (FGDC) endorsed metadata standards (see table at http://www.fgdc.gov/standards/projects/FGDC-standards-projects/fgdc-endorsed-standards).
All metadata shall be in XML format. The Cooperative Ecosystem Studies Unit Member shall reference the FGDC ESRI metadata style sheet when populating Service-level and Feature Class-level metadata. The Cooperative Ecosystem Studies Unit Member is required to supply metadata for all fields within this style sheet.

Mapping Guidelines:

The Cooperative Ecosystem Studies Unit Member shall comply with FGDC *Geospatial Positioning Accuracy Standards, Part 4: Architecture, Engineering, Construction, and Facilities Management*, reference (d), which provides accuracy standards for engineering drawings, maps, and surveys. Map or drawing scales will be determined by the NTR, given specific project requirements.

Data Integrity:

The Cooperative Ecosystem Studies Unit Member shall employ appropriate QA/QC standards to ensure that data is topologically correct, accurate and complete, including:
(1) no erroneous overshoots, undershoots, dangles or intersections in the line work;
(2) point and line features shall be snapped together where appropriate to support networks, e.g. do not break linear features for labeling or other aesthetic purposes;
(3) lines should be continuous and point features should be digitized as points;
(4) no sliver polygons; and
(5) digital representation of the common boundaries for all graphic features must be coincident, regardless of feature layer.

V. GENERAL INFORMATION

A. Meetings:

A kick-off meeting may be held in person at the selected Cooperative Ecosystem Studies Unit Member or otherwise agreed upon location. Update meetings may be held to review progress and discuss interim products and draft deliverables. In addition there will be a need to organize an expert panel review meeting (Task 5). The meeting location should be suitable for approximately 20 people and will include a projector and a note taker. The location will be approved by both the Cooperative Ecosystem Studies Unit Member and the NTR. The Cooperative Ecosystem Studies Unit Member will be responsible for sending meeting minutes to the Navy Technical Representatives after all scheduled meetings summarizing discussions, decisions, and tasking.

B. Progress Reports:

Monthly progress reports shall be submitted the NTR via email on a monthly basis. Each report should include a detailed summary of work accomplished under each task and estimated percentage of each task completed to date. Activities planned for the following month should be incorporated as well as any issues encountered while performing the tasks. Progress report structure and information required may be amended as requested by the NTR.

C. Deliverables:

Deliverables will be made by USPS/UPS/FedEx and/or by electronic delivery as specified by the NTR

1. Detailed Data stake holder review meeting minutes including proposed direction The Cooperative Ecosystem Studies Unit Member will take to rectify any issues discussed shall be submitted to the NTR within 30 days after the meeting is held
2. The Cooperative Ecosystem Studies Unit Member will prepare a summary near the end of the period of performance to document what has been investigated, problems discovered, and any proposed solutions.
3. Monthly progress reports

D. Navy Technical Representative:

The Navy Technical Representative (NTR) will be the Cooperative Ecosystem Studies Unit Member's point-of-contact on all associated technical matters. Mr. David James, Code EV52, NAVFAC Atlantic, TEL (757) 322-4883, FAX (757) 322-4894, is the designated NTR for this Contract Task Order. No other person, except for the Contract Administrator (CA), is authorized to direct work under this scope or to affect decisions or

evaluations. The Cooperative Ecosystem Studies Unit Member shall notify the NTR of the individual designated as the principle investigator. Routine correspondence to the NTR may be addressed to:

Naval Facilities Engineering Command Atlantic
Attn: Mr. David James (Code EV52)
6506 Hampton Blvd.
Norfolk, VA 23508
Email: david.m.james@navy.mil

E. Co-Navy Technical Representative:

The Co-Navy Technical Representative (Co-NTR) will be the Cooperative Ecosystem Studies Unit Member's point-of-contact to coordinate all on-the-ground surveys and habitat restoration implementation practices on NBC and SCI. Mr. Chris Gillespie, NAVFAC Southwest Core, TEL (619) 532-4416, is the designated NTR for this Contract Task Order. The Cooperative Ecosystem Studies Unit Member shall notify the Co-NTR of the individual designated as the principle investigator. Routine correspondence to the Co-NTR may be addressed to:

NAVFAC Southwest Core
Attn: Mr. Chris Gillespie
1220 Pacific Highway
Bldg 1, Room 520
San Diego, CA 92132
(619) 532-4416
chris.gillespie@navy.mil

F. Contract Administration:

The Cooperative Ecosystem Studies Unit Member shall receive direction on all elements of this contract from Ms. Tina Gillespie-Lucas, Contract Specialist (CS). Correspondence should be addressed as follows:

Naval Facilities Engineering Command Atlantic
Attn: Ms. Tina Gillespie-Lucas (Code AQ11)
6506 Hampton Blvd.
Norfolk, VA 23508
Phone: 758-322-4162
tina.gillespie-lucas@navy.mil

G. Evaluation:

Eligible Applicants:

This financial assistance opportunity is being issued under a Cooperative Ecosystems Studies Unit (CESU) Program. CESU[1]s are partnerships that provide research, technical assistance, and education. Eligible recipients must be a participating partner of the Piedmont South Atlantic Cooperative Ecosystem Studies Unit (CESU) Program.

Upon completion of this contract, the NTR will prepare an evaluation of the The Cooperative Ecosystem Studies Unit Member's performance under this contract. The completed evaluation will be retained in the The Cooperative Ecosystem Studies Unit Member 's file at NAVFAC Atlantic for review and consideration by future selection boards.

H. Payment:

Upon approval by the NTR, payment will be authorized on a monthly basis (as requested) to the Cooperative Ecosystem Studies Unit Member. Payment authorization by the NTR shall be based solely on the percentage of the entire project completed within the period for which the Government is billed. An up-to-date status report that clearly indicates the actual work performed during the specific billing period must accompany each billing statement before payment is authorized by the NTR.

Requests for payment shall be made in accordance with NAVFAC Atlantic instructions and addressed to:

Naval Facilities Engineering Command Atlantic
Attn: Code AQ13
6506 Hampton Blvd.
Norfolk, VA 23508

I. Release of Information:

US Navy shall retain rights to access all digital files, hard-copy products, and related materials and information (including all data collected and associated analysis products) for the purposes of environmental planning and regulatory compliance requirements. The primary researchers shall retain rights to unrestricted analysis and publication of data and results without requirement of authorization from the NTR.

J. Equipment:

No equipment is being purchased under this Task Order.

K. Quality of Work:

The Cooperative Ecosystem Studies Unit Member will be responsible for the professional and technical accuracy in addition to the coordination of all work or services rendered. The products submitted by the Cooperative Ecosystem Studies Unit Member will represent the best solutions possible and will be reviewed by the Navy for compliance with government requirements and criteria. The Cooperative Ecosystem Studies Unit Member, at no additional cost to the government, will correct errors and/or deficiencies in the final product resulting from the Member's performance that are designated within three months of final product delivery and that can be corrected by the Cooperative Ecosystem Studies Unit Member within 24 man-hours.