

UNMANNED AIRCRAFT SYSTEMS AND SEABIRD INTERACTIONS



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UNMANNED AIRCRAFT SYSTEMS AND SEABIRD INTERACTIONS



Presentation Elements

- **NOAA Regulated Overflight Zones in West Coast National Marine Sanctuaries**
- **Findings from an August 2017 Literature Review**
- **Sanctuary Permit Conditions for UAS**
- **2017/2018 UAS Research Case Study on the West Coast**
- **Recommended Best Practices for UAS Research Study Design**



NOAA REGULATED OVERFLIGHT ZONES & UAS

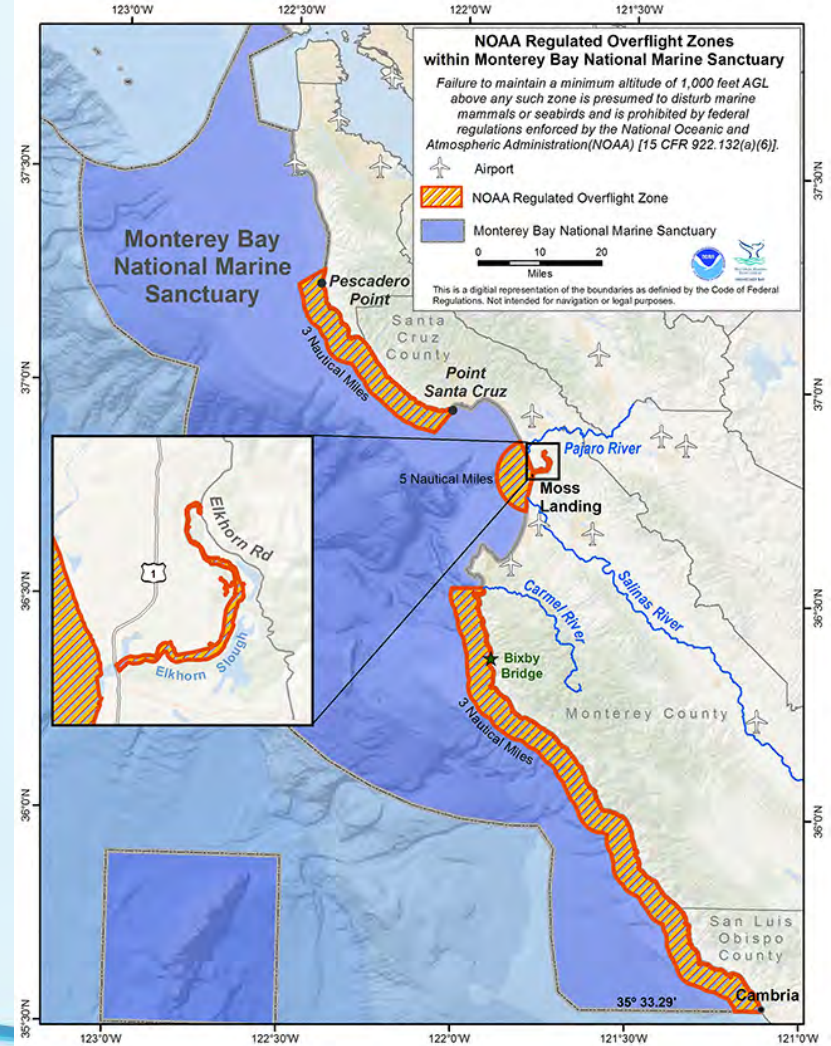
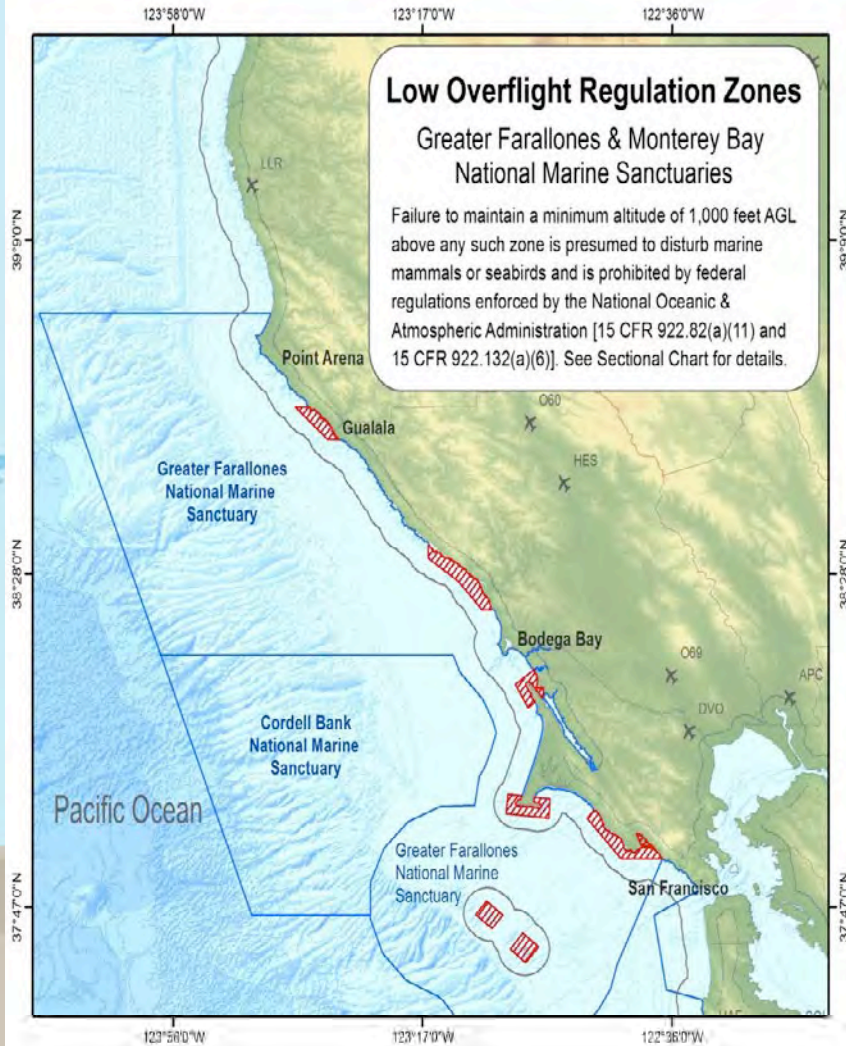


National Marine Sanctuary	Flights Prohibited Below	Location
Channel Islands	1000 feet	Within one nautical mile of any of the islands of the sanctuary
Greater Farallones	1000 feet	Within 7 prescribed zones as defined in sanctuary regulations at 15 CFR Part 82(a)(11)
Monterey Bay	1000 feet	Within four prescribed zones as defined in sanctuary regulations at 15 CFR Part 922.132(a)(6)
Olympic Coast	2000 feet	Within four prescribed zones as defined in sanctuary regulations at 15 CFR 922.152(a)(7)



Unmanned Aircraft Systems or “UAS” include all unmanned craft: Unmanned Aerial Vehicles (UAVs), Remotely Piloted Aircraft (RPA) or “drones”

NOAA REGULATED OVERFLIGHT ZONES & UAS



NOAA REGULATED OVERFLIGHT ZONES & UAS



Zones are designated in areas that have high concentrations of marine wildlife

NOAA REGULATED OVERFLIGHT ZONES & UAS



Flight operations below 1000' AGL over the designated areas within the Greater Farallones National Marine Sanctuary violate NOAA regulations (see 15 CFR 922).

LITERATURE REVIEW: Effects of UAS on Seabirds



Key Findings

- **Limited studies: mostly ducks, geese, shorebirds and waterfowl**
- **Acoustic effects and visual effects were observed**
- **The type of UAS and the way it is flown matters**
- **Different species react differently**
- **Based on existing literature, larger, noisier UAS sizes evoked the greatest reaction**
- **Many studies have concluded that UAS elicited substantially less disturbance behavior when flown at equivalent heights of manned aircraft**

The Final Report was submitted to NOAA National Marine Sanctuaries in August 2017

LITERATURE REVIEW: Effects of UAS on Seabirds



Acoustic Effects



- **Gas Powered UAS are louder and may increase disturbance of seabirds when flown at lower altitudes.**
- **Animal reactions are not only influenced by the volume of the noise, but are also influenced by changes in the intensity of noise produced.**

LITERATURE REVIEW: Effects of UAS on Seabirds



Visual Effects

Figure 1. Response of mixed flocks of waterfowl to UAS of flying overhead at various altitudes

UAV	Shape	Altitude Above Water						
		100 m	90 m	80 m	70 m	60 m	50 m	15 m (take-off)
UAVER Avian-2		NR	NR	NR	NR	V	N/A	F
SkyLark II		NR	NR	NR	NR	V	N/A	F
Drone Metrex Topodrone-100		NR	NR	F	F	F	N/A	F
DJI Phantom		N/A	N/A	N/A	N/A	N/A	V	V
FoxTech Kraken-130		NR	NR	NR	NR	NR	V	N/A

- Size and Shape Matter
- A vertical approach and the hovering behavior in flight appear to cause increased disturbance

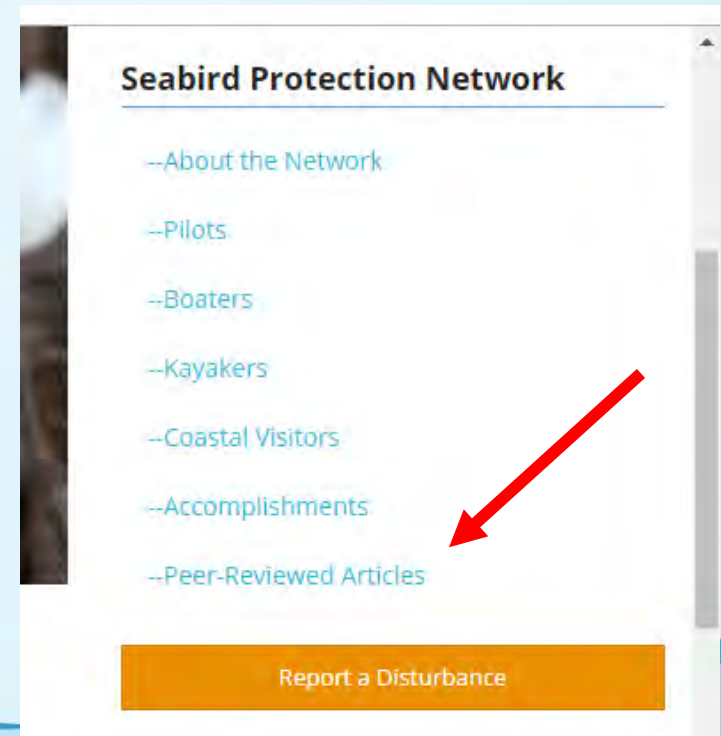
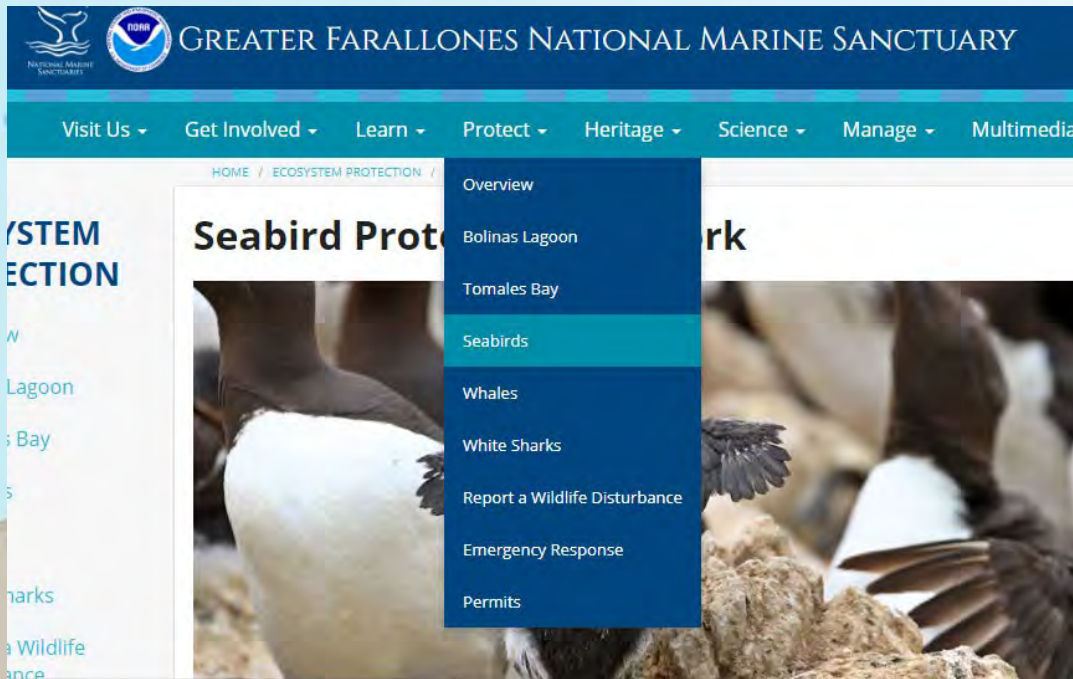
NR (green squares) = No discernible response; V (yellow squares) = Vigilance response detected; F (red squares) = Flight Response; N/A = UAS did not fly over birds at that altitude

LITERATURE REVIEW: Effects of UAS on Seabirds



A Literature Review of the Effects of Unmanned Aircraft Systems on Seabirds and Marine Mammals

https://farallones.noaa.gov/eco/seabird/seabird_news.html



LITERATURE REVIEW: Putting Data to Action



- Outreach to hobbyists
- Understanding hotspots for UAS hobbyists use
- Partnering with manufactures
- Developing standardized research permit conditions
- Promoting research best practices



Example Special Conditions for UAS Research Permits



- **The UAS should not alter its altitude while transiting over marine mammals or seabirds.**
 - *Aimed at addressing noise impacts*
- **The UAS shall not be flown below 100 feet above any seabird or marine mammal colonies.**
 - *Aimed at addressing an increased risk of disturbance during takeoff/landing*
- **Operations shall be conducted by a Solo quadcopter, Phantom 3, or similar phantom model.**
 - *These craft do not look like natural seabird predators*



Example Special Conditions for UAS Research Permits



The permittee shall observe and document the following on potential effects and operational considerations for UASs:

- a. pilot skill and experience
- b. RPM and sound levels monitoring
- c. UAS make, model, and color
- d. bird and marine mammal counts 20 min before use, during use, and 20 min after use
- e. how many passes were made over the survey area
- f. hovering duration at each survey area
- g. altitudes at which the UAS was flown at each survey area



UAS monitoring at Gualala Point Island



- While monitoring a seabird colony consisting of Western Gulls, Common Murres and Cormorants at Gualala Point Island, The Coastal Stewardship Task Force of The Sea Ranch Association was also able observe wildlife reactions and test sanctuary permit conditions. (Permit # GFNMS-2017-004)
- These observations lead to protocol modifications and a list of recommended best practices, referred to as No-Impact Protocols (NIP).



Results: wildlife disturbances observed and protocol modifications



Western Gulls took flight briefly as UAS flew over at 200 feet AGL.

- ***Modifications:*** Avoid a direct approach. Fly slower and higher than 150 feet AGL.

Two Western Gull individuals aggressively approached UAS colony at 100 feet AGL.

- ***Modification:*** UAS fast vertical climb to 300 feet to avoid any aggressively approaching Gulls.

Results: wildlife disturbances observed and protocol modifications

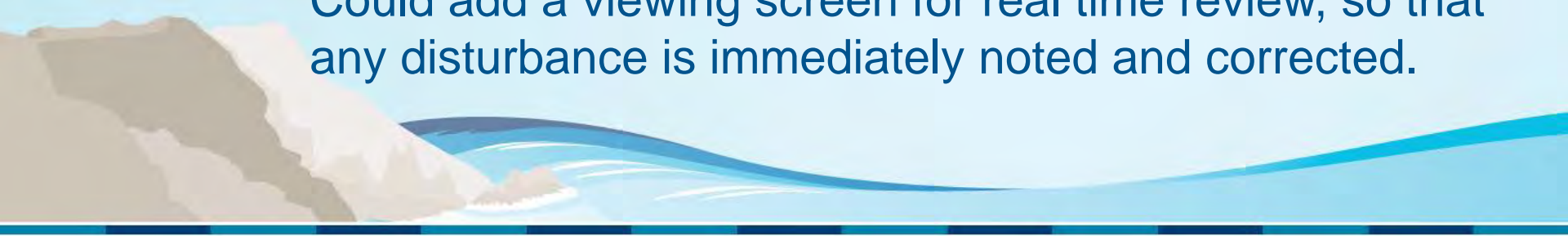


Western Gulls took flight briefly as UAS climbed in lift-off from launch pad on bluff edge.

- ***Modification:*** Lift off and remain stationary over launch pad before moving forward. Then move slowly and steadily at all times.

Nesting Common Murres reacted (wing flapping and head bobbing). Note: Not visible from shore but seen in video after.

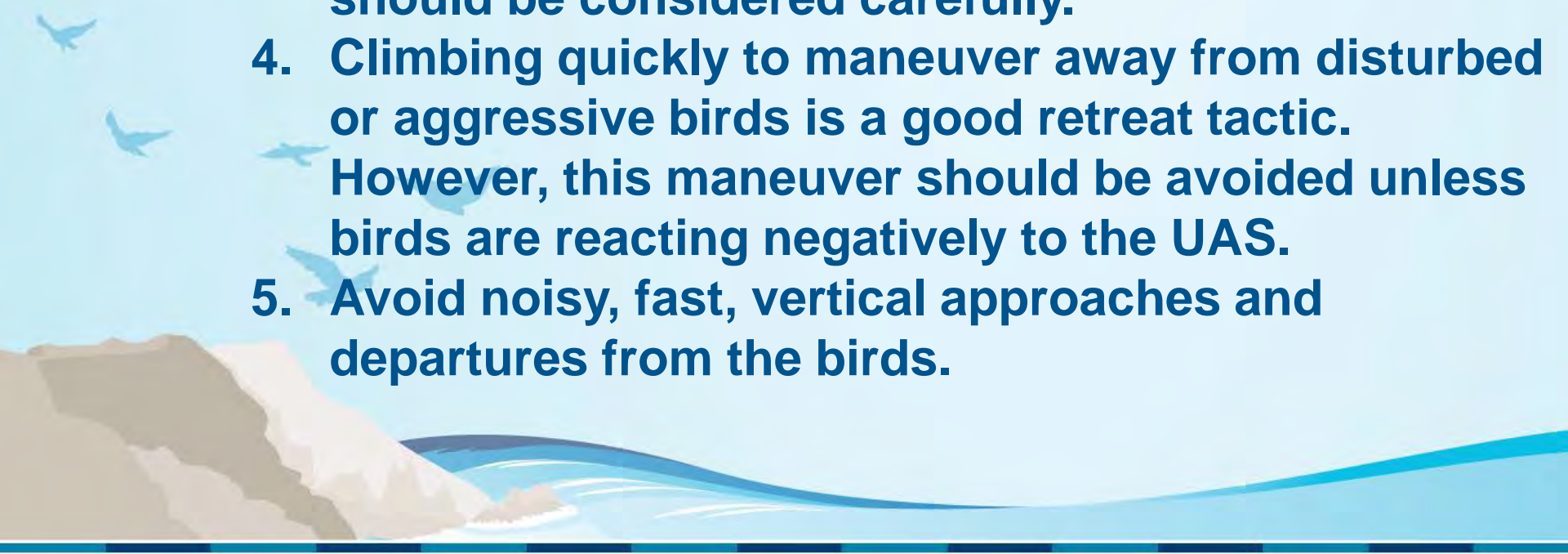
- ***Modification:*** Remain at higher AGL (above 120 feet). Could add a viewing screen for real time review, so that any disturbance is immediately noted and corrected.



Other Recommended Best Practices/ No-Impact Protocols (NIPs)



- 1. Flight crews should be well-organized and communicate easily and often with each other.**
- 2. Flights should be modified or terminated at any time if requested by a wildlife observer.**
- 3. Approach height, angle and speed of the UAS should be considered carefully.**
- 4. Climbing quickly to maneuver away from disturbed or aggressive birds is a good retreat tactic. However, this maneuver should be avoided unless birds are reacting negatively to the UAS.**
- 5. Avoid noisy, fast, vertical approaches and departures from the birds.**



**Thank
You!**

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**Questions
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