PROGRAM OVERVIEW

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WHAT'S A STREAMKEEPER, ANYWAY?
…or… Who Are Those People with the Grubby Equipment Bags?

by William Sarna, Streamkeeper volunteer, inaugural class of 1999

A Humorous Introduction

Hello! My name is Bill S., and I'm a Streamkeeper! *(Hello, Bill!)* In the following paragraphs, I'll paint some broad brushstrokes to introduce the Streamkeeper program to you newcomers.

You're going to become part of a great group of people who go out several times a year to bumble around in the stream, have fun, complain if it's raining, and take a bunch of important scientific measurements that inform the scientists and all the rest of us how the streams are doing.

The core of Streamkeepers is the quarterly stream teams who monitor all over Clallam County from Sequim to Forks. In addition to the regular stream monitoring, there are a lot of other projects Streamkeepers get involved in, such as -sampling for bacteria, counting fish, entering and checking data, and reaching out to the community. But I'm just here to tell you about the regular quarterly monitoring program. We'll overwhelm you more later!

Regular quarterly monitoring means that four times a year, your team (usually 3-6 people) spends an hour or two at each of your designated monitoring sites (usually two to four sites per creek, and usually one or two creeks). There, you'll measure stream health in three different categories: chemical, biological, and physical.

Read on to see a bit more about what we do...

What's in the Water? —Time to Break Out the Chemistry Set!

This is the stuff most people think of when they think of monitoring streams—somebody holding an electronic probe in the water. Don't be afraid; you don't need a degree in science to navigate this section. You'll be recording air and water temperature; pH, nitrate, and dissolved oxygen levels; water clarity; and flow level. In order to get these readings, you must break out the toys. These are all of the gauges and meters, special plastic boxes of ziplock doohickeys and battery-operated neat things. You will use them to poke, prod, and tickle the stream to measure its make-up. If you like Bill Nye the Science Guy, you'll love this part of monitoring.

If, on the other hand, you're more of the touchy-feely type, you'll love…

Is Anybody Home? —The Biological Section

Here you'll look, listen, learn and record what's living in and around your stream reach. Are there any fish? Any birds flying around? Any signs of wildlife? Bad weeds taking over the streambank? And last but not least, once a year we dig up benthic macroinvertebrates (bottom-dwelling stream critters that the "hoi polloi" call "bugs"). Those little guys may be spineless, but they are critical to assessing the overall ecological health of the stream.

Let's Take a Physical! (Habitat, That Is)

[NOTE: As of 2006, we've suspended most of our physical-habitat monitoring procedures, pending further input from our advisors and data end-users. Some teams may continue to measure these parameters as an optional activity.]

The physical-habitat data define the stream channel and corridor at that spot, at that time. This includes measuring shading, streambed rock size, channel shape, logjam volume, and the like. During the regular quarterly monitoring sessions (which don't occur exactly quarterly, by the way), you'll take a bunch of measurements of the physical things in your stream reach.

There's another way we look at physical habitat: from time to time (depending on the team), you'll take a tour of as many different spots along the stream as your team can access or have time to get to. That's called a Streamwalk. It's a good way to explore more of your stream than usual, or to get out on a stream even if it's not on our regular monitoring list.

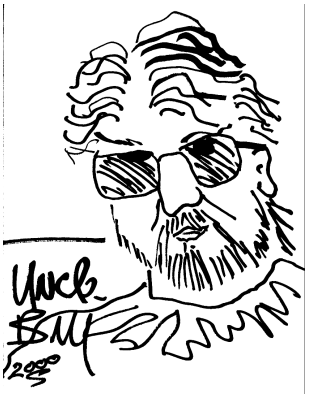
If all of this seems intimidating now, keep in mind that you're joining a program full of former neophytes who are now outstanding in their…streams! (And hopefully not falling down!) You'll have lots of good support to learn as you go. Soon, you'll be one of the old hands spitting out terms like "field calibration", "DO saturation", and "Benthic Index of Biological Integrity". Oy.

That's the basics. There's plenty more to absorb, but believe me, stream monitoring is a fascinating and rewarding experience. You'll learn a great deal about our beautiful surroundings as they change throughout the seasons; and you'll meet some great people in the bargain.

So jump on in, the water's fine! At least…that's what we're here to determine.

Get Wet!

"Uncle" Bill Sarna
May 2000
(Amended slightly by SK staff)



STREAMKEEPERS IN A NUTSHELL

Streamkeepers of Clallam County is the County's watershed public involvement program. Our purpose is to involve residents in caring for watersheds by monitoring local streams, providing useful data that can help guide management decisions, and fostering watershed stewardship.

Streamkeepers are volunteers who want to be actively involved in caring for their local streams. The most typical job of a Streamkeeper is to perform quarterly monitoring at established sites on the stream whose team they have joined. Besides that, volunteers may choose to join special monitoring projects requested by a citizen or another agency, such as grab-sampling for bacterial pollution or trapping and identifying juvenile fish. Some Streamkeepers also elect to perform cleanups and small-scale restoration projects on their streams, to correct problems identified during monitoring. Others may choose to perform office work in support of our program, perform statistical analysis on our data, or reach out to the community about watershed health and the work of Streamkeepers.

Data collected during quarterly monitoring provides basic information about stream conditions in Clallam County, across space and time. Special project work helps other agencies and entities complete one or more aspects of their mission, which might range from watershed planning to restoration. For more on this topic, see "What Happens to the Data" later in this chapter, and the more detailed account in the Appendix entitled, "How Is Our Data Used?"

PROGRAM GOALS

1. Provide credible data useful to decision-makers acting to protect and restore local streams:
   - Describe current watershed conditions
   - Identify trends in watershed conditions
   - Track known problem areas
   - Screen for potential problems
   - Help to determine watershed restoration priorities
   - Monitor the effectiveness of watershed restoration projects
2. Report the information collected to fellow volunteers, County resource planners, other agencies and organizations, and the general public, on a regular and timely basis.
3. Facilitate public involvement in watershed monitoring and stewardship.

WHAT KIND OF MONITORING DO WE DO?

Ambient Monitoring

The heart of Streamkeepers is our ambient monitoring program, in which volunteers are organized into teams which adopt streams. Teams go out quarterly to monitor at several established reaches on each stream, and over the course of the year they sample the following parameters of stream health*. [NOTE: Physical parameters in italics are optional since 2006.]*

Biological parameters	***Chemical parameters***	***Physical parameters***
Benthic macroinvertebrates	Temperature	Flow: speed, depth, and discharge volume
Fish and wildlife	Dissolved oxygen	Gradient
Noxious weeds	Conductivity	Reach sketches, maps, and photographs
Fecal coliform	Salinity	Bank stability, *Cross-section*, *Erosion/Revetment*
	Turbidity	*Large woody debris & Pools*
	pH	*Canopy closure, Canopy type, Conifer stems*
		Pebble count (sediment sampling)

Streamwalk

In addition to monitoring quarterly at established reaches, volunteers go out from time to time to perform a Streamwalk—a rapid, broad-scale assessment of the entire stream.

Special Monitoring Projects

In addition to our regular ambient monitoring program, Streamkeepers also perform special monitoring projects at the request of various clients, generally to help advance watershed planning or stream restoration. In addition to helping clients achieve their goals, these projects provide the added motivation to volunteers of seeing an immediate impact from their efforts. Some of the special projects we've taken on include:

- Measuring bacterial pollution in irrigation ditches to determine priorities for pipelining and other pollution-control activities.
- Counting redds (i.e., fish egg nests) as part of a long-term stream restoration project.
- Surveys of bull trout spawning activity in support of the Endangered Species Act.
- Helping state-established regional watershed councils assess summertime low flows.
- Supporting monitoring efforts undertaken by educational institutions, such as Olympic Park Institute, the Sequim and Port Angeles school districts, and the North Olympic Peninsula Skills Center.

Work Plan for the Current Year

For a list of all the projects Streamkeepers are performing this year, see the current "Work Plan" which should be at the front of this handbook.

WHAT HAPPENS TO THE DATA?

Volunteers enter stream data on customized field sheets, which are stored in our office and can be viewed upon request. We have developed a computerized database to hold all our data, including not only monitoring results, but also information about data quality, sampling sites, samplers and their training levels, digitized photographs, and links to geographic information systems.

Each of our regular measures of stream health provides information of specific interest to at least one data end-user who serves on our technical advisory committee. Our data have been used by a variety of entities, including state agencies, tribes, municipalities, water purveyors, restoration project proponents, watershed planning councils, and private citizens. Our data from special projects, of course, is used by the special projects' sponsors. Some summaries of Streamkeepers data are available on the Web. Eventually we will make more of it available there. Until then, anyone wanting our data can get it from our office.

In 2004, Clallam County achieved a milestone when it published a "State of the Waters" report (see "References" section of the appendix for this and other citations), bringing together all available information about the various waters of the county. Streamkeepers' data formed the backbone of that report, which is available at: http://www.clallam.net/streamkeepers/html/state_of_the_waters.htm
The County hopes to update "State of the Waters" on a regular basis, as time and funding permit. The main purpose of the report is to transmit the data collected in an objective manner to the local citizens, planners and elected officials charged with making decisions about our local streams, salmon and watersheds.

For a more thorough discussion of the actual and potential uses of our data, see the appendix entitled, "How Is Our Data Used?"

WHO RUNS THE PROGRAM?

Structure and Governance

Streamkeepers is part of the Clallam County Department of Community Development. Our ultimate accountability is to the Board of County Commissioners, and through them to the citizens of the County.

On a more practical level, the essential direction of the program is guided by the Streamkeepers Steering Committee, which itself consists of two committees: our Volunteer Advisory Committee and our Technical Advisory Committee.

> ***The VOLUNTEER ADVISORY COMMITTEE*** is composed of any volunteers who care to participate. It recommends changes to any aspect of the program, including program components, activation or inactivation of sites and streams, and other stewardship projects. It meets as needed, convened by program managers or at the request of volunteers. Its one regular meeting in the fall produces recommendations for program changes for the coming year.
>
> ***The TECHNICAL ADVISORY COMMITTEE*** consists of agency biologists and resource managers, plus knowledgeable members of the general public. It connects the Streamkeepers program to other watershed management efforts and local technical expertise, by recommending priorities for sites, streams, parameters monitored, special projects, and reports, as well as providing guidance on technical questions. It meets as needed, convened by program managers or at the request of advisors or volunteers. Its one regular meeting in the fall, along with that of the Volunteer Advisory Committee, produces recommendations for program changes for the coming year.
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> ***THE STREAMKEEPERS STEERING COMMITTEE*** consists of the VOLUNTEER ADVISORY COMMITTEE and the TECHNICAL ADVISORY COMMITTEE. It makes final recommendations on program direction. Its one regular meeting, in late fall, finalizes the work plan for the coming year.

Staff works with these groups every year to evaluate the prior year's programming and plan the next. With the exception of funding, these committees have guided every major program decision, including where, what, when, how, and why to monitor.

VOLUNTEER JOB DESCRIPTION

Streamkeeper Volunteer

SUMMARY: Implement and shape the Streamkeepers of Clallam County volunteer monitoring and watershed involvement program.

RESPONSIBILITIES:

- Perform stream monitoring and other activities when scheduled, according to established written protocols.
  - Coordinate with fellow team members to schedule and perform monitoring activities.
  - Follow inventory procedure for borrowing field kits.
  - Use field kits and equipment properly while in the field.
  - Report low supplies and missing or damaged equipment to Streamkeepers staff.
  - Complete monitoring data sheets and check for accuracy.
  - Deliver data sheets to Streamkeepers staff in a timely fashion.
- Attend required training sessions.

Optional, additional duties include:

- Participate in advisory and other meetings.
- Assist other teams in monitoring or other activities.
- Perform other tasks related to the Streamkeepers program.

TRAINING PROVIDED

- Training in Streamkeepers protocols and procedures, including use of all monitoring equipment and checkout procedures.
- Clallam County Volunteer Orientation.
- Feedback and assistance throughout the year.
- Periodic refresher and supplemental trainings and workshops as needed or requested.

QUALIFICATIONS

- Field volunteers must have physical ability to do field work, which may (but won't necessarily) include carrying equipment storage containers, traversing rough ground and hiking distances of a mile or more to get to a monitoring reach.
- Non-field volunteers need the ability to do assorted tasks, such as office work.
- All volunteers will need enthusiasm, flexibility, tolerance, and willingness to learn new things.

VOLUNTEER JOB DESCRIPTION
Team Leader (= Team Coordinator + Field Team Leader)

SUMMARY: Team Leadership can either be incorporated into one "job" or broken into two. These two roles, Team Coordinator and Field Team Leader, involve coordinating and leading a team of Streamkeepers (usually 3-6 volunteers) in monitoring one or more of the streams or projects identified in the current year's workscope, as well as helping to shape the Streamkeepers program.

RESPONSIBILITIES:

- In addition to regular Streamkeeper responsibilities:
- **TEAM COORDINATOR:**
  - Keep in touch with all team members, to notify them of upcoming activities and solicit their availability.
  - Communicate with team members and Streamkeepers staff to schedule team activities and reserve equipment.
  - Ensure that field kits and data sheets are returned to the Streamkeepers office in good time and good condition.
  - Act as a liaison to the Streamkeepers office for your stream team.
  - Welcome and orient new team members to the team.
- **FIELD TEAM LEADER:**
  - Ensure that team members use field kits and equipment properly while in the field.
  - Assist in training and advising your team's volunteers as needed.
  - Ensure that monitoring data sheets are completely filled out and computations are accurate.

TRAINING PROVIDED: Same as for regular volunteers, plus lots of individual consultation.

QUALIFICATIONS:

- Same as for regular Streamkeepers, plus:
- Willingness and ability to shepherd other volunteers.

ADDITIONAL INFORMATION ABOUT STREAMKEEPERS

(DETAILS, DETAILS!)

WHAT, WHEN AND WHY WE MONITOR

Over the course of each year, Streamkeepers monitor the following parameters:

Type of Parameter	Indicator	When	Why	Desired Level or Range
Chemical	Temperature	quarterly	Consistently cool streams provide better habitat for salmonids. Streams that are unusually warm indicate watershed problems.	16° C maximum (*Class A, 18° C); consistent, cool temperatures
	Dissolved Oxygen (DO)	quarterly	Oxygen in water is vital to growth and development of aquatic life.	> 9.5 mg/L (*Class A, 8.0 mg/L)
	Conductivity	quarterly	A healthy stream has low conductivity. High electrical conductivity indicates various chemical and biological pollution problems.	No standard established for streams, but unusually high readings are cause for concern
	pH	quarterly	A healthy stream is neither excessively acid nor alkaline; some aquatic life forms can only live within a narrow pH range, others are more tolerant.	6.5-8.5 (*Same for Class A)
	Turbidity	quarterly	Turbidity results from suspended solids such as silt. High levels of silt destroy fish habitat.	No more than 5 NTU above "natural" levels (or 10% above if "natural" level is >50). (An "NTU" is a measure of cloudiness in water.)
	Nitrate-Nitrogen *(mothballed as of 2009)*	quarterly screening; lab samples when requested by advisors	Excess nitrogen allows excessive plant growth, leading to eutrophication of water bodies. Sewage and animal waste add nitrogen to rivers.	1 mg/L would be cause for concern (Mitchell and Stapp, 1996).

* Surface water quality standards for freshwater class AA waters, Chapter 173-201A WAC. All Clallam County streams are Class AA, except for the following Class A waters: Dungeness River and tributaries downstream of Canyon Creek (RM 10.8), Port Angeles Harbor tributaries, and Dickey River.

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WHAT, WHEN AND WHY WE MONITOR (cont.)

Type of Parameter	Indicator	When	Why	Desired Level or Range
Physical *(Indicators in italics are optional since 2006)*	*Broad survey (Streamwalk)*	Occasional, usually summers	Provides an overall picture of stream health	Naturally-functioning stream system
	Broad survey photographs	July (with Streamwalk)	Document potential problems	----------
	Fixed-vantage photographs	January, August, and during macroinvertebrate collection	Track changes in stream over time	----------
	Reach map	If quadrilateral reaches are established	Track changes in stream over time	----------
	Flow	Quarterly, plus during extremes if possible	Track flow regime, calibrate hydrology models, interpret water-quality data	Similar to historical conditions
	Gradient	At reach establishment, then as needed	Characterize stream geomorphology	Will vary along the length of the stream
	Bank Stability	August	To provide a simple rating scale, based on easily recognizable factors to help evaluate the serverity of erosion and revetment.	Stable banks
	Cross-section	August	Upstream activities can change the channel shape	Relatively stable cross-section
	Erosion and/or revetment	August	Both excessive erosion and artificial bank protection are harmful to fish and a sign of channel instability	Stable banks, little erosion or armoring
	Substrate (Pebble Count)	August	Channel bed sediment is critical to the physical and biological functioning of stream channels.	Sediment of a size appropriate to the stream size and gradient
	Pools	August	Fish habitat	Abundant, stable pools
	Large woody debris (LWD)	August	Large downed trees help create pools, store sediment, reduce stream energy, and provide cover and nutrients.	Many large downed logs--conifers if they were historically present
	Canopy closure percentage	January, August	Shade regulates stream temperature and provides cover for fish	Multi-storied canopy, abundant shade year-round
	Canopy type percentages	August	Large conifers are crucial to fish habitat	Near historic number of large conifers present in riparian corridor
	Conifer stems	January - every 5 years	Today's small conifers are tomorrow's large conifers	Density close to natural conditions

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WHAT, WHEN AND WHY WE MONITOR (cont.)

Type of Parameter	Indicator	When	Why	Desired Level or Range
Biological	Fish/wildlife	quarterly plus Streamwalk (July)	Fish and/or wildlife, or signs of their presence, signal a functioning stream system.	Abundant, diverse populations.
	Noxious weeds	Streamwalk (July); update as needed	Noxious weeds signal an unhealthy stream system and crowd out desired native species.	No noxious weeds.
	Fecal Coliform concentration and E Coli presence	lab samples collected quarterly by special team (at stream mouths only)	Fecal Coliform and/or E Coli bacteria indicate human and animal waste in runoff water. Fecal matter in streams enriches water with nitrogen, contaminates shellfish, and makes people sick.	Geometric mean of 50 colonies per 100 mL and <10% of readings below 100 colonies for Class AA waters (*Class A, 100 geomean & <10% below 200)
	Benthic macro-invertebrates	Sept 15-Oct 15	Diverse populations of macroinvertebrates signal a healthy stream system capable of supporting fish.	Large diversity of creatures, especially those requiring undisturbed conditions.

* Surface water quality standards for freshwater class AA waters, Chapter 173-201A WAC. All Clallam County streams are Class AA, except for the following Class A waters: Dungeness River and tributaries downstream of Canyon Creek (RM 10.8), Port Angeles Harbor tributaries, and Dickey River.

HISTORY OF THE STREAMKEEPERS PROGRAM

Streamkeepers was not originally a part of Clallam County government. Our volunteer monitoring program had its origins in the 8 Streams Project, a grant-funded project of the Washington State University Cooperative Extension Office of Clallam County, which ran between April 1996 and March 1999. The 8 Streams Project had a broad-based mission to do community education on water quality; volunteer stream teams were just one of several modes used to deliver this education. Volunteers embraced the newly-introduced monitoring program, bonded with their teams, and became increasingly informed and concerned about the health of their streams.

The 8 Streams Project fielded 50 volunteers on nine streams, between summer 1997 and spring 1999. In December 1998, staff asked the volunteers how they would like to proceed after the end of the grant period. Volunteers expressed the desire not only to continue, but also to improve the program. Hence, they proceeded on two fronts:

- Many of them showed up at a County budget hearing to request County funding to continue the volunteer monitoring program. As one volunteer put it, "We're motivated, we're trained, and we're cheap." They were granted a minimal level of funding by County Commissioners.
- Others of them formed a committee to recommend improvements to the monitoring program. Topics covered included accuracy, replicability, and relevance of data, and efficiency of data collection.

When the County voted to continue funding the volunteer monitoring program, they also decided to move the program into County government. By vote of the volunteers, the program took the name Streamkeepers. Its staff was placed in the Department of Community Development.

Streamkeepers staff completely revamped the monitoring program, using the recommendations of volunteers and local natural resource managers (our "technical advisors") to ensure we collect credible, meaningful data that local resource managers can use to help protect and restore county watersheds. Our program manual and Quality Assurance Project Plan (Baccus and Chadd, 2000) are on a list of model documents compiled by the Washington Department of Fish and Wildlife (Johnson et al., 2001).

Since 1999, County funding has been supplemented by outside funding. Some of this has come in the form of direct grants and some in the form of compensation for monitoring activities, but the largest part of outside funding has come from large grants that the County has received to protect and restore water quality, quantity, and habitat. When these large grants include a monitoring component, Streamkeepers performs that component and bills expenses to that grant. Through these varied sources, Streamkeepers funds a varying portion of its budget (including staff and operating expenses) with outside funding.

STREAMKEEPERS STAFF

Ed Chadd, full-time manager of the program, has a B.S. in Environmental Policy and Assessment from Huxley College of Western Washington University. He has 25 years' experience in traditional and experiential education, public education and outreach, volunteer management, and environmental monitoring, working for nonprofits, the National Park Service, and local government. He began his streamkeeping career as a volunteer team captain in the 8 Streams Project (see "History" section), eventually becoming a Project Assistant in that program and then starting up the Streamkeepers program along with Jessica Baccus in 1999.

Robert Knapp, assistant planner who assists Streamkeepers part-time, has a BS and MS in Environmental Science, also from Huxley College, with emphasis on wildlife ecology and geographic information systems. He also works as a part-time instructor for Peninsula College. Robert has experience working with volunteers, executing and coordinating field research. Robert began his Streamkeeping career as a volunteer GIS technician and made the transition to staff in September 2008. Prior to coming to Streamkeepers, he worked as a wildlife technician for Olympic National Park and the USGS Biological Resource Division and as an instructional technician at Peninsula College.

ANNUAL MONITORING CALENDAR

	QUARTERLY MONITORING SESSIONS									
	REGULAR TEAMS								SPECIAL TEAM	STREAM-WALK
	Water quality (Temperature, dissolved oxygen, conductivity, pH, turbidity, nitrate screen)	**Fish & wild-life sight-ings**	**Noxious weeds**	**Flow**	**Photo-point photos**	**Bank stabil-ity**	**Benthic Macro-inverte-brates**	**Physical habitat** *[NOTE: These are optional as of 2006.]*	**Grab Samples for fecal coliform** (plus e. coli, nitrates, other indicators as needed)	**Stream-walk, photos & water-shed inventory**
Winter (Jan)	X	X	X	X	X			Canopy Closure, Conifer Stem Count (every 5 years)	X (January 1-31)	
Spring (Apr)	X	X	X	X					X (April 1-May 31)	
Stream-walk (us. in July)		X	X							X
Summer (Aug)	X	X	X	X	X	X		Gradient, canopy closure, canopy type %s, pebble count, cross-section, large woody debris, pools, erosion/revetment)	X (Aug 1– Sept 15)	
Fall (Sept 15 - Oct 15)	X	X	X	X			X		X (October 5-31)	