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March 4, 2025

Representative Zach Hudson, Chair
House Committee on Higher Education and Workforce Development
900 Court Street NE, HR C
Salem, OR 97301

Re: House Bill 3634

Chair Hudson and Members of the House Higher Education and Workforce Development Committee, thank you for the opportunity to provide background information on House Bill 3634. My name is Alison Hopcroft and I am the Federal Partnerships and Interdisciplinary Initiatives Manager at the Institute for Sustainable Solutions at Portland State University.

Workforce development is at the center of PSU's mission and includes preparing students for careers in the water workforce through majors in Civil and Environmental Engineering, Geology, Geography, Environmental Science and Management, and many others.

For the last two years, my team and I have been working on an initiative to assess water workforce needs in Oregon and determine how we can best respond to that demand. In Fall 2023, we compiled a literature review of recent water workforce reports from local, state and national sources and analyzed Oregon Employment Department data to quantify the demand for workers, skills needed, the positions in highest demand and opportunities to train students for those positions. We have also facilitated conversations with employers and community partners about how to meet their growing needs in the water workforce, including a recent workshop in January 2025 with public sector employers and utilities in the Portland Metro region. The literature review and the summary of that workshop are attached to this testimony.

Several key points have become clear through these efforts:
- Our analysis of Oregon Employment Department data suggests that there will be approximately 50,000 water-related job openings in Oregon in the next 10 years.
- There is a dire need for well-trained and certified water and wastewater treatment operators in Oregon and nationally. This is true in both rural and urban areas, but rural areas often struggle more to recruit and retain qualified operators.
- One of the biggest barriers to growing the pool of qualified operators is funding for internships and training programs, which ensure equitable access to the skills and training students need.
- More support is needed to connect qualified workers and employers.
- Significant outreach and engagement, both with youth/K-12 and post-secondary audiences, are needed to build awareness of and interest in water sector jobs to fill the existing gap.

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HB 3634 provides the essential funding to boost the capacity of community college and other water workforce training programs to meet this dire need for well-trained water operators. The bill's language specifically addresses many of our findings, such as providing stipends and wages for paid work experience and other financial support for on-the-job career and education pathways. It also specifically addresses needs in rural, coastal and remote communities as well as those with limited funding and workforce capacity.

Finally, water treatment operators are just the tip of the iceberg when it comes to filling those 50,000 expected jobs in Oregon. HB 3634 has the potential to provide the additional support needed to prepare students with skills such as applied modeling and coding, information technology and cybersecurity, to meet the rapidly changing technological demands of the water sector.

Thank you for the opportunity to testify on House Bill 3634.

Sincerely,
Alison Hopcroft, Federal Partnerships and Interdisciplinary Initiatives Manager
Portland State University

Water Workforce Literature Review
Arjun Viray and Alison Hopcroft
August 30, 2023

Overview

Students are increasingly under pressure to develop job-specific skills and gain practical experience before graduation for entry-level jobs. PSU currently has some programs and infrastructure that meet these needs. These programs are a smart investment, as our own data shows that participation in undergraduate internship, mentorship and research programs, especially by historically underrepresented students, improves student retention and job placement outcomes after graduation. PSU is well positioned to be the state leader in preparing students, especially our BIPOC students, for satisfying, well-paying jobs in fields with strong demand for workers. However, we will need to scale our existing programs or add additional capacity to achieve this objective. The purpose of this review is to assess the state of the water workforce in Oregon, including current demand for workers, gaps, opportunities and best practices. The information gathered from the 18 reports reviewed will be used to make decisions about investing in water related student programs and related infrastructure.

Challenges

- ***Aging workforce:*** In 2018, the median age of water employees nationally was 48 years and 30-50% of these workers were eligible to retire within the next 5 to 10 years (2); in 2022, at least ⅓ of the water workforce will be eligible for retirement
- ***Lack of diversity:*** Of the 1.7 million workers in the water workforce nationally, 85% are male and ⅔ are white. (1)
- ***Limited training programs and underutilized recruitment strategies:*** Among public and private water and wastewater organizations surveyed in Oregon and Washington, only 9% used a registered apprenticeship program; only 40% pay **or** would pay interns; and only 27% recruited veterans. (4)
- ***Lack of experience:*** There is a noted lack of relevant work experience across all job categories. This reinforces the need to explore and implement apprenticeship programs or training connections to improve applicant quality. (4)
- ***New, additional pressures:*** Emerging contaminants, aging infrastructure, water shortages, cybersecurity, and rapidly changing treatment technologies and processes are placing greater demands on drinking water and wastewater utilities. (2)

Demand

As of 2018, local government water and wastewater utilities and related private sector employers in Oregon & Washington employed over 7,700 people (4). When asked about preparedness to fill certain positions over the next 5 years, concerns were expressed over the professional categories which includes engineers, hydrologists, policy professions, and other highly skilled but non-trades staff (5).

Table 1 shows recent water workforce-related occupational employment projections in Oregon from 2021 to 2031. In the next 10 years, approximately 50,000 water workforce-related jobs are projected to be available. Most of these jobs require at least a Bachelor's degree or a Master's degree. (6)

Opportunities

Technology in the water industry was noted in multiple reports as an area for improvement. As the water system operating environment evolves to incorporate new technologies, there is a growing need to train and employ water specialists with a high degree of technological competence to make data driven decisions and to track utility based operations on up-to-date and accurate information. (2) The growing role of tech in day-to-day operations will continue to expand the role of engineers, IT, and security specialists, helping the water sector attract more technologically competent workers (2)

Recommendations

It is clear that there is current and future demand in Oregon for young, diverse, skilled and experienced workers in the water workforce. PSU is uniquely positioned to help meet this demand, especially for the majority of positions that require a Bachelor's or Master's degree. Recommendations, based on our current strengths and the best practices noted in the literature, include:

- Leverage existing internship programs and infrastructure (e.g. Engineering Work Experience (EWX), LSAMP-ISS Internship Program) to increase specific water workforce opportunities for students, especially BIPOC students. Include cybersecurity, IT, and other technology programs.
- Explore opportunities for a formalized mentorship program, possibly through CIMR
- Develop a centralized website within PSU's existing web infrastructure that would build awareness of and how to prepare for careers in the water workforce. This could include links to our existing academic programs and majors, internship programs, scholarships, job boards and more.
- Convene water workforce employers and community college partners to expand or develop relationships and discuss programming and collaboration opportunities.
- Grow our federal agency partnerships, with a focus on water workforce development

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3. U.S. Environmental Protection Agency. (2020). *America's Water Sector Workforce initiative: A Call to Action*.
4. Manson, P., & Sanneman, C. (2019). *PNW Water Infrastructure Workforce Report*. Willamette Partnership.
5. Manson, P., & Sanneman, C. (2019). *Water Infrastructure Workforce Report Survey of OR and WA Water Utilities*. Willamette Partnership.
6. Oregon Employment Department. (2023) *Oregon Occupational Employment Projections 2021-2031.* *https://www.qualityinfo.org/documents/20126/110687/Oregon+Occupational+Employment+Projections+2021-2031/4b29f2b6-a1fa-1ad3-d7b3-b93d22bab179?version=1.18*

Table 1: Oregon Occupational Employment Projections, 2021-2031

Occupation Title	Employment 2021	Projected Employment 2031	Percent Change	Employment Change	Replacement Openings	Total Openings	Typical Entry-Level Education	Competitive Education
Civil Engineers	4,551	5,292	16.3%	741	3,320	4,061	Bachelor's degree	Master's degree
Environmental Engineers	603	685	13.6%	82	406	488	Bachelor's degree	Master's degree
Mechanical Engineers	3,643	4,139	13.6%	496	2,164	2,660	Bachelor's degree	Master's degree
Engineers, All Other	3,276	3,735	14.0%	459	2,073	2,532	Bachelor's degree	Master's degree
Civil Engineering Technologists and Technicians	1,188	1,343	13.0%	155	1,050	1,205	Associate's degree	Associate's degree
Electrical and Electronic Engineering Technologists and Technicians	2,653	2,938	10.7%	285	2,320	2,605	Associate's degree	Associate's degree
Environmental Engineering Technologists and Technicians	244	274	12.3%	30	215	245	Associate's degree	Associate's degree
Mechanical Engineering Technologists and Technicians	482	562	16.6%	80	433	513	Associate's degree	Associate's degree
Life, Physical, and Social Science Occupations	24,832	27,404	10.4%	2,572	22,286	24,858		
Soil and Plant Scientists	699	763	9.2%	64	691	755	Bachelor's degree	Master's degree
Biochemists and Biophysicists	95	106	11.6%	11	78	89	Master's degree	Doctoral or professional degree
Biological Scientists, All Other	655	676	3.2%	21	521	542	Bachelor's degree	Master's degree
Conservation Scientists	683	750	9.8%	67	615	682	Bachelor's degree	Master's degree

Occupation							Education (entry)	Education
Environmental Scientists and Specialists, Including Health	1,063	1,200	12.9%	137	980	1,117	Bachelor's degree	Master's degree
Geoscientists, Except Hydrologists and Geographers	513	613	19.5%	100	487	587	Bachelor's degree	Master's degree
Hydrologists	267	285	6.7%	18	239	257	Bachelor's degree	Master's degree
Urban and Regional Planners	1,126	1,346	19.5%	220	961	1,181	Bachelor's degree	Master's degree
Biological Technicians	2,772	3,038	9.6%	266	2,904	3,170	Associate's degree	Bachelor's degree
Chemical Technicians	375	443	18.1%	68	361	429	Associate's degree	Bachelor's degree
Environmental Science and Protection Technicians, Including Health	290	336	15.9%	46	343	389	Associate's degree	Bachelor's degree
Geological and Hydrologic Technicians	293	329	12.3%	36	245	281	Associate's degree	Associate's degree
Water and Wastewater Treatment Plant and System Operators	1,239	1,264	2.0%	25	985	1,010	Postsecondary training (non-degree)	Postsecondary training (non-degree)
Pump Operators, Except Wellhead Pumpers	163	211	29.4%	48	192	240	Less than high school	High school diploma or equivalent
Totals	**51,705**	**57,732**		**6,027**	**43,869**	**49,896**		
Construction Managers	6,976	8,358	19.8%	1,382	4,730	6,112	Associate's degree	Bachelor's degree
Architectural and Engineering Managers	3,978	4,517	13.5%	539	2,536	3,075	Bachelor's degree	Bachelor's degree
Natural Sciences Managers	1,218	1,319	8.3%	101	800	901	Bachelor's degree	Master's degree
Training and Development Specialists	4,417	5,025	13.8%	608	4,271	4,879	Bachelor's degree	Bachelor's degree

Project Management Specialists and Business Operations Specialists, All Other	21,984	24,901	13.3%	2,917	20,069	22,986	Bachelor's degree	Bachelor's degree
Computer Occupations, All Other	3,934	4,375	11.2%	441	2,791	3,232	High school diploma or equivalent	High school diploma or equivalent
Data Scientists and Mathematical Science Occupations, All Other	767	1,022	33.2%	255	603	858	Bachelor's degree	Bachelor's degree
Architecture and Engineering Occupations	42,940	49,294	14.8%	6,354	31,356	37,710		
Landscape Architects	-s-	-s-	-s-	-s-	-s-	-s-	Bachelor's degree	Master's degree
Surveyors	750	881	17.5%	131	597	728	Bachelor's degree	Bachelor's degree
Chemical Engineers	303	353	16.5%	50	179	229	Bachelor's degree	Master's degree
Electrical Engineers	2,801	3,331	18.9%	530	1,799	2,329	Bachelor's degree	Master's degree
Electronics Engineers, Except Computer	5,025	5,677	13.0%	652	3,140	3,792	Bachelor's degree	Master's degree
Surveying and Mapping Technicians	999	1,160	16.1%	161	1,176	1,337	High school diploma or equivalent	Postsecondary training (non-degree)
Totals	**96,092**	**110,213**		**14,121**	**74,047**	**88,168**		

Jobs highlighted in green represent jobs that are specifically focused on water or are strongly water-related; those highlighted in yellow may include positions that have a relationship to water or require some background knowledge of water-related topics.

Source: Oregon Employment Department, https://www.qualityinfo.org/projections#1
Contact:
    Sarah Cunningham, Projections Economist, Sarah.E.Cunningham@employ.oregon.gov, 503-871-0046
    Jason Payton, Occupational Economist, Jason.M.Payton@employ.oregon.gov, 503-871-0069

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Training and Education Pathways for Growing the Water Workforce
A water workforce workshop hosted by the USGS-PSU Partnership
January 31, 2025

Event Summary

Panel Discussion Key Takeaways

Panelists
- Chris Wilson – Water Treatment Manager, City of Hillsboro
- Kimberly Gupta – Operations Group Director, Portland Water Bureau
- Tiffany Yelton-Bram – Water Quality Manager, Oregon Dept of Environmental Quality
- Kimi Grzyb - DEQ Wastewater Operator Certification Program Coordinator
- Rachel Lovellford - Surface Water Hydrology Manager, Oregon Water Resources Department
- Alex Etheridge – Associate Director for Studies, USGS, Oregon Water Science Center

Critical Water Jobs and Concerns

Across the water sector, hiring challenges persist due to an aging workforce, stiff competition for skilled professionals, and slow hiring processes. Panelists noted that all job positions are challenging to fill for a variety of reasons, but a top issue is that more people are retiring while fewer people have the credentials, skills or experience to take their place. Water treatment plant operators are one of the most needed positions and the most challenging to fill due to certification requirements and a high demand for but low supply of certified personnel. This is both a local and national concern.

Low pay rates for some positions and a lack of human resources staff to keep the hiring and onboarding process efficient are additional challenges. Some federal agencies frequently lose new hires due to a lengthy onboarding process caused by bureaucratic delays. Pay rates for public agencies tend to be lower than the private sector, and smaller utilities or municipalities often can't pay as much as larger entities. Although public sector benefits are often excellent, and may include advantages like pensions, many entry-level employees can't afford to stay in a lower-paying job long enough to access those benefits. These factors lead to a talent drain.

Jobs that are challenging to fill include:
- Regulatory positions, such as watermasters, and individuals skilled in water rights permitting; this includes both writing permits and enforcing permits, which are two different jobs and skill sets
- Information Systems and Information Technology developers; employers are usually in competition with big tech companies for these positions
- Computer programmers and modelers
- Data collectors, such as hydrologic technicians (hydro techs) and other field work positions
- High-level management positions, such as basin coordinators, that require relationship management skills as well as conflict-resolution and problem-solving skills

Skills High in Demand
Employers are looking for both technical and soft skills in their new hires. A strong work ethic and adaptability to changing work circumstances were universally highlighted, along with a willingness to take on new challenges. Technical skills in demand include:
- **Water treatment -** plant operators
- **Regulatory expertise** – Knowledge of state and federal regulations is essential for operators, water rights permit writers, and permit enforcement personnel
- **Programming and coding skills** – Organizations need employees proficient in Python, applied modeling, and cloud infrastructure.
- **Data Management** - Good data management skills are required for most employees at all levels, beginning with those who do field work, such as hydro techs
- **IT and Cybersecurity** – With increasing cyber threats to drinking water infrastructure, cybersecurity expertise is becoming critical.
- **Financial management** – Managing budgets and funding sources such as loans, grants and infrastructure investments requires financial expertise.
- **Field skills** – The ability to gather accurate water measurements, work in varying weather conditions, problem-solve and even operate boats or other machinery are necessary for field work.

Interpersonal (soft) skills are equally as important as technical skills. The panelists look for employees with strong interpersonal skills who can collaborate with or mentor their peers in an empowering way. Some panelists also look for strong conflict resolution and negotiation skills, especially in management or regulatory roles. During a job interview, employers frequently ask scenario-based questions to evaluate candidates' problem-solving and interpersonal abilities. The panelists also encourage applicants to reflect on past work, internship, or academic experiences to understand which soft skills they have used.

Current Work and Education Pathways
Chris Wilson and Kimberly Gupta share many of the same hiring challenges. This led them to co-found The Hired to Operate Program, or H2O Program, a water workforce training program in Hillsboro, Oregon. The program provides paid training and on the job experience for treatment plant operators. However, this program needs more funding.

At USGS, staff are provided with technical training to meet quality control measures, ensuring staff produce reliable and high-quality work. Entry level positions (i.e. hydro techs) are also encouraged to become hydrologists and can receive funding to support their education. This helps with retention since technicians already have the field work experience and creative problem solving skills needed to be a hydrologist. Finally, USGS has a direct hiring authority for veterans and people with disabilities that removes red tape and provides access to a qualified pool of applicants.

Small Group Discussion Key Takeaways

1. **What types of water-related jobs are your organizations concerned about filling now and in the future?**

    Technical Roles: Technical roles include water system operators, distribution staff, GIS professionals, engineers, hydro techs, electricians and data specialists. Organizations are struggling to attract new graduates to STEM-heavy positions. Certain positions have course requirements such as calculus and physics that are often a barrier for students despite limited real-world application in those positions.

    Support/Administrative Roles: There are not enough professionals to fill support and administrative roles. USGS, for example, are always looking for more HR professionals to make the hiring process more efficient. Also, many of these professionals are likely not considering organizations in the water sector as potential employers. Support and administrative roles include human resources, finance professionals, communication professionals, and social media/public relations specialists. These positions improve the efficiency of organizations' operations and communications with the public and partners.

2. **What essential skills do new employees need to be successful in those jobs and in your organization? Why are those skills important?**

    New employees in government and water sector jobs need a blend of technical and soft skills to succeed. Technical expertise in coding (Python, R), IT, GIS, remote sensing, and data visualization is crucial for data-driven decision-making. Strong communication, leadership, and problem-solving skills enable collaboration and effective science communication with the public. Adaptability, initiative to connect with others, and a willingness to learn help employees grow within their organizations. As public servants, employees must also know how to communicate with the public. Portland Water Bureau (PWB), for example, has an outreach program for community members who face water shutoffs, affordability issues, and pipe breakages. Employees must know how to talk to the public with empathy.

    Interdisciplinary awareness is key—many with coding and IT backgrounds may not realize their skills are highly applicable to water workforce jobs.

    Lastly, getting guidance on navigating government job applications and interviewing can improve access to these opportunities. Many students are unsure where or how to begin applying for these positions, especially for federal job listings. Getting this information and learning best practices for government job applications improves the chances of success for qualified candidates.

3. **What education and training pathways are needed to train your future workforce?**

Training the future workforce requires accessible and interdisciplinary education pathways that reduce barriers to entry. Making math and science more approachable through alternative teaching methods can help students overcome fear and build confidence in these subjects. Biology and chemistry can have the same challenge as math. These courses become a barrier to people who are required to take them but don't necessarily need them in the occupation they are pursuing. One group suggested rethinking credentials and qualifications to reduce barriers.

More exposure to these subjects could also mitigate these fears. For example, expanding coding courses beyond engineering and offering specialized programming for environmental science and water management can equip students with valuable technical skills. PSU's School of Earth, Environment, and Society could play a key role in cross-training students with transdisciplinary knowledge.

Groups also suggested crosswalking job requirements with education needs to identify which classes/courseworks are essential for entry and mid-level jobs.

The following training and education pathways were also mentioned in the small groups:
- Coding classes and non-engineering classes in Python and R
- Specialized programming courses
- Developing a hydro tech training program at a local community college
- Water resources data management training
- Field technician training job classifications
- Mentorship opportunities within organizations

4. **What types of workforce development activities does your org currently participate in?**

Career-Focused Events: Organizations are participating in public and university career fairs, as well as, in-house job panels to connect with potential candidates.

Community Outreach: USGS conducts outreach to educate communities about career opportunities. Similarly, some employers at BES participate in informational interviews with people interested in learning more about the position and what it is like to be a public servant. Clackamas River Water Providers also engage with communities through drinking water tours, newsletters with job announcements, and presentations at schools. PWB engages with students through their watershed field trips where youth are exposed to water quality sampling

Education/Training Programs: USGS offers a national training program for staff. ODEQ initiated a program for operators to obtain Continued Education Units (CEUs) for conducting public outreach.

5. **What types of workforce development activities would be useful to your org in the future?**

Stronger Internship or Specialized Programs: Organizations want well-structured programs that could streamline opportunities to potential candidates and encourage skill growth for entry-level employees. A statewide water internship clearing house would be a useful tool to support this effort. The following specialized roles need new hires:
- Water treatment operators
- Hydro techs
- Cybersecurity specialists
- Data visualization specialists

Coordinated Outreach with Communities: Organizations would like to see more coordinated outreach with communities about internship/career opportunities and existing training pathways. There are opportunities to collaborate with existing events, like the Children's Clean Water Festival, where organizations can engage youth early and spark their interest in these fields. To attract younger professionals, organizations need to make these careers more enticing by highlighting the meaningful impact of the work and providing clear pathways for advancement and development.

Recommended Next Steps

- **Address Workforce Gaps with Tailored Strategies:** Organizations face different workforce challenges and require tailored strategies to address them. Some, like the City of Hillsboro and PWB, struggle to attract enough applicants to fill open positions for technical/advanced jobs, while others, such as Portland BES, lack sufficient entry-level opportunities for job seekers. Expanding training programs and outreach efforts to grow the applicant pool for skilled positions (e.g., water treatment operators) while also creating clearer pathways for entry-level roles can help address these workforce gaps.
- **Strengthen Training or Internship Programs:** Create internship or training programs that address the skills gap of new graduates and employees and ensure specialized roles, like hydro techs and water treatment operators, are filled.
- **Expand Outreach and Engagement:** Conduct targeted outreach to students and communities, informing them about career pathways, training programs, and certifications in the water sector. It is especially important to introduce the youth to the water sector and encourage the exploration of water-related career paths. This can be done by conducting outreach through existing youth/K-12-focused events, creating mentoring opportunities, holding career fairs, etc.
- **Address Financial Barriers to Internships:** Identifying funding for more paid internship opportunities or stipend-based programs to ensure equitable access to training and development.
- **Connecting Talent to the Position:** For students, it is a challenge to find water jobs. For employers, it is a challenge to find talent. A few actionable next steps include:

- Creating a centralized job board to help students find water-related internships and jobs
- Create/expand a centralized list of existing training and certification programs
- Leveraging existing networks (e.g., USGS-PSU, other universities and colleges) to connect hiring organizations with a larger pool of candidates; and hosting networking events to facilitate connections between students and hiring agencies
- Where specific training programs do exist, connect those programs and students to employers in the field (e.g. water treatment)