


Creating A Baseline Water Quality Library

Over 15 years of volunteer monitoring data around Kachemak Bay

Rachel Lord

2012 Kachemak Bay Science Conference

Alaska

- ~40% of all surface water outflow for the USA
- 714,000 miles of rivers and streams, with over 15,000 anadromous streams
- Over 3 million lakes and ponds
- Home to 686,000 people; ~60% of these people live in Southcentral Alaska

Alaska's Baseline

"The majority of Alaska's waters are not subject to man-caused stressors and are considered unimpaired. DEC expects that 99.9% of Alaska's waters can be classified as Category 1; however, no specific waters are identified in this category."

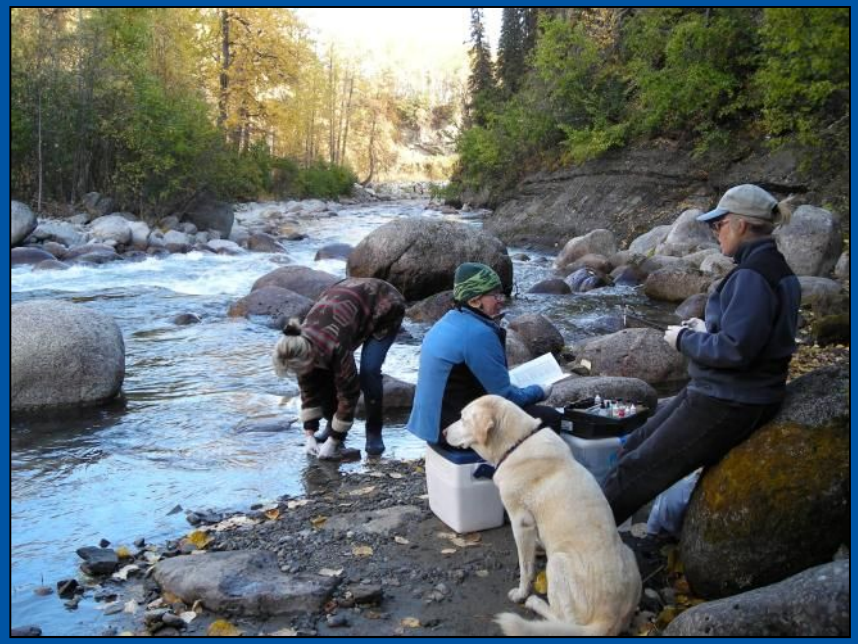

Table 2: Number of Waterbodies

Category	Number of Waterbodies
1	Majority of Alaskan waters
2	44
3	303
4a	32
4b	4
4c	0
5	31

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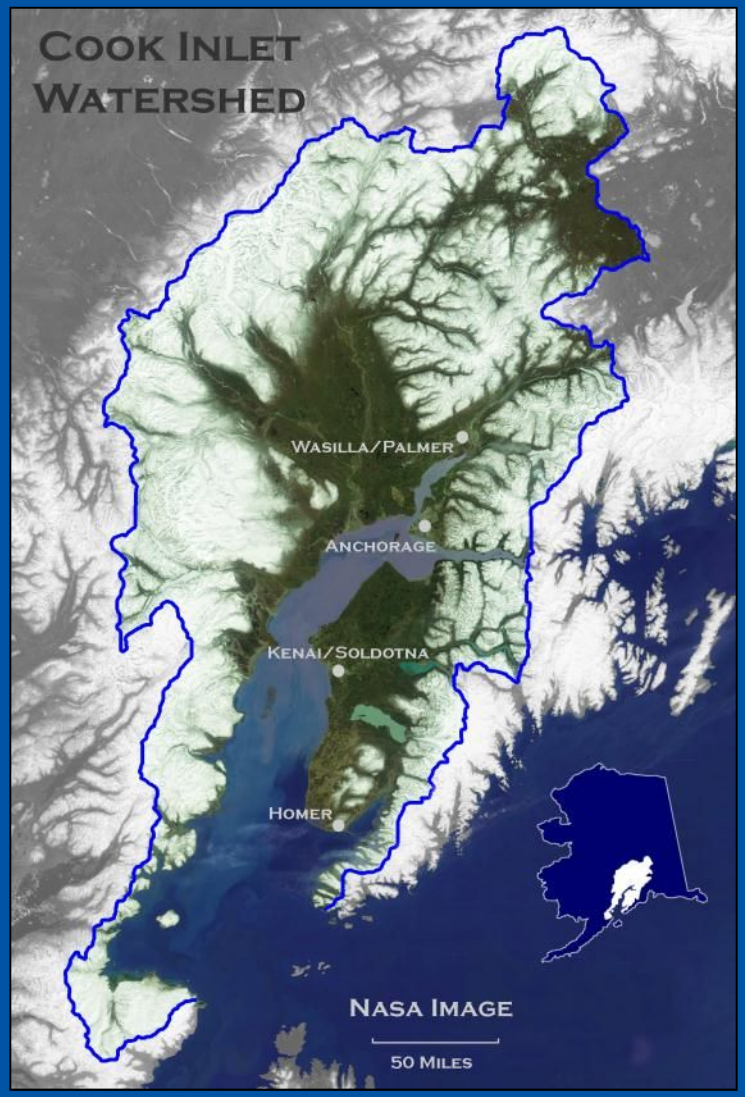
Cook Inletkeeper



Mission

Protect Alaska's Cook Inlet watershed and the life it sustains

1996: established the 1st citizen-based water quality monitoring program in Alaska

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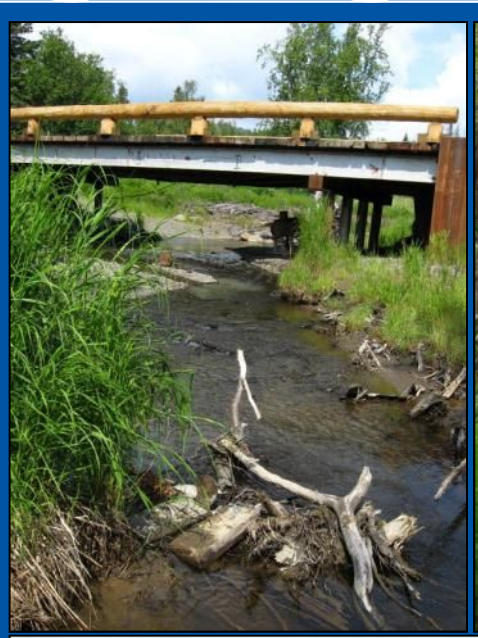
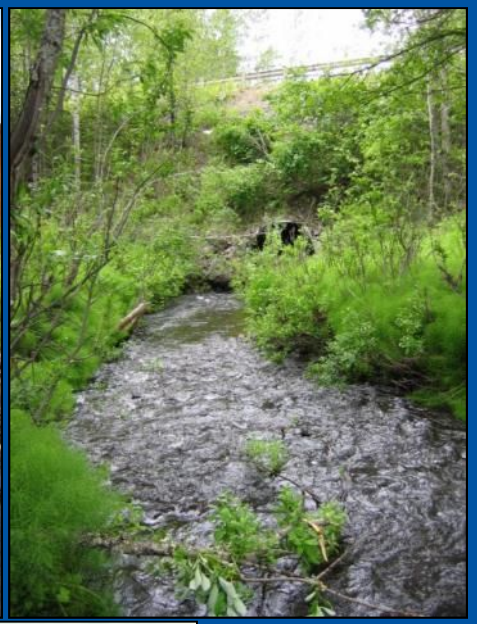
Citizens' Environmental Monitoring Program

- Inventory baseline water quality status

- Detect and report significant changes and track water quality trends

- Raise public awareness of the importance of water quality through hands-on involvement





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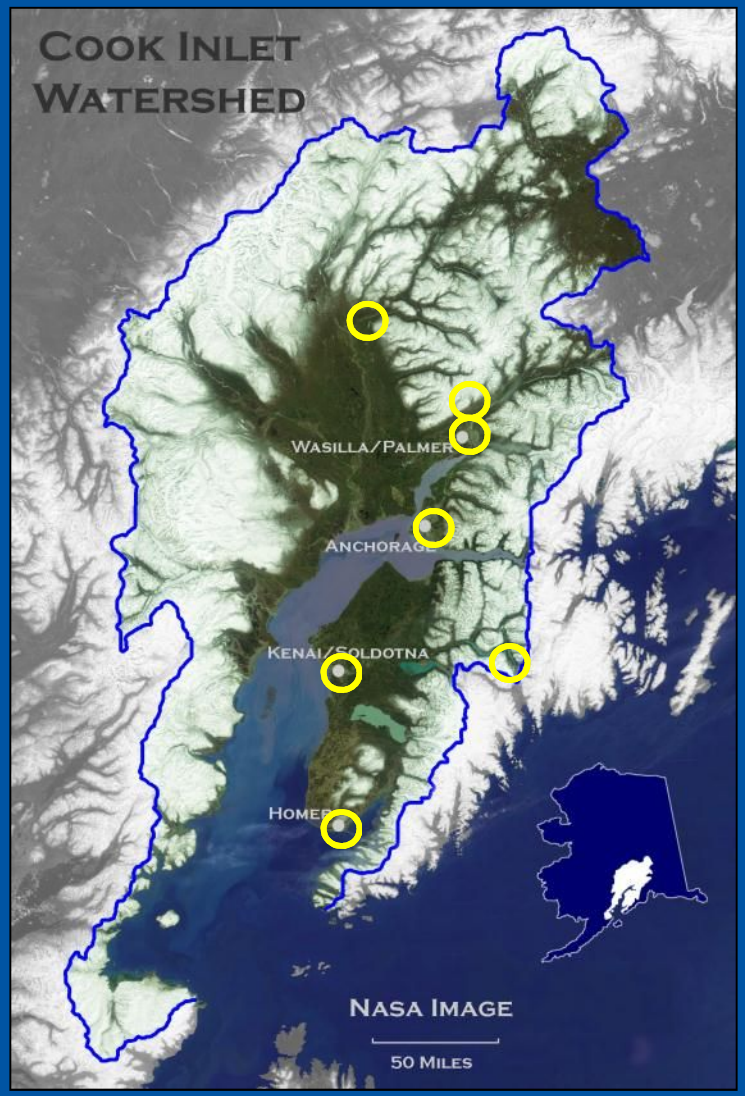
CEMP Partnership



CEMP Monitoring Partners:

Cook Inletkeeper, Resurrection Bay Conservation Alliance, Mat-Su Volunteer Lake Monitoring, *Wasilla SWCD, Upper Susitna SWCD*

CEMP Outreach Partners:

Homer SWCD, Kenai Watershed Forum

CEMP Technical Partners:

UAA Environment and Natural Resources Institute (ENRI)

What We Measure

- Temperature
- Dissolved Oxygen
- Bacteria
- pH
- Specific conductance
- Turbidity
- Macroinvertebrates
- Habitat

Nutrients, Salinity, Secchi depth

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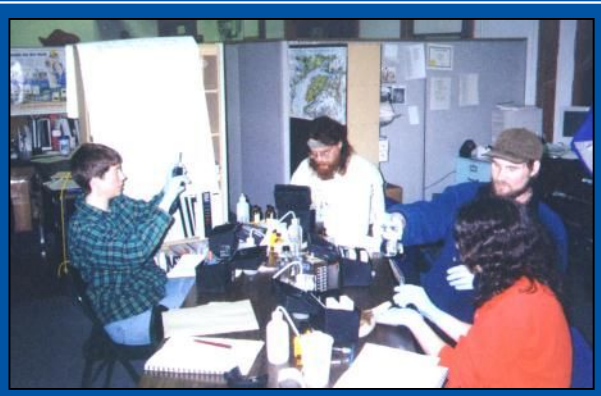
CEMP Through the Years











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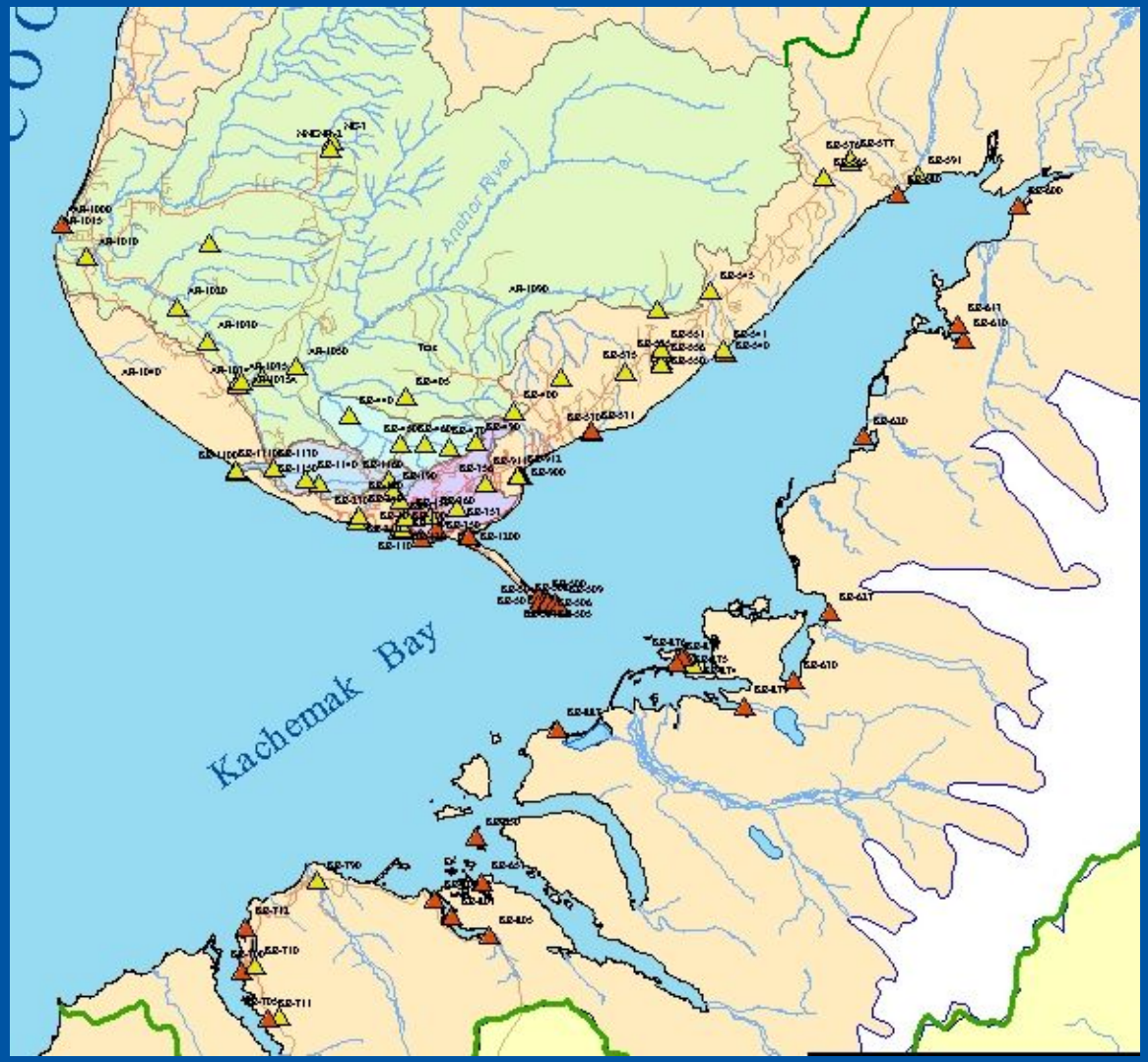
Kachemak Bay/Anchor River CEMP

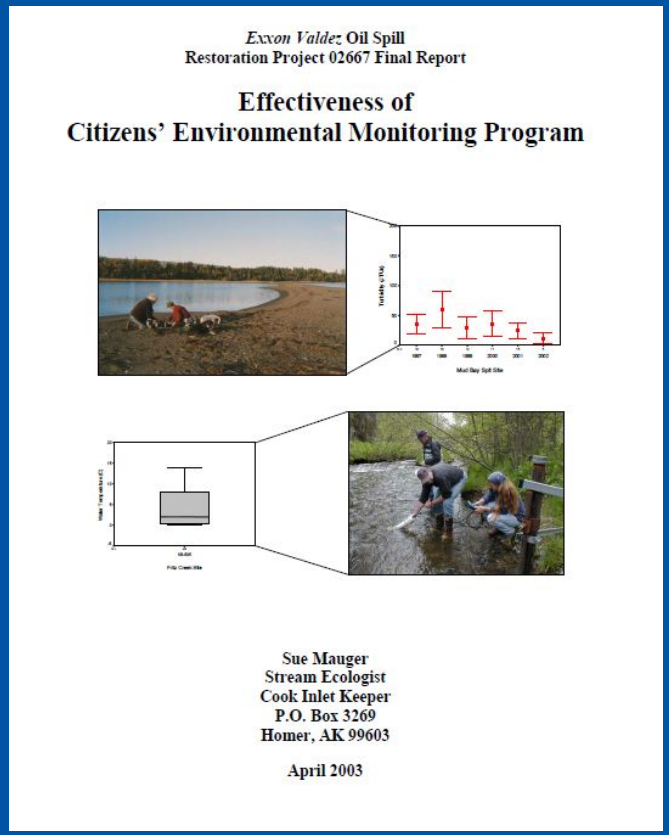


CEMP Watersheds

Current CEMP Sites

CEMP Effectiveness

- Evaluation, 1996 - 2002
  - Frequency
  - Methods
  - Parameters
  - Site selection
- Recommendations
  - Five-year baseline datasets
  - Change detection
  - Adjustments to methods



Exxon Valdez Oil Spill
Restoration Project 02667 Final Report

Effectiveness of
Citizens' Environmental Monitoring Program

Sue Mauger
Stream Ecologist
Cook Inlet Keeper
P.O. Box 3269
Homer, AK 99603

April 2003

Baseline Criteria

Water Chemistry:

>80 site visits within 5 years

40+ during summer months

At least 5 per month

Bioassessment

Continuous temperature

Habitat assessment

Invasive plant assessment

GIS Analysis

Future monitoring strategy

2010 CEMP Strategic Monitoring Plan (based off of data through 2009)		Anchor River and Tributaries					Kachemak Bay Watersheds			
	GOAL	Bridge Creek	Ruby Creek	Two Moose Creek	Beaver Creek	Unnamed Trib	Upper Diamond	Lower Diamond	Bidarka	Upper Woodard
Water Quality										
Years Monitored	>5	10	13	7	8	8	11	10	10	9
Site Visits	>80	61	74	40	107	65	114	82	112	68
Years w/ >12 visits	5	2	2	0	7	0	4	2	6	1
Months w/ > 5 visits	12	5	10	6	11	6	11	7	12	8
Number of summer visits	40	33	34	26	58	36	65	48	54	32
Temperature Monitoring										
Years monitored (May-Oct)		0	5	5	1	0	0	5	0	0
Start Year										
Close-out Year										
Bioassessment										
Number of visits	6	0	13	11	12	0	10	2	0	0
Begin Sampling										
End Sampling										
Habitat Analysis Year	1									
Standard Deviation										
Annual temperature		4.62	3.75	4.15	5.06	3.56	4.33	4.99	3.58	4.12
Summer temperature (June-Aug)		2.94	2.49	1.79	3.16	1.33	2.54	2.49	1.26	2.05
Dissolved Oxygen (mg/L)		0.05	0.08	0.11	0.11	0.13	0.09	0.11	0.09	0.09
pH (Hanna)		0.36	0.37	0.43	0.38	0.46	0.5	0.36	0.76	0.5
Standard Error										
Annual temperature		0.59	0.44	0.66	0.49	0.44	0.41	0.55	0.34	0.50
Summer temperature (June-Aug)		0.51	0.43	0.35	0.41	0.22	0.32	0.36	0.17	0.36
Dissolved Oxygen (mg/L)		0.01	0.01	0.02	0.01	0.02	0.01	0.01	0.01	0.01
pH (Hanna)		0.05	0.04	0.07	0.04	0.06	0.05	0.04	0.07	0.06
GIS Analysis Year										
CEMP Priority										
High, Medium, Low		Medium	High	High	High	Medium	Medium	High	Low	Low
Trend Analysis										

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Are we done yet?

Beaver Creek
2002-2010
112 Site Visits
Kyra & Neil Wagner

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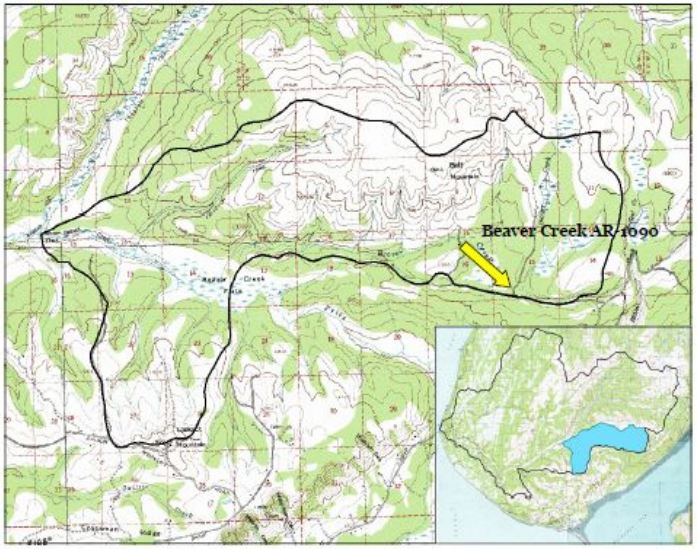
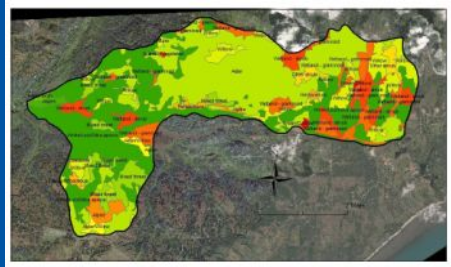
Baseline Reports

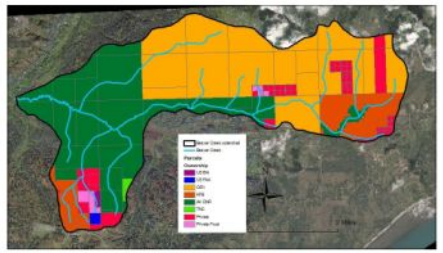
BEAVER CREEK: OVERVIEW

Beaver Creek is a tributary to the Anchor River on the lower Kenai Peninsula. The Anchor River watershed, outlined in black on the inset in the map below, covers 225 square miles and drains into the Cook Inlet. Communities within the Anchor River watershed include Homer, Anchor Point, and Nikolaevsk. The Beaver Creek watershed, highlighted in blue in the inset and outlined in the larger map below, covers 20 square miles. Beaver Creek and its numerous tributaries run nearly 30 miles, with 12.5 miles of anadromous streams (see the map of anadromous stream classifications on page 15). The Beaver Creek CEMP Site, AR-1090, marked with a yellow arrow on the map below, is located almost 2 miles down Hutler Road and below the culvert crossing for Bald Mountain Avenue (GPS Coordinates: 59° 44.314' N, 151° 18.371' W). The map on the right show the vegetation throughout the Beaver Creek watershed. Wetland vegetation types are in red and orange, and are labeled as such. 34.7% of the Beaver Creek watershed is classified as wetlands Learn more about the Anchor River Watershed in the Anchor River Watershed Action Plan online at: http://inletkeeper.org/salmon/AnchorRiverWatershedActionPlan.pdf





Left: topographic maps from United States Geologic Survey. Watershed boundaries: National Resources Conservation Service Watershed Boundary Database. Above: Vegetation type map: Kenai Fish and Wildlife Service. Basemap: ArcGIS Server Service. Quickbird satellite imagery, 2003.



Watershed boundaries are from the National Resources Conservation Service Watershed Boundary Database, 2010. Basemap: ArcGIS Server Service. Quickbird satellite imagery, 2003. Ownership map from the Kenai Peninsula Borough GIS Division, 2010.

Watershed boundaries are from the National Resources Conservation Service Watershed Boundary Database, 2010. Basemap: ArcGIS Server Service. Quickbird satellite imagery, 2003. Anadromous species and stream data are from the Alaska Dept. of Fish & Game Anadromous Waters Catalog, 2009.

Homer Soil & Water Conservation District

Baseline Reports

BEAVER CREEK:VOLUNTEER MONITORS

Neil and Kyra began monitoring Beaver Creek on January 26, 2003. They continued monitoring this site until the baseline dataset was completed in early-2010. They have donated a combined 302 hours of time to establish a baseline water quality dataset for Beaver Creek. They have also participated in bioassessment efforts at Beaver Creek, and have photo documented their efforts with some classic pictures.

We highlighted Neil and Kyra's great work in Inletkeeper's 2008 Winter Newsletter: Known around town as the "Sustainable Homer Lady", you may have spotted Kyra Wagner at the Farmer's Market. You may have noticed that her partner in crime, Neil Wagner, was a co-author for the City of Homer's Climate Action Plan. It is no surprise that this pair has also been involved in the water quality monitoring efforts of Cook Inletkeeper – an effort they have been involved

Neil and Kyra Wagner, Volunteer Monitors at Beaver Creek from 2002-2010.

in since December 2002! Neil and Kyra monitor Beaver Creek site AR-1090. When they first started monitoring Beaver Creek, they lived up on Bald Mountain, which is just a short way away from the site. They've lived in town for a number of years now, but continue to drive out there on monitoring days. When asked what they liked most about monitoring, Kyra replied "it's such a great excuse to get outside! In the

Kyra and Neil were dedicated winter water quality monitors. Often armed with axes and ice picks, they would work through the ice to collect water samples even on the coldest winter days.

winter, we'll drive up on Saturday, spend the day skiing and snowshoeing, spend the night in a cabin with some hot chocolate and then monitor our site on the way out on Sunday." Additionally, they've enjoyed watching a beaver build a dam at their site. Until about two years ago, Neil and Kyra's site was a bioassessment site, but since the beaver dammed it up, it has been too deep to collect insects. Neil explained that he spent about 25 years on Bald Mountain, and remembers both when there were many beavers in the area, and when trappers showed up and the populations declined. They are pleased that this beaver has stuck around, even if it flooded their monitoring site. Thanks so much, Neil and Kyra, for all your hard work!

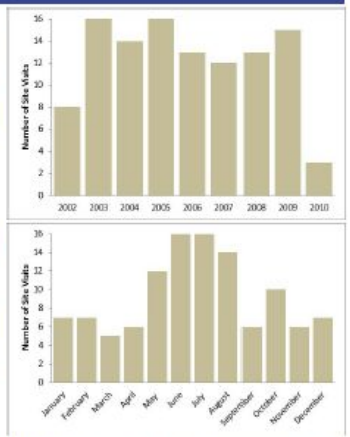
BEAVER CREEK:WATER QUALITY MONITORING 2002-2010

Baseline water quality monitoring began on June 6, 2002 and concluded on March 29, 2010 with a total of 112 observations. The figures on the right show these site visits broken down by year (top) and by month (bottom). Neil and Kyra collected complete datasets (12 or more site visits) in 7 of 8.5 years of monitoring. Each month is represented (bottom graph), by at least 5 site visits.

Inletkeeper staff and volunteers monitored aquatic insect communities twice per summer at Beaver Creek from 2002-2009. Sampling occurred in June only in 2002 and 2007, and no bioassessment was done in 2008. For reporting purposes, we have only used bioassessment data from 2004-2009 due to a change in protocols between the 2003 and 2004 sampling. Raw data from all years can be found online at Inletkeeper's website (http://www.inletkeeper.org).

Continuous temperature monitoring occurred at Beaver Creek in 2007. A temperature data logger was placed in Beaver Creek on June 25 and was removed on September 30, 2007. Water temperature was recorded every 15 minutes during this time period. Results from this effort are included on page 20, Beaver Creek: Temperature.

All water quality exceedences are noted in the respective sections and together in the Future Monitoring pages of the report (38-39).



Top: Number of site visits to Beaver Creek by year, from 2002—2010. Bottom: Number of site visits to Beaver Creek by month from 2002 – 2010.

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Baseline Reports

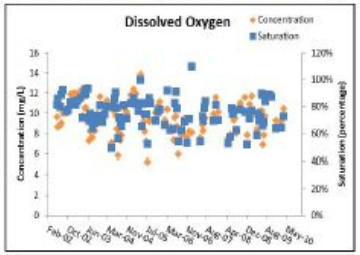
BEAVER CREEK: DISSOLVED OXYGEN

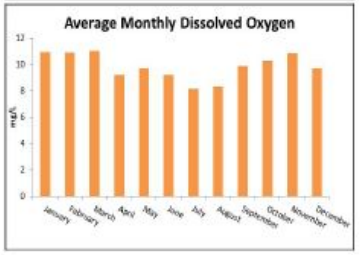
CEMP monitors the levels of dissolved oxygen (DO) in our streams. Oxygen is needed by fish and other aquatic organisms to live. We measure DO using a chemical titration, and express it as a concentration of milligrams of oxygen per liter of water. The amount of oxygen that can be dissolved in water is temperature dependent; colder water can hold more oxygen. Therefore we also look at how saturated the water is with oxygen, that is – how much oxygen does it hold compared to what it could hold at that temperature. Saturation is expressed as a percent.

CEMP monitors measure dissolved oxygen using the Winkler Titration. Most of the chemical reagents in their monitoring kits are for this test.

Changes in dissolved oxygen can be caused by turbulence and interactions with the air (like in a waterfall), decaying plant matter, sewage, and effluent wastewater inputs. High levels of photosynthesis and increased mixing with the air through riffles and small waterfalls could increase saturation levels above 100%, creating a condition of supersaturation.

The concentration of dissolved oxygen during 100 site visits at Beaver Creek ranged from 5.3 mg/L to 13.8 mg/L. Dissolved oxygen saturation ranged from 50% to 110%, and on average DO saturation was 76% at Beaver Creek. The lowest average DO concentrations (mg/L) occurred in the summer months of July and August, with highest levels in March and November (see the middle figure for all monthly averages). DO concentrations exceeded state water quality standards (< 7.0 mg/L) 4 times and are shown in red in the data tables on pages 32-33. Low summer-





Top: All dissolved oxygen concentration levels (mg/L, orange) and saturation (%, blue) measured by CEMP monitors during site visits at Beaver Creek from June 6, 2002 to March 29, 2010. Bottom: Average dissolved oxygen concentration levels by month from CEMP site visits between 2002 and 2010.

BEAVER CREEK:TURBIDITY

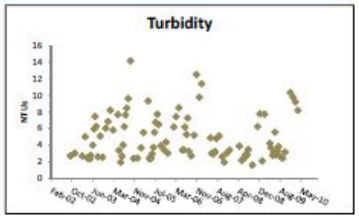
Turbidity is a measure of water clarity and describes the amount of light scattered or absorbed by water. Turbidity is measured in Nephelometric Turbidity Units (NTUs). Lower NTU values correspond to clearer water. Silt, clay, organic material, and colored organic compounds can all influence turbidity. Natural and human caused erosion, as well as storm water runoff can increase turbidity. Negative impacts from increased turbidity may include increased water temperatures, decreased habitat for fish and other aquatic organisms, and more opportunities for the growth of potentially harmful bacteria.

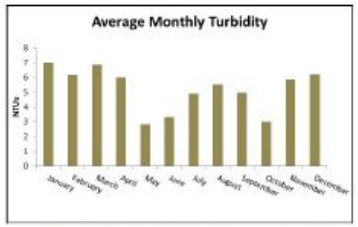
The state water quality standard for turbidity is related to natural conditions. CEMP data provide valuable information to establish what the natural turbidity conditions are for Beaver Creek.

CEMP monitors took turbidity samples during 100 site visits to Beaver Creek, beginning in 2003. Turbidity at Beaver Creek is generally low. Turbidity averaged 4.83 NTU and ranged from 1.61 NTU to 14.15 NTU.

Slightly higher turbidity occurred during winter and spring months, from December through April. Most CEMP streams experience higher turbidity during the spring break-up months when runoff and rainfall increase. Increases in winter turbidity may be due to sampling through the ice, which may introduce sediments into the sample.

An example comes from the site visit comments, recorded on January 31, 2010 (Turbidity = 9.78 NTU): "Axed down 6", water came up in the hole with lots of debris – don't know if it was suspended in stream or if it was stirred up by water rushing into the hole..."





Top: All turbidity data (NTU) were collected by CEMP monitors during site visits to Beaver Creek from June 6, 2002 to March 29, 2010. Water samples for turbidity analysis are collected in the field and analyzed in the lab using a LaMotte Turbidimeter. Bottom: Average turbidity (NTU) by month from CEMP site visits between 2002 and 2010.

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Baseline Reports

BEAVER CREEK: FUTURE MONITORING

Through CEMP, volunteers monitored baseline water quality at upper Beaver Creek from 2002-2010. This baseline report summarizes the chemical, biological, and physical data collected over these 8 years. Our monitoring efforts have shown overall high water quality in this salmon-bearing stream. Turbidity at this site is consistently below 10 NTUs, with only a handful of minor exceptions during spring months of heavy rainfall. Even during these times periods of high runoff our sampling has never shown turbidity above 14 NTUs. Bacteria levels are consistently low, with only one exceedence of *E.coli* occurring in March 2003. Summer dissolved oxygen levels have dipped below the state water quality standard once a year during 4 of the 5 years between 2005-2009. pH levels exceeded state water quality standards 25 times, with a minimum recorded pH of 5.86 which occurred in 2007. It is unclear why pH levels are low in this creek. Low values have been measured during every month of the year, and at least once every year. Wetland soils tend to be more acidic and may be influencing stream pH levels at this wetland-dominated site. This would be a good site to test methods for continuous pH monitoring to assess the frequency of low pH values.

Water temperature data collected with the alcohol-filled thermometer on Beaver Creek showed 8 exceedences of state water quality standards during site visits. Continuous temperature monitoring, however, indicated 22 exceedences in 2007 alone—considerably more than indicated by the volunteer monitoring alone. Beaver Creek is listed as an anadromous stream; King and Coho salmon and Dolly Varden have been documented around the upper Beaver Creek CEMP site. As stream temperatures are likely to increase with increasing air temperatures due to climate change, Beaver Creek is a good candidate for long-term continuous temperature monitoring.

There was minimal development in the upper reaches of the watershed during the 8 years of our monitoring efforts. However, in the past 2 years new access roads have been built on the lower slopes of Bald Mountain, downstream from the CEMP site. Many of the private parcels surrounding the headwaters of upper Beaver Creek are currently undeveloped or have light seasonal use. As the population of Homer grows, there is a potential for increased use of this area and increased impact on Beaver Creek.

pH		
Date	Time	pH
11/24/2002	12:00 PM	5.98
9/25/2005	10:20 AM	6.30
4/25/2004	4:15 PM	6.35
10/26/2003	11:15 AM	6.37
6/24/2007	11:15 AM	5.86
5/10/2009	7:35 AM	6.01
4/26/2009	10:00 AM	6.05
5/31/2009	8:55 AM	6.05
7/8/2007	12:27 PM	6.07
1/28/2007	1:00 PM	6.09
9/28/2008	10:00 AM	6.15
2/22/2009	11:15 AM	6.18
8/9/2009	10:00 AM	6.19
10/26/2008	12:57 PM	6.20
12/31/2006	2:20 PM	6.25
1/25/2009	10:45 AM	6.26
8/27/2006	11:50 AM	6.30
7/22/2007	4:30 PM	6.30
12/28/2008	4:00 PM	6.30
11/30/2008	1:05 PM	6.32
6/14/2009	9:05 PM	6.34
5/15/2007	11:44 AM	6.38
7/26/2008	10:30 AM	6.39
8/10/2008	11:10 AM	6.39
9/27/2009	12:50 PM	6.46

Above and on the right: water quality exceedences at Beaver Creek during CEMP monitoring from 2002-2010.

Dissolved oxygen		
Date	Time	mg/L
7/23/2005	5:45 PM	5.3
7/12/2004	10:04 AM	5.8
8/13/2006	9:45 PM	6.0
7/12/2009	12:30 PM	6.9
Bacteria		
Date	Time	CFU/100mL
3/30/2003	2:40 PM	250
Water Temperature (thermometer)		
Date	Time	Temperature (celcius)
7/10/2005	4:15 PM	16.5
6/29/2003	4:15 PM	16.0
7/23/2005	5:45 PM	15.0
8/1/2002	2:45 PM	14.5
7/12/2004	10:04 AM	14.0
7/14/2003	10:00 AM	14.0
7/6/2009	1:55 PM	14.0
7/12/2009	12:30 PM	

Inletkeeper staff and volunteers maintained a visible presence during the culvert replacement project at the upper Beaver Creek site during the summer of 2009. Baseline water quality reports for CEMP sites provide a foundation for the protection of water quality in our watersheds.

Future Monitoring Recommendations

- Do a Stream Walk every other year (in summer), starting in 2012, with a minimum of 4 photographs taken from established photo points. Incorporate a basic invasive species assessment in partnership with the Homer Soil & Water Conservation District.
- Do a GIS analysis when new satellite images become available to Inletkeeper staff to assess new developments and changes in impervious cover.
- Consider continuous pH and temperature monitoring at this site.
- Resume chemical and biological water quality monitoring if impervious cover becomes greater than 2% in the upper portion of the watershed, in the event of a major spill or other environmental disaster in the upper watershed, or there are other qualitative indicators that water quality may be changing.

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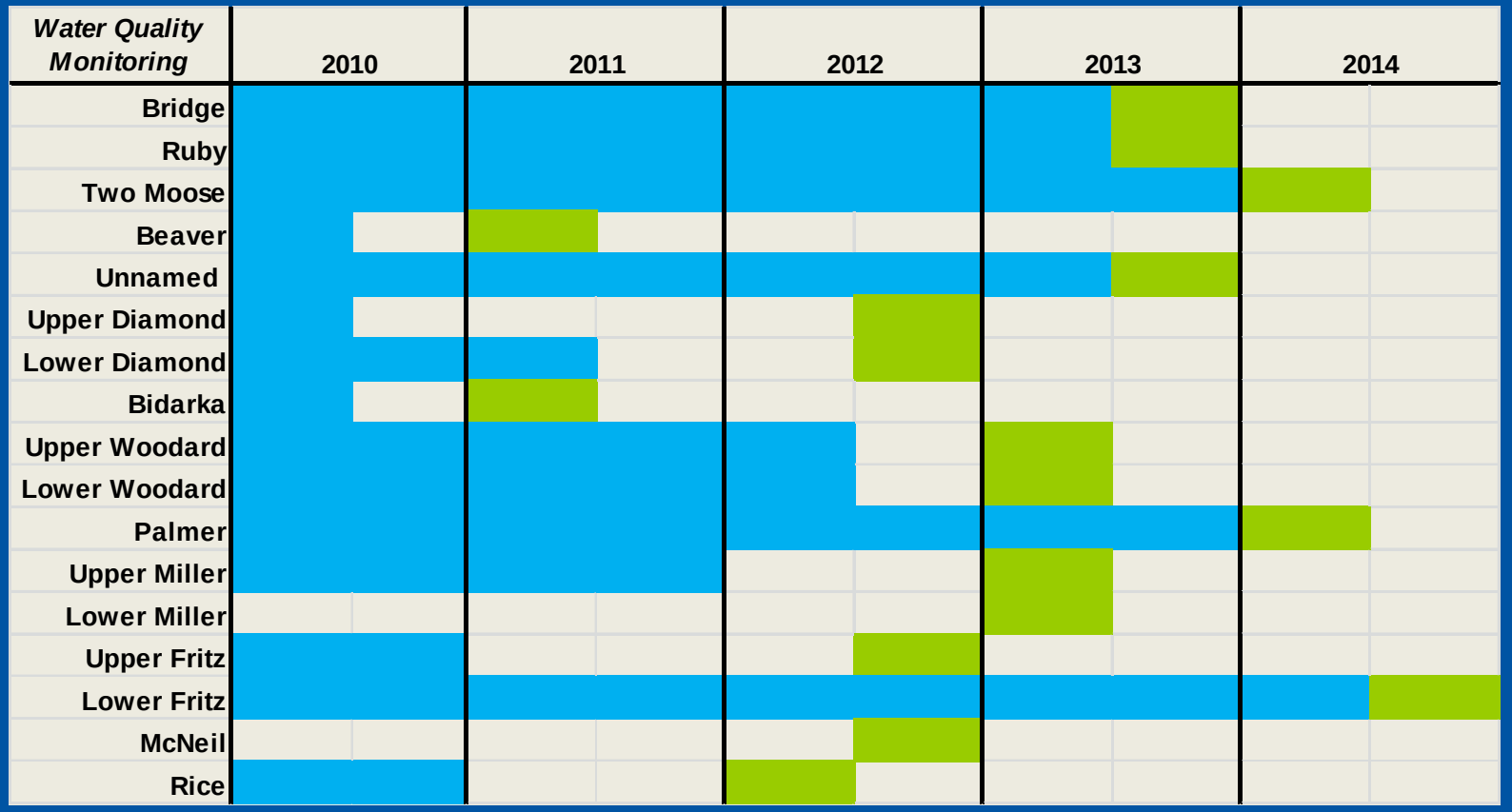

Abbey Kucera	Debbie Schmidt	Jessica Lambert	Mary Pollack	Scott Miller
Adele Groning	Derek Reynolds	Jessica Marx	Matt DeCaro	Scott Owens
Alan Parks	Diana Carbonell	Jesus Trejo	Maureen Powers	Scott Simmons
Alexei Basargin	Diane McBride	Jim Brown	Megan Gajkowski	Sharyn Allyson
Alice Velsko	Don Susens	Jim DePasquale	Melaine Dufur	Shelly Laukitis
Alissa Frye	Donna Melchoff	Jim Levine	Melissa Roberts	Sonja Lee
Alix Chartier	Dorothy Melambianakis	Jimmie Wiles	Meredith Hawkins	Sonja Lee
Ami Riscassi	Doug Krause	Joan Dunn	Merrit Mitchell	Stacy Urich
Amy Busch	Duane Christensen	Jocelyn O'Neil	Michael C. Forbes	Stan Eller
Amy Stockburger	Duane Howe	Joe Lawlor	Michael Dirks	Stephan Pollack
Amy Velsko	Edan Badajos	Joel Cooper	Michael Haines	Stephan Sefcik
Andrew McLeod	Elaine Velsko	John Menke	Michael Ice	Stephan Tricamo
Andy Anderson	Elisa Russ	John Mitchell	Michael McKinney	Steve Foley
Angela McKinney	Elizabeth Wasserman	John Mouw	Mike Geagel	Steve Hackett
Angela Middleton	Elsa Peters	Jonas Akers	Mike Gracz	Steve Harness
Anita and Denali Critchett	Emilie Otis	Jonathan Lee	Mike Hayes	Steve Soistman
Anna Sansom	Emily Ward	Josh Brann	Mike O'Meara	Steve Wilkins
Anne P. Wieland	Eric Schmidt	Josiah Campbell	Mike Stockburger	Susan J. Mumma
Barry Andres	Erica Dibietz	Judi Nestor	Milli Martin	Suzanne Greenwood
Beth Lambert	Erin Babcock	Judy Hamilton	Miranda Weiss	Tamara Stolzenthale
Bill Shelton	Frank Vondersaar	Karen Howorth	N. Gabriel	Tim Robertson
Bob Burns	Fred M. Harnisch	Karen West	Nancy Hillstrand	Tina North
Bob Forrest	Gabe Ritchie	Karl Pulliam	Nat Seaman	Toby Wheeler
Bob Shavelson	Gabriel Sanchez	Kate Crowley	Neil Wagner	Todd Gustafson
Bobby Jones	Gary Kulesza	Kathy Biessel	Nicky Szarzi	Tom Bowden
Bonita Banks	Gene Long	Katie Connor	Nicole Szarzi	Tom Collopy
Brad van Appel	Gina Creedon	Kelly Hill	Noelle McCullough	Tom Evans
Brandon Moonin	Ginnie Litchfield	Kevin Bell	Norbert Neumann	Tom Lewellen
Bree Murphy	Gregg Bafundo	Kevin Ko	Ole Andersson	Tom Wallace
Brenda Dolma	Hans Klausner	Kim Cooney	Oriana Badajos	Tori Lentfer
Brenda Stoops	Heather Beggs	Kristen Brown	Pam Russell	Tracy Parsons
Brent Fagan	Heather Davis	Kristen Kuehl	Pat Arnold	Travis Waterbury
Brian Taylor	Heather Patterson	Kyra Wagner	Pat Cahill	Trinket Gallien
Bridget Paule	Heather Welle	L Susens	Pat McNamara	Wayne Stanley
Brooks Guetschow	Heidi Pancake	L.A. Holmes	Patricia Cue	Wendy Kroll
Byron Sansom	Helen Strothers	Lani Raymond	Patrick Houlihan	Will Schlein
Cal Schmidt	Heloise Chenelat	Laura Brooks	Patty Graham	Willy Dunne
Caren Graupe	Holly Aderhold	Laurie Daniel	Paul Jackson	
Carla Milburn	Holly Davis	Lee Dewees	Paul McCollum	
Carla Stanley	Hunter McCallum	Leslie Hafemeister	Peggy Haughey	
Carol G. Harding	Ingrid Harrald	Linda Coila	Peggy Kleinleder	
Caroline Kroll	Isreal Kettle	Linda Fieler	Peter Velsko	
Cassidy Soistman	J. Martin	Linda Soistman	Rachel Lord	
Cecil Cheatwood	Jack Hughes	Lindsay Wellmann	Randall Howard	
Chad McKinney	Jacob Fuggazzotto	Lindsay Winkler	Rebecca Blanchard	
Chlaus Lotshper	Jacob Keller	Lisa Ruoff	Rebecca Boone	
Chris Russ	Jacquelynn Uwekoolani	Lisa Stratford	Rebecca Swearingen	
Christine S'gro	Jaime Gable	Liz Diament	Ric A. Ingles	
Christy Celetano	Jaime Preston	Liz Lee	Rich Kleinleder	
Clare Kryshak	James Van Oss	Liz Villarreal	Richard (Toby) Tyler	
Claus Lotscher	Jan Flora	Liza Mitchell	Richard Krieger	
Craig Phillips	Jane Handy	Lynda Elaine	Rick Foster	
Cris Rideout	Jane Lewis	Lynn Spence	Rob Fisk	
Cy St-Amand	Jane Middleton	Marcia Payton	Rob Spence	
Cynthia Foster-Munsen	Janel Rideout	Marcus York	Robert Wagy	
Dale Banks	Janet Shepard	Marie Herdegen	Roger Jones	
Danny Elster	Janice Schwartz	Marietta Paulus	Roger Minton	
Dave Erikson	Jeff Jasperson	Marilyn Sigman	Ronna Scanlon	
Dave Morris	Jeff Szarzi	Mark Donohue	Rosemary Foster	
Dave Seaman	Jennifer Oliveria	Mark Lodge	Ryan Campbell	
Dave Swarthout	Jenny Dunne	Marla McPherson	Sandy Murray	
David Davis	Jere Murray	Marta Meengs	Sara Boone	
David Jones	Jeremiah Parsons	Martha Briscoe	Sara Thompson	
David Raskin	Jeremy Kobor	Mary Donlon	Sarah Carroll	
Debbie Rutzebeck	Jerry Haughey	Mary Frische		
	Jessica Bussler			

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