

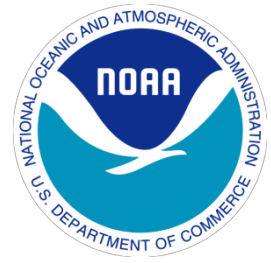
NOAA Unmanned Aircraft Systems (UAS) FY13/FY14 Operations & SUS Update

NOAA UAS Program Office

27 June 2013



Purpose and Outline



- NOAA UAS Strategic Vision and Roadmap
- Missions & Future
- Challenges & Success!





NOAA UAS Strategic Vision and Goals



- ***Vision***

- UAS will revolutionize NOAA observing strategies by 2015 comparable to the introduction of satellite and radar assets decades earlier

- ***Goals***

- Goal 1: Increase UAS observing capacity
- Goal 2: Develop high science-return UAS missions
 - ***High impact weather monitoring,***
 - ***Polar monitoring***
 - ***Marine monitoring***
- Goal 3: Transition cost-effective, operationally feasible UAS solutions into routine operations

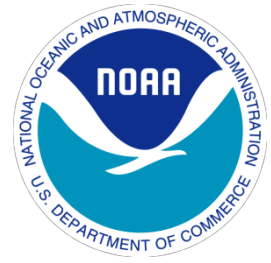




NOAA UAS Program

Analysis of Alternatives

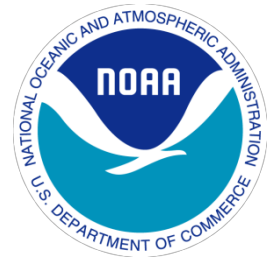
Recommendations



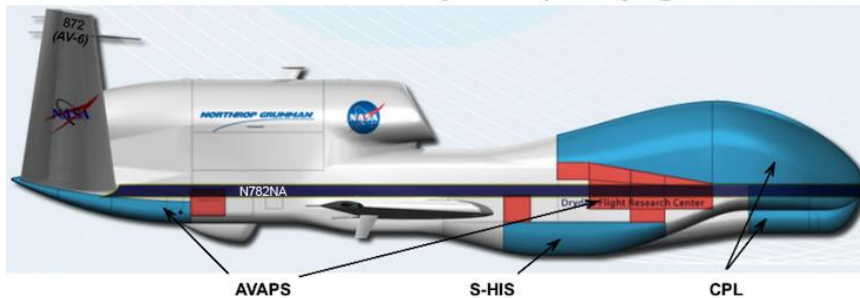
UAS Category	Gross Takeoff Weight (lb)	Operating Altitude (ft)	Range (nm)	Endurance (hrs)	NOAA UAS Program Recommendation
High Altitude Long Endurance (HALE)	> 1320	> 50,000	6,000 – 11,000	24 - 30	Northrop Grumman Global Hawk
Medium Altitude Long Endurance (MALE)	< 1320	18,000 – 50,000	2,000 – 6,000	24 - 30	General Atomics Predator (Ikhana)
Low Altitude Long Endurance (LALE)	21 - 1320	1,200 – 18,000	200 – 2,000	20 - 24	In Situ-Boeing Scan Eagle & Integrator
Low Altitude Short Endurance (LASE)	0 - 20	< 1,200	10 - 200	2	AeroVironment Puma VTOL Immature Market Airlaunched – R&D



NASA Hurricane Severe Storm Sentinel (HS3) Experiment



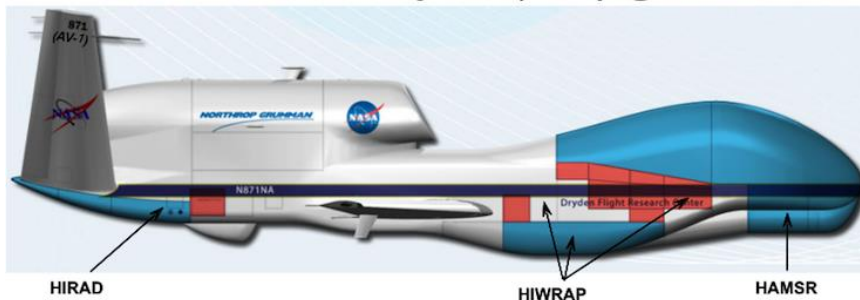
HS3 Environmental Payload (AV-6) @ WFF '12



Environment Observations

- Profiles of temperature, humidity, wind, and pressure (AVAPS)
- Cloud top height (CPL)
- Cloud top temperature and profiles of temperature and humidity (S-HIS)

HS3 Over-Storm Payload (AV-1) @ WFF '12



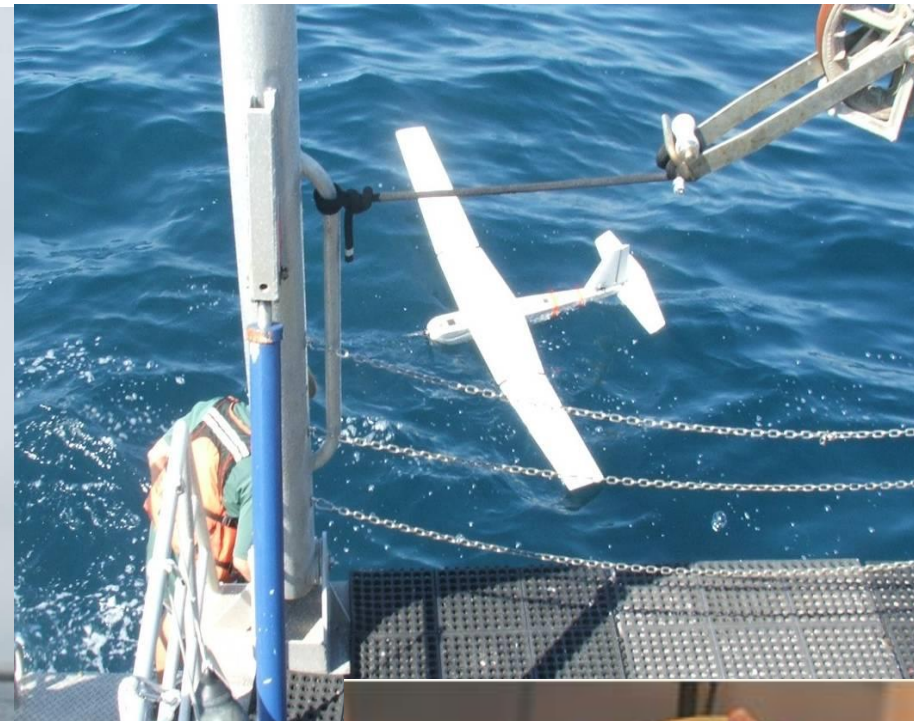
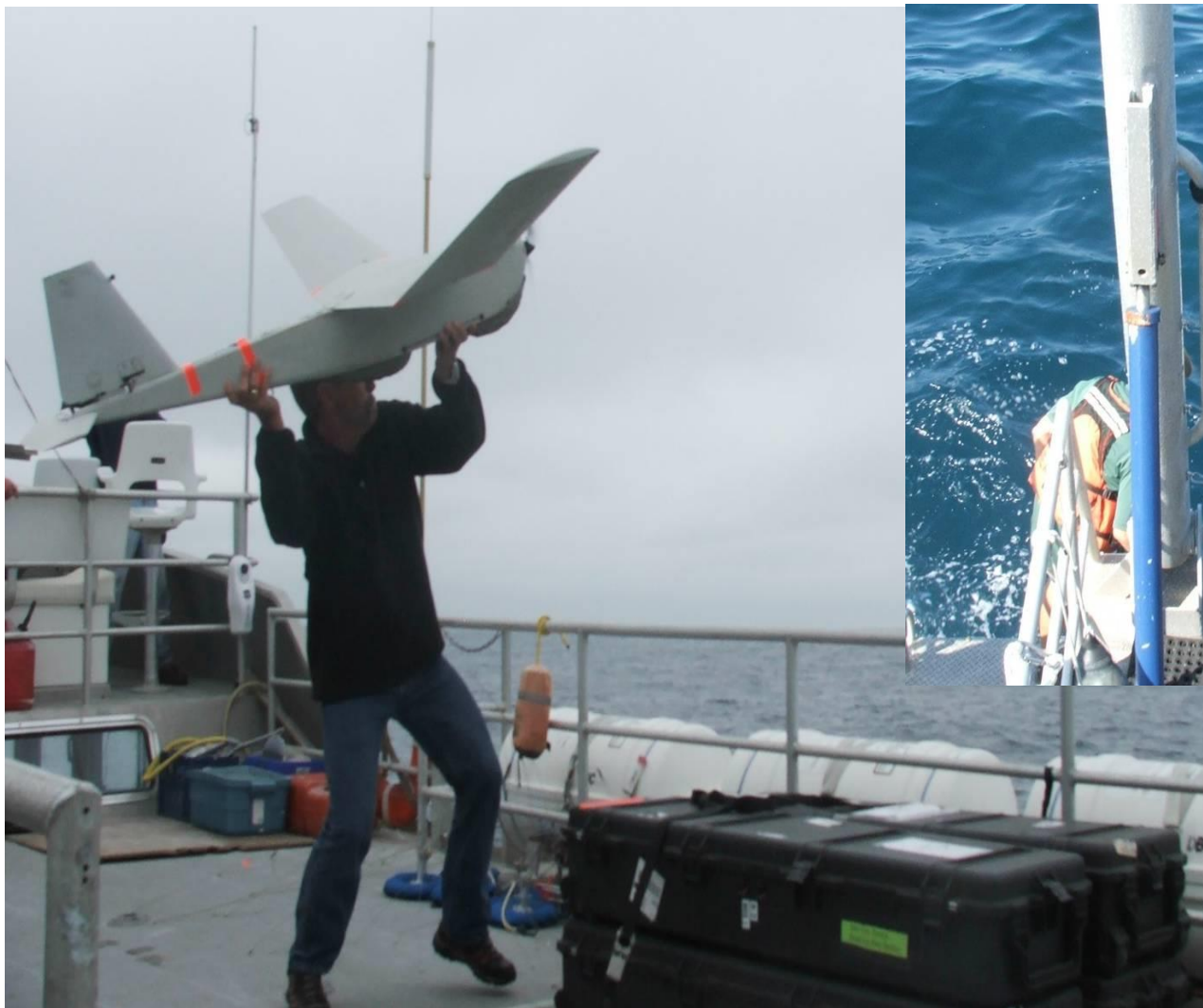
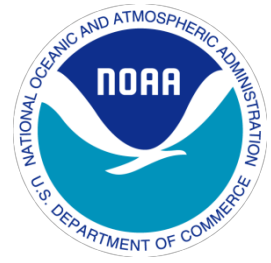
Over-storm Observations

- Doppler velocity, horizontal winds, and ocean surface winds (HIWRAP)
- Profiles of temperature and humidity and total precipitable water (HAMS)
- Ocean surface winds and rain (HIRAD)



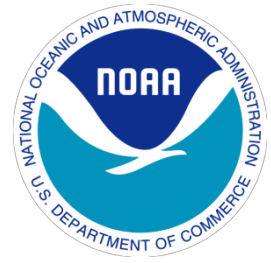


AV Puma AE





md4-1000



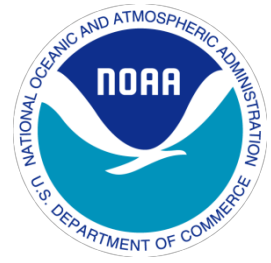
- NOAA currently owns one md4-1000 UAS that consists of one aircraft and one GCS.
- The md4-1000 is built by Microdrones GmbH in Germany.
- The aircraft is a VTOL quadcopter.
- The NOAA md4-1000 capabilities are summarized in the Table below:

Parameter	Value
Payload	1.7 lb
Endurance	1.16 hours
Cruise Speed	29 knots
LOS Range	0.54 nm
Ceiling	3,280 ft
Launch/Recovery	Vertical/Vertical





Marine Debris Mission



Launch



**Deployed
Debris**

Recovery

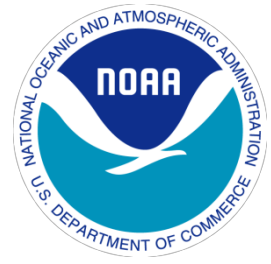


**Marine Debris
Imagery**

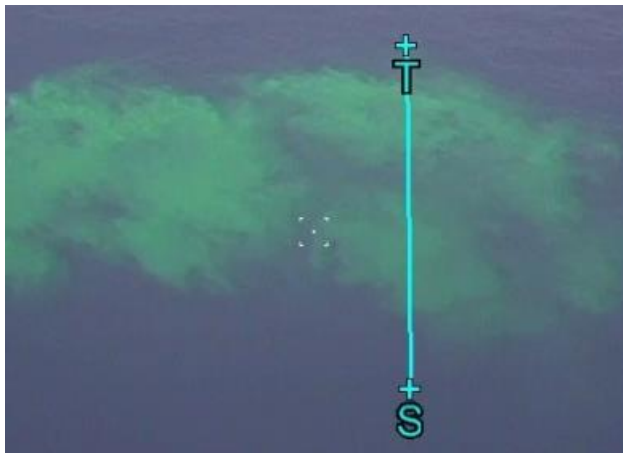




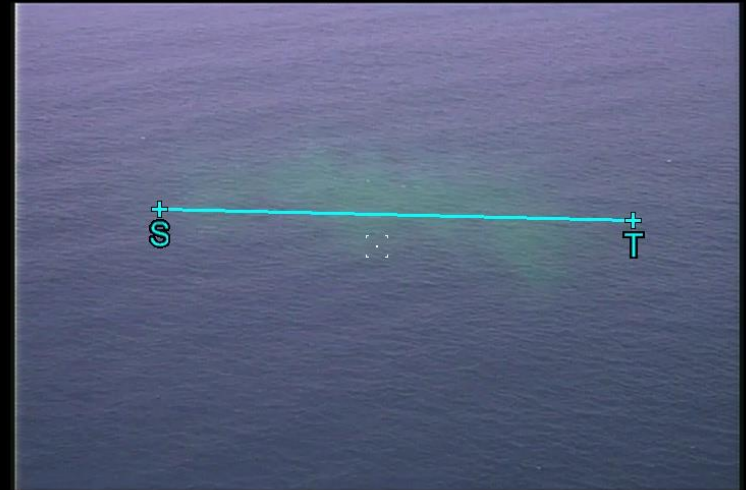
Oil Spill Simulation



Coast Guard UAS partnership study of oil spill monitoring in Santa Barbara channel



Lat/Lon: N 33° 48' 31.53" W 119° 46' 18.60"
Alt: 351 ft MSL
Mag: 39°

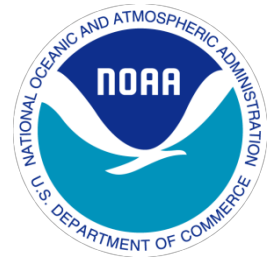


Gimbal
FOV Data:
Slant Rng: 259 m
CFOV Hdg: 320°
CFOV Lat/Lon: N 33° 48' 37.61" W 119° 46' 23.82"
Horiz. FOV: 29.6°

Targeting Data:
Target S Lat/Lon: N 33° 48' 36.66" W 119° 46' 26.12"
Target T Lat/Lon: N 33° 48' 39.29" W 119° 46' 23.45"
ADD 94 m RIGHT 48 m
Range: 106 m Mag Bearing: 27°



Environmental Monitoring of National Marine Sanctuaries



Shoreline Assessments



Fisheries Law Enforcement

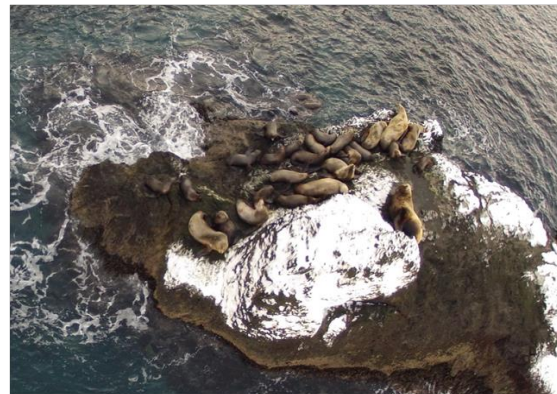
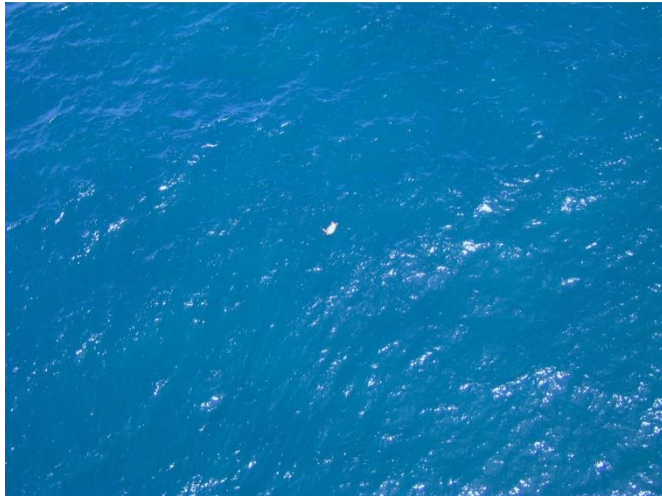
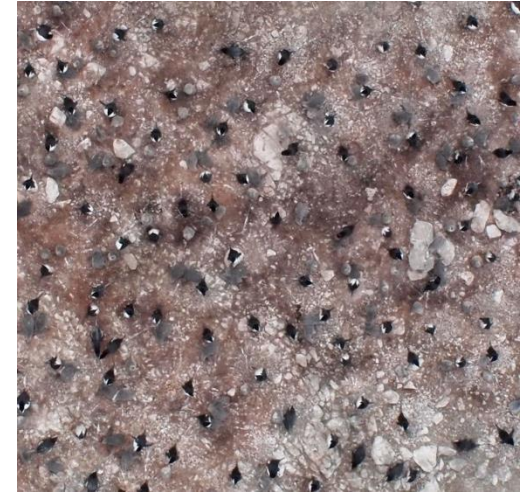
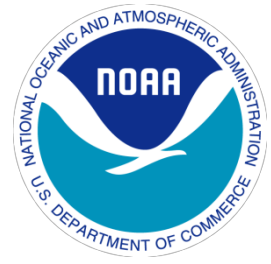


Wildlife Surveys



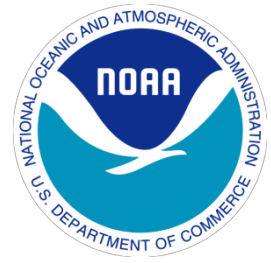


Additional Animal Monitoring





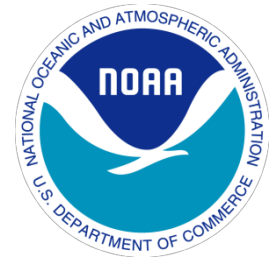
Small UAS Operations FY13



Project	Mission Dates	Location	COA Required	Platform(s)	Mission
Coyote Launch	May - August	California / Avon Park	No	Coyote / GALE	Clear Air and Storm Drop
VX-30 PUMA Emergency Response Exercise	June 18th or June 19th	Plead Control Range	No	PUMA (Army System)	Emergency Response
Olympic Coast NMS	PUMA: Travel June 16, PUMA OPS 17-30, Quad: Travel 23, OPS 24-30	Washington / Oregon	Yes		PUMA / Quadcopter/Resolution
Florida Keys NMS	August 19 - September 1st	Florida Keys	Yes (for habitat mapping mission) / No (for enforcement mission)	PUMA	FKNMS Habitat Mapping and Enforcement Mission
Channel Island NMS	September 13-23	California	Yes	PUMA	CINMS Blue Whale and Enforcement Mission.
HEALY Ice Breaker OPS	7 - 8 Sep: Embark on HEALY in Barrow (two days to allow for poor wx) 9 - 13 Sep: D-17/RDC/NOAA UAS/UAV oil spill exercise 22 Sep: HEALY inports in Seward, AK. PUMA Team disembarks and ships PUMA gear back to AOC	Arctic	Yes	PUMA	Ice Research, Cooperative Ops
Marine Debris	September 15-30 (1 week)	Kodiak Island, AK	Yes	PUMA	Marine Debris Detection
River Forecasting Center	September	Lake Borgne, LA	Yes	PUMA	River Forecasting Center



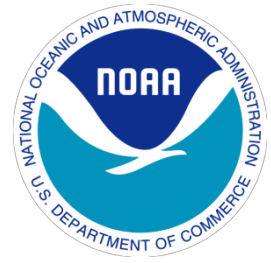
Small UAS Operations FY14



Month	Platform	Mission	Location	AOC Support	Estimated Mission Duration
Oct-13	PUMA AE DDL	Living Marine Resource / Enforcement	Florida Keys NMS	2 operators	10 days
Nov-13	PUMA AE DDL	River Forecasting Center	Bogue Chitto NWR / Pearl River WMA	1 PIC	2 weeks
Dec-13	APH-22 Hexacopter	Marine Mammal Surveys	Antarctica	None	all month
Jan-14	MD4-1000 Quadcopter	Grey Whale / Marine Mammal Surveys\	Central California	1 PIC	10 days
Jan-14	APH-22 Hexacopter	Marine Mammal Surveys	Antarctica	None	
Jan-14	PUMA AE DDL	Living Marine Resource / Enforcement	Channel Islands NMS	Varies (none, 1 or 2 pilots)	10 days
Feb-14	APH-22 Hexacopter	Marine Mammal Surveys	Antarctica	None	all month
		Living Marine Resource, Seabird and Marine Debris Detection			
Feb-14	PUMA AE DDL	Living Marine Resource / Enforcement	Olympic Coast NMS	2 operators	10 days
Feb-14	PUMA AE DDL	Living Marine Resource / Enforcement	Channel Islands NMS	Varies (none, 1 or 2 pilots)	10 days
Feb-14	PUMA AE DDL	River Forecasting Center	Bogue Chitto NWR / Pearl River WMA	1 PIC	2 weeks
Mar-14	APH-22 Hexacopter	Marine Mammal Surveys	Antarctica	None	March 1 - 15
Mar-14	PUMA AE DDL	Living Marine Resource / Enforcement	Channel Islands NMS	Varies (none, 1 or 2 pilots)	10 days
Apr-14	PUMA AE DDL	Living Marine Resource / Enforcement	Florida Keys NMS	2 operators	10 days
Apr-14	PUMA AE DDL	Living Marine Resource / Enforcement	Channel Islands NMS	Varies (none, 1 or 2 pilots)	10 days
May-14	PUMA AE DDL	Living Marine Resource / Enforcement	Florida Keys NMS	2 operators	10 days
May-14	PUMA AE DDL	Living Marine Resource / Enforcement	Channel Islands NMS	Varies (none, 1 or 2 pilots)	10 days
May-14	PUMA AE DDL	River Forecasting Center	Bogue Chitto NWR / Pearl River WMA	1 PIC	2 weeks
Jun-14	APH-22 Hexacopter	Marine Mammal Surveys	Aleutian Island Chain	None	all month
Jun-14	PUMA AE DDL	Living Marine Resource / Enforcement	Stellwagen Bank NMS	2 operators	10 days
Jun-14	PUMA AE DDL	Living Marine Resource / Enforcement	Florida Keys NMS	2 operators	10 days
Jun-14	PUMA AE DDL	Living Marine Resource / Enforcement	Channel Islands NMS	Varies (none, 1 or 2 pilots)	10 days
Jun-14	PUMA AE DDL	Living Marine Resource / Enforcement	Gray's Reef NMS	2 operators	10 days
Jul-14	APH-22 Hexacopter	Marine Mammal Surveys	Aleutian Island Chain	None	July 1-8
			Papahānaumokuākea Marine National Monument	2 operators	10 days
Jul-14	PUMA AE DDL	Living Marine Resource / Enforcement	Florida Keys NMS	2 operators	10 days
Jul-14	PUMA AE DDL	Living Marine Resource / Enforcement	Channel Islands NMS	Varies (none, 1 or 2 pilots)	10 days
Jul-14	PUMA AE DDL	Living Marine Resource / Enforcement	Gray's Reef NMS	2 operators	10 days
Aug-14	Scan Eagle	Marine Mammal Surveys	Arctic (Barrow, AK)	None	month long
Aug-14	PUMA AE DDL	Living Marine Resource / Enforcement	Florida Keys NMS	2 operators	10 days
Aug-14	PUMA AE DDL	Living Marine Resource / Enforcement	Channel Islands NMS	Varies (none, 1 or 2 pilots)	10 days
Aug-14	PUMA AE DDL	Living Marine Resource / Enforcement	Gray's Reef NMS	2 operators	10 days
			Papahānaumokuākea Marine National Monument	2 operators	10 days
Aug-14	PUMA AE DDL	Living Marine Resource / Enforcement	Bogue Chitto NWR / Pearl River WMA	1 PIC	2 weeks
Aug-14	PUMA AE DDL	Marine Mammal Surveys	Arctic (Barrow, AK)	None	month long
			West Coast Region (Monterey, Cordell Bank, Farallones)	2 operators	10 days
Sep-14	PUMA AE DDL	Living Marine Resource / Enforcement	Channel Islands NMS	Varies (none, 1 or 2 pilots)	10 days
Sep-14	PUMA AE DDL	Living Marine Resource / Enforcement	Gray's Reef NMS	2 operators	10 days



Contact Information



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