LUBGWMA Committee Meeting 7

05/05/2023

HYBRID

PORT OF MORROW
RIVERFRONT CENTER, 2
MARINE DR NE,
BOARDMAN, OR 97818

HOSTED BY
SALINI SASIDHARN
OREGON STATE UNIVERSITY

Agenda

Time	Action Item
11:00 am -11:05 am	Welcome; present agenda and recap. Salini Sasidharan
11:05 – 11:10 am	Introduction LUBGWMA Committee Members
11:10 am – 11:20 pm	Irrigated Agriculture and Science and Research (Primary/Alternate) Aaron Madison/Salini Sasidharan/DEQ
11:20 am– 12:00 pm	Public Member #2 Candidates' introduction, nomination, and appointment LUBGWMA Committee Members and DEQ
12:00 pm – 12:10 pm	Break - Lunch Provided
12: 10 pm – 12:55 pm	Snapshot of Second Action Plan / Proposal for a multiday workshop and discussion Salini Sasidharan
12:55 pm – 1:40 pm	Potential engineering/consulting firm (HDR) Commissioner Dorran and team
1:40 pm – 1:55 pm	LUBGWMA SIA Announcement Rob Hibbs, ODA
2 pm	Adjourn

Irrigated Agriculture and Science and Research (Primary/Alternate)
(11:10 am – 11:20 pm)

Irrigated Agriculture

Jake Madison, Madison Ranches

Science and Research

Ruijun Qin (Ray), HAREC, Oregon State University

Presentation of 11th Public Member Nominees
11:20 am – 12:00 pm

Salini Sasidharan, Oregon State University/LUBGWMA Chair

Candidate Evaluation

LUBGWMA Committee Membership Candidate Evaluation Form 2023

Name of the Voting Member:
Category:
Primary/Alternate:
Date:
Position under consideration: Rural Residential Community Representative (May 2023)

Evaluation Criteria

1. **Knowledge and Experience in Rural Residential Communities and Environmental Issues:** The candidate should be a LUBGWMA resident and should demonstrate a deep understanding of rural residential communities, their needs, and challenges. Additionally, they should have knowledge of nitrate contamination in groundwater and the LUBGWMA. Prior experience in working with community organizations, environmental groups, or related fields would be a strong indicator of their expertise in this area.
2. **Communication, Leadership, and Collaboration Skills:** The candidate should possess strong communication skills to effectively represent the interests of non-municipal residents and collaborate with other LUBGWMA Committee members. They should be able to lead community outreach efforts and engage diverse groups in meaningful conversations. Their ability to work well in a team, as well as independently, will be crucial for their success in this role.
3. **Commitment and Engagement:** The candidate should demonstrate a strong commitment to the LUBGWMA's goals and initiatives, as well as to the rural residential communities they represent. This can be assessed through their past involvement in community development or environmental projects, their willingness to attend relevant meetings and events, and their enthusiasm for educating communities about nitrate pollution and its effects. A proactive approach and dedication to continuous learning and improvement will be essential for this role.

For the above three evaluation criteria, assign a rank between 1 and 5 based on the candidate's qualifications, experience, and skills. **1-10 scale (1 – Unsatisfactory; 2-3 – Satisfactory; 4-5 – Average; 6-7 - Above Average; 8-9 – Exceptional; 10 – Outstanding):** This will help in evaluating the candidate against the criteria and selecting the most suitable candidate for the LUBGWMA Rural Residential Committee member position.

Candidates	Knowledge and Experience in Rural Residential Communities and Environmental Issues	Communication, Leadership, and Collaboration Skills	Commitment and Engagement	Overall Ranking
Carla McLane				
Karmen Carlson				
Kelly Doherty				
Philip Hamm				
Todd Crosby				
Wes Killion				

Candidate Nomination and Appointment

LUBGWMA Committee and DEQ

Salini Sasidharan, Oregon State University/LUBGWMA Chair

Pause in Appointment

DEQ (Randy Jones) informed the LUBGWMA Committee that Oregon Gov. Tina Kotek requested to add a "Bilingual,English and Spanish, and be a resident of the basin" to the LUBGWMA Committee and, therefore, asked to pause the selection and appointment process of the 11th Public Member. Note that the Committee Chair and the LUBGWMA Committee was informed of this decision only during the meeting by DEQ and was not involved in the conversation leading to this decision.

Snapshot of Second Action Plan / Proposal for a multiday workshop and discussion

Salini Sasidharan

Oregon State University

Oregon State University

Acknowledgements

This document was prepared by the Lower Umatilla Basin Groundwater Management Area Committee and approved by the Oregon Department of Environmental Quality and the Oregon Department of Agriculture.

LUBGWMA Committee Members include:

Committee Member	Committee Role	Representing
Scott Lukas	Committee Chair	OSU Extension
Janet Greenup	Lead Agency Implementing Local Action Plan	Morrow SWCD
Miff Devin	Committee Vice-Chair & Food Processor Sub-Committee Chair	
	Public Water Systems Sub-Committee Co-Chair	Port of Morrow
Scott Morris	Public Water Systems Sub-Committee Co-Chair	City of Stanfield
Aaron Madison	Irrigated Agriculture Sub-Committee Co-Chair	Madison Farms
Mark Millard	Irrigated Agriculture Sub-Committee Co-Chair	
Pete Meenderinck	CAFO Sub-Committee Co-Chair	M&P Dairy
Dixie Echeverria	CAFO Sub-Committee Co-Chair	Columbia Feeders
Carla McLane	Rural, Open, & Green Space Sub-Committee Co-Chair	Morrow County Planning
Eileen Laramore	Rural, Open, & Green Space Sub-Committee Co-Chair	Tour of Knowledge
Tom Straughan	Livestock Sub-Committee Chair	Umatilla SWCD
Kyle Waggoner	Livestock Sub-Committee Chair	Umatilla SWCD
Aaron Palmquist	Education / Outreach Sub-Committee Chair	City of Irrigon
Leann Rea	Committee Member	Morrow County
Tom Demianew	Committee Member	Oregon Dept of Agriculture

Purpose and Goals

- **1.1.1 Purpose**

The purpose of this Second Local Action Plan is to **identify and encourage voluntary actions that will reduce the groundwater nitrate concentrations in the LUBGWMA**. *This Second Local Action Plan will be reviewed annually by the Committee to identify any necessary amendments that will further reduce groundwater nitrate concentration in the LUBGWMA.*

- **1.1.2 Goals**

The goals of this Second Local Action Plan is to **reduce groundwater nitrate concentrations to less than 7 mg/L throughout the region**. In addition, the Local Action Plan aims to s**ustain this reduction so that public and private drinking waters remain safe to drink and the GWMA declaration can be repealed via ORS 468B.188**.

Oregon's Groundwater Quality Protection & Nonpoint Source Pollution Management

- Groundwater Quality Protection Act (ORS 468B.160): Protects groundwater for existing and future beneficial uses.
- Adoption or failure to adopt a rule for contaminant levels does not solely dictate restrictions on:
  - Fertilizer use (ORS 633.311 to 633.479 and 633)
  - Pesticide use (ORS Chapter 634
- Oregon Statute (ORS 468B.180) requires DEQ to declare a GWMA if contamination exceeds thresholds
  - Thresholds: 50% of federal drinking water standard for most contaminants, 70% for nitrate (7 mg/L)
  - Lower Umatilla Basin declared a GWMA in 1990 due to nitrate levels exceeding 7 mg/L
  - 4-year interagency investigation followed to assess contamination and identify source

Clean Water Act Section 303(d) and Total Maximum Daily Loads (TMDLs)

- Section 303(d) authorizes EPA to assist in listing impaired waters and developing TMDLs
- TMDL establishes the maximum amount of a pollutant allowed in a waterbody
- States must identify waterbodies not meeting water quality standards and establish TMDLs
- TMDLs address total loading, including nonpoint sources
- Oregon Administrative Rules Division 42 describes TMDL process and load allocation development
- DEQ forms local TMDL stakeholder committees and works with ODA
- 2001 Nitrate TMDL for Umatilla Basin set instream nitrate goal of 10 mg/L
- While the TMDL focuses on surface water quality, TMDL recognizes the relationship between surface water and groundwater. Groundwater is the source of summer base flow in some creeks, and thus a potential source for surface water contamination.
- TMDL process involved land-use or water-resource workgroups, stakeholders, and technical committees (the Umatilla Basin TMDL Stakeholders Committee and the Umatilla Basin TMDL Technical Committee).
- All committees were sponsored by a core stakeholder partnership: the Umatilla Basin Watershed Council, the Confederated Tribes of the Umatilla Indian Reservation and the Oregon Department of Environmental Quality.

Section 319 Nonpoint Source (NPS) Management Program

- 1987 amendments to the Clean Water Act established Section 319 NPS Management Program
- Grants provided to states, tribes, and territories for NPS management programs
- Grants support technical assistance, financial assistance, education, training, technology transfer, demonstration projects, and monitoring
- No federal regulatory authority over nonpoint sources; states can develop own NPS regulatory programs
- Section 319 funds can be used for TMDLs, Best Management Practices, and collaboration strategies
- Coastal Zone Act Reauthorization Amendments (CZARA) prevents funding for states without enforceable controls on NPS pollution
- Oregon's Section 319 program documented in the Oregon Nonpoint Source Program Plan
- DEQ's Clean Water State Revolving Fund loans finance various NPS water quality plans and projects

Agricultural Water Quality Management in Oregon

- ORS 561.191 states Oregon Department of Agriculture (ODA) develops Area Plans & Rules to manage nonpoint source pollution in agriculture
- Area Plans: Voluntary outreach programs, land treatments, management activities, compliance & monitoring strategies to prevent and control water pollution from agricultural lands
- Area Rules: Local regulatory requirements for agricultural water quality under Ag Water Quality Program (OAR 603-090-0000 to 603-090-0120) and Umatilla Management Area (OAR 603-095-3200) for the prevention and control of water pollution from agricultural activities
- Biennial reviews: DEQ's is involved in reviewing Area Plans and Rules
- Water quality standards and TMDL load allocations for agricultural lands should be met through implementation of area plans and enforcement of area rules

Second Local Action Plan Development and Regulatory Approval

- DEQ must conduct interagency management of groundwater to prevent contamination (ORS 468B.162)
- DEQ works with the Groundwater Management Area Committee to develop the action plan
- DEQ designates a lead agency to develop and implement a local action plan (ORS 468B.184)
- Action plan must include recommendations of mandatory actions, public review, required amendments for city/county plans, and establishment of BMP programs (ORS 468B.160)
- DEQ recommends that this Second Local Action Plan be funded, resourced and implemented in its entirety by all stakeholders and entities in Oregon and the Lower Umatilla Basin region, including the following Oregon state & local agencies: ODEQ, ODA, OSU, OHA, OWRD, Morrow & Umatilla County SWCDs, and city and county planning agencies.
- As required by statute, DEQ's current recommendations for mandatory action is implementation of the Agricultural Water Quality Management Program by ODA
- Morrow and Umatilla County SWCDs designated as lead agencies for the first action plan; Morrow SWCD for the second action plan
- 60-day public review and comment period required before final approval of the plan
- DEQ has 30 days to accept or remand the plan after submission by the lead agency

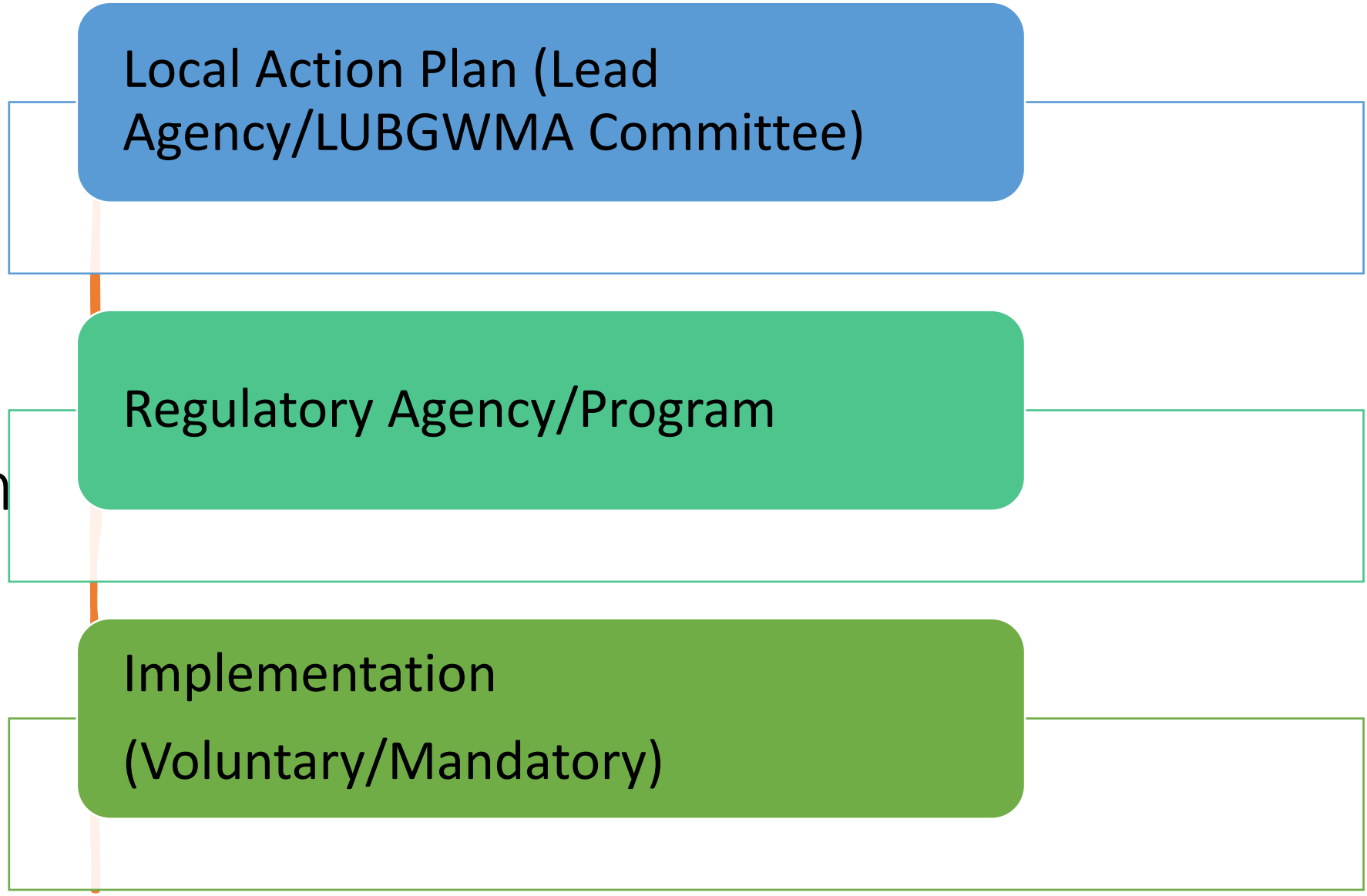
Repealing GWMA Designation under Oregon's Groundwater Quality Protection Act

- DEQ required to repeal GWMA designation if groundwater contamination no longer exceeds established levels (ORS 468B.188)
- Before repealing, DEQ must find that a new or revised local action plan exists to continue groundwater improvement without state enforcement (ORS 468B.188(2))
- Before terminating mandatory controls, a local action plan must be produced, including provisions to improve groundwater without state enforcement (ORS 468B.188(3))

Voluntary Approach & Potential Mandatory Actions

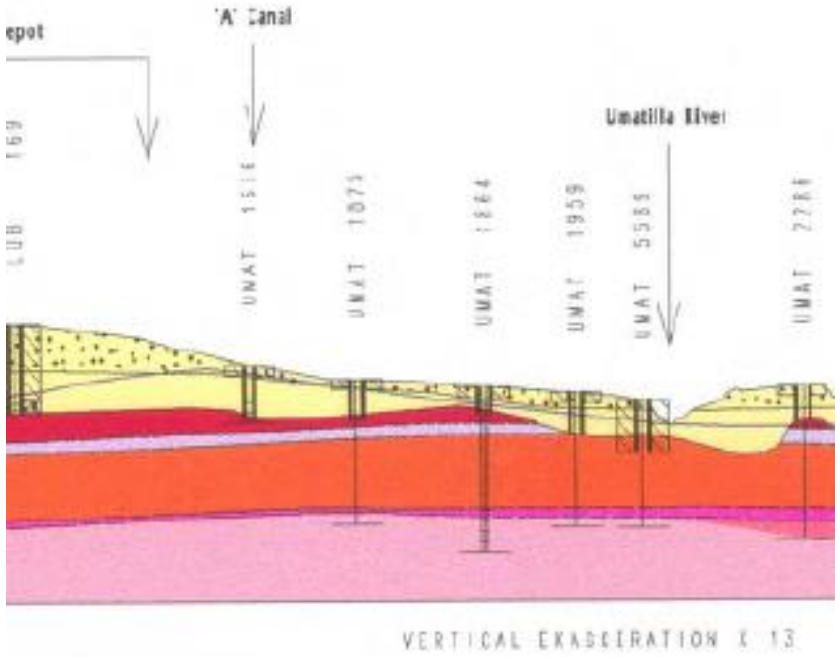
- Committee, ODA, and DEQ implement a voluntary approach to address groundwater contamination
- Voluntary approach complements DEQ and ODA-issued water quality permits for point sources
- Success of the voluntary plan assessed annually by the GWMA Committee and state agencies
- If progress is insufficient, amendments to the Local Action Plan or mandatory actions may be considered
- DEQ responsible for determining if mandatory actions or regulatory changes are needed for groundwater protection
- If mandatory requirements are necessary, DEQ and ODA will work with the Committee to develop and implement them for their respective jurisdictions

Pathway to Implementation



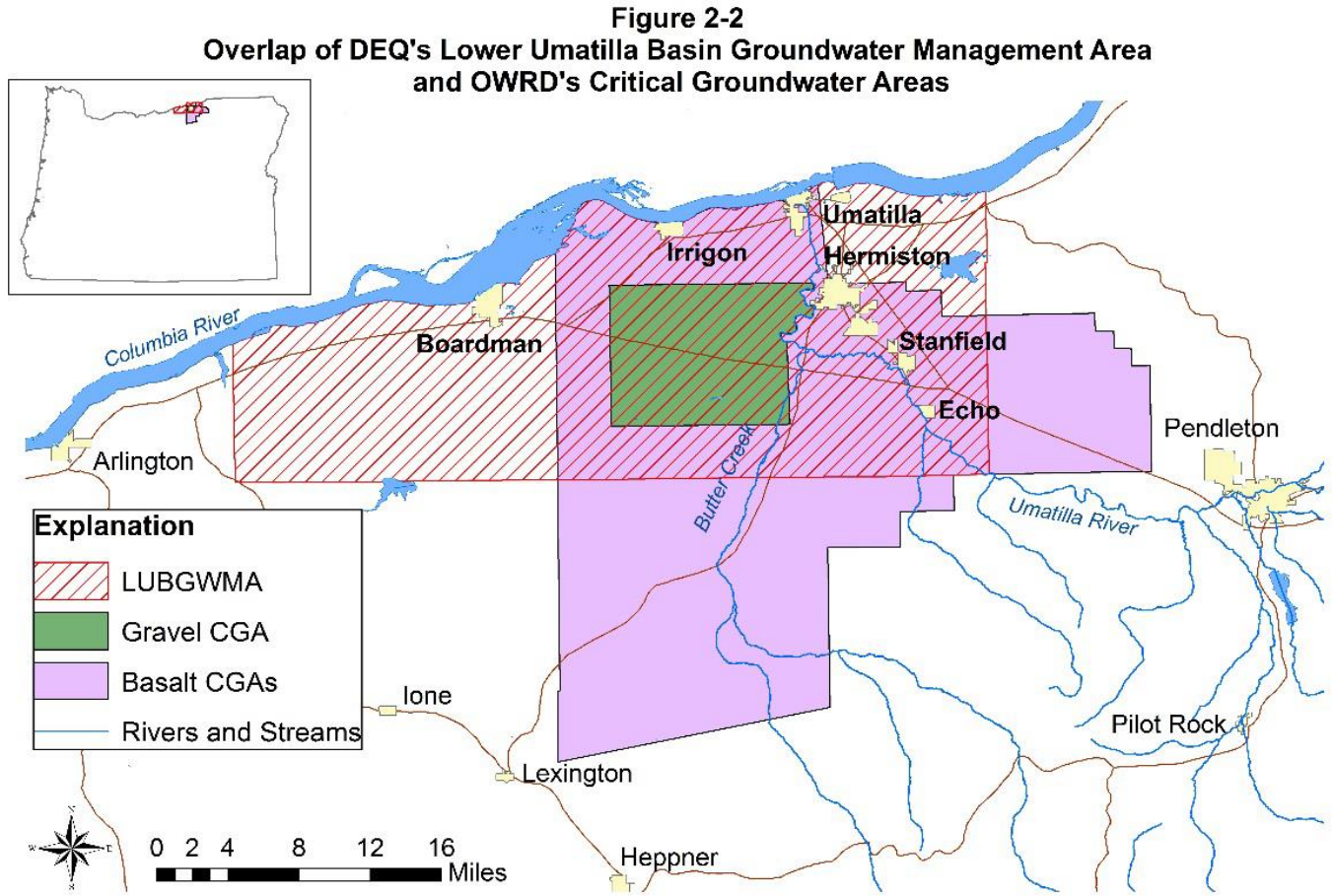
Hydrogeology Overview

- Principal aquifers: alluvial sands and gravels (overlying Columbia River Basalt Group) and porous breccia zones between basalt flows
- Sources of water: domestic groundwater, irrigation for local farms, municipal water (Hermiston, Irrigon, Boardman)
- Focus: shallow alluvial aquifer
- Groundwater recharge: precipitation, deep percolation of irrigation water, leakage from canals, streams, and reservoirs
- Recharge areas: broad for alluvial aquifer (porous and permeable sediments), narrow for basalt aquifers (inter-flow zones, limited exposed surface area)

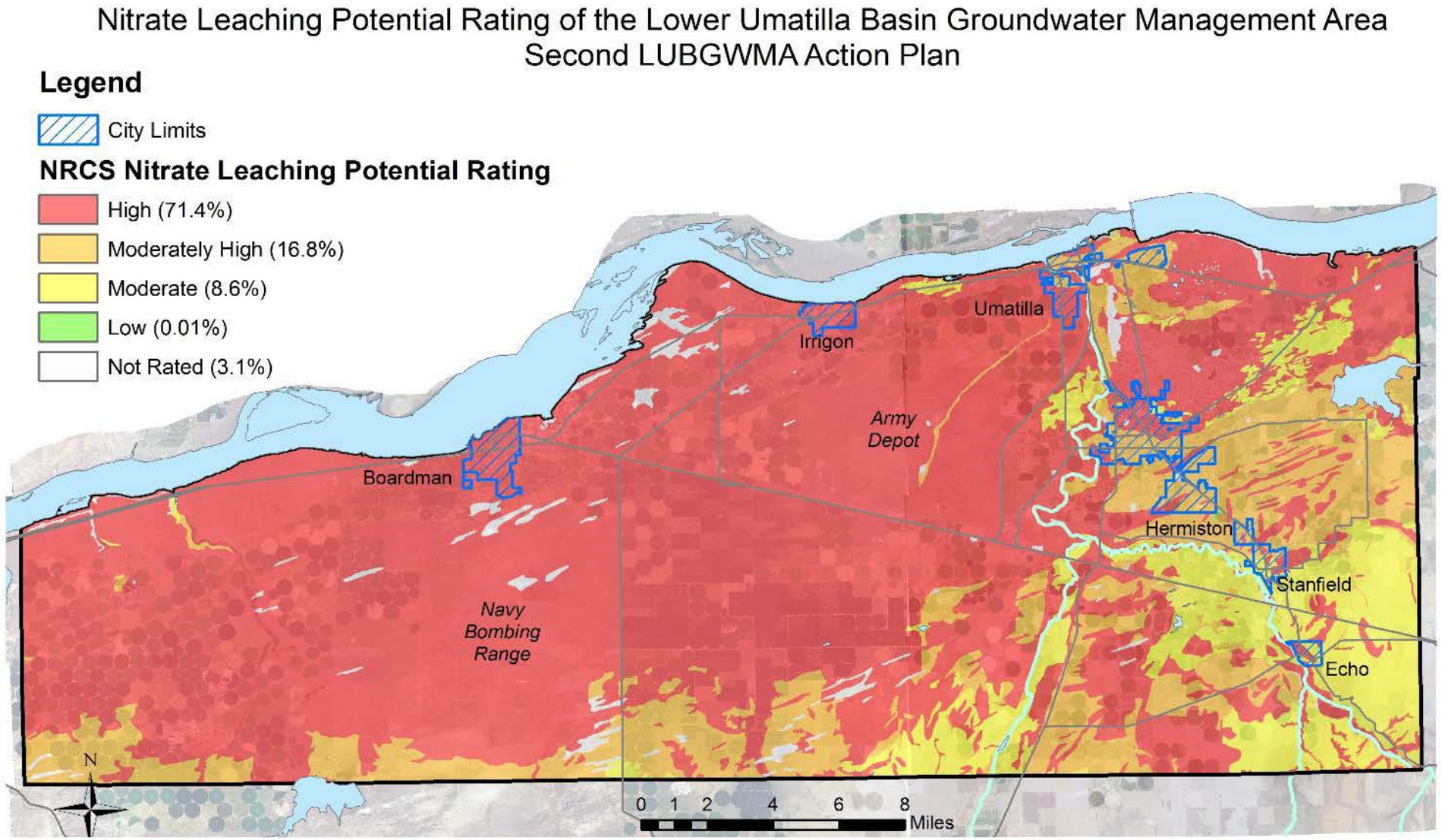


Groundwater Quantity Limited Areas

- Four Critical Groundwater Areas (CGAs) declared by OWRD (1976-1991)Groundwater level declines up to 500 feet
- Three CGAs in deep basalt aquifers, one in shallow gravel aquifer



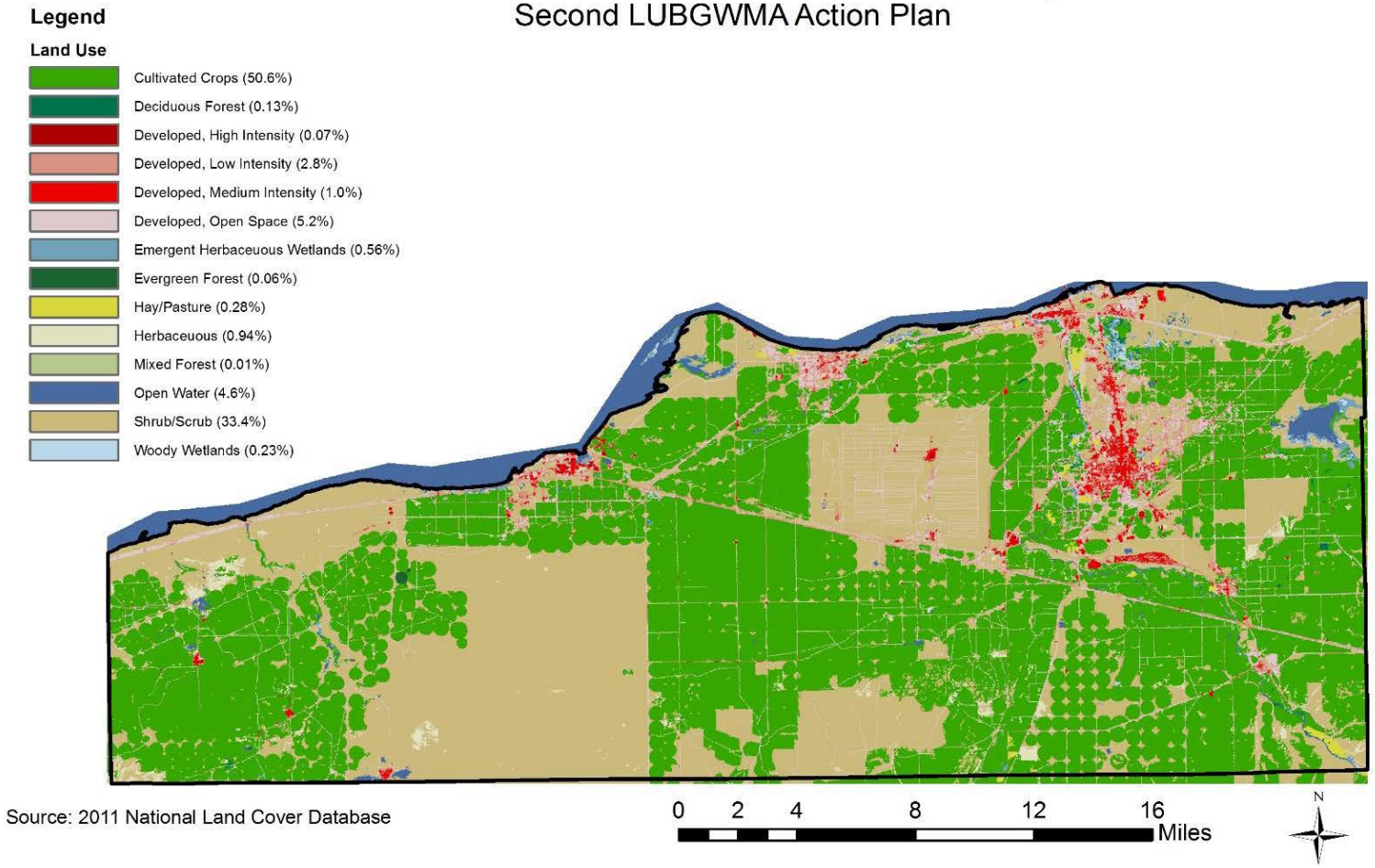
NRCS calculated Nitrate Leaching Potential



Oregon State University

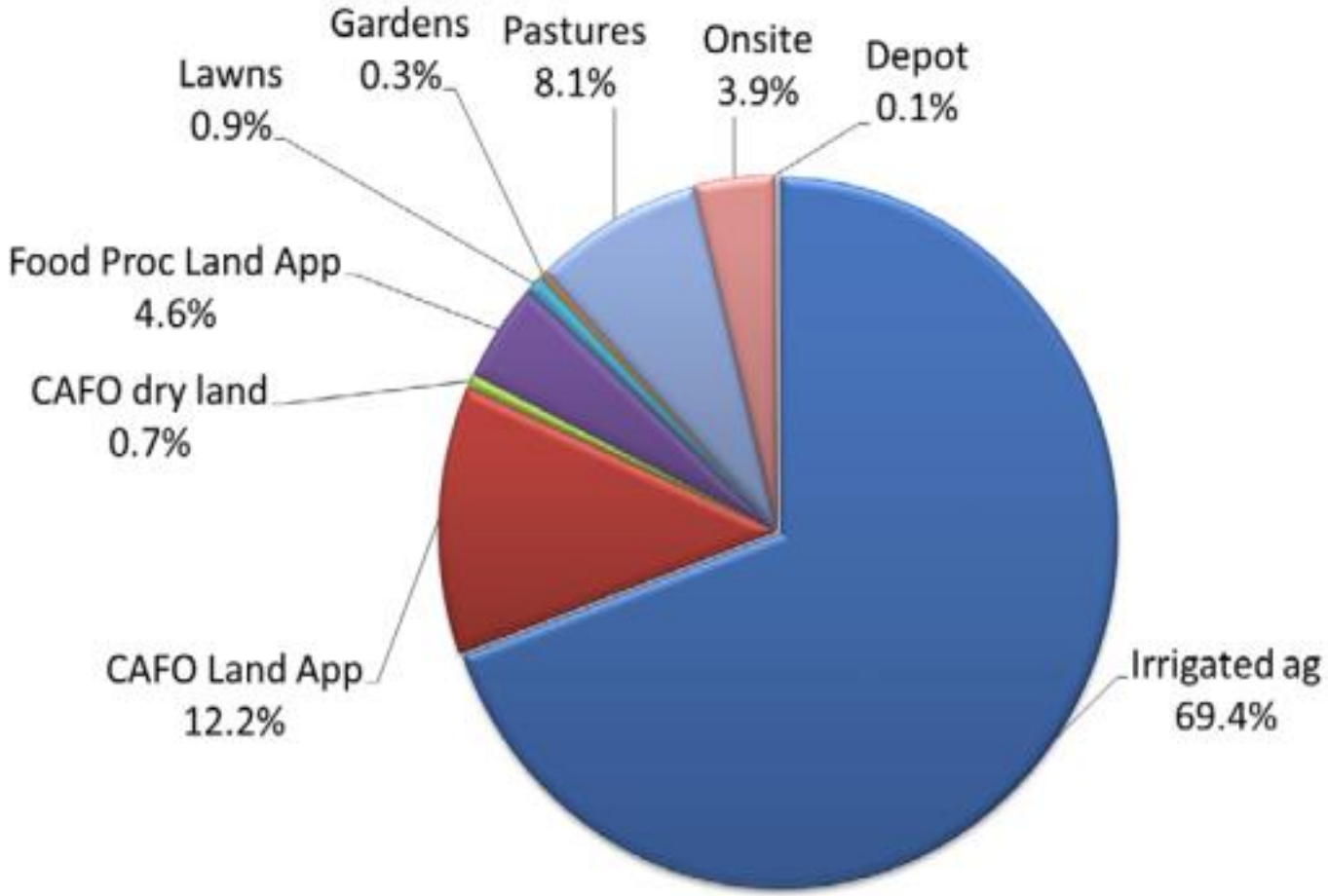
Land Use

Figure 2-4
Land Use in the Lower Umatilla Basin Groundwater Management Area
Second LUBGWMA Action Plan



Salini Sasidharan, Oregon State University/LUBGWMA Chair

Estimation of Nitrogen Leached to Groundwater (Second Action Plan)



Committee decided not to focus on U.S. Army Umatilla Chemical Depot's (UMCD) washout lagoons in LUBGWMA Local Action Plan

- Addressed under federal and state cleanup authorities and regulations by EPA and DEQ
- Remediated and contained by groundwater pump & treat system
- Represents an estimated 0.1% contribution to nitrate contamination

Oregon State University

Well networks and sampling programs

Reconnaissance Sampling in Lower Umatilla Basin

Conducted from July 1990 to September 1991 with 198 wells sampled

- Aimed to understand general groundwater chemistry, identify contaminants, and determine the extent of contamination
- Assisted in establishing project boundaries

LUBGWMA Well Network

Established to determine seasonal variability and trends over time

38 wells initially sampled bi-monthly, reduced to 4 times per year in 2011

Wells selected based on hydrogeological placement, location, groundwater flow path, and groundwater chemistry

Network mostly consists of private domestic wells

Data used to evaluate nitrate trends in the GWMA and inform the Local Action Plan

Synoptic Sampling Events

"Point in time" area-wide snapshot of groundwater quality

Goals: establish regional concentrations, identify source(s), and track transport and fate of nitrate

Sampling events in 1992, 2003, 2009, and 2015

Wells selected based on inclusion in previous events or providing data for isolated locations

Allows comparison of large infrequent samples to small frequent samples

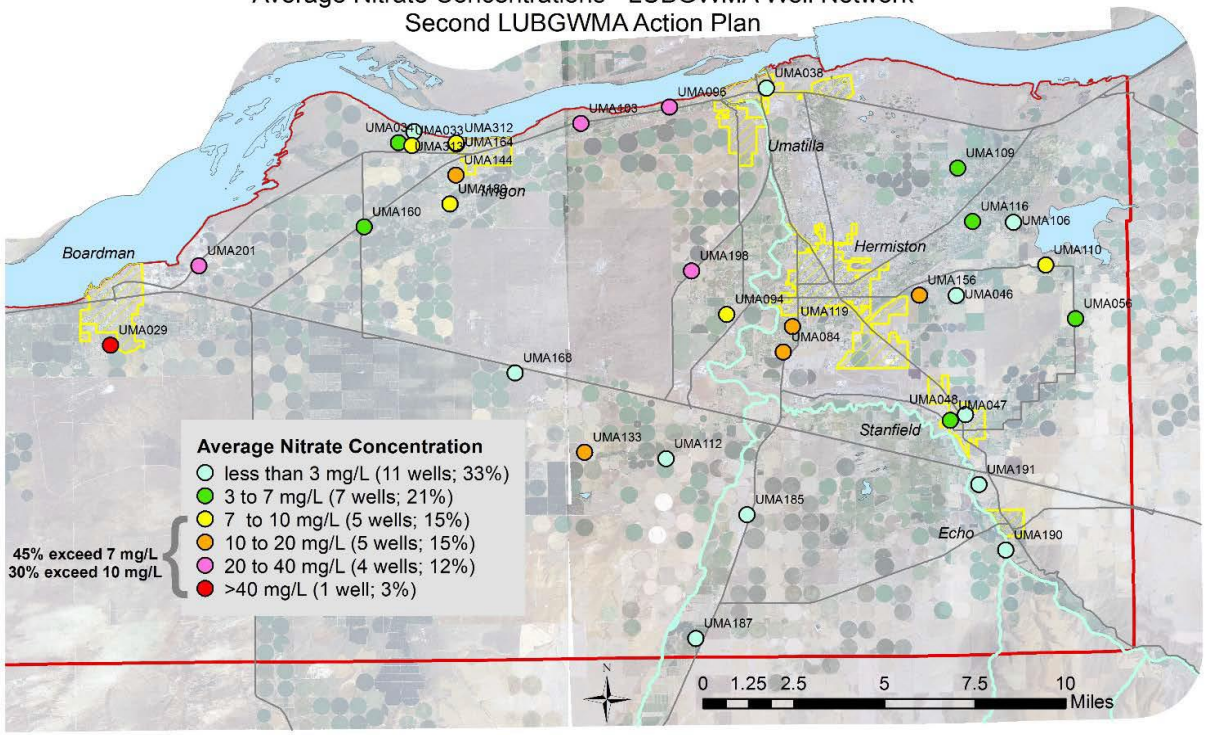
Permitted Facility Well Networks

- Oregon's Groundwater Quality Protection Rules [OAR 340-040-0030(2)] require a groundwater quality protection program for permitted facilities that have the potential for adverse impacts to groundwater quality.
- Many of the sites that land apply waste from food processing facilities and CAFOs have the potential for adverse impacts to groundwater quality
- Facilities operate a groundwater monitoring well network
- Determines rate and direction of groundwater movement, monitors upgradient and downgradient groundwater quality
- If concentrations exceed limits, facilities must conduct remedial investigation, feasibility study, and implement remedial actions
- Given the general scarcity of alluvial aquifer wells in agricultural areas, upgradient wells serve as a gauge for groundwater quality in agricultural areas

Composite of Available Data

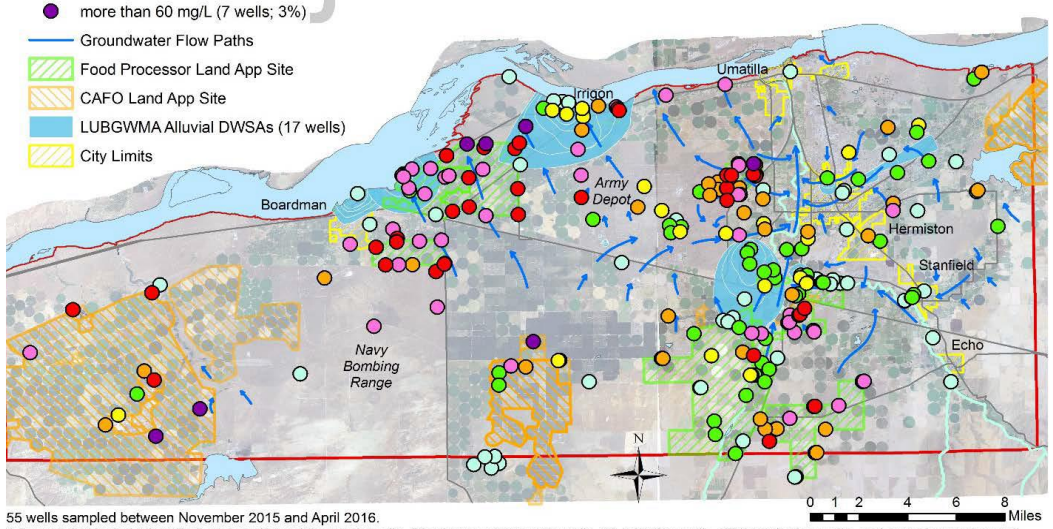
September 1991 through May 2016

Figure 2-7
Average Nitrate Concentrations - LUBGWMA Well Network
Second LUBGWMA Action Plan



November 2015 through April 2016

Figure 2-12
Composite of Available Nitrate Data in the LUBGWMA
Second LUBGWMA Action Plan



55 wells sampled between November 2015 and April 2016.
Wells sampled include the 17 alluvial aquifer public supply wells, 56 private water supply wells, 10 irrigation wells, 171 monitoring wells, and 1 stock watering well.

Oregon State University

Summary and Conclusions of Previous Sampling Events

- Nitrate concentrations exceed the 7 mg/L GWMA trigger level, as well as the 10 mg/L federal drinking water standard in many area wells,
- Nitrate concentrations are higher in monitoring wells located where nitrogen-rich waste is land applied than at private domestic drinking water wells,
- Nitrate trends are increasing at more wells than they are decreasing,
- Increasing trends are generally steeper than decreasing trends,
- • The first LUBGWMA Action Plan's goal of a decreasing nitrate trend throughout the GWMA by 2009 was not met.

Spatial variability of nitrate concentrations and trends

- Nitrogen cycle
- Biogeochemical processing
- Variable sources of nitrogen in the environment
- Temporal changes in source and delivery
- Differing recharge characteristics
- The nature and thickness of material over the aquifer
- The hydraulic properties
- Three-dimensional groundwater flow system
- Stratification of solutes
- Land uses and nitrogen sources

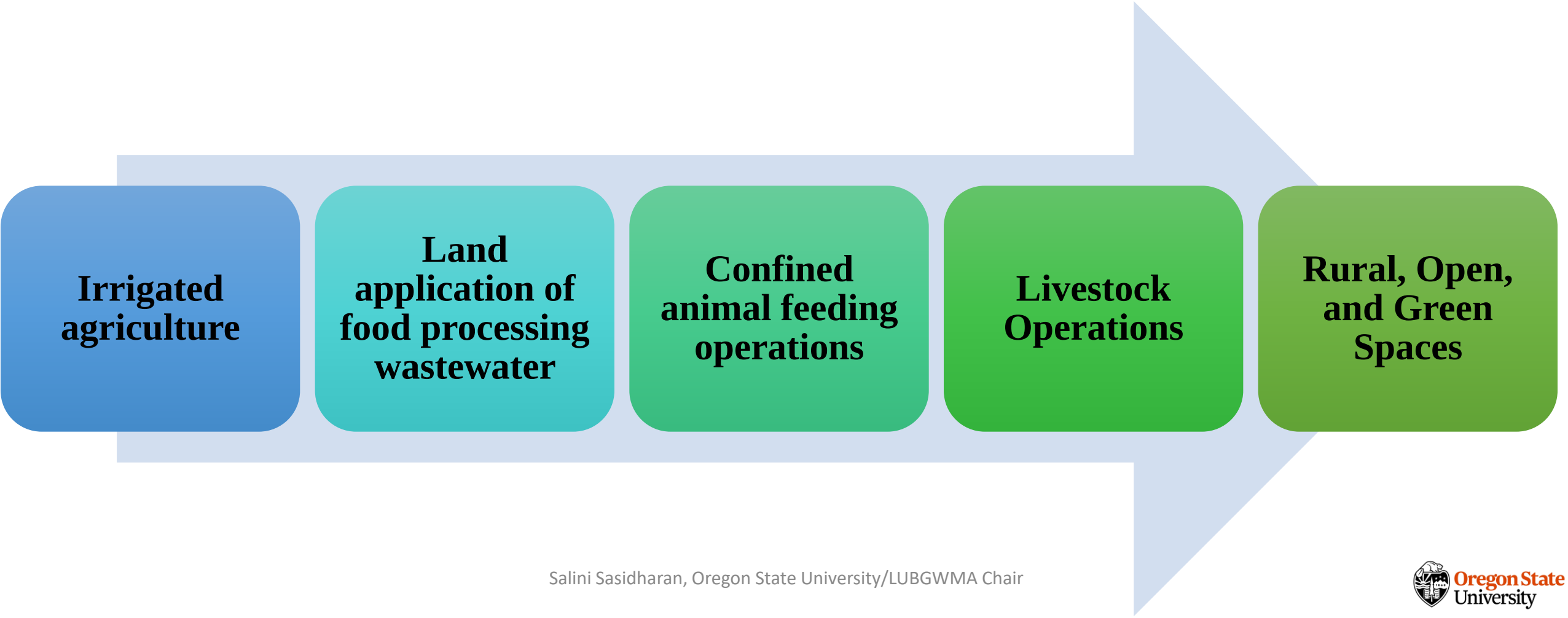
Salini Sasidharan, Oregon State University/LUBGWMA Chair

Summary of Revised Statistical Approach by OSU statistician and DEQ response

- Limitations in available well networks and complexities in data interpretation
- Second LUBGWMA Local Action Plan relies on multiple sources of information
  - LUBGWMA well network, synoptic sampling events, permitted facility wells, public supply wells, and other public data
  - Statistical robustness varies between data sources and analysis methods
  - More weight given to robust sources and methods (e.g., industry-recognized QA/QC procedures, statistical techniques

Oregon State University

Potential Sources of Nitrate Contamination (Second LUBGWMA Action Plan)



Focus areas

- Irrigated Agriculture
- Land Application of Food Processing Industrial Process Wastewater
- Rural, Open, and Green Spaces
- Confined Animal Feeding Operations
- Livestock Operations
- Public Water Systems

Structure of the Second Action Plan

- Goal: An ultimate aim or aspiration
- Strategy: Conceptual means to achieve a goal
- Action: Specific procedures, processes, and activities to accomplish strategies, and ultimately, the goal
- Objective: Measurable, longer-term ways to determine if the goals are being achieved.
- Responsible Entity: Local, State or Private Sector entity with primary responsibility for implementing an action
- Schedule: Timeline for completion of Action

Irrigated Agriculture

Salini Sasidharan, Oregon State University/LUBGWMA Chair

Oregon State University

Salini Sasidharan, Oregon State University/LUBGWMA Chair

Potential Sources of Nitrate from Irrigated Agriculture

Inorganic commercially manufactured fertilizer products

- Three common forms of nitrogen in commercial fertilizer: Urea-N, Ammoniacal-N (Ammonia/Ammonium), and Nitrate-N
- Each form has distinct chemical characteristics, affecting potential loss through volatilization or leaching
- Commercial nitrogen forms with treatments can reduce conversion rates, minimizing nitrogen loss to the environment

Organic residues such as soil organic matter, previous crop residues and manures/compost

- Nitrogen availability varies depending on residue type, manure/compost composition, and decomposition rates
- Soil organic matter levels influence nitrogen release, with higher levels releasing more mineralized nitrogen each cropping season

Atmospheric nitrogen fixed by soil microbiology

- Incorporating leguminous crops into crop rotations introduces nitrogen through nitrogen-fixing root nodules
- Nitrogen is released back into the soil when legume plants die, providing nutrients for subsequent crops
- Free-living soil bacteria can also fix atmospheric nitrogen, but their abundance depends on farm management practices

Irrigation source water

- Proper management of irrigation water and crediting against fertilizer application helps avoid over-application of nitrogen
- The LUB region has sandy soils with a low field capacity, requiring careful management of irrigation water to balance crop needs and groundwater protection

Oregon State University

Goals

- Goal 1: Procure funding for a United States Geological Survey (USGS) to study, characterize, and develop a comprehensive groundwater and hydrology transport model for the Lower Umatilla Basin.
- Goal 2: Procure funding to develop and market a voluntary BMP certification program to inventory and document the extent of BMP implementation in the basin.
- Goal 3: Research, catalog, and publish on the effectiveness of current agronomic best management practices (BMPs) in reducing nitrate contamination of groundwater.
- Goal 4: Create and maintain an online list of reference materials which recommend best management practices and strategies to reduce nitrate loading for targeted crops and conditions in the Lower Umatilla Basin, as well as materials associated with soil health, conservation, and sustainable farming practices.
- Goal 5: Determine what monitoring methods and frequencies are most efficient and effective at helping growers manage in-season water and fertility resources for crops commonly grown in the Basin. Continue to fund research, education, and outreach to improve and encourage the adoption of agronomic BMPs by growers within the Basin
- Goal 6: Develop criteria for achieving GWMA repeal in ORS 468B.188 “Repeal of declaration of groundwater management area”.
- Goal 7: Create an Interagency Task Force to achieve groundwater management goals of the irrigated agricultural community.
- Goal 8: Evaluate the feasibility of a nitrogen mass-balance model and biogeochemical research projects that would spatially identify nitrogen loading in support of
- Goal 9: Evaluate the feasibility of re-defining the LUBGWMA into smaller sections based upon land use, a USGS hydrogeology transport, model and possibly a nitrogen mass-balance model.

Goal 1: Procure funding for a United States Geological Survey (USGS) to study, characterize, and develop a comprehensive groundwater & hydrology transport model for the Lower Umatilla Basin.

- **Strategy 1.1**
- Develop the data, information, and understanding necessary to make informed management decisions regarding groundwater in the Umatilla Basin.
- **Actions**
- ○ Develop, test, and refine a conceptual transport model of the hydrologic system of the Umatilla Basin.
- ○ Describe the hydrologic system through reports and presentations that promote a common understanding of the groundwater resource within the Umatilla Basin.
- ○ Construct numerical models that accurately represent the hydrologic system and can be used as tools to evaluate the effects of proposed management alternatives (for example, future droughts or floods due to changing rainfall patterns).
- ○ Use the hydrologic models to identify optimal management alternatives based on specific quantity and quality management objectives of water resources.

- **Responsible Entity:** DEQ, GWMA Committee stakeholders, USGS
- **Schedule:** 2025

Goal 2: Procure funding to develop and market a voluntary BMP certification program and/or other comprehensive strategies that would inventory, document, and market the extent of BMP implementation in the basin and identify and address opportunities for improvement.

- **Strategy 2.1**
- Develop nutrient best management practice & guidelines and irrigation water best management practice and guidelines. Facilitate farm-scale implementation of the nutrient and irrigation water best management practices guidelines. Support activities and share resources to achieve goals and objectives of reducing and eliminating in-season and winter leaching of nitrate to groundwater.
- **Strategy 2.2**
- Apply for available Western SARE grants to fund a voluntary BMP certification program and BMP research. Continue to apply for DEQ 319 funding when it is available.
- **Strategy 2.3**
- Seek out and apply for new and upcoming sources of funding for a voluntary BMP certification program and BMP research grant proposals.
- **Strategy 2.4**
- Distribution of new educational and promotional materials on Basin BMPs to grower groups within the Basin during the roll-out of a voluntary BMP certification program.

Strategy 2.1

- **Actions**

1. o Increased market visibility and access through development of a BMP groundwater protection standard within existing Salmon Safe (or other) certification and labeling.
2. o **Develop recommended nutrient and irrigation water management guidelines for crops**.
3. o **Develop crop specific recommendations for fertilizer rates, types, placement and timing** for achieving maximum economic yields for the top five irrigated crops (by acreage) grown in the LUB based on standard cropping practices.
4. o **Develop soil-water field capacity model** for the predominantly occurring soils in the LUB. Based upon maximum economic yields and LUB soils, develop crop specific recommendations for irrigation rates, type, timing, and placement.
5. o **Develop and implement data capture and decision making at the field scale** based on right rate, type, timing, and placement of fertilizer and irrigation water.
6. o **Deep soil testing for tracking effectiveness of fertilizer and irrigation water management techniques**.
7. o Recommendations for requisite field scale instrumentation, analytical data collection, monitoring methods, and default values (N source/losses, water meters, soil moisture, ET, etc.) that support active management of nitrogen and water inputs to LUB soils.
8. o **Develop pre-season nutrient & water management plans** coupled with post-season (winter) evaluation.
9. o Crediting the different sources of nitrogen that crops may use beneficially.
10. o Update & develop tools and services to provide recommendations and data for irrigation water and fertilizer management, including weather and soil moisture data collection and distribution.
11. o **Conversion to more efficient irrigation systems**.
12. o Recommend fertilizer source, rate, placement, timing of application, and economically realistic crop yield goals.
13. Procedures for crediting the various sources of nitrate including inorganic fertilizers, organic sources, residual soil nitrogen, and irrigation water.
14. o **Recommendations on soil and tissue sampling** to reduce uncertainty about crop nutrient needs.
15. o **Recommendations regarding the efficient use of irrigation systems** and uniform application of irrigation water for all crops.
16. o **Recommendations to manage for all crops in the rotation and not focus on one crop**.
17. o **Schedule maintenance leaching** to minimize groundwater impact.
18. o **Promote cropping systems to manage nitrate movement**. These systems may include the use of second crops, cover crops, and deep-rooted crops to recover and/or store nitrogen that would otherwise pass the crop root zone.
19. o **Recommend methods, approaches, and reporting that supports data interpretation of actively managed nitrogen and water inputs into the vadose zone** of LUB soils that achieve maximum economic yield while decreasing groundwater impacts.

Strategy 2.2 Apply for available Western SARE grants to fund a voluntary BMP certification program and BMP research. Continue to apply for DEQ 319 funding when it is available.

- **Actions**
- ○ Communicate with Oregon DEQ about the availability of 319 funding opportunities.
- ○ Work with State and local cooperators such as Oregon Department of Agriculture, Umatilla County and Morrow SWCDs, Oregon State University, and others to help design and implement a voluntary BMP certification program and BMP research grant proposals.

- **Responsible Entity:** DEQ, Oregon State University, Oregon Department of Agriculture, Umatilla County and Morrow SWCDs.
- **Schedule:** 2020

Strategy 2.3 Seek out and apply for new and upcoming sources of funding for a voluntary BMP certification program and BMP research grant proposals.

- **Actions**

- Perform periodic searches for new funding opportunities.
- Work with State and local cooperators such as Oregon Department of Agriculture, Umatilla County and Morrow SWCDs, Oregon State University and others to help design and implement a voluntary BMP certification program.

- **Responsible Entity:** Oregon State University, Oregon Department of Agriculture, Umatilla County and Morrow SWCDs.
- **Schedule:** 2020

Strategy 2.3
Distribution of new educational and promotional materials on Basin BMPs to grower groups within the Basin during the roll-out of a voluntary BMP certification program.

- **Actions**

- Evaluate materials currently disseminated at public forums for growers. Work with professional service providers, local conservation districts, and OSU to develop new materials to present new technologies and information.

- **Responsible Entity:** Oregon State University, Oregon Department of Agriculture, Umatilla County and Morrow SWCDs.
- **Schedule:** 2020

Goal 3: Oregon State University researches, catalogs and publishes an evaluation of the effectiveness of current agronomic best management practices (BMPs) in reducing nitrate contamination of groundwater. Research, catalog and evaluate current BMPs that reduce nitrate loss to groundwater. Identify and develop a comprehensive system of irrigation and fertilization practices based on the agronomic practice of the 4Rs (right source, right amount, right timing, right placement) that will improve upon the current level of BMP effectiveness to prevent winter and in-season leaching events.

Strategy 3.1

Monitor in-season and winter soil moisture and soil-test nitrogen across time on a center-pivot irrigated field within the Basin that is being managed with typical BMPs for the crops grown.

Responsible Entity: Oregon State University
Schedule: 2020

- Monitor crop nitrogen removal, soil nitrate accumulation, and nitrate leaching for several years.
- Implement a lysimeter study project measuring nitrate losses from fields in areas with improved fertilizer management. Soil water samples from existing and newly placed lysimeters are collected once a month for two years, and analyzed by a laboratory to determine levels of nitrate and phosphorus leaching below the crop rooting zones in fields using precision agriculture and other innovative fertilizer management practices.
- Monitor soil moisture and soil nitrogen content pre-plant, during the cropping season and post-harvest (winter) to assess the potential for having pushed nitrate below the root zone.
- Document pre-plant soil test nitrogen, in season nitrogen fertilization, and remaining post-harvest soil test nitrogen.
- Compare common methods of soil moisture monitoring to evaluate whether irrigation management effectiveness is influenced by the type and/or frequency of generated data.
- Update and unify all fertilizer rate application tables for the recommended agronomic rate of nitrogen addition to the soil that is needed to produce maximum economic yield, while minimizing adverse environmental effects. The recommended agronomic rate must account for nitrogen available to the crop throughout the growing season from all sources such as mineralization of organic residues and soil organic matter, residual inorganic nitrogen in the rooting zone, and nitrogen from irrigation water or other sources.

Strategy 3.2
Characterize physical variability across the same field and assess the effects of that variability on water and nitrate movement given a uniform application of both resources across the field.

Responsible Entity: Oregon State University
Schedule: 2020

- Grid sample the field for soil textural analysis to determine areas where deeper percolation is likely to occur.
- Analyze elevation and slope data for the field looking for areas where run-off and/or ponding are likely to occur.
- Make visual observations of the field during irrigation looking for wet and dry areas as the soil surface dries out.
- Monitor subsurface moisture movement in areas identified as having abnormal wetting and drying patterns compared to the average of the field.

Goal 4: Oregon State University evaluates existing nutrient management publications and as necessary, adds to its publication catalog of agronomic best management practices to reduce nitrate loading to groundwater. Create and maintain an online list of reference materials that recommend management practices and strategies to reduce nitrate loading for targeted crops and conditions in the Lower Umatilla Basin as well as materials associated with soil health, conservation, and sustainable farming practices.

Strategy 4.1
Utilize a cooperative agency such as Umatilla County, Morrow SWCDs, or OSU Extension to host a webpage for growers to access that would be able to link them to resources on crop specific fertility information, soil and water conservation practices, irrigation management technology and strategies, crop water use curves, etc.

Responsible Entity: Oregon State University
Schedule: 2020

- Catalog and publish all agronomic BMPs that ensure groundwater protection.
- Create a "Groundwater Protection & Agronomic Factor" (GPAF) scoring system, that incorporates groundwater protection and agronomic viability, and apply a GPAF score to each cataloged BMP published by OSU.
- Update the BMP catalog and GPAF scoring on an annual basis.
- Utilizing the GPAF scores, create a standardized suite of BMPs that represent an economically achievable baseline of BMP implementation for growers across the Basin. Provide this standard suite of BMPs to a voluntary BMP certification program that involves active outreach to growers. Active outreach includes recognizing existing BMP performance and improving upon BMP performance.
- Contact potential project partners about the project and determine their willingness and ability to help.
- Compile a list of reference material that can be organized and posted to the webpage.
- Periodically update webpage content.
- Provide a means for growers or industry professionals to suggest additional materials.
- Perform outreach to inform local growers that this source of information exists and is easily accessed.

Goal 5: Oregon State University Agricultural Extension Office in partnership with Oregon Department of Agriculture determines what monitoring methods and frequencies that are most efficient and effective at helping growers manage in season water and fertility resources for crops commonly grown in the Basin. Continue to support research, education, and outreach to improve upon and encourage the adoption of agronomic BMPs by growers within the Basin.

Strategy 5.1
Instrument a field with multiple styles of soil moisture monitoring devices that provide for variable sampling frequencies and cost.

Responsible Entity: Oregon State University
Schedule: 2020

- Contract with local service professionals to install, maintain, and read moisture monitoring devices.
- Collect and compare data sets.
- Assess grower confidence in the data and their ability to make management decisions from it.
- Evaluate total costs of data generation for each style of device.

Strategy 5.2 Compare irrigation practices across common Basin crops and evaluate whether certain types of moisture monitoring devices may be more appropriate than others for certain types of crops.

Responsible Entity: Oregon State University
Schedule: 2020

- Work with local professional service providers to **determine common irrigation practices** and quantify the variability of those practices across crop types.
- Conclude whether there is a strong **correlation between crop type and irrigation management**.
- Assess variables such as irrigation frequency, root zone depth, and seasonal water and fertilizer requirements for different Basin crops. Determine if specific soil moisture monitoring devices are more appropriate than others for specific crops.
- **Promote and certify the use of the most appropriate BMP technology for each crop**.

Goal 6: Develop criteria for achieving GWMA repeal in ORS 468B.188 "*Repeal of declaration of groundwater management area*".

- **Objectives: Objectives include development of criteria for achieving ORS 468B.188**. The objectives outlined in ORS 468B.188 are partially achieved through the existence of this revised local action plan.
- **Responsible Entity:** GWMA Committee
- **Schedule:** 2020

Goal 7: Interagency Task Force to achieve groundwater management goals of the irrigated agricultural community.

- Objectives: The objective of the **structured Interagency Task Force is to coordinate between ODA, ODEQ, OWRD, OSU, and OHA to achieve groundwater management goals of the irrigated agricultural community and basin stakeholders**. Success will include interagency consensus, direct liaison authority, coordinating authorities, channels, terms of commitment, and MOAs or MOUs that support policy, legitimacy, defined purpose, authorities, leadership parameters, functional protocols, unified effort, centralized planning and direction, decentralized execution, and management of resources.

Responsible Entity: GWMA Committee

Schedule: 2020

Goal 8: Evaluate the feasibility of a nitrogen mass-balance model and biogeochemical research projects that would spatially identify nitrogen loading in support of Goal 9.

- **Objectives:** Conduct a nitrogen mass-balance model and biogeochemical research projects that would spatially identify nitrogen loading.
- **Responsible Entity:** GWMA Committee, OSU, EPA
- **Schedule:** 2020

Goal 9: Evaluate the feasibility of re-defining the LUBGWMA into smaller sections based upon land use, a USGS hydrogeology transport model, and possibly a nitrogen mass-balance model that incorporates source loading isotopic signatures.

- **Objectives: Re-define the LUBGWMA into smaller sections** based upon land use, a USGS hydrogeology transport model and possibly a nitrogen mass-balance model.
- **Responsible Entity:** GWMA Committee
- **Schedule:** 2020

Land Application of Food Processing Industrial Process Wastewater

- Historically, the food processing industry focused on process water disposal to avoid nuisances (odor, flies, truck traffic) rather than agronomic rates
- The industry and DEQ did not initially consider the impact of process water application on groundwater quality, focusing instead on preventing runoff from application fields
- Once the impact on groundwater quality was realized, DEQ worked with food processing facilities to modify their process water discharge permits to protect groundwater quality

Salini Sasidharan, Oregon State University/LUBGWMA Chair

Goal 1: Assess and adopt best management practices for land application.

- **Objective:** Assess current OMM and land application practices and compare them to current BMPs of other land application sites in the area.
- **Strategy:** Review current practices and collaborate with other applicants and DEQ to develop a standardized way of applying food processor waste.
- **Actions:** Review and adopt Irrigated Agriculture's action plan items, including participation in a voluntary BMP certification program.
- **Responsible Entity:** DEQ and WPCF permit holders who land apply food processing wastewater.
- **Schedule:** As Irrigated Ag evaluates and adopts practices lined out in its section of the Action Plan.
- **Actions:** Review OMM and current practices and compare to other food processors/WPCF permit holders to create a more standard application process with DEQ and permit holders.
- **Responsible Entity:** DEQ and WPCF permit holders who land apply food processing wastewater.
- **Schedule:** Within one year of Action Plan adoption for existing fields and prior to land application at new sites.

Salini Sasidharan, Oregon State University/LUBGWMA Chair

Goal 2: Minimize site conditions and land application practices that increase the chance of leaching nitrate to groundwater.

- **Objective:** Identify and minimize site conditions and land application practices that increase the chance of leaching nitrate to groundwater.
- **Strategy:** Evaluate site conditions and land application practices to identify conditions or practices that increase the chance of leaching nitrate to groundwater.
- **Actions:** Evaluate site conditions (e.g., soil type, soil moisture variability, NRCS's Nitrate Leaching Potential http://websoilsurvey.nrcs.usda.gov/app/) and identify fields or portions of fields with high nitrate leaching potential. Evaluate land application practices (e.g., crop selection, crop rotation, fertilization practices (including form, placement, and timing), and irrigation practices (including method, timing, and soil moisture movement beneath the root zone).
- **Responsible Entity:** DEQ and WPCF permit holders who land apply food processing wastewater
- **Schedule:** Within one year of Action Plan adoption for existing fields, and prior to land application at new sites.

Salini Sasidharan, Oregon State University/LUBGWMA Chair

Goal 3:Develop nitrogen mass balance model for the LUBGWMA

- **Objective:** Model nitrogen budget and transport
- **Strategy:** Model nitrogen budget and transport
- **Actions:** Evaluate site conditions (e.g., soil type, soil moisture variability, NRCS's Nitrate Leaching Potential http://websoilsurvey.nrcs.usda.gov/app/) and identify fields or portions of fields with high nitrate leaching potential. Evaluate land application practices (e.g., crop selection, crop rotation, fertilization practices (including form, placement, and timing), and irrigation practices (including method, timing, and soil moisture movement beneath the root zone).
- **Responsible Entity:** DEQ and WPCF permit holders who land apply food processing wastewater
- **Schedule:** Within one year of Action Plan adoption for existing fields, and prior to land application at new sites.

Oregon State University

Rural, Open, and Green Spaces (ROGs)

Salini Sasidharan, Oregon State University/LUBGWMA Chair

Oregon State University

Definitions

Residential areas (lawns, gardens, pastures, domestic wells and septic systems), parks and other open space (city parks, walking paths, and golf courses), and agricultural areas smaller than 40 acres (row crops, hobby farms, livestock and pastures).

Rural - lands zoned for rural residential use	Open Space - public lands without maintained lawns/plantings	Green Space - public lands with maintained lawns/plantings

This plan focuses on managing groundwater quality from various sources but does not address impacts from flooding or natural hazards; those are covered in Natural Hazard Mitigation Plans for Umatilla and Morrow Counties

Sources of Nitrates from Residential, Open and Green Space

- Improperly sited, installed or maintained septic systems;
- Density of installed septic systems;
- Wells and their construction, location and leakage;
- Over fertilization of landscaped areas including yards, gardens, and open spaces including parks, play and school grounds;
- Small (less than 40 acres) irrigated operations that are not located on lands zoned for Exclusive Farm Use; and
- Pasture management as an alternative to animal density

Salini Sasidharan, Oregon State University/LUBGWMA Chair

Rural, Open, and Green Spaces (ROGs)

- **Goal 1:** Achieve an increased level of knowledge and cooperation around groundwater quality resulting in reduction of nitrate levels.
- **Goal 2:** Reduce nitrate concentrations by implementing best practices in residential, open and green space areas.
- **Goal 3:** Reduce the nitrate concentration from septic systems.
- **Goal 4:** Reduce the potential for contamination of wells; conduct analytical testing for nitrates in domestic wells and educational outreach to domestic well owners on point-of-use treatment options.
- **Goal 5:** Provide technical support for local governing bodies to adopt rules in accordance with Oregon statute.

Salini Sasidharan, Oregon State University/LUBGWMA Chair

Strategy 1.1
Compile information from the industry or regulatory agencies and provide education.

- **Actions**
- Information gathered can be compiled into a **single brochure or broader information packet** that can be used by the Oregon DEQ, county planning departments and appropriate city planning staffs to better inform citizens or potential citizens about groundwater quality.
- **Offer workshops for realtors on groundwater quality concerns** and provide **continuing education credits**.
- **Identify funding and offer a free drinking water well nitrate testing program**.
- **Implement a project that looks at what types of messages resonate with rural residents** to get their drinking water wells tested or treated. The project will gather baseline data on community awareness of local groundwater contamination in specific geographic areas in the GWMA. The results from this study will help the GWMA Committee, DEQ staff, and others better understand constituents' needs, create the appropriate communication tools, and encourage beneficial practices.
- **Create and implement a school age program for delivery** within the LUBGWMA. Topics should include, but not be limited to, the following: what not to put down your drain, how to have your drinking water tested, and how to maintain a healthy lawn.
- **Integrate a groundwater quality component into the local area watershed curriculum** initiative and other educational forums (such as: 4H, FAA and Scouts).
- **Responsible Entity:** Morrow County and Umatilla County
- **Schedule:** 2020

Oregon State University

Salini Sasidharan, Oregon State University/LUBGWMA Chair

Strategy 1.2
Provide information to the public about groundwater quality.

- **Actions**
- **Develop appropriate articles and newsletters for local publication and media outlets**. Emphasize and encourage the adoption of recommended practices to reduce nitrogen loading to the groundwater.
- **Submit a monthly press release to local newspapers, publish a biannual newsletter and submit articles to the Ruralite magazine** (written by various agency personnel and active citizens).

- **Responsible Entity:** Morrow County and Umatilla County
- **Schedule:** 2020

Salini Sasidharan, Oregon State University/LUBGWMA Chair

Strategy 1.3 Provide the rural residential community with information and alternatives on how to develop property while protecting groundwater quality.

- **Actions**
- **Establish an educational/outreach program** and material for the region.
- **Encourage local area libraries to house information**.
- **Develop bilingual outreach material** for the Hispanic community.

- **Responsible Entity:** Morrow County and Umatilla County
- **Schedule:** 2020

Salini Sasidharan, Oregon State University/LUBGWMA Chair

Strategy 1.4 Offer technical support to elected officials, city and county staff, and citizens' advisory groups about the GWMA and associated issues.

Actions

- **Provide workshops, briefing sheets, meeting speakers, and other educational tools for local policy-makers** and those implementing the policies.
- Coordinate with local partners to include relevant GWMA-related information on their websites.

- **Responsible Entity:** Morrow County and Umatilla County

Strategy 1.5 Identify organizations, both locally, across the region and state, and nationally that have expertise in this or related areas and utilize their knowledge and materials to benefit the LUBGWMA and assist with implementing this and other portions of the Local Action Plan.

Actions

- Oregon DEQ, County Planning Departments and Commissions, and affected cities lead identification of amendments to city or county comprehensive plans and land use regulations to assist county planning commissions, departments and the development community in addressing the groundwater quality impacts of future development.

- **Responsible Entity:** Oregon DEQ, Morrow County and Umatilla County
- **Schedule:** 2020

Salini Sasidharan, Oregon State University/LUBGWMA Chair

Strategy 2.1 Perform outreach and education about best practices to reduce nitrate leaching from residential, open and green space activities

- **Actions**
- Educate and inform landscapers and yard maintenance companies, owners and operators of large public open and green space, and residents generally about best management practices concerning watering, fertilizing and general management of these areas.
- Measure via a survey or other instrument the knowledge of residents about the application of fertilizers at the correct agronomic rate for the plants being fertilized as well as the amount and times of water needed to maintain a healthy landscape, lawn or garden.
- Assist landowners to know about and encourage pasture nutrient, and irrigation management practices for long term viability and to prevent possible groundwater contamination.

Responsible Entity: Morrow

Schedule: 2020

Salini Sasidharan, Oregon State University/LUBGWMA Chair

Strategy 2.2 Assist owners of medium and large animals to better understand the impacts of animals on groundwater and how proper nutrient, manure and irrigation water management can be beneficial to clean drinking water and their environment.

Actions

- Assist landowners to follow **general grazing accepted pasture management practices** to avoid over grazing of pastures. Include pasture maintenance and renovation, pasture rotation and winter grazing management.
- Assist landowners to **practice proper manure management techniques** which include the proper collection, storage of manure, waste water control and application techniques.
- Assist landowners to know about and **implement measures to minimize wastewater by providing dry manure storage facilities and diverting surface runoff.**
- **Outreach through animal feed suppliers and veterinarians**.
- Morrow and Umatilla County Planning Departments and affected cities **amend their animal density**

Responsible Entity: Morrow County SWCD and Umatilla County SWCD

Schedule: 2020

Oregon State University

Salini Sasidharan, Oregon State University/LUBGWMA Chair

Strategy 2.3 Umatilla County and Morrow Soil and Water Conservation Districts, the OSU Master Gardener Program, County Planning Departments, County weed managers or supervisors, and the Cities within the LUBGWMA work cooperatively to educate and inform.

- **Actions**
- Provide homeowners and others managing open or green space information about **causes of different plant problems, including watering and fertilizing**, available to them that is regionally specific with references to available assistance.
- Organize information and **develop an educational outreach program on methods and alternatives to properly maintain landscaping, lawns and gardens** to prevent leaching nutrients to the groundwater.
- **Identify programs currently offered by and through the Umatilla County or Morrow SWCD** that could be expanded into the LUBGWMA and determine if there are incentives involved.
- **Reengage the cities within the LUBGWMA** relative to both residential impacts and the impacts from public lands.
- **Engage the OSU Master Gardener Program** utilizing their organization, meetings and outreach efforts to the benefit of the residents within the LUBGWMA.

Responsible Entity: Umatilla County and Morrow Soil and Water Conservation Districts, the OSU Master Gardener Program, County Planning Departments, County weed managers or supervisors, and the Cities within the LUBGWMA

Schedule: 2020

Oregon State University

Salini Sasidharan, Oregon State University/LUBGWMA Chair

Strategy 3.1 Provide ongoing education and information to address groundwater quality and other effects of improperly installed or maintained systems.

- **Actions**
- Take into consideration the location of existing wells, septic systems, and other possible contamination sources before siting a septic system.
- Encourage periodic inspections and replacement or upgrading of septic systems to meet current standards.
- Encourage routine maintenance of septic systems to extend the useful life of the system and minimize groundwater impacts.
- Use information obtained by surveying septic system pumpers to determine what type of information septic system owners need to improve maintenance of their systems.
- Use information from complaints or through other developed mechanisms to determine failing or impaired septic systems.
- Through amendments to city or county comprehensive plans and land use regulations, consideration should be given to the use of Alternative Treatment Technologies
- Provide information to drug stores and pharmacies about impacts of drugs on septic systems and wastewater treatment facilities. Develop and implement prescription drug take back programs
- **Responsible Entity:** Morrow County and Umatilla County
- **Schedule:** 2020

Salini Sasidharan, Oregon State University/LUBGWMA Chair

Strategy 3.2 Morrow and Umatilla County Planning Departments adopt and implement Comprehensive Plan policy statements or other land use measures and rules that implement and maintain a seven to ten acre rural residential parcel size when new lands are converted from resource to non-resource, particularly residential, use.

- **Actions**
- Amend Land Use Plans and Codes to incorporate groundwater concerns and incorporate groundwater quality as criteria in land use review of development proposals.
- Through amendments to city or county comprehensive plans and land use regulations, develop solutions for county and city governments to use to address the cumulative impacts of clustered and high-density septic systems when planning for and reviewing developments.

Responsible Entity: Morrow County and Umatilla County

Schedule: 2020

Salini Sasidharan, Oregon State University/LUBGWMA Chair

Strategy 3.3 Facilitate the use of financial incentives to encourage the use of technologies that reduce nitrate contributions from septic systems to groundwater.

Actions

- Promote utilization of **Clean Water Loans** offered through DEQ to make repairs more affordable.
- Explore options to make use of the **State Revolving Loan Fund** to finance grants and loans to low- and moderate-income residents for installations or upgrades to meet an approved nitrate reduction standard.
- Investigate the possibilities of **using current or new state income tax or county property tax credits or deductions** for individuals who install onsite wastewater systems that meet an approved nitrate reduction standard, similar to the idea of a tax credit for water conserving appliances.
- Network with local, state, and federal agencies that provide **financial assistance for home rehabilitation and water-quality-protection** to ensure that septic system enhancement is an allowable use of those funds.

- **Responsible Entity:** Oregon DEQ, Morrow County and Umatilla County
- **Schedule:** 2020

Oregon State University

Salini Sasidharan, Oregon State University/LUBGWMA Chair

Strategy 3.4 Minimize septic system wastewater loadings that could create a groundwater quality problem.

- **Actions**
- **Utilize septic system density map, hydrogeology, the current built environment** overlaid with current zoning.
- **Investigate possible methods for determining where in the LUBGWMA high densities of septic systems**, in conjunction with **soil types and other limiting factors**, are likely to have an adverse impact on groundwater quality.
- **Complete amendments to city or county comprehensive plans and land use regulations to guide future land use decisions for zone changes, subdivisions or other land use actions** that would decrease wastewater loading.
- **Responsible Entity:** Morrow County and Umatilla County
- **Schedule:** 2020

Strategy 4.1 Provide nitrate analytical testing and point-of-use treatment options information to owners and users of wells. Provide information to well drillers, realtors, landscapers and yard maintenance companies concerning various aspects of well construction and maintenance

- **Actions**
- **Implement nitrate analytical testing for domestic wells** in Morrow and Umatilla County.
- **Provide educational outreach to domestic well users** regarding point-of-use nitrate treatment options.
- **Assure that older wells** with poor construction or known leakage **are repaired.**
- Assure that **new wells are installed in such a way as to avoid creating new problems** relative to a wells construction, location, or leakage.
- **Work with the Oregon Water Resources Department (OWRD),** the **Oregon Drinking Water Program**, and **city and county planning departments** to provide information
- Construct and repair wells to prevent possible contamination from the surface and the concern about the use of sand points.
- Encourage owners of older wells to get their well casings and seals inspected to ensure that no leakage is occurring.
- Take into consideration the location of existing wells, septic systems, and other possible contamination sources before siting a well
- Locate potential liquid or solid contaminates away from well heads or provide barriers to prevent well contamination.
- When using chemigation provide anti back siphoning devices to prevent contamination of the well and groundwater through back siphoning of chemigation tanks.
- Repair wells that are commingling alluvial and basalt aquifers so contamination in one aquifer does not contaminate another.

- **Responsible Entity:** Morrow County and Umatilla County, OHA, OWRD,
- **Schedule:** 2020

Salini Sasidharan, Oregon State University/LUBGWMA Chair

Strategy 4.2 Facilitate the use of financial incentives to encourage proper abandonment or repair of wells

- **Actions**
- Work with Oregon Water Resources Department and Oregon's Drinking Water Program to identify grants and make available loans to improve well construction and repair problem wells.
- Create an incentives program that would encourage owners of problem wells to address the situation.
- Request increased inspection of wells by OWRD and take necessary steps to support the agency in doing this.
- Agency cooperation to identify needs and risks of the LUBGWMA.

- **Responsible Entity:** Oregon (OWRD), Morrow County and Umatilla County
- **Schedule:** 2020

CAFOs

- Animal feeding operation (AFO) refers to holding animals in treated surface areas to support them in wet weather
- Confined animal feeding operation (CAFO) confines animals for over four months a year and requires permits for waste disposal systems
- Ten operating CAFO facilities exist in the LUBGWMA, consisting of four cow dairies and six cattle feedlots
- These CAFOs collectively manage about 42,000 acres of crop and pasture land within the LUBGWMA

Salini Sasidharan, Oregon State University/LUBGWMA Chair

Potential Sources of Nitrate

- Primary sources of nitrogen in the Basin are **animal manure and process wastewater** from CAFOs
- Secondary sources include **synthetic fertilizer and irrigation water**
- CAFOs must follow an **ODA-approved Animal Waste Management Plan** (AWMP) and implement best management practices (BMPs)
- CAFOs are **regulated to prevent nutrient discharge** or leaching, apply manure and nutrients at or below agronomic rates, and manage irrigation to prevent runoff and leaching
- CAFOs must also **maintain records of crops planted and total nutrients applied to each field, both from manure and synthetic fertilizers**

Confined Animal Feeding Operations (CAFOs)

- Goal 1: **Collect, contain, treat and/or store manure and process wastewater** at CAFOs in a manner that is protective of groundwater.
- Goal 2: **Beneficially utilize nutrients** at CAFOs and prevent leaching of nutrients to groundwater.
- Goal 3: Keep current with CAFO BMPs and provide CAFO education outreach.

Salini Sasidharan, Oregon State University/LUBGWMA Chair

Strategy 1.1: Surface Water Management. Precipitation, or water, that comes in contact with potential pollutant sources at CAFOs continues to be collected, contained and/or treated. Additionally, CAFOs may incorporate facility management techniques that will divert clean surface water and stormwater runoff away from the production area facilities where they can come in contact with manure and stored feed products.

- **Actions:**
- CAFO operators inspect and maintain their systems that collect, contain and/or treat surface and stormwaters that have come into contact with potential pollutants sources at their facility (CAFO permit requires this).
- CAFO operators with freshwater diversion systems inspect and maintain the diversion structures (CAFO permit requires this).

- **Responsible Entity:** CAFO Operators
- **Schedule:** Ongoing; these actions are already required and being implemented

Strategy 1.2. Wastewater Conveyance and Storage Management. Surface and groundwater protection measures for wastewater management include lagoons, evaporative ponds, and conveyance facilities that direct, catch and hold manure, process wastewater and runoff waters that come in contact with manure or feed stores. These facilities allow the capture, management, and storage of manure, process wastewater, and runoff water.

- **Actions:**
- ODA and the CAFO permit will continue to require CAFOs to operate with an approved AWMP that includes a list of planned structural improvements. Newly proposed manure handling structures requires ODA approval prior to constructing.
- CAFOs planning to construct new lagoons, solid storage, and wastewater conveyance facilities submit design plans to ODA for review and receive ODA approval prior to construction.
- ODA reviews design plans for new lagoons, solid storage and wastewater conveyance facilities to ensure that they are designed and constructed in accordance with current state standards to minimize leakage of stored wastewater. ODA may request that DEQ assist in these reviews.
- Existing lagoons and wastewater conveyance facilities meet state design standards for storing wastes, leachates and effluent. All manure and process wastewater structures must be operated and maintained to deliver the designed water quality protections.
- CAFOs follow their operation and maintenance plan in their ODA-approved AWMP when cleaning out sediments from lagoons and holding ponds to prevent damage to the seals or structures, which could result in leakage.
- **Responsible Entity:** CAFO Operators
- **Schedule:** Ongoing; these actions are already required and being implemented

Salini Sasidharan, Oregon State University/LUBGWMA Chair

Strategy 1.3. Management of Solid Storage Areas and Feed yard Surfaces. Studies have shown that concentrating animals in a small area produces a surface seal of compacted organic matter and soil that inhibits movement and leaching of effluent through the seal of feed yard surfaces. Anaerobic conditions can also be created in the seal, which will assist in the denitrification process. New pens, manure storage, and feed storage areas are designed and constructed according to state design standards to minimize groundwater issues.

- **Actions:**
- CAFOs store manure in designated locations identified in the ODA-approved AWMP and in a manner that minimizes impact to surface and groundwater.
- CAFOs maintain the surface seal while removing manure and shaping the feedlot pens.
- CAFOs direct runoff to adequately constructed effluent storage or treatment facilities.

- **Responsible Entity:** CAFO Operators
- **Schedule:** Ongoing; these actions are already required and being implemented

Salini Sasidharan, Oregon State University/LUBGWMA Chair

Strategy 2.1. Manure and Process Wastewater Utilization

- **Actions:**
- Analyze manure and process wastewater for its nutrient value for use when applying to crops.
- Time nutrient applications to coincide with crop uptake requirements.
- Account for any additional nutrients in irrigation water when determining amount of manure and process wastewater to apply to crop systems.
- Account for the nutrient value of all manure and process wastewater or other nutrient source spread on a field. CAFOs cannot exceed the agronomic application rates listed in the ODA-approved AWMP.
- Irrigation water management practices to prevent transport of soluble nutrients as contained in their ODA approved AWMP
- Implement a rotational crop cycle with deep-rooted crops (>3ft rooting depth) to manage nitrates that may have moved past the root zones of shallower rooted crops. Utilizing this deeper nitrate makes it unavailable for leaching to groundwater.
- Employ real-time monitoring and precision agriculture techniques.
- Conduct frequent soil sampling including pre-side dress soil nitrate test (for corn) and end of growing season post-harvest soil tests to evaluate nitrate levels remaining in soil and plan strategies for the next crop cycle.
- **Responsible Entity:** CAFO Operators
- **Schedule:** Ongoing; these actions are already required and being implemented

Salini Sasidharan, Oregon State University/LUBGWMA Chair

Strategy 2.2: Irrigation Management.

- **Actions:**
- At least annually, and prior to the start of irrigation season, CAFOs review the irrigation water management section of their ODA-approved AWMP so that subsequent irrigation operations do not exceed the soil intake rate or provide more water than the rooting depth profile can store.
- CAFOs implement combinations of BMPs, or strategies, when irrigating such as: 1. Develop operation and maintenance schedules for irrigation equipment to ensure water is applied at correct rates.
- 2. Maintain irrigation equipment.
- 3. Use soil moisture monitoring systems, real-time monitoring, precision agriculture techniques, and/or other technologies.
- 4. Balance irrigation applications with crop needs and soil characteristics throughout the irrigation season.
- 5. Use dammer-diker, or similar type of implement where possible with row crops on sloped fields to help control irrigation run-off and prevent ponding at low spots, thus subsequently help prevent leaching of nutrients from those areas.
- 6. Convert to more efficient irrigation systems and practices with a lower potential to leach excess water to the groundwater.
- Responsible Entity: CAFO Operators
- Schedule: 2020

Salini Sasidharan, Oregon State University/LUBGWMA Chair

Strategy 3.1: Keep current with CAFO BMPs, emerging technologies and monitoring advances

- **Actions:**
- Periodically review, research, and identify emerging BMPs and technologies that will improve waste management practices within CAFOs.
- CAFOs annually review their ODA-approved AWMP to make sure that is reflective of the actual operations at the CAFO. AWMP amendments are necessary to include any new BMPs or changes to existing BMPs.
- Attend CAFO manure management conferences.
- Review scientific literature and studies relating to CAFO operations such as groundwater quality management, cropping system nutrient utilization, irrigation water management system, and advances in soil and crop systems monitoring techniques.

- **Responsible Entity:** CAFO Operators and technical service providers
- **Schedule:** 2020

Salini Sasidharan, Oregon State University/LUBGWMA Chair

Strategy 3.2: Develop and implement ongoing CAFO education outreach.

- **Actions:**
- ODA provides upon request on site planning assistance and educational reviews to AFOs and CAFOs. This provides an operation the opportunity to assess current or proposed BMPs effectiveness in groundwater protection. SWCD and NRCS are also available to provide individual farm evaluations of CAFOs to assess the adequacy of groundwater protection measures.
- Develop a brochure that explains when a CAFO permit is required, and also maintain this information on a web site.
- ODA will develop and maintain a web page with a contact list of individuals and agencies with technical expertise in design, construction, and operation of CAFOs.
- SWCD, NRCS, and ODA will develop and maintain a list of web links that directs CAFOs to BMP information.
- Develop a public outreach plan to educate the public about the BMPs that CAFOs implement to protect surface and groundwaters.

- **Responsible Entity:** ODA and CAFO Operators
- **Schedule:** 2020

Livestock Operations

- Livestock operations are a significant agricultural activity in the LUBGWMA, **supporting local markets and the economy**
- Livestock includes domesticated animals like cattle, horses, sheep, goats, swine, chickens, and fowl, but excludes animals in permitted CAFOs
- **Livestock operations are regulated by local Agriculture Water Quality Management Area Rules**, prohibiting pollution discharge to surface or groundwater
- Estimated **16,000 acres of irrigated pasture** in the GWMA, with approximately **8,000 cattle and horses**
- Manure from livestock operations can be a potential source of nitrate leaching into groundwater; well-managed pastures minimize this risk, while areas with concentrated animals and sparse vegetation pose the greatest threat

Oregon State University

Salini Sasidharan, Oregon State University/LUBGWMA Chair

Nitrate Sources

- Pasture Management
- Solid Manure Management
- Confinement Area Management
- Irrigation Management
- Wastewater Runoff
- Stormwater Runoff

Livestock Operations

- Goal 1: Reduce groundwater nitrate concentrations caused by livestock.
- Goal 2: **Organize outreach and education** efforts to increase community awareness of groundwater vulnerability and best management practices for livestock operations.
- Goal 3: Identify **best management practices** (BMP) effectiveness and best management practice adoption of updated BMP's

Salini Sasidharan, Oregon State University/LUBGWMA Chair

Strategy 1.1 ODA and the SWCDs will complete a comprehensive inventory of large and small livestock operations including acreage, irrigation methods and drainage paths.

- **Actions:**
- Inventory large and small livestock operations.
- Inventory livestock operations manure and irrigation management
- Assess information to determine sub-regions of the GWMA with highest risk of groundwater contamination from livestock operations.

- **Responsible Entity:** ODA, Morrow and Umatilla SWCDs
- **Schedule:** 2020

Salini Sasidharan, Oregon State University/LUBGWMA Chair

Strategy 1.2 Select and implement a Focus Area (FA) in the GWMA.

- **Actions**:
- Based on initial inventory, the SWCDs will select a sub-region determined to be a high risk of groundwater pollution
- The intent in selecting Focus Areas is to deliver systematic, concentrated outreach and technical assistance in small geographic areas through the SWCDs and other partners.
- Working within a Focus Area is not intended to prevent implementation within the remainder of the GWMA. The remainder of the GWMA will continue to be addressed through general outreach and technical assistance.

- **Responsible Entity:** ODA, Morrow and Umatilla SWCDs
- **Schedule:** 2020

Salini Sasidharan, Oregon State University/LUBGWMA Chair

Strategy 2.1 Write and publish articles to promote and improve the livestock producer's awareness of water quality issues in the GWMA.

- **Actions:**
- Implement LUBGWMA Outreach Plan.
- Organize and deliver workshops and demonstration projects aimed at livestock producers to show BMP implementation and foster improved BMP use.
- Work with the Umatilla and Morrow County Land Use Departments to review and update county livestock ordinances for compatibility with GWMA goals.
- Once a year, provide an update on the status of the Lower Umatilla Basin GWMA and associated water quality data in each of the Umatilla & Morrow County SWCD newsletters. This should begin in the first state fiscal year after DEQ approves and implements the Local Action Plan.
- Publish two media articles or public service announcements per year in the LUBGWMA about FA activities and successful agricultural resource management practices.
- Work with Irrigation Districts to continue upgrading delivery systems and conversion of flood irrigation to sprinkler and drip systems.
- Work with ROGS committee to address livestock operations in small acreage rural residential settings.

- **Responsible Entity:** Morrow and Umatilla SWCDs
- **Schedule:** 2020

Oregon State University

Salini Sasidharan, Oregon State University/LUBGWMA Chair

Strategy 2.2 Share information and coordinate with agribusiness, producers, and producer groups to promote groundwater quality

- **Actions**
- Meet with agribusiness field representatives active in the LUBGWMA to review the groundwater nitrate issue and share appropriate outreach materials from ODA, DEQ, SWCDs, OSU Extension Service, and other appropriate sources. This should occur once every two years. Some possible ways to meet with field representatives include:
- Grower meetings, Hermiston Farm Fair.
- Individual company meetings.
- Oregon Agriculture Chemical and Fertilizer safety training workshops.
- Breakfast or lunch for local field representatives sponsored by local SWCDs and partners such as ODA, OSU Extension Service, and Natural Resource Conservation Service.
- Each SWCD will deliver one groundwater quality presentation (either as a stand-alone presentation or part of a broader presentation) at one Ag-related or producer group meeting per year.
- Target one producer group per year and distribute OSU Extension Service best management practice (BMP) descriptions to producers and field representatives.
- Make at least 20 groundwater quality contacts per year within the areas served by the Umatilla and Morrow SWCDs.
- Deliver compliance and BMP implementation % and success rates discovered in initial FA implementation. Have operators located in FA describe process from their perspective.

- **Responsible Entity:** Morrow and Umatilla SWCDs
- **Schedule:** 2020

Oregon State University

Salini Sasidharan, Oregon State University/LUBGWMA Chair

Strategy 2.3 Encourage conversion of flood irrigation systems to more efficient systems.

- **Actions:**
- ○ Work with Irrigation Districts and irrigators to continue upgrading delivery systems and conversion of flood irrigation to more efficient systems. Assist landowners in obtaining financial support for conversion of flood irrigation to more efficient systems.
- **Responsible Entity:** Morrow and Umatilla SWCDs
- **Schedule:** 2020

Salini Sasidharan, Oregon State University/LUBGWMA Chair

Strategy 3.1 Write and publish articles to promote and improve the livestock producer's awareness of current BMPs in the GWMA.

- **Actions:**
- Organize and deliver workshops and demonstration projects aimed at livestock producers to show BMP implementation and foster improved BMP use.
- Review county livestock ordinances for compatibility with GWMA goals.
- Collaborate with OSU, SWCDs on the updated list of BMPS that should be utilized more frequently to protect groundwater quality.
- Survey (2nd time) local livestock owners of updated BMPS, evaluate and publish results to the livestock community and document changes.

- **Responsible Entity:** Morrow and Umatilla SWCDs
- **Schedule:** 2020

Oregon State University

Salini Sasidharan, Oregon State University/LUBGWMA Chair

Strategy 3.2
Develop methodology to assist landowners to evaluate the proper carrying capacity of pastures.

- **Actions:**
- Assist landowners determine carrying capacity of pasture by evaluating soil and pasture health.
- Use soil sampling and tissue sampling techniques to determine individual pasture health based on soil fertility and plant health (organic matter, protein and carbohydrate content).

- **Responsible Entity:** Morrow and Umatilla SWCDs
- **Schedule:** 2020

Public Water Systems

- Protect the drinking water source
- Meet water quality standards
- Avoid costly remediation
- Prevent the burden of finding a new source
- Uphold the community's reputation for having a clean drinking water supply.

Salini Sasidharan, Oregon State University/LUBGWMA Chair

Public Water Supply Goals

- Goal 1: Develop nitrogen mass balance model for the LUBGWMA.
- Goal 2: Increase public awareness of groundwater vulnerability, what can be done to protect drinking water, and resources available to aid protection efforts.
- Goal: Recognize and promote actions that are being taken to protect drinking water.
- Goal 4: Supplement existing employee training programs, provide GWMA-specific information to trainers, and seek out technical assistance opportunities related to drinking water protection.
- Goal 5: Encourage land use planning and public health procedures that prevent or minimize groundwater contamination.
- Goal 6: Work with regulatory authorities to provide prioritized, focused, and customized efforts for regulated and permitted activities within the five year time of travel drinking water protection areas.
- Goal 7: Evaluate remediation feasibility to dilute nitrogen hotspots in groundwater and source water protection.

Salini Sasidharan, Oregon State University/LUBGWMA Chair

Strategy 1.1
Work with EPA researchers to identify data and complete a nitrogen mass balance model for the LUBGWMA.

- **Actions:**
- Evaluate land-use, CAFOs, N deposition, stream chemistry, and crop-level and county-level fertilizer use to assess the N inputs, exports and retention in the LUBGWMA.
- **Responsible Entity:** EPA, DEQ, OHA, ODA
- **Schedule:** 2020

Salini Sasidharan, Oregon State University/LUBGWMA Chair

Strategy 2.1
Public Water Systems notify state and local emergency response planners of the locations of their Drinking Water Source Areas and ensure that water system operators are notified in case of a spill or other emergency that may impact the water supply.

- **Actions:**
- OHA and DEQ prepare and distribute a “tipsheet” including a list with contact information for all agencies involved with spill response, links to GIS-based maps of the Drinking Water Source Areas in the region, and triggers for reporting spills to first responders.
- Public Water Systems coordinate with state, regional, and local emergency responders to identify and address gaps in communication related to spill response.

Strategy 2.2
Municipal Public Water Systems distribute GWMA-specific educational materials and drinking water protection materials focused on new development through local planning departments, with permit applications, and at public works offices.

- **Actions:**
- Every two years, review available information and develop new GWMA-specific materials as necessary.
- Identify distribution methods and locations, get approval, and continue distribution through OSU Extension, planning department counters, public water suppliers and other appropriate mechanisms.

- **Responsible Entity:** Municipal Public Water Systems
- **Schedule:** 2020

Salini Sasidharan, Oregon State University/LUBGWMA Chair

Strategy 2.3
Public Water Systems erect signs along major roadways to inform people that they are entering a drinking water supply area and provide a contact number for more information.

- **Actions:**
- Public Water Systems work with stakeholders to determine what information to include and design signs.
- Establish informational phone number to include on the sign.
- Contact public works departments, determine locations for signs, contact appropriate jurisdictions for approval, and erect signs.
- Explore OHA grant funding to implement strategy.
- OHA/DEQ provide assistance as needed.

- **Responsible Entity:** Municipal Public Water Systems
- **Schedule:** 2020

Strategy 6.1
Partner with the OWRD to better understand the location and concentration of temporarily and permanently abandoned wells in the five-year time of travel drinking water source areas. Help the OWRD to prioritize efforts to address temporary and permanent well decommissioning.

- **Actions:**
- Contact the OWRD to discuss ways to collaborate on identifying wells that should be permanently and properly decommissioned.
- Establish a method to prioritize ‘higher risk’ wells.
- Identify funding sources for the permanent abandonment/decommissioning of ‘higher risk’ wells.

- **Responsible Entity:** OWRD
- **Schedule:** 2020

Responsible Agencies for Various Goals per 2nd Action Plan

- DEQ
- ODA
- OHA
- OWRD
- ODFW
- DLCD (Oregon Department of Land Conservation and Development)
- USGS
- Salmon Safe
- Oregon State University
- Oregon Department of Agriculture
- EPA
- Umatilla County and Morrow SWCDs
- Morrow County and Umatilla County
- WPCF permit holders
- OSU Master Gardener Program
- County Planning Departments
- County weed managers or supervisors
- Municipal Water Systems
- Cities within the LUBGWMA
- CAFO Operators and technical service providers
- LUBGWMA Committee stakeholders

Salini Sasidharan, Oregon State University/LUBGWMA Chair

Plan Implementation Performance (PIP) Indicators

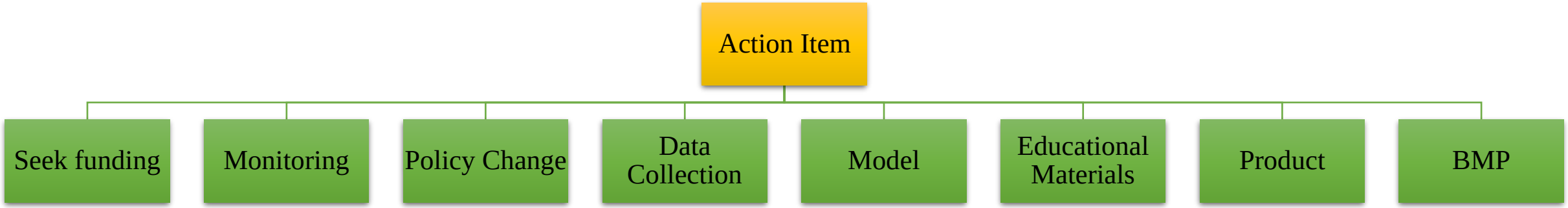
Report from Responsible Entities

- What has been done already?
- Where are we now?
- What needs to be done?
- What needs to be updated?

Oregon State University

Pathway Forward

Strategy → Actions → Implementation



New Technology

Pre-existing Technology

→

Lab Scale

Plot Study

Model

→

Feasibility Study

→ **Upscaling**

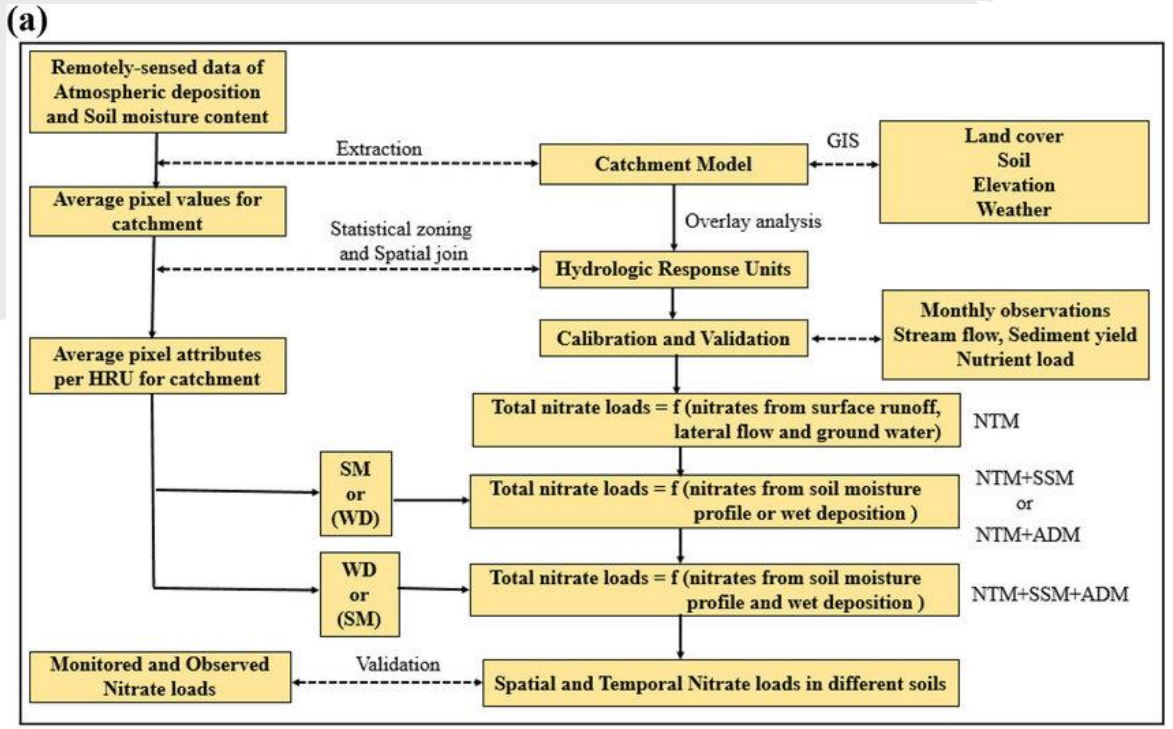
- **Data Collection**
- **Cost**
- **Validation**
- **License/Permit**
- **Policy**
- **Monitoring**

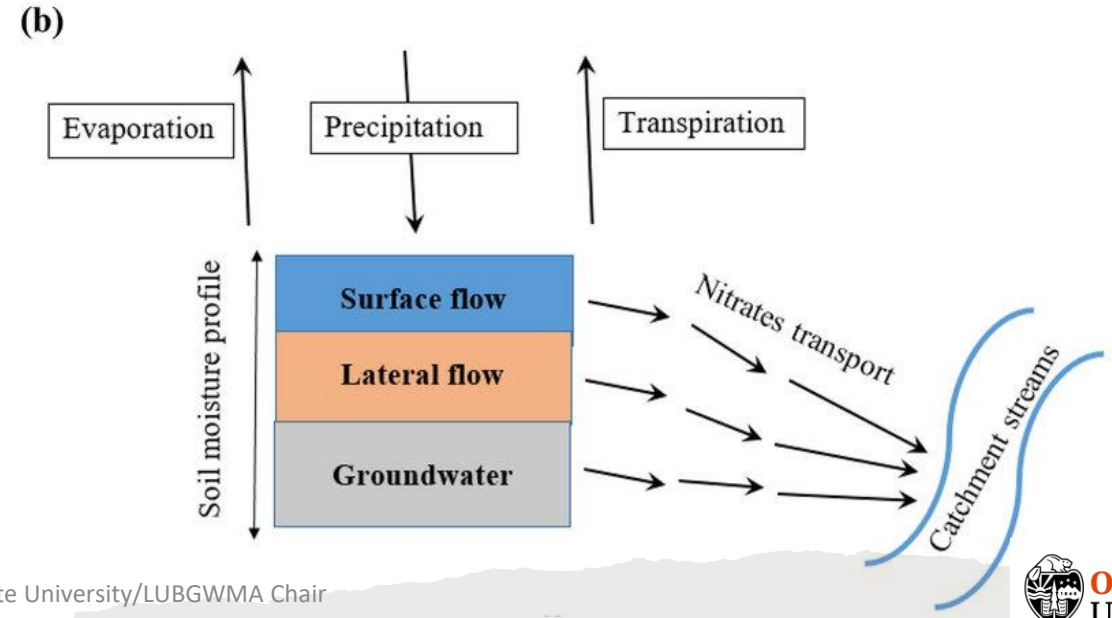
→

Development of a commercial product

Implementation of BMP in the Basin

Potential Implementation Trajectory





Identify Overlap and Synergistically Prioritize the Goals

Nitrogen Mass-balance Model

- **Goal 8 Goal 9 – Irrigation Agriculture,** GWMA Committee, OSU, EPA

Conduct a nitrogen mass-balance model and biogeochemical research projects that would spatially identify nitrogen loading.

- **Goal 3 - Food Processing,** DEQ and WPCF permit holders who land apply food processing wastewater

Evaluate site conditions (e.g., soil type, soil moisture variability, NRCS's Nitrate Leaching Potential http://websoilsurvey.nrcs.usda.gov/app/) and identify fields or portions of fields with high nitrate leaching potential. Evaluate land application practices (e.g., crop selection, crop rotation, fertilization practices (including form, placement, and timing), and irrigation practices (including method, timing, and soil moisture movement beneath the root zone).

- **Goal 1 – Public Water Supply,** EPA, DEQ, OHA, ODA

Evaluate land-use, CAFOs, N deposition, stream chemistry, and crop-level and county-level fertilizer use to assess the N inputs, exports and retention in the LUBGWMA.

Salini Sasidharan, Oregon State University/LUBGWMA Chair

Variables

Feedback – Updates from Responsible Entity

Challenges – Lack of data/funds/resources/others

Resources Required – Dedicated person/fund/data/monitoring/information/permit/policy/grant and loans

Collaboration Required – Interagency agreement, data sharing, trusted relationship, conflict management, incentives

Timeline of Implementation – e.g., Day 1 of Implementation

Timeline of Success Indicator - e.g., the day when a quantifiable outcome is observable.

Roadmap to Implementation

Goals Achieved

- Feedback
- Timeline of Success Indicator

Goals Under Implementation

- Feedback
- Challenges
- Resources Required
- Collaboration Required
- Timeline of Implementation
- Timeline of Success Indicator

Goals Require Additional Information

- Feedback
- Challenges
- Resources Required
- Collaboration Required
- Timeline of Implementation
- Timeline of Success Indicator

Goals Need to be Updated/Merged//New Goals

- Strategies and new actions
- Resources Required
- Collaboration Required
- Timeline of Implementation
- Timeline of Success Indicator

Multiday Regional Workshop

Salini Sasidharan, Oregon State University/LUBGWMA Chair

Oregon State University

Workshop Participants

- Oregon State Agencies, Local Agencies
- EPA, USGS,/relevant federal agency representative
- Oregon Legislative Representatives
- LUBGWMA Category representatives, interested parties, and public
- Science and Research Experts (in-state/out-of-state)
- Policy and Law experts
- Economists
- Industry Expert
- Potential guests from WA, CA, ID or other relevant states with experience in a similar matter

Workshop Structure

- Eastern Oregon and LUBGWMA History
- Federal and State Statues and Water Laws
  Federal, State, and local agencies and responsibilities
- Comprehensive Update of Second Action Plan from Responsible Entities
- Update from OSU Forensic Hydrology study team
- Example Case Studies from OR and US
- Evaluation of the Second Action Plan and Prioritization of Goals
- Development of an Actionable Outcome such as a proposal for a bill or emergency fund or federal grant

Active Engagement and Collaborative Learning

Session

Keynote Talk

Panel

Small Group Discussion

Round Table Discussion

Synthesize of Actions

Workshop Format

3 day

9:00 am – 5:00 pm

July 5-7

or

July 10-12

Hermiston – In person, with limited Hybrid option

Workshop Subcommitte

- Salini Sasidharan
- Kevin Payne

Potential engineering/consulting firm (HDR)

Commissioner Dorran and team
12:55 pm – 1:40 pm

LUBGWMA SIA Announcement

- Rob Hibbs
- Water Quality Monitoring Specialist
- **Oregon Department of Agriculture - Water Quality Program**

Next Meeting

Workshop

May 3, 2023

Lower Umatilla Basin Groundwater Management
Area Committee
c/o Dan Dorran, Chairman
Umatilla County Board of Commissioners
216 SE 4th Street
Pendleton, OR 97801

Via email: dan.dorran@umatillacounty.gov

Subject: *Letter Proposal for Lower Umatilla Basin Groundwater Management Area (LUBGWMA) Initial Coordination and Alternative Analysis.*

Dear Commissioner Dorran:

Thank you for reaching out to HDR Engineering, Inc. (HDR) regarding the need to identify actions to reduce groundwater nitrate concentrations to less than 7 mg/L throughout the management area resulting in the repeal of the declaration of Groundwater Management Area via Oregon Revised Statute (ORS) 468B.188.

HDR understands that you are requesting our presence at the upcoming LUBGWMA Committee meeting on Friday, May 5th at 11:00 am Pacific Standard Time. The meeting is likely to be held at the Port of Morrow in Morrow County, Oregon. HDR further understands that the LUBGWMA Committee is looking for assistance with the development of near-term and ultimately long-term actions to reduce nitrate concentrations in groundwater.

The paragraphs below describe HDR's attendance at the LUBGWMA Committee meeting and first steps to support the LUBGWMA Committee's need to identify near-term actions.

SCOPE OF WORK

Task 1 – Committee Meeting

HDR members, Jerry Otto, Senior Water Resources Project Manager (Boise), Andrew John, Senior Environmental Compliance Lead (Boise) and Paul Worrlein, Oregon Dams, Levees and Civil Work Lead (Portland) will attend the LUBGWMA Committee meeting at the Port of Morrow on Friday, May 5th at 11:00 am Pacific Standard Time.

HDR's primary role will be listen to and note the Committee member's concerns to gain a better understanding of the current needs and challenges.

Assumptions:

- Two HDR staff members from Boise office and one from Portland office will attend.
- Boise participants will arrive Thursday evening and participate in a site tour conducted by the Committee on Friday morning, prior to the Committee meeting. The Committee

meeting will be held at the Port of Morrow Riverfront Center, 2 Marine Drive NE, Boardman, OR 97818.

- HDR Boise participants will be available for a site tour at 8am on Friday, May 5, prior to the Committee meeting.

Task 2 – Existing Data Analysis and Roadmap Statement of Work

HDR's current understanding is that there have been no significant reductions in nitrate levels since the Lower Umatilla Basin was declared a Groundwater Management Area in 1990. However, monitoring of nitrate levels within domestic water wells by multiple State agencies as well as a series of analytical reports recording and describing observed trends have been published since this time.

HDR reviewed *the Second Lower Umatilla Basin Groundwater Management Area Local Action Plan* published October 28, 2020, also referred to as the Second LUBGWMA Action Plan. Further review of this plan is needed along with previous studies referenced within the plan, analysis of the existing data containing well testing results, geologic, and hydrogeologic data (e.g. post-doctoral research being conducted by Oregon State University). This task would develop a detailed statement of work representing the level of effort to create a new or revised strategy (Roadmap) to support the Second LUBGWMA Action Plan. This Roadmap will:

1. Examine baseline monitoring requirements that are statistically appropriate and readily available to demonstrate improvements throughout the LUBGWMA.
2. Identify legitimate opportunities and pathways for pilot-scale implementation of cost-effective nitrate reduction measures within the LUBGWMA. If effective these could be implemented on a larger scale.
3. Assist the LUBGWMA Committee with identifying Federal and State funding opportunities to support implementation of planning and solution-oriented projects.
4. Develop an agreed-to prioritized approach by DEQ and the LUBGWMA Committee reach a sustained reduction in nitrate levels and subsequent repeal of the declaration of Groundwater Management Area.

The Roadmap will be a living document supporting the existing Action Plan strategies and would ultimately identify actionable and phased implementation of nitrate reduction measure projects and additional monitoring needed to support future project implementation strategies. As a living document, the Roadmap would need to be reviewed annually and updated as needed based on observed nitrate reduction effort successes and changes to Action Plan strategies.

In addition, the statement of work will address HDR's support in the development of a request for proposal/solicitation. The solicitation would be developed with the intent of procuring a qualified consultant charged with identifying and developing innovative solutions to reduce or eliminate nitrate concentrations within the LUBGWMA and to provide planning level costs for the nitrate reduction actions. Further, the statement of work will identify the HDR's effort to

assist the LUBGWMA committee in the solicitation process, reviewing the proposed strategies and project costs, and providing recommendations to the committee.

HDR proposes to develop a statement of work that identifies the effort required to establish the framework needed to build the initial Roadmap and develop a solicitation to procure a consultant to provide innovative solutions and planning-level costs for actions to reduce nitrate levels in the LUBGWMA.

Deliverables:

- Detailed Statement of Work

Assumptions:

- Statement of Work will be completed in sequential tasks and will be phased to meet client's timeline and fiscal calendar
- Previous data collection information will be provided to HDR in electronic format, preferably in ArcGIS shapefile format

Client Responsibilities:

- Provide the details of the ultimate contracting entity (who is the client?)
- Provide any additional reports and information that is not publicly available on their website

SCHEDULE

HDR assumes they will receive notice to proceed prior to the May 5, 2023 meeting. Attendance at this meeting will complete Task 1. The statement of work developed in Task 2 will be transmitted to the Client within four weeks of completing Task 1.

ESTIMATED COSTS

HDR proposes to perform Task 1 and Task 2 on a lump sum basis for a fee of $12,500.00. Estimated initial budgets to complete the defined scopes of work are broken out in Table 1 below. Invoices will generally be sent monthly when work is performed.

Table 1

Task 1 – Committee Meeting/Site Visit	**$ 6,700.00**
Task 2 – Data Analysis/Roadmap SOW	**$ 5,800.00**
Total:	**$ 12,500.00**

AGREEMENT

If this proposal meets with your approval, please sign and return the attached Master Service Agreement and Task Order 1, which references this letter proposal.

We appreciate the opportunity and look forward to working with you on this project. Please contact Jerry Otto, jerry.otto@hdrinc.com or (208) 867-7928 with any questions.

Respectfully submitted,

HDR ENGINEERING, INC.

By_____

Jerry L. Otto, P.E.
Sr. Water Resources Project Manager

By_____

Tracy Ellwein, P.E.
Vice President,

Oregon Area Manager

Oregon Department of Agriculture
LUBGWMA
Strategic Implementation Area

May 5, 2023

Rob Hibbs; Agricultural Engineer, MS

State Monitoring Specialist

Agricultural Water Quality Program

OREGON
DEPARTMENT OF
AGRICULTURE

ODA Water Quality Program Announces
2023 LUBGWMA Strategic Implementation Area (SIA)

May 5, 2023

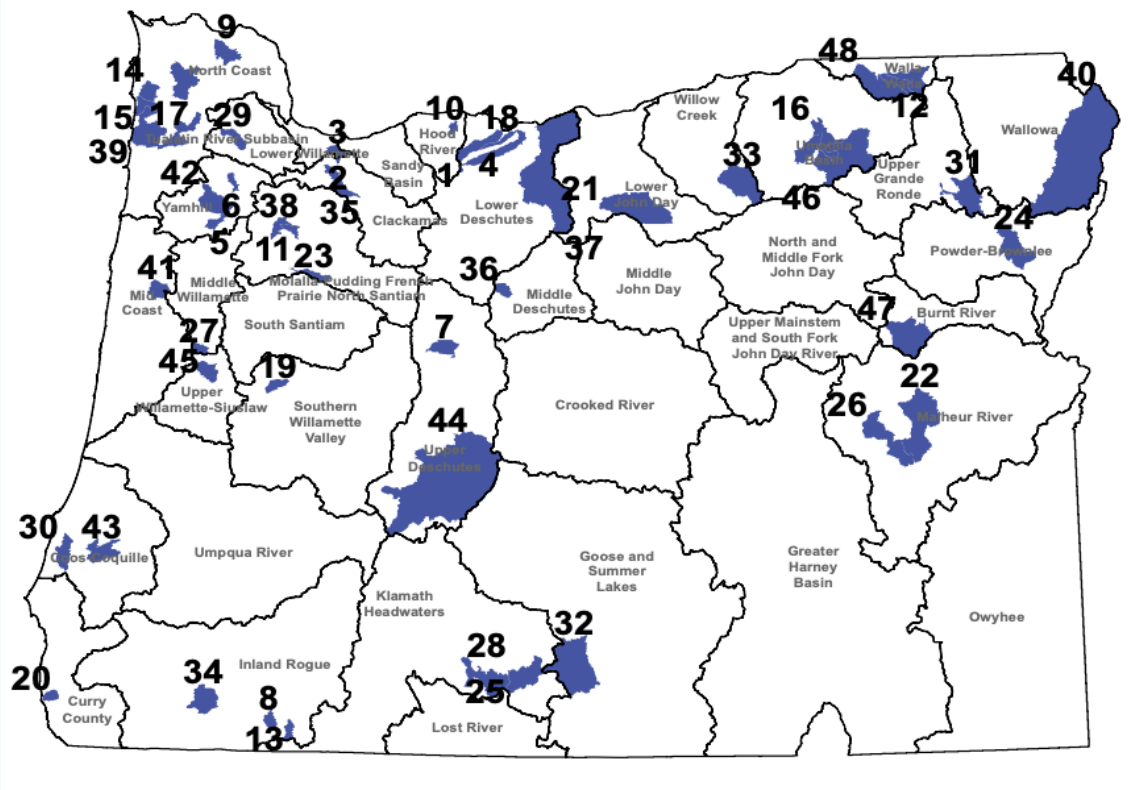
SIA = Focused on-the-ground efforts to locally identify and collaborate on water quality issues

Local Partner is Morrow SWCD

OREGON DEPARTMENT OF AGRICULTURE

ODA's Water Quality Program – Strategic Implementation Areas

2014 to 2021 SIA's



SIA Emphasizes Collaborative Partnerships

Collaborative partnerships and planning to solve local water quality concerns.

Soil and Water Conservation Districts	Watershed Councils	Landowners	Stakeholders	Federal, State, Tribes, and Local Agencies

Shared expertise, local knowledge, resources, data, and funding; working together to achieve common water quality objectives.

Oregon State University

Oregon Watershed Enhancement Board

DEQ

Oregon Department of Agriculture

Oregon Fish & Wildlife

USDA NRCS U.S. Department of Agriculture Natural Resources Conservation Service

SIA Comes With Associated Grant Funding

OWEB SIA Grant funds for SWCD to provide:

- Technical assistance.
- Conservation planning and project design.
- Assist with other project funding/ cost share opportunities where available.
- Monitoring water quality and landscape conditions.

LUBGWMA SIA To Provide On the Ground Activities

Promote Efficient Irrigation and Nutrient Applications

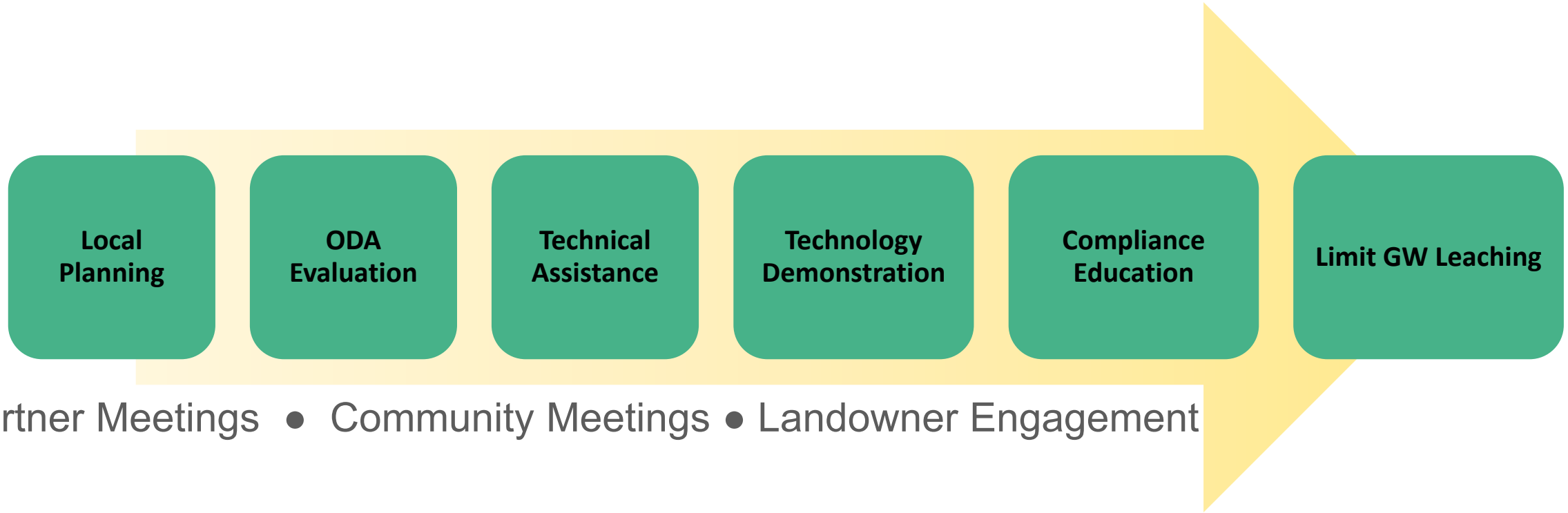
Promote On-farm utilization of technology for irrigation management

Develop Incentives for Ag Growers to be Efficient with Irrigation & Nutrients.

Outreach and Education on Area Laws & Rules

OREGON DEPARTMENT OF AGRICULTURE

LUBGWMA SIA Process



OREGON DEPARTMENT OF AGRICULTURE

ODA Expectations for LUBGWMA Irrigated Ag

1

Match Irrigation Application to Crop/Environmental Demand

2

Match Nutrient Application to Agronomic Demand

3

Maximize Field/Crop Profit by Application Timing and Limiting Inputs

Why is ODA Promoting Efficiency in Irrigated Ag?

It's the right thing to do, and it's the law

Oregon Statute 537: Beneficial Purpose Without Waste
Surface or groundwater may be legally diverted for use only if it is used for a beneficial purpose without waste.

Oregon Statute 468B.025: Waste Law
No person shall cause pollution of any waters of the state or place or cause to be placed any wastes in a location where such wastes are likely to escape or be carried into the waters of the state by any means

OREGON DEPARTMENT OF AGRICULTURE

Strategic Implementation Areas Initiative (SIA)

Demonstrate Compliance with Oregon's Agricultural Water Quality Regulations

Collaborative Partnerships

Voluntary, Incentive-Based Conservation

Monitoring to Track Water Quality & Landscape Conditions

Thank You!

ODA Contact Information

Rob Hibbs

rob.hibbs@oda.oregon.gov

971-719-1576

OREGON DEPARTMENT OF AGRICULTURE