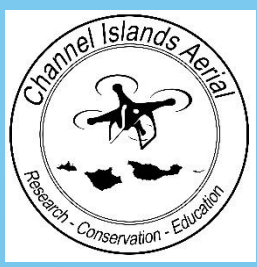




Oceans Unmanned  
*Bringing Tech to Ocean Protection*



# Drones for Debris

Utilizing Small Vessel-Launched UAS for Remote Coastal Surveys

Sixth International Marine Debris Conference

13 March 2018

Todd Van Epps

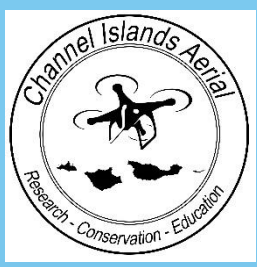
Technical Advisor, Oceans Unmanned, Inc.  
[www.oceansunmanned.org](http://www.oceansunmanned.org)

President, Channel Islands Aerial  
[www.ci-aerial.com](http://www.ci-aerial.com)



# Drones for Debris

## Utilizing Small Vessel-Launched UAS for Remote Coastal Surveys



### Overview

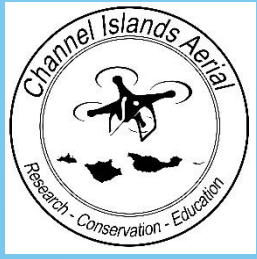


- Oceans Unmanned - Introduction
- Marine Debris and Small UAS Use Case
- Platforms
- Vessel-Launch
- Payloads
- Software
- Challenges
- Discussion



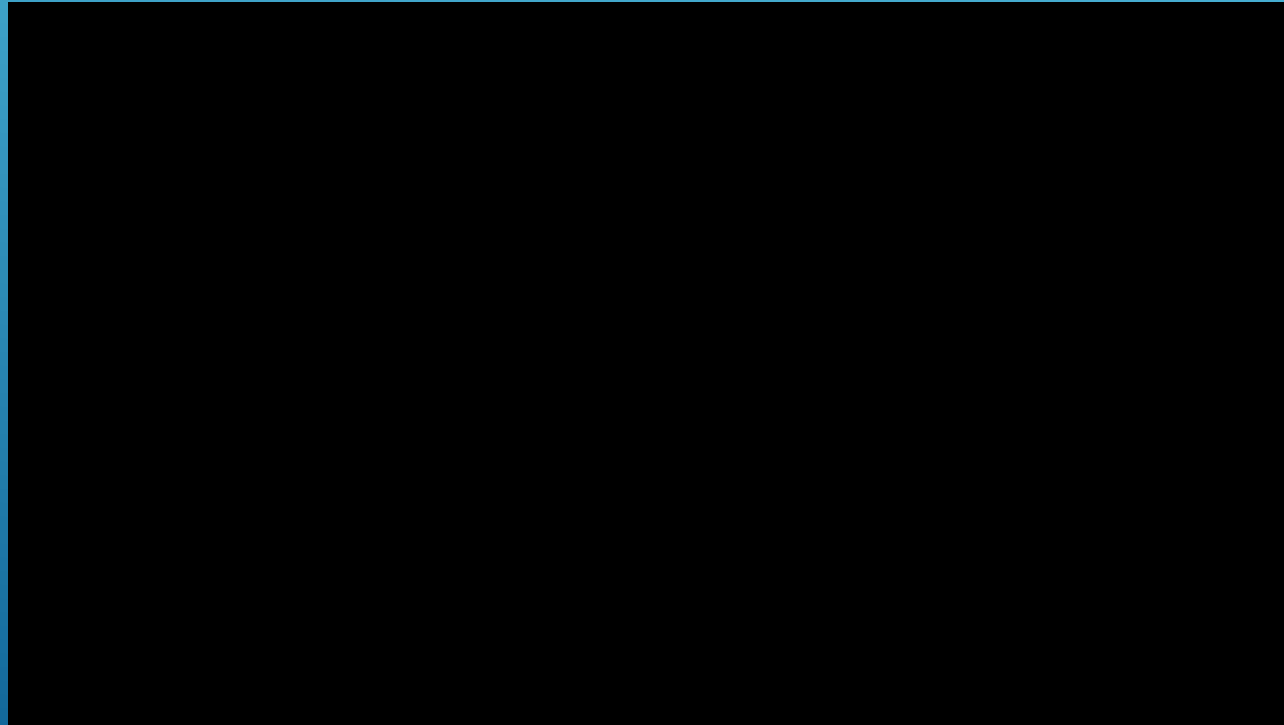
# Drones for Debris

## Utilizing Small Vessel-Launched UAS for Remote Coastal Surveys



## Oceans Unmanned, Inc.

A nonprofit dedicated to protecting our oceans and marine resources through the use of unmanned technologies and promoting their safe and Environmentally Conscious Operations

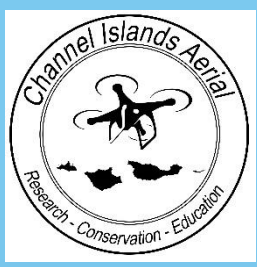




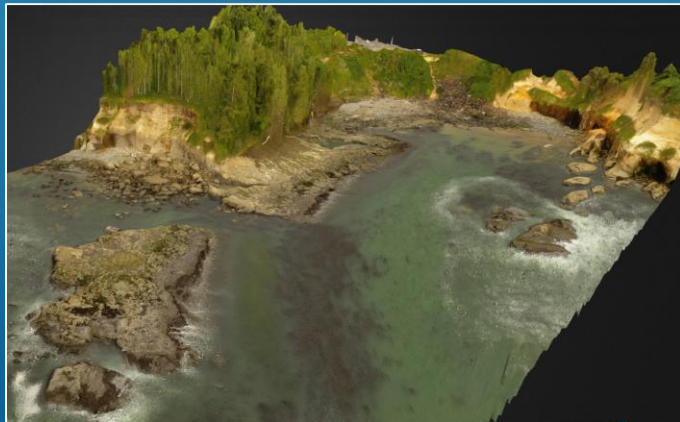


# Drones for Debris

## Utilizing Small Vessel-Launched UAS for Remote Coastal Surveys



### Marine Debris and Small UAS Use Case

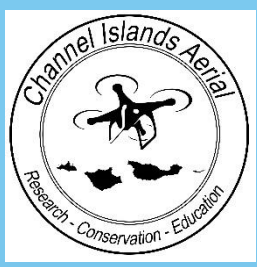


While at-sea marine debris detection continues to present multiple challenges, the development of small, inexpensive, technically capable, and vessel-launched Unmanned Aircraft Systems (UAS), or drones, provide a ready-to-go solution for detection of shore-cast marine debris deposited along difficult-to-access, remote coastlines.



# Drones for Debris

## Utilizing Small Vessel-Launched UAS for Remote Coastal Surveys



### Platforms

- Battery powered quadcopters
- \$1000 - \$5000
- 20 - 30 mins duration
- Realtime video downlink

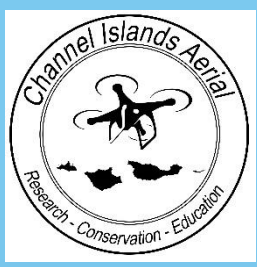






# Drones for Debris

## Utilizing Small Vessel-Launched UAS for Remote Coastal Surveys



### Vessel-Launch

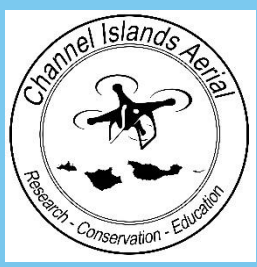
- Most small drones can initialize on boats
- Can safely operate off small vessels
- Can be hand launched or deck launched
- Safe techniques for hand recovery





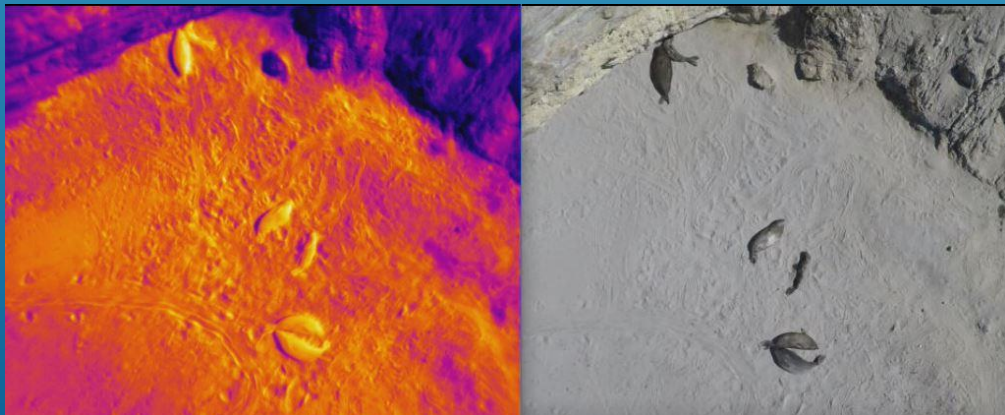
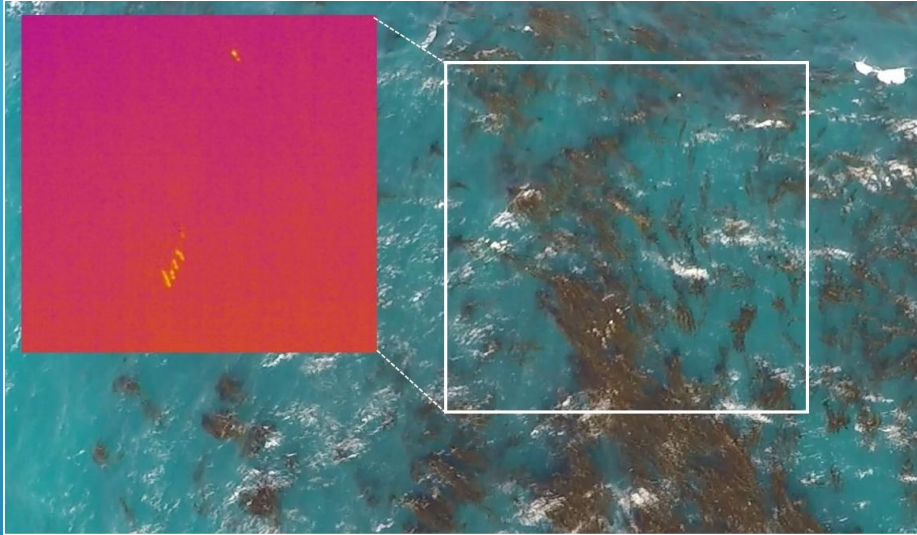
# Drones for Debris

## Utilizing Small Vessel-Launched UAS for Remote Coastal Surveys



### Payloads

- 4K Video and 10+ MP cameras standard
  - wireless VR goggles available
- IR drone-specific sensors widely available
  - uneven surface heating may allow detection
- Multi and Hyperspectral Sensors
  - long post-processing times
  - ground truthing required

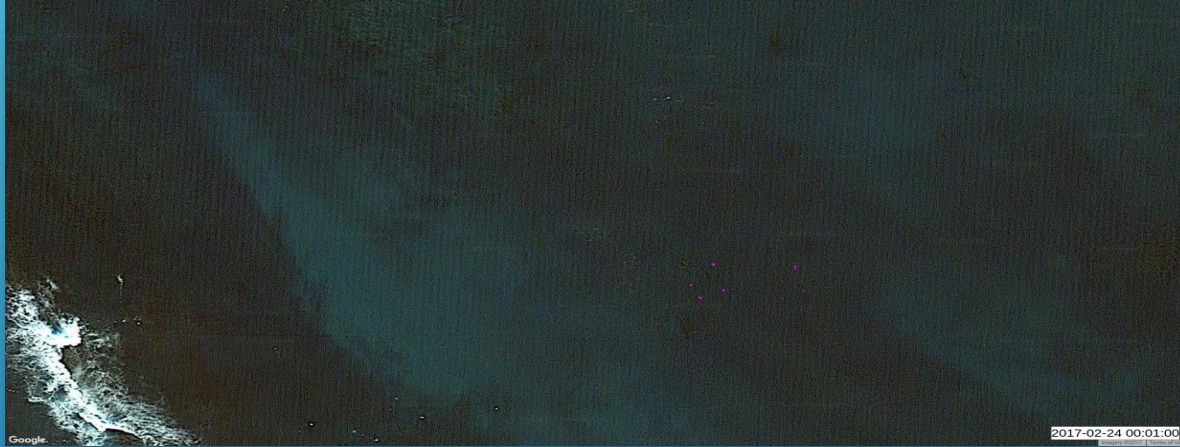
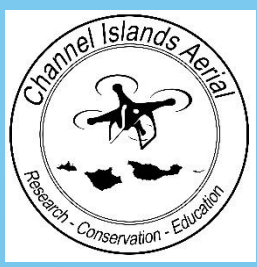






# Drones for Debris

## Utilizing Small Vessel-Launched UAS for Remote Coastal Surveys



## Software

- Autonomous mapping flights
- Multiple photomosaic-ing programs
  - not real-time
- Anomaly detection
  - still in development

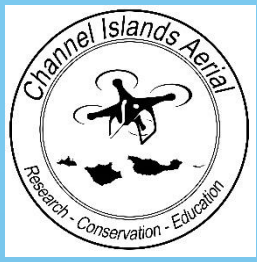






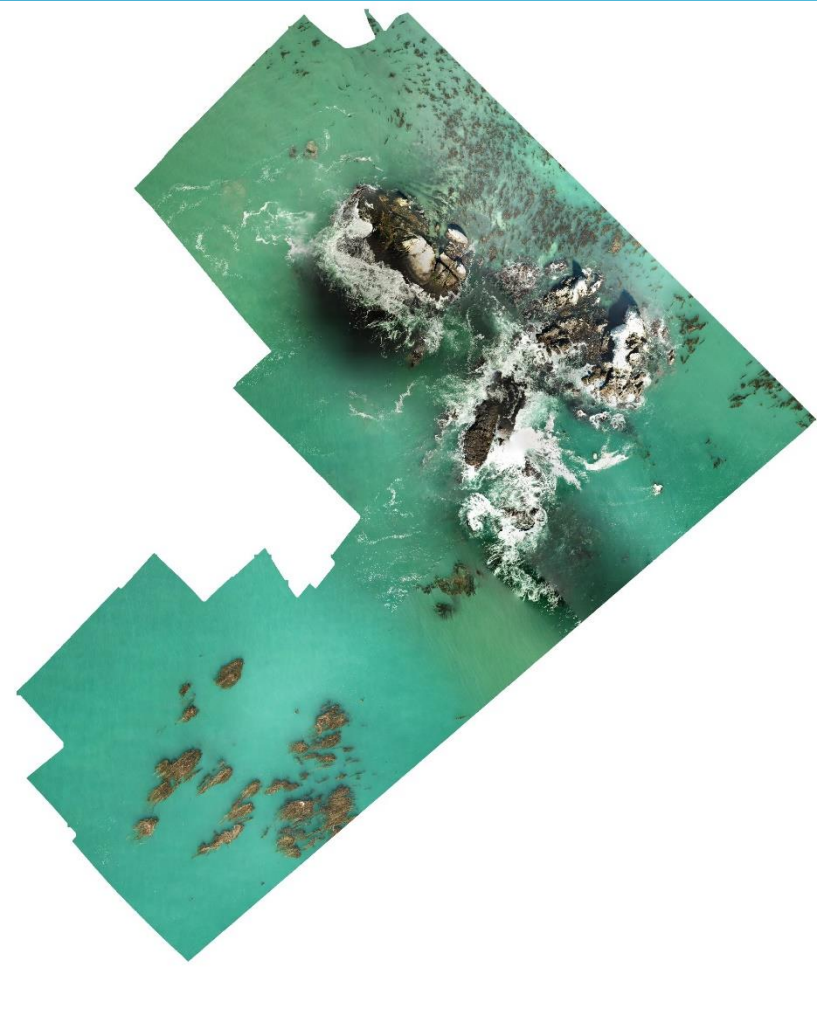
# Drones for Debris

## Utilizing Small Vessel-Launched UAS for Remote Coastal Surveys



### Challenges

- Relatively small geographic areas
- FAA visual-line-of-sight
  - can be waived
- No real-time photomosaic
- Anomaly detection still in development





# ECO-Drone

*Environmentally Conscious Operations*

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The mission of ECO-Drone™ is to advance and encourage **Environmentally Conscious Operations** of recreational drones to protect and limit disturbances to wildlife resources.

**DARTDRONES**





# Discussion

