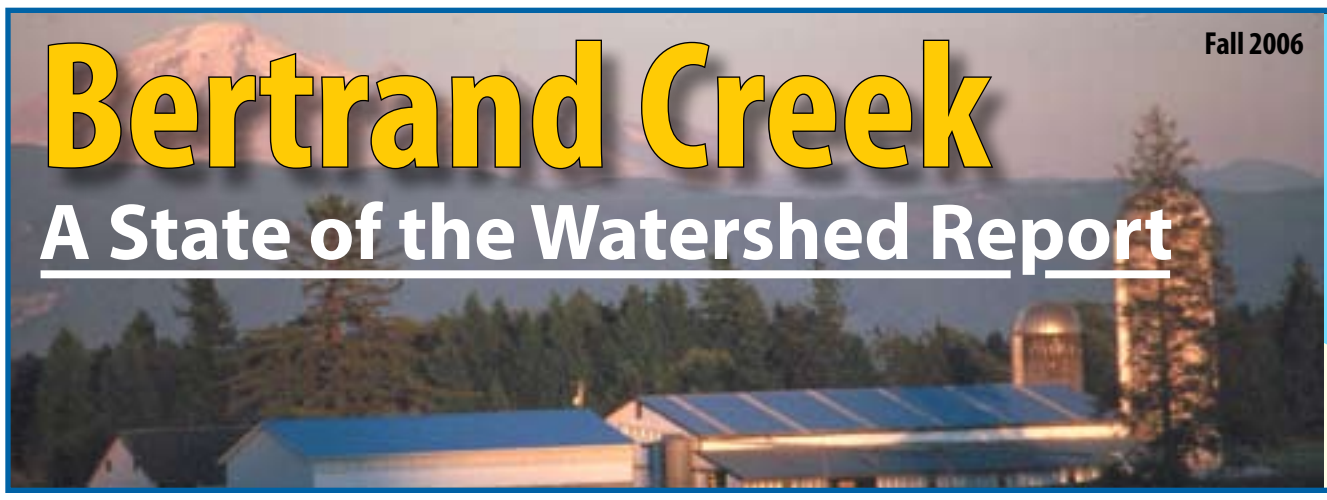
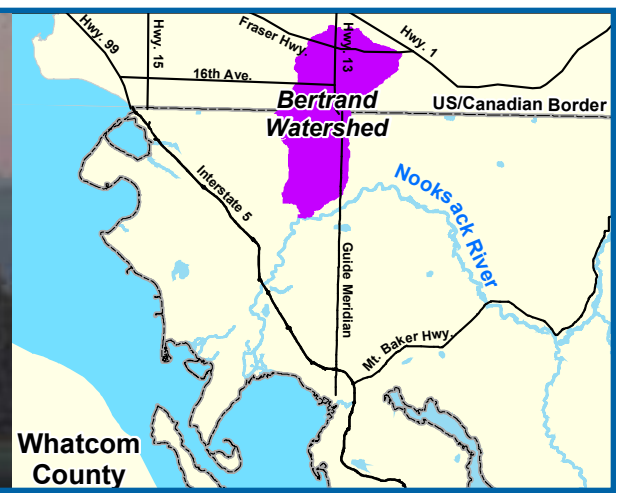


Bertrand Creek

A State of the Watershed Report

Fall 2006



This report will introduce you to watershed-based management activities we are conducting in and around Bertrand Creek. The report includes history of the area, key issues we face and suggested solutions to problems. Those of us living in this beautiful watershed must act cooperatively and effectively in order to ensure stewardship of the creek for future generations.

What is a Watershed?

The term "watershed" describes an area of land that drains down slope to the lowest point. Water moves either underground or on the surface and, in general, converges to a stream or river. McClellan Creek, Duffner Ditch, West Branch, and Francisco Creek are the major drainages converging into Bertrand Creek's main stem. The Bertrand Creek watershed, in turn, is part of the larger Nooksack River watershed, which ultimately drains to Bellingham Bay and Puget Sound.

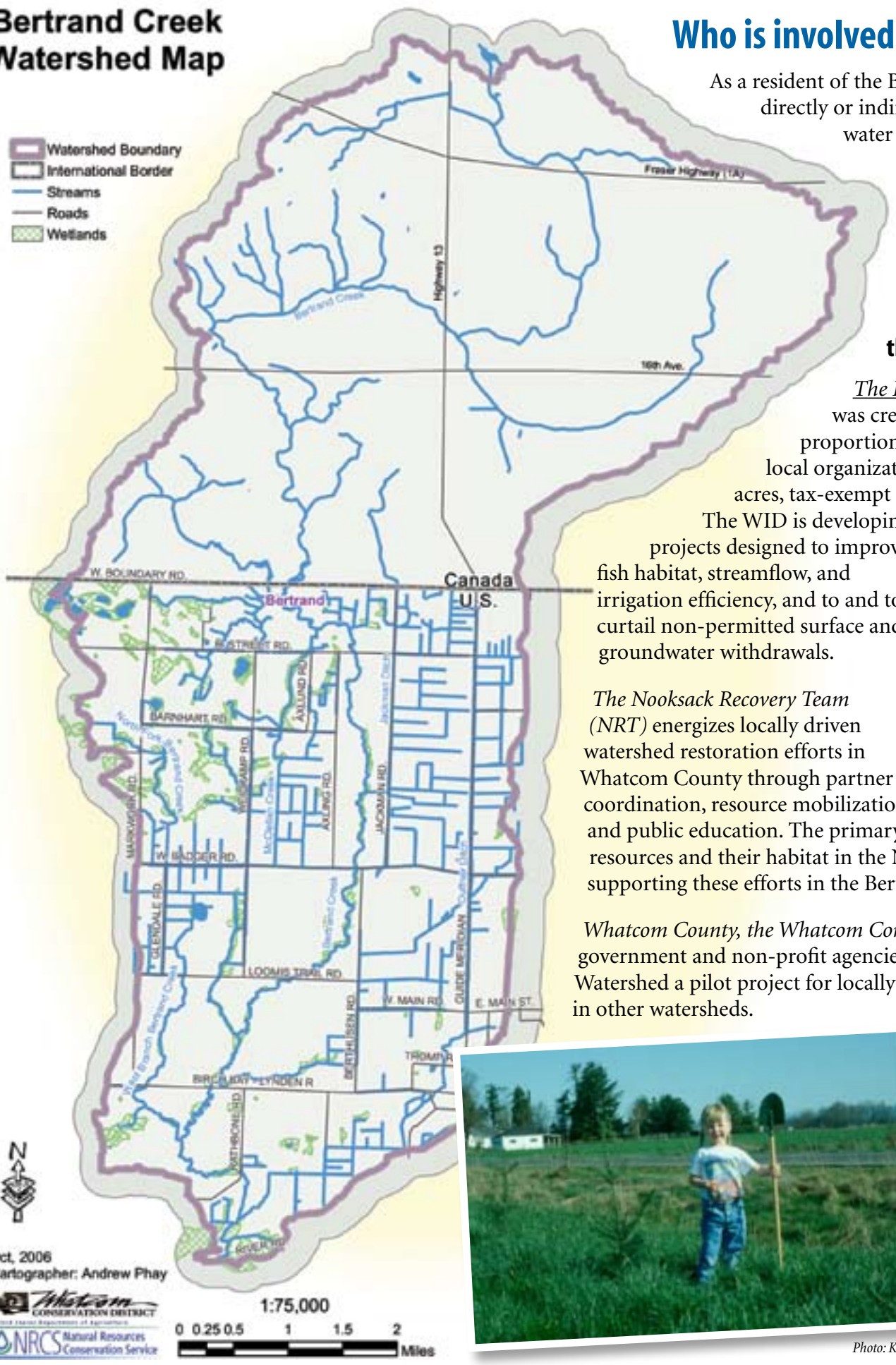
Bertrand Creek Facts

Number of square miles in watershed: 42.5

Division of area between U.S. and Canada: approximately 47% U.S. and 53% Cananda

Length of Bertrand Creek in the US: 9.8 miles

Total length of Bertrand watercourses in the US: 111 miles



Who is involved in the Bertrand Watershed?

As a resident of the Bertrand watershed, you are involved either directly or indirectly in making an impact on the land and water of the area, regardless of how close you are to the Bertrand Creek itself. Your activities at your home and on your land, including your water use and land use, have an impact in the interconnected surface water, ground water, soil and air.

Primary organizations sponsoring this publication:

The Bertrand Watershed Improvement District (WID) was created as an irrigation district in 2003 by votes proportionate to the amount of acreage owned, to provide local organization of water management. Parcels under 2.5 acres, tax-exempt parcels and City of Lynden parcels were exempt. The WID is developing projects designed to improve fish habitat, streamflow, and irrigation efficiency, and to and to curtail non-permitted surface and groundwater withdrawals.

Photo: WCD

The Nooksack Recovery Team (NRT) energizes locally driven watershed restoration efforts in Whatcom County through partner coordination, resource mobilization and public education. The primary purpose of the NRT is to enhance salmonid resources and their habitat in the Nooksack River and its tributaries, and it is supporting these efforts in the Bertrand Creek watershed.

Whatcom County, the Whatcom Conservation District, and numerous other government and non-profit agencies (see page 8) have made the Bertrand Creek Watershed a pilot project for locally-based water management that can be emulated in other watersheds.

Photo: K. Steensma

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The History of Bertrand Creek

Named after James Bertrand, one of the surveyors of the 49th parallel in the 1800's, Bertrand Creek was originally known as the "Sehkomehkl" to native inhabitants. The creek is a transboundary stream, with approximately half the watershed originating in British Columbia. The many small streams and wetlands comprising the Canadian portion travel through hilly terrain, with the watershed flattening considerably as it approaches the U.S. border. Early inhabitants described the northernmost U.S. portion of the watershed as the "Bertrand Prairie" – not a prairie in the Kansas sense, but a flat, wet, grass-and-shrub area interspersed with the huge conifer forest stands common throughout the region (Jeffcott, 1995).

Native peoples inhabited the watershed for thousands of years prior to white settlement. In the 1800s a native leader named Skaleel reportedly lived to the age of 125 years in the northern open prairie along the creek. Lockanum, another native leader around that time, lived several miles away, down at the mouth of the creek along the Nooksack River. Lockanum subsisted on the abundant salmon and waterfowl available near his home and on *wapatoes* (potatoes) grown by his industrious wife. He also aided white explorers and settlers portaging around log jams on the Nooksack near the mouths of Bertrand and Fishtrap Creeks (Jeffcott, 1995).

Photo: WCD

Inset photos: Lynden Pioneer Museum

Berthusen Park (Inset photos) Hans and Lida Berthusen homesteaded along Bertrand Creek, leaving 20 acres of virgin forest to the City of Lynden in 1944, to be kept as a nature preserve.

The Sehkomehkl watershed proved to be rich and productive not only for native peoples, but for the new inhabitants as well. The following description rings familiar to those who have loved and inhabited this area, but it was written over 100 years ago by Axling Road settler John Potgeter: "We can see the snow-capped mountain from here – it appears as if it is only two miles…Here we have every fruit…apples, plums, berries – no want for anything. The water runs through the ditches along the road the whole year…there are more fish than [anyone] could eat…[including] many salmon. The creeks have the nicest trout and the largest salmon in the fall. The trees are beautiful…here is rich land, a mild climate; [anything closer to] a heaven on this earth you could not find." (Walcott, 1966).

Berthusen Park was thus established in 1944, and its unique barn was added to the National Register of Historic Places in 2004. About 20 acres of the park have never been logged, and represent the only remaining example of an old growth temperate rainforest in lower Whatcom County.

Other watershed inhabitants of the mid-1900's recalled the large salmon runs and plentiful wildlife. Farm wife Nellie VanderMey revealed that the code phrase used by Dutch settlers, "*De hondjes zyn aan het lopen*" ["The doggies are running"] meant that it was time to get to the creek to harvest the running salmon, often simply by pitchfork. Long-time residents such as Marshall Bayes and Myrtle VanderYacht related that other fish species, freshwater clams, deer, bears and beaver were plentiful enough to be taken as food also. Cougars and bears were not uncommon, and foxes and numerous birds of prey and other birds were in the area (personal communication).

By the 1950s the Bertrand watershed on both sides of the international border was primarily in agricultural use, with dairy cows and row crops supporting many small farms. Some of the finest soils on earth, in combination with a mild climate and plentiful rain, resulted in the highest milk production per cow in the world as well as the most concentrated raspberry production in the world, interspersed with productive salmon streams and wetlands.

Photos: R. Carlsen

Roy and Lila Carlsen lived and farmed for over 25 years along the Canadian border, where the main stem of the Bertrand Creek crosses into the U.S. Together they worked tirelessly to improve habitat for fish and wildlife until Lila passed away in May 2006. Roy still resides at the farm. This publication is dedicated to Lila's memory, in grateful appreciation for the Carlsen's stewardship efforts on the Bertrand Creek.

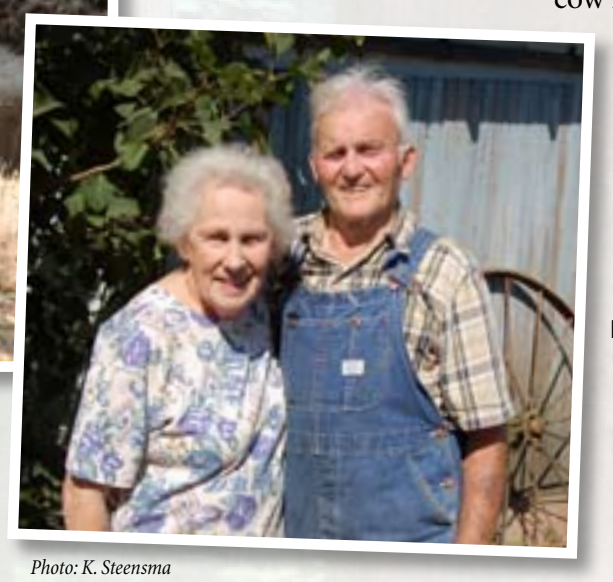


Photo: K. Steensma

Elmer and Hess Kaemingk have lived for 51 of their 59 years of marriage on River Road, where they still farm. Their home is the only dwelling between the mouths of Fishtrap and Bertrand Creeks on the Nooksack River. They have graciously allowed stream research and habitat improvement projects on their property.

One of the area's most famous settlers, Hans Berthusen, so valued the Bertrand Creek and surrounding forest that he penned the following words in his will: "I have always had a great love for the things of nature, and for that reason chose as my homestead a tract of land with timber and a running stream, and have…reserved…a park of virgin trees and native shrubs [to be given to the City of Lynden]" (Hawley, 1945).

References:

Hawley, R.E. 1945. Skqee mus, or pioneer days on the Nooksack. Bellingham, WA: Whatcom Museum of History and Art. 189 pp.

Jeffcott, P.R. 1995. Nooksack tales and trails. Bellingham, WA: Sincyrly Ours Publishing. 436 pp.

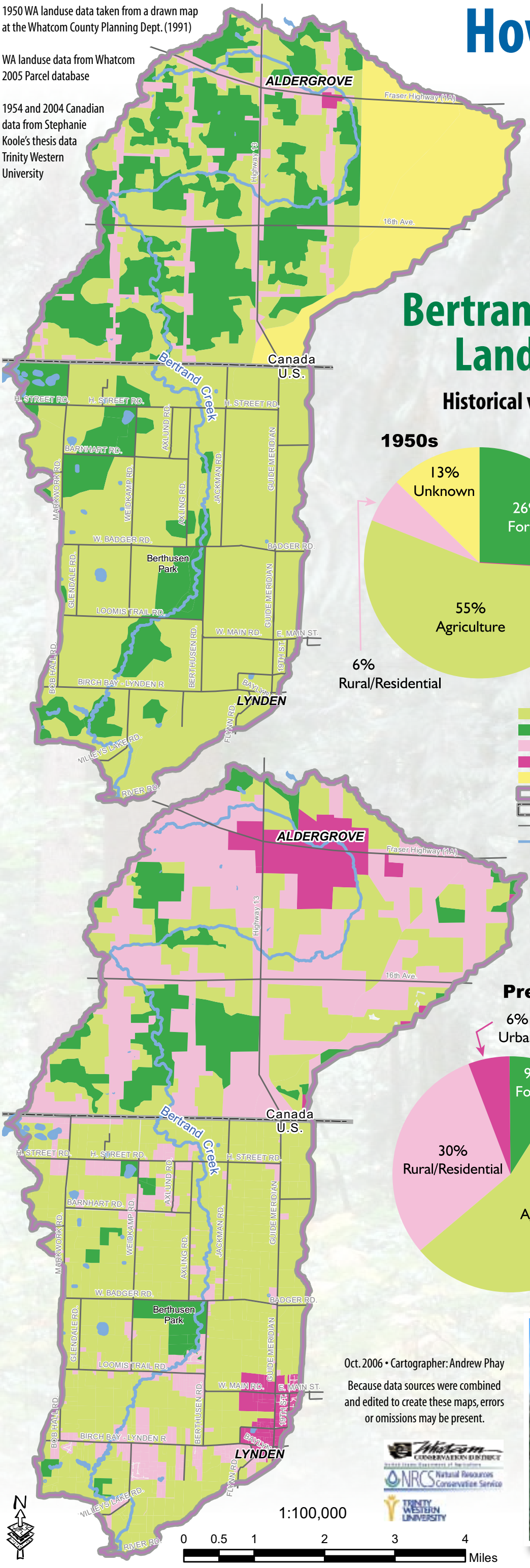
Walcott, A.R. 1966. Genealogy of Jan Potgieter. Dearborn, MI: privately published. 68 pp. Family records provided by Howard and Rachel Van Aalsburg of Lynden, Washington.

How Have We Changed the Landscape of the Bertrand Watershed?

1950 WA landuse data taken from a drawn map at the Whatcom County Planning Dept. (1991)

WA landuse data from Whatcom 2005 Parcel database

1954 and 2004 Canadian data from Stephanie Koole's thesis data Trinity Western University



Bertrand Creek Land Use

Historical vs. Current

Oct. 2006 • Cartographer: Andrew Phay

Because data sources were combined and edited to create these maps, errors or omissions may be present.

Bertrand Watershed Land Use

- **The Canadian portion of the watershed is much more urbanized today than the U.S. portion.** Rural and residential housing, hobby farms, and an urban area, Aldergrove, dominate the B.C. land-use. Commercial agriculture and hobby farms dominate the Whatcom County land-use of the watershed.

- **Wetlands have been lost and impervious surfaces have increased.** The loss of water-retention capacity of wetlands and the increase in pavement, rooftops, and other hard surfaces has resulted in a "flashy" watershed. This means that the Bertrand reaches flood stage very quickly in response to rainfall, has more pollution potential, and dwindles down to extremely low flow during the driest months.

- **Only 9% of the land in the watershed remains forested.** Most of the conversion to urbanized area has occurred at the expense of forested areas. The largest single tract of woodland is in Berthusen Park. The park and the wooded stream corridors have become habitat "islands" or refuges for remaining wildlife.

- **Agricultural land has less impact on water management than residential or urban areas.** After natural forests and wetlands, well-managed farmland is best at performing many hydrologic (water control), filtration (pollution control), and habitat functions in the watershed. Preserving farmland in the watershed has the potential to maintain both esthetic values and stream health, as well as an important economic base.

- **The U.S. and Canada do cooperate with each other.** Canadian land use practices affect water quality and quantity in the U.S., while U.S. practices affect aquatic species that migrate across the border and thus have an effect in Canada. In both countries, non-profit enhancement groups and government entities have worked to improve water quality and streamside habitat and remove barriers to fish passage.

Photo: K. Steensma

The Bertrand Creek Watershed Today: A Snapshot

The Bertrand Creek main stem still has many trees in the upper reaches of the watershed.

However, development and loss of agricultural land, forests, and wetlands has occurred in recent years. Though many of the trees, plants and wildlife species described historically still exist in pocket areas like Berthusen Park, some – such as foxes – have all but disappeared from the watershed. Many individuals and organizations have undertaken stream enhancement projects over the last 20 years to maintain and improve habitats for fish and wildlife, and other projects to prevent erosion and flood problems for landowners.

Photo: WDFW

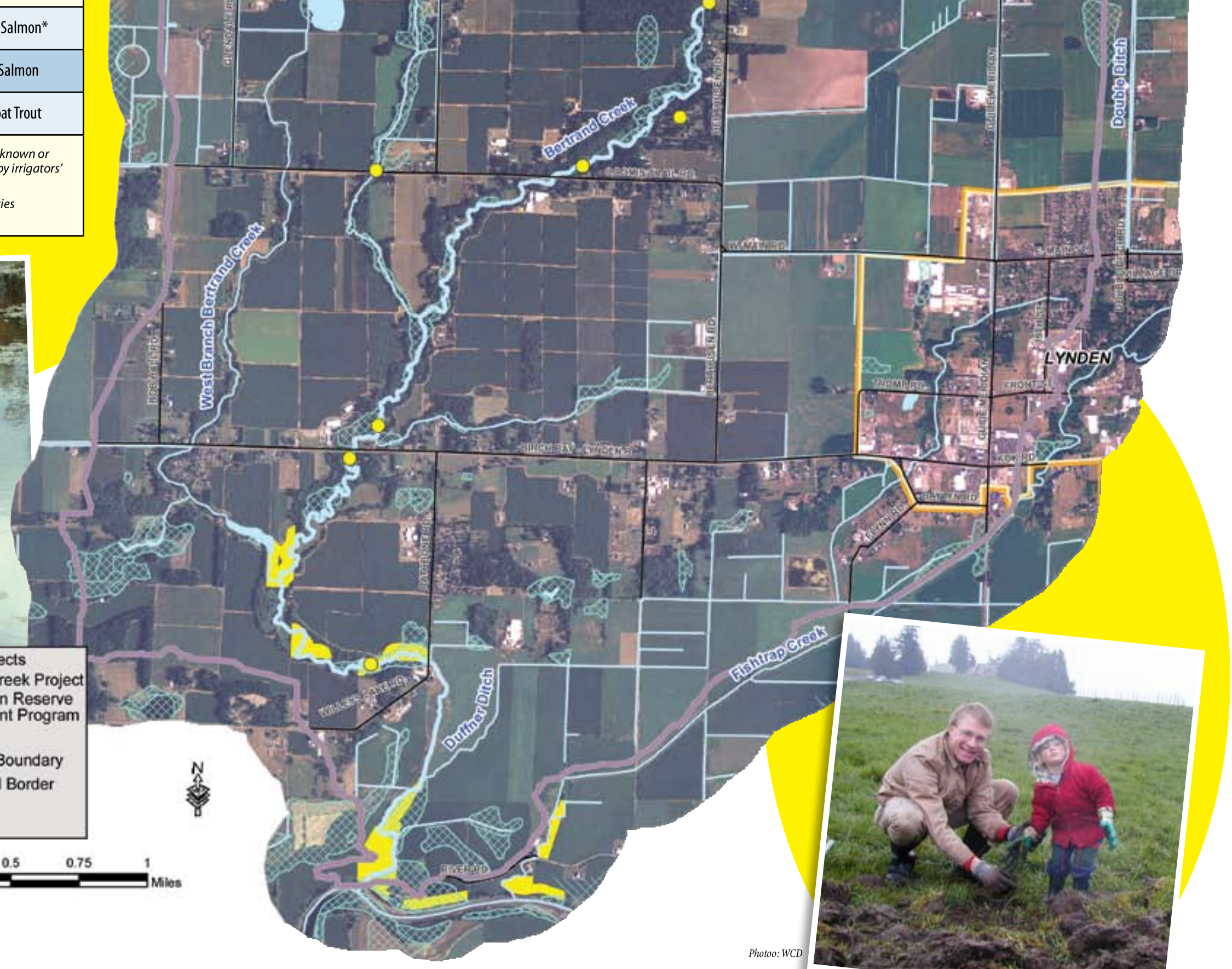
Photo: NSEA

Selected Species of Interest within the Bertrand Creek Watershed

Bald Eagle*	Bull Trout/Dolly Varden*	Chinook Salmon*
Coho Salmon**	Nooksack Dace†	Chum Salmon
Steelhead**	Rainbow Trout	Cutthroat Trout

Note: *These species were selected under the CIDMP on the criteria that they are known or believed to occur within the watershed, are likely directly and adversely impacted by irrigators' activities, and/or are listed under the Endangered Species Act (ESA).*

** ESA threatened or endangered status species **ESA candidate species*
†Species at Risk in Canada



Photoo: WCD

Wetlands in the Bertrand Creek Watershed

Historically, the lower Nooksack River and delta had extensive wetlands. Over time the watercourses of Bertrand Creek and its sister stream, Fishtrap Creek, have been straightened, re-routed, and dredged for agricultural and urban uses. Dikes and drainage to remove water from agricultrual lands during the wet season result in less water for streams during dry months. About 1/3 of the 10,600 agricultural acres on the U.S. side of Bertrand Creek Watershed are drained. There are 900 acres of permanent wetlands in the U.S. portion of Bertrand and Fishtrap Creek watersheds.

Why do we need to protect the existing wetlands in the watershed? Wetlands provide essential habitat for wildlife and serve as excellent water storage areas which help to mute flooding in the winter and to recharge the creek during low flow summer conditions. They also serve as natural pollution filtration areas.

Solving Bertrand Creek Flow Problems:

Sharing Water Between Farms and Fish

The amount of water in the Bertrand Creek system is a crucial issue. Instream flow requirements were established by Washington State in 1986 to provide the minimum water necessary to sustain fish life and other aquatic functions. These flows range from 13 cubic feet/second (cfs) in the summer to 90 cfs in the winter. Despite being minimums, the requirements may not be met on any given day due to variations in weather and other factors. Bertrand Creek is closed to additional permitted allocations from surface or ground water.

Photo: K. Steensma

Factors contributing to the instream flow problems, especially in summer, are water withdrawals on both sides of the border, increased paved development particularly on the Canadian side, and loss of wetland function on both sides of the border. All of these factors have led to a stream that floods more easily in the winter and has little slow release of water from wetlands during the summer, to sustain streamflow. Heavy draw-down of groundwater from wells in the watershed also limits groundwater replenishment sources for the creek and its tributaries in summer months.

Water taken out of the stream for agricultural purposes decreases streamflow. If surface water was not used for irrigation, flows would be higher, and instream flow requirements not currently being met during summer would be met a larger percentage of the time, or would at least be closer to meeting desired flows. One of the difficulties in dealing with instream flows is that water demand is highest for agriculture during the summer months when the amount of available water is at its lowest. Row crops have the highest irrigation demand, with grass and corn requiring the least.

Monitoring points along the stream over the last years show serious streamflow impairment during heaviest irrigation months. This past summer a research team from Washington State University began more detailed monitoring of water flow in the creek at various points, as well as connections between creek water levels and groundwater levels in the watershed. The team includes people trained in engineering, agriculture, biology, and hydrology. By spring 2007 a preliminary analysis of their results should be available to the public. As a pilot watershed, Bertrand Creek will have instream flows re-evaluated and new flow requirements may be recommended.

Potential Solutions to Flow Problems

The Bertrand WID is examining several ideas to improve year-round streamflow in the creek.

- <u>*Water conservation*</u>: *Use existing legally permitted water resources more efficiently for irrigation and other uses.* Currently a large percentage of both surface and groundwater withdrawals are not legally permitted uses.
- <u>*Water "bank":*</u> *Voluntary transfer unused water rights from legal holders.* Some property owners may not be using all of their surface or groundwater rights. Voluntary transfer of rights, with compensation to owners relinquishing their rights, could be used to make more water available for other uses.
- <u>*Groundwater*</u>: *Substitute groundwater sources for current surface water rights.* This would be beneficial only if there was no significant continuity between surface and groundwater, and if there were no serious quality issues with the groundwater. Potential problems include high nitrates, iron, salts, and low oxygen, in groundwater.
- <u>*Deep Aquifer*</u>: *Tap a deep aquifer in the northernmost portion of the U.S. watershed to potentially supply additional water.* Cooperation with Delta Water Association on geophysical tests, and the drilling of a 750-foot deep test well, indicated a large quantity of salty water. The salt may make the water unusable.
- <u>*Import Water*</u>: *Import water from a source outside of Bertrand Creek.* Public Utility District (PUD) No. 1 may have the opportunity to withdraw additional water from the Nooksack River. The potential for this project is to transfer river water to the WID for domestic/agricultural purposes or to augment streamflows in Bertrand Creek. The City of Lynden is also exploring this option to address their water needs, which might allow benefits to the WID. This would be an expensive, long-term project that would require designing and building a water transmission and distribution system. Potential problems are similar to the groundwater problems listed above.
- <u>*Reclaimed Water*</u>: *Substitute reclaimed water from municipal or industrial wastewater processors for surface water withdrawals.* Reclaimed water could come from Lynden's wastewater treatment plant or the Darigold plant, and might be suitable for some crops.
- <u>*Wetlands*</u>: *Protect, enhance, and restore wetlands.* The sponge-like capability of wetlands to reduce peak flows and maintain flows during low flow periods, would aid in stabilizing streamflow. Marginal agricultural lands may present wetland restoration opportunities.

Photo: K. Steensma

- <u>*Storage*</u>: *Divert surface water during non-critical streamflow periods to storage areas, allowing water for later use during low flow periods.* Such water would be potentially too warm to add directly to the stream during summer low flow periods, so direct use on crops would be the best option for such water. Stored groundwater could naturally recharge the stream during low flow periods
- <u>*Stream Augmentation*</u>: *Divert well water directly to the stream at critical lowflow periods.* The Department of Ecology has awarded funds to explore this option on the northern portion of the watershed. The impact on existing groundwater rights and supplies would need to be ascertained.

Solving Bertrand Creek Habitat Problems:
Keeping Water Healthy for People and Fish

FACTOR	ISSUE	CAUSES	GOAL
Fish Passage & Habitat	Barriers in streams and habitat degradation and loss preclude native salmonids and other fish from historic habitat, removing an important ecological link and fisheries resource.	Development, dam placement, loss of streamside vegetation, straightening, dredging, draining, diking, erosion, invasive plant species.	Removal of barriers and restoration of habitat complexity to allow healthy wild fish runs.
Temperature	High water temperature causes stress or death of aquatic animals. It also reduces the capacity of water to hold dissolved oxygen.	Decreased stream flow and loss of deep pools. Removal of riparian vegetation (trees and shrubs shading the stream). Collapse of stream bank due to erosion, leading to a wide, shallow streambed. Discharge of warm water to stream.	Maintain cool summer water (below 18˚C / 64˚F) to allow salmon and other aquatic animals to thrive.
Dissolved Oxygen	Dissolved oxygen (DO) is the oxygen freely available in the water, and is vital to fish and other aquatic life. DO levels in Bertrand drop during the dry season.	High water temperatures. Excess nutrients (i.e., septic failure, fertilizers) cause blooms of aquatic vegetation that consume oxygen when they decompose.	More consistently meet state standards throughout the year.
Fecal Coliform Bacteria	Fecal coliform (FC) bacteria live in the intestines of warm-blooded animals. Elevated FC levels in water indicate the potential presence of disease-causing organisms and nutrient enrichment.	Bacteria sources include failing septic systems, waste from domestic pets, livestock manure, and wildlife.	Meet FC bacteria levels established by the state to ensure safe shellfish harvesting downstream, as well as uses in the creek itself.
Pesticides	Pesticides can run off into surface water and leach into ground water. Contaminated wells exist in the watershed, and those property owners must be supplied with water from the City of Lynden.	Row crops such as berries and potatoes are the most intensive agricultural pesticide users. Homeowner landscape uses of pesticides can be much higher per acre than commercial farms.	Minimize pesticide use through Integrated Pest Management practices or implementation of organic practices.
Sediment	High sediment levels decrease clarity of streams. Water with sustained excess sediment clogs gills of animals, degrades gravelspawning habitat, and harms plant growth. However, wetlands and native vegetation are the most effective means to capture and slow the transport of sediments	Land clearing, road building, plowing and tilling adjacent to streams with no vegetation buffers. Erosion of stream banks during flood events. Poorly managed livestock areas.	Minimize runoff through wetland preservation and increased streamside buffers. Add stormwater treatment. Use proper techniques on drainage ditch maintenance.

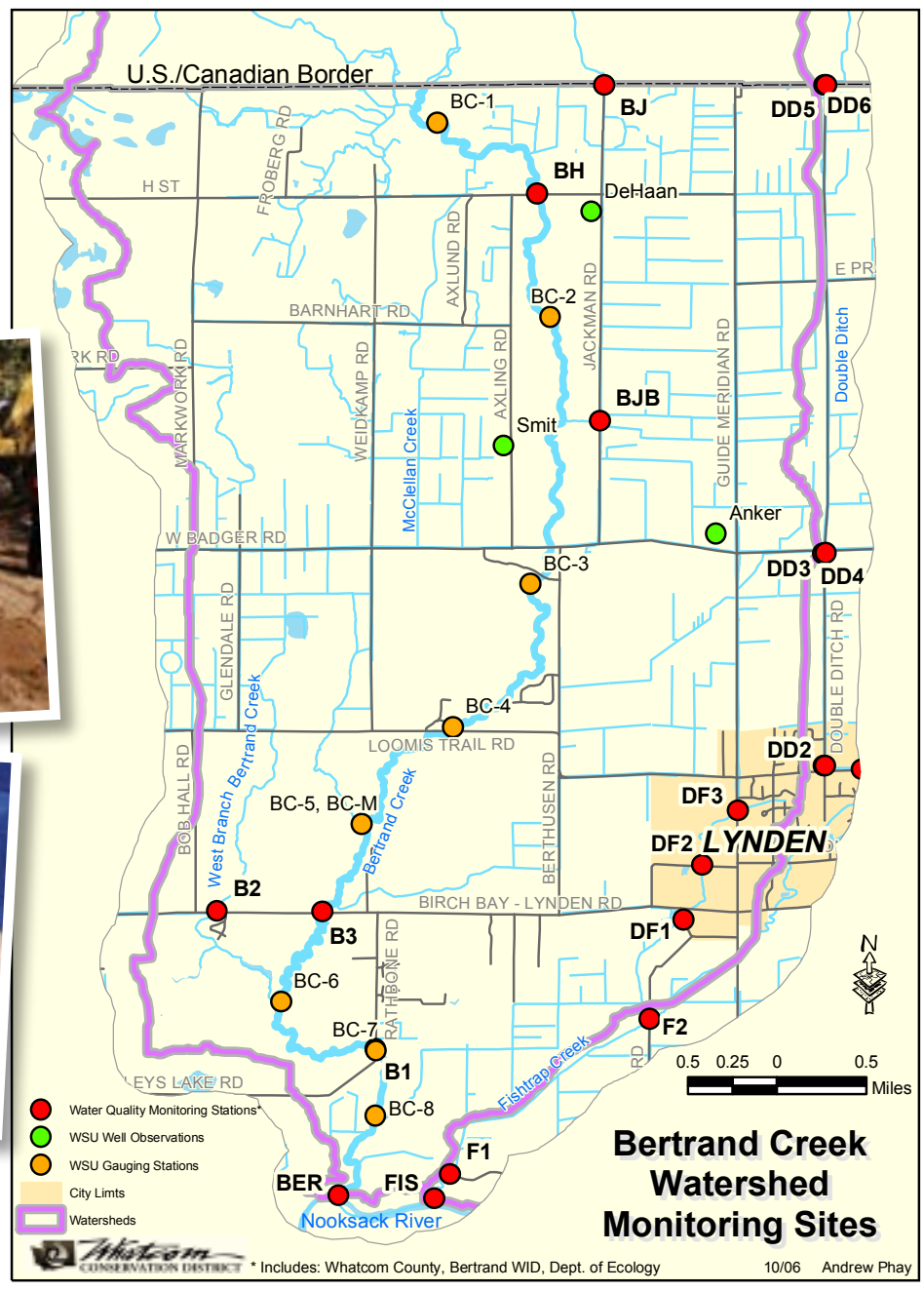
Current Projects for Improving Bertrand Creek Fish Habitat

Monitoring Projects: Ongoing monitoring in the watershed for salmon spawners, flow, temperature, fecal coliform, dissolved oxygen (DO), and other parameters occurs at least monthly at sites in the top, bottom, and middle of the watershed. The goal is to collect baseline data about the watershed to assess the worth of future projects.

Fish Passage Improvement: Barriers to fish passage in the Bertrand Watershed include culverts installed too high for fish to enter, or undersized for the stream, creating strong culvert flows through which fish cannot navigate. Poorly designed fish ladders on irrigation pond dams and a flood gate at the mouth of Duffner Ditch also inhibit free fish passage in the basin. A recent fish passage assessment identified 20 culverts, the flood gate, and six fish ladders which at least partially block fish access to an estimated 44% of stream habitat in part of the Bertrand watershed in the US. The WID is working cooperatively with the Nooksack Salmon Enhancement Association (NSEA) and private property owners to repair two or three of these blockages each year.

Photo: NSEA

Photo: WDFW



Habitat Restoration: The WID and NSEA are coordinating with property owners to identify locations where habitat improvements are needed, doing in-stream work to increase the complexity of the stream, and restoring natural functions by making the channel longer, setting back levees, installing woody debris to create pools and cover, and doing riparian (streamside) plantings. In addition to wildlife benefits, landowners have less erosion when riparian areas are well-established.

Organizations Cooperating on Bertrand Creek Watershed Issues

The Bertrand Watershed Improvement District (WID), formed by landowners in 2003 as an irrigation district, is a pilot project for locally-based watershed management. Board members: Vern VandeGarde, Chair; Larry DeHaan; Steve Groen; Marty Maberry; Peter Vlas. Administrator: Henry Bierlink. (360) 354-1337 bertrandwid@verizon.net

The Nooksack Recovery Team (NRT) energizes locally driven watershed restoration efforts in Whatcom County through partner coordination, resource mobilization and public education. Its primary purpose is to enhance salmonid resources and their habitat in the Nooksack River and its tributaries. Contact: Jim Hansen, 2616 Kwina Road, Bellingham, 98226 (360) 384-2340.

Whatcom County (WC) provides staffing and funding to support and coordinate watershed planning, public information and education, water quality monitoring, groundwater assessment, and fish passage projects and programs to support information-based watershed management in Bertrand and other WRIA 1 watersheds.

The Whatcom Conservation District (WCD) has worked for many years to monitor water quality and to help farmers and landowners implement best management practices in this watershed. All commercial dairies, and many hobby farms, have farm plans to protect water quality and enhance nutrient use (manure effectiveness).

The Nooksack Salmon Enhancement Association (NSEA) is a community–based nonprofit organization dedicated to restoring sustainable wild salmon runs in Whatcom County. NSEA has invested thousands of dollars and hours in enhancing streamside vegetation and fish habitat along the Bertrand Creek and its tributaries.

Washington State Dept. of Ecology (Ecology) is working in partnership with the Bertrand WID by providing funds for implementation projects and developing a cooperative water management program in the watershed. Ecology, the WID and others are working to meet the needs of irrigators while enhancing stream flows to improve habitat for salmon spawning and migration.

The Washington Department of Fish and Wildlife (WDFW) mission is sound stewardship of fish and wildlife in the state. The WDFW partners with public and international entities, tribal leaders, public volunteers and service groups to share responsibility for fish and wildlife, and with landowners and land use decision makers to maintain and enhance habitat.

Lummi Natural Resources and **the Nooksack Tribe** provide technical and funding support for implementation of salmon habitat restoration activities in the Bertrand and other watersheds.

The Comprehensive Irrigation District Management Plan (CIDMP) was developed with a grant from the Washington State Department of Agriculture to guide the actions of the WID in its mission to provide an adequate quantity of quality water for all needs in the watershed.

The Water Resources Inventory Area (WRIA) 1 Watershed Management Plan is the overarching blueprint for the Nooksack River Basin. The Bertrand WID is considered a pilot project for testing effectiveness of local, watershed-based management within this watershed.

Resources for Landowners

Sustainable Farming/Integrated Pest Management
WSU Cooperative Extension (360) 676-6736
www.whatcom.wsu.edu

Livestock Management
Whatcom Conservation District
(360) 354-2035 ext. 3 www.whatcomcd.org

Habitat Improvement
Lummi Natural Resources and Nooksack Tribe
(360) 384-2340
Nooksack Salmon Enhancement Association
(360) 715-0283 www.n-sea.org
WA Department of Fish & Wildlife
(360) 676-2003 www.wdfw.wa.gov

Septic Systems
Whatcom County Department of Health, On-site Sewage System Program
(360) 676-6724 www.co.whatcom.wa.us/health/environmental/sewage_systems/sewage.jsp

Water Quality/Water Resources
Whatcom County Storm Water (360) 715-7450
www.co.whatcom.wa.us/publicworks/water/index.jsp

Water Rights
Washington State Department of Ecology
(360) 738-6250 www.ecy.wa.gov/programs/wr/wrhome.html

Water Quality Database
Northwest Indian College www.nwic-research.org/research/Water_Quality.html

Canadian Issues
Bertrand Creek Enhancement Society
www.vcn.bc.ca/bces/welcome.html
Langley Environmental Partners
(604) 514-4550 www.leps.bc.ca

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