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UAS Potential Uses and Limitations


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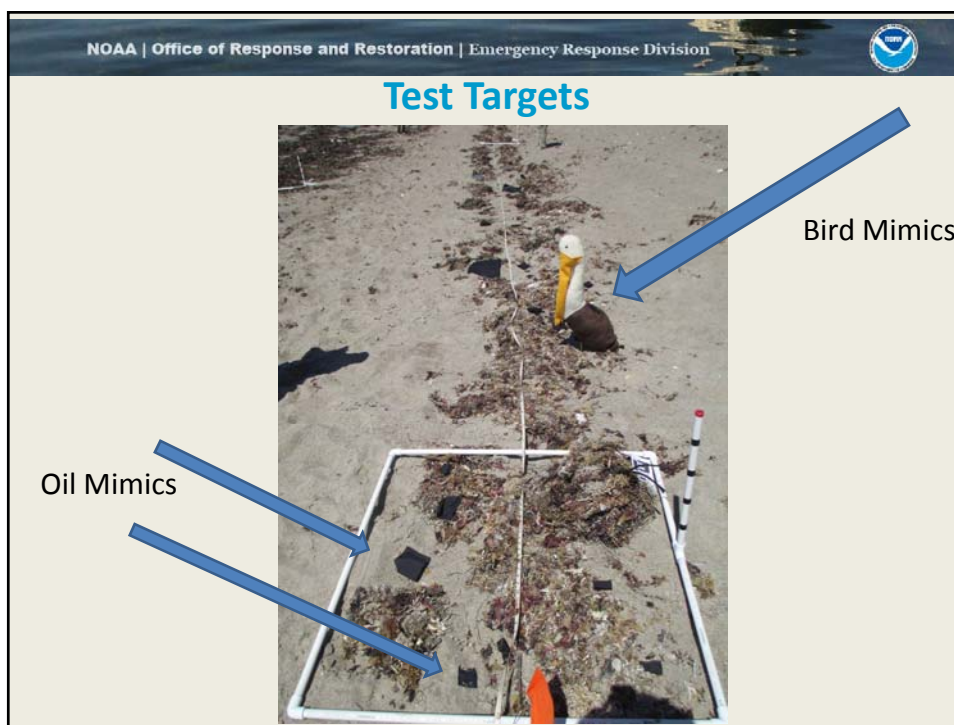
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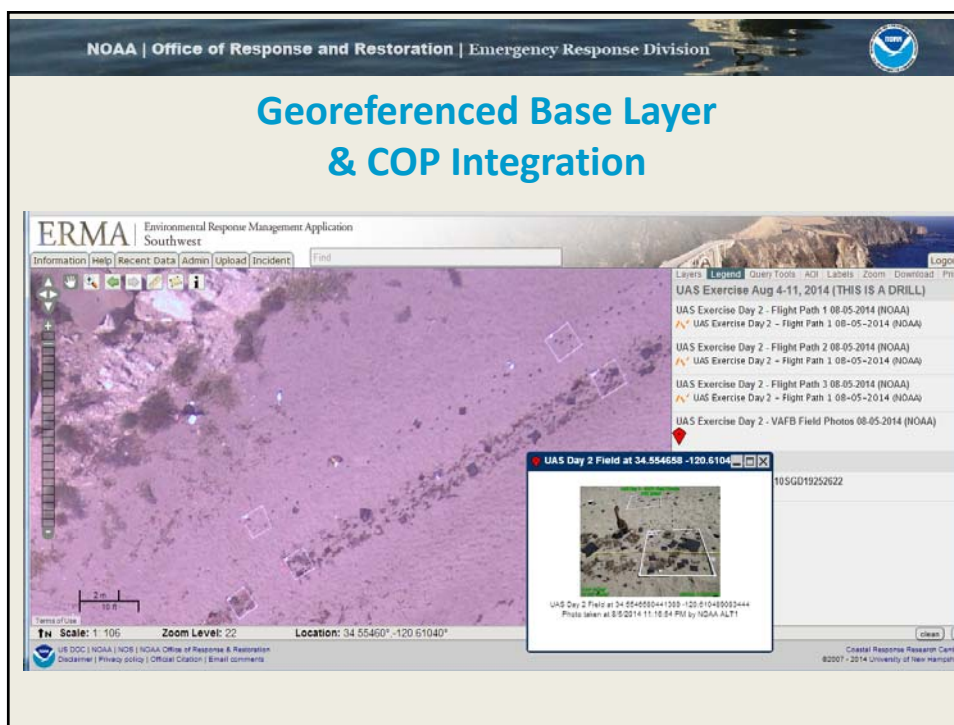
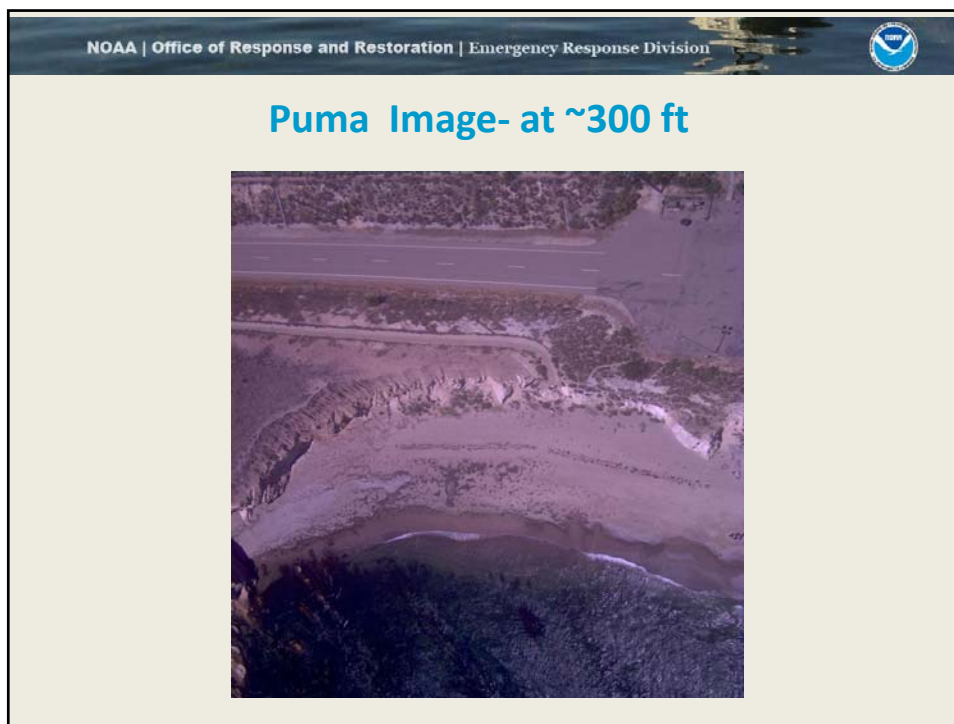
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Needs for UAS in Response


- Limited access to areas of interest (distance, safety concerns, personnel bandwidth issues, etc.)
- Both response & natural resource damage assessment can be met with data acquisition
- Survey focus
 - Oil coverage/ extent
 - Convergence zones
 - Trust resource observations: sensitive habitats, targeted species, rookeries, etc.
 - Human Use/ Socio- economic impacts
 - Marine Debris characterization
 - Outreach and messaging









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Off Shore Deployments Distance Calculations/ Annotations



Lat/Lon: N 34° 08' 59.17" W 119° 25' 30.19"
Alt: 334 ft MSL
Mag: 42°



Simbal
FOV Data:
Slant Rng: 171 m
CFOV Hdg: 313°
CFOV Lat/Lon: N 34° 09' 02.34" W 119° 25' 33.92"
Horiz. FOV: 29.6°


Targeting Data:
Target S Lat/Lon: N 34° 09' 01.63" W 119° 25' 33.34"
Target T Lat/Lon: N 34° 09' 02.97" W 119° 25' 34.76"
ADD 32 m - LERT 44 m
Ranger: 54 m - Mag Bearing: 307°

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Practical Deployment & Reality



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Process / Timeline


- Wanted to test deployment during real event due to prior UAS demos
- Trustees agreed due to hard to access areas of shoreline & potential wildlife impacts UAS images could be useful for damage assessment
- Response (SSC/ USCG) did not see an operational need
- OAR/ NMS supportive of deployment with vessel and staffing capacity
- NRDA had priority concerns relative to core ephemeral data collection and data in-take needs

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Implementation

- Deliverables requested:
 - Geo Tiffs stills ready for input into ERMA within 30 minutes of a shore-based flight landing
 - Derived products (mosaics, stitching, etc.) available within 4-6 hours of a flight landing
 - Copies of data for potential litigation hold
- Logistics
 - OAR coordinated with Aerovironment for all asset field needs
 - NMS offered Vessel for off shore deployment
 - Response Operations approval and Air Boss coordination requirements
 - Effort Initially denied and only re-evaluated when former OR&R Staff rotated into the position
 - Manned air craft coordination was successful due to personal connections

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Standard NOAA Puma Flown



- Covered broad area in single day
- ~180 Images
- 5 videos
- No live wildlife observed
- Could not spatially rectify outputs
- Resolution not adequate for operational need

* Images not for public distribution due to on-going NRDA

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PUMA High Resolution Nadir Camera

ERMA | Environmental Response Management Application Southwest




Scale: 1 : 1
200 m / 1000 ft
10 m / 50 ft

US DOC | NOAA
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Coastal Response Research Center
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* Images not for public distribution due to on-going NRDA

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Lessons Learned


- Process involved a **HIGH** degree of coordination for approvals – FAA, FCC, NMFS Protected Resources, Managed Areas, Response ICS, and asset logistics
- UAS deployment while response air ops is occurring is likely **NOT** practical in the near term
- Delivery of high resolution geo-rectified images is the operational requirements for ARD
- Video is not a primary product need for ARD, but streaming video could help direct operations of other assets in future for the response

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Lessons Learned

- Post processing time is **MUCH** slower than operational need at moment
- Creation of contracting vehicle would be needed for future use and funded within appropriate ICS funding structure
- Weather induced limitations on UAS flights (winds, ice, fog) very similar to manned
- Further evaluation is needed regarding collection platforms and mission needs (e.g. sensor type, fixed winged vs. copters, etc.) and improved information flow

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Next Steps: Outline Mission Requirements

Survey Need	Mission Type	Tool & Application	Output
<u>Overview Reconnaissance</u>	Pre-planned flight of a large area	-Longer range flight time/ capacity -Offshore capabilities -Planned Flight paths -Model input -Night time operations for resources planning	High resolution, geo-referenced photomosaic covering a defined area of interest in short processed time
<u>Remote Shorelines</u>	Pre-planned flight of a long stretch of shoreline with limited shore access. May include flight plan adjustments and/or additional, short ad-hoc flights for spot-checks.	Boat-based operation with teams using UAS w/live streaming video feed to vessels to guide SCAT/ NRDA teams to "hot spots" or areas of interest.	Live streaming video feed to vessel to guide field teams to areas of interest.
<u>Sensitive Habitats</u>	Pre-planned flight of a defined area (covering the entire marsh or GRP sensitive area)	High resolution visual image/video.	High resolution, geo-referenced photomosaic covering a defined area of interest
<u>Haul Outs/ Pocket Beaches</u>	Short duration, low altitude, as-needed flight(s) of small, discrete areas restricted / not safely accessible by other means	Daypack-sized UAS launched by field team (or accompanying Technical Specialist) on site for short spot checks.	Short video with associated trackline to accompany SCAT segment form & high resolutions still images for counts and species ID

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Future Deployments



Health Assessments



Image Recognition



Tag/ Recapture / Counts



Ephemeral Collections



Habitat Delineation



Arctic