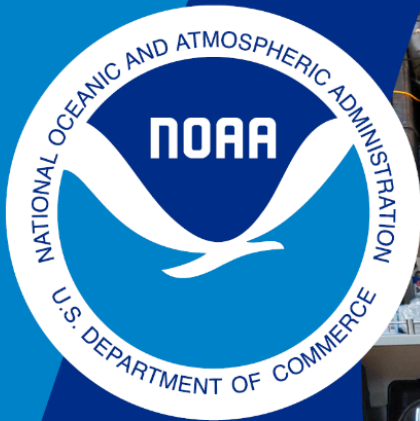


# NOAA Uncrewed Marine Systems Manual

Produced on behalf of the  
Uncrewed Systems Executive  
Oversight Board  
February, 2025



## Endorsement Page

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Please direct any questions regarding this Manual and associated guidance to  
[umsd.oma@noaa.gov](mailto:umsd.oma@noaa.gov).

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## 1) Purpose

NOAA Administrative Order [NAO 212-19](#) prescribes agency policy and responsibilities for the management and utilization of Uncrewed Maritime Systems (UMS) in support of National Oceanic and Atmospheric Administration (NOAA) Programs. The objectives of this Order are to:

- Foster and facilitate cooperation within NOAA and collaboration with external stakeholders having a common interest in safe, efficient, and environmentally responsible UMS operations;
- Manage and minimize operational risks through implementation of risk mitigation and best practices;
- Abide by NOAA adopted best practices, including seaworthiness, operational safety, and environmental performance standards;
- Foster a culture that values the skilled UMS operator;
- Encourage sharing of UMS-relevant information to promote efficiencies and quality in NOAA UMS Operations;
- Establish a NOAA UMS Advisory Board;
- Guide the operations of the NOAA OMAO UxS Operations Center in regards to UMS;
- Make UMS safety and environmental performance a priority for all NOAA UMS operations; and
- Ensure UMS data management practices comply with NOAA data management directives.

This Manual is promulgated to support, implement, and operationalize the NAO, and to prescribe the policies necessary to do so. The Manual has been reviewed and cleared by the UMS Advisory Board and approved by the Uncrewed Systems Executive Oversight Board (UxS EOB).

## 2) Authority

NOAA Administrative Orders are agency directives that remain in effect until superseded or canceled by appropriate action. NAOs cover substantive program matters and administrative management policies, procedures, requirements, and responsibilities.

NOAA Administrative Order NAO 212-19 is specific to the operations and administration of NOAA Uncrewed Maritime Systems. Section 4 of that order describes NOAA's UMS policy. Section 4 specifically calls for a NOAA UMS Standards and Procedures Manual (this Manual), consisting of a broad programmatic core Manual

containing approved operational standards and reference information supporting NOAA-wide applications. It is developed and maintained by the NOAA Uncrewed Systems Operations Center (UxSOC) and UMS Advisory Board, and is approved and promulgated by the Uncrewed System Executive Oversight Board (UxS EOB). Supplemental UMS policies and operating Manuals may be developed by NOAA Programs to address their unique program and/or mission requirements.

### 3) Scope

This Manual has an identical scope as NOAA Administrative Order NAO 212-19 from which it derives authority. *Uncrewed Maritime Systems* (UMS) means remotely operated or autonomous craft that can function without an onboard human presence and that may include associated components such as control and communications. UMS do not include exclusively aerial systems of any kind. UMS include underwater, surface, and hybrid systems (i.e. systems that operate both on the surface and below the surface). For purposes of this Manual, the term UMS includes, but is not limited to, the following terms that may be used in statutes, regulations, or policies: "remotely operated vehicles," "unmanned systems," "unmanned vehicles," "autonomous systems," "autonomous vehicles," and variants including "unmanned surface vehicles/systems," "unmanned underwater vehicles/systems," "autonomous surface vehicles/systems," and "autonomous underwater vehicles/systems." The term UMS does not encompass buoys, drifters, or floats.

The Manual is applicable to:

- a. UMS operated by NOAA federal, NOAA Corps or NOAA contractor personnel;
- b. UMS operated by cooperating partner organizations from NOAA vessels or facilities by the partner's personnel; and
- c. UMS owned or leased by NOAA

This Manual is not applicable to external partners who are operating UMS independently to provide data to NOAA, typically referred to as “data-as-a-service”.

### 4) NOAA UMS Categorization and Identification

There are many types and variations of UMS across the agency; they encompass underwater and surface vehicles, craft propelled by batteries, internal combustion engines, hybrid, and by environmental energy in the form of wind, waves, or solar power. They have varying degrees of autonomy, ranging from direct and immediate human control to high degrees of autonomy to avoid obstacles, comply with nautical rules of the road, and sample the environment adaptively. Finally, UMS used or relied upon by

NOAA are subject to a variety of administrative regimes, ranging from government-owned and operated to contractor-owned and operated with direct NOAA guidance, to data-as-a-service platforms with little or no government direct control.

The following categorization is intentionally broad and flexible and classifies UMS by vehicle type, size, and fuel type to reflect the relative level of risk presented by each. It is subject to change as NOAA's use of UMS and the types of vehicles expand.

**Categorization:**

NOAA's UMS can be divided into four broad categories: uncrewed surface vehicle (USV), uncrewed underwater vehicle (UUV), buoyancy glider, and remotely operated vehicle (ROV).

Within the USV and UUV categories, the UMS are further subdivided into classes to reflect different levels of operational risk and complexity.

All buoyancy gliders and ROVs are treated as a single class in each category.

Uncrewed Surface Vehicles:

USV's primary operational risk involves collisions or allisions with other marine craft, including manned vessels, loss or damage to government property (i.e. the USV), harm to personnel in launch and recovery, and damage to the environment through hazardous material spills and/or damage to the aquatic environment or benthos when sinking or when sunk.

To roughly reflect the potential for harm, USVs are divided into three classes based on length overall, which typically correlates to mass and speed. That is, larger USVs typically are more massive and can achieve higher speeds, and, therefore, have increased potential to cause damage from collision.

	Class 1	Class 2	Class 3
USV	Greater than 12m	Between 3m and 12m	Less than 3m

*Examples:*

Class 1: Saildrone Surveyor, Manta 38, DriX O16

Class 2: Saildrone Voyager and Explorer, DriX H8, C-Worker 5 and 7, SeaTrac

Class 3: Echoboat 240, Waveglider

Uncrewed Underwater Vehicles:

UUV’s primary operational risk involves harm to personnel during launch and recovery and loss or damage to government property. Since they operate primarily by battery power and well below the surface, interactions with surface marine traffic are of significantly lower risk than with USVs.

In general, the risks of damage during launch/recovery and the complexity of required handling systems correlate to vehicle mass. Small UUVs can be launched by hand from small boats or shore, while larger UUVs may require shipboard cranes, davits, or specialized handling systems. To reflect operational considerations and complexity, UUVs are divided into three classes based on mass.

	Class 1	Class 2	Class 3
UUV	More than 400 kg. (big ship launched)	100-400 kg. (small R/V/light crane launched)	0 to 100 kg. (hand launched)

*Examples:*

Class 1: REMUS 6000, Bluefin 21, Hugin

Class 2: REMUS 600

Class 3: REMUS 100 and 300

Buoyancy Gliders

Buoyancy gliders, while often considered UUVs, have mission profiles and risks that are substantially different from battery-powered and propelled UUVs. Given their high endurance (untended by ships, often deployed for multiple months), lower cost (\$250K each or less for bare hulls), and low speeds (0.5-2 kts.), the resultant different risk profile warrants them being treated separately from battery-powered and propelled UUVs. All buoyancy gliders are treated as a single class.

*Examples:*

Teledyne Slocum, Seaglider

Remotely Operated Vehicles

All ROVs are treated as a single class.

*Example:*

Deep Discoverer

**Identification:**

NOAA USVs and UUVs will be identified by a three-segment nomenclature identifying the category, size descriptor, and sequential number assigned by the OMAO UMS Division. Gliders will be identified by a two-segment nomenclature identifying the category and sequential identification. A dash is included between segments as a delimiter and to aid machine readability.

<i>UMS Category</i>	<i>Prefix</i>	<i>Descriptor</i>	<i>Sequential ID</i>
Surface Vehicles	US	Length Overall (LOA)	Three digits
Underwater Vehicles	UU	Diameter or beam	Three digits
Buoyancy Gliders	UG	Not applicable	Three digits
ROV	UR	Not applicable	Three digits

*Examples:*

DriX H8	LOA: 7.7m.	US-8-001
REMUS-600	Diameter: 32.4cm.	UU-32-001
Slocum G3 Glider	N/A	UG-001
Deep Discoverer	N/A	UR-001

## 5) Legal Governance

All activities in ocean spaces are governed by international law as reflected in the UN Convention on the Law of the Sea (UNCLOS). UNCLOS establishes the rights and obligations of nations in those ocean spaces, including navigational rights and environmental obligations. Those rights and obligations are elaborated through numerous treaties and conventions, including those negotiated at the International Maritime Organization (IMO), such as the Convention on the International Regulations for Preventing Collisions at Sea (COLREGS), the International Convention for the Safety



of Life at Sea (SOLAS), and the International Convention for the Prevention of Pollution from Ships (MARPOL).

Congress has yet to enact a law that specifically imposes requirements on the deployment and use of UMS as the term is defined by [NOAA Administrative Order 212-19](#). However, several federal laws contain requirements that apply to UMS, and others may come to apply to UMS as agencies settle on interpretations of laws they administer.

Federal laws with requirements that may apply to the operation of agency UMS include the Marine Mammal Protection Act, the Endangered Species Act, the National Environmental Policy Act, the National Marine Sanctuaries Act, and the Clean Water Act. Compliance is mandatory when these laws apply, and NOAA, as a steward of the marine environment, has an institutional obligation to set a high standard.

The U.S. Coast Guard is the federal agency principally responsible for marine safety. The Coast Guard has not yet promulgated regulations that specifically address UMS or issued guidance that applies existing Coast Guard regulations to UMS. In the absence of such regulations or guidance, NOAA UMS operators must coordinate with the U.S. Coast Guard Sector within whose jurisdiction activities are planned before beginning UMS operations.

The NOAA UMS Advisory Board will continue to monitor the adoption and implementation of federal regulations, guidance, and policy that address UMS operations and will update this Manual accordingly.

## 6) Environmental Compliance

All UMS operations must comply with the National Environmental Policy Act, 42 U.S.C. § 4321 *et seq.*; see [NOAA Administrative Order 216-6A: Compliance with the National Environmental Policy Act, et al.](#) Depending on their nature and location, UMS operations may also require a permit, authorization, or inter-agency consultation to comply with other Department of Commerce and NOAA Administrative Orders and applicable legal requirements, including but not limited to, those imposed by the Marine Mammal Protection Act, 16 U.S.C. § 1361 *et seq.*, the Endangered Species Act, 16 U.S.C. § 1531 *et seq.*, the Migratory Bird Treaty Act, 16 U.S.C. § 703 *et seq.*, the National Historic Preservation Act, 54 U.S.C. § 300101 *et seq.*, the essential fish habitat provisions of the Magnuson-Stevens Fishery Conservation and Management Act, 16 U.S.C. § 1801 *et seq.*, implemented through regulations at 50 C.F.R. Part 600, and the National Marine Sanctuaries Act, 16 U.S.C. § 1431 *et seq.* The NOAA-authorized UMS operator shall verify compliance with all applicable environmental regulations prior to commencing operations. In instances where the authorized operator is not the project proponent, such as the UxS Operations Center operated DriX supporting NMFS projects, the operator and proponent shall clearly coordinate on responsibilities for environmental compliance and permitting. Generally, the proponent is responsible for completing any consultations and

obtaining any permits that are necessary, and for demonstrating compliance to the operator prior to project initiation.

## 7) Cyber-security Requirements

The Department of Commerce (DOC), Office of Cybersecurity and IT Risk Management (OCRM), Office of the Chief Information Officer (OCIO) publishes the [Enterprise Cybersecurity Policy \(ECP\)](#). The ECP establishes the Cybersecurity Program governance framework, and roles and responsibilities for implementing security and privacy controls throughout the Department. The OCRM performs annual reviews of the ECP and makes updates as necessary to ensure alignment with new Federal policy, mandates, standards, and guidance issued by the OMB, National Institute of Standards and Technology (NIST), Department of Homeland Security (DHS), Cybersecurity and Infrastructure Security Agency (CISA), Committee on National Security Systems (CNSS), Office of the National Cyber Director (ONCD), and the Office of the Director of National Intelligence (ODNI). All DOC Bureaus must adhere to the ECP and may develop supplemental policies if necessary to address specific Bureau mission needs. However, Bureau supplemental policies must meet or exceed the minimum requirements set forth in the ECP. The Uncrewed Marine Systems (UMS) Cyber Working Group will leverage the ECP to address UMS cybersecurity issues and concerns. This guidance is available at the link above and will serve as an overarching UMS cybersecurity benchmark for all NOAA UMS security and privacy requirements. The authorized NOAA UMS operator is responsible for security and privacy compliance utilizing the references provided above.

## 8) Data Management

[NOAA Administrative Order 212-15B: Management of NOAA Data and Information](#), ensures that NOAA data are treated as a strategic asset and managed to maximize NOAA's investment in environmental information. The [NOAA Data Management Handbook](#) provides detailed guidance on how to implement the Administrative Order. Please refer to these resources for complete information.

These documents direct the use of Data Management Plans regardless of where NOAA personnel are in the data collection process, to ensure that data collected complies with NOAA policies and guidelines. If there are any questions regarding Uncrewed Systems (UxS) data management, contact [ncei.uxs.data@noaa.gov](mailto:ncei.uxs.data@noaa.gov).

## 9) Inventory Requirements

[NOAA Administrative Order NAO 219-19](#): *NOAA Uncrewed Marine Systems* dictates that all UMS owned by NOAA are categorized and identified per the scheme set forth in this Manual and listed in an annual inventory report. Line and Program Offices that own or operate UMS are responsible for providing timely input for the annual reports.

On behalf of the UMS Advisory Board, the UMS Division will initiate an annual UMS inventory refresh and review with emails to known owners of NOAA UMS. NOAA UMS owners should review and update inventory information. Any additional information relating to the location, mission, and status of NOAA-owned UMS is greatly appreciated. Acquisitions of additional UMS can be added to the inventory at the time of acquisition by [filling out this form](#). Partner-owned, partner-operated, and data as a Service UMS can optionally be added to the inventory to maintain awareness of NOAA UMS projects. Line and Program Offices are responsible for ensuring that any UMS under their purview are included in the inventory. Please reach out with any questions or updated information to [umsd.oma@noaa.gov](mailto:umsd.oma@noaa.gov).

## 10) Training & Certification

Operators of NOAA UMS will have adequate, comprehensive experience with their specific platform and environmental conditions to be encountered in each evolution. NOAA personnel gain such experience over time by being initially trained in basic platform operation, and through iterative evolutions of increasing complexity and requirements, with the NOAA operator performing roles of increasing responsibility under the guidance and advice of more expert NOAA operators.

In instances where a NOAA operator's exposure to certain platforms is limited and/or incipient, the platform manufacturer is most commonly utilized as the source of expert knowledge and operational advice. For platforms with operational maturity, NOAA personnel routinely achieve expert status and develop roles as platform experts for NOAA operations. Depending on the number of such platforms operated by NOAA, such personnel may replace manufacturers' experts in training roles, developing and teaching platform and NOAA specific curricula, in cooperation with, or to the exclusion of manufacturers' representatives.

Before operating UMS for NOAA, NOAA personnel should undertake available training on the specific platform, whether taught by the manufacturer or, if available, a qualified NOAA trainer. Third party trainers are also a possibility if they have an established record of performance and accountability. In addition to the minimum platform specific training, NOAA personnel should gain initial operating experience under benign,

controlled conditions and under the watch of platform experts before venturing into operations in challenging conditions.

For USVs, and UUVs when periodically at the surface, safe operations entail interacting with the marine transportation system (e.g., other vessels and boats, other watercraft, channels, aids to navigation, fairways and restricted areas, and maritime authorities, including port state control, traffic systems, etc.). As such, NOAA USV and UUV operators should have additional training to ensure familiarity with the COLREGS, collision avoidance, and general maritime practice as appropriate for operations.

## 11) NOAA UMS Best Practices

### Maritime Safety and Protection of the Marine Environment

To promote maritime safety and protection of the marine environment, agency staff and agency contractors are to ensure that –

- a. They equip and/or use NOAA UMS in a manner that does not present an unreasonable risk to persons, property, living marine resources, or the marine environment;
- b. They equip NOAA UMS in such a manner as to minimize risk of collision, allision, or harm to vessels, persons, property, living marine resources, and the marine environment including, but not limited to, the appropriate use of lights, sounds, markings, and electronic signals to ensure that NOAA UMS can be detected, identified, and avoided. To help minimize any such risks, NOAA UMS used exclusively or predominantly at the surface are to be equipped and/or configured, to the extent practicable and appropriate, with:
  - i. technology that offers-look-out capability commensurate with the expected environmental and marine traffic conditions;
  - ii. radar reflectors and other reflective markings;
  - iii. markings that identify NOAA as the owner or operator, including contact information (e.g., email address and/or phone number) along with the UMS identification number issued by the OMAO UMS Division;
  - iv. markings that identify the UMS as a UMS, e.g., UNCREWED;
  - v. high visibility coloration;
  - vi. an Automatic Identification System (AIS) transponder that broadcasts a unique identifier; e.g.: UNCREWED;
  - vii. sound-producing and listening devices that mimic the requirements for providing and monitoring audible alerts/warnings under COLREGs;
  - viii. multiple modes of communication;
  - ix. a device to transmit and record position; and
  - x. other safety devices as deemed necessary.

- c. They equip UMS that primarily operate underwater (UUVs, Gliders, and ROVs) to the extent practicable and appropriate with:
  - i. markings that identify NOAA as the owner or operator, including contact information (e.g., email address and/or phone number) along with the UMS identification number issued by the UMS Division;
  - ii. high visibility coloration;
  
- d. They conduct an assessment of the risks associated with the use and/or operation of a NOAA UMS prior to such use or operation. This risk assessment should include, but not be limited to, consideration of:
  - i. Weather and oceanographic conditions relative to the performance capability of the NOAA UMS;
  - ii. The normally anticipated failure modes of the NOAA UMS (lost link, power or equipment failures, loss of control, etc.) and the resultant consequences of any such failure modes;
  - iii. Notices to Mariners and other public information regarding potential hazards to navigation or conflicting uses in the planned operating area;
  - iv. Circumstances with respect to the operating area, including visibility conditions, vessel traffic likely to be encountered, compliance with regulations as appropriate to the operation; and abnormal procedures;
  - v. The need to notify mariners with respect to their intended operations by all reasonable means, including the use of escort vessels where practicable and appropriate;
  - vi. Communication, command, and control requirements; and
  - vii. Reliability, performance, and seaworthiness standards.
  
- e. They use and/or operate NOAA UMS in such a manner as to minimize risk of collision, allision, or harm to vessels, persons, property, living marine resources, and the marine environment including, but not limited to, using or operating them:
  - i. with a system of functional checks upon or shortly after deployment/ before the mission begins;
  - ii. with a human-in-the-loop monitoring the UMS and its environment,
  - iii. For USVs, continuous operation and monitoring of collision avoidance systems by appropriately trained operators whenever the vehicle is underway (i.e., not on land or secured to a pier or mothership);
  - iv. with a contingency plan to respond to foreseeable unplanned incidents (e.g., damaged or dysfunctional UMS); and
  - v. with a plan to address technical difficulties/contingencies.
  
- f. They use and/or operate NOAA UMS only when authorized to do so and they have adequate experience and proper training as described in the **Training and Certification** section of this Manual. Authorization means that an appropriately trained NOAA employee or contractor has been granted permission for the use of the UMS for testing, training or to meet mission needs.

- g. They comply with any applicable international and domestic legal requirements as they relate to NOAA UMS use and/or operations.
- h. They respect any environmental designations applicable to the area in which the UMS operates, such as marine protected areas designated by federal, state, tribal, or local authorities. See [NOAA Marine Protected Areas Inventory](#). Operating a UMS in designated areas, particularly at times of the year when there is the potential for disturbance to wildlife (*e.g.*, migrating birds), may be an activity that requires prior permission from the relevant environmental or conservation authority. Further, their advice should be sought in advance.
- i. They cooperate with domestic authorities in response to emergency NOAA UMS deployments and incidents.

### **Operational, Safety, Maintenance, and Repair Considerations**

NOAA is to ensure that –

- a. Operating, safety, emergency, and maintenance procedures are documented and available for review in the appendices to this Manual;
- b. Appropriately trained and authorized personnel are identified for all stages of NOAA UMS deployment and operations and given the appropriate directions and authority to act on those responsibilities;
- c. Procedures to cover NOAA UMS programming and system checks are documented and protected; and
- d. All NOAA UMS are inventoried by and registered with the UMS Division of the UxS Operations Center.

### **Public Awareness and Communications**

To foster public awareness and communications, agency staff and agency contractors are to ensure that –

- a. Any applicable U.S. Coast Guard policies and requirements with respect to public notification are followed. At a minimum, the appropriate USCG Sector should be contacted as soon as operational details are known.
- b. A designated agency point of contact is available to respond to inquiries about NOAA UMS deployments at [umsd.oma@noaa.gov](mailto:umsd.oma@noaa.gov).

## 12) Operational Loss and Incident Reporting

### Definitions

#### a) Accident

A NOAA accident is defined as an unplanned event, or series of events, which results in one or more of the following:

- Occupational illness to NOAA employees, volunteers, student interns, NOAA Corps personnel, or NOAA affiliates;
- Injury to on-duty NOAA employees, volunteers, student interns, or NOAA affiliates.
- On or off-duty injury to NOAA Corps personnel;
- On or off-duty injury to NOAA employees, volunteers, student interns, NOAA affiliates, or NOAA Corps personnel while at sea;
- Damage to NOAA property;
- Damage to public or private property and/or injury or illness to non-NOAA personnel caused by NOAA operations (e.g., NOAA had a causal or contributing role in the accident); and
- Damage to the environment, hazardous material spill, impact on ecosystems, protected species.

#### b) Incident

A NOAA incident is defined as an unplanned event or series of events which results in one of the following:

- A NOAA accident;
- The unintentional release of a hazardous substance into the environment;
- The unintentional exposure of a NOAA employee, volunteer, student intern, NOAA affiliate, or the general public to a radioactive substance; and
- A near-miss event that could have resulted in a NOAA accident.

#### c) Near Miss

A NOAA near miss is defined as an unplanned event or series of events, which:

- Did NOT result in injury, illness, property or environmental damage;
- Was not considered during the mission's operational risk assessment (i.e., not incidental to normal operations); and
- Could have resulted in an incident/accident if allowed to progress without interruption and/or without last minute intervention.

#### d) Casualty, Damage and Conditions Found

A NOAA casualty, damage and conditions found is defined as material condition of equipment that has been compromised, breached, or rendered inoperable due to events or conditions other than normal wear and expected life cycle.

### **Reporting Responsibilities**

Incident reporting requirements exist to learn from experience and modify best practices when appropriate. Damage and loss not considered to be incidental to normal operations must be reported to NOAA's Safety and Environmental Compliance Office via the NOAA [Online Incident Reporting System](#). All reported incidents, including near misses, are investigated and characterized by the NOAA Safety and Environmental Compliance Office. UMS incidents that involve a UMS host vessel may also be investigated by the host vessel operator, whether the operator is OMAO, a NOAA Line Office, or other entities.

In addition to incident investigations performed by the NOAA Safety and Environmental Compliance Office and NOAA UMS operators, the UMS Advisory Board (and/or UMS Division) will make available experienced UMS operators and staff to investigate any incidents involving NOAA UMS. These UMS operators will assist investigation teams to apply UMS-specific knowledge and experience in any investigations on an ad-hoc basis as requested.

Additionally, at least annually, summary investigations will be performed by the UMS Advisory Board to retrospectively review all UMS incidents, identify causal factors and corrective actions indicated, and disseminate findings to the NOAA UMS community of practice via appropriate fora, including an annual written UMS Incident Summary to be reported to the UxS EOB, as well as public presentations to the user community.

To summarize, UMS Incident reporting requirements involve two primary pathways:

- 1.) through NOAA's Safety and Environmental Compliance system via the [NOAA Online Incident Reporting System](#) to serve general incident reporting requirements. When filing the required report, add [umsd.oma@noaa.gov](mailto:umsd.oma@noaa.gov) as an 'informed party', and
- 2.) directly to the UMS Division via email ([umsd.oma@noaa.gov](mailto:umsd.oma@noaa.gov)).

The UMS Division will be responsible for notifying the relevant [Line Office primary member and any designates](#) within 24 hours of receipt of a UMS incident report.

Additionally, the UMS Division will host a repository for NOAA safety incident information using the [UMS Division intranet site](#), and will ensure complete and adequate response to incidents, whether they involve property damage, personnel injury, or hazardous materials releases.



### **Notification Chain and Timelines**

NOAA UMS operators involved in any incident or near miss should make immediate efforts to capture and preserve incident relevant facts and information, and promptly initiate an incident report via the [NOAA Online Incident Reporting System](#), and via email to [umsd.oma@noaa.gov](mailto:umsd.oma@noaa.gov) in addition to cooperating with any investigation that may be performed by the vessel operator and reporting up the NOAA operator's chain of command. At least annually, the UMS Advisory Board will review incidents reported in the preceding year in order to develop and promulgate appropriate lessons learned to the UxS Executive Oversight Board and to the user community.

### **Investigation Authority**

NOAA Administrative Order NAO 212-19, Section 5.03.e.iv provides that the UMS Advisory Board may review UMS incidents and near-misses to document lessons learned and recommend risk mitigation strategies and measures.

## **Appendices - UMS Category-specific Best Practices**

- 1 Category 1
- 2 Category 2

# Audit trail

## Details

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