

Nichol Gray

m

From: Ann Skelton <anniskelton@comcast.net>
Sent: Wednesday, August 2, 2017 2:53 PM
To: Tim Crose
Subject: SSRT amendment to zoning code as drafted for August 3, 2017

August 2, 2017

To: Tim Crose, Planning Director, DCD
Pacific County Planning Commission
RE: SSRT Amendment to Ordinance 178

Dear Tim and Commissioners,

I have attended the workshops and hearing regarding Leadbetter's proposal for Small Scale Tourist Use in the RL and RR zones of Pacific County and still think there are outstanding issues.

There is little substantive language about critical areas. I testified earlier about my concerns about the liberal provisions found in the section on Expansion of a SSRT, and the potential for nuisance between non-compatible zones. I have questions how a new SSRT would fit into the Comprehensive Plan if it is adjacent to an existing LAMIRD, especially on parcels that have a dual designation.

I don't think that this diluted Jefferson County Code language fits with Pacific County Code. Because of the density of parcels and variety of existing uses on the peninsula where most of the RR zoning is found, I cannot support this amendment in its current form.

Thank you for considering these comments as well as my earlier testimony. I would like to commend the planning commission for all their efforts on this amendment.

Ann LeFors

Tim Crose

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From:

Sent:

To:

Subject:

Attachments:

Paul Majkut <paulsmajkut@gmail.com>

Wednesday, August 2, 2017 6:14 PM

Tim Crose

Proposed amendment to Ordinance 178
Pacific County Planning Commission 8-2-17.docx

We have attached our comments to the Planning Commission on the Proposed amendment to Ordinance 178. Attachments fo follow. Thank you, Paul and Nikki Majkut

Pacific County Planning Commission

PO Box 68, 1216 W. Robert Bush Dr.

South Bend, WA 98586

RE Proposed amendment to Ordinance No. 178, allowing Small Scale Recreation and Tourist Uses in designated Rural areas of Pacific County

August 2, 2017

Dear Planning Commissioners:

We are writing to ask that you reject all of the proposed amendments to Ordinance No. 178. Pacific County's Zoning Ordinance was carefully developed with significant public input to focus commercial development in already established business districts and cities. Allowing the proposed commercial activities in Rural Residential and Rural Lands zones goes against this intent and will negatively impact the county's livability and wildlife in the long term.

Pacific County has thousands of acres in RR and RL zoning. Please review the zoning maps to understand the extent and location. Areas include Leadbetter Point, Ocean Park, Loomis Lake, east of Long Beach, Chinook River and the Willapa River.

Much of these lands are environmentally sensitive, including numerous wetlands, lakes, and rivers. Most of these areas are on wells and septic. Much of it is undeveloped, or developed at a low density currently. The lands host abundant wildlife including bear, elk, and a myriad of migratory waterfowl, shorebirds, and song birds. Leadbetter Point hosts Endangered Species Act-listed snowy plover and streaked horned lark, who nest there each summer. The Columbia, Chinook and Willapa Rivers and associated wetlands host priority and sensitive salmon runs. The Columbia (and Chinook as a tributary) has 15 listed fish species. Increased and more intensive commercial development would affect water quality and quantity, and hurt wildlife habitat.

People who live in Pacific County love its wildlife and scenic beauty. Also, many residents rely on the tourist industry for jobs/income, which is driven by people who love wildlife and scenic beauty. The proposed amendments will result in the loss of wildlife and scenic beauty as commercial development sprawls out of commercial areas. It could also hurt the commercial and recreation fishing industry as fish habitat and water quality is impacted on Pacific County's rivers.

Please consider the long term impact of the proposed amendments and reject them. Thank you.

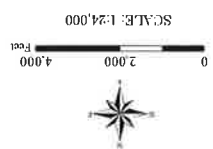
Sincerely,

Paul and Nikki Majkut Ocean Park

Tim Crose

From: Paul Majkut <paulsmajkut@gmail.com>
Sent: Wednesday, August 2, 2017 6:21 PM
To: Tim Crose
Subject: Proposed amendment to Ordinance 178
Attachments: rethehinesmarsh.zip

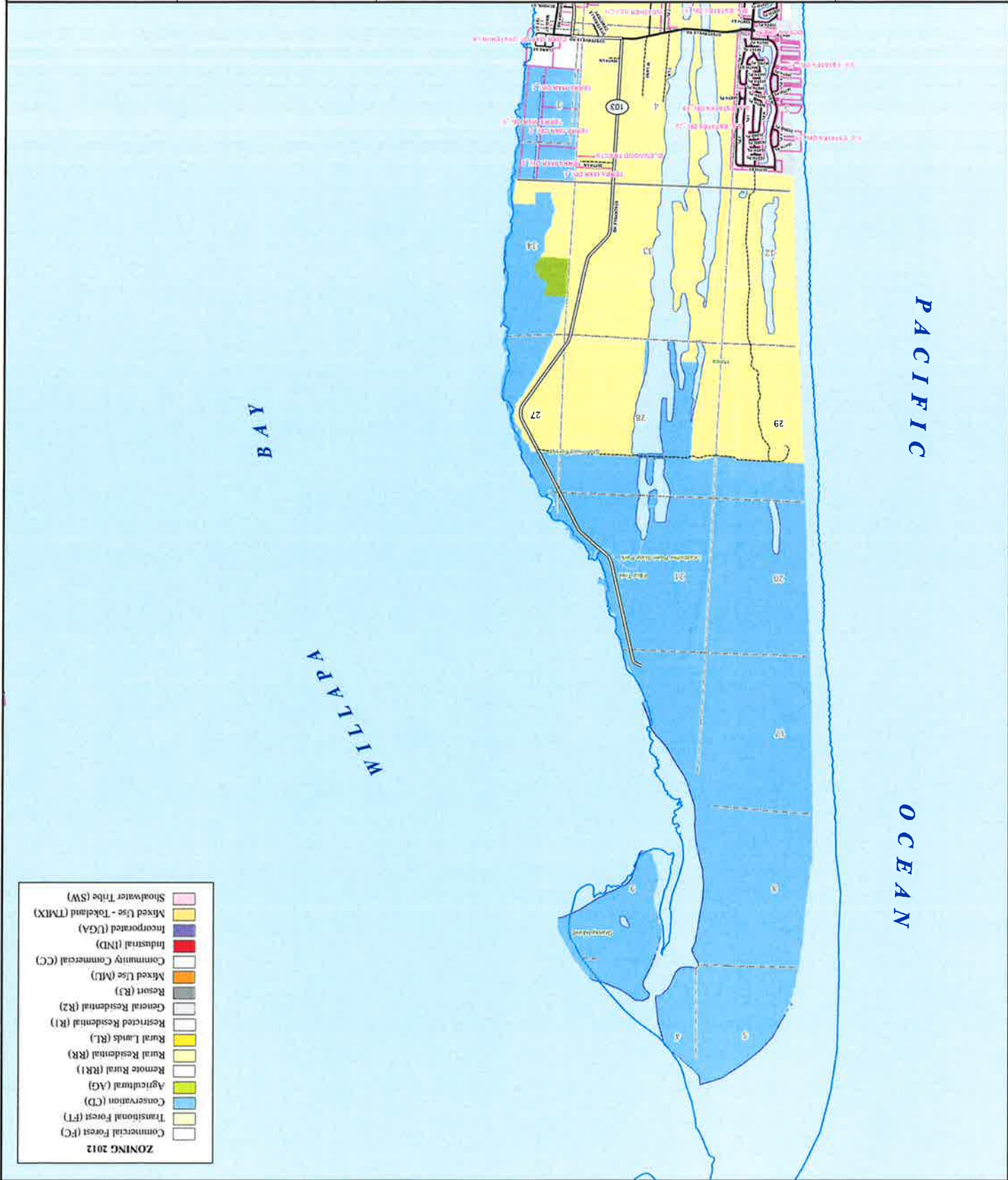
Here are the attachments. Paul and Nikki Majkut



- Legend**
- Airport Class C
 - Assisted Living Center
 - Camp
 - Chamber of Commerce
 - Casino
 - Cemetery
 - Fire Department
 - Gas Station
 - Hospital
 - Library
 - Police Station
 - Post Office
 - Public Works
 - School
 - Senior Center
 - Water Treatment Plant
 - Wastewater Plant
 - Telephone Company
 - State Road
 - County Road
 - Highway
 - Landmark
 - Road
 - Hydrology

Pacific County
 (Department of Public Works)
 200 National Drive
 P.O. Box 100
 Warrenton, OR 97146
 Phone: (503) 865-3566
 Fax: (503) 865-3567
 Website: www.pacificcounty.gov

Zoning Map
2012
 T. 13 N., R. 11 W.



- ZONING 2012**
- Commercial Forest (FC)
 - Transitional Forest (FT)
 - Conservation (CT)
 - Agricultural (AG)
 - Remote Rural (RR1)
 - Rural Residential (RR)
 - Rural Lands (RL)
 - Restricted Residential (R1)
 - General Residential (R2)
 - Resort (R3)
 - Mixed Use (MU)
 - Community Commercial (CC)
 - Industrial (IND)
 - Incorporated (UGA)
 - Mixed Use - Tokeland (TMIX)
 - Shoalwater Tribe (SW)

Tim Crose

Q

From: Paul Majkut <paulsmajkut@gmail.com>
Sent: Wednesday, August 2, 2017 5:26 PM
To: Tim Crose
Subject: Ordinance 178 proposed amendments
Attachments: R U R A L S M A L L.docx

Mr. Crose, Thank you for speaking to me today about the proposed amendments to Ordinance 178. My comments in opposition to the proposed changes are attached. Paul Majkut

August 2, 2017

Tim Crose, Director

Pacific County Planning and Community Development Department

South Bend, Washington

Dear Mr. Crose and Planning Commission,

Some wealthy individuals contribute to their community by making funds or their lands available to preserve wetlands and other sensitive wildlife habitat for future generations. Others such as Mr. Craig Tillotson, owner of Leadbetter "farms," build a 150 foot faux-lighthouse that is a non-conforming use and is part of a private playground for his exclusive guests.

I object to the amendment of Ordinance 178, section 26 to legitimize occupation of a tower that is the antithesis of the rural land scape on the Long Beach peninsula. Such use is not dependent on a particular rural location. This tower does not belong here and should never have been built. I hope that Mr. Tillotson's monument to himself will remain a non-conforming use that will be torn down by a future civic-minded owner. In addition, the County should not legitimize this non-conforming use because doing so sets a precedent for development that is inconsistent with a rural area and increases pressure on sensitive habitat such as nearby Hines marsh and the shorelines of the Peninsula and the Bay.

Mr. Tillotson adds insult to this injury by proposing extensive County-wide amendments to Ordinance 178, euphemistically titled "Rural Small Scale Recreational and Tourist Use." In fact, Mr. Tillotson wants to develop his private playgrounds for his exclusive guests. In the July 5, 2017 Chinook Observer Amy Nile reports that Mr. Tillotson's attorney states that Mr. Tillotson is looking for ways to "make money from the hundreds of acres he owns in Pacific County for his heirs. . . . The wealthy entrepreneur does not plan to open the metal gates of Leadbetter Farms to offer traditional lodging to the public. He wants to use the oceanfront property for exclusive high-end retreats." I object to these amendments to Ordinance 178. Through these amendments he would entitle himself and others to place non-rural uses in rural areas. Some of these are listed, others are not. As the proposed language states, "(t)he following list of uses is not intended to be exhaustive, but rather is intended to be illustrative of the types of small-scale recreation or tourist uses:"

Aerial recreational activities such as drone use, glider and parachute events; Animal preserves and game farms; Equestrian centers; Commercial fishing ponds; Cultural festivals; Miniature golf; Model hobby parks and sites; Outdoor recreational equipment rental and guide services; Private hunting or fishing camps; Public display gardens; Recreational, cultural or religious conference center/retreat facilities; Rural restaurants and brewpubs; Rural recreational lodging or cabins for overnight rental; and Wineries, microbreweries and distilleries.

There are places for most such development, when appropriate, and they are the existing commercial areas in South Bend, Raymond and Long Beach, for example. These uses are not dependent upon a particular rural location or setting and their placement in rural area is inconsistent with the intent and application of RCW 36.70A.070(5)(d) and the Pacific County Comprehensive Plan. They would encourage the very sprawl the law was intended to prevent.

In addition, we do not know the impacts of this ordinance change on the rural areas and the sensitive fish wildlife habitat of Pacific County. Some uses such as drones, animal preserves and game farms, and commercial fishing ponds pose unique threats to native birds, fish and wildlife and their habitat. These impacts should be explored and exposed before taking this radical step.

Ms. Niles states in the same July 5, 2017 Chinook Observer article noted above that the proposed amendment is modeled on Jefferson County's regulations under the Growth Management Act. Mr. Crose is then quoted "So it's not like we're doing something crazy." What is crazy is putting the onus on the County to defend any future decision to deny such uses in Rural areas. We have reached a new low for evaluating the significant change proposed by one man, Mr. Tillotson, to our public policy in Ordinance 178. The standard should be what is the appropriate way to protect the residents and unique and valuable fish and wildlife habitat of Pacific County. The appropriate way is the current unamended Ordinance 178.

Paul Majkut, Ocean Park

Nichol Gray

P

From: Tim Trohimovich <Tim@futurewise.org>
Sent: Wednesday, August 2, 2017 4:48 PM
To: Tim Crose
Subject: RE: Comments on the proposal to allow Small-Scale Recreation and Tourist Uses in designated rural areas
Attachments: 2014SWMWW on impacts of development on stormwater.pdf; JAWRA Instructions for Authors.pdf; Forest Cover Impervious-Surface Area and Mitigation 38 JAWRA 835 (2002).pdf

Director Crose:
Here are the supporting documents. Thank you again for considering our comments.

Tim Trohimovich, AICP
Director of Planning & Law

816 Second Avenue, Suite 200
Seattle, WA 98104-1530
206 343-0681 Ex 118
tim@futurewise.org
connect:  
futurewise.org

From: Tim Trohimovich
Sent: Wednesday, August 02, 2017 4:46 PM
To: 'tcrose@co.pacific.wa.us' <tcrose@co.pacific.wa.us>
Subject: Comments on the proposal to allow Small-Scale Recreation and Tourist Uses in designated rural areas
Dear Director Crose:

Enclosed please find Futurewise's comments on the proposal to allow Small-Scale Recreation and Tourist Uses in designated rural areas. We are sending some supporting materials in a separate email.
Thank you for considering our comments.

Tim Trohimovich, AICP
Director of Planning & Law

816 Second Avenue, Suite 200
Seattle, WA 98104-1530
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tim@futurewise.org
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futurewise.org

August 2, 2017

Mr. Tim Crose, Director

Pacific County

Department of Community Development

7013 Sandridge Road

Long Beach, Washington 98631

Dear Director Crose:

Subject: Comments on the proposal to allow Small-Scale Recreation and Tourist Uses in designated rural areas.

Sent via email to: tcrose@co.pacific.wa.us

Thank you for the opportunity to comment on the proposal to allow Small-Scale Recreation and Tourist Uses in designated rural areas. Futurewise works throughout Washington State to support land-use policies that encourage healthy, equitable, and opportunity-rich communities, and that protect our most valuable farmlands, forests and water resources. Futurewise has members across Washington State, including Pacific County. We have some comments and recommendations to water quality, water quantity and compatibility with nearby property explained below.

Limit the allowed uses to rural uses in authorized locations

The Growth Management Act (GMA), in RCW 36.70A.070(5)(b) provides that:

The rural element shall provide for a variety of rural densities, uses, essential public facilities, and rural governmental services needed to serve the permitted densities and uses. To achieve a variety of rural densities and uses, counties may provide for clustering, density transfer, design guidelines, conservation easements, and other innovative techniques that will accommodate appropriate rural densities and uses that are not characterized by urban growth and that are consistent with rural character.

RCW 36.70A.030(19) provides that:

“Urban growth” refers to growth that makes intensive use of land for the location of buildings, structures, and impermeable surfaces to such a degree as to be incompatible with the primary use of land for the production of food, other agricultural products, or fiber, or the extraction of mineral resources, rural uses, rural development, and natural resource lands designated pursuant to RCW 36.70A.170. A pattern of more intensive rural development, as provided in RCW 36.70A.070(5)(d), is not urban growth. When allowed to spread over wide areas, urban growth typically requires urban governmental services. “Characterized by urban growth” refers to land having urban growth

located on it, or to land located in relationship to an area with urban growth on it as to be appropriate for urban growth.

In analyzing these requirements, the Growth Management Hearings Board has held that:

[P]roposed [non-residential] uses that meet the definition of urban growth will be prohibited in a rural area unless: (1) the use, by its very nature, is dependent upon being in a rural area and is compatible with the functional and visual character of rural uses in the immediate vicinity; OR (2) the use is an essential public facility.”

We are concerned that some of the proposed uses qualify as urban growth when there parking lots and other supporting facilities are taken into account. These uses include miniature golf, model hobby parks and sites, restaurants and brewpubs that are not accessory to an agricultural or fish or shellfish operation, wineries, microbreweries and distilleries not associated with an onsite agricultural operation that grows some of the raw materials for the operation, and similar uses. Some of these uses would qualify as RCW 36.70A.070(5)(d)(ii) limited areas of more intense rural development. If the County decides to move forward with allowing these uses, we recommend that these uses be allowed through RCW 36.70A.070(5)(d)(ii) and include a site-specific comprehensive plan amendment and rezone to site these uses and mitigate their impacts.

Include measure to protect water quality and water quantity

RCW 36.70A.070(1) requires that the “land use element shall provide for protection of the quality and quantity of groundwater used for public water supplies.” The same subsection provides that “the land use element shall review drainage, flooding, and storm water run-off in the area and nearby jurisdictions and provide guidance for corrective actions to mitigate or cleanse those discharges that pollute waters of the state”

RCW 36.70A.070(5)(c)(iv) requires that “[t]he rural element shall include measures that apply to rural development and protect the rural character of the area, as established by the county, by: (iv) Protecting critical areas, as provided in RCW 36.70A.060, and surface water and groundwater resources”

Unallotted water is generally not available within the Willapa Watershed, WRIA 24.² A new right to use ground water cannot be obtained to support a new development or

¹ *Vasbon-Matney v. King County*, CPSC/MHB Case No. 95-3-0008, Final Decision and Order (Oct. 23, 1995), at pp. * 52 – 53, 1995 WL 903209 p. *48 (bold in original) and followed by *Timberlake Christian Fellowship v. King County*, 114 Wn. App. 174, 184 – 85, 61 P.3d 332, 337 – 38 (2002).

² State of Washington Department of Ecology Water Resource Program, *Focus on Water Availability Willapa Watershed*, WRIA 24 pp. 1 – 2 (Publication Number: 11-11-028 rev. August 2012) accessed on Aug. 2, 2017 at: <https://fortress.wa.gov/ecy/publications/summarypages/1111028.html> and enclosed with this letter.

redevelopment unless the request is mitigated, which often requires acquiring a senior water right.³ The State of Washington Department of Ecology also writes that:

Seawater intrusion is a real concern on the Long Beach Peninsula and other areas located near the Pacific Ocean. The peninsula is essentially a sand bar, and the water table is relatively shallow, not much above sea level. Use of jetted wells (drilling with high-pressure water) is common and it is difficult to properly install a surface seal on such wells. Susceptibility to contamination from septic discharges is also a real concern in this area.⁴

Salt water intrusion can worsen until wells “must be abandoned due to contaminated, unusable water.”³ Salt water intrusion is often worsened by over-pumping an aquifer.⁶ For these reasons, the Western Washington Growth Management Hearings Board has held that Growth Management Act requires counties to designate vulnerable seawater intrusion areas as critical aquifer recharge areas.⁷ The Board also held that counties must adopt development regulations “to protect aquifers used for potable water from further seawater degradation.”⁸

To address the GMA requirements and the limited water availability and to protect existing water right holders, we recommend that the proposed uses be required to demonstrate that they have physically and legally available water that meets drinking water standards. For proposed uses on the Long Beach Peninsula and areas near Willapa Bay and the Pacific Ocean, the County should require that the proposed uses demonstrate they will not cause salt water to intrude into the aquifers on the Long Beach Peninsula and areas mapped by Ecology as being near Willapa Bay and the Pacific Ocean. These measures are necessary to protect water quality and existing water right holders.

In addition, we recommend that the proposed uses include measures to better protect water quality from storm water and other pollutants. For well over a decade now, the scientific

 \mathcal{M}_ε $+Id$ at p. 1.

Emily B. Tibbott, *Seawater Intrusion Control in Coastal Washington: Department of Ecology Policy and Practice* p. 7 (United States Environmental Protection Agency Region 10, Office of Ground Water: Aug. 1992, EPA 910/9-92-023) accessed on Aug. 2, 2017 at:

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&DocBackPage=x&SearchBack=Zy\Action1&Back=Zy\Action5&BackDesc=Results*20page&MaximumPages=
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PI 9

⁷ *Olympic Environmental Council v. Jefferson County*, Western Washington Growth Management Hearings Board (WVGMB) Case No. 01-2-0015, Final Decision and Order (Jan. 10, 2002), at *8 & *16 motion for reconsideration denied *Olympic Environmental Council v. Jefferson County*, WVGMB Case No. 01-2-0015, Order Denying Motion for Reconsideration (Feb. 8, 2002), at *3, both orders accessed on Feb. 16, 2017 at:

<http://www.gmh.b.wa.gov.au/CasesDetail.aspx?cid=324>

⁸ *Olympic Environmental Council v. Jefferson County, WVGMB Case No. 01-2-0015*, Final Decision and Order (Jan. 10, 2002), at *15.

literature shows that constructed storm water facilities alone will not protect water quality.⁹ Rather impervious surface area and clearing regulations are needed too.¹⁰ The Booth article, enclosed in a separate email, considered storm water controls in analyzing whether they alone can effectively protect water quality.¹¹ The evidence is they cannot.¹²

In discussing the impacts of development on water quality, the *Stormwater Management Manual for Western Washington* states:

There is some agreement that preserving a high percentage (possibly 65 to 75%) of the land cover and soils in an undisturbed state is necessary. To achieve these high percentages in urban, urbanizing, and suburban watersheds, a dramatic reduction is necessary in the amount of impervious surfaces and artificially landscaped areas to accommodate our preferred housing, play, and work environments, and most significantly, our transportation choices.¹³

Limiting impervious surfaces 20 percent of a lot in rural Pacific County combined with infiltrating storm water where possible will address the problems identified above.¹⁴ Clearing and excavations should be limited to maintain 65 percent native vegetation with undisturbed soils.¹⁵ We would support provisions to allow a larger impervious surface and clearing limit for lots 2.5 acres and smaller to assure that there is adequate buildable land on lot.

In addition, outdoor shooting ranges have a high potential to pollute surface and ground water including wetlands. These uses should only be allowed in areas that are not susceptible to ground water pollution and should be well setback from wetlands and surface waters to protect them from pollution. These provisions should be added to the requirements for these uses.

Thank you for considering our comments. If you require additional information, please contact me at telephone 206-343-0681 Ext. 118 or email tim@futurewise.org

⁹ Derek B. Booth, David Hartley, and Rhett Jackson, *Forest Cover, Impervious-Surface Area, and the Mitigation of Stormwater Impacts* 38 JOURNAL OF THE AMERICAN WATER RESOURCES ASSOCIATION 835, 838 – 43 (2002). The Journal of the American Water Resources Association is a peer-reviewed scientific journal. The Journal of the American Water Resources Association (JAWRA) Instructions for Authors pp. *2 – 4 accessed on July 7, 2017 at: <http://www.awra.org/jawra/JAWRA%20Instructions%20for%20Authors.pdf> and both the article and the instructions are enclosed in a separate email.

¹⁰ Derek B. Booth, David Hartley, and Rhett Jackson, *Forest Cover, Impervious-Surface Area, and the Mitigation of Stormwater Impacts* 38 JOURNAL OF THE AMERICAN WATER RESOURCES ASSOCIATION 835, 844 (2002).

¹¹ *Id.* at 838 – 43.

¹² *Id.*

¹³ Washington State Department of Ecology Water Quality Program, *Stormwater Management Manual for Western Washington* p. 31 (Publication Number 14-10-055: Dec. 2014) accessed on July 10, 2017 at: <http://www.ecy.wa.gov/programs/wq/stormwater/manual/2014SWMANWWinteractive/2014%20SWMANWW.htm> and excerpts enclosed in a separate email.

¹⁴ Derek B. Booth, David Hartley, and Rhett Jackson, *Forest Cover, Impervious-Surface Area, and the Mitigation of Stormwater Impacts* 38 JOURNAL OF THE AMERICAN WATER RESOURCES ASSOCIATION 835, 844 (2002).

¹⁵ Washington State Department of Ecology Water Quality Program, *Stormwater Management Manual for Western Washington* p. 31 (Publication Number 14-10-055: Dec. 2014) accessed on July 10, 2017 at: <http://www.ecy.wa.gov/programs/wq/stormwater/manual/2014SWMANWWinteractive/2014%20SWMANWW.htm> and excerpts enclosed in a separate email.

¹⁶ Washington State Department of Ecology Water Quality Program, *Stormwater Management Manual for Western Washington* p. 31 (Publication Number 14-10-055: Dec. 2014).

Very Truly Yours,

A handwritten signature in blue ink, consisting of two large, stylized, overlapping loops that resemble the letters 'S' and 'S' joined together.

Tim Trohimovich, AICP
Director of Planning & Law

Enclosures

Willapa Watershed, WRIA 24

This focus sheet provides information on the availability of water for new uses in the Willapa Watershed. This information provides a starting point for potential water users in determining the best strategies for securing water for a future project or proposal in this area.

The Willapa Watershed, located on Washington's south coast, includes the Johns, Elk, North, Nemah, Naselle, and Bear River drainages.

Annual precipitation in the Willapa Watershed ranges from 60 inches per year along the coastal lowlands to 140 inches per year in the Willapa Hills. Most precipitation arrives during the winter months when overall water demands are the lowest. During the summer, snow pack is gone, there is little rain, and naturally low stream flows are dependent on groundwater inflow. This means that groundwater and surface water are least available when water demands are the highest.

Factors affecting water availability

Seawater intrusion is a real concern on the Long Beach Peninsula and other areas located near the Pacific Ocean. The peninsula is essentially a sand bar, and the water table is relatively shallow, not much above sea level. Use of jetted wells (drilling with high-pressure water) is common and it is difficult to properly install a surface seal on such wells. Susceptibility to contamination from septic discharges is also a real concern in this area.

There is also an adjudicated area (Black Lake & Tartatt Slough), just north of Ilwaco.

Increased demands from population growth, low summer and early fall streamflow levels, and impacts from climate change add to the challenge of finding new water supplies in WRIA 24, especially during the summer months.

The state Department of Fish and Wildlife has recommended that Ecology not issue water rights in a large portion of this WRIA, in order to protect fish populations. See [RCW 77.57.020](#) for more information.

Definitions

Adjudication: A legal process conducted through a superior court to determine the extent and validity of existing water rights within a basin or basins.

Aquifer: An underground layer of sand and gravel that acts as a reservoir for groundwater.

Mitigation plan: A scientifically-sound plan to offset the impacts of a proposed water use.

Seawater intrusion: The movement of salt water into freshwater aquifers.

WRIA: Water Resources Inventory Area; also known as a watershed or river basin. For environmental administration and planning purposes, Washington is divided up into 62 major watersheds, or WRIs.



MORE INFORMATION

Water supply available for new uses

Applicants seeking new water appropriations will likely need to mitigate the impacts their water use will have on surface water bodies.

Connecting to an established water supplier is generally the fastest and simplest option for obtaining new supplies of water.

This watershed has many small farms and permit-exempt domestic well uses. The groundwater permit exemption allows certain users of small quantities of ground water (most commonly, single residential well owners) to construct wells and develop their water supplies without obtaining a water right permit from Ecology. For more information about the groundwater permit exemption, refer to www.ecy.wa.gov/pubs/twr92104.pdf.

Additional options for finding a water supply include processing a water right application through the [Cost Reimbursement Program](#). The applicant may need to develop mitigation to offset the impacts of their water use to surface water.

For more information on these and other options, refer to “[Alternatives for Water Right Application Processing](#).”

Pending water right applications in this watershed

Washington water law is based on the “prior appropriation” system, often called “first in time, first in right.” Applications for water from the same source must be processed in the order they are received. Ecology asks anyone who needs a water right (new, change, or transfer) to submit the pre-application consultation form and meet with us to review your water supply needs and project proposal.

- Apply for a New Water Right <http://www.ecy.wa.gov/programs/wr/rights/newrights.html>
- Apply to Change or Transfer a Water Right or Claim http://www.ecy.wa.gov/programs/wr/rights/change_transfer_use.html

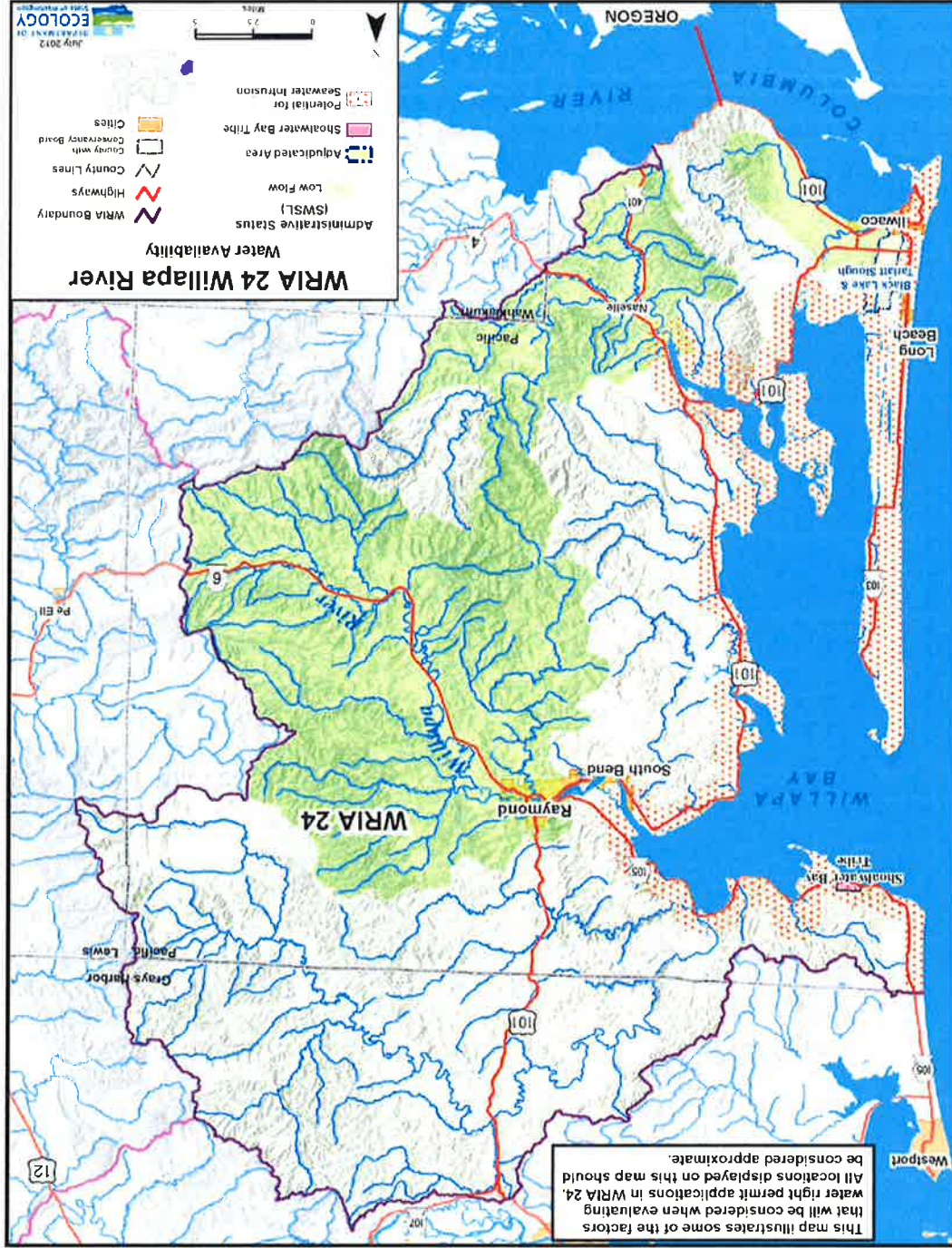
The map in this document shows some of the factors that will be considered when evaluating water right permit applications. Here are some information sources to assist you with your research:

- Locate and research water rights on land parcels anywhere in the state (Water Resource Explorer) <http://www.ecy.wa.gov/programs/wr/info/webmap.html>
- Pending Water Right Applications by County <http://www.ecy.wa.gov/programs/wr/rights/tracking-apps.html>

- Subscribe to a water right application RSS feed for a county or WRIA http://www.ecy.wa.gov/programs/wr/rights/wr_app_rss.html
- WRIA map showing the total number of water right claims, certificates, permits and applications <http://www.ecy.wa.gov/programs/wr/rights/images/pdf/waterright-wria-maps.pdf>
- Search and view well reports using a variety of search tools <https://fortress.wa.gov/ecy/waterresources/map/WCLSWebMap/default.aspx>

For more information

Ecology Southwest Regional Office
300 Desmond Drive
Lacey, WA 98503
360-407-6300



If you need this document in a version for the visually impaired, call the Water Resources Program at 360-407-6872. Persons with hearing loss can call 711 for Washington Relay Service. Persons with a speech disability can call 877-833-6341

2012 Stormwater Management Manual for Western Washington



as Amended in
December 2014
(The 2014 SMMWW)



DEPARTMENT OF
ECOLOGY
State of Washington

Publication Number 14-10-055
(Replaces Publication 12-10-030)

 Printed on recycled paper

Stormwater Management Manual for Western Washington




Volume I - Minimum Technical Requirements and Site Planning
Volume II - Construction Stormwater Pollution Prevention
Volume III - Hydrologic Analysis and Flow Control Design/BMPs
Volume IV - Source Control BMPs
Volume V - Runoff Treatment BMPs

Prepared by:

Washington State Department of Ecology
Water Quality Program

December 2014

Publication Number 14-10-055
(Replaces Publication Number 12-10-030)

 Printed on Recycled Paper

information on our Stormwater Management Manual website. Ecology will not use the website to make revisions in key policy areas – such as the thresholds and minimum requirements in Volume I. Please check this site periodically for corrections and updates.

Public involvement leading up to the 2012 SWMMWW

Ecology provided public involvement opportunities and received public comments in preparation of the 2012 SWMMWW through advisory committees, listening sessions, surveys, meetings with experts in selected fields, and a public comment period.

- **Low Impact Development (LID) Advisory Committees** To support the development of LID requirements, Ecology formed two advisory committees comprised of representatives from local government permittees, state government, ports, environmental groups, scientists, consultants, and the development industry. The advisory groups met in 2009 and 2010 and provided input to Ecology on the definition of LID, a performance standard, feasibility criteria, and a number of implementation issues. In August 2010, Ecology presented an outline of the proposed LID requirements and took comments from the committee members and the broader interested public. Meeting materials, summaries, references, and comments on Ecology's proposal are available on Ecology's website. The committees met jointly again in May 2011 to provide input on Ecology's preliminary draft LID proposed language. See LID advisory process materials at: <http://www.ecy.wa.gov/programs/wq/stormwater/municipal/LIDstandards.html>.

- The LID requirements are found primarily in Volume I of the manual. Ecology acknowledges the participants of the LID Advisory committees in Volume I.
- **Listening Sessions** In August and September 2010, Ecology hosted listening sessions statewide to announce the reissuance schedule and gather input for preparing to reissue the 2012 permits and update the Manual. More than 200 people attended the listening sessions statewide. Participants largely agreed that the Manual should not be substantively revised, except to include new technical information about LID implementation, add BMPs approved as equivalent, and remove non-working BMPs.

- **Surveys on the Volumes in the Manual** Ecology sent out surveys specific to Volumes II-V to permittees, internal experts, and outside experts asking for comments and advice on revisions for the 2012 draft Manual. Ecology acknowledges those that actively participated in the surveys in the Acknowledgment sections of Volumes II-V.

- **Meetings with experts** In a very few cases, Ecology met with internal and external experts to discuss needed changes to the Manual. Ecology acknowledges those that participated in these meetings in the Acknowledgment section of each volume.

- **Public Comment Period** Ecology issued the Draft 2012 SWMMWW for a 90 day public comment period (November 4, 2011 – February 3, 2012). During the comment period Ecology held five public workshops throughout Western Washington on the Draft 2012 SWMMWW. At the workshops, Ecology explained the proposed changes to the manual and answered questions. Ecology considered the comments received during the 90-day comment period and made the final changes to the 2012 SWMMWW. Ecology has issued a response to comments with the final version of the 2012 SWMMWW.

Photo Credits

Cover (clockwise from lower left): This photo shows what can happen when it rains and stormwater controls are not used to control sediment runoff at construction sites; above - a construction crew lays permeable pavers that will help infiltrate stormwater and reduce the size of a centralized stormwater facility; a bioretention swale is used to infiltrate and filter stormwater from a city street and sidewalk; high visibility silt fencing prevents sediment stormwater from coming into contact with stormwater (photo by Robert Wright); a stormwater wetpond has vegetation that filters pollutants, and check dams that create ponding to allow the settlement of sediments, and reduce the velocity of water.

Spine (top): oil from a parking lot drains to a catch basin and could flow into a stream or lake unless a stormwater treatment facility is provided (photo by Robert Wright); permeable pavement and permeable pavers help reduce the amount of stormwater runoff through infiltration and make a beautiful walkway (photo by Anne Dettelbach); a rain garden in a parking lot filters and infiltrates stormwater runoff.

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shaft, or dug hole whose depth is greater than the largest surface dimension; (2) An improved sinkhole; or (3) A subsurface fluid distribution system (contains perforated pipe or similar structure)."

Depending upon the manner in which it is accomplished, the discharge of stormwater into the ground can be classified as a Class V injection well. For more information and for a listing on potential stormwater facilities that may have Class V classification refer to the memorandum available at <http://www.ecy.wa.gov/programs/wq/stormwater/municipal/resources/EPAmemo infiltrationclasswells.pdf>.

I-1.6.16 Other Local Government Requirements

Local governments have the option of applying more stringent requirements than those in this manual. They are not required to base those more stringent requirements on a watershed/basin plan or their obligations under a TMDL. Project proponents should always check with the local governmental agency with jurisdiction to determine the stormwater requirements that apply to their project.

I-1.7 Effects of Urbanization

I-1.7.1 Background Conditions

Prior to the Euro-American settlement, western Washington primarily was forested in alder, maple, fir, hemlock and cedar. The area's bountiful rainfall supported the forest and the many creeks, springs, ponds, lakes and wetlands. The forest system provided protection by intercepting rainfall in the canopy, reducing the possibility of erosion and the deposition of sediment in waterways. The trees and other vegetative cover evapo-transpired at least 40% of the rainfall. The forest duff layer absorbed large amounts of runoff releasing it slowly to the streams through shallow ground water flow.

I-1.7.2 Hydrologic Changes

As settlement occurs and the population grows, trees are logged and land is cleared for the addition of impervious surfaces such as rooftops, roads, parking lots, and sidewalks. Maintained landscapes that have much higher runoff characteristics typically replace the natural vegetation. The natural soil structure is also lost due to grading and compaction during construction. Roads are cut through slopes and low spots are filled. Drainage patterns are irrevocably altered. All of this results in drastic changes in the natural hydro-logy, including:

- Increased volumetric flow rates of runoff
- Increased volume of runoff
- Decreased time for runoff to reach a natural receiving water

- Reduced ground water recharge
 - Increased frequency and duration of high stream flows and wetlands inundation during and after wet weather
 - Reduced stream flows and wetlands water levels during the dry season
 - Greater stream velocities
- Figure I-1.7.1 Changes in Hydrology after Development (p.24) illustrates some of these hydrologic changes. As a consequence of these hydrology changes, stream channels are eroded by high flows and can lose summertime base flows. Increased flooding occurs. Streams lose their hydraulic complexity. Habitat is degraded and receiving water species composition is altered as explained below.

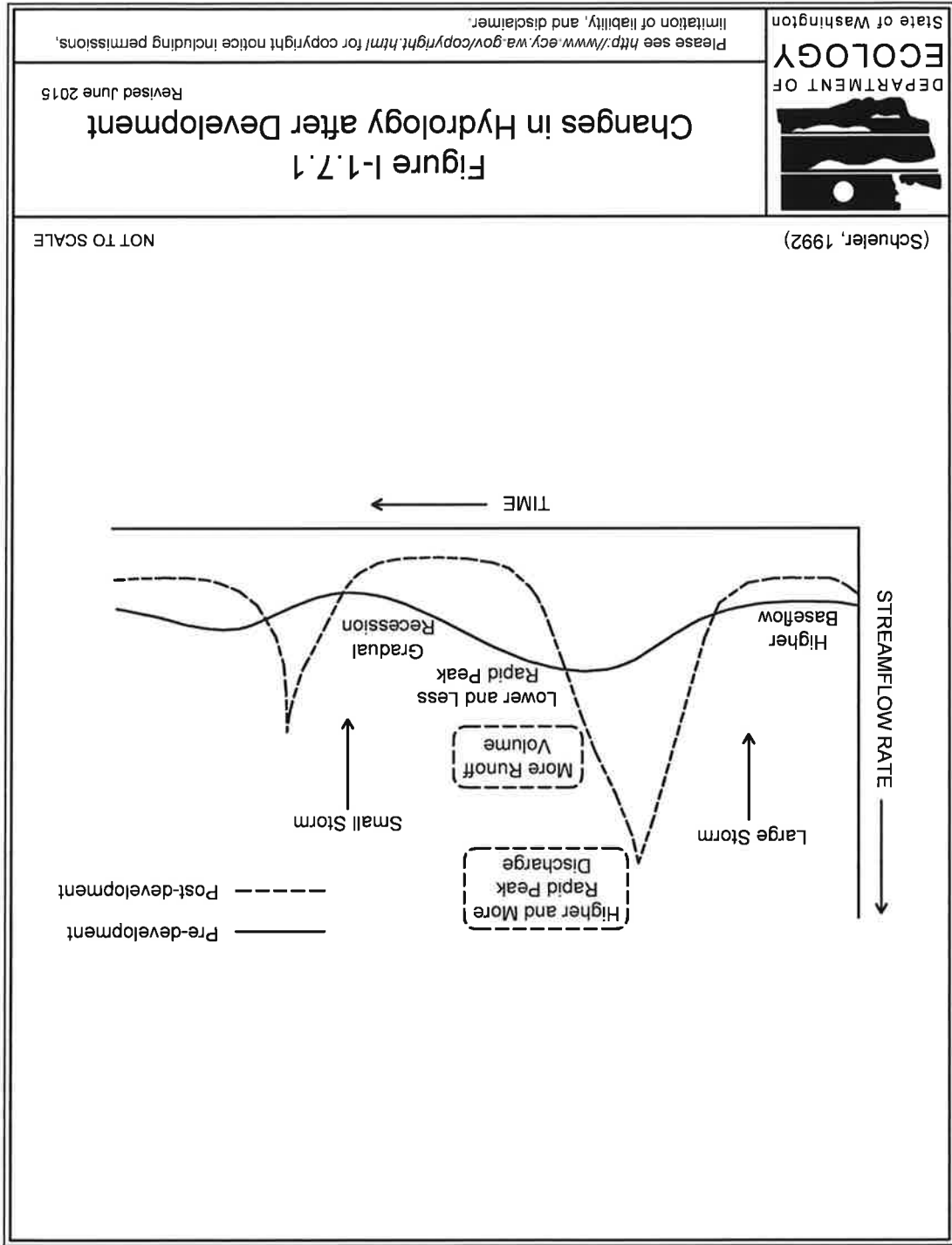
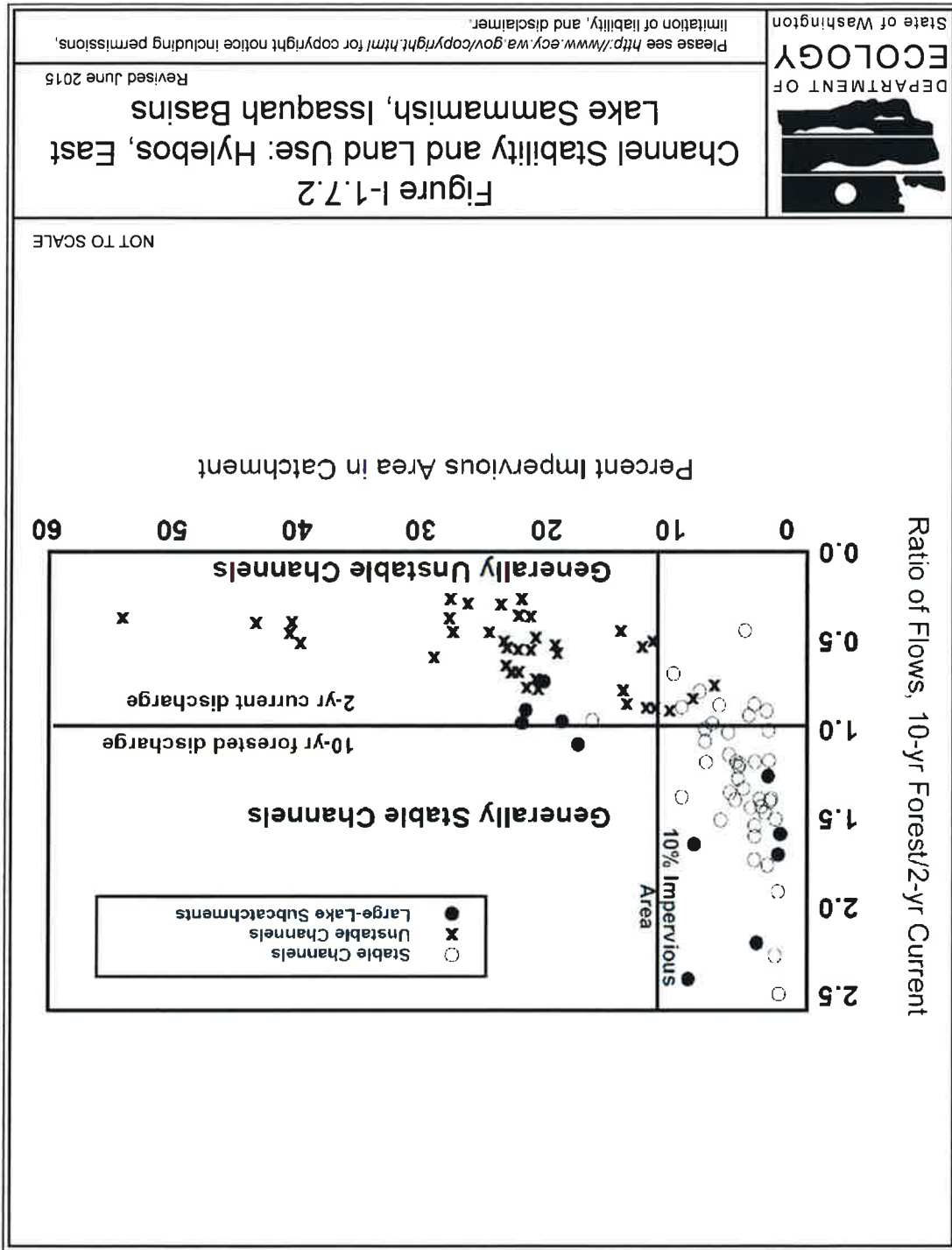


Figure I-1.7.1 Changes in Hydrology after Development

Figure I-1.7.2 Channel Stability and Land Use: Hylebos, East Lake Sammamish, Issaquah Basins (p.26) (Booth and Jackson, 1997) illustrates one observed relationship between the level of development in a basin (as measured by effective, not total, impervious area), the changes in the recurrence of modeled stream flows, and the resultant streambank instability and channel erosion. These data show that even a crude measure of stream degradation, "channel instability," shows significant changes at relatively low levels of urban development. More sensitive measures, such as biological indicators (see I-1.7.4 Biological Changes (p.28)), document degradation at even lower levels of human activity.

Figure I-1.7.2 Channel Stability and Land Use: Hylebos, East Lake Sammamish, Issaquah Basins



I-1.7.3 Water Quality Changes

Urbanization also causes an increase in the types and quantities of pollutants in surface and ground waters. Runoff from urban areas has been shown to contain many different types of pollutants, depending on the nature of the activities in those areas. [Table I-1.7.1 Mean Concentrations of Selected Pollutants in Runoff from Different Land Uses \(p.27\)](#), from an analysis of Oregon urban runoff water quality monitoring data collected from 1990 to 1996, shows mean concentrations for a limited number of pollutants from different land uses. (Streckler et al., 1997)

Table I-1.7.1 Mean Concentrations of Selected Pollutants in Runoff

from Different Land Uses

Land Use	mg/l				mg/l	
	TSS	Total Cu	Total Zn	Dissolved Cu	Total P	
In-pipe Industry	194	0.053	0.629	0.009	0.633	
Instream Industry	102	0.024	0.274	0.007	0.509	
Transportation	169	0.035	0.236	0.008	0.376	
Commercial	92	0.032	0.168	0.009	0.391	
Residential	64	0.014	0.108	0.006	0.365	
Open	58	0.004	0.025	0.004	0.166	

Note: In-pipe industry means the samples were taken in stormwater pipes. Instream industry means the samples were taken in streams flowing through industrial areas. Samples for all other categories were taken within stormwater pipes.

The runoff from roads and highways is contaminated with pollutants from vehicles. Oil and grease, polynuclear aromatic hydrocarbons (PAH's), lead, zinc, copper, cadmium, as well as sediments (soil particles) and road salts are typical pollutants in road runoff. Runoff from industrial areas typically contains even more types of heavy metals, sediments, and a broad range of man-made organic pollutants, including phthalates, PAH's, and other petroleum hydrocarbons. Residential areas contribute the same road-based pollutants to runoff, as well as herbicides, pesticides, nutrients (from fertilizers), bacteria and viruses (from animal waste). All of these contaminants can seriously impair beneficial uses of receiving waters.

Regardless of the eventual land use conversion, the sediment load produced by a construction site can turn the receiving waters turbid and be deposited over the natural sediments of the receiving water.

The pollutants added by urbanization can be dissolved in the water column or can be attached to particulates that settle in streambeds, lakes, wetlands, or marine estuaries. A

number of urban bays in Puget Sound have contaminated sediments due to pollutants associated with particulates in stormwater runoff.

Urbanization also tends to cause changes in water temperature. Heated stormwater from impervious surfaces and exposed treatment and detention ponds discharges to streams with less riparian vegetation for shade. Urbanization also reduces ground water recharge, which reduces sources of cool ground water inputs to streams. In winter, the replacement of warmer ground water inputs with colder surface runoff during colder periods may have biological impacts.

I-1.7.4 Biological Changes

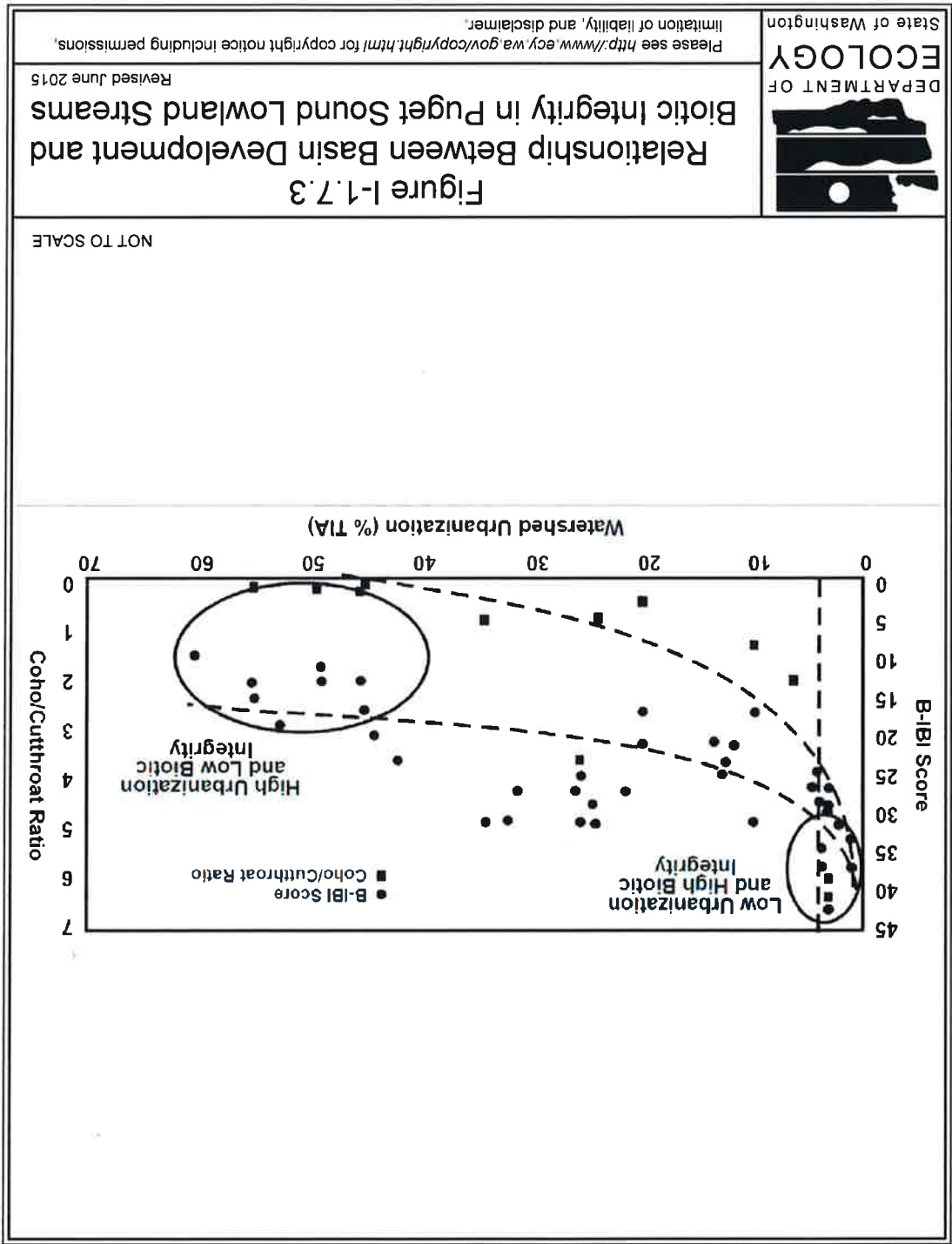
The hydrologic and water quality changes result in changes to the biological systems that were supported by the natural hydrologic system. In particular, aquatic life is greatly affected by urbanization. Habitats are drastically altered when a stream changes its physical configuration and substrate due to increased flows. Natural riffles, pools, gravel bars and other areas are altered or destroyed. These and other alterations produce a habitat structure that is very different from the one in which the resident aquatic life evolved. For example, spawning areas, particularly those of salmonids, are lost. Fine sediments imbed stream gravels and suffocate salmon redds. The complex food web is destroyed and is replaced by a biological system that can tolerate the changes. However, that biological community is typically not as complex, is less desirable, and is unstable due to the ongoing rapid changes in the new hydrologic regime.

Significant and detectable changes in the biological community of Puget Sound lowland streams begin early in the urbanization process. May et al. (1997) reported changes in the 5-10% total impervious area range of a watershed. [Figure I-1.7.3 Relationship Between Basin Development and Biotic Integrity in Puget Sound Lowland Streams \(p.30\)](#) from May et al. (1997) shows the relationship observed between the Benthic Index of Biotic Integrity (B-IBI) developed by Kleindl (1995) and Karr (1991), and the extent of watershed urbanization as estimated by the percentage of total impervious area (% TIA). Also shown in the figure is the correlation between the abundance ratio of juvenile coho salmon to cutthroat trout (Lucchetti and Fuerstenberg 1993) and the extent of urbanization.

The biological communities in wetlands are also severely impacted and altered by the hydrological changes. Relatively small changes in the natural water elevation fluctuations can cause dramatic shifts in vegetative and animal species composition. In addition, the toxic pollutants in the water column such as pesticides, soaps, and metals can have immediate and long-term lethal impacts. Toxic pollutants in sediments can yield similar impacts with the lesions and cancers in bottom fish of urban bays serving as a prime example.

A rise in water temperature can have direct lethal effects. It reduces the maximum available dissolved oxygen and may cause algae blooms that further reduce the amount of dissolved oxygen in the water.

Figure I-1.7.3 Relationship Between Basin Development and Biotic Integrity in Puget Sound Lowland Streams



NOT TO SCALE

Figure I-1.7.3 Relationship Between Basin Development and Biotic Integrity in Puget Sound Lowland Streams

Revised June 2015

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I-1.7.5 The Role of Land Use and Lifestyles

The manual's scope is limited to managing the surface runoff generated by a new development or redevelopment project. The manual does not intend to delve deeply into site development standards or where development should be allowed. Those are land use decisions that should not be directed by this stormwater manual. The manual applies after the decision to develop a site has been made. The manual can provide development strategies to reduce the pollutants generated and the hydrologic disruptions caused by development.

The engineered stormwater conveyance, treatment, and detention systems advocated by this and other stormwater manuals can reduce the impacts of development to water quality and hydrology. But they cannot replicate the natural hydrologic functions of the natural watershed that existed before development, nor can they remove sufficient pollutants to replicate the water quality of pre-development conditions. Ecology understands that despite the application of appropriate practices and technologies identified in this manual, some degradation of urban and suburban receiving waters will continue, and some beneficial uses will continue to be impaired or lost due to new development. This is because land development, as practiced today, is incompatible with the achievement of sustainable ecosystems. Unless development methods are adopted that cause significantly less disruption of the hydrologic cycle, the cycle of new development followed by beneficial use impairments will continue.

In recent years, researchers (May et al., 1997) and regulators (e.g., Issaquah Creek Basin and Nonpoint Action Plan, 1996) have speculated on the amount of natural land cover and soils that should be preserved in a watershed to retain sufficient hydrologic conditions to prevent stream channel degradation, maintain base flows, and contribute to achieving properly functioning conditions for salmonids. There is some agreement that preserving a high percentage (possibly 65 to 75%) of the land cover and soils in an undisturbed state is necessary. To achieve these high percentages in urban, urbanizing, and suburban watersheds, a dramatic reduction is necessary in the amount of impervious surfaces and artificially landscaped areas to accommodate our preferred housing, play, and work environments, and most significantly, our transportation choices.

Surfaces created to provide "car habitat" comprise the greatest portion of impervious areas in land development. Therefore, to make appreciable progress in reducing impervious surfaces in a watershed, we must reduce the density of our road systems, alter our road construction standards, reduce surface parking, and rely more on transportation systems that do not require such extensive impervious surfaces (rail, bicycles, walking). Reducing the extent of impervious surfaces and increasing natural land cover in watersheds are also necessary to solve the water quality problems of sediment, temperature, toxicants, and bacteria. Changing public attitudes toward chemical use and preferred housing are also necessary to achieve healthy water ecosystems.

Until we are successful in applying land development techniques that result in matching the natural hydrologic functions and cycles of watersheds, management of the increased surface runoff is necessary to reduce the impact of the changes. [Figure I-1.7.3 Relationship Between Basin Development and Biotic Integrity in Puget Sound Lowland Streams \(p.30\)](#) illustrates that significant biological impacts in streams can occur at even low levels of development associated with rural areas where stormwater runoff has not been properly managed. Improving our stormwater detention, treatment, and source control management practices should help reduce the impacts of land development in urban and rural areas. We must also improve the operation and maintenance of our engineered systems so that they function as well as possible. This manual is Ecology's latest effort to apply updated knowledge in these areas.

The question yet to be answered is whether better management – including improved treatment and detention techniques – of the increased surface runoff from developed areas can work in combination with preservation of high percentages of natural vegetation and soils on a watershed scale to yield a minimally altered hydrologic and water quality regime that protects the water-related natural resources.

In summary, implementing improved engineering techniques and drastic changes in where and how land is developed and how people live and move across the land are necessary to achieve the goals in the federal Clean Water Act - to preserve, maintain, and restore the beneficial uses of our nation's waters.

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- The Copyright section has been revised to reflect new policy and procedure.

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Publishing a paper or abstract in a conference proceedings does not necessarily disqualify it from publication in JAWRA. Several factors considered are: (1) quality and completeness; (2) copyright; (3) disclosure; and (4) level of prior exposure. Authors who wish us to consider work based upon proceedings are encouraged to discuss the matter with the JAWRA editor-in-chief (JAWRA-editor@awra.org) prior to submittal.

Part II – Preparing a Manuscript

Article Types

JAWRA articles may be one of four types as outlined below. All articles, regardless of type, are subject to full peer review.

Technical Paper – This type of article presents the results of recent research, including case studies or literature reviews, or offers facts-based analysis of a timely and important topic. Most articles in JAWRA are Technical Papers.

Technical Note – This is a short, narrowly-focused communication on a topic of interest. Examples of appropriate topics for a Technical Note would be to correct a common misperception about a sampling technique, or to add a recollection of an historical event.

Discussion – A Discussion is a commentary on a Technical Paper or Technical Note recently published in JAWRA. It is limited to the material covered in the article in question and cannot add new research results not previously published.

Reply – A Reply is prepared by authors of a Technical Paper or Technical Note in response to a Discussion about their article. A timely Reply will be published in the same issue as the corresponding Discussion.

Abstract

The abstract should briefly summarize, in one paragraph limited to 1,500 characters including spaces and the heading “Abstract:”, the general problem and objectives, the results obtained, and the implications. Mention place names and program names if they are important to the study. Do not include citations. Do not include details of methods, sampling, etc., unless they are the main point of your paper. Use and define acronyms only if they appear more than once in the Abstract itself.

When submitting your manuscript for consideration in ScholarOne Manuscripts, be sure to copy and paste the Abstract into the field provided as this is not automatically completed. If changes are made in revisions, the amended Abstract should be uploaded.

Acknowledgments

Acknowledgements are included in a separately titled section, directly before the Literature Cited. This is the appropriate place for disclosing any affiliations that could be perceived as influencing the objectivity of the work (See Professionalism and Civility) and for adding any disclaimers required by your employer.

Appendices

All appendices must have a title. Appendices are placed before the Acknowledgments and Literature Cited sections.

Tip! Many JAWRA readers do so electronically. On the Web, you have only a few seconds to grab the attention of a reader. Do not waste the first sentences of your abstract with introductory material. Get right to the point of telling what you did and what you found!

Author Information

Although author information is listed in ScholarOne Manuscripts, the names may not be in the format you prefer and are not automatically transferred to the manuscript. Therefore, in the manuscript, under the title, list the author names in the **exact form and order** you want them to appear.

We have discussed with Wiley-Blackwell the possibility of showing author names in native characters. However, at this time we cannot guarantee such characters would be printed accurately, therefore we do not presently offer this service.

The JAWRA style is to include, in a footnote on the title page, a position title and affiliation for each author (e.g., "Associate Professor (AUTHLASTNAME), Department of Basketball, Enormous State University, Bigten, Ohio 12345", and the full mailing and e-mail addresses for the *one* designated corresponding author. Do not include phone numbers. The example below presents a common situation, but you should examine a recent issue of JAWRA for other examples.

¹ Associate Professor (Smith), Department of Basketball, Enormous State University, 123 Court Street, Bigten, Ohio 12345; Graduate Student (Doe, Liu), Department of Sportsmanship, Smalltime University, Littletown, Ohio 67891; and Senior Scientist (Jones), Recruitment Support, Acme Consultants, Moneysville, Ohio 23456. (E-Mail/Smith: smith@bigten.edu).

Sometimes authors change their affiliation after preparing a paper. In this case, you may give past, present, or both affiliations as you prefer: "Formerly, Associate Professor, Enormous State University, currently Senior Scientist (Jones), Recruitment Support, Acme Consultants..." A better approach, though, is to list your current affiliation, and give credit to your former employer in the Acknowledgements.

Citations within Text

Proper citations are critical not only as a matter of professional courtesy, but make it easier and faster for reviewers to check a paper's references. All sources of data and information not original to the paper should be described, either as *published literature* or as an *informal reference*. It is important to recognize how these classes are defined and treated.

- ***[Published Literature](#)***, or formal citations, includes published materials available to future researchers. All entries have an author/compiler/editor/manager (person or organization), a date of publication, and title and publishing information to uniquely identify the materials. Contractor reports to a public agency fall in this category if they can be clearly and uniquely identified.
- ***[Informal References](#)*** include everything else: personal communications (letters, notes, and conversations), unpublished reports, legal citations, and databases.

Published Literature

Refer to published literature within the text by author(s) and date; for example, Black (1984) or (Black, 1984). Do not use a numbering system. Use letters to differentiate citations in the same year, as Black (1984b). Though using the author's surname normally is sufficient, an initial or given name should be included when referencing multiple authors with the same surname: Black, P. (1984) and Black, A. (1984).

Every published literature reference within the text must have a corresponding entry in the [Literature Cited](#) section. **If you delete or insert a text reference during revision, be sure to update the Literature Cited section as well.** Please check this, as it is one of the most common errors found in copyediting.

Informal References

Letters, memos, similar non-published materials, and references to databases are **not** included within Literature Cited. They should be referenced as fully as possible in parentheses within the text, e.g.: (Memo from AWRRA Executive Vice President K.D. Reid to JAWRA Editor K.J. Lanfear, September 15, 2005, Subject: Wasn't that great water?)

Data sources should be specified with enough detail to lead a qualified researcher to an appropriate starting point in the database. Dates of access may be given approximately or as a range to help resolve any future updates in the source. Some examples of common databases are given below. You may designate a "default" source for groups of data, as in the second example:

(U.S. Geological Survey, National Water Information System. Accessed December 8, 2012, <http://waterdata.usgs.gov/nwis>.)

(U.S. Geological Survey, National Water Information System. Accessed June, 2011 - December, 2012, <http://waterdata.usgs.gov/nwis>. Unless otherwise noted all streamflow data in this paper are from this source.)

(U.S. Environmental Protection Agency, 2012. STORET. Accessed December, 2012, <http://www.epa.gov/store/>.)

Unpublished data citations should follow this example:
(Moe Smoe, USEPA, 1999, unpublished data)

Unpublished report citations should follow this example:
(Acme Consulting, "Design Solutions for the Main Street Water Works", unpublished report for MegaWater, Inc., 2010.)

Legal citations should include sufficient information for the reader to identify the appropriate statute or case: (33 U.S.C. §403)

Computer Code

Except for short fragments, computer code should not be included within the text of a manuscript. Computer code may be submitted as separate files to accompany the online version of the paper, so users can download the code as a text file (see [Supplemental Material](#) below).

Cover Letter

A cover letter briefly summarizing the new contributions the manuscript makes to water resources literature is required and should be submitted in the space provided in ScholarOne Manuscripts. Also use the cover letter to advise us if you are submitting a multi-part paper, a manuscript for consideration of inclusion in a featured collection, etc., or if there are any other special conditions we should consider. If not necessary for the cover letter to repeat information already provided in ScholarOne Manuscripts. If you have color figures, provide printing instructions here; this information should be included in every iteration of the cover letter. (Example: "Please print all color graphics in B&W and show in color online.") Costs associated with color pages are detailed in the [Publication Charges](#) section.

Data Sets

All data sets obtained from outside sources must be identified within the text. We strongly recommend all original data sets used in the paper be placed into an archive available to the public. The concern with data availability is any qualified researcher should be able to obtain your data to reproduce or check your results. JAWRA allows authors to include data sets with the online version of their paper. See [Supplemental Material](#) below for details.

See the examples under Citations within Text/Informal References for how to reference a data set.

Dates and Times

The preferred date format is either, Month Day, Year (*e.g.* August 6, 2012), or the ISO Standard 8601 form, YYYY-MM-DD (*e.g.*, 2012-08-06). Alternative forms, such as 6 August 2012, 6Aug12, may be used in figures if graphics programs or space requirements do not allow the preferred form. Use of non-ISO numerical forms, such as 6/8/12 or 8/6/12, is discouraged because of confusion between American and European notations.

The preferred time format is 24-hour notation, or 20:15, not 8:15 PM. All times are assumed to be local, unless indicated as UTC (Coordinated Universal Time) or a specific time zone. We recommend a complete date and time follow the ISO Standard 8601 form.

Equations

Equations should be numbered consecutively with a numeral in parentheses to the right of the equation [aligned to the right margin]. Prepare equations in the simplest form possible and define all variables, including their units. If the length of an equation is likely to exceed one column width (3 ½ inches), provide the equation on multiple lines, breaking it where the break will cause the least ambiguity.

$$E = mc^2 \quad (1)$$

where E is energy, m is mass, and c is the speed of light.

Figures

Figures are required to be submitted as separate files before final acceptance of the manuscript. Authors may embed figures in the manuscript text during the review process. When submitting separate figure files for initial review, it is best to include the figure numbers and captions within the file to aid the reviewers.

Figures should be numbered consecutively and include a brief title followed by an optional description. To assist those who may not be able to clearly see the figure, the title/description should explain the main point of the figure. Examples: "FIGURE 1. Photograph showing bank erosion with severe undercutting on Mud Creek." or "FIGURE 2. Graph of Costs showing how cost increases exponentially with size."

A figure will appear in the text as soon as possible after it is first mentioned, unless a specific place is indicated by note, "[INSERT FIGURE 1 HERE]."

Figures should clarify a point or document some condition, and should add to the text, not duplicate it. The concepts of Edward Tufte's "The Visual Display of Quantitative Information" (ISBN 0961392142, http://www.edwardtufte.com/tufte/books_vdq1) are highly recommended, particularly those of minimizing ink and avoiding "chartjunk."

The University of Oregon, Data Graphics Research Program (<http://geography.uoregon.edu/datagraphics/>) has developed attractive color schemes which show well in black-and-white printing and will be easily viewable by readers with impaired color vision. The common red-yellow-green "stoplight" pattern, for example, is almost incomprehensible when rendered in black-and-white.

There are three preferred formats for digital artwork submission: Encapsulated PostScript (EPS), Portable Document Format (PDF), and Tagged Image Format (TIFF). We suggest line art be saved as EPS files. Alternatively, these may be saved as PDF files at 600 dots per inch (dpi) or better at final size. Tone art, or photographic images, should be saved as TIFF files with a resolution of 300 dpi at final size. For combination figures, or artwork containing both photographs and labeling, we recommend saving figures as EPS files, or as PDF files with a resolution of 600 dpi or better at final size. More detailed information on the submission of electronic artwork can be found at <http://authorservices.wiley.com/bauthor/illustration.asp>.

IMPORTANT: To verify the image you are providing is of adequate resolution, perform a visual inspection by zooming-in to 300%, if the image becomes blurry or pixelated, adjust the resolution. When adjusting the resolution in Photoshop, Illustrator, etc., the "resample image" box MUST be un-checked in the dialog box (figure editing programs automatically have the "resample image" box checked - it needs to be un-checked in order for the resolution to actually increase).

Footnotes

Footnotes are not used except for the author information; include all explanations within the text.

Format

Manuscripts should be formatted as follows:

File Type = MS Word
Paper size = 8.5x11
Font = standard [such as Times New Roman or Arial]
Font size = 12 point
Line spacing = double
Margins = 1 inch

Section headings [LEVEL I] are in all caps and are centered. Sub-headings [LEVEL II] are left justified and italicized. Sub-sub-headings [LEVEL III] are indented, bold, and punctuated by a period. Sub-sub-headings [LEVEL IV] are indented, underlined, and punctuated by a period. Sections are not numbered.

Key Terms

At least four (4) key terms should be provided as an aid to information retrieval and selecting reviewers. Three or more of these terms must be selected from the JAWRA list of key terms (<http://www.awra.org/jawra/keyterms.html>). This list is available online during the submittal process in ScholarOne Manuscripts. In addition to selecting key terms in the online system, the Key Terms should be listed on the manuscript directly following the Abstract. The preferred limit for key terms is 210 characters including spaces.

Literature Cited (Formal References)

Proper citations are critical as a matter of professional courtesy and because search engines such as Google Scholar recognize them and infer linkages. Cite references to published literature by author(s) and date, as in the examples provided below. Do not use a numbering system. **Each entry in Literature Cited must have at least one corresponding reference in the text. If you delete or insert a text reference during revision, be sure to update the Literature Cited section as well.**

References to an unpublished work should not be listed under Literature Cited unless it has been fully approved for publication. Please see the "Citations within Text" section for a description of what qualifies for Literature Cited.

The basic form for names is: First author: Surname, followed by initials. Each subsequent author: Initials followed by surname.

Publications by the same author(s) shall be ordered oldest to newest.

Book Please give the ISBN if known. You can often find this on amazon.com.	Fritts, H.C., 1976. Tree Rings and Climate. Academic Press, London, United Kingdom, ISBN-13: 978-1930665392
Book chapter, or paper in a Proceedings	Rickert, D.A., W.G. Hines, and S.W. McKenzie, 1975. Implications of Dissolved Oxygen in the Willamette River, Oregon. In: (Editor). <i>American Water Resources Association</i> , Middelburg, Virginia, pp. 70-84.
Journal article Please pay particular attention to how the journal prefers to abbreviate its name, and how it identifies a particular article. Include the digital object identifier (DOI) whenever possible.	Robbins, Jesse Lance and Lynne Y. Lewis, 2008. Demolish It and They Will Come: Estimating the Economic Impacts of Restoring a Recreational Fishery. <i>Journal of the American Water Resources Association</i> (JAWRA) 44(6):1488-1499. DOI: 10.1111/j.1752-1688.2008.00253.x
Thesis or Dissertation	Cosgrove, D.M., 2001. Response Functions for the Conjunctive Management of Water in the Eastern Snake River Plain, Idaho. Ph.D. Dissertation, University of Idaho, Moscow, Idaho.
USGS Report Each USGS report is uniquely identified by its series and number. Many USGS reports now are stored online in the USGS Publications Warehouse (http://pubs.er.usgs.gov/), and should be cited with the URL found in the Publications Warehouse. Please note USGS databases are treated as informal references.	Lantear, K.J., 2005. A Near-optimum Procedure for Selecting Stations in a Streamgaging Network. U.S. Geological Survey Scientific Investigations Report 2005-5001, 14p. http://pubs.er.usgs.gov/usgspubs/sir/sir20055001 .

Tip! Correcting citations is, by far, the biggest source of questions in copyediting. The most common errors are: (1) Different dates or name spellings between the text and the Literature Cited section; and (2) Citations missing volume, number, pages, etc.

Online Report Please use the most persistent URL available.	CalFed Bay-Delta Program Ecosystem Restoration Plan, Strategic Plan for Ecosystem Restoration. http://www.calfed.water.ca.gov/ecosystem_rest.htm .
Web Page	(Other than online reports, web pages should not be included in Literature Cited because they are subject to change or updating and should be treated as an Informal Reference .)
Wikipedia	(We do not consider Wikipedia to be an authoritative source to be included in Literature Cited. Please treat Wikipedia as an Informal Reference)

References

(See [Literature Cited](#) or [Citations within Text](#))

Style Guide

You may see our detailed instructions to copyeditors in the JAWRA Style Guide (<http://www.awra.org/jawra/JAWRAStyleGuide.doc>).

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All submissions are processed through **ScholarOne Manuscripts** (<https://mc.manuscriptcentral.com/jawra>). Please note ScholarOne Manuscripts has a total file size limit of 100 Mb for manuscript submissions.

Supporting Information (Supplemental Material)

If there is supplemental material that will be available online but not with the print version of the paper, include a *Supporting Information* section directly before the Acknowledgments and Literature Cited and after any Appendices. There should be one sentence as provided below. The descriptive text should be kept very short.

“Additional supporting information may be found in the online version of this article: <provide a very brief description of the supplemental material>.”

Visit <http://authorserver.wiley.com/bauthor/supplinfo.asp> to access the Wiley-Blackwell guidelines for the submission of Supporting Information.

Tables

Tables may either be included at the end of the manuscript file or uploaded as separate Excel files before final acceptance of the manuscript. Authors may embed tables within the manuscript text during the review process. When submitting separate table files for initial review, it is best to include the table numbers and titles within the file to aid the reviewers.

Tables should be used to replace text, not duplicate it. They should be numbered consecutively and include a brief but descriptive title; the title may be followed by up to several lines of explanation. Use a minimum amount of horizontal or vertical lines to separate rows and columns. A table will appear in the text as soon as possible after it is first mentioned unless a specific place is indicated by note, “[INSERT TABLE 2 HERE].” When submitting a table in its final form for publication, it must be editable [i.e. either as a Word table or an Excel file]; embedded images are not acceptable.

Text

Text should be written so it will be of interest to readers in the wide variety of disciplines represented by AWRAs membership. The manuscript may be written in the first or third person. Excessive use of bulleted or numbered text is discouraged. Rare is the manuscript that cannot be shortened!

If assistance is needed with English translation, our publisher, Wiley-Blackwell, provides various services to help prepare manuscripts for submission at <http://wileyeditingservices.com/en/>. Authors must make their own arrangements to use any service and are responsible for all costs. Authors are not required to use these services and are free to find other providers.

Title

Titles are limited to 130 characters including spaces and should succinctly reflect the contents of the article.

Units

For units of measurement, System International (SI) units are required, as defined by the National Institute of Standards and Technology (<http://physics.nist.gov/cuu/Units/introduction.html>). Other units may be given only when they derive from source materials, as in, "The ordinance allowed the diversion of 1,000 acre-ft (1.23 Mm³) of water," and should include the SI equivalent in parentheses. In rare cases, the editor-in-chief will authorize use of non-standard units for policy subjects to make them more understandable to their main audience.

The preferred unit for large volumes of water is cubic meters, m³, prefixed as needed by million (Mm³) or billion (Gm³). There is no direct metric equivalent for acre-feet, such as hectare-centimeters; rather, one should use cubic meters.

The preferred abbreviation for liter is an upper-case "L". Logically, then, one should use "mg/L" and "µg/L" for milligrams per liter and micrograms per liter, respectively. However, "mg/l" and "µg/l" are common (though older) representations in water literature and cause no confusion. Authors may choose either usage, but must be consistent.

Word Conventions

The following are two words when used as a noun, and hyphenated when used as an adjective:

base flow	flow path	storm flow
bed load	flow rate	time scale
decision maker	ground watershed	water body
field work	policy maker	

The following are treated as one word:

bankfull	groundwater	stormwater
database	hillslope	streambank
dataset	instream	streamflow
floodplain	overpredict	underpredict
freshwater	snowmelt	wastewater

FOREST COVER, IMPERVIOUS-SURFACE AREA, AND
THE MITIGATION OF STORMWATER IMPACTS¹Derek B. Booth, David Hartley, and Rhett Jackson²

consequences of urban development, but even in this jurisdiction the path toward aquatic resource protection has been marked by well-intentioned but ultimately mistaken approaches, compromises with other agency goals that thwart complete success, and imperfect implementation of adopted policies and plans. This experience demonstrates the difficulty of meeting urban and suburban water-quality and aquatic-resource protection goals in the face of competing social priorities and variable political resolve on environmental issues that require sustained, long-term strategies to achieve progress.

King County provides a useful case study for resource managers in urbanizing regions across the country. It covers about 5,600 square kilometers with a population of 1.7 million people, the twelfth most populous county in the United States. Its western boundary is Puget Sound and its eastern boundary is the crest of the Cascade Range. It contains all or most of three major river basins, two large natural lakes, and numerous small rivers and streams (Figure 1). The streams and lakes support all species of anadromous Pacific salmon and resident trout. Land uses include urban, industrial, suburban, agriculture, rural, commercial timber production, and National Forest. Cities include Seattle, Bellevue, Renton, and Redmond; population growth has been explosive over the last 20 years.

Recent Endangered Species Act (ESA) listings of Puget Sound chinook and bull trout, and the potential for more salmonid listings, have brought new scrutiny to all aspects of watershed protection and urbanization-mitigation efforts in King County and

ABSTRACT: For 20 years, King County, Washington, has implemented progressively more demanding structural and nonstructural strategies in an attempt to protect aquatic resources and declining salmon populations from the cumulative effects of urbanization. This history holds lessons for planners, engineers, and resource managers throughout other urbanizing regions. Detention ponds, even with increasingly restrictive designs, have still proven inadequate to prevent channel erosion. Costly structural retrofits of urbanized watersheds can mitigate certain problems, such as flooding or erosion, but cannot restore the predevelopment flow regime or habitat conditions. Widespread conversion of forest to pasture or grass in rural areas, generally unregulated by most jurisdictions, degrades aquatic systems even when watershed imperviousness remains low. Preservation of aquatic resources in developing areas will require integrated mitigation, which must include impervious-surface limits, forest-retention policies, stormwater detention, riparian-buffer maintenance, and protection of wetlands and unstable slopes. New management goals are needed for those watersheds whose existing development precludes significant ecosystem recovery; the same goals cannot be achieved in both developed and undeveloped watersheds.

(KEY TERMS: urbanization; stormwater; BMP; land use planning; watershed management; urban water management.)

INTRODUCTION

For decades, watershed urbanization has been known to harm aquatic systems. Although the problem has been long articulated, solutions have been elusive because of the complexity of the problem, the evolution of still-imperfect analytical tools, and socioeconomic forces with different and often incompatible interests. King County, Washington, has been a recognized leader in the effort to analyze and to reduce the

¹Paper No. 01124 of the *Journal of the American Water Resources Association*. Discussions are open until February 1, 2003.

²Respectively, Research Associate Professor, Center for Urban Water Resources Management, Department of Civil and Environmental Engineering, University of Washington, Seattle, Washington 98195-2700; Senior Hydrologist, King County Water and Land Resources Division, 201 South Jackson Street, Suite 600, Seattle, Washington 98104-3855; and Associate Professor, Daniel B. Warnell School of Forest Resources, University of Georgia, Athens, Georgia 30602-2152 (E-Mail/Booth: dbooth@u.washington.edu).

Correlations between watershed development and aquatic-system conditions have been investigated for over two decades. Klein (1979) published the first such study, where he reported a rapid decline in biotic diversity where watershed imperviousness exceeded 10 percent. Steedman (1988) believed that his data showed the consequences of both impervious cover and forest cover on instream biological conditions. Later studies, mainly unpublished but covering a

EMPIRICAL RELATIONSHIPS BETWEEN WATERSHED CONDITIONS AND STREAM CONDITIONS

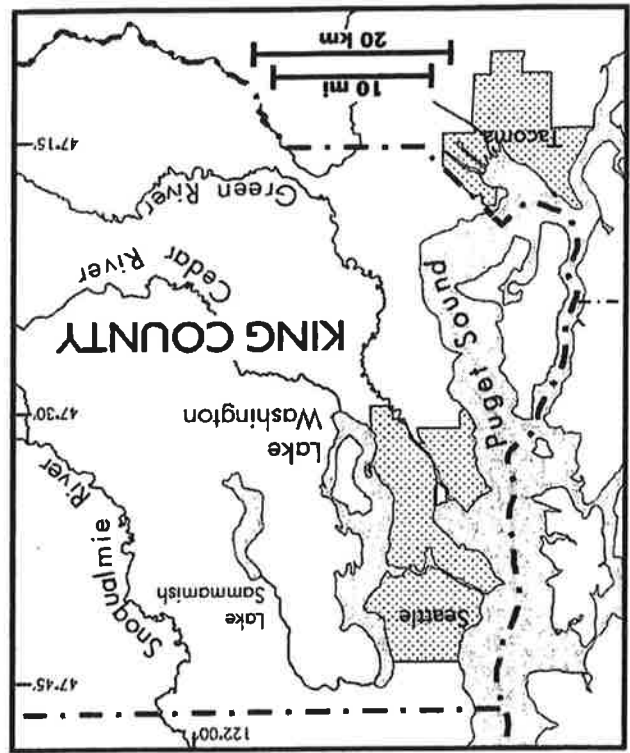
Modifications of the land surface during urbanization produce changes in both the magnitude and the type of runoff processes. In the Pacific Northwest, the fundamental hydrologic effect of urban development is the loss of water storage in the soil column. This may occur because the soil is compacted or stripped during the course of development, or because impervious surfaces convert what was once subsurface runoff to Horton overland flow. In either situation, the precipitation over a small watershed reaches the stream channel with a typical delay of just a few minutes, instead of what had been a lag of hours, days, or even weeks. The result is a dramatic change in flow patterns in the downstream channel, with the largest flood peaks doubled or more and more frequent storm discharges increased by as much as ten-fold (Figure 2).

This paper focuses on changes in runoff and stream flow because they are ubiquitous in urbanizing basins and cause often dramatic changes in flooding, erosion, sediment transport, and ultimately channel morphology. Hydrologic change also influences the whole range of environmental features that affect aquatic biota — flow regime, aquatic habitat structure, water quality, biotic interactions, and food sources (Karr, 1991). Yet runoff and stream-flow regime, while important, are by no means the only drivers of aquatic health. Consequently, there should be no illusion that just addressing hydrologic conditions will necessarily "fix" or "protect" an urban stream.

Many years ago, problems were easily solved, they would have been so the past decade. We have no panaceas, however. If the present strategy based on King County's experience of (4) to recommend an integrated stormwater management rather than building structural BMPs, to minimize the downstream consequences of urbanization, and evaluate the basis for regulating watershed land use, analysis and mitigation of urban development; (3) to

Our purpose here is to diagnose what has gone wrong with these structural and regulatory approaches, so that others can think more creatively and productively about potentially more successful strategies, and to suggest preliminary solutions of our own. Our approach has four elements: (1) to review some empirical relationships between watershed conditions and stream conditions; (2) to review the history of surface-water management in King County as it relates to the

Figure 1. Location of King County, Washington. Most urban and suburban development here is occurring in the region between Puget Sound and the Snoqualmie River.



the surrounding region. Such increased attention is forcing improved articulation of the goals, the means, and the justification for mitigating the effects of urban development. It also has highlighted the failure of most stormwater mitigation efforts, not only in the Pacific Northwest but also across the country, where well-publicized successes are overshadowed by progressive degradation of once-healthy stream systems. This degradation has continued, despite sincere but ineffectual efforts via structural "Best Management Practices" (BMPs), particularly detention ponds, buffer regulations, and rural zoning.

large number of methods and researchers, were compiled by Schueler (1994). Since that time, additional work on this subject has been done by a variety of Pacific Northwest researchers, including May (1996), Booth and Jackson (1997), and Morley (2000) (Figures 3, 4, and 5).

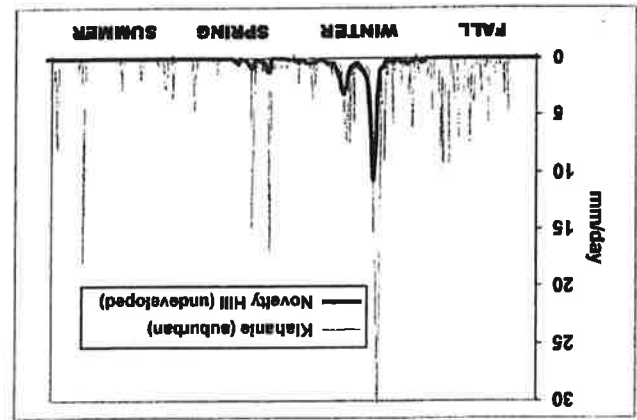


Figure 2. One year's measured discharges for a suburban (Klahanie) and an undeveloped (Novelty Hill) watershed, normalized by basin area (data from Burges *et al.*, 1998).

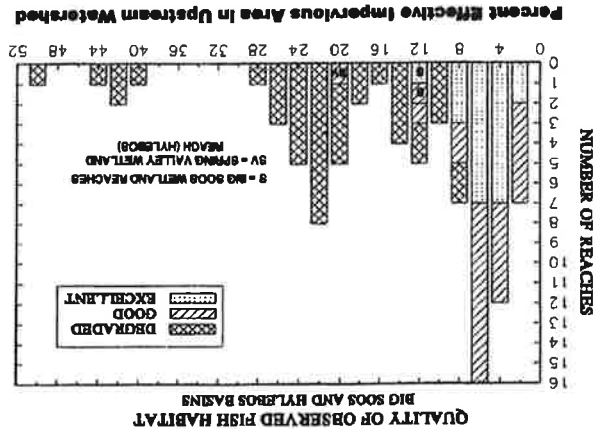


Figure 3. Observed fish habitat quality as a function of effective impervious area in the contributing watershed, based on more than 80 individually inventoried channel segments in south King County (from Booth and Jackson, 1997; data from King County, 1990a, 1990c). "EXCELLENT" reaches show little or no habitat degradation; "GOOD" reaches show some damage to habitat but still maintain good biological function; and "DEGRADED" reaches contain aquatic habitat that has been clearly and extensively damaged, typically from bank erosion, channel incision, and sedimentation.

FISH HABITAT AND RIPARIAN CONDITIONS

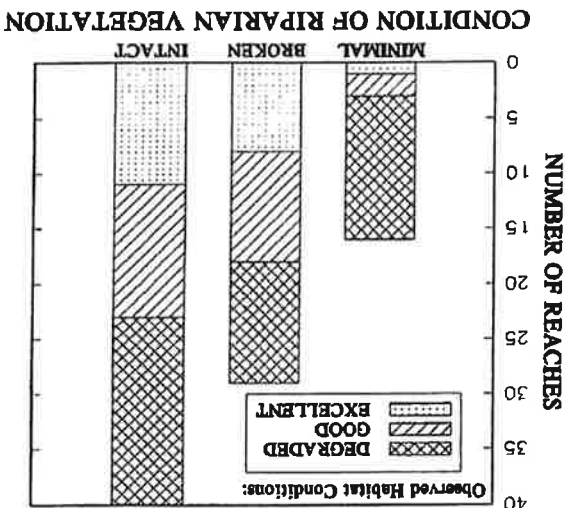


Figure 4. Relationship between riparian vegetation and instream conditions, using the same sites and criteria as for Figure 3. A relatively intact riparian corridor is clearly necessary, but not sufficient, for high quality habitat.

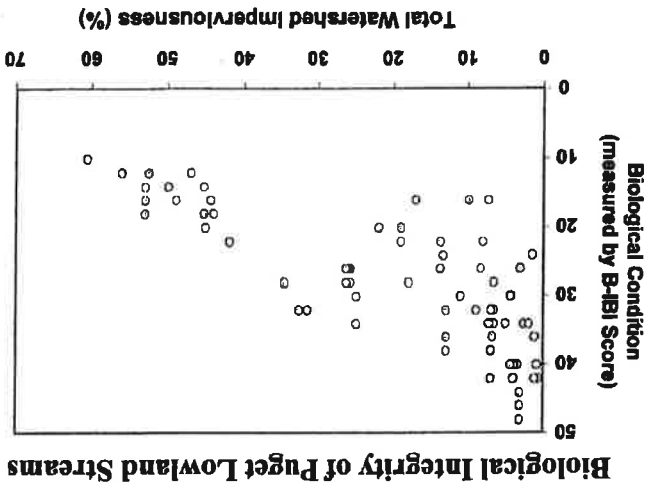


Figure 5. Compilation of biological data on Puget Lowland watersheds, reported by Kleindl (1995), May (1996), and Morley (2000). The pattern of progressive decline with increasing imperviousness in the upstream watershed is evident only in the upper bound of the data; significant degradation can occur at any level of human disturbance (at least as measured by impervious cover).

discharge," below which sediment transport in the

receiving channel is presumed not to occur and so post-development flow durations can be increased without concern. This choice can be made by site-specific, but rather expensive, analysis based on stream hydraulics and sediment size (Buttington and Montgomery, 1997) or can be applied as a "generic" standard based on predevelopment discharges.

The first efforts at runoff mitigation sought to reduce peak flows, reflecting the traditional focus on flood reduction. Well over 100 years ago, the fundamental predicting equation of runoff used in these early mitigation efforts was developed (Mullany, 1851). The Rational Runoff Formula related the runoff rate to the simple product of the rate of rainfall, the basin area, and the *runoff coefficient*, a number equal to the fraction of the rain falling on a basin that presumably contributes to the flood peak. This formula was used by King County in the Pacific Northwest region's first surface-water design manual (King County, 1979). Unfortunately, it tended to overestimate predevelopment flows, which led to the construction of grossly undersized detention ponds that had little or no benefit in preventing downstream flooding (Booth and Jackson, 1997). Ponds designed with the Rational method had such high release rates that they rarely backed up water during storms.

The subsequent edition of King County's design manual (King County, 1990b) substituted the Soil Conservation Service's (SCS) curve-number methodology for the Rational equation. This was a dramatic, and costly, change on several fronts: (1) it nominally allowed for closer matching of watershed conditions by the modeling; (2) it generally yielded a requirement for larger detention ponds; and (3) it necessitated significant additional training in hydrologic-modeling skills for local engineers doing drainage-design work. Although it was an improvement over the Rational method, the SCS method still contained fundamental flaws that resulted in detention ponds that did not meet desired performance criteria. In this method, runoff from individual 24-hour design storm events was used to test and adjust pond design, and ponds were assumed to be empty at the beginning of a storm. Yet this is rarely the case during (commonly sequential) wet-season storms. SCS curve-number hydrology also commonly overestimated predevelopment flows, a tendency sometimes exacerbated by design engineers who manipulated the time of concentration and curve number to reduce the size of the pond on their client's behalf. Furthermore, the SCS methodology was still a "peak standard" that ignored any problems associated with increased flow durations. Continuous flow modeling revealed that the ponds designed with the SCS method would not achieve the stated protection goals (Barker *et al.*,

These data have several overall implications:

- "Imperviousness," although an imperfect measure of human influence, is clearly associated with stream-system decline. A wide range of stream conditions, however, can be associated with any given level of imperviousness, particularly at lower levels of development.
- "Thresholds of effect," articulated in some of the earlier literature (e.g., Klein, 1979; Booth and Reimelt, 1993) exist largely as a function of measurement (im)precision, not an intrinsic characteristic of the system being measured. Crude evaluation tools require that large changes accrue before they can be detected, but lower levels of development may still have consequences that can be revealed by other, more sensitive methods. In particular, biological indicators (e.g., Figure 5) demonstrate a continuum of effects, not a threshold response, resulting from human disturbance.

MITIGATION OF NEW DEVELOPMENT: THE KING COUNTY, WASHINGTON, EXPERIENCE

Hydrologic Mitigation Through Structural Means

As a consequence of the urban-induced runoff changes that cause flooding, erosion, and habitat damage, jurisdictions have long required some degree of stormwater mitigation for new developments. The most common approach has been to reduce flows through the use of detention ponds, which are intended to capture and detain stormwater runoff from developed areas. These ponds can be designed to either of two levels of performance, depending on the desired balance between achieving downstream protection and the cost of providing that protection. A *peak standard*, the classic (and least costly) goal of detention facilities, seeks to maintain post-development peak discharges at their predevelopment levels. Even if this goal is successfully achieved the aggregate duration that such flows occupy the channel must increase because the overall volume of runoff is greater.

In contrast, a *duration standard* seeks to maintain the post-development duration of a wide range of peak discharges at predevelopment levels. Yet unless runoff is infiltrated, the total volume of runoff must still increase in the post-development condition. Thus durations cannot be matched for all discharges because this "excess" water must also be released. Duration standards seek to avoid potential disruption to the downstream channels by choosing a "threshold

of any other effects (either physical or biological) of extended low-flow durations.

Point Discharge. These analyses ignore the consequences of converting what was once spatially distributed subsurface runoff into a point discharge at a surface-water outfall, because there are no analytic tools to assess those consequences. Field examples, however, demonstrate that the consequences of point discharges can include locally severe erosion and disruption of riparian vegetation and instream habitat (e.g., Booth, 1990).

Ground Water. Any analysis of flow durations will not address changes to ground water recharge or discharge, because no constructed detention ponds, even the largest designed under this standard, can delay wintertime rainfall sufficiently for it to become summertime runoff. Yet exactly this magnitude of delay does occur under predevelopment conditions, because far more of the precipitation is stored as ground water.

Individual Storm Hydrographs. The flow-duration design, by definition, assures that the fractional time of a given discharge's exceedence remains unchanged over an extended climate record (nearly 50 years, in the case of King County), but there is no attempt (or ability) to construct detention ponds that match durations for specific storm events or even an entire storm season. Thus the *aggregate* flow-duration spectrum may be unchanged, but the timing and brevity of any single storm hydrograph may be quite different from the undisturbed condition.

Des Moines Creek, a small urban system, demonstrates these difficulties in accomplishing the hydrologic restoration in an urban stream. Since the 1940s, widespread conversion of forests and pastures has occurred to accommodate Seattle-Tacoma International Airport and other commercial and residential uses. Within the Creek's 14 km² watershed, total impervious area was raised approximately 50 percent, wetlands were filled, some of the stream headwaters were piped, and storm runoff to the remaining natural drainage system was discharged with minimal detention. As a result, increased magnitude, frequency, and duration of peak flows raised flow velocities, destabilized the stream channel, eroded spawning gravels, degraded fish habitat, and caused flooding of park facilities near the mouth of the stream. Additionally, summer base flows and water quality declined in the Creek. By the 1990s, the public and local government resolved to develop and implement a basin plan to solve these problems and restore the creek. However,

1991). Although convincing the land developers and their engineers of these problems has proven difficult, the county's 1998 version of the Design Manual did incorporate a regionally calibrated continuous flow model for designing stormwater facilities (King County, 1998; Jackson *et al.*, 2001). The practice of seeking duration control for new developments was introduced through King County's Basin Planning Program in the late 1980s. The goal of this standard is to match pre- and post-development flow durations for all discharges above a chosen threshold. Hydrologic analysis using a more advanced (albeit still imperfect) hydrologic model, HSPF (Hydrologic Simulation Program-Fortran) (Bicknell *et al.*, 1997), could predict the detention needed to achieve this goal (Jackson *et al.*, 2001). From the outset, this approach has been controversial for several reasons:

1. The required ponds are larger, often dramatically so, than required by previous design methods.
 2. The method requires a threshold discharge, below which durations will increase dramatically, but how to choose that discharge is not immediately obvious or without dispute.
 3. The analytic tool (HSPF) used to establish the standard is not as widely used as the Rational or SCS method, and so appeared less transparently justifiable to many practitioners. For example, as part of the Bear Creek Basin Plan (King County, 1990d) a surrogate approach that involved an intentional "misapplication" of the SCS method was proposed to achieve the same objective without requiring the ability to run HSPF.
 4. Few (and initially, no) ponds were actually constructed under this standard, and so empirical evidence for their effectiveness (or lack thereof) is sparse.
- Despite these shortcomings, these standards reflected the best understanding of hydrologic conditions in urban streams and so have been part of Basin Plan-recommended detention standards in King County since the early 1990s [and incorporated into more recent updates (1998) of the design manual]. Yet several issues remain unanswered, even with the current status of implementation:

"Threshold" Discharge. As noted above, there is a presumed threshold discharge below which there are "no effects" of flow-duration increase. This may be defensible, at best, with regard to sediment transport in gravel-bed streams. A true "threshold of no effects" is certainly not correct for sediment transport in sand-bedded streams (uncommon but not unknown in the region); some bed material moves at almost any discharge. In addition, there has been no evaluation

(King County, 1994) used the "threshold" criteria for stream-channel stability suggested by Figure 7 to evaluate the likely consequences of model predictions of post-development runoff conditions. These initial assessments, presuming basinwide application of the mitigation tools that were then "accepted practice" (i.e., exemption of rural-zoned developments from detention requirements, and SCS-based hydrologic designs for the rest), produced results that were inconsistent with the goals of the basin plan – to protect aquatic habitat and to resolve existing and potential future flooding problems. The empirical hydrologic criterion for channel instability ($Q_{2-urban} > Q_{10-for}$) was exceeded pervasively throughout the watershed under all future development scenarios.

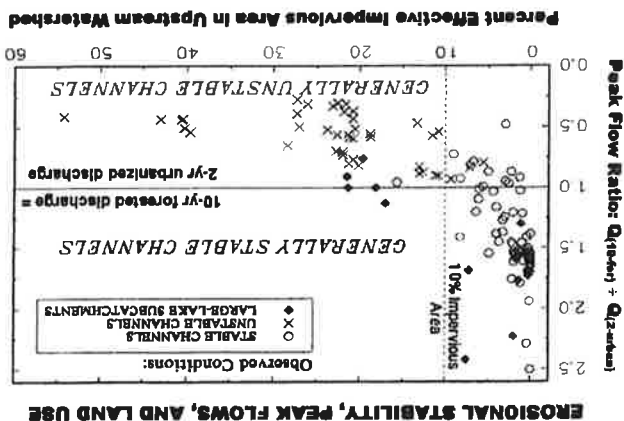


Figure 7. Observed stable ("O") and unstable ("X") channels, plotted by percent effective imperVIOUS area (ELA) in the upstream watershed (horizontal scale) and ratio of modeled ten-year forested and two-year urbanized (i.e., current) discharges (vertical scale). "Stable channels" consistently meet the apparent thresholds of either (ELA ≤ 10 percent) or ($Q_{2-urban} \leq Q_{10-for}$), except for the few catchments containing large lakes (from Booth and Jackson, 1997).

As a consequence of these results, the Issaquah plan evaluated a variety of alternative rural development scenarios (Appendix G of King County, 1994). The analyses found that with 65 percent forest retention in a nominal five-acre zone (i.e., 20 houses per 100 acres, but clustered on the nonforested 35 percent of the land area), the criterion of keeping the two-year developed discharge below the ten-year forested discharge could be just met on glacial till soils (the most common type in King County). Greater amounts of cleared land resulted in two-year developed discharges that exceeded ten-year forested discharges, even though the amount of effective imperVIOUS area was well under 10 percent. The analysis noted that

percent of the landscape, with significant effects on landowners were inclined to "manage" the streams on their property. This might include riparian forest clearing, removing woody debris from the channel, and hardening stream banks to protect property. Rural zoning, in and of itself, does not necessarily protect aquatic resources.

The failure of simple land-use controls (i.e., zoning) to protect aquatic resources led to the need for objective criterion for "acceptable" hydrologic performance that might protect stream channels. This "stream-protection" criterion was taken directly from previous empirical assessments of channel stability and bank erosion, which in turn had been generated from observations made in the late 1980s and early 1990s while working on the past and current basin plans (and subsequently published in Booth and Jackson, 1997) (Figure 7). These data showed that two linked thresholds apparently marked a transition of the visible channel form from "stable" to "unstable" (see also Henshaw and Booth, 2000). One was the measure discussed previously – where effective imperVIOUS area in the contributing watershed had exceeded 10 percent, readily observed physical degradation of the channel was ubiquitous. The other was based on hydrologic analyses of those same contributing watersheds – almost without exception, the same observed transition from "stable" to "unstable" channels was marked by the equality of the ten-year forested (i.e., developed) discharge (Q_{10-for}) and the two-year

current discharge ($Q_{2-urban}$). There was, and is, no theoretical basis for these particular outcomes – they are simply empirical results, remarkable in their consistency across western Washington and quite possibly recognizable in other regions of the country as well (Schueler, 1994).

Although these data compose a robust set of observations, spanning a wide variety of streams with remarkably consistent results, they also carry two limitations. First, the absence of observed instability does not guarantee an absence of *any* effects. The second limitation is more vexing: these data were collected on watersheds without much, if any, effective stormwater detention. Had larger and more effective ponds been present, would the observed impacts been reduced? Recent investigations by Maxted and Shaver (1999) suggest virtually no improvement in stream conditions from typical detention ponds. Even if they could be designed to be hydrologically effective, ponds cannot avoid other key problems such as disruption of storm flow patterns, increased winter storm volumes, or declining base flows. Notwithstanding these limitations (i.e., potentially unrecognized degradation and potentially effective detention ponds), the Issaquah Creek Basin Plan

The thresholds implied by these data are simply the "wrong" type on which to base genuine resource protection. They do not separate a condition of "no impact" from that of "some impact," instead, they separate the condition of "some impact" from that of "gross and easily perceived impact." Hydrologically and biologically, there are no truly negligible amounts of clearing or watershed imperviousness (Morley, 2000), even though our perception of, and our tolerance for, many of the associated changes in downstream channels appear to undergo a relatively abrupt transition. Almost every increment of cleared land, and of constructed pavement, is likely to result in some degree of resource degradation or loss. The decision of how much is "acceptable" is thus as much a social decision as a hydrologic one.

These conditions also emphasize the need to develop new approaches to mitigate the consequences of watershed urbanization on streams. If urban and suburban watersheds cannot hydrologically mimic forested ones, no matter how large their associated detention ponds, then reducing the coverage of effective impervious area or the extent of urban development itself is an inescapable consequence of the present desire to "restore" urban watersheds. If those necessary reductions run counter to other, even more pressing social goals, most notably those to accommodate additional population growth, then our goals for aquatic resource conservation need to be modified in urban areas. By not acknowledging the need for such tradeoffs, opportunities to discover the most rational and effective strategy for protecting the condition of once-natural aquatic systems continue to be lost.

CONCLUSIONS AND MANAGEMENT IMPLICATIONS

Land development that eliminates hydrologically mature forest cover and undisturbed soil can result in significant changes to urban stream flow regimes and, in turn, to the physical stability of stream channels. These changes are manifested in altered stream flow patterns with higher volumes of storm flow, leading to accelerated channel erosion and habitat simplification. Even with stormwater detention ponds, seasonal and stormflow patterns are substantially different from those to which native biota have adapted. These hydrologic changes cannot be completely mitigated with structural measures. Although factors other than hydrologic change (e.g., water chemistry, riparian buffers) can undoubtedly affect the magnitude of urban impacts, the breadth of the existing data suggest that improvements in these other factors can

Hydrological analyses suggest that maintaining forest cover is more important than limiting impervious-area percentages, at least at rural residential densities where zoning effectively limits the range of EIA between 2 and 6 percent of the gross development area. Absent clearing limitations, however, forest cover will range between 5 and about 85 percent. Consequently, even if both types of land cover control (i.e., forest retention and EIA limitation) are critical to protect stream conditions, current land-use practices suggest that mandating retention of forest cover is the more pressing regulatory need in rural areas. Degraded watersheds, with less than 10 percent EIA and less than 65 percent forest cover, are common ("cleared rural"); in contrast, we have found no watersheds with more than 10 percent EIA that have also retained at least 65 percent forest cover ("forested urban") (Figure 10).

CORRELATION OF FORESTED AND IMPERVIOUS AREAS KING COUNTY LOWLAND BASINS

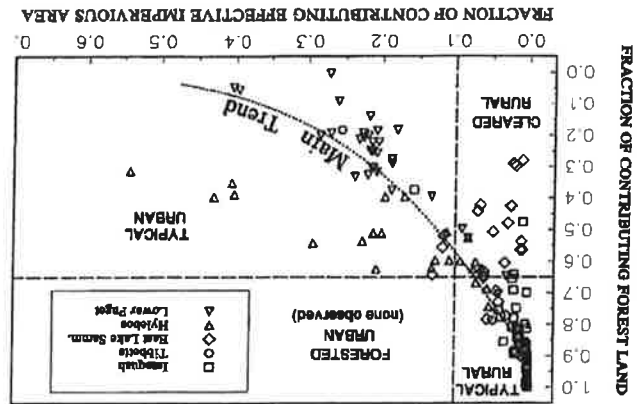


Figure 10. Land cover data from individual subcatchments within five King County watersheds, compiled from Basin Plan land-cover data (King County, 1990c, 1990e, 1991). At 65-percent forest retention, EIA \leq 10 percent in all cases, yet with EIA $>$ 10 percent, substantial clearing is still commonly observed.

The apparent correlations between stream stability and both impervious-area and forest-cover percentages present a quandary for watershed managers. On the one hand, these correlations point to a tangible, defensible criteria for achieving a specific management objective, namely "stable stream channels." On the other hand, this objective, however worthy, still allows the possibility of serious and significant aquatic-system degradation – and as development is allowed to approach these clearing and imperviousness criteria, degradation is virtually guaranteed.

the challenges faced by the technical and policy teams were formidable (Des Moines Creek Basin Committee, 1997). Any solution to existing problems also needed to accommodate additional future development within the watershed that would raise total impervious area from approximately 50 percent to 65 percent of the total drainage area and to have a cost acceptable to the participating jurisdictions.

Hydrologic modeling was used to evaluate feasible combinations of on-site detention ponds, regional flow bypasses, and regional detention ponds to reduce storm-flow energy in the creek. For \$6 million, covering a range of feasible options, very large reductions in flows and flow energy compared to 1990s conditions could be achieved. Yet none of these options could restore storm flows to pristine conditions. The preferred alternative combined peak control with on-site detention ponds, regional detention, and a preexisting pipeline to bypass peak stormwater flows. This alternative provides dramatic flow-duration improvement over current conditions (Figure 6a), but daily flows in the stream do not even begin to approximate pristine conditions, despite a capital cost of nearly \$5,000 per watershed hectare (almost \$2,000/acre) (Figure 6b).

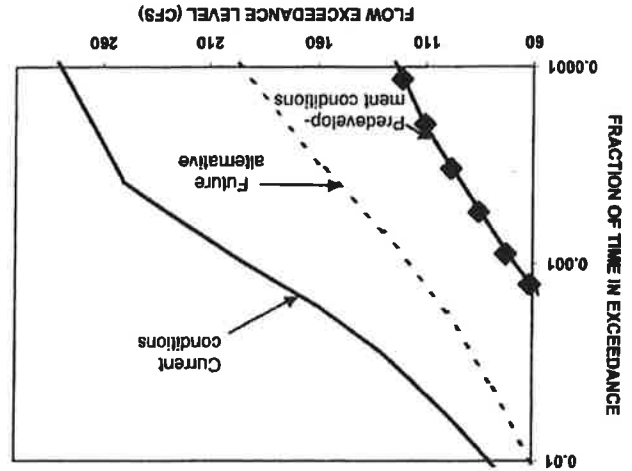


Figure 6a. HSPF-modeled flow-duration curve for Des Moines Creek, displaying dramatic improvement in future flow durations relative to current. Analysis assumes projected land-use changes and construction of proposed detention ponds and bypass pipeline (from Des Moines Basin Committee, 1997).

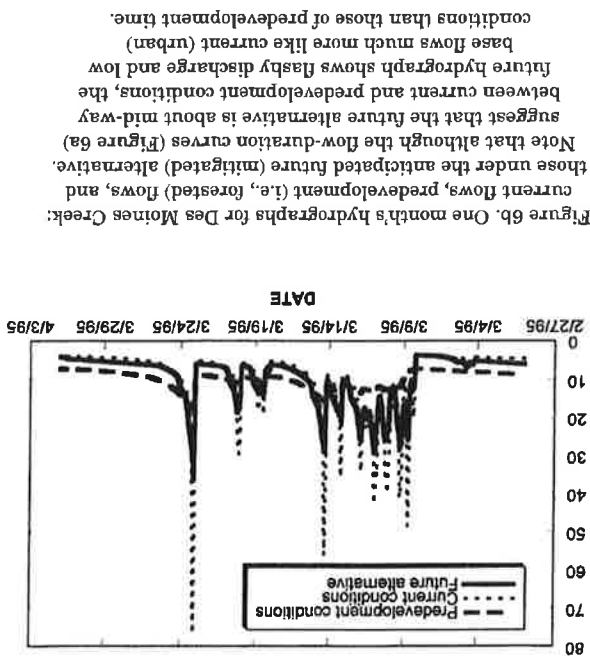


Figure 6b. One month's hydrographs for Des Moines Creek: those under the anticipated future (mitigated) alternative, current flows, preddevelopment (i.e., forested) flows, and base flows much more like current (urban) conditions than those of preddevelopment time.

Hydrologic Restoration Through Watershed Planning

Realizing that on-site drainage controls alone were insufficient to achieve the goals of either stormwater management or resource protection, King County initiated an interdisciplinary watershed planning program in the mid 1980s, with the goal of solving and preventing flooding, water-quality, and habitat problems within the rapidly-urbanizing western part of the county. This "basin planning process" involved a two step approach:

1. A detailed assessment of basin conditions that included inventories of point and nonpoint pollution sources, characterization of channel habitat and fish uses, identifying and characterizing flooding and channel erosion problems, and modeling stream flows under various development scenarios using HSPF.
2. Development of solutions that combined constructed projects, drainage and zoning regulations, and public education programs.

One finding of the early plans was that aquatic resources had been degraded by low-density rural development (e.g., one dwelling unit per five acres) (King County, 1990a, 1990d). Although this density of development generally did not create much imperviousness, the amount of forest clearing to create large lawns, pastures, or hobby farms could easily reach 60

that such damage was almost certainly occurring. More recently, biological data (e.g., Morley, 2000) have demonstrated the anticipated consequences at these lower levels of human disturbances.

Less empirical data have been collected on the direct correlation between forest cover and stream conditions than for watershed imperviousness and stream conditions. In general, the "evidence" has been based on the observed correlation of channel instability to the modeled hydrologic condition of $Q_{2-urban}$ greater than Q_{10-for} , coupled with hydrologic analyses that have explored the relationship between forest cover reduction and peak-flow increases. The first such analyses, for the Issaquah Creek Basin Plan, made a variety of assumptions about "typical" watershed characteristics in that basin and found that 65 percent forest cover with 4 percent effective impervious area closely approached the condition of $Q_{2-urban} = Q_{10-for}$. Using more generalized model parameters and a range of effective impervious areas typical of rural areas, 65 percent forest cover is a plausible, but by no means definitive, value for meeting the presumed "stability criterion" of $Q_{2-urban}$ less than Q_{10-for} in rural-zoned watersheds on moderately (5 to 15 percent) sloping till soils (Figure 9). The analysis summarized in Figure 9 assumes no on-site detention facilities are present because they are often technical-ly (and politically) infeasible in low-density rural areas. Other soils (particularly more infiltrative ones) may yield much greater hydrologic response with even lesser amounts of clearing.

CHANNEL STABILITY AND FOREST RETENTION IN RURAL-ZONED BASINS

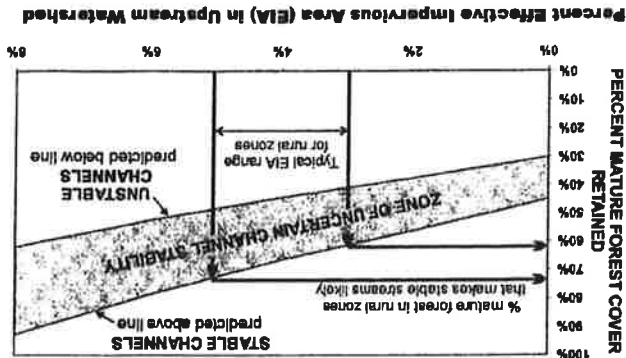
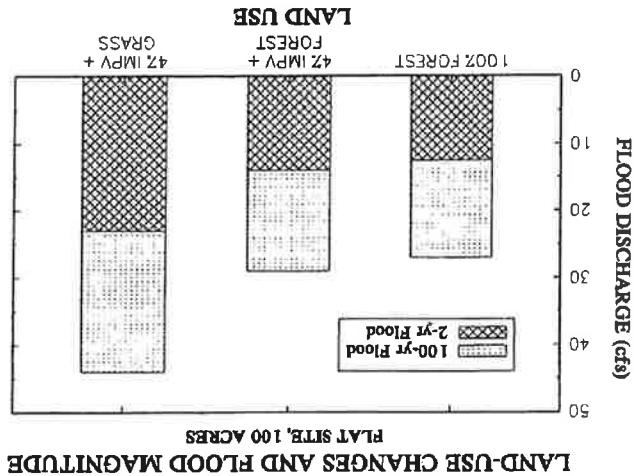


Figure 9. Conditions of forest cover and impervious area in an HSPF-modeled watershed, with moderate slopes and till soils, relative to the channel-stability criterion $Q_{2-urban} = Q_{10-for}$. The range of effective impervious areas (EIA = 3 to 5 percent) reflects variation in rural land cover conditions; the "zone of uncertain channel stability" reflects uncertainty in the hydrologic parameters.

THE BASIS FOR REGULATING IMPERVIOUS AREA AND CLEARING

Figure 8. HSPF-modeled increases in two-year and 100-year discharges that result from forest conversion on moderately sloping till soils. Four percent (effective) imperviousness, a typical value for five-acre residential densities, shows particularly significant hydrologic changes only when accompanied by forest clearing.



development on highly pervious glacial outwash soils (the other, but much less common, soil type used for hydrologic modeling) failed the criterion at virtually any level of forest retention, because so little runoff occurs there naturally that almost any amount of imperviousness produces proportionally large peak-flow increases. The analysis also found that in rural areas, forest clearing and conversion to suburban vegetation (mainly lawns) was far more significant in determining peak discharge increases than the small increases in impervious area typical of low-density development (Figure 8). As a result, forest retention has been adopted as an alternative to detention for rural plats and short plats in the latest update to the Stormwater Design Manual.

In the realm of physical channel conditions, the data collected from field observations have consistent-ly shown remarkably clear trends in aquatic-system degradation. In this region, approximately 10 percent effective impervious area in a watershed typically yields demonstrable degradation, some aspects of which are surely irreversible. Although early observations were not sensitive enough to show significant degradation at even lower levels of urban development, the basin plans of the early 1990s recognized

• clustered developments that protect half or more of the forest cover, preferentially in headwater areas and around streams and wetlands to maintain intact riparian buffers;

• a maximum of 20 percent total impervious area, and substantially less effective impervious area, through the widespread reinfiltration of stormwater (Konrad and Burges, 2001);

• on-site detention, realistically designed to control flow durations (not just peaks);

• riparian buffer and wetland protection zones that minimize road and utility crossings as well as overall clearing; and

• no construction on steep or unstable slopes.

Past experience suggests that each of these factors are important. However, we still lack empirical data on the response of aquatic resources to such "well-designed" developments. Therefore, these recommendations are based only on extrapolations, model results, and judgment; they are tentative at best. Where development has already occurred, these conditions clearly cannot be met and different management objectives are inescapable: many, perhaps all, streams in already-urban areas cannot be truly protected or restored, and a significant degree of probably irreversible stream degradation is unavoidable in these settings.

We can recognize why streams nominally protected under past drainage regulations have experienced severe degradation, we can articulate the kinds of development styles and strategies that should minimize new examples of degraded streams, and we can recognize the role of watershed land-cover regulation in minimizing the consequences of new development, but we cannot find any basis to expect that the full range of hydrological and ecological conditions can be replaced in a now-degraded urban channel. The key tasks facing watershed managers, and the public that can support or impede their efforts, are therefore: (1) to identify those watersheds where existing low urbanization and associated high-quality stream conditions that warrant the kinds of development conditions that may protect much of the existing quality of these systems; and (2) to develop a new set of management goals for those watersheds whose surrounding development precludes significant ecosystem recovery. Following the same strategy in *all* watersheds, developed and undeveloped alike, simply makes no sense.

never fully mitigate the hydrologic consequences of rural land uses, the magnitude of observed forest-cover losses affects watershed flow regime as much as, or more than, associated increases in impervious area.

The goals of stormwater detention have become progressively more ambitious as the consequences of urban-altered flow regime have become better recognized and understood. Even the largest detention ponds, however, are limited in their ability to mitigate all aspects of hydrologic change. Twenty years of empirical data display a good correlation between changes in flow regime that correspond to loss of about one-third of the forest cover in a "typical" western Washington watershed. A similar degree of observed damage also correlates to a level of watershed effective imperviousness (EIA) of about ten percent.

Field observations and hydrologic modeling showed that the watershed plans of the early- to mid-1990s could only hope to meet plan-stipulated goals for resource protection by imposing clearing and impervious-area restrictions. The most commonly chosen thresholds, maximum 10 percent EIA and minimum 65 percent forest cover, mark an observed transition in the downstream channels from minimally to severely degraded stream conditions. At lower levels of human disturbance, aquatic-system damage may range from slight to severe but is nearly everywhere recognizable with appropriate monitoring tools. Not every watershed responds equally to a given level of human disturbance, but some degree of measurable resource degradation can be seen at virtually any level of urban development. The apparent "threshold" of observed stream-channel stability has no correlative in measured biological conditions; for any given watershed, additional development tends to produce these imperious and forest-retention percentages have proven to be attractive regulatory thresholds and are being advocated by the National Marine Fisheries Service as necessary conditions for mandated protection of rural areas under the Endangered Species Act.

Development that minimizes the damage to aquatic resources cannot rely on structural BMPs, because there is no evidence that they can mitigate any but the most egregious consequences of urbanization. Instead, control of watershed land-cover changes, including limits to both imperviousness and clearing, must be incorporated (see also Horner and May, 1999). We anticipate needing all of the following elements to maintain the possibility of effective protection:

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From: David Beugli <wgihoga@gmail.com>
Sent: Wednesday, August 2, 2017 4:00 PM
To: Tim Crose; Lisa Ayers; Lisa Olsen; Frank Wolfe
Subject: Comments on Proposed Amendment to Rural Lands Zoning
Attachments: PC Rural Amend Comments.pdf

Tim,
Please find the attached comments from the Willapa-Grays Harbor Oyster Growers Association addressing our concerns with the proposed zoning changes to allow Small Scale Recreation and Tourist uses in areas zoned as Rural in Pacific County.
Thank you,
David

--
David Beugli
Project Coordinator
Willapa-Grays Harbor Oyster Growers Association
2907 Pioneer Rd.
Long Beach, WA 98631
tel. (360) 642-3755
wgihoga@gmail.com

Willapa-Grays Harbor Oyster Growers Association

P.O. Box 3 Ocean Park, WA 98640

August 2, 2017

Tim Crose
Pacific County Department of
Community Development
7013 Sandridge Road
Long Beach, WA 98631

Re: Change in Pacific County Shoreline Master Plan that would expand permissible
uses in shoreline areas.

As you are aware the shellfish industry is the largest private employer in Pacific County and for well over 100 years shellfish growers have been a solid economic contributor to the County. The shellfish industry supports a large portion of the County's population by creating year round family wage jobs and with increasing consumer demand are poised to continue to provide this stable economic benefit for future generations. For our continued success the single most important requirement is the continued protection of water quality. For this reason, the members of the Willapa-Grays Harbor Oyster Growers Association are strongly opposed to changes to the Shoreline Master Plan (SMP) recently proposed by Leadbetter Farms, known formally as Leadbetter Resorts, which would allow the expansion of permissible uses in rural shoreline areas. This could threaten the continued protection of clean waters in Willapa Bay.

The SMP has recently gone through a multiyear process involving many stakeholders, all of whom worked hard to consider the many needs of our communities in Pacific County. Shellfish growers and many others provided thousands of hours of voluntary time to assure all bases were covered in the SMP. The issue of shoreline uses were discussed at length during the many committee meetings, hearings, etc. as the update was completed. There was a large effort to encourage participation in the open forum by all citizens, and yet at no time did Leadbetter Farms choose to participate. During

the SMP update deliberations there were many compromises made by the large number of stakeholders. Those representing shellfish accepted troubling language in the SMP that in our view results in more shoreline development regarding increased recreational and other development pressure. Now we have a proposal that appears to open up the rural shorelines to a broad array of activities that Best Available Science demonstrates act to degrade water quality. We see no Best Available Science used to justify any change to the SMP. We request that the County not alter the recently revised SMP.

Sincerely,

Ken Wiegardt
WGHOGA President
CC:
Lisa Ayers
Lisa Olsen
Frank Wolfe

Tim,

From: northernmystercor@gmail.com
Sent: Thursday, August 3, 2017 10:26 AM
To: Tim Crose
Cc: Frank Woffe; Lisa Ayers; Lisa Olsen; Ken Wiegardt; Warren Cowell; Dale Beasley; Mike Nordin

Subject: Re: Proposed amendment to the newly adopted SMP

We understand that since the Planning Commission last took public testimony on the matter of Leadbetter Farm's request to amend the SMP that the issue of the water tower has been removed from that specific request. Our understanding is that they are now seeking to have what is essentially a "Spot Zone" to allow what was permitted as a water tower to allow that structure to be used as a residence. We do not support any alteration that would allow the use of that tower as a temporarily or any other type residence. Making this allowance sets a precedent that is not aligned with the intent of the SMP, or other zoning ordinance to provide for the protection of our shorelines.

In general, we believe it's imperative to understand that opening up shorelines in Pacific County to what is essentially more commercial shoreline development acts as a direct threat to sustaining water quality. In the instance of the request being made by Leadbetter Farm's, the threat to water quality is real and specifically tied to Willapa Bay. The property in question drains entirely either into Willapa Bay in the Stackpole Harbor area, into the sensitive wetland areas adjoining Willapa Bay, or into our shallow aquifer. Many shellfish growers rely on the Stackpole Harbor area for their best harvest ground. This historic shellfish area must not be put at risk by allowing growth management policy to be altered so as to increase the risk of chronically degrading water quality. As an industry, shellfish growers have watched as areas such as Puget Sound have taken a path in growth management policy that has caused serious water quality degradation. It's of great concern to us that the proponent has used a county such as Jefferson as a model for how our growth management policy might be developed when not only that county, but many others around Puget Sound have seen thousands of acres of shellfish growing area closed to due to chronic water quality degradation. It's clearly demonstrated by Best Available Science that increasing shoreline development is what has caused Puget Sound and most other shellfish growing areas across the nation to suffer chronic water quality degradation. The increased protections now being implemented by counties such as Jefferson are not going to solve the problem, and adopting the types of policy used by them will only cause Willapa Bay to suffer the same disastrous effects to water quality. We've watched for years as the Washington Department of Health and other agencies celebrate the opening back up of areas in Puget Sound to shellfish harvesting, only to have those same areas close again to pollution caused by shoreline development. The worst thing Pacific County could do is to adopt similar policy to that developed by those counties who are now paying huge cost associated with the chronic collapse of water quality. Over the past many years a large array of stakeholders have dedicated endless effort to assuring Willapa Bay and its tributary areas are protected by solid growth management policy that does not follow the same path as other areas where their local policies have acted to eliminate shellfish growing areas due pollution from upland development. Most recently the SMP and CAO updates have again seen this type dedicated effort by stakeholders to deliver a document with long term water quality protection as its core value.

We suggested to the County about 15 years ago that it request that Leadbetter Farms deliver a long range development plan describing its future plans for it's property. The natural and other lands surrounding that property are sensitive in nature and will be impacted by activities on the property in question. If this plan had been produced, it could have been used to inform the SMP and CAO updates. As it was, there was no

participation by Leadbetter Farms in the multi year SMP update. We'd again suggest that Leadbetter Farms be asked to produce a long term plan for the property in question that is aligned with the sensitive nature of the overall Leadbetter areas, and adjoining waters of Willapa Bay and the nearshore ocean.

Sincerely,

Brian and Marilyn Sheldon

On Thu, Jun 1, 2017 at 3:54 PM, Tim Crose <tcrose@co.pacific.wa.us> wrote:

Got it – thanks Brian.

From: northernovysterco@gmail.com [mailto:northernovysterco@gmail.com]
Sent: Thursday, June 1, 2017 3:30 PM

To: Tim Crose <tcrose@co.pacific.wa.us>

Cc: Ken Wiegardt <oysterman73@hotmail.com>; Warren Cowell <tblom@wwest.net>; Mike Nordin

<plutroll@willapabay.org>; Frank Wolfe <fwolfe@co.pacific.wa.us>; Lisa Ayers <layers@co.pacific.wa.us>
Subject: Proposed amendment to the newly adopted SMP

Hi Tim,

I regret that I won't be able to attend the Planning Commission hearing tonight in regard to the request from Leadbetter Farms to alter the SMP so as to allow increased recreational development, and specifically so as to essentially expand the allowed use of the tower they constructed to store water.

We just completed a multi year process to revise and adopt the SMP. One of the primary goals of the process was to consider public access. The group worked on this and developed an approach that allowed minor development specifically tied to supporting this access, but that did not encourage private commercial shoreline development. There were many opportunities for anyone to participate in SMP discussions, and yet this new issues was never brought forward to be worked within the SMP update process so it could be thoroughly considered by the many participating stakeholders.

I do not support altering the SMP to allow this expanded use in the shoreline areas under SMP. The goal was to allow minor development tied specifically to public access points. This proposal greatly broadens the intent of the SMP process so as to allow private recreational development when that was not the overall intent of the SMP process. I suggest that the County require a long term plan to be delivered that defines the ultimate goals of Leadbetter Farms so it can evaluate how these plans fit within the current goals of SMA.

Thanks,

Brian Sheldon

Nichol Gray

S

From: Tim Crose
Sent: Thursday, August 3, 2017 3:50 PM
To: Nichol Gray
Subject: FW: Comments RE: Pacific County Amendment to Zoning Ordinance No. 178, Leadbetter Farms Application of April 20, 2017
Attachments: MyLetter178A.pdf

Tim Crose | Director
Pacific County Department of Community Development
PO Box 68 | 1216 W Robert Bush Dr. | South Bend, WA 98586
P: 360.875.9356 | F: 360.875.9304 | C: 360-589-3374
website | county ordinances | facebook

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From: Madeline Anne Kalbach [mailto:kalbach@ucalgary.ca]
Sent: Sunday, July 23, 2017 4:39 PM
To: Tim Crose <tcrosc@co.pacific.wa.us>
Cc: Madeline Anne Kalbach <kalbach@ucalgary.ca>
Subject: Comments RE: Pacific County Amendment to Zoning Ordinance No.178, Leadbetter Farms Application of April 20, 2017

Dear Mr. Crose,
Please find attached my comments regarding the Pacific County Amendment to Zoning Ordinance No.178, Leadbetter Farms Application of April 20, 2017.
Regards,
Madeline A. Kalbach, Ph.D

Dr. Madeline Kalbach
Professor Emeritus
Department of Sociology
University of Calgary
Calgary, AB
T2N 1N4

July 23, 2017

Mr. Tim Crose
Director
Pacific County Department of Community Development
P.O. Box 68
South Bend, WA 98586

REGARDING:

Pacific County Amendment to Zoning Ordinance No. 178
Leadbetter Farms April 20, 2017 application

Dear Mr. Crose/Planning Commissioners/County Commissioners:

As a concerned individual I am submitting this letter in opposition to the above proposed amendment to rural lands (RR/RL) designations.

Pacific County and the Long Beach Peninsula already have Land Use Ordinances and a conditional use process.

The provisions of this proposed ordinance allow for commercial development in the rural areas of Pacific County to the detriment of the environment and to the detriment of the community. It appears this Zoning amendment is totally focused on one landowner without any consideration to the overall negative impact on the citizens and of Pacific County.

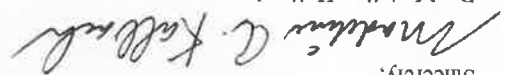
I am deeply concerned as to the effects on the environment, the diverse habitats, wildlife and people as a result of allowing inappropriate development in rural areas of the County that would result if this amendment is approved.

Allowing drones, outdoor shooting ranges, off road vehicles, in areas previously not allowed, will adversely affect the wildlife as well as destroy sensitive habitats. Not to mention the noise issues. It appears more wetland habitat will be destroyed, and much bigger densities will be allowed then is appropriate for the rural land designations. Fire danger is a critical safety issue to the entire community which is being downplayed and minimized with some of the provisions being proposed.

Huge towers are not appropriate in Pacific County, and in twisting the provisions to simply fit the needs of a Landowner who apparently built a "water tower" which is not really a water tower, to now allow it to be used as a "25 bedroom" hotel is absolutely outrageous.

I am asking that this proposal be rejected as not appropriate for Pacific County and its citizens. This will allow for the destruction of rural lands that visitors and community members alike love and treasure.

Sincerely,



Dr. Madeline Kalbach,
400C SW 17th
PO Box, 1257
Long Beach, WA, 98631
Professor Emeritus
Department of Sociology
University of Calgary
Calgary, AB
T2N 1N4
kalbach@ucalgary.ca
Cell: 403-512-9133; H: 403-241-9254

Nichol Gray

From: Nadia Gardner <ngardner@columbiaandtrust.org>
Sent: Thursday, August 3, 2017 3:54 PM
To: Nichol Gray; Tim Crose; Alex Russell
Subject: Ord 178 Letter
Attachments: PacificColtr2017-08-03.pdf

Mr. Crose,

Please find attached public comment regarding this evening's meeting and proposed Ord 178 amendments. Our apologies for its lateness, our signer was on vacation until today. If it could be distributed to the Commissioners, we would appreciate it. We are unable to attend the meeting.

Nadia Gardner | Conservation Manager

Columbia Land Trust

818 Commercial St. #309 | Astoria, OR 97103
(503) 298-9785 cell | ngardner@columbiaandtrust.org
Also in Vancouver | Portland | Hood River
www.columbiaandtrust.org





Dan Roix, Conservation Director

Sincerely,

If you have any questions, please contact me at (360) 213-1211 or droix@columbialandtrust.org. Thank you.

Since 1990, Columbia Land Trust has worked to conserve signature landscapes and vital habitats together with the communities of the Columbia River region in both Oregon and Washington. In Pacific County, we have protected sensitive wildlife areas, including at Leadbetter Point, Loomis Lake, and the Chinook River. These conservation areas are surrounded by land zoned Rural Residential and Rural Lands. In the long term, the proposed zoning ordinance changes could negatively impact water quality and quantity, and wildlife habitat. These areas are reliant on well water and septic systems. They are largely undeveloped now, extending the wildlife habitat, recreational and scenic benefits of the County's public and private protected lands.

The proposed changes would allow for significant commercial development on thousands of rural acres. Commercial development can often take more resources than residential usage. We ask that you consider whether such a wide sweeping change is necessary, or if individual applications are more appropriate and allow more public input on specific applications.

Dear Planning Commissioners:

Pacific County
Planning Commission
PO Box 68
South Bend, WA 98586

August 3, 2017



CONTACT
TEL. 360.696.0131
FAX 360.696.1847

HEADQUARTERS
550 OFFICERS' BOY
VANCOUVER WA 98661

✓
07/29/2017

Mr. Tom Crose, Director

Pacific County Department of Community Development

P.O. Box 68

South Bend, WA 98586

Re: Pacific County Amendment to Zoning Ordinance No. 178

Dear Mr. Crose:

As a Pacific County resident and taxpayer, I am utterly opposed to amending our very sensible zoning ordinances for commercial exploitation.

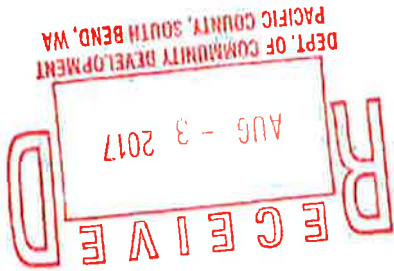
Isn't the applicant for the zoning ordinance change the same outfit that deceptively used an application for a "water tower" to construct a multi-story guest house? "When you sup with the devil, use a long spoon".

Sincerely,

Robert R. Zimmerman

1402 251st Place, Ocean Park, WA 98640

Phone 360-665-3400

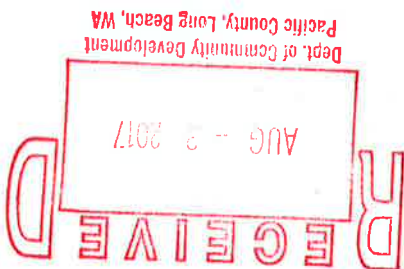




United States Department of the Interior
FISH AND WILDLIFE SERVICE

Willapa National Wildlife Refuge Complex
3888 State Route 101
Ilwaco, Washington 98624
Phone: 360-484-3482 Fax: 360-484-3109

8:00pm



August 3, 2017

Mr. Tim Crose, Director
Pacific County Department of Community Development
P.O. Box 68
South Bend, WA 98586

Dear Mr. Crose, Pacific County Planning Commissioners, and County Commissioners:

Thank you for the opportunity to comment on the Pacific County Planning Commission's (Commission) proposed changes to zoning ordinance number 178 that would greatly expand commercial uses of Rural Residential (RR) and Rural Lands (RL). We appreciate the interest of the Commission in increasing public access to these areas. As a Federal land manager we also accommodate public access; however we believe the proposed amendment to the rural lands (RR/RL) designations may have a detrimental effect on trust resources managed by the U.S. Fish and Wildlife Service (USFWS). The proposed amendment could allow activities that impact sensitive resources on adjacent public lands, including those zoned by the County as Conservation District (CD).

The proposed amendment would allow small scale recreation and tourist activities including, but not limited to: (a) Aerial recreational activities such as drone use, glider and parachute events; (b) Animal preserves and game farms; (c) Equestrian centers; (d) Commercial fishing ponds; (e) Cultural festivals; (f) Miniature golf, not to exceed a gross use area of one acre; (g) Model hobby parks and sites; (h) Outdoor recreational equipment rental and/or guide services; (i) Private hunting or fishing camps; (j) Public display gardens; (k) Recreational, cultural or religious conference center/retreat facilities.

The application materials accompanying this amendment appear to inadequately and/or incorrectly address questions on the SEPA checklist completed by Leadbetter Farms LLC. We urge the Commission to review the checklist again and consider impacts to critical areas, including wetlands, streams, and other wildlife habitat, including federally listed species and designated critical habitat; as well as impacts to ground water, runoff, recreation, land and shoreline use, historic and cultural preservation, transportation, public services, etc. prior to adopting this zoning amendment.

Proper siting of these activities is crucial to minimize or avoid impacts to sensitive resources. The following issues could have substantial impacts. Allowing aerial recreational activities, outdoor shooting ranges, and off-road vehicles in areas where they are currently not allowed could adversely affect wildlife as well as degrade sensitive habitats.

(1) Aerial recreational activities: such as unmanned aerial systems (UAS), better known as drones, glider use, and parachute events would be illegal along the adjacent beaches where federally-listed wildlife regularly occur. Aerial vehicles and recreational activities that involve the use of airborne equipment (e.g., kites, kiteboards, wind surfers, etc.) are known to disturb wildlife, including nesting and roosting birds, and are not permitted on state-managed beaches north of Oysterville Road.

(2) If improperly sited, outdoor shooting ranges, off-road vehicle parks, and commercial tourist facilities likewise would degrade the local environment, including disturbing people and wildlife. Twenty acres or less would not provide an adequate buffer to eliminate the noise disturbance from such activities.

Furthermore, the state land classification for the Seashore Conservation Area at Leadbetter Point State Park is Resource Recreation Area. That classification places an emphasis on snowy plover recovery. State Parks Resource Recreation Areas provide opportunities for low- and medium-intensity recreational experiences. Off-trail equestrian and/or bicycle use may be appropriate in selected areas if approved by the commission. Basketball, tennis, organized group sporting activities requiring formal sports fields, commercial-sized piers and docks, standard and utility camping, indoor accommodations and centers, developed swimming areas, and other similarly intense uses do not meet classification standards for Resource Recreation Areas. The proposed changes to the rural land designation seem contrary to the management objectives on adjacent public properties.

Finally, Section 21, subsection Z (4g) of the proposed amendment could allow for additional forms of access if the beach is considered a "state route." This change would increase the level of non-conforming activities that already occur under current conditions. For instance, we have observed recurring trespass violations in closed areas adjacent to the Leadbetter Farms, LLC property. This amendment could exacerbate these violations which could exacerbate negative impacts to listed species and designated critical habitat.

The USFWS would like to further discuss proposed changes and offer our assistance in developing zoning ordinances that enhance public access and protect wildlife and natural habitats. We appreciate the opportunity to comment and express our concerns regarding this proposal.

Sincerely,

Jackie Ferrier
Project Leader

Michael Parker
 Landscape Architect/Planner (Ret.)
 PO Box 65
 33511 Territory Rd.
 Oysterville, WA 98641
 360/665-5077
michaelparkeroysterville@yahoo.com

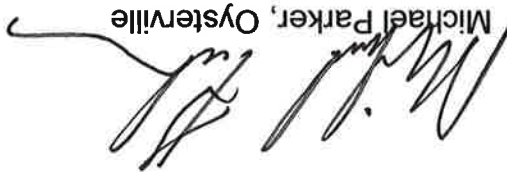
August 2, 2017

Pacific County Planning Commission
 PO Box 68
 South Bend, WA 98586

RE: Amendments to Ordinance No. 178; Pacific County Zoning Ordinance

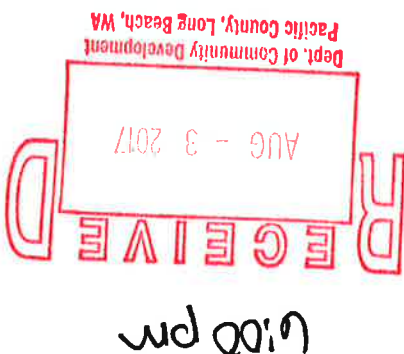
Dear Planning Commissioners:

You are legally and ethically charged to reject the Tillotson request for proposed amendments to Ordinance No. 178. The subject area is a pristine natural area legally protected by the ordinance based on scientific documentation and valid planning principles. It's inconceivable that any planning commission member will give serious consideration for approval of this request.


 Michael Parker, Oysterville

Michael Parker is a 1960 graduate of the University of Oregon with a degree in Landscape Architecture and City Planning. He provided professional services to the private and public sector regarding planning and environmental issues and projects. Extensive site and planning information was gathered for private corporations, public agencies, and environmental organizations

From 1960 to 1984 he maintained a private practice in Portland. After moving to Oysterville in 1986 he provided pro-bono services to Pacific County related to environmental protection efforts. He also provide extensive planning information to the State of Oregon for its wetlands and coastal study projects. Other assignments were completed at sites throughout the entire United States.



6:00pm
X

RECEIVED
AUG - 3 2017
Dept. of Community Development
Pacific County, Long Beach, WA

PACIFIC CONSERVATION DISTRICT
904 WEST ROBERT BUSH DRIVE
P.O. Box 336
SOUTH BEND, WA 98586
PHONE (360) 875-6735



August 1st, 2017,

Dear Pacific County Planning Commission Members,

The Pacific Conservation District (PCD) fully discourages your approval of proposed amendment to Ordinance No. 178, allowing Small-Scale Recreation and Tourist Uses in designated Rural areas of Pacific County, submitted by Leadbetter Farms, LLC, and Proposed amendment to Ordinance No. 178, Section 26 - Non-Conforming Uses and Structures, allowing residential occupancy of existing structures above 35 feet, submitted by Leadbetter Farms, LLC. PCD agrees with letters submitted by the Pacific County Marine Resources Committee, and Mr. Oman. Many members of the community work many hours on the Shoreline Master Plan, and if Mr. Tillotson wanted changes or consideration he should have spent the time to be at the table to discuss changes. The Shoreline Master Plan, along with many other efforts, provide room for growth in Pacific County without harming the beauty of the county, it's ecology, or its natural resource industries that define the county and are the lifeblood of the economy.

Although well intended, PCD has to disagree with PCEMA Director Scott McDougall's letter of support. Structures for tsunami evacuation (27 as recommended) could go through a separate process after being properly designed for specific purpose and limited to the needed number strategically placed, not a cart blanch change in development permission.

PCD wholly opposes these proposed changes.

Thank you for your consideration,

Mike Nordin

Pacific Conservation District Manager

360-208-4451