



U.S. Integrated Ocean Observing System (IOOS) Implementation
Southern California Coastal Ocean Observing System (SCCOOS)
FY11-16 National Oceanographic Partnership Program Report:
1 June 2016 to 30 November 2016

Eric Terrill, Principal Investigator
SCCOOS Technical Director
Scripps Institution of Oceanography, University of California, San Diego
9500 Gilman Drive, Mail Code 0214, La Jolla, CA 92093
Phone: 858-822-3101 E-mail: eterrill@ucsd.edu

Julie Thomas, Co-Investigator
SCCOOS Executive Director
Scripps Institution of Oceanography, University of California, San Diego
9500 Gilman Drive, Mail Code 0214, La Jolla, CA 92093
Phone: 858-534-3034 E-mail: jothomas@ucsd.edu

Proposal Partners:

California Polytechnic State University, San Luis Obispo
Farallon Institute for Advanced Ecosystem Research
University of California, Los Angeles (UCLA)
University of California, Santa Barbara (UCSB)
University of Southern California (USC)

Grant Number: NA11NOS0120029
www.sccoos.org

1) PROGRESS AND ACCOMPLISHMENTS

SCCOOS continues to have the ability to achieve its milestones by providing access to high-quality integrated data and support regional user needs while complying with the standards and protocols for sharing and archiving data that are developed nationally. SCCOOS actively participates in IOOS Data Management efforts such as the Thematic Real-Time Environmental Distributed Data Services (THREDDS). By leveraging the Coastal Data Information Program (CDIP) and the HF Radar National Network programs, SCCOOS targets THREDDS distribution for wave, surface currents and most recently, shore station data. SCCOOS also continues to implement QARTOD data quality control standards. Wave and surface current data have associated XML and FDGC compliant metadata.

Ecosystems and Climate Milestones

1. Operate and Maintain a network of glider lines to collect measurements of temperature, salinity, chlorophyll, current velocity, dissolved oxygen and acoustic backscatter; deliver data to SCCOOS website and push to modeling centers.
 - a. Completion date: TBD - ongoing milestone
 - b. Status: On-Track with exception of dissolved oxygen. Gliders were equipped with dissolved oxygen sensors that were collecting data until 2012. At that point the manufacturer (SeaBird) changed the design of the sensor that was being used and the new iteration isn't compatible with our gliders. The principle investigator is in the testing phase of adapting the new sensor to the glider fleet. It is undetermined when the new sensor will come online.
 - c. Successes: There are 3 Spray underwater gliders off the coast of California at all times sending back data on temperature, salinity and ocean currents. These missions are funded through IOOS and NOAA's Climate Program Office/Climate Observation Division. These data were used to feed the models that predict currents to help responders know where the oil will go. This demonstrates the importance of having a persistent observing asset that can immediately be used in an emergency.
2. Conduct Shipboard observations with CalCOFI surveys to count seabirds and post online
 - a. Completion date: TBD - ongoing milestone
 - b. Status: On-Track
 - c. Successes: As part of CalCOFI-LTER program, SCCOOS [displays](#) parameters that are measured in the nearshore region of Southern California including temperature, salinity, zooplankton, phytoplankton, fish eggs and invertebrate larvae.
3. Publish survey reports and maps of species' distribution and abundance on SCCOOS web site.
 - a. Completion date: TBD - ongoing milestone
 - b. Status: On Track
 - c. Successes: Physical and ecological ocean patterns and processes constitute valuable information for Coastal and Marine Spatial Planning and marine protected areas monitoring. Under the auspices of SCCOOS, the California Current Ecosystem Long Term Ecological Research (CCE_LTER) program, and in conjunction with the California Cooperative Ocean Fisheries Investigation (CalCOFI), the distribution and abundance of seabirds during 3 seasonal surveys were studied. Survey reports and maps of species' distribution and abundance are published on SCCOOS [website](#).

Water Quality Milestones

1. Monitor Harmful Algal Blooms (HABs) at five pier stations by collecting weekly measurements of temperature, salinity, chlorophyll, nutrients and toxic species. Provide data online and distribute via the California HABMAP listserv.
 - a. Completion date: TBD - ongoing milestone
 - b. Status: On-Track

- c. Successes: Expanded HABs website to include Central and Northern California. Weekly reports are derived from a year long time series of sampling for HAB species and related water quality measurements and are provided to the California HAB Monitoring and Alert Program Group. *Pseudo-nitzscha* blooms that produce domoic acid are being monitored. The Caron lab at the University of Southern California (USC), is responsible for the analysis of domoic acid from the 5 SCCOOS HAB monitoring sites. The SCCOOS HAB program contributes to the statewide HAB Monitoring and Alert Program (HABMAP) initiated by NOAA, the California Ocean Science Trust, and the Southern California Coastal Water Research Project (SCCWRP). The HAB program generates a baseline time-series of ocean properties to monitor ocean conditions in the very near shore zone of the Southern California Bight. These measurements are used to develop forecast models for short term warnings. They also increase our knowledge of the sign, frequency and magnitude of variation of temperature, salinity, density, nutrients and pollutants.
 2. Implement the 3-km ROMS ocean forecasting system for real-time operations statewide; conduct a systematic validation of the 3-km statewide ROMS.
 - a. Completion date: TBD - ongoing milestone
 - b. Status: On-Track
 - c. Successes: 3-km California state-wide ROMS model with data assimilation and real-time forecasting capabilities have been running continuously. This state-wide ROMS model is assimilating both the HF radar surface current data and the vertical profiles of temperature and salinity from four Spray gliders as well as other available observational data sets including satellite sea surface temperature and vertical profiles of temperature and salinity from moorings, ships and floats. In addition to the display at the SCCOOS web site, we are also displaying some static ROMS images on our group web site. The ROMS nowcast page is: http://west.rsoffice.com/ca_roms?variable=curr. The ROMS forecast page is: http://west.rsoffice.com/ca_roms_forecast?variable=curr. ROMS validation images against three assimilated data sets are also displaying:
 - i. Satellite SST http://west.rsoffice.com/ca_roms_valid_other?variable=IRsst
 - ii. HF radar http://west.rsoffice.com/ca_roms_valid_radar?variable=2
 - iii. Gliders http://west.rsoffice.com/ca_roms_vaild_prof?variable=sscat
 3. Analyze pollution dispersal in finescale, nearshore, and shelf ROMS for the San Pedro and Santa Monica Bays.
 - a. Completion date: TBD - ongoing milestone
 - b. Status: On-Track
 - c. Successes: Fine-scale simulations with ROMS are being analyzed at UC, Los Angeles to examine two phenomena. First, pollution effluent dispersal from the Orange County and Hyperion discharge outfalls are being assessed for their amount of augmentation of net primary productivity in the surrounding shelf regions. Second, the roles of surf current instability and the ensuing surf-eddy turbulence under various wave and coastline shape influences are being assessed how far offshore their influences reach. This is being done using two tactics; 1) Exploit the surface wave - current interaction and grid- nesting capabilities of ROMS to examine cross-shore exchange of materials in the shelf and surf zone. Sites near Pt. Conception, the northern Channel Islands, Santa Monica Bay, and the Newport region are the foci, and 2) Develop a coupled ROMS/biogeochemistry/ecosystem model to aid the evaluation of the effects of nutrient inputs on bloom formation and nutrient cycles, as well as variability and trends in hypoxia and acidification. The progress is posted [online](#).
 4. Continue automated sampling at four shore stations to measure temperature, salinity, chlorophyll, turbidity and water level.
 - a. Completion date: TBD - ongoing milestone

- b. Status: On-Track with exception of the Santa Monica Shore Station. Calibration samples have been collected during cleaning and service dives, however incorporation of data quality checks from 4 stations is not feasible at the current funding level.
- c. Successes: The automated shore stations program now operates and maintain 3 stations (Scripps Pier, Newport Pier and Santa Barbara Pier) and provide real-time continuous data at 1-4 minute intervals with limited interruptions. Automated shore station data are one of the most requested data sets provided through SCCOOS. These data are used by the public and local state and research agencies to assess local conditions related to water quality, nearshore processes, population dynamics of coastal species and harmful algal blooms.

Marine Operations Milestones

1. Annually provide training to first responders of maritime incidences in the use of SCCOOS products.
 - a. Completion date: TBD - ongoing milestone
 - b. Status: On-Track
 - c. Successes: SCCOOS participates in training and science education to a broad range of stakeholders either by request or as opportunity arises.
2. Operate and maintain the network of short, medium and long range HF radar systems and deliver data streams to the National HFR Network.
 - a. Completion date: TBD - ongoing milestone
 - b. Status: On-Track
 - c. Successes: The live feed of HF radar data are now available on the national HFR network for oil and hazardous spill response in the Environmental Response Management Application[®] (ERMA) map viewer for the southwest region. Near real-time and archived surface current measurements have been used in the National Preparedness for Response Exercise Program (NPREP) drill scenarios led by the U.S. Coast Guard in San Diego, Los Angeles and Ventura.
3. Maintain and expand integrated, customized products with multi-layer views of observations, nowcasts and forecasts. Collaborate with the Port of Long Beach to maximize the benefit of SCCOOS observations.
 - a. Completion date: TBD - ongoing milestone
 - b. Status: On-Track
 - c. Successes: The customized, interactive map display of ocean conditions and forecasts for the Port of Los Angeles and Long Beach Harbor is used to improve navigation, safety and efficiency for commercial vessels, harbor pilots and port operations.
4. Deliver glider data for assimilation into models including US Navy coastal models.
 - a. Completion date: TBD - ongoing milestone
 - b. Status: On-Track
 - c. Successes: Glider data are provided to the Naval Oceanographic Office (NAVO) for assimilation into operational models.
5. Deliver surface current data and surface wind analyses to aid spill response, SAR real-time recovery and post analysis trajectories.
 - a. Completion date: TBD - ongoing milestone
 - b. Status: On-Track
 - c. Successes: Surface current measurements and surface wind analyses are integrated into the General NOAA Operational Modeling Environment (GNOME) for oil spill trajectory analysis. Customized and expanded interactive map displays of wave and surface currents with multi-layered views of observations, nowcasts, and forecasts were developed for Naval Air Systems Command (NAVAIR), at Point Mugu. Implementation of surface currents measured by the

SCCOOS HF radar network are now accessible by U.S. Coast Guard for search and rescue (SAR) applications using their Environmental Data Server.

Coastal Hazards Milestones

1. Develop Shoreline inundation forecast, validation, and dissemination of warnings. Display inundation development and integration information online. Expand development and integration of inundation web site.
 - a. Completion date: TBD - ongoing milestone
 - b. Status: On-Track
 - c. Successes: Surveys of sand levels on beaches and monitor storm inundations at selected locations are posted on the SCCOOS website. These data are used to validate and refine coastal data and forecast models of erosion, flooding, and inundation levels can be used to protect and improve beaches, real estate, and highways. These endeavors have led to the development of a statewide 'flooding index' forecast plots in accordance with the CDIP current research on wave run-up. The new plots are not based only on the tide and wave height, but also take the wave period into account. The resulting water level predictions are generally lower than those from the old model, but they should be significantly more representative of the actual water levels observed at the coast. The Cardiff CDIP water level page has been updated to include mild and moderate flood thresholds. Additionally, plots of Southern California beach widths are being regularly updated. Beach surveys at Seal Beach are required as boundary conditions for inundation modeling are in progress. Seal Beach sand level and bathymetric surveys were conducted this year on January 21, 2016 and April 6, 2016. The next survey is scheduled for December 20, 2016.

2) SCOPE OF WORK

SCCOOS operates as a system of partnerships and projects that are facilitated by technical and programmatic staff. Organized by the four focus areas, the SCCOOS scientific and technical approach is based on a system of core ocean observing technologies and the delivery of useful data products and tools. System components include sub-surface ocean observations from underwater gliders, nearshore and coastal measurements, wave measurements and models, pier-based monitoring, satellite imagery, high frequency (HF) radar surface current mapping and data assimilative ocean modeling. The projects described in this report represent the multi-disciplinary and collaborative efforts of the research teams that contribute data and information to SCCOOS.

3) PERSONNEL AND ORGANIZATION STRUCTURE

Dr. Clarissa Anderson became the Deputy Director of SCCOOS on October 1, 2016. Julie Thomas will remain the Executive Director until January 2017. At that point Clarissa will become the Executive Director and Julie will participate in SCCOOS as an Ex-Officio participant.

4) BUDGET ANALYSIS

FY 2016, SCCOOS received a no cost extension for this award, and is on track to spend out expenditures by May 2017.

FY11-16 funding has provided a valuable investment in important assets and will strengthen regional partnerships and national program planning. SCCOOS will continue providing its core observations and expand data products when possible within budget constraints. SCCOOS is also committed to contributing to larger ocean observing efforts regionally, nationally, and internationally.

Expenditures are progressing as expected, with no major discrepancies between actuals and budgeted on both the main award and the subawards.

Performance Progress Report Addendums

1) Education and Outreach

SCCOOS has [updated](#) the Education and Outreach Inventory.

2) Data Management, Products and Services

a. Open Data Sharing

SCCOOS continues to have the ability to achieve its milestones by providing access to high-quality integrated data and support regional user needs while complying with the standards and protocols for sharing and archiving data that are developed nationally. SCCOOS actively participates in IOOS Data Management efforts such as the Thematic Real-Time Environmental Distributed Data Services (THREDDS). By leveraging the Coastal Data Information Program (CDIP) and the HF Radar National Network programs, SCCOOS targets THREDDS distribution for wave, surface currents and most recently, shore station data. SCCOOS also continues to implement QARTOD data quality control standards. Wave and surface current data have associated XML and FDGC compliant metadata.

SCCOOS has completed a standards-based foundation for DMAC capabilities by converting HF radar and shore station formats into NetCDF and THREDDS.

- SCCOOS has released ncSOS service for its automated and manual shore stations.
- SCCOOS has released ERDDAP service for its automated shore stations.
- SCCOOS has leveraged CDIP wave data that are decimated to the NDBC for ingestion into WMO GTS
- SCCOOS has developed a Data Management Plan describing the current status of SCCOOS data streams and future goals for data quality assurance, quality control, dissemination, distribution, and archiving.
- In addition to the Data Management Plan, SCCOOS has developed more detailed descriptions of various data streams and products in the form of Sensor Plans.
- Sensor Plans follow a NOAA Data Sharing Template.
- Sensor Plans have been developed for Gliders, Automated Shore Stations, CalCOFI Cruises, CDIP, HFR, HABS, Manual Shore Stations, Satellite Imagery, AIS and the Burkolator.
- Observations are collected from a variety of platforms in a variety of ways, each of which has its own level of data processing maturity. SCCOOS accepts data from both automated and manual systems via SFTP, HTTP, serial over internet, Webforms and email. Observations are stored in flat files, databases and NetCDF files, all of which are available on the SCCOOS website.

b. Data Management Planning and Coordination

Ongoing program-level participation in data management planning and coordination activities are;

- Darren Wright and Julie Thomas attended the IOOS DMAC meeting in Washington D.C. June 2 & 3, 2016.
- Sarah Heim & Darren Wright attended a SciPy training workshop on behalf of SCCOOS July 9-17, 2016.
- Julie Thomas and Darren Wright participate in ongoing program-level data management and Julie Thomas is on the committee for IOOS DM standards.
- Julie Thomas participates in the Joint Planning DMAC work groups.
- Julie Thomas is a QARTOD steering team member.
- Julie Thomas and Clarissa Anderson presented on Big Data at BlueTech Week
- Darren Wright collaborates regularly CeNCOOS data and information managers on California ocean observations and website development.
- Darren Wright collaborates with the West Coast RA Data Managers to ensure that our west coast wide ocean observing efforts are coordinated.

d. Provision of Data to the Global Telecommunication System (GTS)

	WMO GTS	THREDDS	ERDDAP	SOS	IOOS Catalog (DAC)	Web Page	Primary Funder	Operated	Maintained (QC, Archive)
Automated Shore Stations	x	X	x	x	x	x	SCCOOS	SCCOOS	SCCOOS
Burkolator						x	SCCOOS	SCCOOS	SCCOOS
Gliders	x	x	x		x	x	NOAA/SCCOOS	NOAA/SCCOO	NOAA/SCCOOS
Harmful Algae Blooms						x	SCCOOS	SCCOOS	SCCOOS
High Frequency Radar	x	x		x	x	x	SCCOOS	SCCOOS	SCCOOS
State & Federally Leveraged									
Automated Information System						x	USCG	USCG	USCG
CalCOFI			x			x	NOAA/State of CA/NSF	NOAA/State of CA/NSF	NOAA/State of CA/NSF
CDIP Wave Data	x	x		x	x	x	USACE	CDIP	CDIP
Satellite Data						x	NASA/JPL	NASA/JPL	NASA/JPL

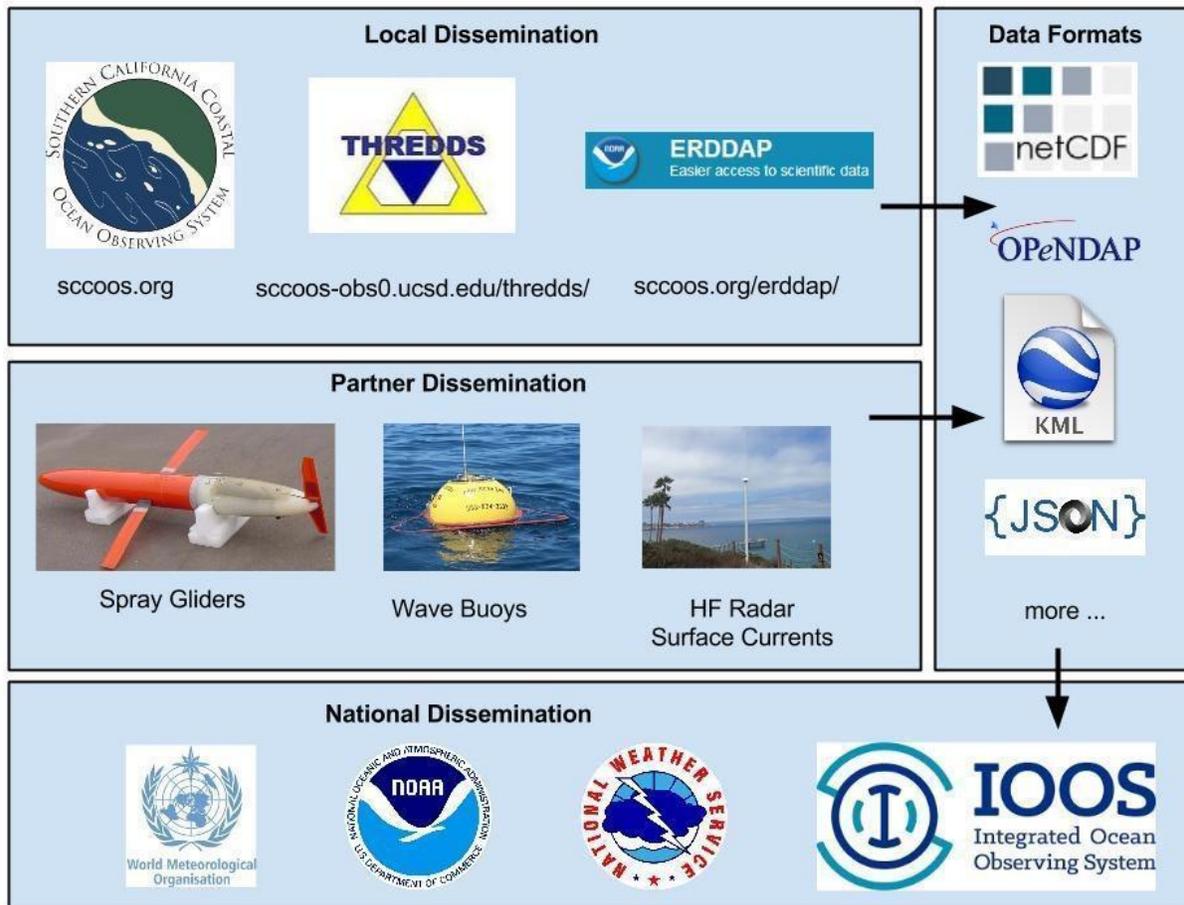
Table 1: Table indicates which communication; web services and access options are available for SCCOOS distributed data.

- SCCOOS has leveraged CDIP wave data that are decimated to the NDBC for ingestion into WMO GTS (See Table 1).
- The HFR, glider, and CDIP wave observations are all transmitted to the National Data Buoy Center for inclusion on the World Meteorological Service Global Telecommunication Service.

e. Data Access Services

See Table 1 above for a breakdown of how SCCOOS data can be accessed. SCCOOS adheres to the NOAA Data Sharing Procedural Directive. All real-time and near real-time data managed by SCCOOS are freely available through open services, without delay or restriction. Avenues for accessing the data include the SCCOOS website: sccoos.org. SCCOOS does not restrict access to any data it collects or serves.

- SCCOOS targets THREDDS distribution for wave, surface currents and most recently, shore station data.
- SCCOOS has completed a standards-based foundation for DMAC capabilities by converting HF radar and shore station formats into NetCDF and THREDDS.
- All SCCOOS data are publicly available through the SCCOOS website. SCCOOS actively participates in on-going efforts to standardize data distribution through the use of web services such as the Sensor Observation Service and the Open-Source Project for a Network Data Access Protocol (OPeNDAP)/THREDDS.
- As an operational Data Assembly Center, SCCOOS aggregates and manages the integration and distribution of ocean data and products. Serving as a federal repository for physical and biochemical datasets, the Data Assembly Center provides data ingest, analysis, quality control, discovery, access services, visualization and archive. Observational information is made available in a variety of data formats to ensure that products are useful and easy to access, while preserving the necessary detail to support the scientific and educational communities.



Picture 1. Real-time and near real-time data managed by SCCOOS are freely available through open services, without delay or restriction.

f. Catalog Registration

- HFR, gliders, Automated Shore Station and CDIP wave buoys are registered in the IOOS Service Registry. Registration of datasets and services with IOOS provides basic monitoring of service availability and response time.

g. Common Data Formats

- All SCCOOS data are publicly available through the SCCOOS website. The HFR, glider, and CDIP wave observations are all transmitted to the National Data Buoy Center for inclusion on the World Meteorological Service Global Telecommunication Service. SCCOOS actively participates in on-going efforts to standardize data distribution through the use of web services such as the Sensor Observation Service and the Open-Source Project for a Network Data Access Protocol (OPeNDAP)/THREDDS.
- SCCOOS participates with IOOS partners in a highly distributed system of interoperable components.
- Collaboration with international programs such as OceanSITES and the Joint Commission of Oceans and Meteorology (JCOMM) are on-going instructive for CF compliancy and data handling issues.

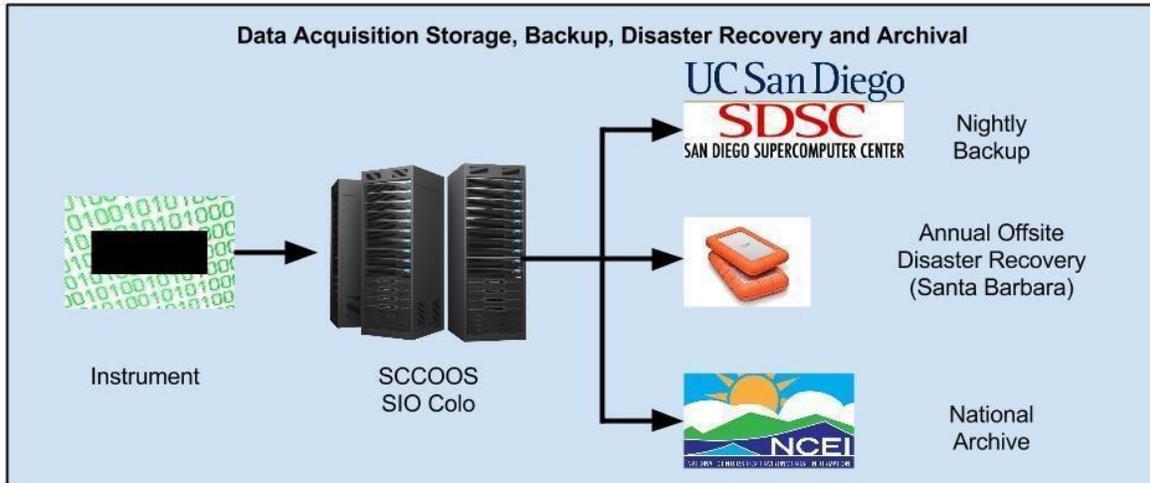
h. Metadata Standards

SCCOOS is regularly in accordance with manufacturer guidance or industry best practice for calibrating, validating, operating, and maintaining equipment owned and/or operated by SCCOOS. Publicly available data are quality controlled at minimum with the following QARTOD required tests: 1) timing, 2) syntax, 3) location, 4) range, 5) climatology. SCCOOS maintains an active role in the ongoing effort to develop and apply QC standards throughout the IOOS Regions. Highly leveraged programs such as

CDIP wave data, HFR network, CalCOFI cruise data, and glider programs manage their own quality control which are compliant with the federal repository data management standards.

i. **Storage and Archiving**

SCCOOS stores observational data on servers located at Scripp’s CoLo data center. SCCOOS operates two enterprise servers running Redhat Operating Service. Each server has Xeon Processors, 96 GB of RAM and shares a JBOD with 12 Terabyte of storage. Servers are backed-up nightly and copies stored offsite at the University of California San Diego Supercomputer Center. Annual disaster and recovery hard drives are sent to the University of California Santa Barbara for additional backup.



Picture 2. Data acquisition, storage, disaster recovery and archival

There are only two existing datasets that are not archived at NCEI at this time:

- HABs, will be archived by June 2018 at NCEI,
- Burkolator Ocean Acidification, SCCOOS is in discussion with Matt Biddle at NCEI and preparing to submit a request or archive by April 2017.

Presently, Automated Shore Station data, CDIP’s wave data, HFR data and glider data are all archived at NCEI. Certain datasets that are registered with the IOOS Service Registry contain FGDC and ISO 19115-2 metadata are available through ERDDAP and THREDDS.

j. **Ontologies, vocabularies and common identifiers**

Observations are collected from a variety of platforms in a variety of ways, each of which has its own level of data processing maturity. SCCOOS accepts data from both automated and manual systems via SFTP, HTTP, serial over internet, Webforms and email. Observations are stored in flat files, databases and NetCDF files, all of which are available on the SCCOOS website.

k. **Consideration for long term operations**

SCCOOS Data Management and Communications goals are to develop and maintain the following capabilities:

- Deploy the information system components (including infrastructure and relevant personnel) for full life-cycle management of observations including product creation, public delivery, system documentation, and curation.
- Deliver accurate and timely ocean observations and model outputs to a range of consumers including government, academic, private sector users, and the general public utilizing standardization and specifications common across all providers.
- Establish a robust data exchange that is responsive to a wide breadth of customer requirements and user feedback, assuring the data handling flexibility to accommodate decision-support requirements.

SCCOOS will continue to provide timely access to high-quality integrated data and support regional user needs while complying with the national standards and protocols for sharing and archiving data

following the “Guidance for Implementation of the Integrated Ocean Observing System (IOOS) Data Management and Communications Subsystem”. SCCOOS will also continue to integrate a broad suite of observations in the form of raw data and products. Collaboration with partner RAs to advance stakeholder access to cross-regional data services as defined by commonalities in specified user requirements, is on-going through IOOS Data Management and Communications including workshops and webinars. SCCOOS is well poised to improve ingestion with a level of quality control based on Quality Assurance of Real Time Oceanographic Data (QARTOD) parameters, standardize the web services for all parameters, submit to National Centers for Environmental Information (NCEI) for archive, and enhance data visualization. Additional desired outcomes are described on pages 18-30 of the Strategic Operational Plan.

Environmental Compliance

1) First Responder Training

IOOS/NOAA determined this project has a categorical exclusion, and their statement is as follows: The aforementioned project will not result in any changes to the human environment. As defined in Section 6.03c3(d), Administrative r Routine Program Functions, of NAO 216-6, this project involves conference room and/or classroom training activities that hold no potential for significant environmental impacts. As such, they should be categorically excluded from the need to prepare an Environmental Assessment or an Environmental Impact Statement.

2) Gliders

IOOS/NOAA determined this project has No Significant Impact, and their state is as follows: It has been determined that this proposed activity is described in the Final U.S. IOOS Programmatic Environmental Assessment, dated June 2016. The action is covered by the analysis within the U.S. JOOS Program PEA and the signed U.S. IOOS Finding of No Significant Impact. The project and its potential impact may be limited through terms or conditions placed on receipt of NOAA funds. The action requires no further environmental review.

3) Shore Stations

IOOS/NOAA determined this project has No Significant Impact, and their state is as follows: It has been determined that this proposed activity is described in the Final U.S. IOOS Programmatic Environmental Assessment, dated June 2016. The action is covered by the analysis within the U.S. JOOS Program PEA and the signed U.S. IOOS Finding of No Significant Impact. The project and its potential impact may be limited through terms or conditions placed on receipt of NOAA funds. The action requires no further environmental review.

4) Vessel Sampling – CalCOFI

IOOS/NOAA determined this project has No Significant Impact, and their state is as follows: It has been determined that this proposed activity is described in the Final U.S. IOOS Programmatic Environmental Assessment, dated June 2016. The action is covered by the analysis within the U.S. JOOS Program PEA and the signed U.S. IOOS Finding of No Significant Impact. The project and its potential impact may be limited through terms or conditions placed on receipt of NOAA funds. The action requires no further environmental review.

5) Mooring

IOOS/NOAA determined this project has No Significant Impact, and their state is as follows: It has been determined that this proposed activity is described in the Final U.S. IOOS Programmatic Environmental Assessment, dated June 2016. The action is covered by the analysis within the U.S. JOOS Program PEA and the signed U.S. IOOS Finding of No Significant Impact. The project and its potential impact may be limited through terms or conditions placed on receipt of NOAA funds. The action requires no further environmental review.

The project and its potential impact may be limited through the following terms or conditions placed on receipt of NOAA funds:

- Three permits are in place to allow the mooring to reside in its location: 1) Aid to navigation application; 2) Aid to navigation addendum; and 3) FCC Experiment License valid until 2017. The applicant must provide copies of these permits to the IOOS Office for the EC File of Record prior to undertaking the Del Mar Mooring Activities under the subject award.
- SCCOOS will implement (has implemented) the Essential Fish Habitat Conservation Recommendations provided by NMFS on July 7, 2014 to avoid, minimize, or offset effects of this activity.

**United States of America
FEDERAL COMMUNICATIONS COMMISSION
EXPERIMENTAL
RADIO STATION CONSTRUCTION PERMIT
AND LICENSE**

EXPERIMENTAL
(Nature of Service)

XR FX
(Class of Station)

WI2XAA
(Call Sign)

0539-EX-PL-2015
(File Number)

NAME Scripps Institution Of Oceanography

Subject to the provisions of the Communications Act of 1934, subsequent acts, and treaties, and all regulations heretofore or hereafter made by this Commission, and further subject to the conditions and requirements set forth in this license, the licensee hereof is hereby authorized to use and operate the radio transmitting facilities hereinafter described for radio communications in accordance with the program of experimentation described by the licensee in its application for license.

Operation: In accordance with Sec. 5.3(d) of the Commission's Rules

Station Locations

- (1) Santa Barbara Channel, within 32 km, PC - NL 34-18-31; WL 120-48-15
- (2) Pacific Ocean,, within 32 km, PC - NL 33-31-41; WL 122-30-15
- (3) Pacific Ocean, within 32 km, PC - NL 32-55-48; WL 117-18-57

Frequency Information

Santa Barbara Channel, within 32 km, PC - NL 34-18-31; WL 120-48-15

Frequency	Station Class	Emission Designator	Authorized Power	Frequency Tolerance (+/-)
161.975-162.025 MHz	FX	25K0F1D	12.5 W (ERP)	0.00015 %

Pacific Ocean,, within 32 km, PC - NL 33-31-41; WL 122-30-15

Frequency	Station Class	Emission Designator	Authorized Power	Frequency Tolerance (+/-)
161.975-162.025 MHz	FX	25K0F1D	12.5 W (ERP)	0.00015 %

This authorization effective November 09, 2015 and will expire 3:00 A.M. EST November 01, 2017

**FEDERAL
COMMUNICATIONS
COMMISSION**



Frequency Information

Pacific Ocean, within 32 km, PC - NL 32-55-48; WL 117-18-57

Frequency	Station Class	Emission Designator	Authorized Power	Frequency Tolerance (+/-)
161.975-162.025 MHz	FX	25K0F1D	12.5 W (ERP)	0.00015 %

Special Conditions:

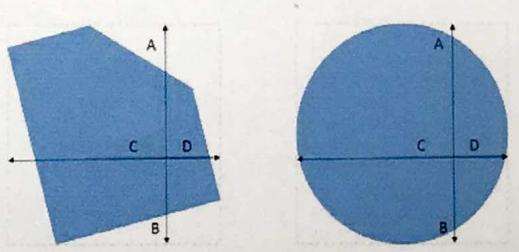
- (1) The occupied bandwidth of the emission shall not extend beyond the band limits set forth above.

**U.S. Coast Guard Private Aid to Navigation (PATON) Application Addendum
for an Automatic Identification System (AIS) AtoN Station**

Attributes of the Physical AIS AtoN station

Parameter	Values	Description & Default Values
Make & Model	Make: Pharos Marine Model: ATONIS1 Installer: UCSD/Scripps	Provide the make, model and installer of the station.
AIS AtoN Station Type	Type I Dual	Denote AIS AtoN station type and whether single/dual channel (see IALA A-126).
Power Source	See 'Additional Comments'	Denote its main and back-up power source.
Transmit Power	12.5 W	Denote transmit power if other than 12.5 W .
Transmitter Capability	See 'Additional Comments'	If Type I/II, denote whether this station can also transmit on other than AIS1/2.
Receiver Availability	Not Applicable	If Type II, denote receiver on times in the 'Additional Comments' section.
Type of Electronic Position Fixing Device (EPFS)	1=GPS	0=Undefined (default); 1=GPS; 2=GLONASS; 3=Combined GPS/GLONASS; 4=Loran-C; 5=Chayka; 6=Integrated Navigation System; 7=surveyed (manually inputted); 8=Galileo; 9-14=not used; 15=internal DGNSS. Non-floating AIS AtoN must provide a surveyed grade position or alternatively the mean position of at least 500 RAIM GPS position reports spread across a 4-hour sampling.
RAIM Capability	No RAIM	If using GPS, denote its Receiver Autonomous Integrity Monitoring (RAIM) capability.
UTC Synchronization	Direct	Denote direct, indirect or semaphore (Type III) synchronization.
Assigned Mode Flag	0=Autonomous & Continuous	Denote station assigned mode.
Chaining	Not Applicable	If chained, denote each chained MMSIs (parent, sibling, child) in the 'Additional Details' section.

Message contents

Name of AtoN	UCSD.EDU-DELMAR1	Proposed 20-character ATON name, its official name will be provided by USGG. The 14-character 'Extended Name' parameter is not to be used.
Type of AtoN	30=Special Mark	Denote the type of AtoN (IALA Bouyage System), not the 'Station Type' .
AtoN Status	00000000	Denote status indicators available on the AtoN; see IALA A-126.
Latitude & Longitude of the broadcast location	LAT: 32.93020 LONG: -117.31583	Denote the WGS84 latitude & longitude position of the station broadcast antenna ; in 10,000ths degrees (i.e. 38.25000°N, 85.76670°W). Degree, Min. Sec. converter at: https://www.fcc.gov/encyclopedia/degrees-minutes-seconds-to-from-decimal-degrees . If the AtoN position differs from this position (i.e. virtual or synthetic AtoN), denote its/there position(s), AtoN type(s), and name(s) in the 'Additional Detail' section.
Dimension / Reference for Position of Broadcast Antenna	A= 2 B= 2 C= 2 D= 2	Default: A=B=C=D=0 [for a Reference Point, Synthetic or Virtual AIS ATON] 'A' shall always indicate True North dimension 
Off-Position Threshold	1,000	The off-position monitoring threshold for a floating AIS ATON should be set to: = $(\sqrt{(\text{Chain Length}^2 - \text{Water Depth}^2)} * 110\%)$ meters
Antenna Height	2.0	Denote the height of the broadcast antenna in meters above sea level (ASL) .

Transmitted messages, Access Mode & Reporting Rate

Message 21 shall be transmitted at least every 3 minutes; alternating on AIS1 & AIS2. Denote any other messages to be transmitted, their reporting rate and access mode (i.e. RATDMA, /CS/SO-TDMA. **Note, the USCG will not reserve FATDMA for AIS ATON.** Messages 6, 8, 25 or 26 shall include their designated area code (DAC), function identifier (FI), and version number; and may not be transmitted more than one version per minute. Message 12 or 14, if used, shall be pre-formatted (and their text provided in the 'Additional Details' section).

Message# / DAC / FI / Version Number / Reporting Rate per Channel / Access Mode / Additional Comments

21/ FATDMA reporting every 3 minutes alternating on AIS1 and AIS2

Additional Details & Concept of Operations

Denote who, when, where and how it will be configured, deployed, monitored, maintained & operated; include standard presentation interface (PI) sentences (i.e. IEC 61162 series), standard AIS AtoN configuration messages, and/or proprietary sentences or binary configuration messages that will be used; and whether done via the AIS VHF Data-Link (VDL) and/or by other communication means (i.e. IP/TCP). Provide brief concept of operations and desired period of operation, etc. If the station is configured to broadcasts Virtual ATONs include: the total number and their position(s). Synthetic AIS ATON broadcasts should reflect their published USCG Light List position.

Power:

The AIS ATON unit is powered using a non-rechargeable battery pack. This battery pack has enough capacity for the AIS ATON unit to operate for 2 years.

Transmitter Capability: Type 1 Unit will transmit on both AIS1 and AIS2 frequencies.

Project description:

Surface buoy mooring DELMAR1 with AIS to be deployed by SIO personnel from a research vessel. Position of DELMAR1 will be monitored constantly to ensure mooring remains where originally deployed, along with engineering and scientific data from on-board sensors.

For more information on the DELMAR1 project, please visit http://mooring.ucsd.edu/projects/delmar/delmar_intro.html

Mooring is expected to be in the water one year from the time of deployment before turnaround is needed. It will be deployed each year at the same location.

Digitally signed by David Gassier
DN: cn=David Gassier, o=University of California,
ou=San Diego Super Institution of Oceanography, ou,
email=dgassier@ucsd.edu, c=US
Date: 2015.08.24 13:59:50 -0700

Maritime Mobile
Service Identity

Final approval is conditional upon licensing or authorization by the Federal Communications Commission (FCC) or National Telecommunications Information Agency (NTIA), respectively.

* * *

The applicant shall cease operations and notify cgnav@uscg.mil immediately whenever this station is not operating in accordance with 33 CFR 66, IEC 62320-2, and this application and addendum.

**U. S. COAST GUARD
PRIVATE AIDS TO NAVIGATION APPLICATION
INSTRUCTIONS**

1. The rules, regulations, and procedures pertaining to private aids to navigation are set forth in the copy of Code of Federal Regulations; Title 33, Chapter 1, Part 66, on the back of this page.

2. Three copies of the application for private aids shall be forwarded to the Commander of the Coast Guard District in which the aids will be located 30 days in advance of the proposed action. Sections of charts or sketches showing the work proposed shall accompany each application.

3. When making application for private aids to mark structures and mooring buoys in navigable waters or to mark the excavating or depositing of material therein, evidence is required of the authorization obtained from Corps of Engineers, Department of the Army, for such work. (Code of Federal Regulations; Title 33, Part 209.120.)

4. The applicant shall complete all of Blocks 1, 2, 3, 4, 5, 9 and 10 for all new applications. When an aid is being discontinued, Block 3 need not be completed. Block 6 shall be completed whenever authorization is required to be obtained from Corps of Engineers (See Instruction No. 3). Columns of Block 7 will be completed as follows:
a. Unlighted buoys - 7a, 7e, 7f, and 7j.
b. Lighted buoys - 7a, 7b, 7c, 7d, 7e, 7f, 7g, 7h, and 7j.
c. Daybeacons - 7a, 7e, 7f (if applicable), 7h, 7i, and 7j.
d. Light on a structure - 7a, 7b, 7c, 7d, 7e, 7f (if applicable), 7g, 7h, 7i, and 7j.

When an aid is being changed, Block 8 shall be used to describe the nature of the change.

5. The required information for each column includes the following:

(7a) Proposed number or letter to be assigned to the aid.
(7b) Period of light (time in seconds for one complete cycle).

(7c) Flash length in seconds. For complex or multiple flashes, explain in column (7j).
(7d) Color of light.

(7e) Position by two or more horizontal angles, or bearing and distance from a prominent charted landmark. If a prominent charted landmark is not available, show latitude and longitude as precisely as the chart permits.

(7f) Depth of water at buoy or structure (if marine site). All depths are measured from mean low water except on Great Lakes where depths are measured from low water datum.

(7g) Candlepower, if known; otherwise, include the following information in column (7j): lens size, lamp voltage and amperage if electric, or details of other illuminant to be used.

(7h) Height of light or unlighted structure above water. Height is measured from mean high water except in the Great Lakes where heights are measured from low water datum shown on U.S. Lake Survey Charts. The height of a light on a buoy is measured from the water line.

(7i) Include details of structure (type, color).

(7j) Used for the following specific information, plus any other useful details: a. buoys - size, shape, color, and reflective material used; b. structures - daymark shape and color; c. fog signal on a buoy or structure - type and model, audible range, and characteristic (number of strokes or blasts, period and blast length).

6. This form may be used to cover more than one aid in the same geographic area. Draw a line between each aid as indicated in example. Attach separate sheet if additional space is required.

7. Attach a section of chart showing the proposed location of the aid(s) to navigation.

8. a. After receipt of the approved form the applicant will advise the District Commander by telegram or other rapid means of communications when the work authorized is actually accomplished.

b. If the aids have not been installed within one year of the approval date, the approved application is automatically cancelled.

c. Any discrepancy in the operation of the aid(s) at any time shall be reported to the District Commander by telegram or other rapid means of communication in order that Notices to Mariners may be issued. A discrepancy exists whenever the aid is not as described in the approved application, i.e., lack of signal, incorrect light characteristic, or improper color, shape or position of shore structure or buoy. The correction of the discrepancy will also be reported by the same method.

9. All classes of private aids to navigation shall be maintained in proper condition. They are subject to inspection by the Coast Guard at any time and without prior notice to the maintainer.

7. APPLICANT WILL FILL IN APPLICABLE REMAINING COLUMNS

FOR DISTRICT COMMANDERS ONLY		EXAMPLE OF USE OF APPLICATION									
LIGHT LIST NUMBER OR PAGE	NAME OF AID	NO. OR LTR. (7a)	LIGHT			POSITION (7e)	DEPTH OF WATER (7f)	CANDLE POWER (7g)	HT. ABOVE WATER (7h)	STRUCTURE	REMARKS (See Instructions) (7j)
			PER. (7b)	FLASH LGTH. (7c)	COLOR (7d)					TYPE, COLOR, AND HEIGHT (7i)	
		1	4s	0.4s	WHITE	205°T, 3540 yds from tank, Bayview, VA.	9 Ft.	20	6 Ft.		5' Lighted buoy - black
		2				200°T, 3425 yds from tank, Bayview, VA.	7 Ft.				Nun buoy - Red White reflector
		3				210°T, 2810 yds from tank, Bayview, VA.	2 Ft.		7 Ft.	Single pile	2' square daymark - black
		5	2.5s	0.5s	WHITE	218.5°T, 330 yds from tank, Bayview, VA.	8 Ft.	20	13 Ft.	5 - pile	3' square daymark - black

FEDERAL REGULATIONS CONCERNING PRIVATE AIDS TO NAVIGATION, 33 CFR 86

§ 66.01-1 Basic provisions.

(a) No person, public body or instrumentality not under the control of the Commandant, exclusive of the Armed Forces, shall establish and maintain, discontinue, change or transfer ownership of any aid to maritime navigation, without first obtaining permission to do so from the Commandant.

(b) For the purposes of this subpart, the term private aids to navigation includes all marine aids to navigation operated in the navigable waters of the United States other than those operated by the Federal Government (Part 62 of this subchapter) or those operated in State waters for private aids to navigation (Subpart 66.05).

(c) Coast Guard authorization of a private aid to navigation does not authorize any invasion of private rights, nor grant any exclusive privileges, nor does it obviate the necessity of complying with any other Federal, State or local laws or regulations.

(d) With the exception of shore based radar stations, operation of electronic aids to navigation as private aids will not be authorized.

§ 66.01-3 Delegation of authority to District Commanders.

(a) Pursuant to the authority in 49 CFR 1.4(g), the Commandant delegates to the District Commanders within the confines of their respective districts (see Part 3 of this Chapter for descriptions) the authority to grant permission to establish and maintain, discontinue, change or transfer ownership of private aids to maritime navigation, and otherwise administer the requirements of this subpart.

(b) The decisions of the District Commander may be appealed within 30 days from the date of decision. The decision of the Commandant in any case is final.

§ 66.01-5 Application procedure.

Application to establish and maintain, discontinue, change or transfer ownership of a private aid to navigation shall be made to the Commander of the Coast Guard District in which the private aid to navigation is or will be located. Application forms (CG-2554) will be provided upon request. The applicant shall complete all parts of the form applicable to the aid to navigation concerned, and shall forward the application in triplicate to the District Commander. The following information is required:

(a) The proposed position of the aid to navigation by two or more horizontal angles, or bearings and distance from charted landmarks. A section of chart or sketch showing the proposed location of the aid to navigation shall be included.

(b) The name and address of the person at whose expense the aid will be maintained.

(c) The name and address of the person who will maintain the aid to navigation.

(d) The time and dates during which it is proposed to operate the aid.

(e) The necessity for the aid.

(f) For lights: The color, characteristic, height above water, and descriptions of illuminating apparatus.

(g) For log signals: Type (whistle, horn, bell etc.) and characteristic.

(h) For buoys or daybeacons: Shape, color, number, or letter, depth of water in which located or height above water.

§ 66.01 - 10 Characteristics.

The characteristics of a private aid to navigation shall conform to the standard U.S. system to aids to navigation characteristics described in subpart 62.25 of Part 62 of this subchapter, except that only tungsten-incandescent light sources will be approved for electric lights.

§ 66.01 - 15 Action by Coast Guard.

(a) The District Commander receiving the application will review it for completeness and will assign the aid one of the following classifications:

Class I: Aids to navigation on marine structures of other works which the owners are legally obligated to establish, maintain and operate as prescribed by the Coast Guard.

Class II: Aids to navigation exclusive of Class I located in waters used by general navigation.

Class III: Aids to navigation exclusive of Class I located in waters not ordinarily used by general navigation.

(b) Upon approval by the District Commander, a signed copy of the application will be returned to the applicant.

§ 66.01 - 20 Inspection.

All classes of private aids to navigation shall be maintained in proper operating condition. They are subject to inspection by the Coast Guard at any time and without prior notice.

§ 66.01 - 25 Discontinuance and removal.

(a) No person, public body or instrumentality shall change, move or discontinue any authorized private aid to navigation required by statute or regulations (Class I § 66.01-15) without first obtaining permission to do so from the District Commander.

(b) Any authorized private aid to navigation not required by statute or regulation (Classes II and III, § 66.01-15) may be discontinued and removed by the owner after 30 days' notice to the District Commander to whom the original request for authorization for establishment of the aid was submitted.

(c) Private aids to navigation which have been authorized pursuant to this part shall be discontinued and removed without expense to the United States by the person, public body or instrumentality establishing or maintaining such aids when so directed by the District Commander.

§ 66.01-30 Corps of Engineers' approval.

(a) Before any private aid to navigation consisting of a fixed structure is placed in the navigable waters of the United States, authorization to erect such structure shall first be obtained from the District Engineer, U.S. Army Corps of Engineers in whose district the aid will be located.

(b) The application to establish any private aid to navigation consisting of a fixed structure shall show evidence of the required permit having been issued by the Corps of Engineers.

§ 66.01-35 Marking of structures and floating obstructions.

Any structure, mooring, mooring buoy, or dam, in or over the navigable waters of the United States shall display the lights and other signals for the protection of maritime navigation as may be prescribed by the Commandant. The prescribed lights and signals shall be installed, maintained and operated by and at the expense of the owner, or operator. After obtaining such approval or a statement of no objection from the Corps of Engineers as is required by law, the owner or operator shall apply in accordance with § 66.01-5 to the District Commander having jurisdiction over the waters in which the structure or floating obstruction will be located for a determination of the lights and other signals to be displayed. This requirement includes the temporary lights and signals to be displayed during the construction of a structure. If no regulation exists prescribing the lights or other signals required to mark any work or obstruction, each case shall be considered individually by the District Commander, who will prescribe such lights and signals as he considers necessary for the safety of navigation.

§ 66.01-40 Exemptions.

(a) Nothing in the preceding sections of this subpart shall be construed to interfere with or nullify the requirements of existing laws and regulations pertaining to the marking of vessels and other obstructions sunk in the navigable waters of the United States (Part 64 of this subchapter), the marking of artificial islands and structures which are erected on or over the seabed and subsoil of the outer Continental Shelf (Part 67 of this subchapter), or the lighting of bridges over navigable waters of the United States (Part 68 of this subchapter).

(b) Persons marking structures pursuant to Part 64 or Part 58 of this subchapter are exempted from the provisions of § 66.01-5 and 66.01-35.

§ 66.01-45 Penalties.

Any person, public body or instrumentality, excluding the Armed Forces, who shall establish, erect or maintain any aid to maritime navigation without first obtaining authority to do so from the Coast Guard or who shall violate the regulations relative thereto issued in this part, is subject to the provision of 14 U.S.C. 83. Any owner or operator of a fixed structure, excluding an agency of the United States, who violates any of the rules or regulations prescribed with respect to lights and other signals for fixed structures, is subject to the provision of 14 U.S.C. 85.

§ 66.01-50 Protection of private aids to navigation.

Private aids to navigation lawfully maintained under these regulations are entitled to same protection against interference or obstruction as is afforded by law to Coast Guard aids to navigation (Part 70 of this subchapter). If interference or obstruction occurs, a prompt report containing all the evidence available should be made to the Commander of the Coast Guard District in which the aids are located.

§ 66.01-55 Transfer of ownership.

(a) When any private aid to navigation authorized by the District Commander, or the essential real estate or facility with which the aid is associated, is sold or transferred, both parties to the transaction shall submit application (§ 66.01-5) to the Commander of the Coast Guard District in which the aid is located requesting authority to transfer responsibility for maintenance of the aid.

(b) The party relinquishing responsibility for maintenance of the private aid to navigation shall indicate on the application form (CG-2554) both the discontinuance and the change of ownership of the aid sold or transferred.

(c) The party accepting responsibility for maintenance of the private aid to navigation shall indicate on the application form (CG-2554) both the establishment and the change of ownership of the aid sold or transferred.

(d) In the event the new owner of the essential real estate or facility with which the aid is associated refuses to accept responsibility for maintenance of the aid, the former owner shall be required to remove the aid without expense to the United States. This requirement shall not apply in the case of any authorized private aid to navigation required by statute or regulation (Class I, § 66.01-15) which shall be maintained by the new owner until the conditions which made the aid necessary have been eliminated.

DEPARTMENT OF HOMELAND SECURITY U.S. COAST GUARD CG-2554 (Rev. 03-03)	PRIVATE AIDS TO NAVIGATION APPLICATION <i>(See attached instructions and copy of Code of Fed. Reg., Title 33, Chap. 1, Part 66)</i>	Form Approved OMB-1625-0011
--	---	--------------------------------

NO PRIVATE AID TO NAVIGATION MAY BE AUTHORIZED UNLESS A COMPLETED APPLICATION FORM HAS BEEN RECEIVED (14 U.S.C. 83; 33 C.F.R. 66.01-5)

1. ACTION REQUESTED FOR PRIVATE AIDS TO NAVIGATION: A. <input checked="" type="checkbox"/> ESTABLISH AND MAINTAIN B. <input type="checkbox"/> DISCONTINUE C. <input type="checkbox"/> CHANGE D. <input type="checkbox"/> TRANSFER OWNERSHIP	2. DATE ACTION TO START 8/22/2006
---	--------------------------------------

3. AIDS WILL BE OPERATED: A. THROUGHOUT THE YEAR B. TEMPORARILY UNTIL _____ C. ANNUALLY _____ TO _____

4. NECESSITY FOR AID <i>(Continue in Block 8)</i> SCIENTIFIC RESEARCH	5. GENERAL LOCALITY DEL MAR	6. CORPS OF ENGINEERS AUTHORIZED THIS STRUCTURE OR BUOY BY <input checked="" type="checkbox"/> PERMIT OR <input type="checkbox"/> LETTER <i>(file and date)</i> NWP-1
---	---------------------------------------	---

FOR DISTRICT COMMANDERS ONLY			7. APPLICANT WILL FILL IN APPLICABLE REMAINING COLUMNS								
LIGHT LIST NUMBER OR PAGE	NAME OF AID	NO. OR LTR. (7a)	LIGHT			POSITION (7e)	DEPTH OF WATER (7f)	CAN-DLE POWER (7g)	HT. ABOVE WATER (7h)	STRUCTURE	REMARKS <i>(See Instructions)</i> (7j)
			PER. (7b)	FLASH LGTH. (7c)	COLOR (7d)					TYPE, COLOR, AND HEIGHT ABOVE GROUND (7i)	
2289.15	SCRIPPS DEL MAR RESEARCH BUOY		4s	.4s	Y	32-56-05.88 N 117-19-06.9 W	56 fath				2.5 meter yellow sphere w/ 3 meter yellow tower

8. ADDITIONAL COMMENTS
 THIS BUOY IS PART OF THE SCCOOS PROGRAM. IT IS NOT ASSOCIATED WITH CDIP.
 CHARTS 18765, 18774, 18740

9a. NAME AND ADDRESS OF PERSON IN DIRECT CHARGE OF AID Paul Harvey Integrative Oceanography Division	10a. NAME AND ADDRESS OF PERSON OR CORPORATION AT WHOSE EXPENSE Scripps Institute of Ocean U of California, San Diego 9500 Gilman Avenue La Jolla=, CA 92093-0209	10b. THE APPLICANT AGREES TO SAVE THE COAST GUARD HARMLESS WITH RESPECT TO ANY CLAIM OR CLAIMS THAT MAY RESULT ARISING FROM THE ALLEGED NEGLIGENCE OF THE MAINTENANCE OR OPERATION OF THE APPROVED AID(S).	
9b. TELEPHONE NO. (858) 534-4540		10c. DATE	10d. SIGNATURE AND TITLE OF OFFICIAL SIGNING
FOR USE BY DISTRICT COMMANDER		RECD.	DATE APPROVED
SERIAL NO.	CLASSIFICATION OF AIDS II	CHART 18765	SIGNATURE <i>(By direction)</i>
		L. N. M.	

PREVIOUS EDITIONS ARE OBSOLETE

REMARKS

DATE		REFERENCE	ACTION AND REMARKS											
			J	F	M	A	M	J	J	A	S	O	N	D
NAME OF AID												LIGHT LIST NO.	PAGE	