

Welcome

YOU ARE IN THE RIGHT SPOT. WE WILL START AT 9:00 AM.



Critical Aquifer Recharge Areas (CARAs)

Monitoring and Adaptive Management

FEBRUARY 24, 2021

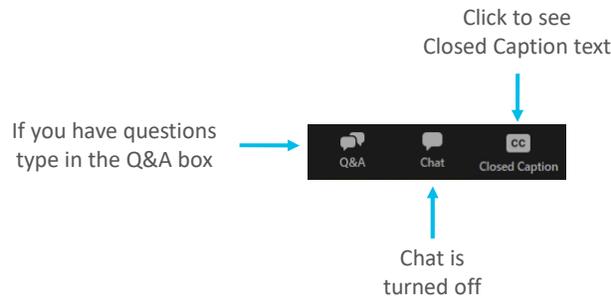


2021 Critical Areas and Shoreline Monitoring & Adaptive Management Online Workshops



Welcome to
Critical Aquifer Recharge Areas (CARAs)

2021 Critical Areas and Shoreline Monitoring & Adaptive Management Online Workshops



2021 Critical Areas and Shoreline Monitoring & Adaptive Management Online Workshops

How to Successfully Protect Critical Areas and Shorelines: A Step-by-Step Introduction to Monitoring and Adaptive Management

JANUARY 13, 2021

Washington Department of FISH and WILDLIFE
Washington State Department of Commerce
DEPARTMENT OF ECOLOGY
State of Washington

Click in between to change size

Maria Kibene, Director
SCOTT KIBENE

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Visit Project Website for More Information

https://www.ezview.wa.gov/site/alias_1992/37576/overview.aspx

ezview Critical Areas Adaptive Management Training Workshops (Portal ID #1962)

Overview Contacts Events 2021 Workshops Library

2021 Workshops

Do you want to know if your critical areas and shoreline regulations are working as intended? Or how to effectively track special permit conditions and mitigation requirements?

Please join us for an in depth review of best practices, case studies, resources, and tools to enhance monitoring and adaptive management efforts for your critical areas and shorelines.

As a follow-up to our 2018 workshops, this 11-week webinar series features expert guest speakers, opportunities for peer-to-peer learning, information sharing, and individual technical assistance.

Earn AICP continuing education credits for your attendance!

Click on a link below to register. (Most sessions are 90 minutes. A couple sessions may go up to 2 hours.)

- Adaptive Management Workshop 1 – How to Successfully Protect Critical Areas and Shorelines: A Step-by-Step Introduction to Monitoring and Adaptive Management
- Adaptive Management Workshop 2 – Setting the Stage: Successful adaptive management and critical areas monitoring opportunities
- Adaptive Management Workshop 3 – Wetlands
- Adaptive Management Workshop 4 – Geologically Hazardous
- Adaptive Management Workshop 5 – Fish and Wildlife Habitat Conservation Areas
- Adaptive Management Workshop 6 – Frequently Flooded Areas
- Adaptive Management Workshop 7 – Critical Aquifer Recharge Areas (CARAs)
- Adaptive Management Workshop 8 – Shoreline
- Adaptive Management Workshop 9 – Permit Implementation Monitoring Tools
- Adaptive Management Workshop 10 – CAO Performance Indicators
- Adaptive Management Workshop 11 – Adaptive Management Interactive Workshop

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2021 Critical Areas and Shoreline Monitoring & Adaptive Management Online Workshops



This project has been funded wholly or in part by the United States Environmental Protection Agency under assistance agreement PC-01J2230116-05251 through the Washington Department of Fish and Wildlife.

The contents of this document do not necessarily reflect the views and policies of the Environmental Protection Agency or the Washington Department of Fish and Wildlife, nor does mention of trade names or commercial products constitute endorsement or recommendation for use.

Workshop Wednesday Series Lineup

Register using Zoom.



January 13 - 9:00 a.m. - 11:00 a.m.
How to Successfully Protect Critical Areas and Shorelines: A Step-by-Step Introduction to Monitoring and Adaptive Management



February 24 - 9:00 a.m. - 11:00 a.m.
Critical Aquifer Recharge Areas (CARAs)



January 20 - 9:00 a.m. - 11:00 a.m.
Setting the Stage: Successful adaptive management and critical areas monitoring program basics



March 3 - 9:00 a.m. - 11:00 a.m.
Shorelines



January 27 - 9:00 a.m. - 11:00 a.m.
Wetlands



March 10 - 9:00 a.m. - 11:00 a.m.
Permit Implementation Monitoring Tools



February 3 - 9:00 a.m. - 11:00 a.m.
Geologically Hazardous Areas



March 17 - 9:00 a.m. - 11:00 a.m.
CAO Performance Indicators



February 10 - 9:00 a.m. - 11:00 a.m.
Fish and Wildlife Habitat Conservation Areas



March 24 - 9:00 a.m. - 11:00 a.m.
Adaptive Management Interactive Workshop



February 17 - 9:00 a.m. - 11:00 a.m.
Frequently Flooded Areas

Note: Workshop names may change but topic will stay the same.

American Planning Association Education Credit

GO TO: [HTTPS://PLANNING.ORG/EVENTS/EVENTMULTI/9210027/](https://planning.org/events/eventmulti/9210027/)

The screenshot shows the American Planning Association (APA) website. The header includes the APA logo, the tagline 'Creating Great Communities for All', and navigation links for 'About APA', 'Join', and 'Log In'. A search bar is present with the text 'Enter keyword or phrase' and a 'Search' button. The main navigation menu includes: Membership, Knowledge Center, Education and Events, AICP, Policy and Advocacy, Career Center, In Your Community, Connect with APA, and APA Foundation. The left sidebar lists 'Education and Events' with sub-links for Online Education, Educational Events, National Planning Conference, Policy and Advocacy Conference, Speaker Directory, Burnham Forum, and Calendar of Events. The main content area displays the event title '2021 Critical Areas and Shorelines Monitoring and Adaptive Management Online Workshops' under the breadcrumb 'Home > Education and Events > Educational Events >'. Below the title is the 'APA Washington Chapter' information, including the event ID #9210027 and dates: Wednesday, February 3, 2021, 9 a.m. and Wednesday, March 24, 2021, 11 a.m. PDT in Olympia, WA, United States. An 'OVERVIEW' section states: 'In partnership with the Washington State Department of Ecology and the Washington State Department of Fish and Wildlife, the Washington State Department of Commerce is developing an 11-week webinar series featuring expert guest speakers, opportunities for peer-to-peer learning, information sharing, and technical assistance for local government planners seeking to start or enhance monitoring and adaptive management of the critical areas and shorelines in their jurisdictions.'

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Land Acknowledgment

Discover which tribal lands you reside on text your zip code to (907) 312-5085.



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Poll



?

?

?

What size jurisdiction do you work with?

What is your role?

How long have you worked on critical areas?

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Poll



?

?

Has your jurisdiction recently encountered issues complying with the GMA for CARAs?

Does your Jurisdiction map CARAs, and how?

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Meet Your Presenter



Laurie Morgan began her career as a hazardous waste inspector in California, followed by a position as an Engineering Geologist with the California Regional Water Quality Control Board, Los Angeles. She inspected businesses for potential contamination sources in the San Fernando Superfund area and oversaw soil and groundwater investigations. Laurie has worked for the Washington State Department of Ecology for 29 years, first as the well construction coordinator for the Southwest Region, then as a hydrogeologist for the Water Quality Program, where she is lead staff for the Groundwater Quality Standards. She has worked on aquifer vulnerability, pesticide risk modeling, regulatory issues with Large Onsite Sewage Systems and Onsite Sewage Systems, wrote the Critical Aquifer Recharge Area Guidance in 2005, and substantially revised the guidance in 2021. Laurie has reviewed and comment on Critical Aquifer Recharge ordinances as well.

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Critical Aquifer Recharge Areas (CARAs)

Laurie Morgan, LHg
Hydrogeologist
Water Quality Program
Department of Ecology

Overview

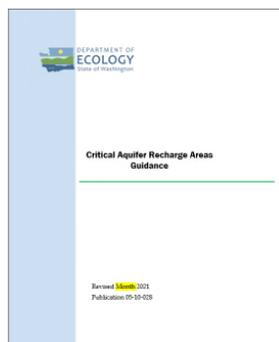
- New guidance revision
- Critical Aquifer Recharge Area WAC
- Washington's drinking water and contamination
- Geology
- Monitoring – What it means for Critical Aquifer Recharge Areas
- Adaptive Management
- Implementation and Integration - Issaquah
- A community monitoring and adaptation example - Scatter Creek
- The Voluntary Stewardship Program
- Resources



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2021 Critical Aquifer Recharge Area Technical Guidance

- The Public Comment Draft will be on Ecology's website.
- We will send out an announcement about how to comment soon.



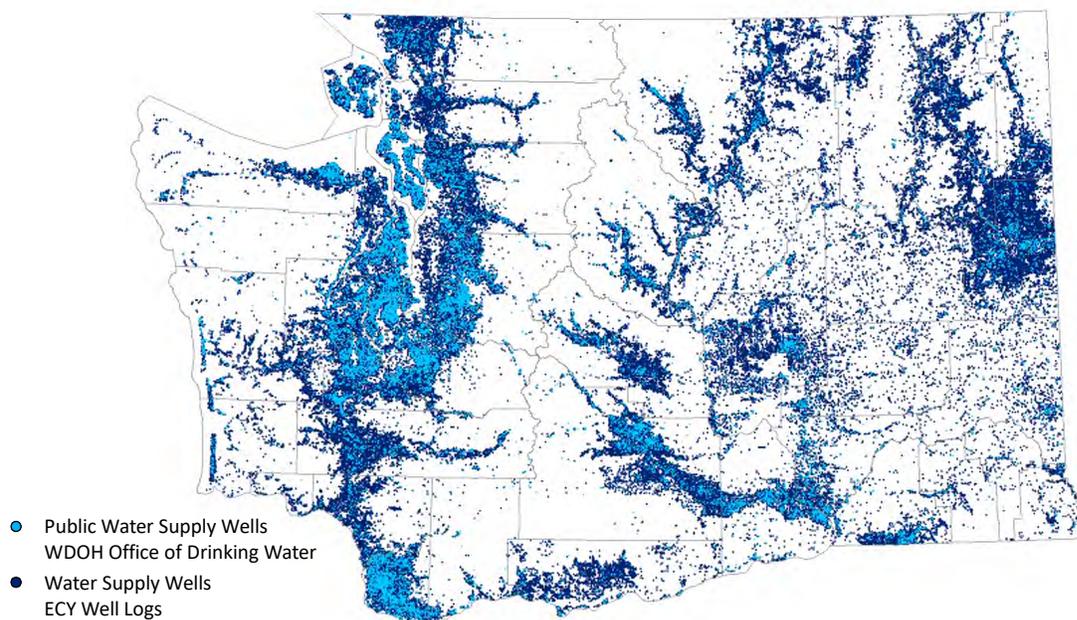
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Chapter 365-190-100 - Critical Aquifer Recharge Areas

- Where is drinking water dependent on groundwater?
- What is the ground like – Is it susceptible to contamination?
- Are there existing studies? Soils maps, surficial geology?
- Where are existing potential contamination sources?
- Do they have practices that prevent leaks and spills?
- If a new development is proposed, are pollution prevention measures required?
- If a new development is proposed, does the jurisdiction have sufficient ordinances to prevent a very unfortunate location for certain hazardous uses (Chemical tank farm near drinking water wells...)
- Sole Source Aquifers, Groundwater Management Areas, Wellhead Protection Areas?

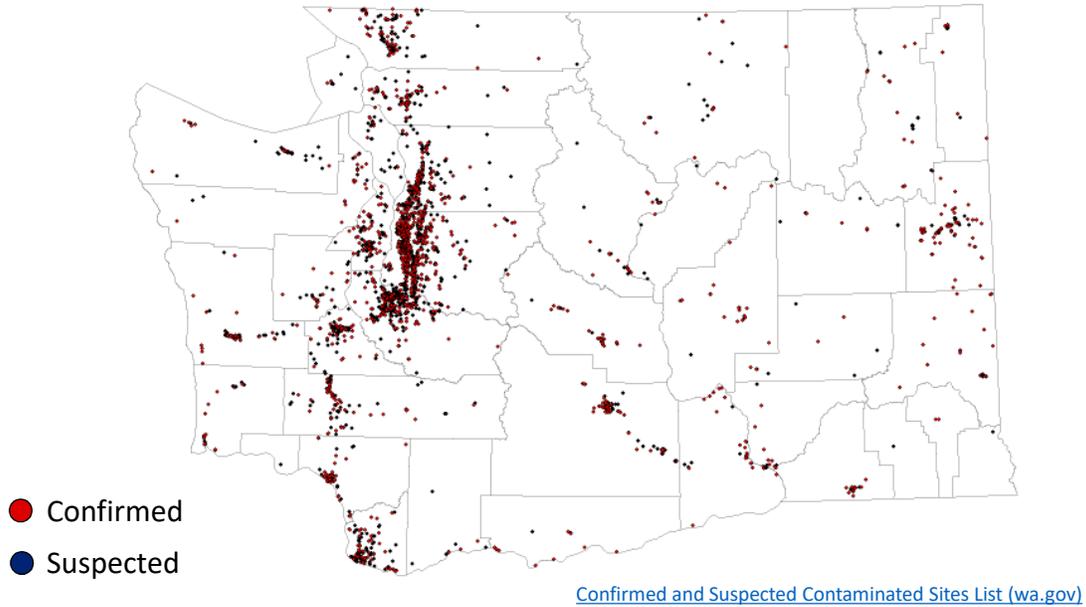
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Washington Water Wells



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Confirmed & Suspected Groundwater Contamination Toxic Cleanup Sites



Confirmed Groundwater Contamination in an Industrial Area



Cost of Contamination

Freeman Cleanup Site

- Carbon tetrachloride in the high school well
- Treatment system installed
- Residential wells found to have unsafe levels of carbon tetrachloride
- Source was the Grain Handling Facility



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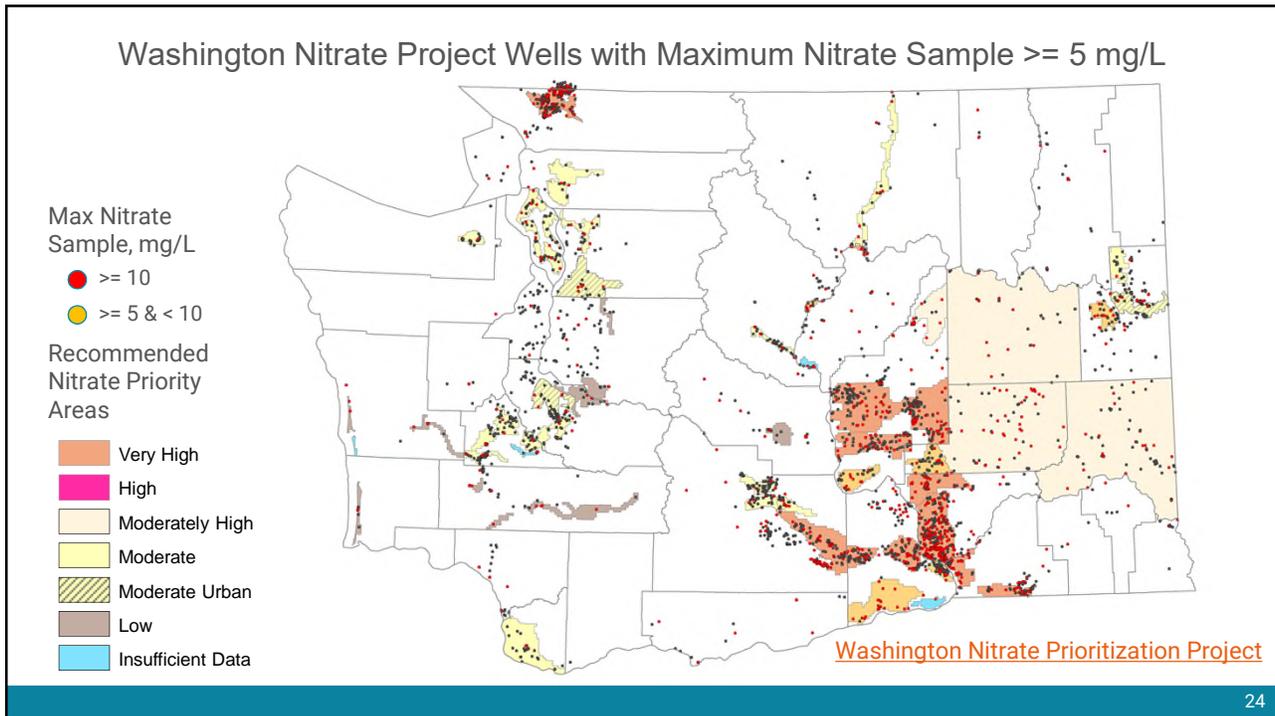
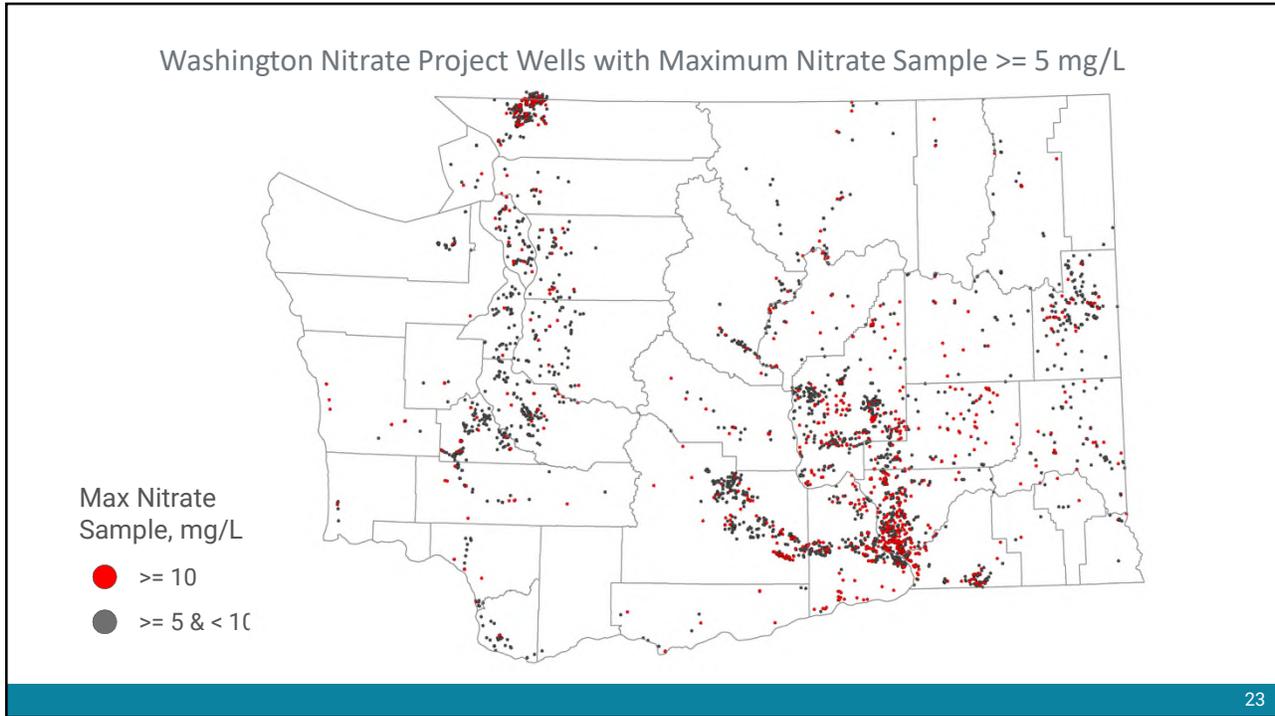
Cost of Contamination

Freeman Cleanup Site Costs

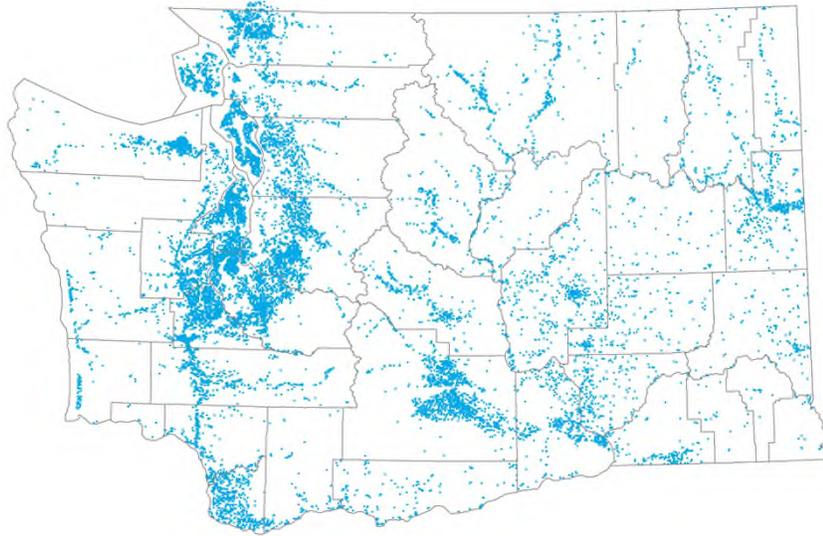
- Soil sampling
- Groundwater monitoring
- Air stripper treatment system for drinking water treatment
- Monthly drinking water well sampling
- Pump and treat system to clean up groundwater
- **Costs for groundwater treatment alone for 17 years range from \$7 million to \$10 million dollars.**



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Washington Nitrate Project Wells with Maximum Nitrate Sample < 5 mg/L



Washington State Dept. of Health Drinking Water Alerts

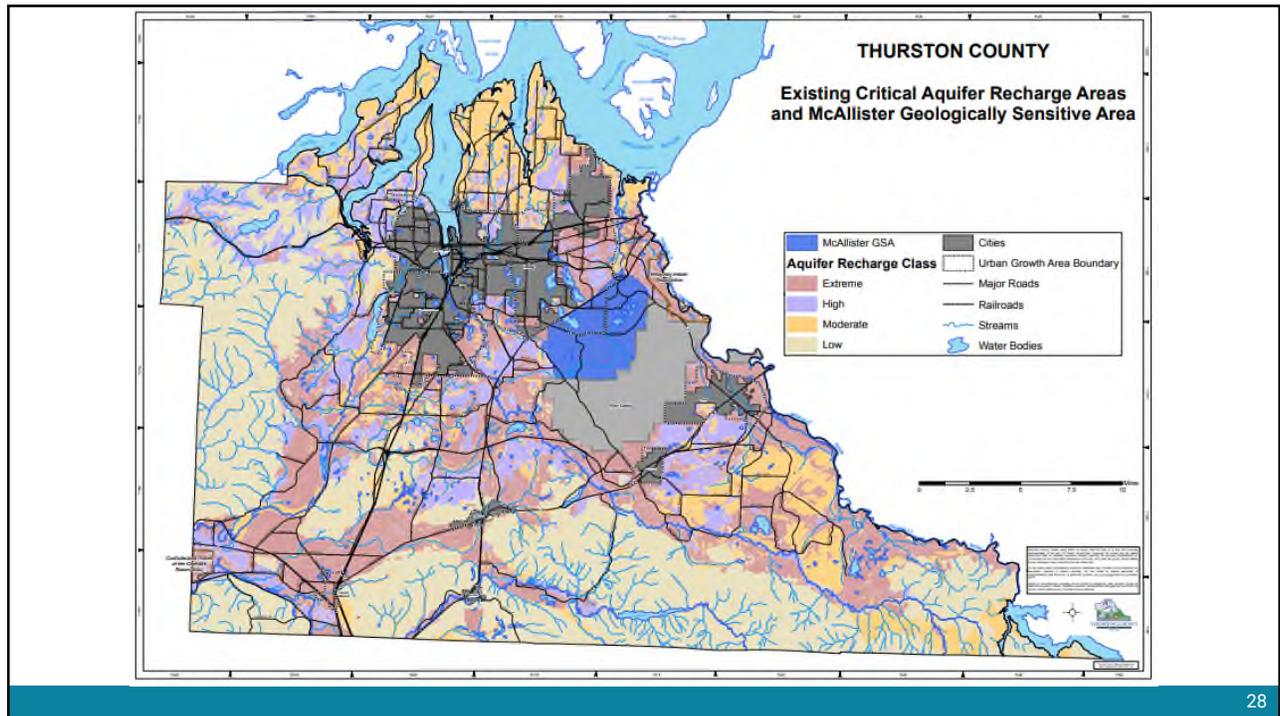
Adams County

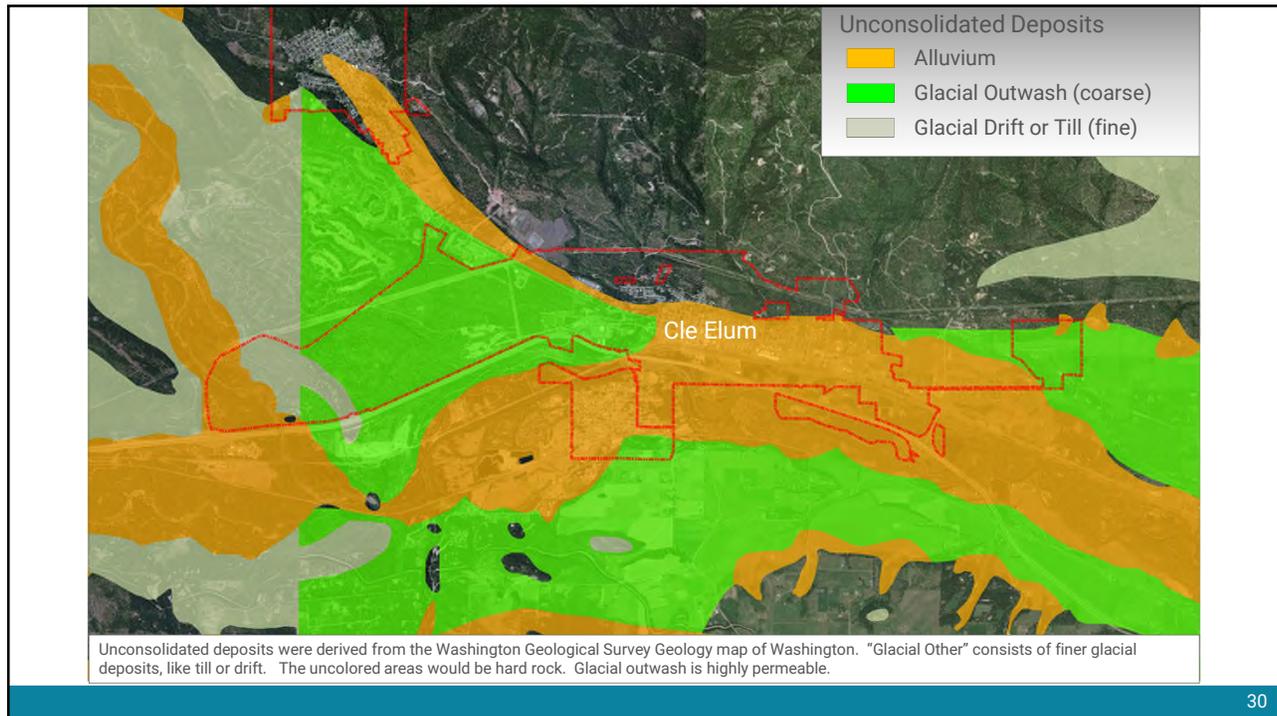
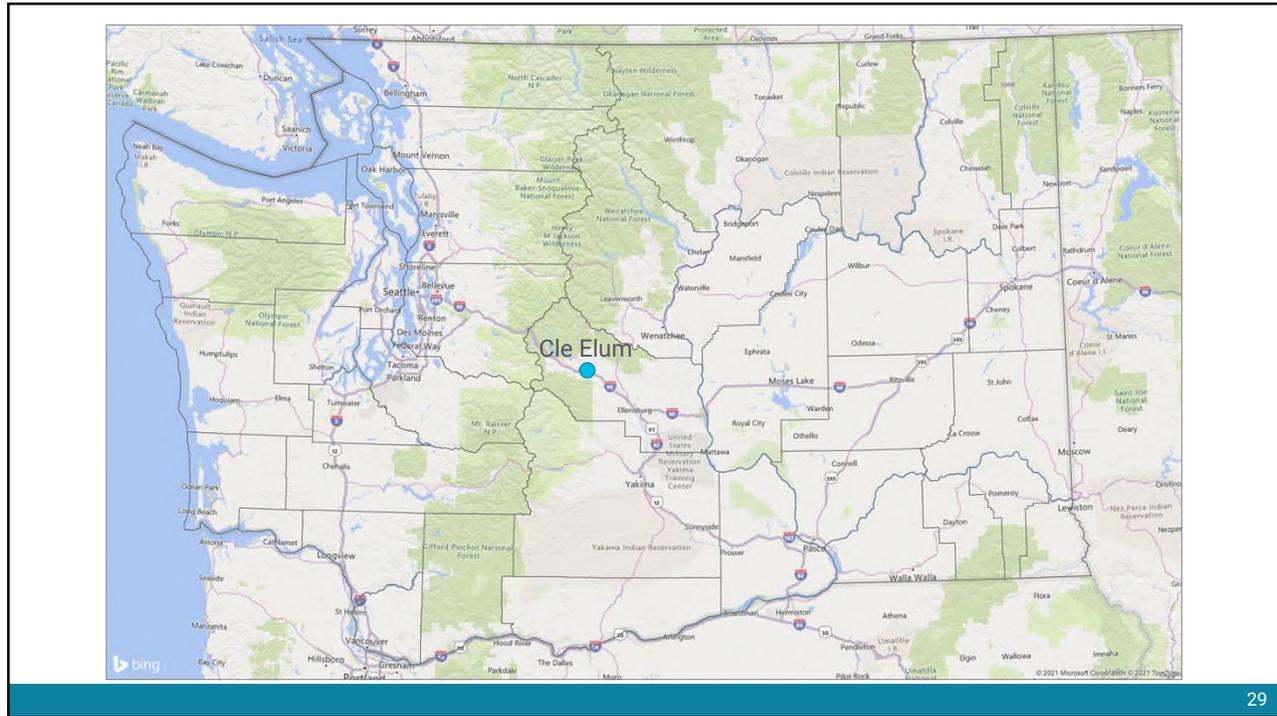
Four Seasons Campground	Issued: 7/5/2019	Do Not Drink
Schrag EB/WB Rest Areas	Issued: 10/21/2020	Do Not Drink

Benton County

Coxville Water Association #1	Issued: 2/21/2014	Do Not Drink	>
Plymouth Water District	Issued: 6/6/2019	Do Not Drink	>
Sundance Improvement Assn.	Issued: 6/27/2017	Do Not Drink	>
WSP Kennewick Detachment	Issued: 1/12/2021	Do Not Drink	>

“Nitrate levels in the water system exceed safe drinking water standards. This can pose a health risk for infants, pregnant women and the elderly. Vulnerable populations should drink only purchased bottled water until further notice.”





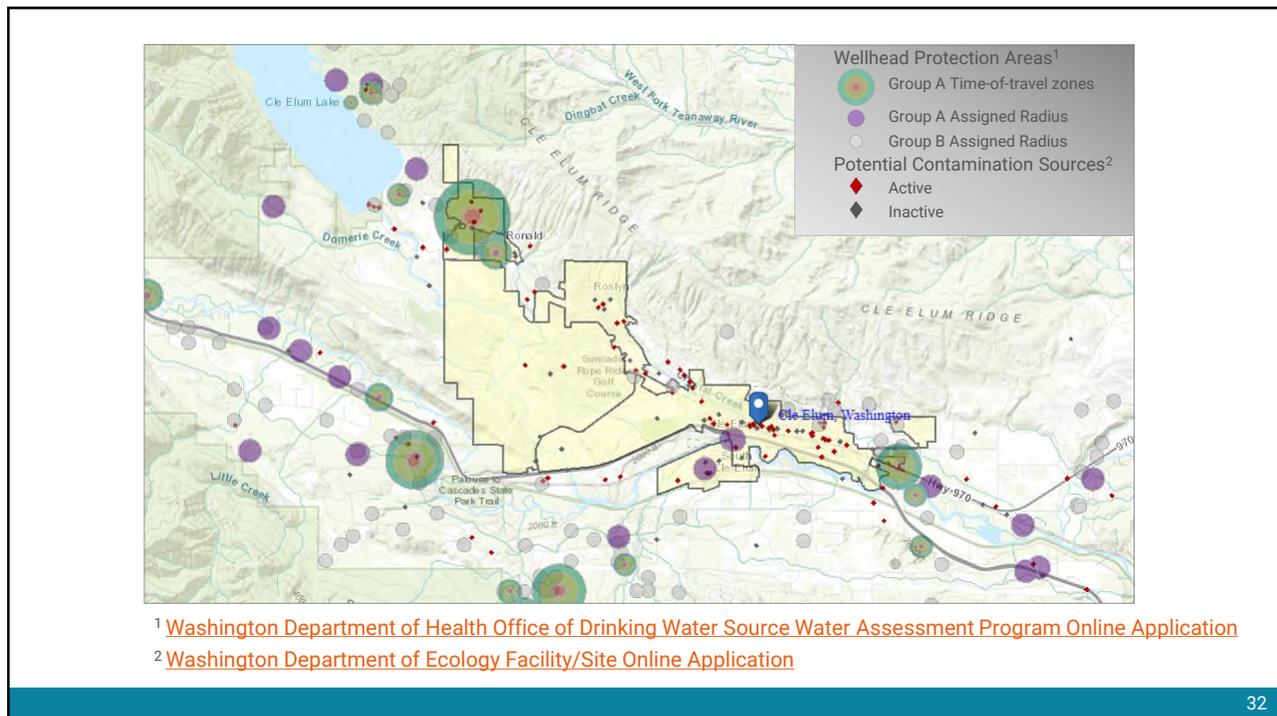
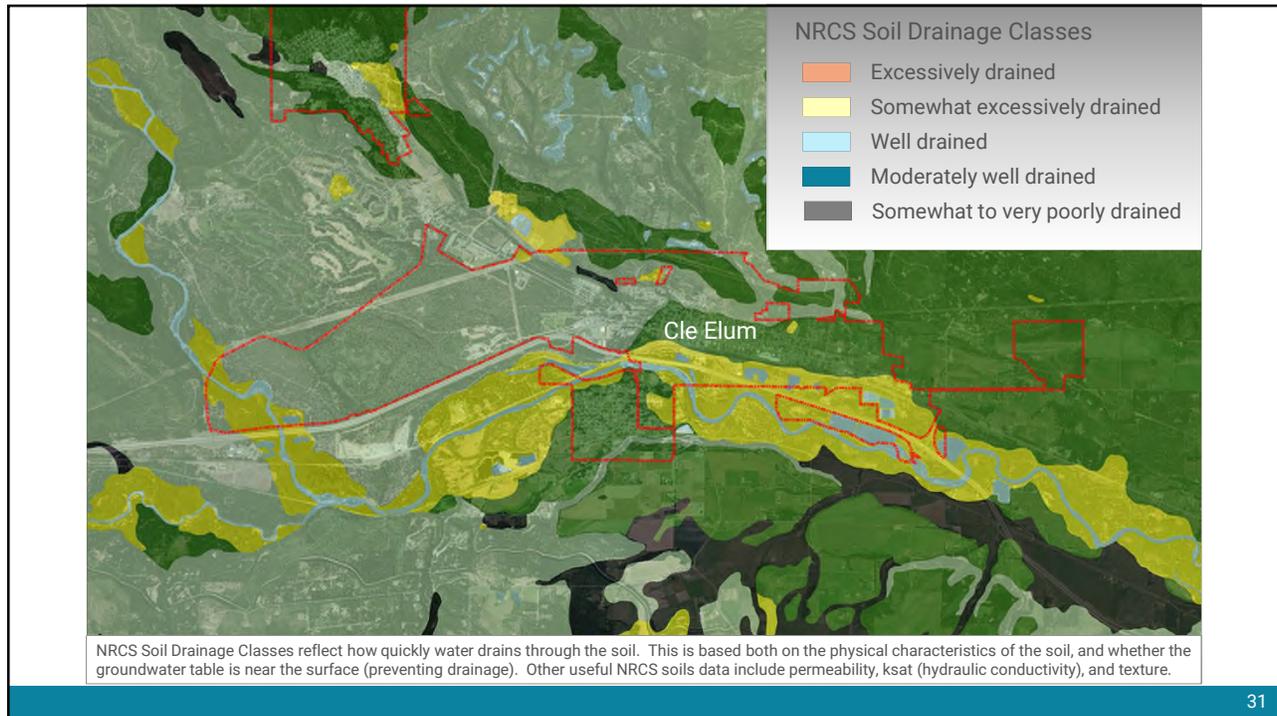
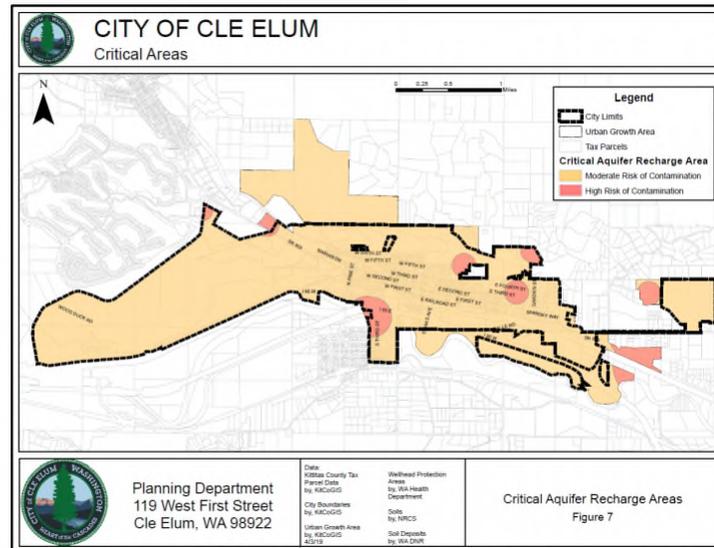


Figure 7: Critical Aquifer Recharge Areas



19-1206_Emergency-Ord-Exhibit-A-Draft-Revised-LU-Element-FNL.pdf (cityofcleelum.com)

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Monitoring Part I



- Follow-up on whether permit requirements were implemented (pollution prevention, pervious surfaces, etc.)
- Inspections to watch out for existing pollution threats
 - Code enforcement - Look for problems & correct
 - Contaminant inventories (Spokane County)
 - Fire department inspections
 - Recommend program integration to leverage other inspection programs (stormwater, surface water, pollution prevention, hazardous waste) - Issaquah



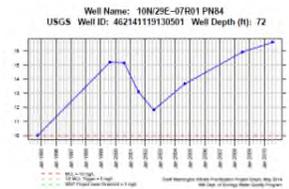
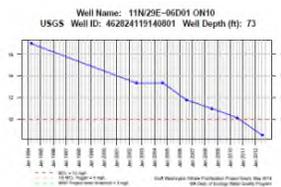
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Monitoring Part II

- Using existing groundwater monitoring data
 - [Washington State Department of Health Office of Drinking Water online data - SENTRY](#)
 - USGS – [NWIS](#) or the federal [Water Quality Portal](#)
 - [Ecology – Environmental Information Management system \(EIM\)](#)
- Local groundwater monitoring program
 - Dedicated groundwater monitoring (where there are resources for this)
 - Well sample results from property transfers
- Follow-up when groundwater monitoring detects contamination



Ecology Hydrogeologist sampling a groundwater monitoring well.



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Best Available Science and Adaptive Management

The GMA requires continuing review and evaluation of comprehensive land use plans and development regulations on an eight-year cycle.

Changes are recommended in response to changing local knowledge, advances in scientific or technical knowledge, and in response to findings from monitoring programs.

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Best Available Science and Adaptive Management

Availability of best available science

Western Washington Growth Management Hearings Board: The best available science is science that is presently available as well as practically and economically feasible.

The Central Puget Sound Growth Management Hearings Board: The “best available science” requirement includes the word “available” as an indicator that a jurisdiction is not required to sponsor independent research but may rely on competent science that is provided from other sources . . .”

See also [Chapter 365-196-050 WAC Regional and Local Variations](#) for important distinctions related to availability of best available science with respect to smaller jurisdictions. The GMA recognizes the variability of population **and available resources** across the state.

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Adaptive Management – Authority

Has the jurisdiction given itself authority

- To require pollution prevention?
- To require spill cleanup?
- To inspect and correct?
- To require Agricultural Best Management Practices (Non-VSP counties)?

Keep an eye out and be able to do something when there is a threat or existing contamination event.

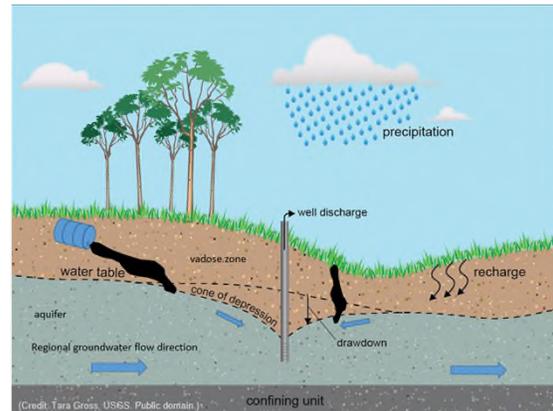


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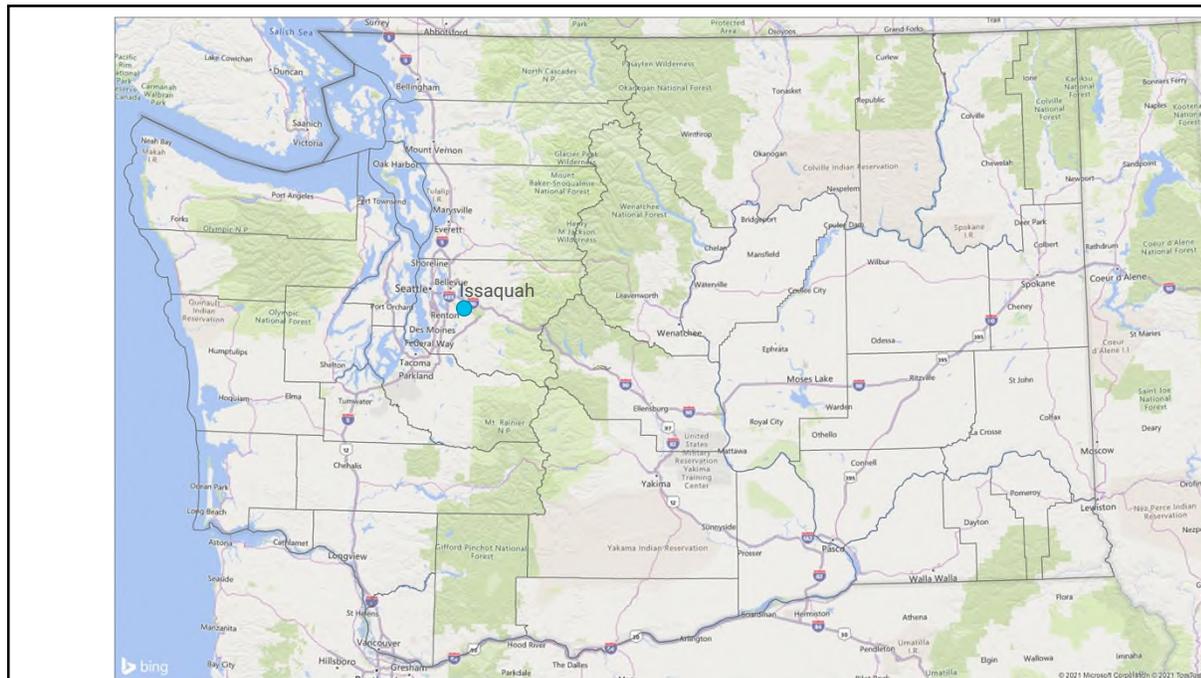
Adaptive Management – Procedures

Has the jurisdiction developed procedures

- To require pollution prevention?
- To require spill cleanup?
- To inspect and correct?
- To require Agricultural Best Management Practices (Non-VSP counties)?
- To follow-up when groundwater monitoring indicates groundwater is contaminated?



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Issaquah – Program Integration & Implementation

- Well-developed groundwater and pollution prevention protection program.
- Integrates and aligns state requirements, city ordinance, inspections, and site visits with education and outreach opportunities for both businesses and residents.
- Effectiveness and efficiency is obtained through overlap in programs and staff.
- Issaquah does this by:
 - Requiring businesses and development within the City and CARA to adhere to a higher standard of pollution prevention through the collection of Hazardous Materials Management Plans for both hazardous waste and hazardous materials,
 - Complying with the National Pollution Discharge and Elimination System (NPDES) stormwater permit, illicit discharge identification and prevention, and protection of our CARA.

See the draft Critical Aquifer Recharge Areas Guidance

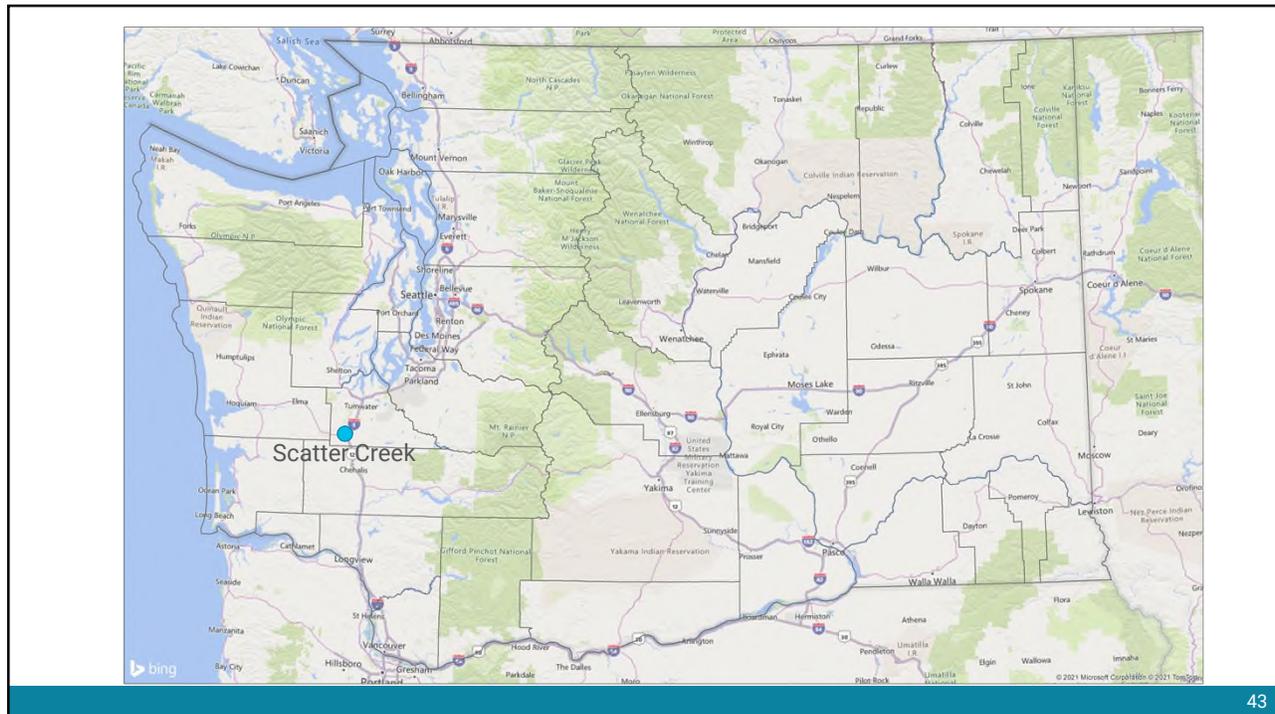
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Issaquah – Program Integration & Implementation

Integration of pollution prevention goals enables programs to make use of shared resources for administration, funding, information, inspections, and public outreach and education.

- | | |
|--|--|
| • Spill Response | • Fats Oils and Grease management review |
| • Illicit Discharge Investigation | • Septic Inspection Verification |
| • Hazardous Materials Management Plans | • Private Storm System Inspections |
| • Hazardous Materials Management Inventories | • NPDES Storm System Inspections |
| • Pollution Prevention Technical Assistance | • Ambient Water Quality Sampling |

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Scatter Creek Aquifer Septic System Management Project

- The Scatter Creek aquifer - Shallow, unconfined, and extremely vulnerable sole source of drinking water for more than 18,000 area residents in Thurston County.
- Some drinking water wells exceeded the state and federal drinking water maximum contaminant levels for nitrate and coliform bacteria.
- Citizen Advisory Committee established to evaluate options, gather input from the community, and make recommendations to the Board of Health.

[Scatter Creek Aquifer Septic System Management Project](#)

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Scatter Creek Aquifer Septic System Management Project

- Existing Onsite Sewage System rules and policies sufficient?
- Risk at full build-out of this unsewered area?
- Alternative management measures?

[Presentation from third Community Workshop](#), held September 30, 2014 at Rochester Middle School

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Scatter Creek Aquifer Septic System Management Project

- Groundwater monitoring found decreasing levels of nitrate*.
- Modeling at full build-out indicates nitrate < 4 mg/L.
- Citizen Advisory Committee recommended
 - Well siting to minimize risk
 - Septic siting to minimize risk
 - Incentives for nitrogen-reducing septic systems
 - Alternative septic systems, like incinerating toilets and composting toilets
 - Continued groundwater monitoring
 - Learn more about the presence and health effects from chemicals of concern such as pharmaceuticals, personal care products, stormwater contaminants, etc.

*Nitrate concentrations in downgradient wells have steadily decreased following the closure of the dairy areas over the last decade ([Grand Mound Model Report, Thurston County, December 2010](#)).

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The Voluntary Stewardship Program

- Growth Management Act – Administered by the Washington Conservation Commission
- Work plans were submitted about five years ago
- Five-year reviews required by the Act are going on now
- VSP was set up primarily around riparian buffers and wetlands. The following terms do not apply to Critical Aquifer Recharge Areas in the same way:
 - No net loss
 - Mitigation
 - Protect
 - Enhance
 - “On a watershed basis”

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The Voluntary Stewardship Program

- Applies to Agricultural activities in the county, not in the city limits
- If a county is not in the VSP, they must include agricultural activities in their protection of drinking water aquifers.
- The same adaptive management and monitoring processes we have talked about apply.
- When the contamination source is not identifiable (nonpoint), strategies are needed to control likely sources in the area.

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Agricultural activities – Things that Help

- Apply less nutrients or chemicals to crops.
- Transport excess manure away from where it is produced to where it can be used at a rate that avoids groundwater.
- Store manure and compost on impermeable surfaces and cover.
- Precision agriculture to apply what is needed, where it is needed, when it is needed.
- Like any industry, store agricultural chemicals with on an impermeable surface that is covered.
- Properly functioning backflow devices on wells used for [Chemigation/Fertigation - Pesticides and Fertilizers | Washington State Department of Agriculture](#)

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Voluntary Stewardship Program Resources

- [Washington Conservation Commission VSP Program](#)
- [Department of Commerce Handbook – Chapter 5](#)
- [Local VSP Lead Entity – Most often the Conservation District](#)

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Resources

- Communities (regulators, planners, residents, etc.)
- Guidance
- Grants
- State technical assistance
- Federal agencies
- Consultants



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Resources Online

- [Learn more about the Growth Management Act and critical areas](#) from the Department of Commerce.
- [Department of Ecology – Critical Aquifer Recharge Areas Guidance Document \(Replace with new draft\)](#)
- [Washington Nitrate Prioritization Project](#)
- [Protecting Washington's Groundwater - The Nitrate Project \(storymap\)](#)
- [USGS – Aquifers and Groundwater basics](#)
- [Department of Health – Source water protection](#)
- [Department of Health – Water system planning](#)
- [Department of Ecology – Facility/Site](#)
- [Department of Ecology – Facility/Site GIS layer](#)
- [Department of Ecology – Well Logs](#)
- [Department of Ecology – Low impact development](#)
- [Puget Sound Partnership – Low impact development manual](#)
- [RCW 90.44.400 – Groundwater management areas](#)
- [RCW 36.70A.172 – Criteria for determining which information is the "best available science"](#)
- [WAC 365-195-905 through 920 – Criteria for determining which information is the "best available science"](#)

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Resources – Maps and Data

- [Washington's Source Water Assessment Program Maps - WA State Dept. of Health](#)
- [Department of Ecology – Facility/Site](#)
- [Department of Ecology – Facility/Site GIS layer](#)
- [Department of Ecology – Well Logs](#)
- [Washington Geological Survey](#)
- [Department of Ecology Contaminated sites list](#)
- [USGS National Water Information System – Groundwater quality data](#)
- [Department of Ecology EIM Groundwater Data Center](#)
- [Department of Health – Public water supply information](#)
- [USGS studies](#)
- [Department of Ecology – Groundwater studies](#)
- The NRCS hosts an online tool called [Web Soil Survey](#), which gives a user access to soil characteristics and maps.

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Think about

- What the ground is like where drinking water is now or in the future
 - Where are your aquifers?
 - How is your jurisdiction dependent on them for drinking water?
- What potential contamination sources are there or could come up in the future
 - How will you know? How will you track?
- How to prevent groundwater contamination
- How to maintain recharge

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Q&A

TYPE YOUR QUESTIONS IN THE Q&A BOX IN YOUR TOOLBAR



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Poll



Does your jurisdiction have access to a hydrogeologist or other groundwater professional?

When developing or amending long-range plans, does your jurisdiction consider the long-term availability or protection of groundwater?

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Meet Your Presenter Today



Deborah Johnson serves as wellhead protection specialist for DOH's Office of Drinking Water. A Washington State native who grew up in the Wenatchee Valley, her experience spans 25+ years in both current & long-range planning at various governmental levels (cities, county, & quasi-public councils of governments). Deborah also served as a planning commissioner for 10 years after relocating to Olympia to attend The Evergreen State College's MPA program.

[Connect on LinkedIn](#)

[Connect on Facebook](#)

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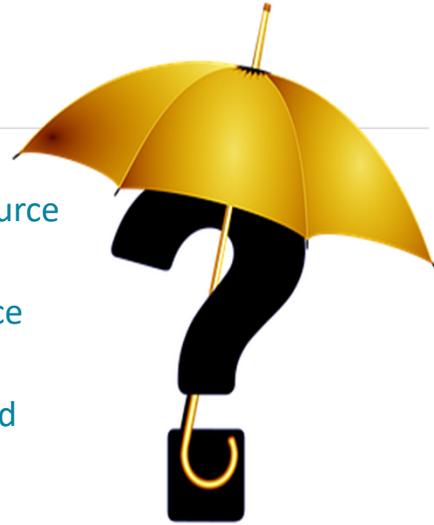
Wellhead Protection Areas (WHPAs)

[WAC 365-190-100 \(4\)\(b\)\(iii\)](#)

"Examples of areas with a critical recharging effect on aquifers used for potable water may include ...areas designated for wellhead protection pursuant to the Federal Safe Drinking Water Act..."

DOH's Purview

- Group A & B public water system plans – source water protection component
- Up-front technical assistance & 60-day notice review – critical areas & comp plan updates
- SEPA review – individual projects in wellhead protection areas (spot check basis) [Q. B.8.h](#)



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“Quickie 101” Wellhead Protection Areas

- Source water protection amendments to federal SDWA (1996)
- [WAC 246-290-135](#) - Group A public water systems must designate sanitary control area & 6-mo. & 1-, 5-, & 10-year times of travel to source as part of their water system plans
- Size & location of WHPAs are based on math formula -OR- modeling
- DOH, not local health dept., approves Group A water system plan & WHPAs
- Group Bs – 600’ radius “preliminary short-term groundwater contribution area” [WAC 246-291-125\(2\)\(d\)\(ii\)](#) – local health dept. approves most

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Regulatory Roles

CARAs/WHPAs	Responsible Party & Role			
	Local government (city/town/county)	DOH	Group A public water systems	Local health dept/district (LHJ)
Land-use authority ("police power of zoning")	YES (CAO, SEPA, & utilities regs)	NO	NO	NO
Advise POs & developers on allowed uses	YES	MAYBE (LOSS/new Group A)	NO stakeholder – WHPAs utility provider	MAYBE (OSS/new Group B)
Regulate development (permit admin.)	YES	PARTNER* (LOSS/new Group A)	NO	PARTNER (OSS/new Group B)

OSS=on-site system (septic) – see [Chapter 246-272A WAC](#) & local health regs
LOSS=large on-site system – see [Chapter 246-272B WAC](#)

*Certain other roles may apply – see [Chapter 246 WAC](#) for entire DOH authority

WHPAs: The Low-Hanging Fruit of CARAs

Listed type of CARA [WAC 365-190-100 \(4\)\(b\)\(iii\)](#)

Easy-peasy designation; they are already mapped for you!

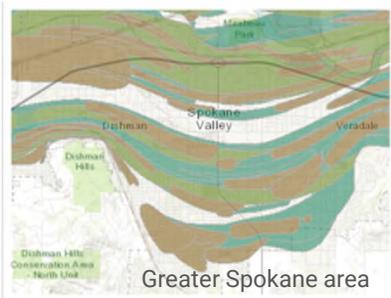
[DOH Source Water Assessment Program \(SWAP\) map](#)

We encourage using this map rather than maintaining local mapping. Why?

- WHPAs can change in size, dimension or location as system plans are updated
- Wells or entire systems can be taken out of service
- New sources & systems can be added

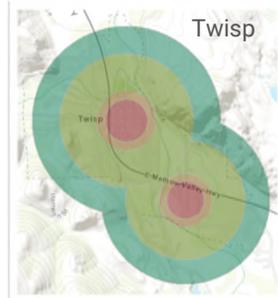


Types of Wellhead Protection Areas



Modeled

- Predictive of groundwater movement
- Irregular blobs or swoop patterning
- Most reliable
- Least prevalent



Calculated fixed radius

- Product of math formula
- Always looks like a bullseye
- Moderately reliable
- Most prevalent



Assigned

- 1,000' radius set by DOH
- Purple circle
- Better than nothing
- Small systems/emergency wells

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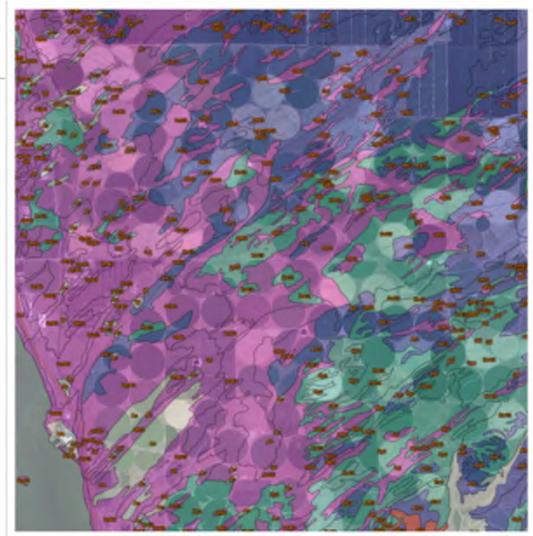
More Low-Hanging Fruit

[NRCS Hydrologic Soil Group map](#) (Web Soil Survey)

High-infiltration soils

Not user-friendly!

- Select county using "address" – L toolbar
- Select area of interest – L toolbar
- Click Soil Data Explorer tab – top
- Select Soil Properties & Qualities tab – 2nd top
- Select Soil Qualities & Features – L toolbar
- Select Hydrologic Soil Group – L toolbar then "view rating"



Shown: Western Walla Walla County approaching Columbia River

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Potentially Contaminating Auto Uses & Practices in CARAs



Other Types of Potentially Contaminating Land Uses in CARAs









Potentially Contaminating Agricultural Uses & Practices in CARAs





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Special Considerations

[Ecology UIC Program](#)

Stormwater

Contemporary heating systems (schools)



Septic systems (OSS/LOSS)
Not if...but when
Infiltration/ground assimilation capability
Inability to readily detect failures

*Image: Lakeway Municipal Utility District
(Lakeway, Texas)*



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Know Your Water Systems!

...ALL of them! In the water world, “municipal” systems can be publicly *or* privately owned

- Cities/towns; schools, ports, PUDs & other special purpose districts; & state (ex. WSDOT & Parks)
- Also HOAs, RV/manufactured home parks, standalone rural businesses & industries, agricultural worker housing, & others
- Remember the stakeholder role! In WHPAs, give systems an opportunity to comment on permit applications, as distinguished from confirming ability to serve. (Best practice: flag it as being in their WHPA)

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Poll



A thick horizontal line with a blue square containing a white question mark in the center.

Does your jurisdiction have wellhead protection area(s) located in or overlapping it?

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Using Existing Codes

- “Copying others’ homework”
- Make sure the shoe fits
- Adaptation vs. literally copying
- Adoption by reference = don’t!

Special Concerns for Small Cities & Towns

- Generally – be thoughtful about administrative capacity (individual capabilities, legality, regulating to a level jurisdiction cannot reasonably administer, etc.)
- Unintended consequences: Be careful what you prohibit outright. If a WHPA covers most or all of your corporate limits, you may inadvertently prohibit things that you don’t intend to. (Example: prohibiting underground storage tanks completely would serve to prohibit gas stations.)
- If you require submittal of hydrogeo reports or other special studies, include a clause allowing for 3rd party review at applicant’s cost, unless you have on-staff expertise to review it. If your code requires submittal but there is no associated review, merely submitting it satisfies the requirement.
- Code enforcement – Is your code sufficient? Who will police follow up on permit conditions or problems, & how?
- If your jurisdiction owns wells that are outside the corporate limits, keep an eye out for permits in that area that may affect your wellhead protection interests.

Land Use/Permit Based Performance Monitoring

Source monitoring is not a CARAs responsibility

Group A systems must monitor their source water periodically for specific contaminants, but there isn't always going to be an obvious "smoking gun" in terms of surrounding development, because sometimes contaminants:

- Occur naturally (for instance, high levels of certain minerals)
- Rise & fall seasonally
- May result from water treatment (DBP-disinfection byproduct)
- Sometimes historic problems with a source

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Monitored Contaminants

- What is MCL? "The highest level of a contaminant that is allowed in drinking water ...set as close to MCLGs [goals] as feasible using the best available treatment technology & taking cost into consideration. MCLs are enforceable standards." (EPA)
- Federal MCLs set for specific contaminants (Safe Drinking Water Act), including such things as bacteria, minerals, & chemicals. But doesn't mean they're not present at a lower level or that unregulated contaminants aren't present.
- Controversial – it takes years for new contaminants to be listed as "unregulated" contaminants, much less to set MCLs. Provisional health advisories & long-term exposure (lifetime health advisory) levels.
- [EPA MCL lookup](#)
- MCLs are not a good measure for the purpose of performance monitoring, although they may be an indicator of problems. Pay attention to trends & red flags.

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Contemporary MCL Example #1

Roundup was introduced in the early-mid 1970s, but the glyphosate MCL was not set until 1992 (current MCL 1995)



United States
Environmental Protection
Agency Office of Water
4601 EPA 811-F-95-003-a-T
October 1995

EPA **National Primary Drinking
Water Regulations**
Glyphosate

CHEMICAL/PHYSICAL PROPERTIES	Density/Spec. Grav.: 0.5g/ml at 15° C	BIOCONCENTRATION FACTOR:
CAS Number: 1071-83-6	Solubility: 12 g/L of water at 25° C;	BCF ~1 in fish; not expected to biocon-
Color/Form/Odor:	Soluble in water	centrate in aquatic organisms.
Odorless white crystals	Soil sorption coefficient:	Trade Names/Synonyms:
M.P.: 230° C B.P.: N/A	Strong, reversible adsorption	N-(phosphonomethyl) glycine; Glialka;
Vapor Pressure: Negligible	Odor/Taste: Thresholds: N/A	Roundup; Sting; Rodeo; Sparac;
OCTANOL/WATER PARTITION (Kow): N/A	Henry's Law Coefficient: N/A	Musler; Tumbleweed; Sonic; Glifosox;
		Glycol; Rondo

DRINKING WATER STANDARDS

MCL: 0.7 mg/L
MCL: 0.7 mg/L
HAL(child): 1- to 10- day: 20 mg/L
Longer-term: 1 mg/L

HEALTH EFFECTS SUMMARY

Acute: EPA has found glyphosate to potentially cause the following health effects from acute exposures at levels above the MCL: congestion of the lungs; increased breathing rate.

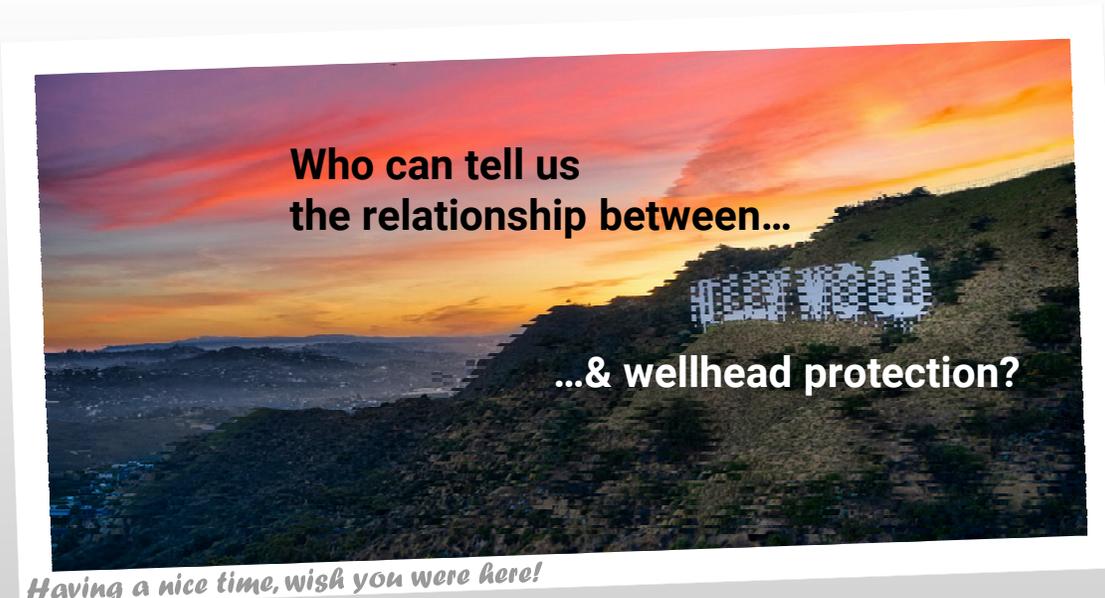
Drinking water levels which are considered "safe" for short-term exposures: For a 10-kg (22 lb.) child consum-

beans, field corn; ornamentals, lawns, turf, forest plantings, greenhouses, rights-of-way.

Glyphosate is among the most widely used pesticides by volume. In 1998, an estimated 6,308,000 pounds of glyphosate was used in the United States. Usage in 1990 was estimated to be 11,595,000 pounds. It ranked eleventh among conventional pesticides in the US during 1990-91. In recent years, 13 to 20 million acres were treated with 18.7 million lbs. annually. Glyphosate is generally sold as the isopropylamine salt and applied as a liquid foliar spray.

RELEASE PATTERNS

Glyphosate is released to the environment in its use as



Who can tell us
the relationship between...
...& wellhead protection?

Having a nice time, wish you were here!



Real, highly accessible examples of drinking water impacts from groundwater contamination!

- **A Civil Action** (1998)
TCE, Woburn, Massachusetts
Anne Anderson v. Cryovac, Inc.
- **Erin Brockovich** (2000)
hexavalent chromium (chromium-6), Hinkley, California
Anderson, et al. v. Pacific Gas & Electric
- **Dark Waters** (2019)
PFOA/PFAS – Parkersburg, West Virginia
“DuPont C8 cases”



Source: <https://www.levinlaw.com/duPont-c8-litigation>

Contemporary MCL Example #2

MCLs were recently set for PFAS (Teflon; firefighting foam) after contaminant came to the forefront as a concern



PFAS cause significant environmental and human health issues	SL
<ul style="list-style-type: none"> • The “forever chemical.” • Very mobile in groundwater. • Bioaccumulates in humans and animals. • Impacts to prostate, liver, kidney and immunological systems 	

Above: from Richard Head, SL Environmental Law Group, in “PFAS: Learn How to Navigate the Evolving Regulatory and Legal Landscape” webinar, American Water Works Association, 11-05-2020
At left: Rob Bilott profile by Nathaniel Rich, 01-06-2016

Fertile Ground for Legal Exposure



Erin Brockovich in
"Safety Culture
Summit 2020:
From Surviving to
Thriving" webinar,
11-18-2020

"...an entire community brought to its knees...a breakdown in planning for the inevitable...the consumers & the businesses deserve rapid, honest, answers"
[San Angelo, TX, Feb. 2021 contamination event]

Risk management issues for local governments/ potential exposure points

- Ignoring BAS in adopting CAO (ex. *Walla Walla*)
- "Political expediency"
- Dismissing relevant comments/concerns on individual projects during permitting process
- Failing to exercising due care in conditioning projects that may pollute
- Ignoring contamination it has reason to believe is occurring (failing to respond to complaints, red flags, etc.)

Use your attorney/insurance pool counsel/MRSC

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Adaptive Management as Applied to WHPAs

WAC 365-195-920(2)

*"Where there is an **absence of valid scientific information or incomplete scientific information** relating to a [local jurisdiction's] critical areas... Management, policy, & regulatory actions are treated as experiments that are purposefully monitored & evaluated to determine whether they are effective &, if not, how they should be improved to increase their effectiveness. ...Change course based on the results and interpretation of new information that resolves uncertainties..."*

- Local water system plans – hydrogeological characterizations & contaminant inventories (part of source water protection program)
- Regional watershed plans ([Ecology watershed plan archive](#))
- Other agencies (ex. [Icicle Creek Strategy](#))
- [Ecology groundwater report library](#)



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Poll



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Do you use the guidance materials/mapping tools made available from DOH and ECY for updating CARA regulations?

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Groundwater Degradation

- Hard to tell whether aquifer is being adequately protected when the most obvious measure of inadequacy is going to be fouled water
- [Ecology groundwater quality standards](#) – incl. antidegradation policy
- “No net loss” implies that some degree of gross loss is acceptable. Proceed with caution when it comes to drinking water! By its nature, it’s difficult or impossible to remediate, create, or replace an aquifer to offset fouled water.
- Compensatory mitigation does not apply to CARAs. The compensatory mitigation provisions of [WAC 365-196-830\(4\)](#) are carried through to only two specific critical areas types – geohazard areas (in [WAC 365-190-120](#)) & wetlands (in [WAC 365-190-090](#)) – but do *not* extend to CARAs (excluded from [WAC 365-190-100](#)). Applying mitigation to CARAs implies that some degree of degradation to an aquifer is acceptable, while in reality, allowing even a limited degree of harm to an aquifer could result in lost potability.

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Bottom Line

Keep your drinking water drinkable! (quality & quantity)

Protect sources belonging to all types of systems

Much cheaper to preserve than clean up



Resources

Oregon Department of Environmental Quality & Oregon Health Authority (July 2020). Pollutant Reduction Strategies for Common Land Uses/Activities within Groundwater Sources of Drinking Water.

<https://www.oregon.gov/deq/FilterDocs/dwpgwaterResources.pdf>

Yates, D. et al. Ground Water Report to the Nation: A Call to Action (2007). Groundwater Protection Council.

<https://www.gwpc.org/topics/ground-water-report-to-the-nation/> (Note: on this website, but link may not display properly; go to site & search within)

Conrad, E., et al (Winter 2019). Putting Adaptive Management into Practice: Incorporating Quantitative Metrics into Sustainable Groundwater Management. Stanford Digital Repository. <https://purl.stanford.edu/hx239rw5017>

Doremus, H. et al (April 2011). Making Good Use of Adaptive Management. White Paper #1104, Center for Progressive Reform.

https://cpr-assets.s3.amazonaws.com/documents/Adaptive_Management_1104.pdf

Williams, B.K., et al (2009). *Adaptive Management: The U.S. Department of the Interior Technical Guide*. Adaptive Management Working Group, U.S. Department of the Interior, Washington, DC.

<https://www.doi.gov/sites/doi.gov/files/uploads/TechGuide-WebOptimized-2.pdf>

Q&A

TYPE YOUR QUESTIONS IN THE Q&A BOX IN YOUR TOOLBAR



Thank you!

We're available for technical assistance.

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