NOAA Uncrewed Systems Strategy

The NOAA Uncrewed Systems (UxS) Strategy will dramatically expand the application of uncrewed aircraft and marine systems (together, "uncrewed systems" or "UxS") in every NOAA mission area by improving the efficiency, effectiveness, and coordination of UxS development and operations across the agency. As future data exploitation opportunities continue to increase exponentially with improved UxS platforms and architectures, the integration of artificial intelligence, and new commercial data sources, this Strategy will guide transformative advancements in the quality and timeliness of NOAA science, products, and services.

NOAA's Integrated Ocean Observing System partnered with the U.S. Navy and Shell Oil Co. to share data from over 20 gliders deployed in the Gulf of Mexico in 2018. Salinity and temperature data from gliders can improve hurricane intensity forecasts.

Demonstrated Leadership in Uncrewed Systems

Many NOAA programs have pioneered the innovative use of UxS as a valuable force multiplier—augmenting data collection often at lower costs, increased safety, and reduced risk, especially in remote or extreme environments. The systems we have used to conduct research and operations include uncrewed underwater vehicles (UUVs), such as gliders, remotely operated vehicles (ROVs), uncrewed surface vehicles (USVs), and uncrewed aerial vehicles (UAVs). UxS data are improving fishery stock assessments, hurricane intensity forecasts, and ocean and habitat mapping. Accelerating and expanding the use of uncrewed systems across every NOAA mission area will provide NOAA customers with higher-quality, cost-effective services at faster cycle times that result in higher operational performance and safety. Example applications include:

- Hydrographic and disaster response surveys;
- Ocean exploration;
- Seafloor and shoreline mapping;
- Weather and flood damage assessment;
- Remote sensing for hazardous weather warnings;
- Marine mammal surveys;
- Fishing surveys for stock assessment; and
- Satellite sensor calibration.

The UxS Strategy is available at https://nrc.noaa.gov/NOAA-Science-Technology-Focus-Areas.

Uncrewed Systems Strategy Goals

1. Coordinate and support UxS operations at an enterprise level.
2. Expand UxS applications across NOAA's mission portfolio.
3. Accelerate transition of UxS research to applications.
4. Strengthen and expand UxS partnerships.
5. Promote workforce proficiency in UxS use and operations.

NOAA research biologists, Katie Sweeney and Dr. Brian Fadely, deploy a hexacopter to monitor depleted northern fur seal populations with minimal disturbance. UxS can be ideal for marine mammal monitoring in difficult-to-traverse environments, such as the remote Aleutian Islands, at reduced cost and risk to scientists.

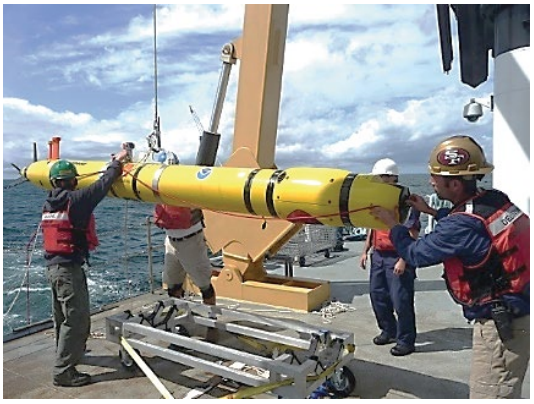
The FY 2020 President's budget includes $4M to support establishing a NOAA Uncrewed Systems Operations Program and aligns with:

- **Bipartisan Congressional action, such as the** *Commercial Engagement Through Ocean Technology Act of 2018 (CENOTE).*
- **The Executive Order on** *Maintaining American Leadership in Artificial Intelligence.*
- **The National Science and Technology Council's** *Science and Technology for America's Oceans: A Decadal Vision* **as well as the Executive Office of the President's August 30, 2019, Memorandum "Fiscal Year 2021 Administration Research and Development Budget Priorities."**
- **The November 19, 2019, Presidential Memorandum, "Memorandum on Ocean Mapping of the United States Exclusive Economic Zone and the Shoreline and Nearshore of Alaska."**

For the third year in a row, NOAA is using Environmental Sample Processors designed by the Monterey Bay Aquarium Research Institute and mounted on a UUV to study potentially toxic algal blooms in Lake Erie in collaboration with NOAA's Great Lakes Environmental Research Laboratory.

Bold New Era in Harnessing UxS

To ensure the NOAA Uncrewed Systems Strategy realizes transformational advances in performance, skill, and efficiency, NOAA is developing a UxS Strategic Implementation Plan or "Roadmap" to define detailed action items, deadlines, and responsibilities. Meanwhile, NOAA's use of UxS is already improving performance in our lifesaving and economically impactful missions, and setting the course to strengthen our renowned environmental science and technology leadership for the coming decades. Through this, NOAA will achieve our top agency priorities to regain and maintain global leadership in numerical weather prediction and sustainably expand the American Blue Economy.



NOAA's Office of Coast Survey prepares to launch a Hydroid REMUS 600 autonomous underwater vehicle on a bathymetric mapping mission. This vehicle can operate for 20+ hours at depths up to 450 meters while maintaining acoustic communications with the host ship.