Environmental Defense Fund
Smart Boat Initiative

**Request for Proposals: 2019 Fisheries Electronic Technology Service Provider
Machine Vision for Speciation and Enumeration of Discarded Catch in the West Coast
Groundfish Trawl Fishery**

DATE: April 24th, 2019

POINT OF CONTACT: Christopher Cusack; ccusack@edf.org

BACKGROUND:

Environmental Defense Fund (EDF) is an internationally recognized non-profit working to forge practical solutions that help nature and people prosper sustainably. EDF recently launched the SmartBoat Initiative (SBI) which focuses on leveraging the technological advances and plummeting costs in sensors, artificial intelligence, broadband communication and data analytics to equip and surround fishing vessels of all sizes with digital tools and infrastructure that can increase sustainability, accountability, profitability and transparency in fishing. Through the SBI we're working with fishermen, government, and industry partners to test sensor, network, data analysis and other technologies to open new frontiers for fishing fleets globally, recognizing that success depends not only on the use of new technologies, but on science-based catch limits, good governance and incentives for fishermen to comply — the hallmarks of well-managed fisheries.

On the U.S. West Coast, EDF has worked with members of the Pacific groundfish industry, fishery managers and others to transform what was a failing fishery in 2000, to a best in class model for sustainability today. The key drivers for this change were the rationalization of the trawl sector, fleet capacity reduction, habitat protections, adherence to science-based catch limits, and 100% accountability through at-sea and dockside monitoring. In an effort to reduce costs and increase uptake of fisheries monitoring we are engaged in collaborative pilots and extensive policy efforts to develop an electronic monitoring (EM) program for the groundfish trawl sector, due to become fully implemented in the near future.

The EM program currently in use under an Exempted Fishing Permit (EFP) on the West Coast of the U.S. relies on the use of cameras and gear sensors that record fishing activity, data storage on removable hard drives on the vessel, the removable, replacement and shipping of these hard drives to data analysts based at the Pacific States Marine Fisheries Commission (PSMFC) who review the data, and the long term storage of data on internal storage servers

housed on PSFMC premises. Through engagement in practical work with technology service providers we aim to help improve the efficiency and efficacy of this system of EM data management by emphasizing wireless data transmission, cloud based data storage, and machine learning for activity recognition to improve the efficiency of the data management and review system. However, in the West Coast bottom trawl groundfish fishery a significant barrier to uptake of EM is the necessity of identifying and counting all species discarded at sea. While the use of EM for monitoring in this sector of the fishery is allowed under an Exempted Fishing Permit (EFP), many fishermen do not utilize EM systems due to the arduous catch handling requirements involved, and instead choose to take a human observer to fulfill monitoring requirements.

We believe that new and emerging technologies can help to catalyze uptake of EM in situations such as this by negating the need for fishermen to sort all discarded catch by species. Specifically, we believe that by developing and testing a catch handling process that incorporates the use of a machine vision algorithm that can automatically identify and count bycatch species in this fishery, we can decrease the time and resource requirements involved in using EM. We also believe that developing an efficient catch handling protocol in this fishery will have broad applicability across a range of fisheries, target species, and gear types.

PROJECT DESCRIPTION:
EDF is seeking a suitably qualified technology and services provider (*provider*) to work with us and our fishermen partners to design, implement, and test a 'smart' catch handling protocol in the west coast groundfish bottom trawl fishery that focuses on the development of a machine vision algorithm that is capable of identifying and counting discarded species in the fishery. Working with one (1) fisherman partner based out of Warrenton, Oregon, the provider will co-design a catch handling protocol which will enable the integration of a camera-based machine vision system into the process. The project partner already has a working conveyor belt that is part of the existing catch handling process and we therefore expect there to be minimal alteration of this physical process. However, any modifications that need to be made to the speed of the belt, the lighting conditions, the depth and orientation of species placed on the belt, and any other aspects of the process, we expect will be the main subject of the co-design process. The camera system will be installed by the provider but will not be integrated with the EM system on the vessel. All data transmission (via hard drive transfer or wirelessly), storage, and analysis (labeling for the purposes of training the machine vision algorithm) of video data will be the responsibility of the provider.

The provider will then engage in the development of a machine vision algorithm that is capable of automatically identifying and counting discarded species that go over the conveyor belt to a high level of accuracy. A quantitative test of the performance of this algorithm will be conducted over an extended period of time and all intermediate and final results will be made available to project partners. In addition, we expect that the algorithm developed during the course of this project will be made freely and publicly available to help future development in this field.

SERVICE PROVIDER RESPONSIBILITIES
- ◊ Provide, install, and maintain a single camera-based machine vision system on a single trawl vessel based out of Warrenton, Oregon for the term of the project.
- ◊ Co-design a catch handling protocol that enables the effective integration of the camera based machine vision system into the catch handling protocol.
- ◊ Ensure that all data collected during the course of the project are stored securely and made available to project partners on an as-needed basis.
- ◊ Development and training of a machine vision algorithm that is capable of identifying and enumerating individual species that are placed on the discard belt.
- ◊ Provide technical performance and cost information for all aspects of the system during the course of the project
- ◊ Respond quickly to maintenance or troubleshooting requests from the project manager or project partners.
- ◊ Provide a brief project report at the end of the project term summarizing the technical performance of the system.

TERM: June 1, 2019 to September 15th, 2019, with possible extension.

APPLICATION:
Interested parties should submit a proposal with descriptive budget via email as a Microsoft Word or PDF attachment to kfairman@edf.org, by midnight EST on Monday 13th May, 2019. The budget may be submitted in spreadsheet form. The proposal should consist of:
- A **cover letter** explaining the provider's interest and qualification for the contract including a description of previous experience with the types of work proposed in the RFP.
- A **narrative proposal** outlining how the provider intends to fulfill the responsibilities outlined in the previous section.
- A **descriptive budget** outlining the total cost of fulfilling the terms of the project.
- A **proposed timeline** for completing the project.
- **Resumes/CVs** of key project personnel.

SELECTION CRITERIA:
EDF will select the provider based on the following rubric:

Evaluation Area	Weight
Experience with development of machine vision techniques to solve fisheries monitoring problems	40%
Experience installing and maintaining camera equipment on fishing vessels for the purposes of development of machine vision algorithms	20%
Availability to engage in project activities before June 1st, 2019	20%
Proposed cost	20%

QUESTIONS:

Any questions related to the RFP should be sent via email to ccusack@edf.org no later than Midnight EST, May 10th, 2019.

SUBMISSION DEADLINE: Midnight EST, May 13th, 2019

SUBMISSION: Please submit all bids to: kfairman@edf.org