Green Light for Sustainability

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UC San Diego

Nimitz Marine Facility Neighbors

Grey whale spends one month in San Diego Bay

Endangered Eastern Pacific Green Sea Turtles

Forages for eel grass in San Diego Bay

Endangered California Least Tern

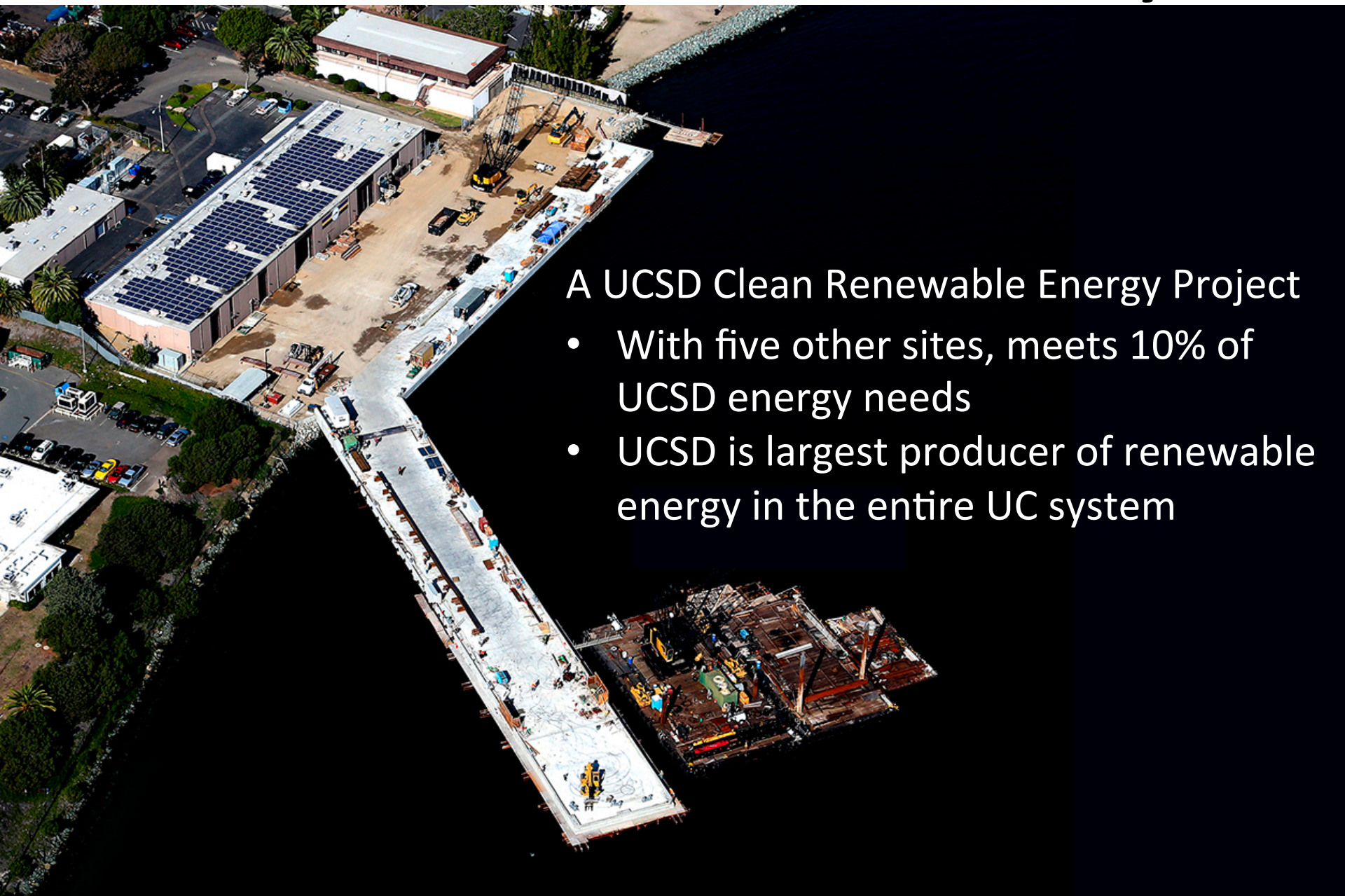
574 breeding pairs counted 1974

4600 breeding pairs counted 2000

“Point Loma’s Wonderful Hidden Beach”

* Translation: “The Beach”

Solar: 95 KW Photovoltaic Array



A UCSD Clean Renewable Energy Project

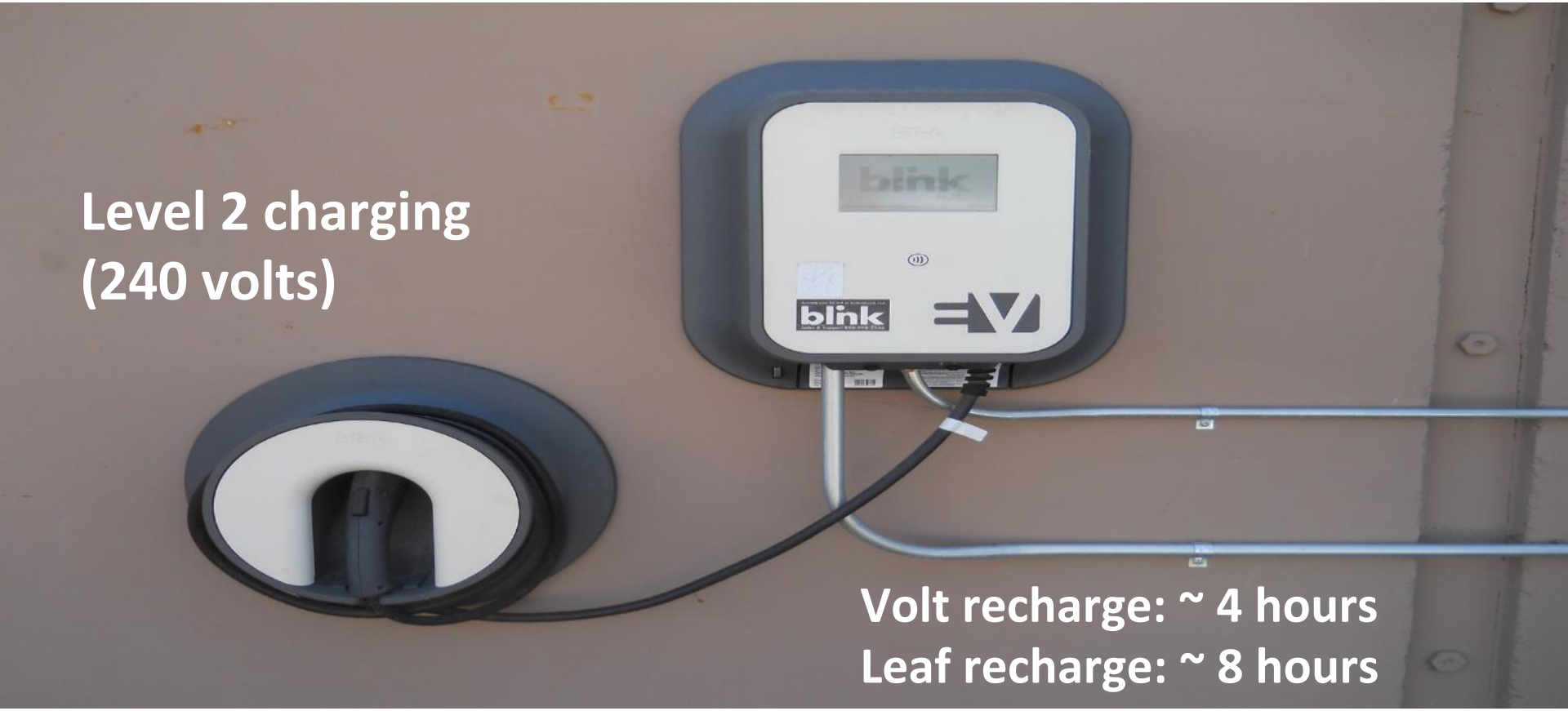
- With five other sites, meets 10% of UCSD energy needs
- UCSD is largest producer of renewable energy in the entire UC system

Increased Shore Power

- Scripps Nimitz Marine Facility has provided cold-iron berthing since 1967
- Minimizes diesel emissions and noise from berthed vessels

All ship's loads including crane and winch starting current can be picked up on shore power

Electric Car Charging Station



Battery Powered Forklift

Environmentally friendly
Simple maintenance
Zero emissions: indoor use

Stormwater Runoff = Pollution

Urban runoff as a result of rain or excessive irrigation

- Trash
- Litter
- Sand
- Sediment
- Petroleum products leaking from motor vehicles
- Heavy metals in the dust from motor vehicle brake pads and diesel exhaust
- Excess fertilizers and pesticides

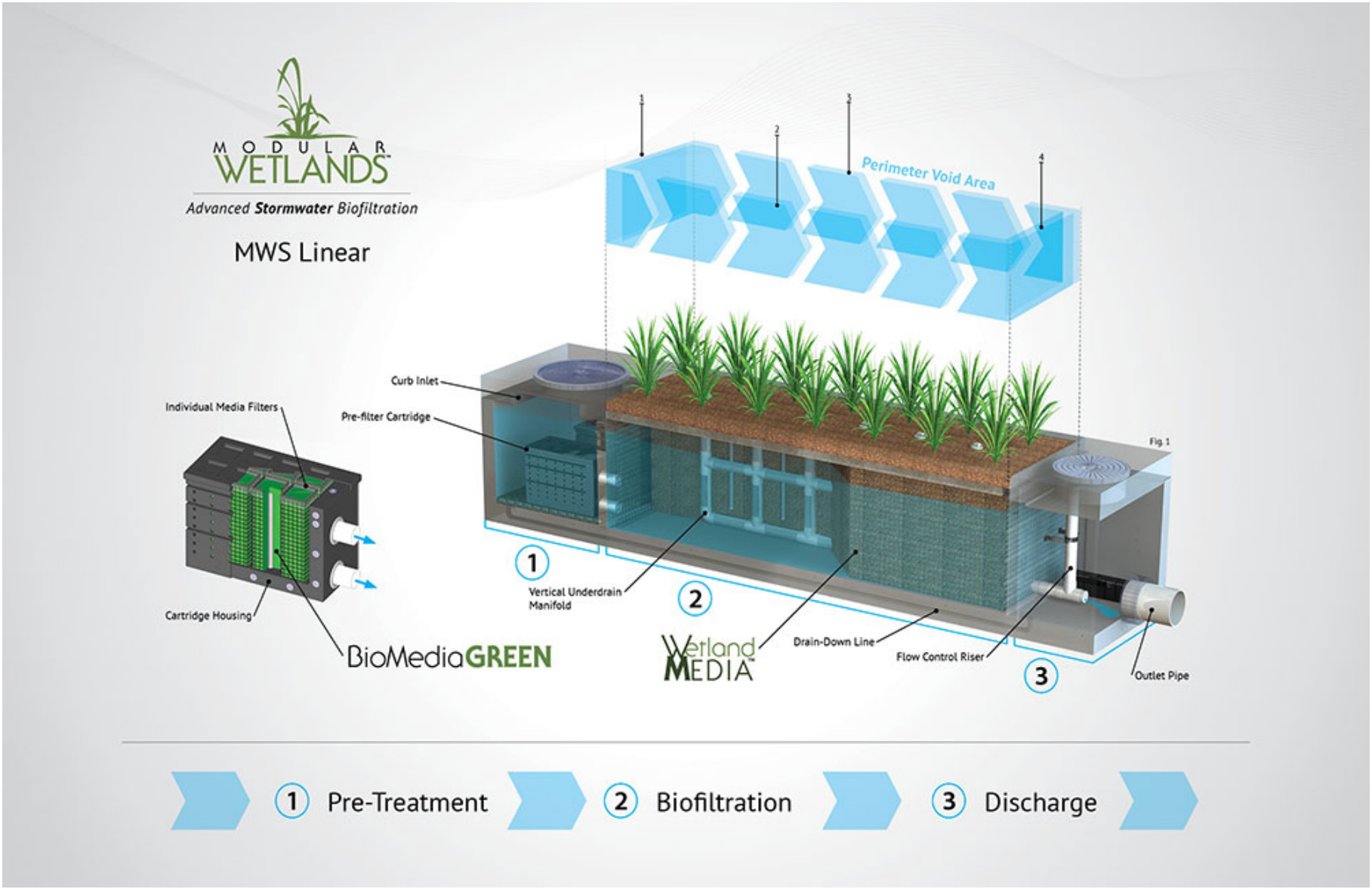
Sediment plume from San Diego Bay following rain event (NASA photo STS090-758-17)

Zero Runoff Stormwater Collection

Stormwater Filtration

Bioclean Modular Wetland

Bioclean Modular Wetland

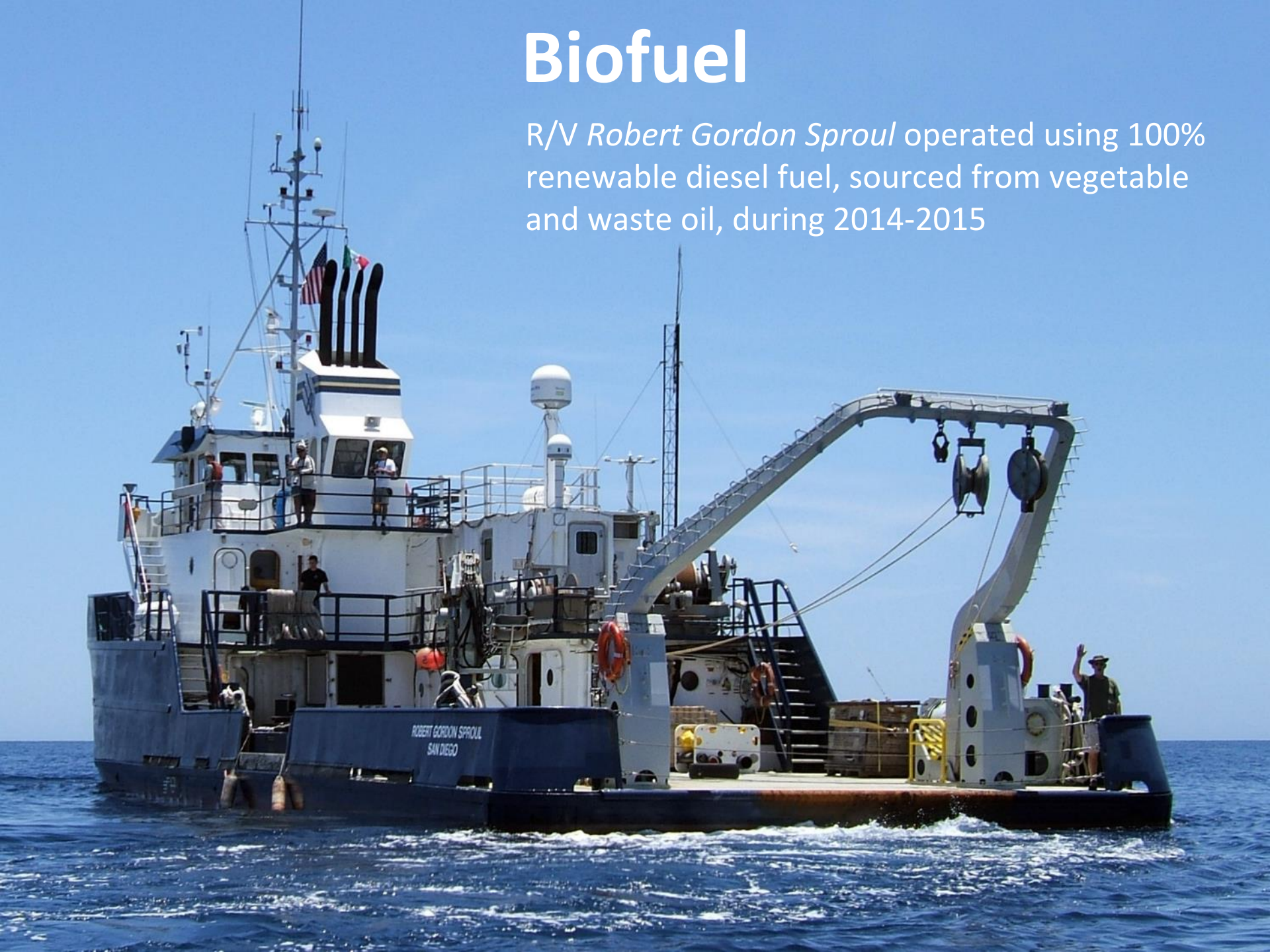


Heavy Metal Dust Collection Prevention

Code Compliant Hazardous Material Shed

Biofuel

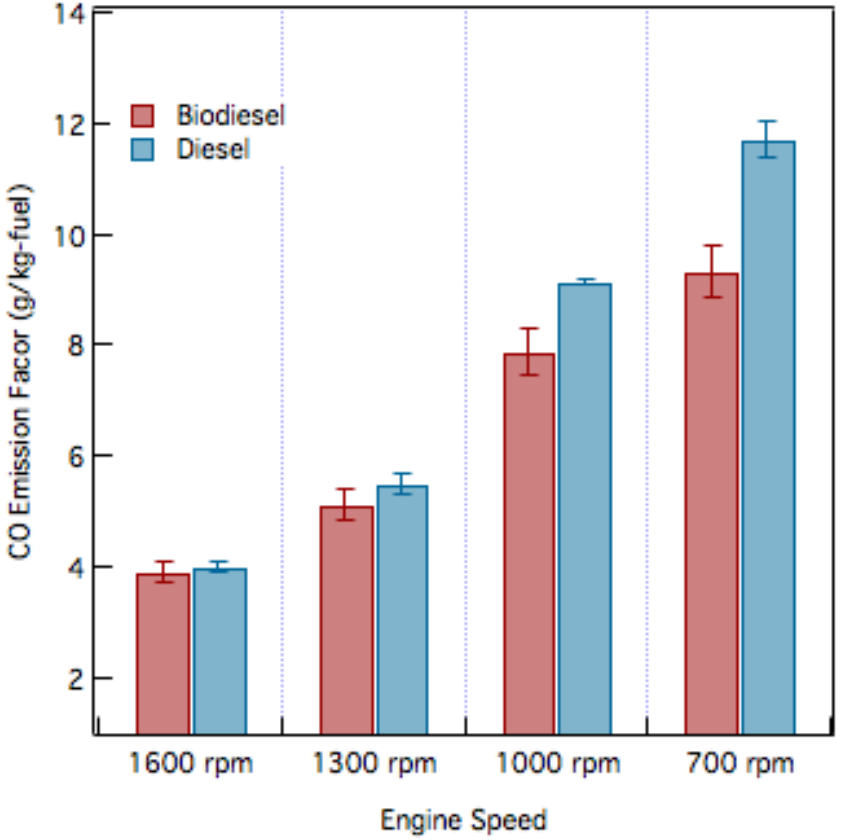
R/V *Robert Gordon Sproul* operated using 100% renewable diesel fuel, sourced from vegetable and waste oil, during 2014-2015

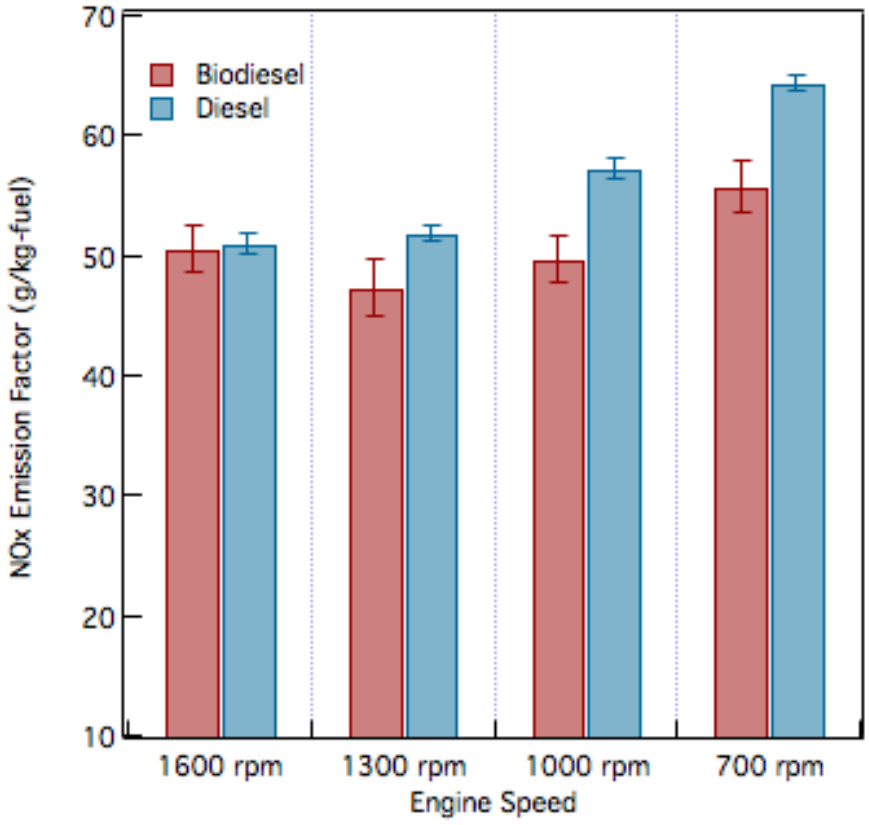


Biofuel

- Continuous use of 100% renewable diesel during 2014-2015 part of MARAD study on emissions
- 52,500 gallons used during 39 regular research and education missions (89 operational days, 14,400 nautical miles, carrying 527 scientists to sea).
- Dr. Lynn Russell monitored gas and particle emissions continuously, in addition to two focused monitoring cruises, and quantified environmental benefits of operating with 100% renewable diesel.
- Slight reduction in fuel economy (~4%).
- Total costs ~ 10% greater than using fossil fuel.

Biofuel





Emission factors of CO and NOx from R/V *Robert Gordon Sproul* at different engine speeds when powered by diesel and biodiesel. Each mean represents the average of a number of one-hour test periods (n=7 for biodiesel; n=2 for diesel). The average was calculated over different engine cycle tests conducted during a 2015 cruise.

Biodiesel emission factors improve relative to fossil fuel at lower engine RPM.

Sponsors

Operation of R/V *Robert Gordon Sproul* using 100% renewable biofuels during 2014 and 2015 was made possible by **Department of Transportation Maritime Administration** award DTMA-91-H-2013-0001

Research vessel operations at Scripps Institution of Oceanography are supported by the **National Science Foundation** awards 1119644, 1212770, 1227624, 1212782 and 1321002 (for ship operations and marine technical support), as well as many other individual awards to researchers who use Scripps-operated vessels.

R/V *Roger Revelle*, R/P *FLIP*, and the forthcoming R/V *Sally Ride* are operated by Scripps Institution of Oceanography under a charter agreement with the **Office of Naval Research**.

The **University of California Ship Funds Program** enables graduate and undergraduate students, postdoctoral researchers and early career faculty to pursue independent research, practical training and laboratory instruction at sea aboard Scripps-operated ships.

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Questions?