**ESRM Benchmark Statement - Learning outcomes mapping**

**Revised following the 2024 SEFS faculty retreat**

**Version 5/6/25**

**ESRM Goals and Objectives:**

Goals are broad statements of the desired outcomes for ESRM graduates, while objectives are specific, measurable achievements that contribute to reaching these goals.

* **Develop Comprehensive Understanding**:
  + Goal: Equip students with a thorough understanding of ecological, biological, social, and economic principles and quantitative and technological tools to manage natural resources sustainably.
  + Objective: Gain a deep understanding of ecosystem components, structure, and functions, including human systems, to assess and manage terrestrial natural resources effectively. This includes:
    - *Ecosystem Knowledge*: Understanding of ecosystem components and functioning, encompassing biological sciences, ecological principles, and biotic and abiotic factors.
    - *Assessment Techniques*: Proficiency in measurement and assessment techniques, including geospatial techniques and data analysis.
    - *Human Dimensions:* Grasp of environmental and natural resource policy, economics, and administration, laws and regulations, environmental justice, and social and environmental psychology.
    - *Management Practices*: Knowledge of management planning, practice, and implementation, including silviculture, fire ecology, restoration ecology, and adaptive management.
* **Promote Ethical Stewardship**:
  + Goal: Foster a commitment to ethical stewardship, conservation, and sustainable management of terrestrial natural resources.
  + Objective: Integrate principles of sustainability, environmental justice, and ethics into natural resource management practices.
* **Enhance Integrative Skills:**
  + Goal: Cultivate the ability to work effectively in interdisciplinary teams to address complex environmental challenges.
  + Objective: Develop effective written and oral communication skills, leadership qualities, and the ability to work collaboratively in diverse teams. Foster analytical and critical reasoning skills including systematic problem solving and decision making, and careful and productive use of emerging AI technologies.
* **Foster Inclusivity and Diversity:**
  + Goal: Promote diversity, equity, and inclusivity in natural resource management practices and decision-making processes.
  + Objective: Cultivate cultural competence and an understanding of diverse perspectives in natural resource management.

**Skills**

1. **Intellectual Skills (Knowledge and Understanding):**
   1. Understand ecological, social, and economic theories, concepts, and principles related to environmental science and resource management and sustainability.
      1. Ecological theory and principles
      2. Silvicultural theory and principles
      3. Economic theory and principles
      4. Social science (non-economics) theory and principles
      5. Management science and principles
      6. Sustainability theory and principles
      7. Traditional ecological knowledge
      8. Regional (PNW) applications of the above principles
      9. International/global applications of the above principles
   2. Analyse, synthesise, and critically evaluate quantitative and qualitative information to develop and evaluate solutions for complex environmental problems, with recognition of synergies and tradeoffs.
      1. Statistical analysis
      2. Mathematical modelling
      3. Simulation/process modelling
      4. Qualitative research methods
      5. Optimization, including principles of multi-objective optimization
      6. Principles and practice of critical thinking and reasoning
   3. Plan and conduct research projects, integrating evidence from various sources to inform investigations and design experiments, including:.
      1. Principles of experimental design
      2. Literature reviews/systematic reviews/meta-analyses
      3. Opportunities to conduct original supervised research
2. **Practical Skills**
   1. Conduct fieldwork and laboratory investigations competently and ethically, applying appropriate techniques for data collection and analysis.
   2. Use appropriate technologies to address environmental problems effectively.
      1. Mapping/spatial analysis
      2. Airborne and space-born remote sensing
      3. Terrestrial sensors and monitoring systems
      4. Programming/working with code
   3. Interpret and evaluate empirical evidence, considering the implications for environmental management and sustainability
      1. As distinct from 1.2, use of evidence in developing/critiquing policies and plans
3. **Communication and Professional Skills**
   1. Communicate effectively with diverse audiences, using a range of formats and media, and to provide and receive constructive criticism.
      1. In-class presentations
      2. Presentations involving external partners/stakeholders
      3. Use of peer feedback/review
      4. Short essays/reflections
      5. Long essays/papers
   2. Work effectively as a team member, demonstrating leadership qualities and professional behaviors.
   3. Reflect on the learning process, plan and execute projects, and develop skills for autonomous, life-long, learning and professional development.
      1. Written reflections
      2. Proposal writing
      3. Library research
      4. Independent study/investigations
   4. Recognize the importance of equality, diversity, and inclusivity in environmental science practices, and act ethically and in accordance with relevant legislation and professional standards
      1. Cultural knowledge and competence, including indigenous perspectives and history of marginalization
      2. Principles and practical applications of environmental justice
      3. Ethical and inclusive engagement with diverse communities in class, field, and professional settings
      4. Act ethically and professionally, fostering open exchange of ideas

**Environmental Science & Resource Management (ESRM) — Learning Outcomes**

ESRM trains future environmental science and natural resource professionals who couple rigorous analysis with ethical foundations to steward terrestrial ecosystems—now and for generations to come.

Our graduates:

* **Integrate science & society** – Analyze ecological, economic, and social data to design sustainable solutions for forests and linked human systems, in the Pacific Northwest and worldwide.
* **Apply cutting‑edge tools** –Map, measure, model, and manage ecosystems with drones & LiDAR, satellite & hyperspectral imagery, in‑situ sensor networks, eDNA labs, code and AI-driven analytics and decision‑support simulators.
* **Practice ethical stewardship** – Weave environmental justice, traditional ecological knowledge, and sustainability into every management choice.
* **Think critically, act decisively** – Synthesize quantitative and qualitative evidence, weigh trade‑offs, and productively navigate uncertainty.
* **Communicate & lead** – Craft clear narratives and compelling visuals for scientists, policymakers, and the public; guide interdisciplinary teams toward shared goals.
* **Embrace diversity & inclusion** – Engage respectfully with communities near and far, ensuring benefits and burdens of resource use are shared equitably.
* **Learn for life** – Reflect on theory and practice, nurture curiosity, and continually renew skills to meet emergent environmental challenges.