Improving Water Quality in the Samish Bay Watershed

June 3, 2006

WASHINGTON STATE DEPARTMENT OF ECOLOGY

Water Quality in the Samish Basin

- Bacteria in the rivers, Samish Bay affect recreation, shellfish harvest
- State & local collaboration to reduce pollution
- Monitoring - why and where? (Ecology)
- Local agency partners
  - Skagit Conservation District
  - Skagit Health Department

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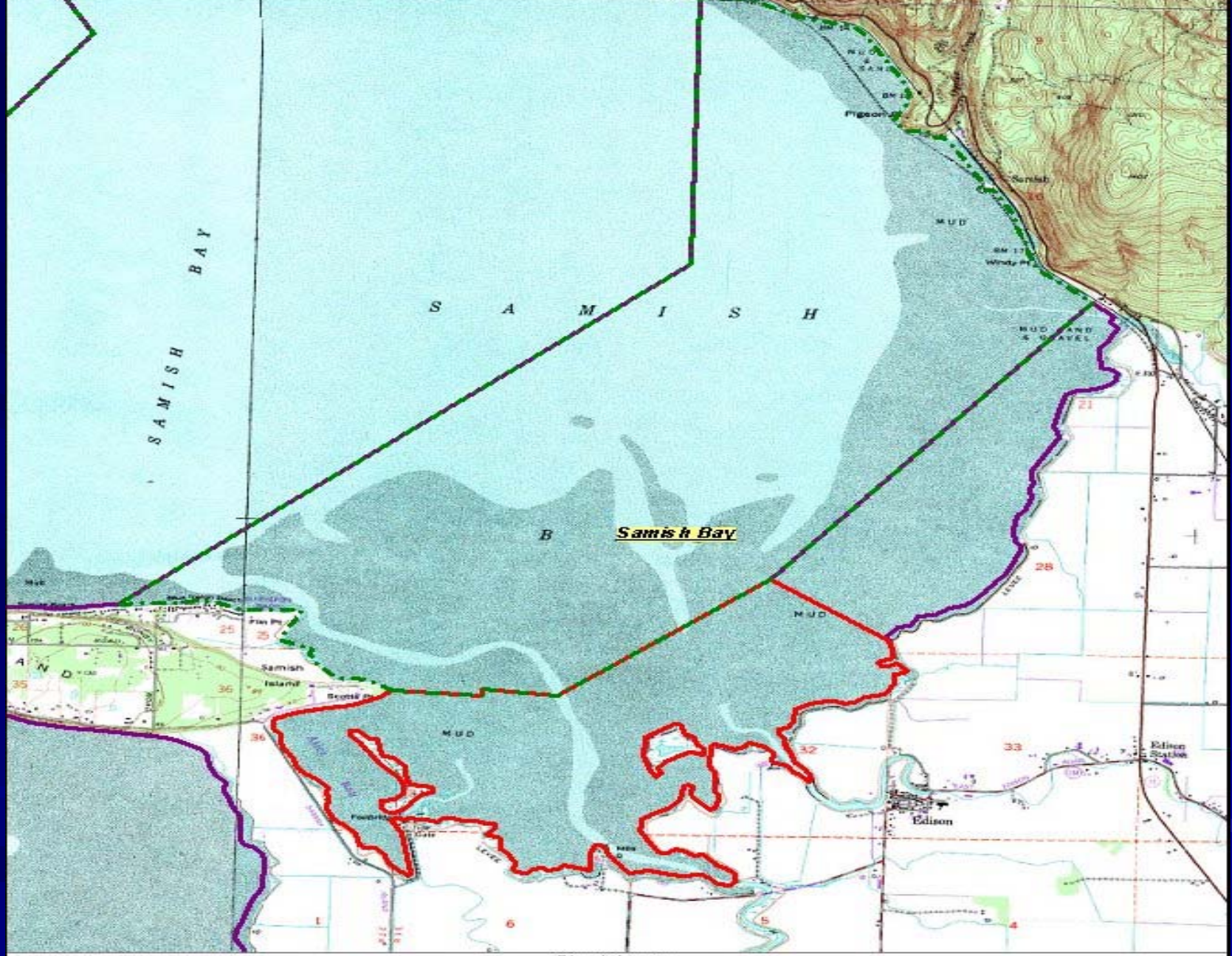

Disclaimers

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Maps may change without notice.
Maps show commercial classifications only.
For recreational beach classification see:
http://ww4.doh.wa.gov/gis/biotoxin.htm
Maps do not show biotoxin closure information.
Maps are not intended for navigational purposes.

Samish Bay
2003 shellfish production

- ~ 3 million live oysters
- ~ 2.5 million shucked oysters
- ~ 7.5 million Manila clams
- Value = $3.2 million

Samish Bay Recreation

- Fishing, shellfishing and hunting
- Walking, birding, tourism
- Swimming? And boating

Upriver Water Quality Data

- County monitored 24 locations in Samish (2000 – 2003); shows bacteria pollution
- County-wide monitoring program continues 11 stations in the Samish Watershed – only 1 meets state bacteria standards
- Ecology station on Samish at Hwy 99 has exceeded bacteria standard 4/5 yrs

Shellfish-related Illnesses

- April 1994 40-40 people reported illness after eating Samish Bay shellfish. Health Dept closes Bay to harvesting.
- 1994-1995 Blanchard septic repairs & Edison community system.
- November 2003 10-14 people reported illness after eating Samish Bay shellfish. Human virus implicated. DOH closes beds.

How Samish Bay Water Quality Can Be Improved

- Determine bacteria sources?
- More monitoring helps us look at ALL the land uses and sources
- Local agencies, Ecology work together to assist landowners
- Each landowner is responsible
- *Thank you Edison and Blanchard!*

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Agricultural Areas – BMP Successes

- Chehalis watershed study: www.ecy.wa.gov/biblio/0203015.html

- Evaluated effectiveness of BMPs installed along creeks
- What worked – fencing, off-stream watering, riparian buffers
- Continued oversight, maintenance necessary

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Samish Watershed's Recent Successes

- Edison community system replaced failing individual septic systems: Blanchard repaired individual septics

- Local, organized effort paid off

County, Ecology support

- Bay water quality at mouth of Edison Slough now meets standards!

WA Department of Ecology
Samish Bay Fecal Coliform TMDL Monitoring Program

Project Manager and Field Lead: Trevor Swanson

Alternate Field Leads: Chad Brown

and Craig Homan

What are fecal coliform (FC) bacteria?

– Subset of coliform bacteria that is present in the gut or feces of warm-blooded animals

Why does Ecology sample for FC bacteria?

- Good indicator species
  - indicates the likelihood that pathogens (disease-causing organisms) are in the water
- FC is easy to sample in field and count in lab
  - Pathogenic organisms are hard to ID and isolate
- WA state has set FC standards that surface waters must meet to protect public health and beneficial uses
- We don’t want people to get sick

Potential Sources of FC bacteria

- Failing on-site septic/sewage systems
- Point Sources (WWTPs, illicit discharges)
- Stormwater runoff
  - Pet wastes
  - Road runoff
  - Agricultural runoff (dairy, cattle, etc.)

Potential Sources of FC bacteria

- Increased recreation and insufficient sanitary facilities
  - King salmon run, bird watching/hunting, windsurfing, hang gliding, hiking, kayaking etc.

Potential Sources of FC bacteria

- Boater waste (liveaboard & transient)
- Wildlife (waterfowl, seals etc)

Samish Bay Watershed Sampling - Why?

- Section 303(d) of the federal Clean Water Act requires the WA state Dept. of Ecology to prepare a list of all surface waters in the state that do not meet water quality standards.
- Ecology is then required to perform a TMDL study on waterbodies on that list

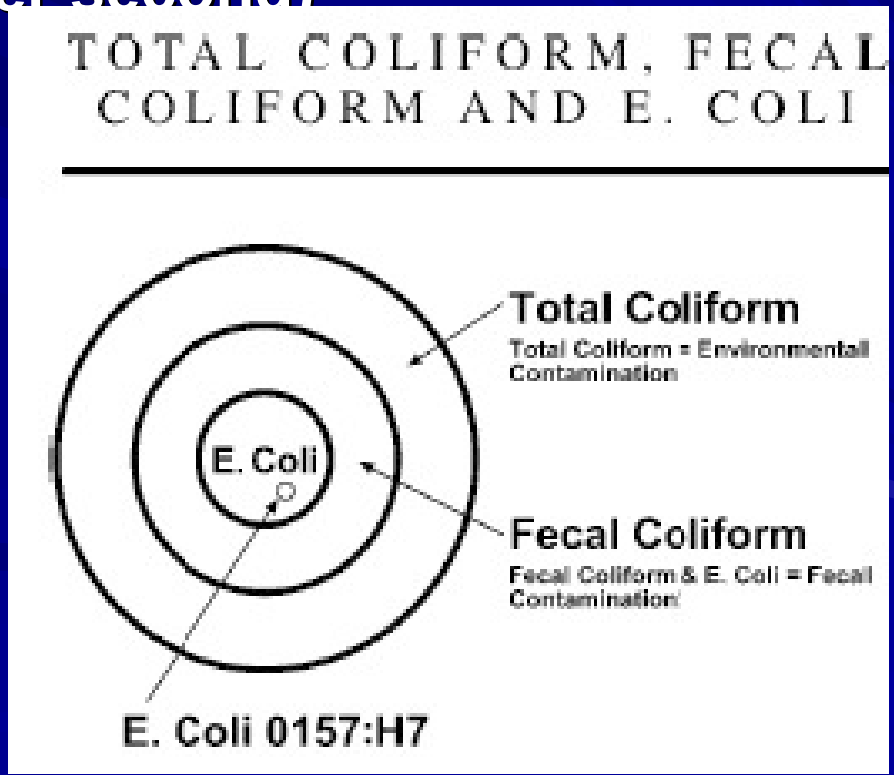
- Washington's 2004 303(d) list includes segments of:
  - Samish Bay
  - Samish River
  - Edison Slough
  - Thomas Creek
  - Friday Creek
  - unnamed slough to Samish Bay


Chuckanut Bay
Watershed Boundary
Lake Whatcom
Samish Lake
Reed Lake
Cain Lake
Larrabee State Park
Wickersham
Ennis Creek
Samish River
Whatcom County
Skagit County
Oyster Ck
Silver Ck
Alger
Friday Ck
Parson Creek
Dry Creek
Thunder Creek
Thornwood
Prairie Rd
Blanchard
Colony Rd
Colony Ck
Samish Bay
Samish Island
Alice Bay
Old Hwy 99
Hatchery
Swede Ck
Bow
Edison
Bow Hill Rd
Edison Slough
Padilla Bay
Sunset Rd
Thomas Rd
Bayview Edison Rd
Ershig Rd
Samish River
Thomas Ck
Wollard Creek
Allen West Rd
Allen
Farm to Market Rd
Avon-Allen Rd
Sedro Woolley
WRIA 03
Legend
Major streams
303d listed - FC (2004)
Samish Bay Watershed
0 1 2 3 Miles
WA State Dept. of Ecology, 2005

Samish Bay Watershed
What Is Being Measured?

- Fecal coliform at all sites
- E. Coli at selected sites
- Salinity
- Streamflow (cubic feet per second)

- Turbidity
- Dissolved Oxygen
- Temperature



Samish Bay Watershed Sampling - Where?

Generally -

- Blanket the watershed with ~ 32 sites, including all inputs to Samish Bay, (streams, sloughs, pump stations, etc.)
- More sites in Samish Bay at strategic locations (WA Dept. of Health will sample)

Specifically -

- Concentrate on 303(d) listed streams
- Other areas where historical data has shown high fecal coliform concentrations
- Bracket any probable sources or areas where FC is high.


Chuckanut Bay
Larrabee State Park
Watershed Boundary
Lake Whatcom
Samish Lake
Reed Lake
Cain Lake
Wickersham
Ennis Creek
Samish River
Whatcom County
Skagit County
Oyster Ck
Silver Ck
Alger
Friday Ck
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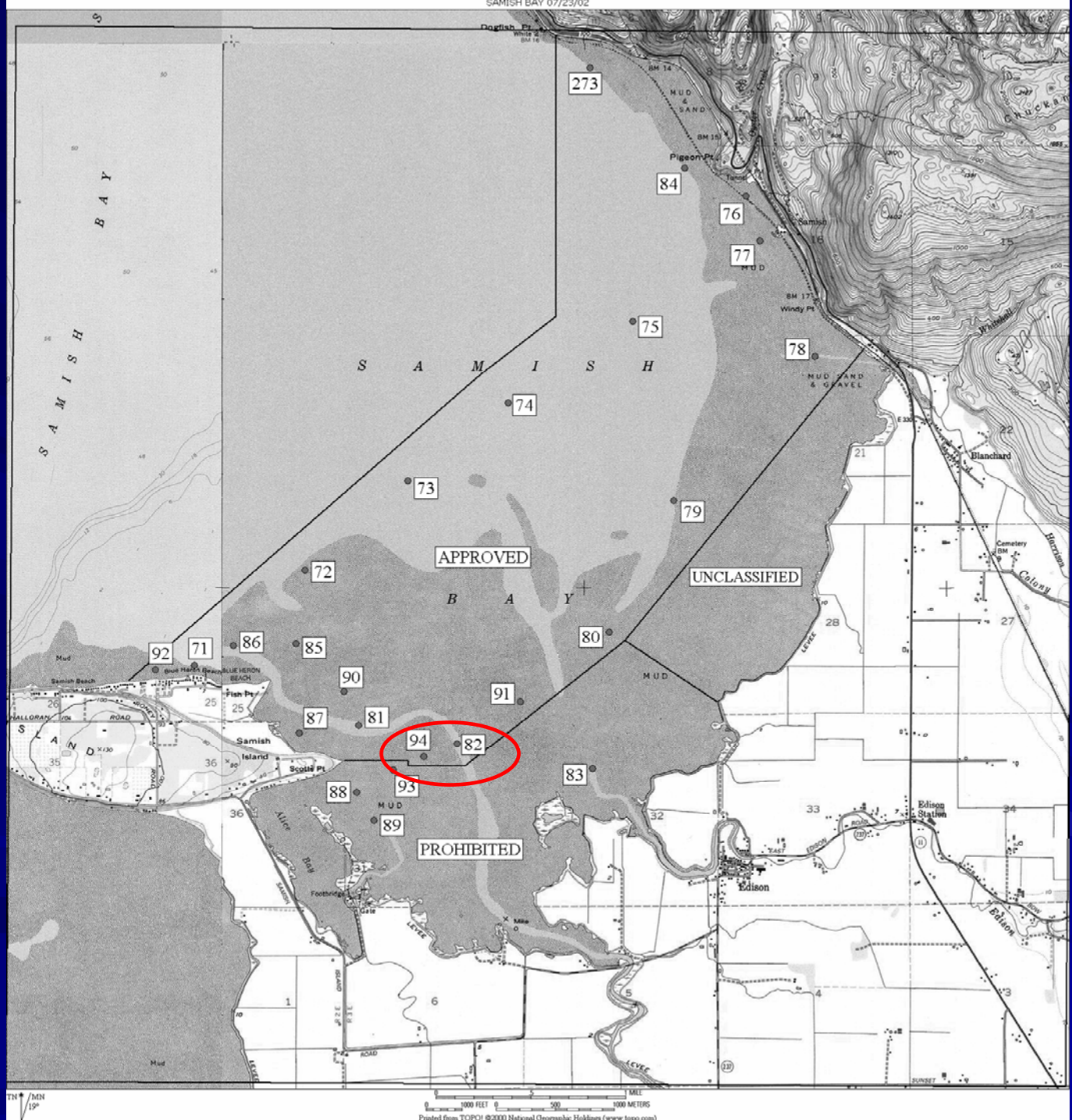
WRIA 03
Legend
Major streams
TMDL sampling sites
Samish Bay Watershed
0 1 2 3 Miles
WA State Dept. of Ecology, 2005


SAMISH BAY 07/23/02
S A M I S H B A Y
APPROVED
B A Y
UNCLASSIFIED
PROHIBITED
273
84
76
77
75
78
74
73
79
72
71
92
86
85
80
90
91
87
81
94
82
83
88
93
89
Dogfish Pt
Pigeon Pt
Samish
Windy Pt
Blanchard
Samish Island
Scotts Pt
Fish Pt
Blue Heron Beach
Samish Beach
Alice Bay
Edison
Edison Station
MUD
MUD SAND & GRAVEL
MUD & SAND
LEVEE
ROAD
Colony
Harrison
Whitehall
Footbridge
Gate
SUNSET

Samish Bay Watershed Sampling - When?

- Sampling started in February 2006 and continues through April 2007
- Ecology samples twice a month in freshwater
- DOH samples once a month in bay
- Separate storm sampling will occur when we get enough rain.

Samish Bay Watershed Sampling - How?

Sampling Strategy

- Fixed network of sites
  - 22 sites on mainstem and tributaries
  - 10 sites on Edison Slough and drainages to bay
- Bay FC sampling (DOH or Ecology)
  - Concurrent with freshwater sampling
- Storm sampling
  - Fixed network sampled twice during 4 or more rain events (0.3” defines a rain event)
- Segmented sampling to bracket stream reaches and land uses
- Keep track of bird populations and changing land use patterns

Samish Bay Watershed Sampling - How?

- Ensure good, accurate data by…
  - Meeting monitoring goals
    - Make sure we get enough data
    - Make sure samples are representative of what's really out there (spatially and temporally)
      - Sample dry and wet seasons
      - Sample storm events and during high and low flows
      - Sampling is non-biased, just tells there

Samish Bay Watershed Sampling - How?

- Make sure we are properly trained, follow sampling and lab protocols, and use correct equipment

Samish Bay Watershed Sampling - How?

Following a peer reviewed Quality Assurance Project Plan, specifically for the Samish Basin

What are the goals of the TMDL?

- Identify and characterize FC concentrations and loads from ALL inputs to Samish Bay
- Identify bacteria sources where possible (mostly upstream of RM 10 (Hwy 99)
- Establish how much FC needs to be eliminated at each site/reach to bring the Samish Watershed back into standards
- Identify relative contributions of FC so clean-up activities can focus on the largest sources

Issues

- Flows at tide gates, pump stations, ditches
- Access to private lands
- Background and natural conditions above RM 25 (birds, wildlife, marshes, etc.)

Alice Bay pump station

Edison Slough smart gate

Samish River mouth

What can you do?

- Check your septic system
- Manage livestock and consider what a farm plan can do for you
- Protect, add native trees along streams
- Bag pet waste & put in garbage
- Safeguard manure piles from rain and runo
- Manage waste while boating, fishing, recreating

Thanks!

Ecology Regional TMDL Lead
Sally Lawrence
slaw461@ecy.wa.gov
(425) 649-7036

Water Quality Standards

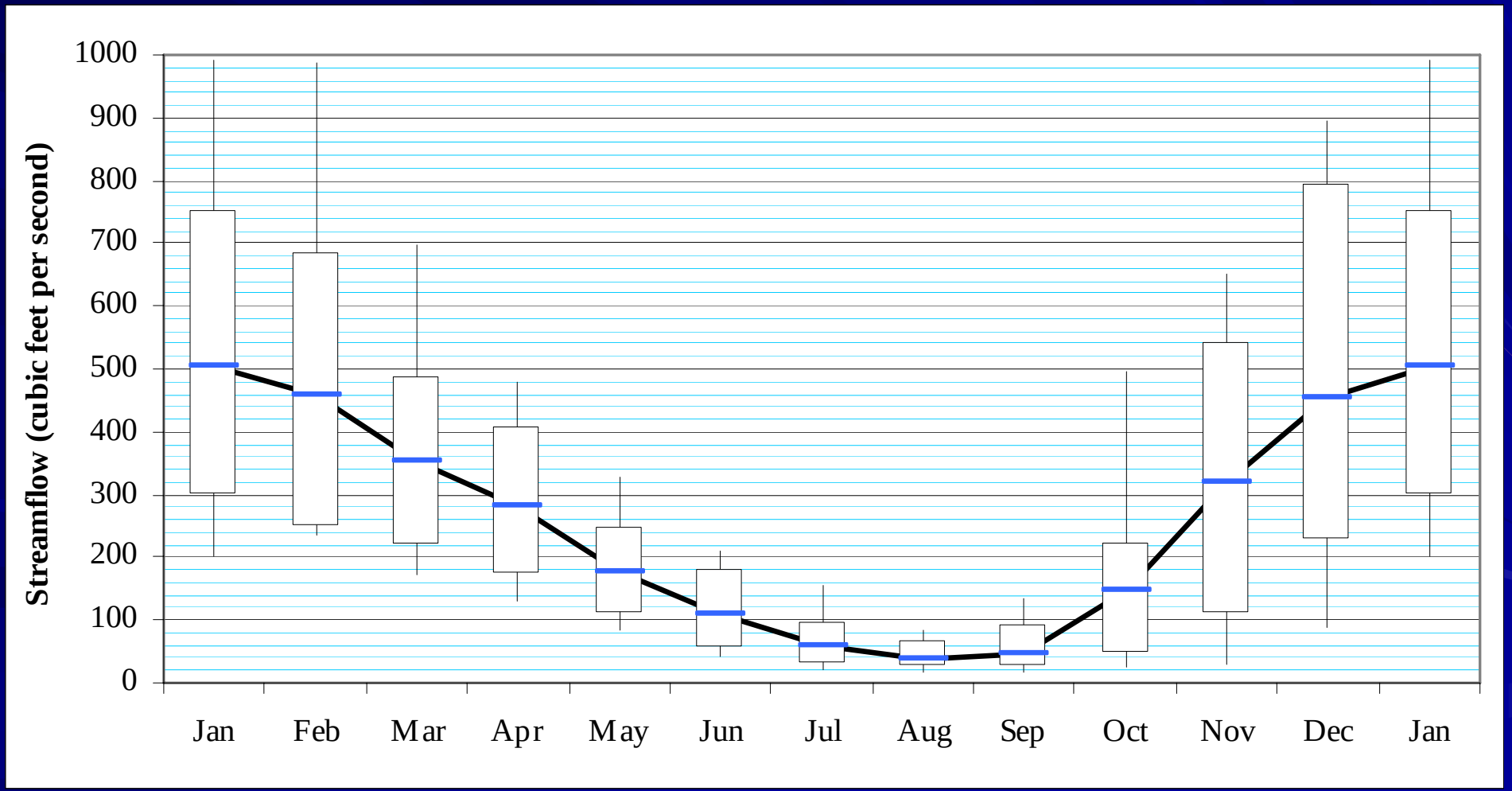
Samish Bay

- Class A (marine water)
  - Geomean <14 cfu/100 mL
  - <10% exceed 43 cfu/100mL

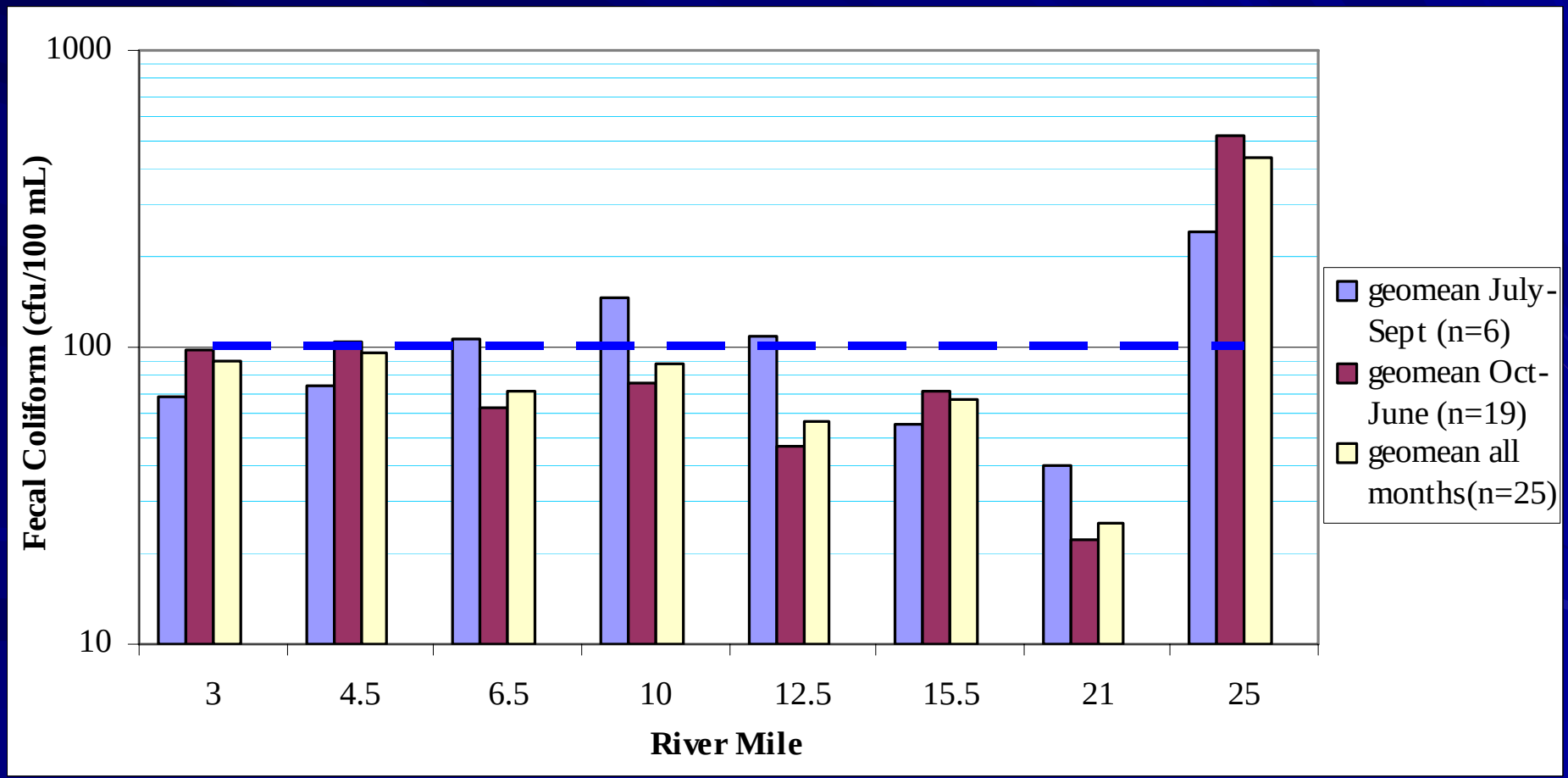
Samish River and drainages to Bay

- Class A (freshwater)
  - Geomean < 100 cfu/100 mL
  - <10% exceed 200 cfu/100 mL

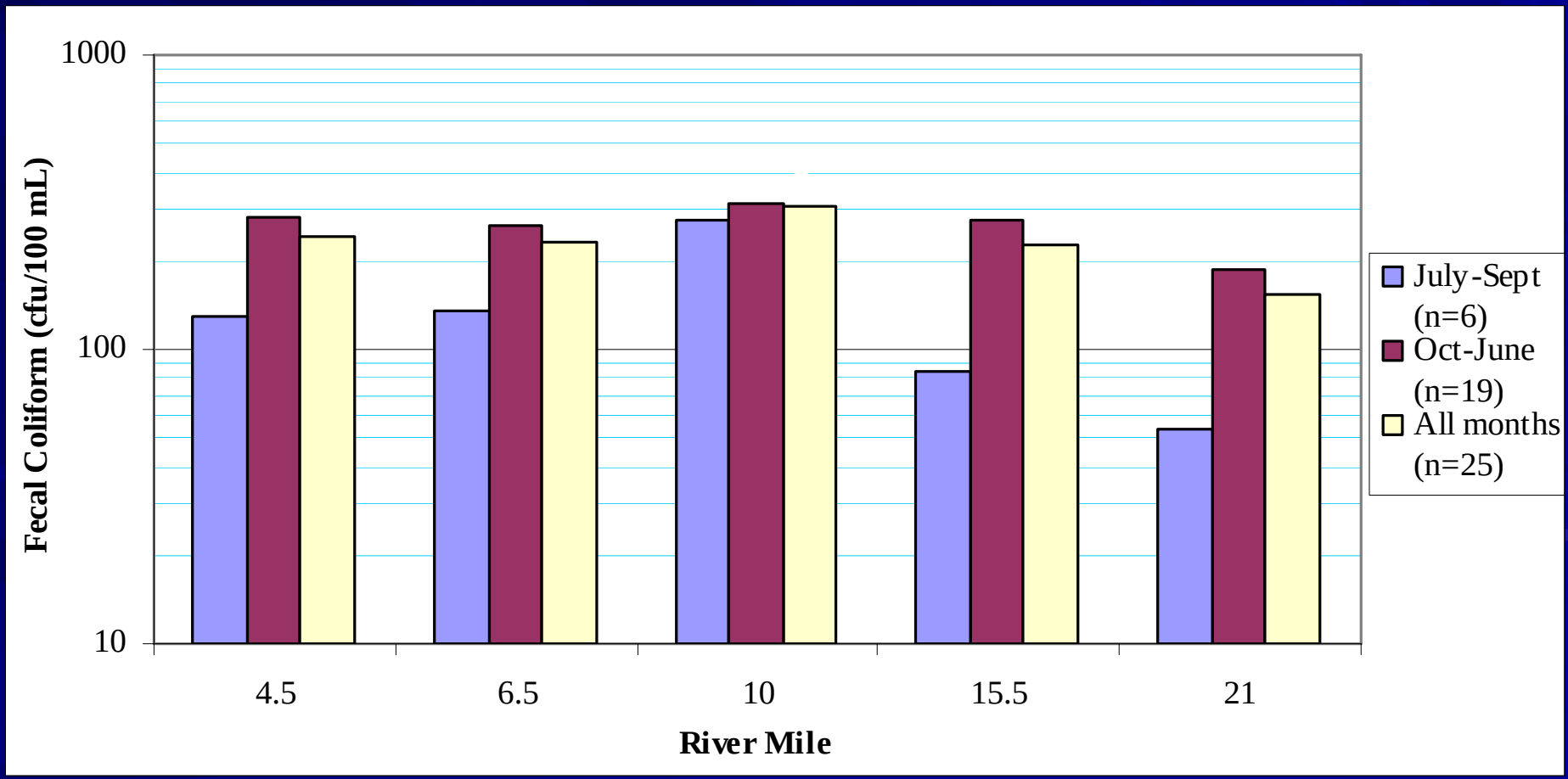
USGS Mean Monthly Flow (1943 to 2005)



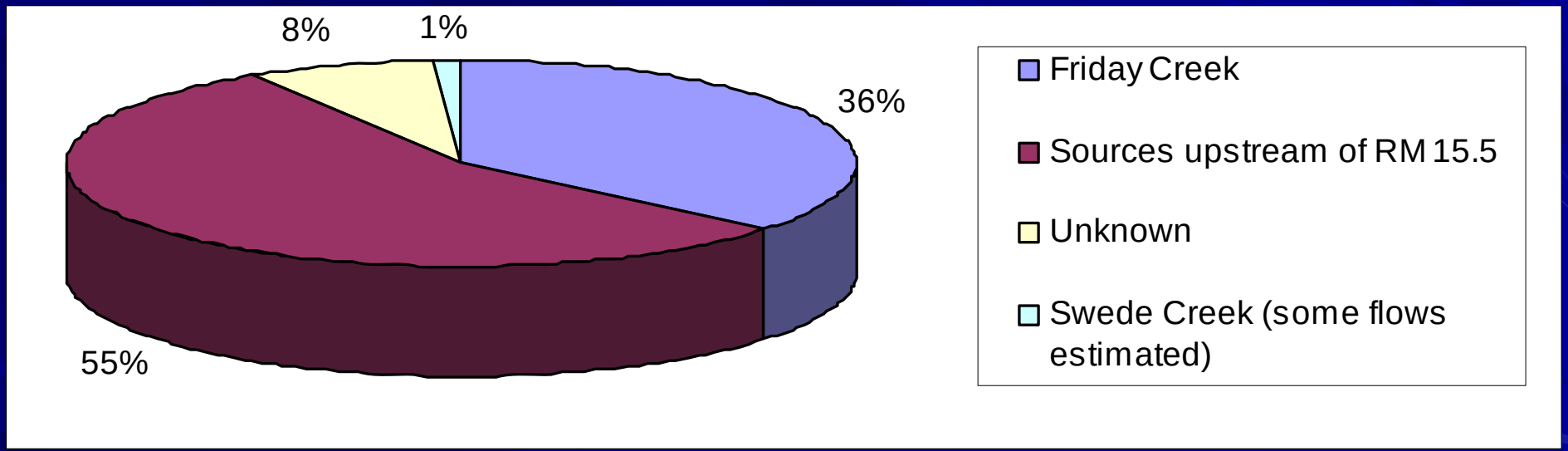
Samish River longitudinal geometric mean FC concentrations



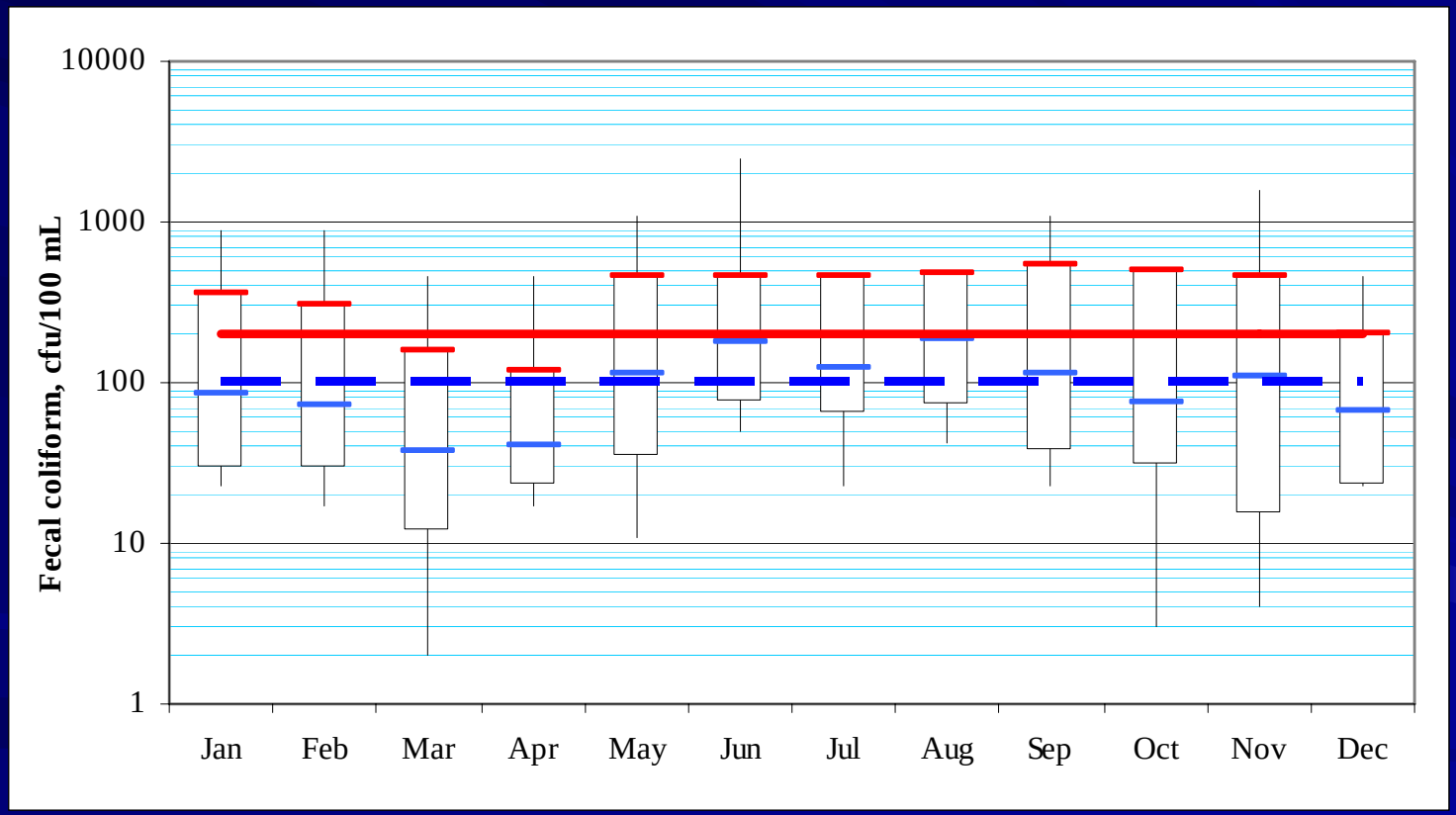
Samish River longitudinal FC loading profile

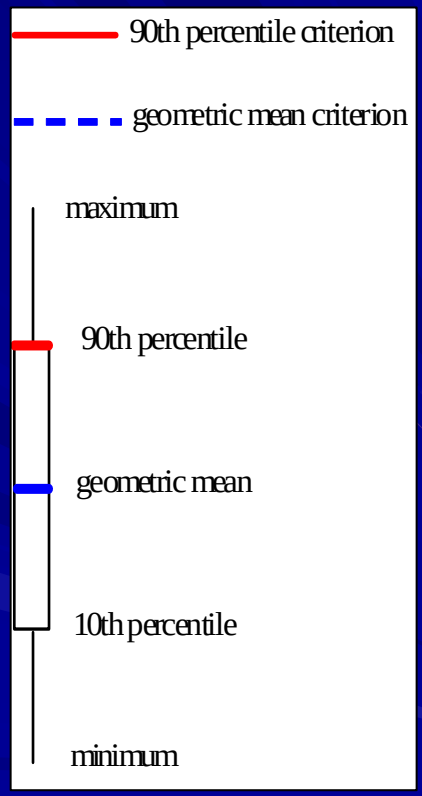


Relative contributions of annual FC to the Samish River at RM 10 (Hwy99)

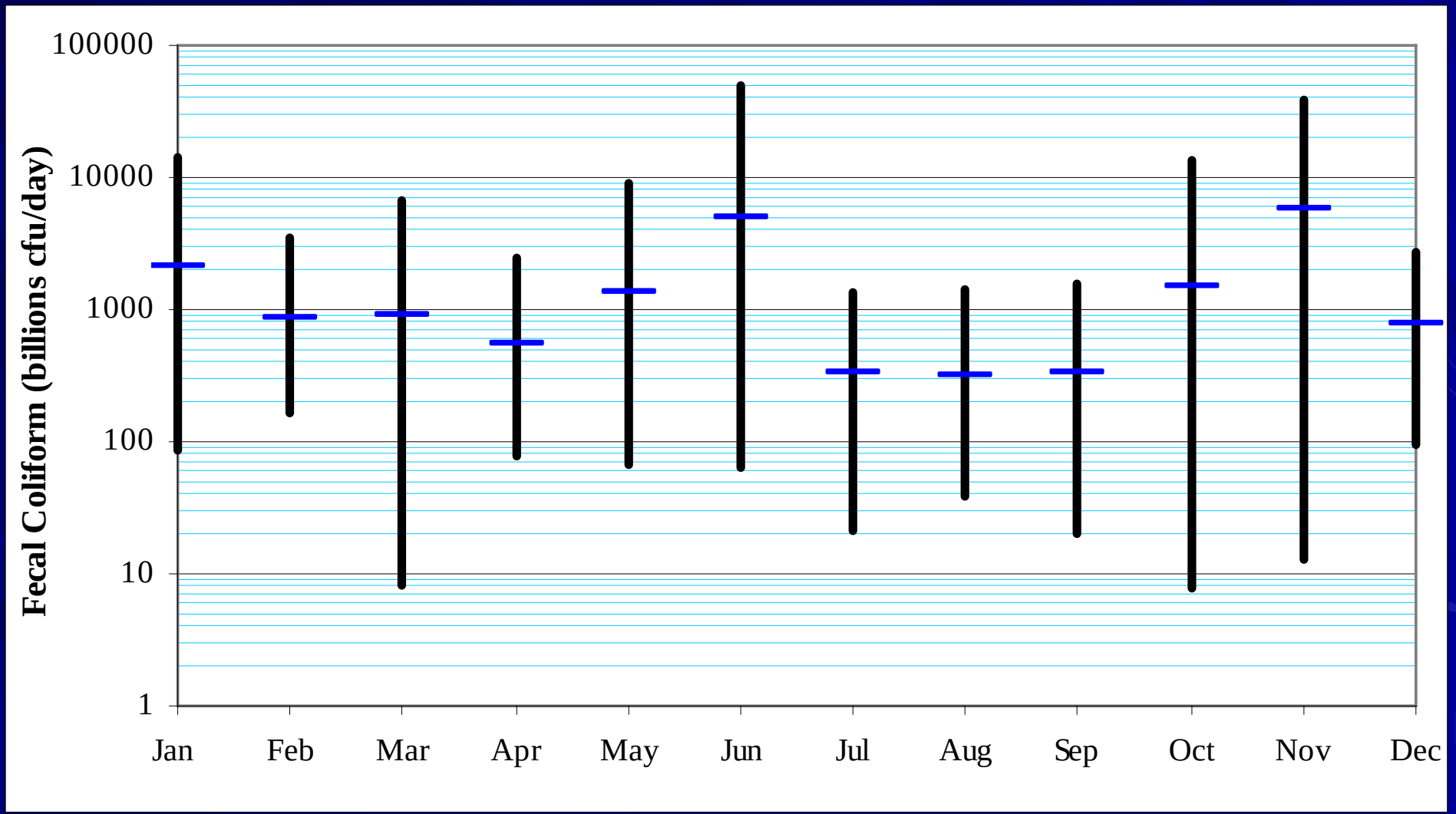


Seasonal FC concentrations in the Samish River at RM 4.5 (Thomas Road)

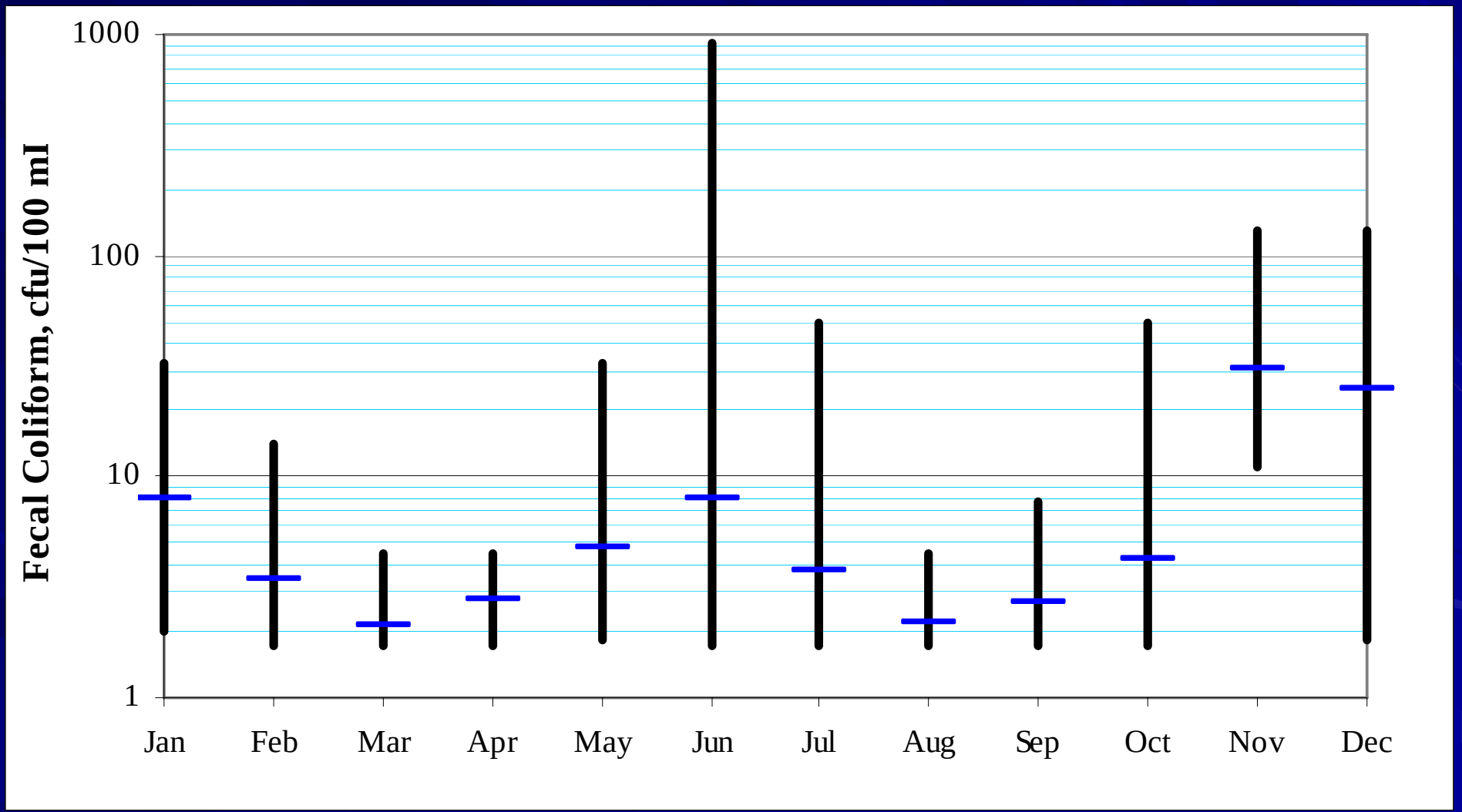




Samish River at Thomas Road (RM 4.5) seasonal FC loading



DOH Site 94 seasonal FC concentrations



Why E. coli and %KES?

- Characterize wastes from different sources
  - Higher percentage of E. coli indicates mostly animal wastes
  - Higher percent KES (Klebsiella, Enterobacter, Serratia) indicates decaying vegetation

What a TMDL looks like: