Environmental Defense Fund
Smart Boat Initiative

Request for Proposals: 2020 Fisheries Electronic Technology Service Provider –

Machine Vision for Recognition and Enumeration of Recreational Fishing Vessels in Oregon's Marine Recreational Fishery

DATE: April 21, 2020

POINT OF CONTACT: Sepp Haukebo, shaukebo@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 Smart Boat 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.

Catch from recreational fishing in the United States is estimated to represent a significant portion of total fishery landings in many fisheries yet receives much less monitoring than commercial fisheries. The size, heterogeneity and geographical spread of the marine recreational fishing fleet means that monitoring recreational fishing activity is logistically challenging and, when limited monitoring budgets are taken into account, efforts to quantify recreational catch often fall short. Many recreational fishery managers rely on dockside intercepts to get a handle on catch per boat, but estimating the total number of boats fishing on a particular day is problematic due to the large number of potential intercept sites. Some fishery managers use human observers to enumerate recreational fishing vessels at entrances to ports or harbors but these methods can be costly and in many cases do not provide total spatial or temporal coverage.

Currently the Oregon Department of Fish and Wildlife (ODFW) uses video monitoring at certain coastal pinch points, including river mouths and jetties to estimate marine recreational fishing effort in Oregon (see, for example https://nrimp.dfw.state.or.us/CRL/Reports/Info/2009-01_correctedv1.pdf). To our knowledge ODFW is one of the only state agencies in the country that uses video monitoring to capture timely and accurate estimates of recreational effort. The current system relies on human reviewers to manually count vessels from recorded video and, while effective, we believe that recent advances in machine vision techniques have the potential to pave the way towards a more cost effective methodology for accounting for marine recreational fishing effort in Oregon and throughout the United States. By developing and testing machine vision techniques for rapidly estimating recreational effort and integrating these methods with a smart camera system that can process data and transmit effort estimates in close to real time, we aim to decrease the time and resources required for state agency staff to estimate recreational fishing effort.

Through this work, we aim to test if a machine learning algorithm could be used in place of human video reviewers to accurately estimate recreational effort. If the test is successful, we also aim to identify and communicate the benefits for fishery managers and fishermen which can serve as a model for recreational fishery managers nationwide.

PROJECT DESCRIPTION:
EDF is seeking a suitably qualified technology and services provider (*"Provider"*) to work with EDF's Smart Boat Initiative and the Oregon Department of Fish and Wildlife (ODFW) to design, implement and test a '*smartpass*' camera system that is capable of identifying and enumerating recreational fishing vessels leaving and returning to ports in Oregon.

Working with members of EDF's Smart Boat Initiative team and ODFW staff based in the Newport, OR office, the Provider will co-design up to two (2) smartpass systems that each include up to two (2) cameras, sufficient local data storage to retain all video data for a calendar month, a method of transmitting all data from the system to ODFW staff and the ability to monitor system health remotely and in real time. The Provider will also be responsible for the development of a machine vision protocol that can automatically identify and count recreational fishing vessels to a high degree of accuracy. This algorithm and protocol, as well as the system design, will be made freely available to the public, including EDF and ODFW staff, at the completion of the project. The role of installation and maintenance of the system(s) will most likely be completed by ODFW and EDF staff, with direction from the Provider. However, if unexpected circumstances arise, the Provider may be asked to provide installation of the system(s). The Provider is expected to provide timely

and sufficient remote support to ensure the continued and successful operation of the system(s).

ODFW has an existing process, including existing camera sites at ports along the Oregon coast, to capture and review video footage that will operate in conjunction with this project. The Provider will collaborate with EDF and ODFW to identify the most suitable site(s) for installation of the smartpass system(s) that meet the existing needs of ODFW.
The Provider will also be responsible for developing and providing, with feedback from ODFW and EDF, a user-friendly interface for ODFW staff to review and audit any and all video images as part of their existing sampling program. Enabling real time transfer of all video data via WiFi or cellular network is a core objective of this work. Developing all protocols for wireless data transmission, storage, and analysis (including labeling for the purposes of training the machine vision algorithm) of video data will be the responsibility of the Provider. EDF and ODFW staff will assist with training the technology Provider on differences between recreational and commercial fishing vessels.

A quantitative test of the performance of this algorithm will be conducted by the Provider 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, video review software and system design specifications 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 up to two (2) camera-based machine vision 'smartpass' systems for use at up to two (2) coastal passes in Oregon. Each location may require up to two (2) cameras to adequately collect video data. The system(s) will remain installed at the coastal location(s) for continued use by ODFW beyond the term of the project.
  ◇ Provide assistance with installation of the system(s) either through on-site or remote support to ensure successful initial operation of the system(s).
  ◇ Provide a protocol to ODFW staff for reviewing all video data, including a program, web portal, or other method that enables staff to execute existing monitoring efforts in system locations.
  ◇ Help to maintain, by providing timely and sufficient remote support, the smartpass system(s) for the term of the project.
  ◇ Ensure that all data is collected lawfully during the course of the project and the data is stored securely and made available to project partners.
  ◇ Development and training of a machine vision algorithm that is capable of identifying and enumerating all recreational fishing vessels, to a high degree of accuracy, moving through up to two (2) coastal passes in Oregon for the duration of the project term.
  ◇ Provide technical performance and cost information for all aspects of the system(s) on

request, during the course of the project.

◊ Respond quickly to maintenance or troubleshooting requests from the project manager or project partners.

◊ Provide a detailed project report at the end of the project term summarizing the technical performance of the system(s), lessons learned, and opportunities to improve the system(s).

◊ Provide a presentation of the final report to EDF staff and partners.

TERM: May 20, 2020 to February 28, 2021, with possible extension.

APPLICATION:

Interested parties should submit a proposal with descriptive budget via email as a Microsoft Word or PDF attachment to kmah@edf.org, by the submission deadline outlined below. The budget should 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 for the purposes of development of machine vision algorithms	30%
Availability to engage in project activities before May 20, 2020	10%
Proposed cost	20%

DISCLAIMER:

Nothing in this RFP should be construed as or should imply that EDF is bound to select an applicant, and EDF reserves the right to reject all or any of the proposals without assigning any reasons whatsoever.

QUESTIONS:

Any questions related to the RFP should be sent via email to shaukebo@edf.org no later than Midnight EST, April 29th, 2020.

SUBMISSION DEADLINE: Midnight EST, May 7th, 2019

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