

PROJECT TITLE: Testing of Pop-Up Gear in the California Dungeness Crab Fishery

A. CONTACT INFORMATION

Provide contact information for key participants, including the applicant and, if applicable, the entity administrator and any authorized agent(s). If any key participant does not have a Get Outdoors ID (GO ID) or commercial fishing license (CFL) number, they must provide information for CDFW to create a new customer profile pursuant to subsection 91(c)(2)(A)(1), Title 14, CCR.

1. Applicant

Name	Bart Chadwick
Title and Affiliation	Owner, Sub Sea Sonics
Mailing Address	[Mailing address omitted]
Email Address	[Email address omitted]
Telephone Number	[Telephone number omitted]
GOID or CFL Number	[GOID/CFL number omitted]
If no GOID or CFL number:	Please provide the following information.
Residence Address (if different from mailing)	
Date of Birth	
Height	
Eye Color	
Hair Color	
Weight	
Gender	
Personal Identification	A copy of DMV ID, passport, military ID, or other acceptable form of identification as listed in <u>subsection 700.4(c), Title 14, CCR.</u>

2. **Entity Administrator** (if applicable)

Name	Kim Sawicki
Title and Affiliation	President, Sustainable Seas Technology INC.
Mailing Address	[Mailing address omitted]
Email Address	[Email address omitted]
Telephone Number	[Telephone number omitted]
GOID or CFL Number	[GOID/CFL number omitted]
If no GOID or CFL number:	Please provide the following information.
Residence Address (if different from mailing)	
Date of Birth	[Date of birth omitted]
Height	[Height omitted]
Eye Color	[Eye color omitted]
Hair Color	[Hair color omitted]
Weight	[Weight omitted]
Gender	[Gender omitted]
Personal Identification	[Personal identification omitted]

3. Authorized Agent(s) (if applicable)

Using the table below, complete a separate entry for each authorized agent.

Name	Russ Mullins
Title and Affiliation	Owner, Longsoaker Fishing Systems LLC
Mailing Address	[Mailing address omitted]
Email Address	[Email address omitted]
Telephone Number	[Telephone number omitted]
GOID or CFL Number	[GOID/CFL number omitted]
If no GOID or CFL number:	Please provide the following information.
Residence Address (if different from mailing)	
Date of Birth	
Height	
Eye Color	
Hair Color	
Weight	
Gender	
Personal Identification	

Name	Marc Alley
Title and Affiliation	Owner/Operator, F/V Ronna Lynn
Mailing Address	[Mailing address omitted]
Email Address	[Email address omitted]
Telephone Number	[Telephone number omitted]
GOID or CFL Number	[GOID/CFL number omitted]
If no GOID or CFL number:	Please provide the following information.
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Eye Color	
Hair Color	
Weight	
Gender	
Personal Identification	A copy of DMV ID, passport, military ID, or other acceptable form of identification as listed in <u>subsection 700.4(c), Title 14, CCR.</u>

Name	Ed Tavasieff
Title and Affiliation	Owner/Operator, F/V Friendship
Mailing Address	[Mailing address omitted]
Email Address	[Email address omitted]
Telephone Number	[Telephone number omitted]
GOID or CFL Number	[GOID/CFL number omitted]
If no GOID or CFL number:	Please provide the following information.
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Gender	
Personal Identification	A copy of DMV ID, passport, military ID, or other acceptable form of identification as listed in <u>subsection 700.4(c), Title 14, CCR.</u>

Name	Steven Melz
Title and Affiliation	Owner/operator F/V Sunrise
Mailing Address	[Mailing address omitted]
Email Address	[Email address omitted]
Telephone Number	[Telephone number omitted]
GOID or CFL Number	[GOID/CFL number omitted]
If no GOID or CFL number:	Please provide the following information.
Residence Address (if different from mailing)	
Date of Birth	
Height	
Eye Color	
Hair Color	
Weight	
Gender	
Personal Identification	A copy of DMV ID, passport, military ID, or other acceptable form of identification as listed in <u>subsection 700.4(c), Title 14, CCR.</u>

B. STATEMENT OF PURPOSE

1. Describe the purpose and goals of the proposed project, including how the project meets or is consistent with the policies of [Fish and Game Code \(FGC\) Section 7050](#).

Purpose

The purpose of this Experimental Fishing Permit (EFP) is to allow for the additional testing necessary to support authorization of Sub Sea Sonics pop-up gear in conjunction with Longsoaker Fishing Systems' Guardian line management system in the California Dungeness Crab fishery under the Risk Assessment and Mitigation Program (RAMP). Authorization of the gear would allow continued fishing during periods when the fishery is closed to traditional gear to prevent wildlife entanglements. Recent regulations to prevent whale and sea turtle entanglements have resulted in time-area closures that have significantly shortened the commercial Dungeness crab fishing season. While this has reduced entanglements, it has delayed the season opener and impacted fishery participants that rely on a longer fishing season. The results of the testing will ultimately serve to enable decision making regarding authorization of alternative gear under the RAMP. Consistent with FGC Code 7050, this project aims to ensure the conservation of endangered marine species and the sustainability of the historic California Dungeness crab fishery through effective collaborations and a science-based process. Efforts included within this EFP promote scientific research to better inform fishery management decisions that recognize the importance of commercial fisheries while conserving the health and diversity of marine ecosystems.

Previous Work

During 2021 and early 2022, Sub Sea Sonics and Longsoaker Fishing Systems conducted extensive reliability testing and refinement of the pop-up gear in accordance with specified requirements of the RAMP. The gear has also undergone significant testing in other fisheries including the California Spiny Lobster fishery and the Southeastern US Black Sea Bass fishery. Sub Sea Sonics submitted a gear authorization request to the California Department of Fish and Wildlife (CDFW or "the Department"). The gear authorization documented extensive successful reliability testing, gear marking technologies, line handling systems as well as specified methods for vessel monitoring.

The gear authorization was declined on the basis the Department believed that further work was required to test the gear at depths greater than 200 ft and under poor sea conditions, and that additional testing was required to ensure the gear could be properly enforced. The Department further recommended that this additional testing be carried out under the EFP process. Thus, this EFP application has focused goals to address the performance and enforceability questions identified by CDFW during our previous gear authorization request. These EFP goals are summarized below.

EFP Goals

Primary Goals

1. Provide necessary information, testing results, and protocols to establish the performance, and limitations of the Sub Sea Sonics timed-release and acoustic pop-up gears over the expected range of conditions for the fishery.
2. Work with CDFW Enforcement staff to establish and test alternative gear enforcement mechanisms and procedures and refine the gear and methods accordingly.
3. Evaluate the technologies in the context of risk reduction and fishing performance.

Secondary Goals

1. Provide experience with the gear and provide documented testing results to build confidence within the Dungeness crab fishery.
2. Work with other fisheries to ensure coordination and transparency about the location of pop-up gear testing efforts to reduce and prevent gear conflict.

2. Provide a list of proposed project activities that are prohibited under current state fishing laws or regulations (cite the specific section number(s), if known), and the reasons to justify authorization (exemption) of those activities under the EFP.

- *Fish and Game Code Section 9005: Every Dungeness crab trap placed in waters of the state to take Dungeness crab for commercial purposes shall be marked with a buoy.*
 - We are requesting an exemption to allow for the use of pop-up gear with the surface marker submerged during the majority of the deployment period. Along with a surface marker buoy with traditional markings (that will only be present after the pop-up event), traps fished with pop-up fishing gear under this EFP will also be identifiable to the associated fisher, other fishers, and enforcement virtually, via the gear marking app (i.e. Trap Timer) associated with the pop-up gear. This app will be accessible through a mobile device or computer (see Section 4 for a detailed description of the app and enforcement protocol).
- *California Code of Regulations § 132.6.(d): It is unlawful to leave any Dungeness crab buoys, lines, or traps in state waters after the end of the Dungeness crab fishing season. All Dungeness crab traps shall be removed from state waters by 11:59 pm on the last day of the season as set forth in sections 8276 and 8277 of the Fish and Game Code.*
 - We are requesting an exemption to allow for continued testing of the gear year-round. Retention and sale of crab is only requested during the statutory season. Testing out of season will focus on training aspects and will not allow for active fishing, retention or sale of crab. If whales are present during these out of season periods, then testing would only involve the use of pop-up gear. If whales are not present, we request authorization to use pop-up gear in conjunction with traditional vertical lines and buoys as back-up devices. During training events, small numbers of traps (up to 10) would only be deployed for short periods (~2 hours) and would remain within visual contact of the fishing vessel.

- *California Code of Regulations § 132.8. Risk Assessment Mitigation Program*
 - We are requesting exemption from regulations within the California Risk Assessment and Mitigation Program, including from triggers for management actions and the resulting management actions. Specifically, we are requesting to be permitted to use pop-up fishing gear within the statutory season with retention of crab, and outside the statutory season for training purposes only with no retention of crab.

- *Requirement of single trap per line.*
 - We are requesting an exemption from the prohibition on the use of multiple traps per line in the Dungeness crab fishery. While fishing under this EFP, participants may use strings of up to 20 traps connected by a ground line with a pop-up unit at one or both ends. The purpose is to test the operational feasibility of using multiple traps per line as a means to increase fishing efficiency and economic viability of pop-up units while also providing redundancy and an effective means of recovering lost gear via grappling.

C. STATEMENT OF QUALIFICATIONS

Respond to each of the following statements by providing relevant qualifications to demonstrate the ability of the applicant and, if applicable, other key participants to perform the necessary duties and responsibilities to carry out the proposed project. PLEASE NOTE: If any scientific or technical assistance is requested of CDFW, pre-application consultation is required.

1. Lead and provide supervisory oversight for all activities of the permit under the authorizations, standard terms, and special conditions.

Bart Chadwick with Sub Sea Sonics will lead and provide overall supervisory oversight for all activities of the permit under the authorizations, standard terms, and special conditions. Dr. Chadwick has a PhD in Oceanography from Scripps Institution of Oceanography, University of California, San Diego. He currently owns and operates Sub Sea Sonics, a small business focused on low-cost recovery of underwater equipment from the sea floor. He is also a principal partner in Coastal Monitoring Associates which focuses on technologies for assessment of coastal environments. He has extensive experience in research, development, and applied studies in technology development for underwater equipment, ropeless fishing, and coastal contaminant transport and fate processes. His experience includes 3 years as owner of Sub Sea Sonics, 18 years in private consulting with Coastal Monitoring and 30 years as a lead scientist and Technical Director at the Navy's Marine Environmental Quality Program in San Diego, California. His research and applied experience includes development and production of underwater timed and acoustic releases, coral reef restoration structures, underwater energy harvesting devices, contaminated sediment assessment and remediation, groundwater exchange with the marine environment, contaminant exchange at the sediment-water interface, sea level rise vulnerability, water security, mixing and exchange processes in bays and estuaries, fate and effects of copper, zinc, and petroleum hydrocarbons in the marine environment, real-time monitoring and mapping techniques and estuarine risk assessment methodologies. He has led the development of and holds patents for a number of new technologies for use in coastal environments.

Kim Sawicki with Sustainable Seas will collaborate on the project and provide oversight of training and field testing aspects under the permit. Ms. Sawicki is a research associate and PhD student at the University of Massachusetts-Dartmouth School for Marine Science and Technology and the President of Sustainable Seas Technology, Inc. She has dual degrees in Pathobiology & Veterinary Science and Allied Health Sciences. In these capacities, she has conducted extensive field research on alternative fishing gear methods around the world for over 10 years and is currently overseeing research for a similar experimental fishing permit in the South Atlantic Black Sea Bass pot fishery. Her work with Sustainable Seas focuses on empowering individuals, fishing communities, and conservationists to engage in productive and non-judgmental dialogue to help reduce cetacean mortalities. In this role, she provides access to innovative gear and training as a means to empower fishers to maintain their historical fisheries while reducing the threat of marine mammal entanglement.

Russ Mullins with Longsoaker Fishing Systems will collaborate with Dr. Chadwick on activities authorized under the permit related to the use of the Guardian line handling system. Mr. Mullins lives and works on the west coast of Washington State just south of the US/Canada border. He has a BS in Environmental Science and has spent time operating a 45' commercial crab vessel. Mr. Mullins recently retired as a Sergeant after a 28 year career with Washington Department of Fish and Wildlife Enforcement (WDFW). During this time, he supervised WDFW's Northern Puget Sound marine unit where commercial trap fishery regulation and enforcement was a primary task. Mr. Mullins has authored and managed consecutive NOAA Section 6 grant proposals that have provided WDFW with over \$2m being awarded specifically for protection of ESA listed Southern Resident Killer Whales. Mr. Mullins currently owns and operates Longsoaker Fishing Systems which was formed in 2013 to market and promote gear innovations for crab and lobster trap fishing. The Guardian pop-up system was developed in 2018.

2. Experience in identification, methods, and protocols specific to the requested species listed under [Section E.2.](#) of this document.

The nature of this project does not require any special experience in identification, methods, and protocols specific to the requested species listed under Section E.2. of this document beyond what is required for normal fishing operations. Thus, these requirements will be carried out by the participating fishers during the normal course of their fishing operations. The fishers each have over 20 years of experience in identification of the target and potential bycatch species.

3. Obtain all appropriate authorizations and oversee quality control measures to assure conformance to the specified standards or requirements (e.g., take appropriate measures to ensure, promote, and facilitate compliance).

Bart Chadwick of Sub Sea Sonics will be responsible for obtaining all appropriate authorizations, and Kim Sawicki with Sustainable Seas will be responsible for day-to-day oversight of quality control measures to assure conformance to the specified standards or requirements. Russ Mullins of Longsoaker Fishing Systems will be responsible for quality control measures and conformance with standards related to the use of the Guardian line handling system.

4. Train all persons operating under the permit.

Bart Chadwick of Sub Sea Sonics, Kim Sawicki of Sustainable Seas Technologies and Russ Mullins of Longsoaker Fishing Systems will be responsible for the initial training of all persons operating under the permit. Subsequently, once fishers have demonstrated proficiency with the gear, they will also be enlisted to help with training other fishers when and if needed. Chadwick, Sawicki and Mullins all have extensive experience with the gear and with training fishers in the use of the gear. This includes previous training and use of the gear in the California Dungeness Crab fishery.

5. Coordinate field activities and communicate field findings with CDFW Marine Region.

Bart Chadwick of Sub Sea Sonics will be responsible for coordinating field activities and communicate field findings with CDFW Marine Region. Dr. Chadwick has worked closely with CDFW over the past three years in the development and testing of the gear and is experienced and knowledgeable in these requirements.

6. Collect, analyze, and transmit data gathered under the EFP to CDFW Marine Region.

Bart Chadwick of Sub Sea Sonics and Kim Sawicki of Sustainable Seas Technologies will be responsible for the collection, analysis, and transmission of data gathered under the EFP to CDFW Marine Region. Both Chadwick and Sawicki have extensive experience with the collection, analysis and communication of data related to pop-up fishing gear including testing programs in the Dungeness Crab, Spiny Lobster and Black Sea Bass fisheries.

D. PERMIT APPLICATION TYPE

1. Select desired permit tier.

- Tier 1 (For purposes other than exploratory fishing)
 - Tier 2 (For purposes other than exploratory fishing with assistance from CDFW)
 - Tier 3 (For the purpose of exploratory fishing)
 - Tier 4 (For the purpose of exploratory fishing with assistance from CDFW)
-

2. Request [permit fee reduction option](#) consideration.

- Yes
 - No
-

3. Has pre-application consultation with CDFW taken place with respect to this proposal? (Required for a Tier 2 EFP, Tier 4 EFP, or permit fee reduction option)

- Yes
- No

If yes, attach a copy of the pre-application consultation summary letter or provide the name and contact information of CDFW staff with whom the applicant consulted:

Meeting #1: Friday, May 6 from 2:00 – 3:15 pm

Meeting #2: Friday, September 16, 2022 from 2:00 – 2:45 pm

E. PROJECT DESCRIPTION

Describe the proposal and any other relevant details, including:

1. A description of the experimental design and research plan, including specific procedures for data collection, storage, processing, and analysis; and a timeline for implementing the project, including, if applicable, when compensation fishing is expected to occur.

The experimental design of this EFP is comprised of a four-year phased approach to the testing and scaled-up implementation of pop-up gear in the California Dungeness crab fishery to inform the establishment of a clear pathway for authorization of alternative gears under the RAMP. It will support decisions regarding future authorization of the use of timed- and acoustic release pop-up gear systems that can be used with single traps or multiple traps (up to 20 connected by a ground line) (see Section 6 for further description of the gear).

This EFP seeks to address several research questions and follows a robust data collection and analysis procedure, described below. The phased approach will allow for the training, testing, and expansion of pop-up gear in a controlled environment.

Research Questions

This EFP is designed to meet the quantitative and qualitative goals defined previously by addressing the following specific research questions focused on authorizing pop-up gear under the RAMP and based on the specific issues identified by CDFW:

Goal 1: Establish the performance and limitations of selected timed and acoustic pop-up gear over the expected range of conditions for the fishery.

- What is the reliability of the gear over the expected range of depths and environmental conditions of the fishery?
- If the gear is designed for a specific range of conditions, what is the reliability over this range?
- What gear limitations should be specified for each system in a gear authorization to ensure it can reliably operate under anticipated conditions?

Goal 2: Work with CDFW Enforcement staff to create and test alternative gear enforcement mechanisms and procedures and refine the gear and methods accordingly.

- Are the virtual gear-marking system and data accessibility sufficient to allow for effective enforcement?
- Is the vessel tracking system and data availability sufficient to ensure pop-up gear is not placed in the absence of gear marking and/or in closed areas?
- What, if any, additional security and verification methods are required to allow effective enforcement?

Goal 3: Evaluate the technologies in the context of risk reduction and fishing performance.

- What is the relative risk reduction for entanglement achieved under potential implementation scenarios of the pop-up gear based on the testing data?
- How many gear trials does it take to fish gear reliably and efficiently?
- What is the average servicing time per trap with each of the pop-up systems compared to traditional gear?

Data Collection and Analysis

Data collected under the EFP will be utilized to determine the reliability, range of conditions, level of risk reduction, and efficiency of the pop-up gear. Data collection will be the responsibility of the research team in coordination with the participating fishers. A standard data collection sheet will be provided to ensure that uniform data is collected for each vessel and will routinely be collected and stored by Sub Sea Sonics. Required data includes:

- Environmental data (e.g., wind speed, current, depth, visibility)
- Time/location of deployment (GPS coordinates), programmed pop-up time (for timer gear), time of retrieval
- Electronic monitoring data (e.g., virtual gear marking app, vessel tracking logger)
- Retrieval, sorting and deployment time (comparison with traditional gear)
- Catch of legal-size crabs per trap

Data analysis will be conducted by Sub Sea Sonics and included in the annual reports. Analysis will be focused on demonstrating the reliability of the gear across a variety of fishing conditions (depth, current, swell, etc.) as well as comparing traditional fishing gear to pop-up fishing gear.

Timeline: Phased Approach

Phase 1 – Dockside Training Phase

During year one, we will conduct an installation and operational training workshop with the initial authorized agents (fishers). This will include an overview of the equipment and protocols involved in the EFP. Gear manufacturers and qualified trainers will demonstrate pier-side how to set-up, deploy, retrieve, and re-set the gear. Fishers will then practice deploying, retrieving, and resetting the gear and must demonstrate ability to conduct these activities independently before moving to Phase 2. We will also aim to include enforcement personnel participation to establish a baseline of understanding on the operation of the equipment. Additional workshops will be scheduled throughout years one through four if additional fishers are added to the EFP.

Phase 2 – At-sea Trial Phase

During years one through four, fishers will be provided with pop-up gear to be trialed at-sea. During the trials, data will be collected on environmental conditions, location, and virtual marking aspects as described above. Trials during this phase will follow the guidelines listed below:

- Fishers will conduct at least 50 successful consecutive trials with minimum 95% success rate

- Short pop-up times (<2 hours) with 10 or less units of gear
- Trials conducted with back-up buoy
- Trials limited to depths <250 feet and line lengths <300 ft
- Trials conducted in areas that minimize potential interference with other fishers

In addition to the testing by fishers, this phase will also aim to include the participation and training of enforcement personnel. Ideally, enforcement will practice using the gear and begin to consider and establish an enforcement and management regime in preparation for the authorization of pop-up gear under the RAMP. During this time, fishers will be permitted to retain and sell crab only if caught during the fishery season. If they are using pop-up gear while the statutory is closed, traps will be un-baited and closed to prevent the unintended catch. It is anticipated that use during the period when the fishery is closed would only be for training purposes (Phase 2 activities), or to evaluate specific aspects of the gear performance that are not related to fishing performance.

Phase 3 – Scaled-up Implementation

Upon completion of phases 1 and 2, fishers will be permitted to test the pop-up gear year-round at with an expanded number of traps. At least three vessels and no more than ten total vessels will be outfitted with up to pop-up units for up to 50 traps per vessel and the fishers will operate the gear independently for a period of at least one month during the statutory Dungeness crab season. Similar to Phase 2, fishers or other project participants will collect data on environmental conditions, location, and virtual marking aspects. During Phase 3, fishers will have the option to test with singles, or with multiple (up to 20) traps on a single line with either a single pop-up system at one end, or a pop-up system at each end. Testing and fishing efforts during this phase will also be limited to depths less than 250 ft and line lengths less than 300 ft.

During this time, fishers will be permitted to retain and sell crab only if caught during the statutory season. If possible, fishers may fish traditional gear concurrently with pop-up gear to compare efficiencies such as set-up and haul times and catch size. If they are using pop-up gear while the statutory season is closed, traps will be un-baited and closed to prevent the unintended catch. It is anticipated that use during the period when the fishery is closed would only be for training purposes (Phase 2 activities), or to evaluate specific aspects of the gear performance that are not related to fishing performance.

2. A list of target species expected to be harvested as samples or for compensation under the EFP, including anticipated amounts (weight or number) and proposed use (e.g., bait, sell, personal use, or other (e.g., research or tag and release)). [Add rows to the table below as needed.](#)

Species Name	Weight or Number	Proposed Use
Dungeness crab	Same as in traditional Dungeness crab fishery.	Retain and sell if caught during fishery season, release if caught out of season.

3. A list of species expected to be taken incidental to fishing conducted under the EFP, including anticipated amounts (weight or number), proposed use (e.g., bait, sell, personal use, discard, or other (e.g., research or tag and release)), and a description of any measures that will be used to reduce incidental catch mortality. [Add rows to the table below as needed.](#)

Species Name	Weight or Number	Proposed Use
Rock crab	Same as in traditional Dungeness crab fishery.	Retain and sell if caught during fishery season and if fisher holds permit. Otherwise release.

4. A description of the mechanisms that will be utilized to ensure that any proposed harvest limit for target and incidentally caught species are not exceeded and are accurately tracked or monitored (e.g., at sea fisheries observers, electronic monitoring, or other reporting method); and, if applicable, a description of the vessel’s capacity to accommodate an onboard observer.

A combination of electronic monitoring, reporting, and trap set-up will be used to ensure limits are not exceeded and are accurately tracked or monitored.

Harvest Limits

The Dungeness crab fishery does not contain harvest limits – rather sustainability relies on limits on size, sex, and season. This EFP does not propose to alter any of these limits on harvest.

Electronic Monitoring

The primary purpose of electronic monitoring is to ensure enforcement, reliability, and gear marking to prevent gear conflicts in the absence of a surface buoy and vertical line. All vessels using the pop up gear and associated gear marking app will also have an operational vessel tracking system affixed to the vessel.

We propose to conduct vessel tracking using the Pelagic Data Systems solar vessel location data logger (solar logger) electronic monitoring systems affixed to the vessel (www.pelagicdata.com). The solar logger will continuously record the vessel location, course, and speed at a frequency of once per minute. CDFW will be provided access to the solar logger records on request so they can ensure that no gear is being deployed without marking the gear in the virtual gear marking app. Records will be maintained for at least 60 days after the end of the season, or for 60 days after the testing date for data collected for testing purposes outside of the season. Under this permit we may also test other vessel tracking systems that may be identified so long as they meet the requirements for frequency of tracking and ability to respond to data requests from CDFW in a timely manner.

5. A description of any potential impacts on existing fisheries, habitats, or possible incidental interactions with threatened, endangered, or protected species (e.g., sea turtles, marine mammals, and birds) that could occur as a result of the project.

The gear included within this EFP was designed to reduce marine species entanglement risk. The degree to which risk is reduced is based on the removal of the vertical line during the time between deployment and gear surfacing. The degree of risk reduction is a function of the percentage of time the system is in ropeless mode (i.e., the rope and buoy have not surfaced yet), which is determined by the return time of the fisher relative to the popup time (for timer systems). In general, these times can be very close and risk reduction for entanglement should be on the order of 90% or greater. For timed-release gear, we propose to service gear as soon as possible after gear surfaces and within a maximum 6 hours of gear surfacing under normal conditions. For a 2-day (54-hour) release delay, this would represent a minimum of 90% reduction in risk. In some instances, vessel breakdown or unanticipated weather events may extend the time it takes to recover the gear after popup, but these events are expected to be relatively rare. The percent of ropeless time is tracked within the Ropeless Regulatory Web Portal on a fishery-wide basis as well as down to the specific permit holder level, so that monitoring of the effectiveness of the system can be determined and adjustments made to operations if necessary. Risk Reduction for each ropeless trap is calculated using the following formula:

$$\% \text{ Risk Reduction} = \frac{\text{Deployment Time} - \text{Popup Time}}{\text{Deployment Time} - \text{Retrieval Time}} \times 100$$

Thus, there is still potential for entanglement to occur with marine mammals and sea turtles, even with the 90% risk reduction. Note that the different types of pop-up gear (on-demand versus time) may achieve different levels of risk reduction.

6. The type and amount of gear to be used, including gear specifications and design, and, if applicable, a description of any measures and/or devices that will be used to reduce bycatch. If the project involves gear modifications or other gear innovations, the description must include the means by which CDFW staff can locate, retrieve, and inspect the proposed gear.

The gear included within this EFP includes the Sub Sea Sonics TR4RT Timed Release Pop-up System (TR4RT), the Sub Sea Sonics AR4RT Acoustic Release Pop-up System (AR4RT) and the Sub Sea Sonics and Longsoaker Guardian rope management systems. All pop-up gear systems will be used with a virtual gear marking application (e.g. Trap Timer), and a Pelagic Data System solar logger. Back-up systems will include rotten cotton, galvanized time releases (GTRs) and/or grappling. Descriptions of the gear types (including subsystems and operational methods), the amount of gear, how CDFW staff can locate, retrieve, and inspect the gear are provided below.

Gear Type: Sub Sea Sonics TR4RT Ropeless Trap Timer

The Sub Sea Sonics TR4RT Ropeless Trap Timer was developed specifically for application to low-cost ropeless trap fishing. The design of the system focused on addressing key inputs from the Dungeness crab fishing communities on the US west coast to provide a system that:

- Minimizes/eliminates exposure of whales and sea turtles to entanglement hazards in the water column;
- Has the potential to be capitalized and operated at costs that will not impose burden on fishers;
- Is simple enough to be easily integrated into the existing fishing process without undue impact to the time and effort required to deploy and retrieve the fishing gear;
- Is easily stowed within the footprint of the existing trap and allows stacking of traps;
- Is reliable and redundant to the degree that the amount of equipment loss is expected to be either the same or less when using the ropeless system compared to the traditional system;
- Provides comparable visibility on the surface to the traditional system when retrieving gear, and;
- Integrates a means to determine the location and identify the gear by fishers and enforcement agencies in the absence of surface buoys.

The system integrates three main components including the TR4RT release unit, the line handling system, and the gear marking capability. The concept of operation is that the ropeless trap is deployed including the trap, the timed-release with line and float (Figure 1).

The timed-release is preprogrammed so that the buoy will pop up just before the next visit, thus minimizing exposure and risk for entanglement of nearby whales. At the time of deployment, the real-time geolocation system is used to mark the location of the trap and transmit that location to a database that houses all the regional trap locations and other meta-data. The geolocation system is also used to display the locations of other nearby traps so that interference or gear conflicts among trap locations can be avoided. For turnaround/retrieval, the float is at the surface when the fisher arrives. The trap is then recovered using normal handling gear. The TR4RT is then re-set with the recoiled rope and buoys and the trap is re-deployed following the sequence described above. Details of the specific sub-systems are provided below.

Release Unit

The TR4RT release unit consists of an underwater housing, a rotating release and programming cam, and a release line retainer (Figure 2). The system works on the principle of “Time Until Release” (TUR). Using the cam, the user programs the unit with a specified TUR. The user then arms the system and deploys the equipment. After the specified TUR duration has elapsed, the cam rotates 180 degrees to activate the release. This releases a coil of line and float that are secured to the top of the trap; the float comes to the surface; and the equipment can then be retrieved. The system can also be disarmed using a cam rotation sequence. A small LCD screen on the unit provides user feedback on the command sequence and time setting. Figure 3 shows the typical command sequences that are used to program, arm, and disarm the system.

For simplicity, once the TUR is set in the unit, the system can be subsequently armed over and over if the same time setting is desired without having to reprogram the time for each deployment. Cam rotation is generally done using a small screwdriver to provide leverage. No other tools, deck units, or devices are needed for operating the system.

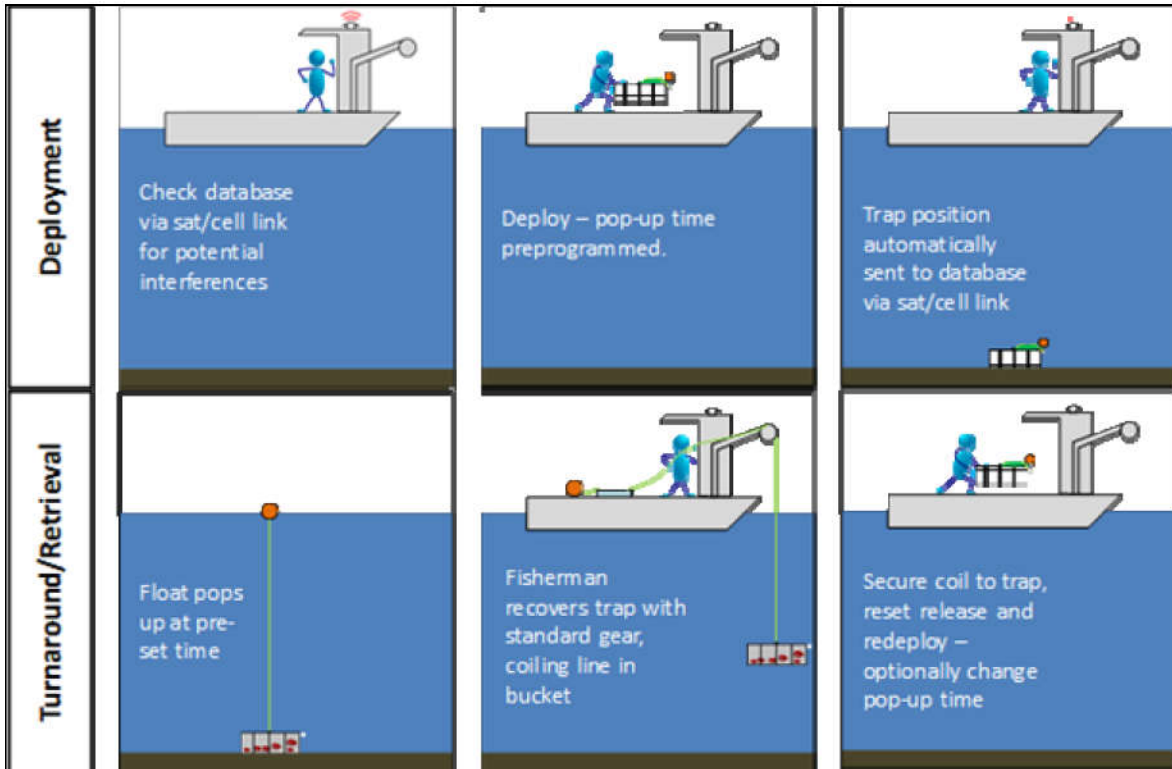


Figure 1. Concept of operations for the TR4RT Trap Timer ropeless fishing system.

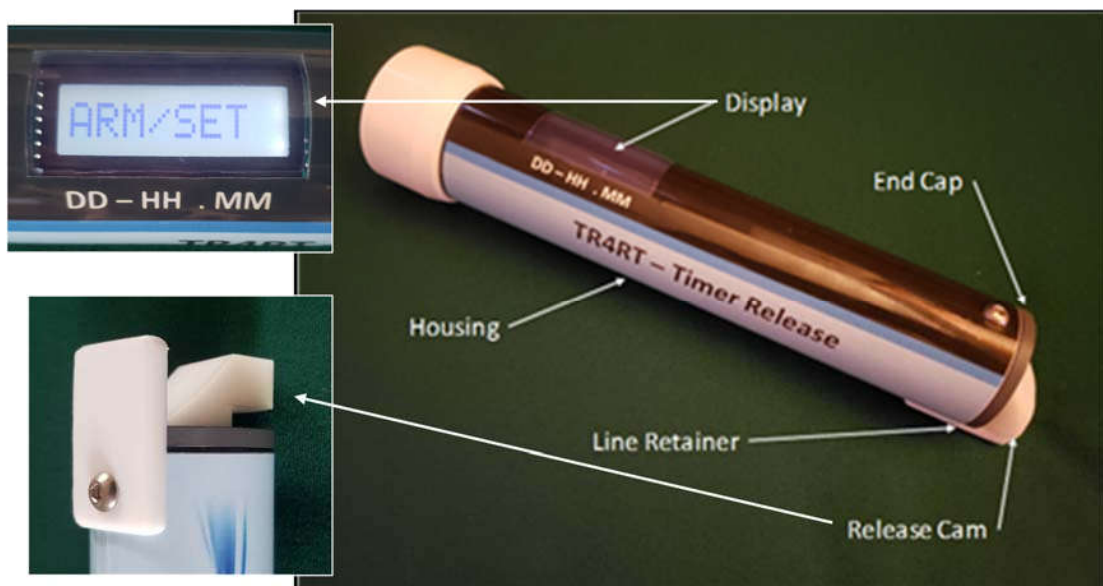


Figure 2. The TR4RT ropeless release unit.

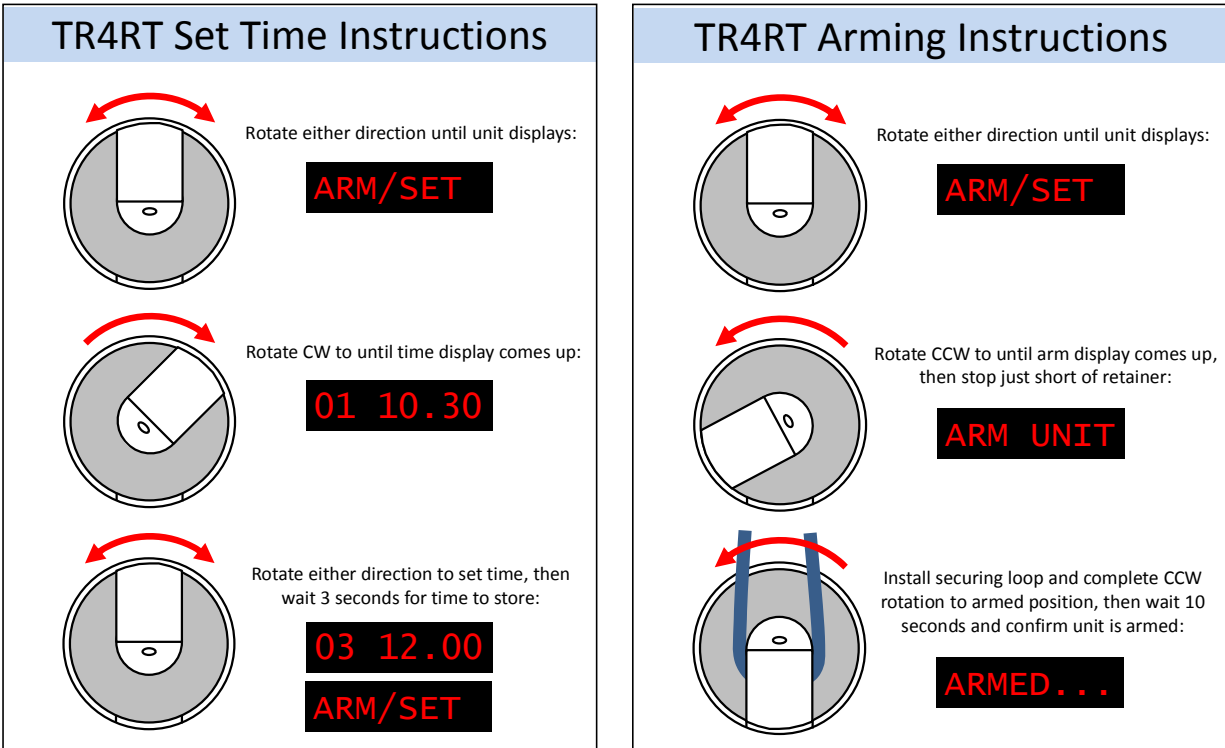


Figure 3. Typical command sequences for the TR4RT release unit.

Line Handling

We propose to allow for two options for line handling to be selected based on the preference of the fisher. The first line handling system is a bungee and release loop pin-down system that was developed by Sub Sea Sonics for the TR4RT and AR4RT systems in collaboration with West Coast lobster and crab fishers. The second line handling system (Guardian) is a drawstring mesh system that also pins the line and buoy to the top of the trap. This second system was developed by Longsoaker Fishing Systems (Russ Mullins) for use with GTR releases. Both systems have already undergone significant field testing and the Guardian line handling system has also been tested very successfully with the TR4RT release unit in the Southeast Black Sea Bass fishery.

Bungee/Release Loop System: The approach focuses on providing a reliable retrieval system while utilizing existing gear and handling systems as much as possible. The line used is the same type of line that is currently in use on the traps. Traditional foam buoys generally need to be replaced with hard floats for operations in greater than 100 feet of water depth. Various options for hard floats are available and have been tested. The preferred floats based on the testing are Polyform A-0 8" X 11.5" floats (main and trailer). These floats have proved to be very rugged, safe to handle, and effective for working at depth. Compared to hard floats they have the advantages of being much safer and also having lower buoyancy when the trap is on the bottom (thus less tendency for the traps to walk) and more buoyancy at the surface to resist current and wave drag. The line coil and floats are secured to the top of the trap using a three-

point tie down system that is formed using a bungee cord and the release line loop that goes to the release unit. There is a D-ring mounted at the center of the top of the trap to act as a guide for the release line (Figure 4). The release itself is generally secured to a vertical member of the trap using pipe clamps. As a backup, a cotton line is secured between the bungee and the release line so that if the release fails, the line and float will still release when the cotton degrades (Figure 5).

In operation, the line is coiled (either by hand or with a coiler) into a tub with the floats set to the side. The tub is then inverted, and the coiled line is placed on the top of the trap. The release unit is programmed, and the cam is rotated to a position close to the closed position but with sufficient gap for the release loop to be installed. The release loop is then fed through loops at the base of each float (main and trailer), then fed thru the D-ring, pulled in tension such that the bungee secured over the line coil, and then secured onto the release cam. The release cam is then rotated to its final armed position. Figure 6 shows the typical sequence.

During setup for the testing, the Department expressed concern that placing the line coil on the top of the trap has the potential to impede escape of crabs through the required escape rings and the “rotten cotton” biodegradable cords. To address this this, the rotten cotton sections are installed on the sides of the trap and the sections on the top of the trap are replaced with stainless steel wire. In addition, escape rings are installed on the side and are not impeded. Escape rings allow undersized crabs to exit the trap during fishing operations or if a trap is lost (Figure 7). Biodegradable “rotten cotton” allows larger crabs to escape if trap is lost, as it typically degrades in sea water within weeks.

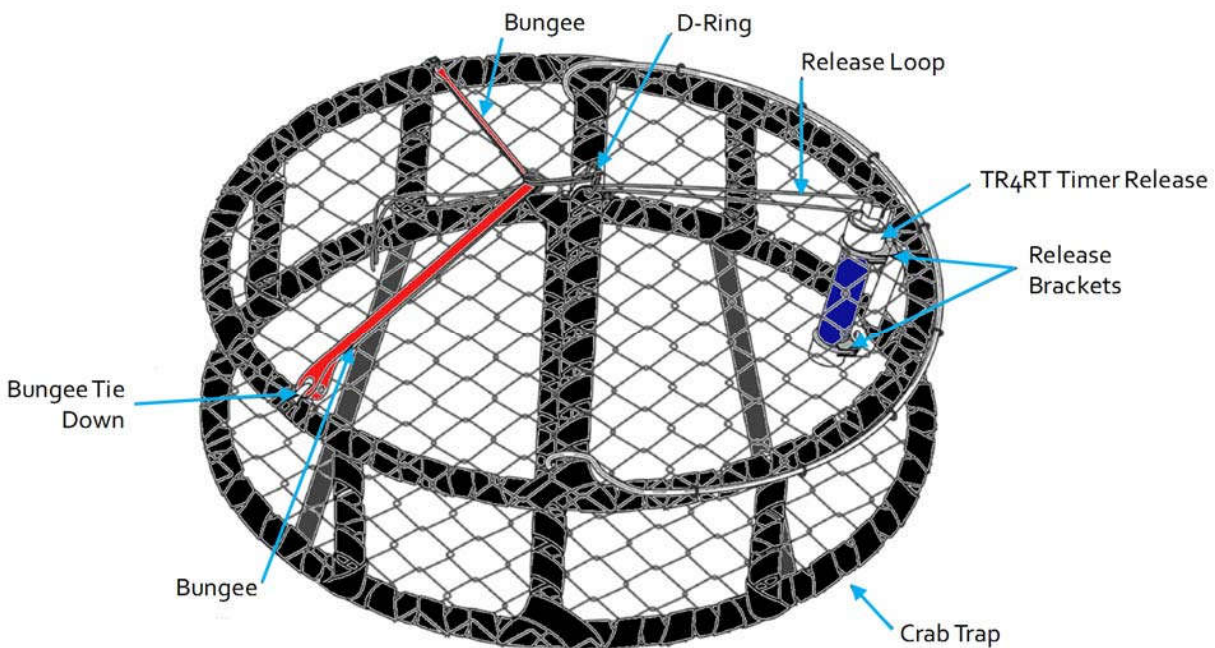


Figure 4. Line handling system for the TR4RT release installed on a Dungeness crab trap.

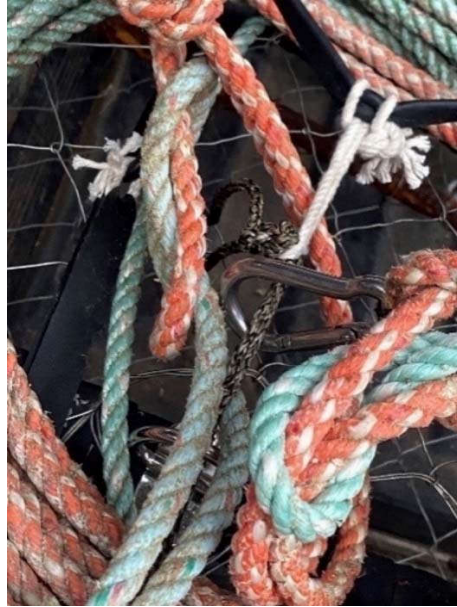


Figure 5. Rotten cotton connecting the release line to the bungee allows provides a backup release mechanism for the fishing line and floats if the primary release mechanism fails.



Figure 6. Typical rigging sequence for the TR4RT line handling system.



Figure 7. Configuration including degradable “rotten cotton” and steel escape ring installed on the side of the trap.

Guardian System: As with the first system, this approach also focuses on providing a reliable retrieval system while utilizing existing gear and handling systems as much as possible. The line used is the same type of line that is currently in use on the traps. Traditional foam buoys generally need to be replaced with hard floats for operations in greater than 100 feet of water depth. Various options for hard floats and poly floats are available and have been tested. The line coil and floats are secured to the top of the trap using an open-topped mesh that is sewn to the top of the trap. Around the top of the mesh, a drawstring is inserted using that can be pulled tight to secure the line and buoy to the top of the trap. The loop formed by the drawstring is then run through a loop on the buoy, and through a guide to the release cam (Figure 8). As with the first system, the release itself is generally secured to a vertical member of the trap using pipe clamps. As a backup, a cotton line can be inserted in the drawstring so that if the release fails, the line and float will still release when the cotton degrades.

In operation, the line is either free spooled or coiled into a tub with the floats set to the side. The tub is then inverted, and the coiled line is placed into the mesh on the top of the trap. The release unit is programmed, and the cam is rotated to a position close to the closed position but with sufficient gap for the release loop to be installed. The drawstring is then pulled tight and the loop is then fed through eyes at the base of each float (main and trailer), then fed thru the guide, pulled in tension, and then secured onto the release cam. The release cam is then rotated to its final armed position.

As with the first system, rotten cotton escape port sections will be installed on the sides of the trap and the sections on the top of the trap are replaced with stainless steel wire. In addition, escape rings are installed on the side and are not impeded. Escape rings allow undersized crabs to exit the trap during fishing operations or if a trap is lost. Biodegradable “rotten cotton” allows larger crabs to escape if trap is lost, as it typically degrades in sea water within weeks.



Figure 8. Longsoaker Guardian drawstring/mesh line handling system.

Gear Type: Sub Sea Sonics AR4RT Ropeless Trap Timer

The Sub Sea Sonics AR4RT Ropeless Acoustic system is essentially the same as the TR4RT time in form and function but is triggered using on-demand acoustics instead of a timer. The system integrates four main components including the AR4RT release unit, the line handling system, the deck unit/transducer, and the gear marking capability. The concept of operation is the same as for the TR4RT except that no release time is set, and the system retrieval is trigger through the Trap Timer app instead of by the timer. At the time of deployment, the Trap Timer app is used to identify the acoustic unit number of the system, mark the location of the trap and transmit that location to a database that houses all the regional trap locations and other meta-data. The geolocation system is also used to display the locations of other nearby traps so that interference or gear conflicts among trap locations can be avoided. For turnaround/retrieval, the fisher uses the app to trigger the acoustic release of the line and float. The trap is then recovered using normal handling gear. The AR4RT is then re-set with the recoiled rope and buoys and the trap is re-deployed following the sequence described above. Details of the specific sub-systems are provided below.

Release Unit

The AR4RT release unit consists of an underwater housing, a rotating release cam, and a release line retainer (Figure 9). The system works on the principle of acoustic on-demand triggering. Using the cam, the user arms the system and deploys the equipment. Cam rotation is generally done using a small screwdriver to provide leverage. When the acoustic on-demand signal is received, the cam rotates 180 degrees to activate the release. This releases the line retention device which sends the float to the surface where it can then be retrieved through traditional means



Figure 9. The AR4RT ropeless release unit.

Deck Unit

The AR4RT deck unit consists of a small, waterproof electronics box and a transducer. The electronics box communicates with the Trap Timer app via a Bluetooth connection. At the time of release, no action is required from the deck unit, but the app is used to mark the location and designate the acoustic ID number. At the time of retrieval, the app is used to select the trap and the app sends a Bluetooth command to the deck unit, which in turn sends the on-demand acoustic release command to the underwater unit.

Line Handling

The line handling systems for the AR4RT system are identical to the TR4RT system.

Virtual Gear Marking

In order to enable the use of ropeless fishing traps, there is a concurrent requirement for maintaining the ability to regulate and enforce the use of traps while preventing gear conflicts. Additionally, detectability by other fishers is imperative to reduce and prevent gear conflict. The TR4RT and AR4RT systems are supported by a tablet/cell-based app, a website, and a database to provide this capability. The app (Trap Timer) has versions that can be used onboard fishing boats, enforcement vessels and public vessels. The website is setup primarily for regulatory use. Access to the app is provided through an onboarding website that requires administrative approval by Sub Sea Sonics. Administrative approval includes verification of the user identity and role (fisher, enforcement, public). Once the user has been verified, the user is established in the database, and a private link to download the app from the app store is provided. For regulatory personnel, this process also provides access to the website. The app is free and available to the public.

Gear Marking App

Details of the Trap Timer app are described below. Other gear marking apps available to the project operate on a similar basis. For the fisher, the app is setup and operated on a cell phone or tablet (Android or iOS) with the following features:

- **Map:** A map display showing the location of the deployed traps overlaid on a nautical chart (Figure 10). This is the default screen. A symbol indicates the location of the boat on the screen. The deployed traps are color coded to indicate their popup status including green (up), yellow (down but coming up soon) and red (down). The map view displays all of the fisher's traps that are within the view window, along with other fishers' traps (as a different symbol) that are within $\frac{1}{4}$ nautical mile.
- **Table:** A table display that shows the latitude and longitude of the fisher's deployed traps and the expected popup time (Figure 10).
- **Deploy:** A button labeled "Deploy" that shows in both the Map and Table screens and activates a popup window that prompts the fisher for the TR4RT/AR4RT timer setting and warns the fisher if there is another fisher's trap within a pre-specified radius of the location (Figure 8). If the time setting is selected, a calculator/converter is available that automatically converts the release delay time into a calendar date and time. There is also a "Release" button that executes the deployment of the trap, recording the position and then returning to either the Map or Table screen.
- **Retrieve:** A button labeled "Retrieve" that shows in both the Map and Table screens and activates a popup window that indicates that the trap has been retrieved and the retrieval time. By default, the closest trap to the boat is selected. Alternatively, the user can click on a specific trap in either the map or table mode and the option to retrieve it will come up in a popup window (Figure 11). The retrieve action also allows the fisher to mark the trap as lost or left in the event that the trap cannot be retrieved.
- **Synchronize:** There is a Sync button on the main screen that synchronizes the app with the shoreside database. Synchronization to the database can occur when the user is within Wi-Fi or cellular range. The system has settings options to select manual, Wi-Fi only, or Wi-Fi and cellular. When this function is executed, the system sends all user data since the last successful sync and retrieves others' data (interference data) since last successful sync for the area covered by map.
- **Settings:** An item from the upper left menu that allows the fisher to specify a name, password, boat name, interference radius, synchronization option, and default release time setting.

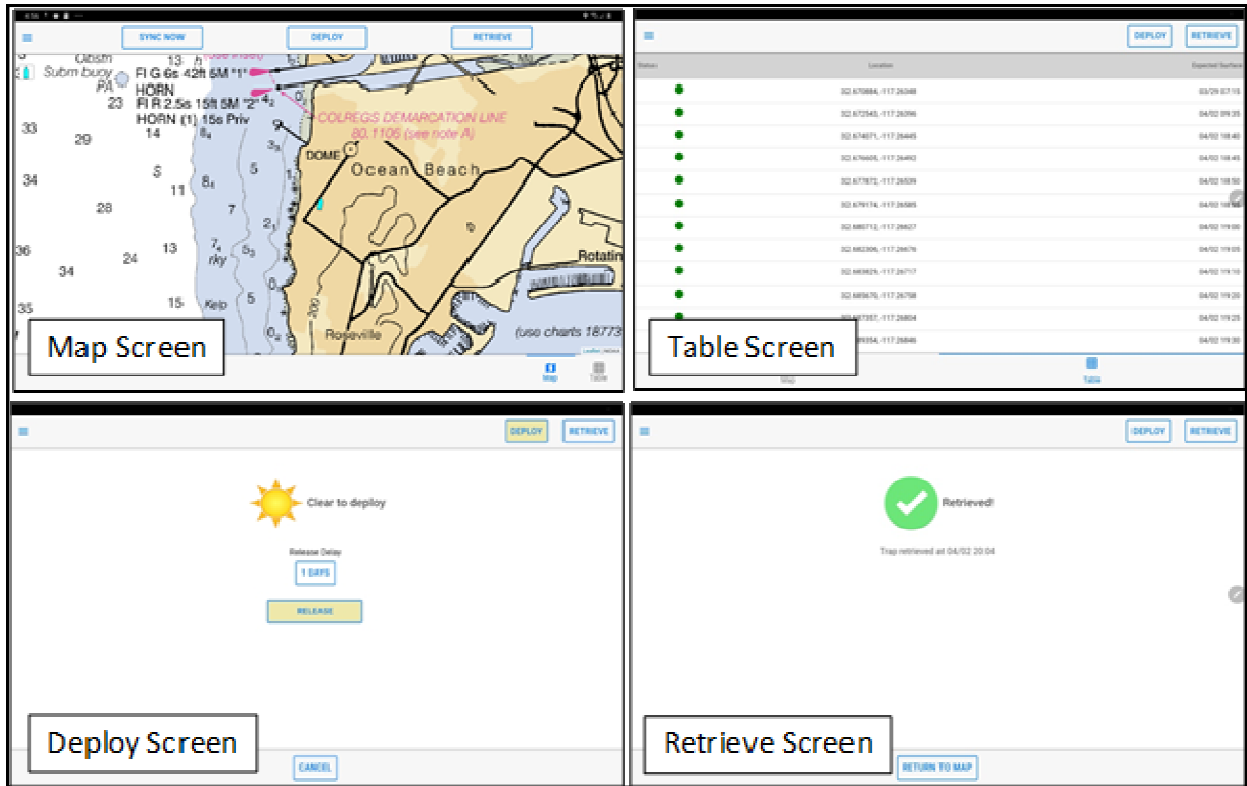


Figure 10. App screens for the Trap Timer app.

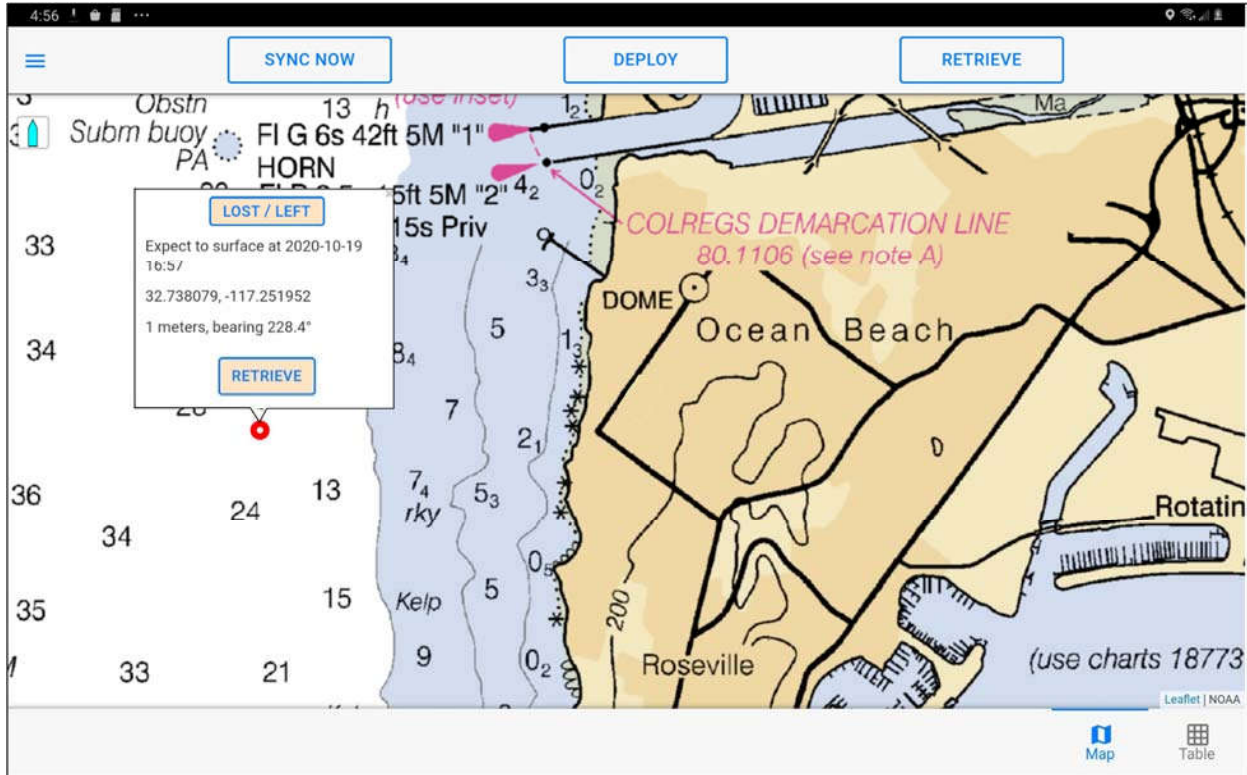


Figure 11. Popup window on the retrieve action.

The enforcement version of the app is the same as the fisher version except that traps for all fishers are displayed that are within ¼ nautical mile of the enforcement vessel. From within the map or table view, they can access information about the trap including location, deployment time, popup time, range, bearing and associated permit number.

The public version of the app is the same as the enforcement version except that they cannot access any information about the fisher, only have visibility of any traps that are within ¼ nautical mile.

Ropeless Regulatory Web Portal

The regulatory website (Ropeless Regulatory Portal) provides CDFW Law Enforcement and Marine Region Staff access to all data associated with users that are (or have been) actively fishing with ropeless gear. The website includes three main panels including a map view, a fisher table, and a data table (Figure 12). These views can all be filtered based on the data parameters of the database. In general, the data are first filtered in the fisher window by fishery, date, and then fishers within that fishery can be selected based on name, vessel name, or permit number. The filtered data are then displayed in the map view and the data view. The data view also provides multiple tabs to view general information, detailed information, and summary statistics associated with the filtered data.

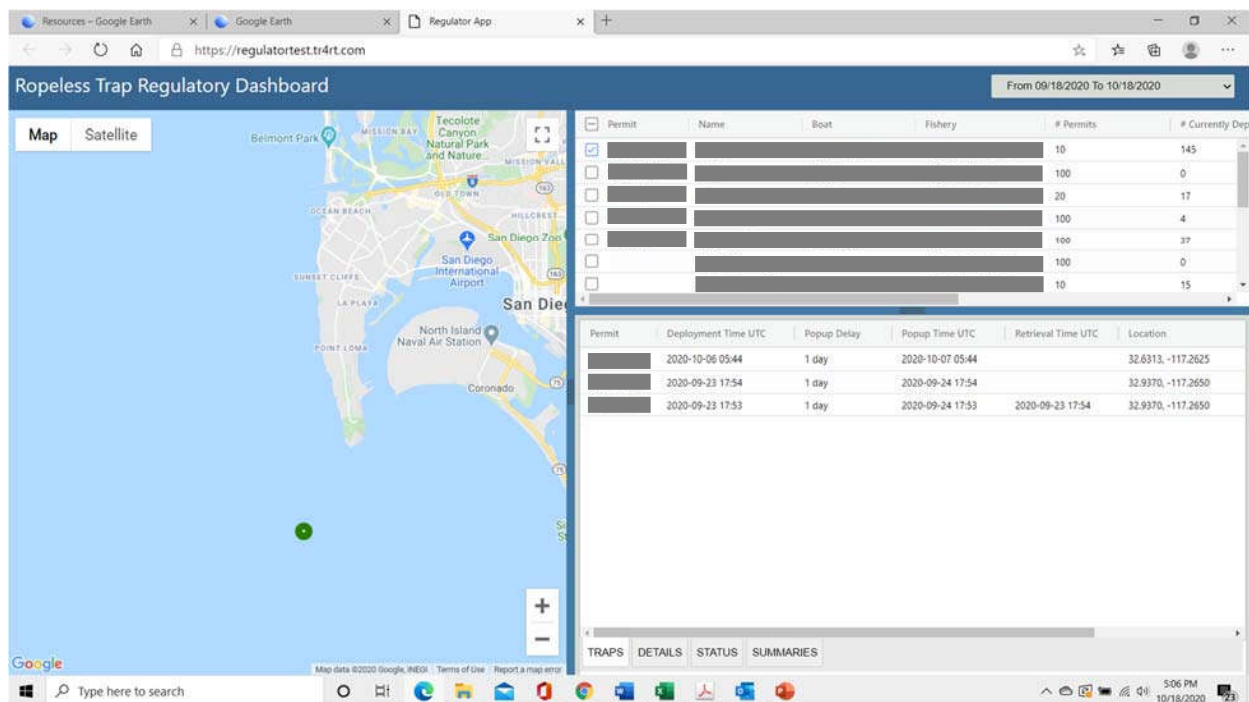


Figure 12. Screen shot from the Ropeless Regulatory Web Portal.

Electronic Monitoring

All vessels using the Trap Timer system will have an operational vessel tracking systems affixed to the vessel that will record location at all times. We propose to conduct vessel tracking using the Pelagic Data Systems solar vessel location data logger (solar logger) electronic monitoring

systems affixed to the vessel (www.pelagicdata.com). The solar logger will continuously record the vessel location, course, and speed at a frequency of once per minute. CDFW will be provided access to the solar logger records on request so they can ensure that no gear is being deployed without marking the gear in the virtual gear marking app. Records will be maintained for at least 60 days after the end of the season, or for 60 days after the testing date for data collected for testing purposes outside of the season. Under this permit we may also test other vessel tracking systems that may be identified so long as they meet the requirements for frequency of tracking and ability to respond to data requests from CDFW in a timely manner.



Figure 11. Pelagic Data Systems Solar Logger unit (www.pelagicdata.com).

Lost Gear Recovery

The approach for lost gear recovery will be specific to the gear configuration as singles or longlines.

Gear Recovery for Singles

Each single trap will be configured with the primary release and the backup rotten cotton release. For singles, in the event that the release unit fails, the first back-up method will be the rotten cotton on the release loop. If the unit still cannot be retrieved, the second alternate recovery method will be grappling. Given that the gear is accurately marked using the app, and that the lost status is flagged in the database, this will provide a reliable search location for the grappling activity. We will also use high-resolution sounders (fish finder), that can be used to identify potential targets in the search area. During search and recovery operations, the app will also be used to update the status of any gear that is recovered. Finally, any unrecovered lost traps with pop-up gear will be reported to the coordinators of the Trap Gear Recovery Program to partner on recovery efforts.

Gear Recovery for Longlines

Each longline will be configured with the primary release and the backup rotten cotton release on an end trap. Optionally, a second electronic release or GTR can be installed on the other end

of the trap. For longlines, in the event that the release unit fails, the first back-up method will be the rotten cotton on the release loop. If the unit still cannot be retrieved, the second alternate recovery method will be the backup release on the other end trap. If the unit still cannot be retrieved, the third alternate recovery method will be grappling. Given that the gear is accurately marked using the app, and that the lost status is flagged in the database, this will provide a reliable search location for the grappling activity. We will also use high-resolution sounders (fish finder), that can be used to identify potential targets in the search area. During search and recovery operations, the app will also be used to update the status of any gear that is recovered. Finally, any unrecovered lost traps with pop-up gear will be reported to the coordinators of the Trap Gear Recovery Program to partner on recovery efforts.

Amount of Gear

The maximum amount of gear will not exceed pop up gear associated with up to 50 traps per fisher, with up to 10 fishers. Participating fishers will have the option to fish the pop-up systems with single traps or with a string of traps (up to 20 traps), but not to exceed their permitted number of traps. Each fisher will be permitted to use up to 20 traps per trawl with 1 or 2 units of pop-up gear located at the ends of the trawl string.

CDFW Considerations for Locating, Inspecting, and Retrieving the Gear

Enforcement officials will have access to the gear marking app and the Ropeless Regulatory Web Portal that provide information on trap locations, associated pop-up times, and permit holders. Enforcement can use the data to determine which pop-up gear they want to inspect and when it will be on the surface for retrieval.

To use the gear marking app to locate gear while at-sea, law enforcement will need an iOS or Android tablet with the Trap Timer app. If Law Enforcement does not already have tablets, inexpensive tablets are currently available in the range of \$100-300. The gear marking app and portal are free. Access to the app is provided through an onboarding website that requires administrative approval by Sub Sea Sonics, and permissions will be granted to Law Enforcement to see the location of all deployed traps. Sub Sea Sonics will provide any needed guidance or training in the use of the website or app to Law Enforcement upon request. Proposed enforcement mechanisms specific to the TR4RT and AR4RT are included below.

Sub Sea Sonics TR4RT (Timed-release)

Law enforcement will be able to retrieve this gear using traditional methods at the time the buoy surfaces and will be able to re-deploy gear in the same manner as traditional gear. Timed-release gear cannot be accessed until it reaches its pre-programmed popup time which is set at the time of deployment, so this effectively prevents fishers from tampering with the gear. This will allow enforcement to continue to conduct random checks of the gear, while obviating the need for enforcement to use new equipment.

Enforcement can arrive at the marked location of the gear before it is scheduled to surface and retrieve the gear using traditional line haulers immediately after the gear surfaces (or thereafter). Enforcement can then re-deploy the gear as traditional gear with the line and

buoys released, as the fisher is required to retrieve and redeploy the ropeless system within hours of surfacing. Therefore, deployment by enforcement is the same as deploying a traditional crab trap. Enforcement will be able to be present, either aboard the fishing vessel (boarding) or close by aboard a patrol vessel, while the permitted fisher recovers the gear after the time of the scheduled release. This will allow for trap and catch inspection, virtual gear marking compliance, trap limit compliance, and verification of compliance with other provisions of this EFP.

Sub Sea Sonics AR4RT (Acoustic-release)

Retrieval and deployment of the AR4RT by enforcement can be done via an acoustic transducer. Once the float reaches the surface, the trap is recovered like traditional fishing gear with a float and line. After inspection, the AR4RT can be redeployed by coiling and stowing the line, stowing the float, and re-arming the release unit.

7. The location and timing of the project. The description must include trip specifications, such as fishing depth, anticipated number of trips, expected trip duration, and estimated number of hauls and average soak time (for fixed gear) or estimated number of tows/sets to be made per day, and estimated duration and speed per tow (for mobile gear). For project vessels listed in [Section F](#) of this document, the description must also identify any fishing activity that is expected to occur on the same trip as the project for purposes other than those provided by the EFP (e.g., fishing before and/or after the EFP activities).

Location: The geographic area of the EFP will be limited to locations of interested fishers, rather than allow state-wide use. The areas will be selected to ensure access for participating fishers. Initial participation is expected from the ports of Santa Cruz, San Francisco, Moss Landing and Bodega Bay within Zones 3 and 4.

Timing: We are requesting a four-year EFP with authorization for gear deployment and testing. The retention and sale of crab will be limited to the statutory season. Otherwise, traps will be un-baited and disabled. Testing during the statutory season will not include the statutory portion of the season prior to the opening of the season if the opening of the season is delayed. Testing during this portion of the season may be considered through an addendum later in the permit period if there is support for it from the fleet.

Trip specifications:

- **Depth:** During all Phases, the depth will initially be restricted to no deeper than 250 ft. Based on testing results in this range and interest from participating fishers, we may request expanding the depth range to deeper water at a later date within the permit period.

- **Anticipated number of trips:** The maximum number of fishers participating in this EFP is 10 and each is required to meet the requirements of each phase (described in Section E). Phase 1 is expected to occur pier side and not include any trips. Fishers may complete the requirements for Phase 2 with a minimum of one trip depending on conditions and trial results. During Phase 3, the 10 fishers may conduct up to 100 trips each depending on availability and time authorized under the EFP.
- **Duration:** Trip durations are expected to last one day each, depending on the conditions and type of testing being conducted.
- **Hauls and average soak time:** Soak times will vary from 30 minutes to 96 hours. We estimate that up to 10 fishers will conduct a max number of 50 hauls each trip.

F. PROJECT VESSELS (IF APPLICABLE)

Provide vessel information. Using the table below, complete a separate entry for each project vessel to be authorized by the EFP. For any vessel that will be used in commercial fishing activity related to the permit, the commercial boat registration number issued pursuant to [FGC Section 7881](#) is required. For any vessel that will not be used in commercial fishing activity related to the permit, the commercial boat registration number issued pursuant to [FGC Section 7881](#) or a copy of the United States Coast Guard (USCG) Certificate of Documentation is required. If there is no Certificate of Documentation for the vessel, a copy of the vessel's state registration is required.

Vessel Name	F/V Ronna Lynn
Boat Registration Number or Documentation	[Boat registration number omitted]
Owner Name	Marc Alley
Owner Address	[Owner address omitted]
Owner Telephone Number	[Owner telephone number omitted]
Operator Name	Marc Alley
Operator Address	[Operator address omitted]
Operator Telephone Number	[Operator telephone number omitted]

Vessel Name	F/V Friendship
Boat Registration Number or Documentation	[Boat registration number omitted]
Owner Name	Ed Tavasieff
Owner Address	[Owner address omitted]
Owner Telephone Number	[Owner telephone number omitted]
Operator Name	Ed Tavasieff
Operator Address	[Operator address omitted]
Operator Telephone Number	[Operator telephone number omitted]

Vessel Name	F/V Sunrise
Boat Registration Number or Documentation	[Boat registration number omitted]
Owner Name	Steve Melz
Owner Address	[Owner address omitted]
Owner Telephone Number	[Owner telephone number omitted]
Operator Name	Steve Melz
Operator Address	[Operator address omitted]
Operator Telephone Number	[Operator telephone number omitted]

G. SIGNATURE

X  10/4/22

Signature of Applicant Date

H. APPLICATION FEE PAYMENT

Please see [CDFW's EFP Program page](#) for further information.