



# CIMRS

Cooperative Institute for Marine Resources Studies



**Oregon State**  
University

CIMRS is a leader in marine resource and ecosystem research in the Pacific Northwest

## Cooperative Institute for Marine Resources Studies at Oregon State University

The Cooperative Institute for Marine Resources Studies (CIMRS) at Oregon State University is a National Oceanic and Atmospheric Administration (NOAA) Cooperative Institute. For 42 years, CIMRS has conducted cutting-edge transdisciplinary research that supports NOAA's mission, goals, and strategic initiatives, while training the next generation of marine scientists to advance knowledge of ocean ecosystems. CIMRS researchers and partners work from local to global scales to address NOAA's strategic emerging science and technology focus areas in support of numerous NOAA science centers, laboratories, and line offices.

### What Makes CIMRS Unique?

- **Our Co-Location with NOAA, Hatfield Marine Science Center, Marine Studies Initiative, and other Partners**—Our greatest strength is the partnerships that have developed from synergies built through decades of co-location and shared marine and coastal research in Newport, Oregon. Newport is home to three NOAA line offices—the Office of Marine and Aviation Operations (OMAO), the National Marine Fisheries Service (NMFS) Northwest Fisheries Science Center (NWFSC) and Alaska Fisheries Science Center (AFSC), and Oceanic and Atmospheric Research's Pacific Marine Environmental Laboratory (OAR, PMEL)—the Hatfield Marine Science Center, the OSU Marine Studies Initiative, the Marine Mammal Institute, Oregon Sea Grant, three other federal agencies (Environmental Protection Agency, US Department of Agriculture, and US Fish and Wildlife Service), and the Oregon Department of Fish & Wildlife. Close proximity among fisherman, academic, and agency scientists at a working waterfront facilitates long-term partnerships and efficiencies that foster unique research at scales that fuel innovative transdisciplinary marine and coastal research.
- **Our Dedication to Workforce Development**—CIMRS emphasizes workforce training where unique academic-agency mentoring among students, post docs, and faculty has generated key leadership at NOAA, the nation's top marine universities, NGO's, and private industry enterprises.
- **Our Ability to be Flexible, Efficient, and Nimble**—Linking NOAA directly to top-rated marine university scientists and their partners provides a nimble context that efficiently pivots to address exciting research initiatives through cost-effective facility and administrative function.
- **Our Track Record of Serving the Needs Within and Across NOAA Line priorities.** CIMRS works within and across line offices to achieve multiple goals. For example, the development of an integrated, multi-layer Geographic Information System (GIS) database for West Coast groundfish integrated oceanographic, biological, geological and groundfish fisheries data. Spatial maps classify, characterize, and predict the distribution of seafloor habitats to study relationships between habitat types and fishing ground productivity, and to document the consequences of management options on harvest and habitats. This approach meets the needs of several NOAA line offices, fisheries science centers, and laboratories.



## An Example of a Flagship Program Supported by CIMRS-HMSC-MSI

Each year, CIMRS explores opportunities to make scientific contributions in new and emerging areas and strategically advance unique and long-standing flagship programs in partnership with NOAA and OSU's Hatfield Marine Science Center, and Marine Studies Initiative. One example is the Newport Hydrographic Line/Ocean Ecosystem Monitoring project illustrated below. For examples of other flagship programs, see the CIMRS website @ [www.cimrs.org/flagship](http://www.cimrs.org/flagship).

### Newport Hydrographic Line/Ocean Ecosystem Monitoring

The Newport Hydrographic (NH) Line 20+ year time-series informs our understanding of the connectivity between changes in ocean-climate and ecosystem structure and function. It is the only long-term, high-frequency dataset of its kind for the California Current, providing fortnightly to monthly data collection to monitor and study climate variability and climate change through physical, chemical, and biological oceanographic metrics. Data are distilled into ocean ecosystem indicators used to:

- Characterize the habitat and survival of juvenile salmonids.
- Inform Pacific Fishery Management Council coastal pelagic species Stock Assessment and Fishery Evaluation.
- Inform critical and emerging issues, such as marine heatwaves, ocean acidification, hypoxia, and harmful algal blooms.

Ocean ecosystem monitoring from the NH Line is known for the high frequency, longevity, and scientific rigor of the sampling, and the near real-time availability of the data that enables managers to anticipate effects of changing ocean conditions on fisheries. The NH Line received the 10<sup>th</sup> POMA Award at the 2017 PICES Annual Meeting for significant advancement of marine science in the North Pacific through long-term ocean monitoring and data management.



### The Contributions of the Newport Hydrographic Line Project

Assess ecosystem status and trends

Characterize ecological interactions within and among species

Characterize habitat and ecosystem processes, climate variation, and organism viability

Use physiological, biological, and behavioral information to predict population-level processes

Implement ecosystem-based management

Ensure safe seafood for healthier populations

Understand how climate influences ecosystem variability

## Research Horizons – Addressing Emerging Challenges

As new ocean challenges and opportunities arise, CIMRS is responding by adding capacity to its research expertise portfolio through its many partnerships. Examples include:

- Expanding partnerships with academic oceanographic programs on the West Coast that focus on the California Current ocean and coastal research.
- Partnering with industry, renewable energy, and defense to inform sustainable use of marine resources, while protecting marine mammals.
- Investigating new mapping and monitoring technologies to support shoreline change analysis, inundation modeling, benthic habitat mapping, marine navigation, and coastal resource management.
- Advancing emerging tools in 'omics and cloud resources to integrate diverse, large data and modeling tools to better characterize, monitor, and predict impact of increasingly complex forces affecting marine ecosystems.
- Supporting offshore aquaculture production using renewable wave energy to reduce negative impacts to air, sound, and water quality.
- Developing new designs and uses for autonomous underwater vehicles and sensors to map the ocean floor, record environmental information, apply artificial intelligence to identify hazards to navigation, and explore geologic formations.
- Fully integrating human dimensions and social sciences across all marine and coastal research to better acknowledge and understand this complex and coupled human-natural system that underpins our society and resources.



## Advancing NOAA Strategic Priorities

The first four decades of marine and coastal research through CIMRS has helped NOAA address numerous priorities, from understanding the status and informing the management of commercial fisheries to developing unmanned technologies that collect and share data about changes in ocean chemistry in real time. Foundational to this research has been **workforce development**—providing training and educational opportunities for the next generation of ocean researchers that have the skills, abilities, and knowledge to think critically and creatively, and to develop, use, and maintain new technologies and approaches that advance our understanding of ocean processes. We fuel this through Graduate and Undergraduate Fellows that we co-recruit with OSU's Marine Studies program, advancing opportunities to nurture diverse skills suited to emerging global marine needs. We are proud of our ~70 CIMRS graduates now serving key enabling and leadership roles at NOAA labs, top universities, and private sector enterprises (e.g., NWFSC, PMEL, AFSC, WCR, OSU, UW, UMA, APL, PNNL, ESRI, EU BioMara, etc.).

Examples of how CIMRS has advanced NOAA priorities:

- Contributing to marine and coastal science through an average of 30 peer-reviewed publications per year.
- [Producing forecasts of returns of salmon](#) to the Columbia River and coastal rivers of Oregon and Washington through CIMRS research on ecosystem status assessments using basin-scale climate indicators and physical and biological oceanographic indicators.
- Developing [autonomous moored hydrophone instruments that record acoustic energy](#) from underwater seismic activity and marine mammals to provide wide-area, continuous monitoring of global ridge systems.
- Developing an integrated, multi-layered [GIS database for West Coast groundfish](#) through the integration of oceanographic, biological, geological, and groundfish fisheries data to characterize, classify, and predict the distribution of seafloor habitats, study relationships between habitats and fishing grounds, and document management alternative consequences.
- Characterizing the extent and health of marine ecosystems to understand the causes and consequences of ecosystem change, and to [forecast future change to ecosystems](#), or potential socioeconomic consequences of change.
- Forecasting the [impact of global warming on coastal and ocean habitat affecting marine resources](#) due to modification of temperature regimes, ocean acidification, and hypoxia through observations of physical and biological oceanographic conditions.
- Improving assessments and evaluation of fisheries management strategies and actions through [analysis of community resilience and commercial fishing fleets](#) as well as effort shifts.
- Integrating biological data on species distribution and habitat use into regional programs on [coastal marine spatial planning](#) centered on renewable ocean energy, aquaculture, and fishing.
- Assessing the [vulnerability, resilience, and well-being in risk assessment and communication for coastal communities](#).
- Assisting NOAA in [collecting data and monitoring important commercial and recreational fish stocks and assessing the status of stocks in the California Current](#).

### Examples of CIMRS Focal Areas Informing Understanding of Key Marine and Coastal Issues

- CIMRS Changing Ocean Conditions research embraces empirical and modeling studies to predict changes in climate, weather, oceans, and coasts, and to conserve and manage coastal and marine ecosystems and resources.
- CIMRS Marine Species and Ecosystems research informs NOAA ecosystem-based management strategies that incorporate interactions with the ocean, cumulative impacts, management, use, and sustainability of marine and coastal resources.
- CIMRS Coastal Mapping, Monitoring and Geodetic Surveying research helps NOAA monitor coastline changes, enhance coastal resilience, and inform coastal management and resource decisions.
- CIMRS Ocean Acoustics research helps us understand and discriminate how natural marine systems and animals make sound, and determine the potential impacts of volcanic activity, iceberg melting, man-made and other noises on the underwater environment.
- CIMRS Seafloor Processes research hydrothermal vents, methane seeps, and submarine volcanism. Through its unique Newport Helium Isotope Laboratory, we discover, characterize, and study chemical and physical interactions between solid Earth and the ocean.
- CIMRS Coastal Hazards and Resilience research advances understanding of the nature and determinants of socially optimal investment in natural infrastructure in coastal and estuarine resilience.



For more examples, see the CIMRS website at [www.cimrs.org](http://www.cimrs.org).

## CIMRS 2021–2030

The next decade offers exciting new opportunities for Newport-based OSU programs—CIMRS, HMSC, and MSI—and OSU researchers to help NOAA adapt and mitigate for changes in our ocean by implementing cutting-edge research that informs each of NOAA’s six line offices (Figure 1). **Technology and Innovation** as well as **Mapping, Monitoring, and Surveying** are keystone strengths of CIMRS and inform the outcomes of the six CIMRS focal themes. Each of the six themes is also reliant upon **Data Analytics** and **Human Dimensions**. Understanding the impact of humans on the ocean, the impact of the ocean on humans, and the human aspects of ocean governance provides the scientific basis for ensuring ocean health and quality of life for this and future generations (Joint Subcommittee on Ocean Science and Technology, 2007).

In its 5<sup>th</sup> decade, CIMRS and its Newport-based partners—HMSC, and MSI—seeks to support numerous NOAA priorities, including:

- Supporting the development of a multi-mission mapping fleet, integrating the efficient collection of information and data across numerous research projects to address the most pressing marine and coastal research questions.
- Use of technology and innovation to meet emerging information marine and coastal information needs associated with ‘omics, unmanned systems, artificial intelligence, and cloud services.
- Conducting ocean and coastal mapping, monitoring, and survey research to achieve NOAA’s National Ocean Mapping and Exploration Strategy.
- Developing research and technology to support sustainable aquaculture.
- Conducting stock and species assessments to inform conservation and restoration of coastal habitats and ecosystems.
- Understanding and forecasting the effects of climate change on marine and coastal ecosystems.
- Collection of coastal hazard- and climate change-related data to enhance community resilience and communicate risk.
- Understanding ecosystem, climate, and habitat condition to inform assessment and management of US fisheries, including mitigating the impacts of changes in climate on protected species and their habitats.
- Developing acoustic technologies, tools, and services to address numerous NOAA priorities.
- Characterizing and monitoring seafloor environments to better understand and predict solid Earth and ocean interactions.
- Delivering integrated data, tools, and information to guide decisions about complex ecosystem and coastal management challenges.



Figure 1. CIMRS focal areas.

### CIMRS and Oregon State University

Faculty from within CIMRS and from the colleges of Earth, Oceanic and Atmospheric Sciences, Sciences, Agricultural Sciences, Liberal Arts, Engineering, Forestry, and others contribute their expertise in areas such as fisheries, oceanography, human dimensions, sociology, economics, environmental arts and humanities, political science, anthropology, geology, geography, and others. This **transdisciplinary approach** strengthens all Oregon State University programs and positions CIMRS, HMSC, and MSI to deliver ocean and coastal research that helps us determine the effects of humans and nature in the ocean while developing potential strategies to mitigate and enhance resilience.

### Interested in conducting research through CIMRS?

CIMRS encourages researchers and students to inquire about opportunities for research, funding, and fellowships. For more information, go to [www.cimrs.org/opportunities](http://www.cimrs.org/opportunities).

# CIMRS Action Agenda 2030 – Achieving Our Vision

## Our Vision

To be a model of excellence and innovation conducting world-class transdisciplinary research focused on addressing important challenges facing the Pacific Northwest coast and ocean, leveraging NOAA expertise, facilities, and resources with Oregon State University academic strengths.

## Our Goals

### Research

*Conduct innovative, world-class, transdisciplinary marine and coastal research that meets NOAA's mission and strategic priorities and OSU-CIMRS expertise while advancing our understanding of and ability to respond to marine and coastal processes.*

1a. Foster multi-disciplinary collaborations to address complex scientific questions by engaging representatives from numerous OSU and other colleges, agencies, NGOs, and industry.

1b. Integrate human dimensions and social science disciplines in all research projects conducted through CIMRS by enhancing engagement with OSU colleges that have faculty and staff with this expertise.

1c. Create and sustain a diverse research portfolio focused on CIMRS focal areas built upon collaboration with NOAA as well as by CIMRS faculty supporting original research as PIs through competitive grants from NOAA, NSF, and others.

1d. Expand CIMRS research capacity to include regional marine ecosystem forecasting, supporting high resolution modeling and downscaling coupled with climate-ecosystem modeling that address ecosystem and economy-relevant questions.

1e. Expand ocean and coastal mapping, geomatics, and monitoring to support ecosystem-based management decisions, enhanced resilience through better geospatial data and modeling, and support of coastal resource management.

1f. Assess gaps in CIs and CI consortiums to determine if CIMRS can and should fill those gaps.

1g. Serve as a leader in the testing and developing new technologies that ultimately become NOAA standards.

1h. Support Blue Economy by helping NOAA transition new technologies to industry, as well as develop industry internships and partnerships.

## CIMRS Guiding Principles

- **Collaboration:** We embrace collaborations and partnerships to address the complex and challenging issues facing our ocean and coasts.
- **Training:** We guide and develop the next generation of marine scientists by fostering an environment that welcomes and supports a diversity of students with the skills, abilities, knowledge, training, and expertise to conduct meaningful research and invent and maintain needed technologies that inform our understanding of marine and coastal processes.
- **Sustainability:** We strive to be sustainable, creating a balanced funding portfolio that makes commitments to large-scale, long-term research while supporting a suite of short-term research studies capable of addressing more immediate challenges.
- **Transdisciplinary Research:** We acknowledge that understanding complex ocean and coastal issues requires researchers working from many different disciplines, including social sciences, to explore research questions at the intersection of their respective fields.

## Performance Metrics

- Basic and applied scientific research that addresses the highest priorities within CIMRS research focal areas and NOAA.
- Ability of CIMRS to meet NOAA's mission of science, service, and stewardship.
- Amount of funding secured on an annual basis for priority research in major focal areas.
- CIMRS contributes to measurable outcomes in marine-related management, use, conservation, and safety.
- CIMRS maintains a balanced portfolio that conducts research across a variety of disciplines and promotes transdisciplinary research.

## Workforce

*Foster the development of a diverse, skilled, trained, and experienced workforce to contribute to innovative marine and coastal research and technologies.*

- 2a. Establish pathways for engineering students and those from other underrepresented colleges to compete with other types of students for fellowships and other opportunities at OSU through CIMRS (e.g., engineering students may currently not be competing as well with students from other disciplines whose writing and other skills may be stronger).
- 2b. Contribute to the development of a workforce capable of implementing advanced, cutting edge technologies by training and graduating students with the technical skills (e.g., survey techs, electronic techs) to support the collection and assessment of data and information.
- 2c. Increase traditionally underrepresented groups in CIMRS research and activities.
- 2d. Expand experiential learning opportunities for students.
- 2e. Be a leader in diversity, equity, and inclusion by becoming a venue for training, dialogue, and support, including ongoing mentoring, introduction, and application training and guidance to students to help them succeed in attaining other NOAA-related experience and scholarships (e.g., NOAA's Hollings and EPP scholarships).
- 2f. Work with NOAA representatives to identify the skills, knowledge, and abilities (SKAs) the next generation of marine scientists needs to address emerging issues and technologies relating to marine and coastal research, and revisit these SKAs bi-annually.
- 2g. Create opportunities for student fellowships, internships, research, and field experience, and exposure to the Pacific Fishery Management Council.
- 2h. Develop mechanisms to allow exchange of personnel at all levels between CIMRS and industry.
- 2i. Enhance OSU and NOAA support for CIMRS faculty and scientists so that they are fully recognized as academic collaborators and principal investigators and rather than as temporary technicians.

### Performance Metrics

- Demonstrated ability to contribute to a workforce with the knowledge, skills, and abilities to meet existing and emerging marine industry and science needs.
- Talented students engaged in CIMRS research and activities that are representative of traditionally underrepresented groups.
- Number of CIMRS students and interns placed with industry, NGOS, and other government entities in their respective fields of study/work.
- Human resource enhancement evaluated by training and recruitment of new and diverse talent into NOAA, academia, and private industry.
- Expanding number of CIMRS-related researchers collaborating with non-CIMRS scientists and others.
- Maintaining and building support for CIMRS faculty to collaborate with NOAA and non-NOAA scientists to conduct original research as principal investigators through competitive grants from NOAA, NSF, and others.

## Outreach

*Build enhanced awareness, appreciation, and connection to the OSU-CIMRS brand to create a community of support and investment in the unique products and services CIMRS offers and develop a shared understanding of the value and benefits of CIMRS.*

- 3a. Host a summit or workshop annually to help identify emerging issues, potential collaborations and priorities.
- 3b. Ensure an OSU researcher has a presence at NOAA NW, PMEL, and AFSC to share CIMRS research.
- 3c. Develop a "four slides per project" approach to describing the work of CIMRS and share with OSU, PSU, University of Oregon, and other academic institutions (e.g., in Northern California and Idaho) as well as private industry to expand understanding of opportunities to collaborate with CIMRS.
- 3d. Participate in the Hatfield Research Summit bi-annually to increase collaboration across the Hatfield campus.
- 3e. Identify and communicate the values CIMRS offers to enhance understanding, promote collaboration, and shift the emphasis from being a funding transfer mechanism to an entity that adds significant value to NOAA interests (e.g., workforce development).
- 3f. Enhance collaboration with NOAA Marine Ops and the Rainier and Fairweather mapping ships. Make full use of proximity to NOAA MOC-P and engage mapping and fisheries vessels in mutually beneficial research.
- 3g. Implement actions that integrate NOAA line offices and strengthen visibility and engagement with NOAA entities (e.g., PMEL, AFSC, NWFSC, WRC, and NOS), adding value to NOAA programs and deliverables.
- 3h. Work in partnership with Oregon Sea Grant to conduct outreach to coastal communities and enhance outreach and information associated with marine and coastal research issues.
- 3i. Use social media platforms to highlight most recent CIMRS research and technological developments.
- 3j. Host science-management conferences to stimulate conversations and collaborations.
- 3k. Maintain an updated portfolio of programs and evaluate proposals in a portfolio context, not on individual merit. Articulate the process CIMRS undergoes to vet potential research projects, sunset research programs, and commit to longer-term scientific studies.
- 3l. Work with OSU Administration to highlight the contributions CIMRS makes in helping the university achieve its strategic plan, particularly as it relates to being a global leader in a) providing unique experiential learning opportunities b) engaging people to address the health and well-being of the ocean and coastal communities, and c) conducting and supporting interdisciplinary research, education, and engagement.
- 3m. Strengthen awareness and collaborations with OSU researchers and the new University of Washington cooperative institute, CICOES (Cooperative Institute for Climate, Ocean, and Ecosystem Studies), to enhance awareness and understanding of what differentiates the two institutes as well as how they can be supportive and complementary of one another.

### Performance Metrics

- CIMRS, and its brand, is widely recognized as a leader in basic and applied marine science research, addressing existing and emerging issues of importance.
- CIMRS produces an annual Year in Review, highlighting key outcomes of its basic and applied research, and articulating emerging issues.
- Expression of CIMRS value and contributions through its website, OSU outreach platforms, Oregon Sea Grant, NOAA, and others.

## Partnership

*Strengthen existing and develop new partnerships to achieve CIMRS' mission and to better position CIMRS as the "go-to" organization for joint NOAA-academic marine ecosystem and coastal research.*

- 4a. Conduct a bi-annual horizon scanning exercise with industry and international partners to match science needs with economic growth and commercial opportunities, and assess cross-cutting issues. Approach industry with a "value-driven" mindset focusing on mutual benefits and advancing the blue economy.
- 4b. Conduct a bi-annual horizon scanning exercise with NOAA staff to evaluate priorities and co-develop research proposals.
- 4c. Expand academic partnerships within the State of Oregon, in Northern California, and across NOAA Science Centers.
- 4d. Expand partnerships with the National Science Foundation OOI-based collaborations.
- 4e. Foster the benefits of co-location with Hatfield Marine Science Center, Marine Studies Initiative, Oregon Sea Grant and the Coastal Oregon Marine Experiment Station to develop, promote, and support dedicated graduate and post-doctoral opportunities.
- 4f. Develop long-term multi-year strategic alliances with industry representatives (e.g., <https://ccom.unh.edu/partners>, Blue Technology) to enhance collaboration through integration and understanding of cultures and expectations.
- 4g. Explore opportunities to engage with new federal partners.

## Management

*Strengthen CIMRS organizational and administrative management components to ensure long-term sustainability and serve as a global leader in contributions to marine and coastal science priorities.*

- 5a. Develop and support a benthic sorting lab for the West Coast (both science and sample processing).
- 5b. Convene CILC (CI's on the Left Coast) bi-annually as part of CIMRS' horizon scanning exercise to define emerging priorities and discuss ways to work together to achieve mutual interests.
- 5c. Develop a diversified funding portfolio for CIMRS that results in a long-term sustainable funding stream well beyond the next 10-year NOAA funding cycle for cooperative institutes.
- 5d. Consider expansion/modification of CIMRS Executive Board representation to incorporate industry representatives and strengthen the guidance role of the Board.
- 5e. Participate in the development of an Innovation Fund through Newport partners (HMSC, MSI, CIMRS, etc.).
- 5f. Earmark a portion of the CIMRS budget portfolio to sustain long-term programs, develop new, short-term opportunities, and sunset others. Develop criteria to inform decision making.
- 5g. Partner with the OSU Foundation to identify private donors interested in supporting CIMRS research.
- 5h. Champion investments made by OSU in new areas and faculty that leverage NOAA investment.
- 5i. Consider the merits of aligning CIMRS fiscal year with NOAA's fiscal year.

### Performance Metrics

- CIMRS has a growing list of collaborators outside of public and academic institutions.
- Enhanced contributions to NOAA line office priorities through engagement and collaboration.
- Completion of bi-annual horizon scanning exercise with industry and NOAA.
- Established partnership with Northern California academic institutions that results in collaborative research projects in the California Current.