

Skokomish River Fecal Coliform TMDL Attainment Monitoring in Washington State

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Introduction/Background

- Washington State is located in the Pacific Northwest and is bounded by:
 - British Columbia, Canada, to the north
 - Idaho to the east
 - Oregon to the south, and
 - Pacific ocean to the west



Introduction/Background

The state has a:

- **Population** – 5.9 million people
- **Land Area** – 66,582 mi² (176,000 Km²)
- **Average annual Temp.**
 - 4.4 °C (40 °F) East
 - 10.6 °C (51 °F) Coast
- **Average annual Rainfall**
 - 6 in (152 mm) East
 - 160 in (4,064 mm) Coast

Introduction/Background (cont'd)

- Based on the 1998 Section 303(d) listing, Washington State has 1,316 impairments:
 - ❖ 1,110 in stream/creek segments
 - ❖ 141 in estuaries
 - ❖ 65 in lakes/reservoirs/ponds

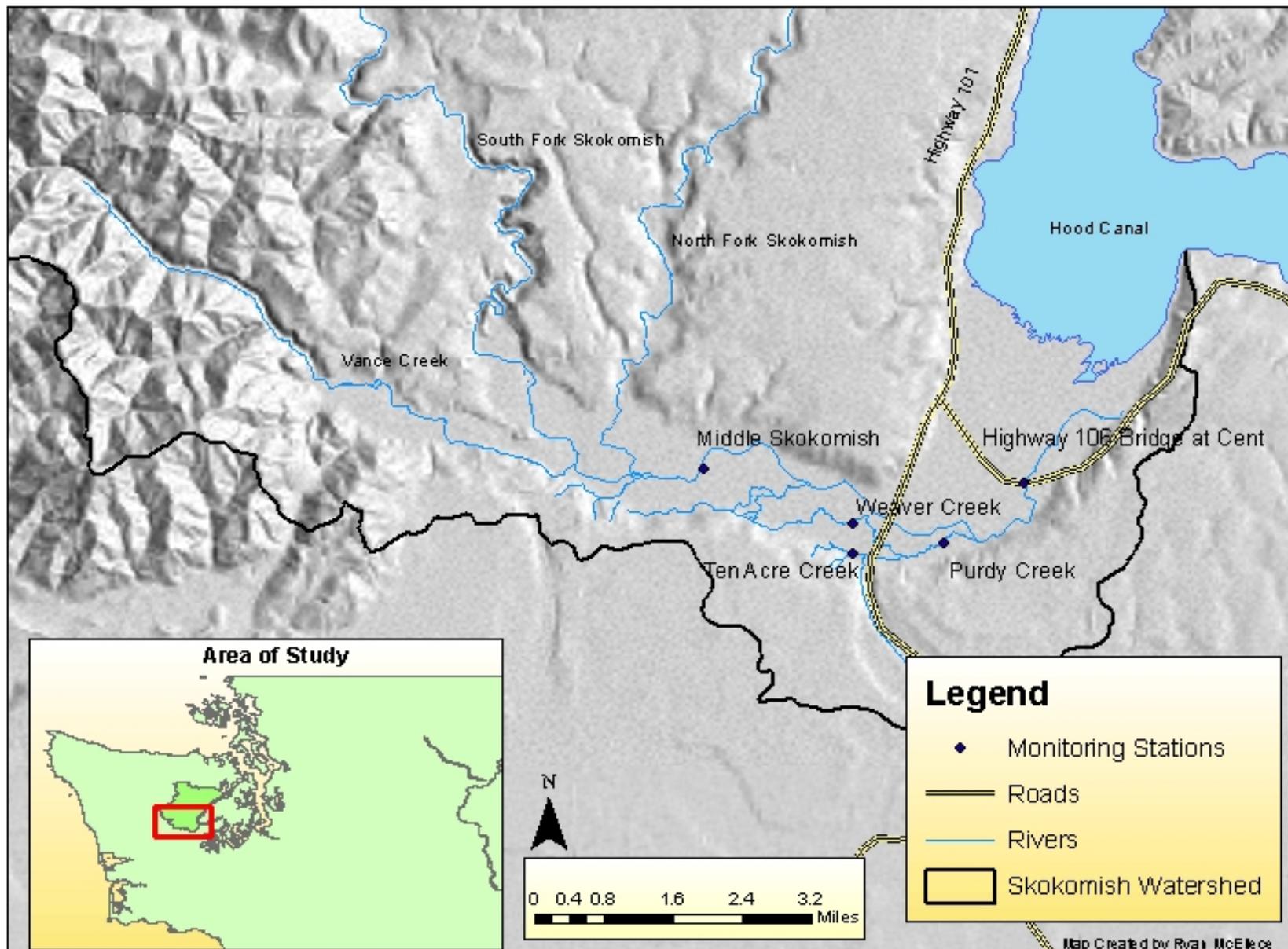
Introduction/Background (cont'd)

- As of 2006, the number of EPA- approved TMDLs in Washington State - **671 TMDLs**.
- Close to **45%** of Washington State approved TMDL is for FC bacteria.
- The state FC Bacteria water quality standard has 2 parts:
 - A geometric mean value (GMV) number
 - A 90th percentile number
- Skokomish River is a **Class AA waterbody** with
 - Associated geometric mean value of **50 colony-forming units per 100 mL (cfu/100mL)**
 - Not more than **10%** of the samples used to calculate the **GMV should exceed 100 cfu/100mL**

Skokomish River Basin

- Skokomish River is located in **Mason County** about 30 miles northwest of Olympia.
- The river drains a basin of about **247 square miles** before discharging into Annas Bay.
- Annas Bay, a rich shellfish harvest area, is located in **southern Hood Canal near Potlatch.**
- Annual rainfall – Between **75 and 230 inches.**

Skokomish River Monitoring Sites



Land Use Activities

- Rural residential dwellings
- Commercial and non-commercial agricultural activities
- Scattered pasture lands
- Forestry in the upper watershed (i.e. private land owners and within the Olympic National Forest).

Beneficial Uses of the river

- Fishing
- Primary contact recreation **e.g. swimming and boating.**
- Habitat for wildlife
- Shellfish resource **near the mouth**
- Scuba diving **near the mouth**



Water Quality Problem – FC Bacteria

Impacts to humans include:

- Gastrointestinal distress
- Respiratory infection
- Symptoms such as skin irritations (from contact recreation)

Impacts to the Environment include:

- Commercial shellfish beach closures
- Recreational shellfish beach closures

Nonpoint Sources of FC Bacteria

- Agriculture
- Humans e.g. failing septic tank systems
- Recreation (uncontrolled human waste)
- Domestic animals
- Wild animals
- **No point sources**



FC Bacteria TMDL

TMDL was developed and approved in 2001.

TMDL target limits were set for 4 compliance points:

Site	Study GMV	Target FC GMV	Study 90 th Percentile	Target 90 th Percentile	Percent Reduction
Hwy 106 Bridge*	32.8	18.5	120.3	67.7	44%
Purdy Creek	54.3	25.7	146.6	69.4	53%
Weaver Creek	55	17.5	314.6	100.0	68%
Ten Acre Creek	34.1	25.6	133.2	100.0	25%
Middle Skokomish **	Ref.	Ref.	Ref.	Ref.	Ref.

* Furthest downstream point of attainment

** Reference site

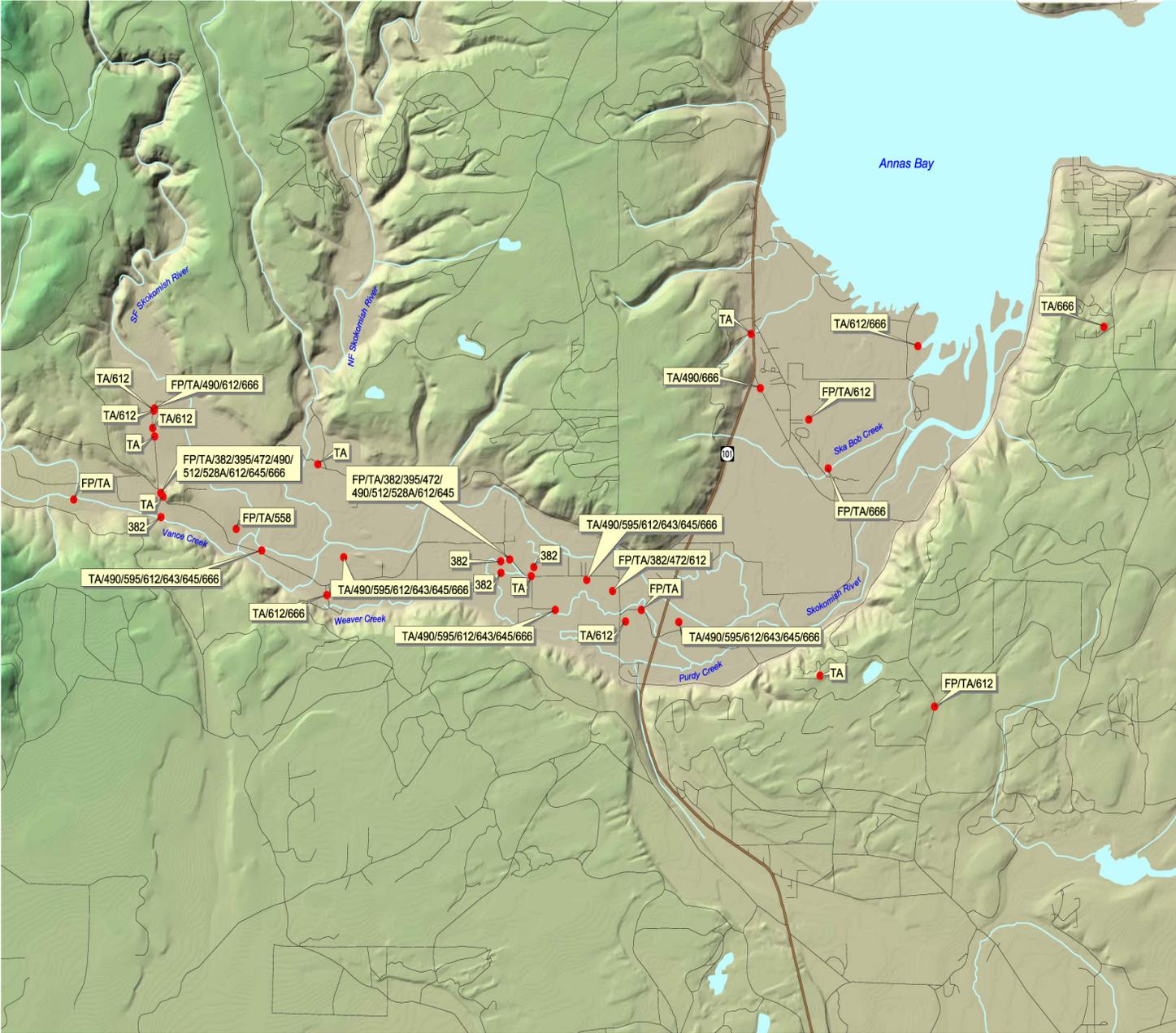
Best Management Practices Implemented

Activity	Action
Tree planting	32,000 trees planted (\$1.50 per tree)
Fencing	24,000 ft of riparian fencing installed (\$3.50/ft)
Land enrolment	62 acres of land enrolled with a buffer with of 150ft
Cascade land acquisition	175 acres of land acquired that is adjacent to prime fish habitat (total cost \$350,000.00)
On-site-septic systems repair	Dept. of Fish & Wildlife inspected and repaired all the fish hatchery septic systems

Best Management Practices Implemented

Activity	Action
Port-a-potties installation	Local farm stores installed port-a-potties during fishing seasons
No trespassing signs	Posted no trespassing signs resulting in a 40% reduction in trash (total cost \$200.00)
Waste management flyers distribution	Put flyers on fishermen's windshields on proper waste management and nearby toilet facilities
On-going educational outreach	Technical assistance on proper manure handling and storage

Skokomish Watershed Conservation Projects



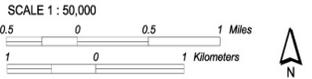
Legend

- Water Bodies
- Streams
- Roads
- Conservation Project Sites

FP Farm Plan Completed
TA Technical Assistance Provided

Best Management Practices Implemented

- 382 Fence
- 395 Stream Habitat Improvement & Management
- 472 Use Exclusion
- 490 Forest Site Preparation
- 512 Pasture and Hayland Planting
- 528A Prescribed Grazing
- 558 Roof Runoff Management
- 595 Pest Management
- 612 Tree/Shrub Establishment
- 643 Restoration & Management of Declining Habitats
- 645 Upland Wildlife Habitat Management
- 666 Woodland Improvement



North American Datum 1927
Universal Transverse Mercator, Zone 10T
Map produced 24 September 2003

Monitoring Sites & Parameter

- **Four compliance sites and one reference site** established.
- Ecology sampled **monthly for 2 months and quarterly after 2 months.**
- Mason Conservation District (MCD) sampled **bi-weekly.**
- Parameter sampled – **Fecal coliform.**

Results

Site	Study GMV	Target FC GMV	Target Percent Reduction	Current Ecology GMV	Current Ecology Percent Reduction	Current MCD GMV	Current MCD Percent Reduction
Hwy 106 Bridge*	32.8	18.5	44%	6.2 (12)	81%	12.0 (27)	63%
Purdy Creek	54.3	25.7	53%	8.3 (11)	85%	13.4 (26)	75%
Weaver Creek	55	17.5	68%	15.2 (12)	72%	14.0 (27)	75%
Ten Acre Creek	34.1	25.6	25%	11.7 (12)	66%	12.0 (26)	65%
Middle Skokomish **	Ref.	Ref.	Ref.	3.7 (11)	Ref.	3.6 (24)	Ref.

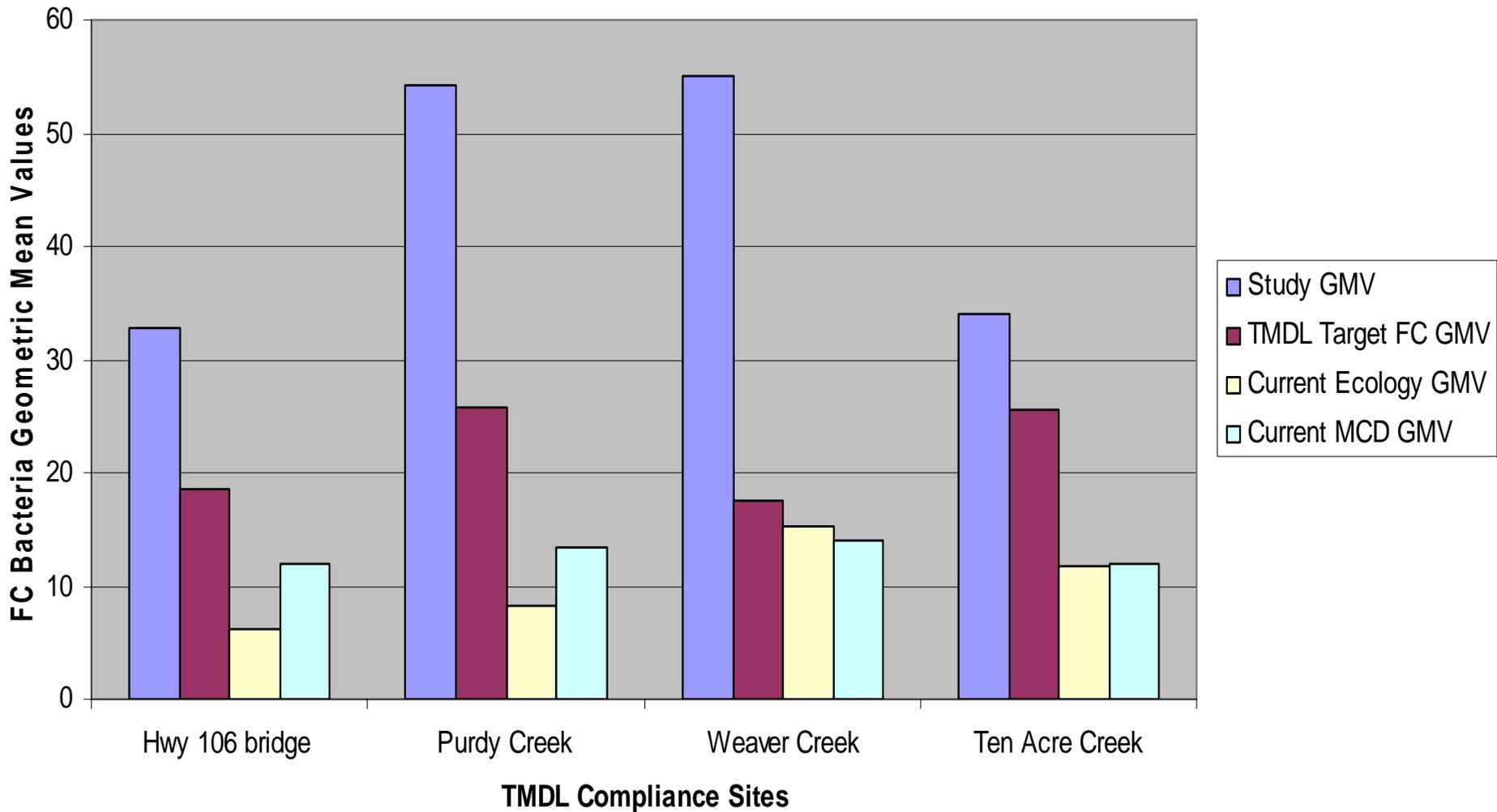
* Furthest downstream point of attainment

** Reference site

Number in bracket – Sample size (n)

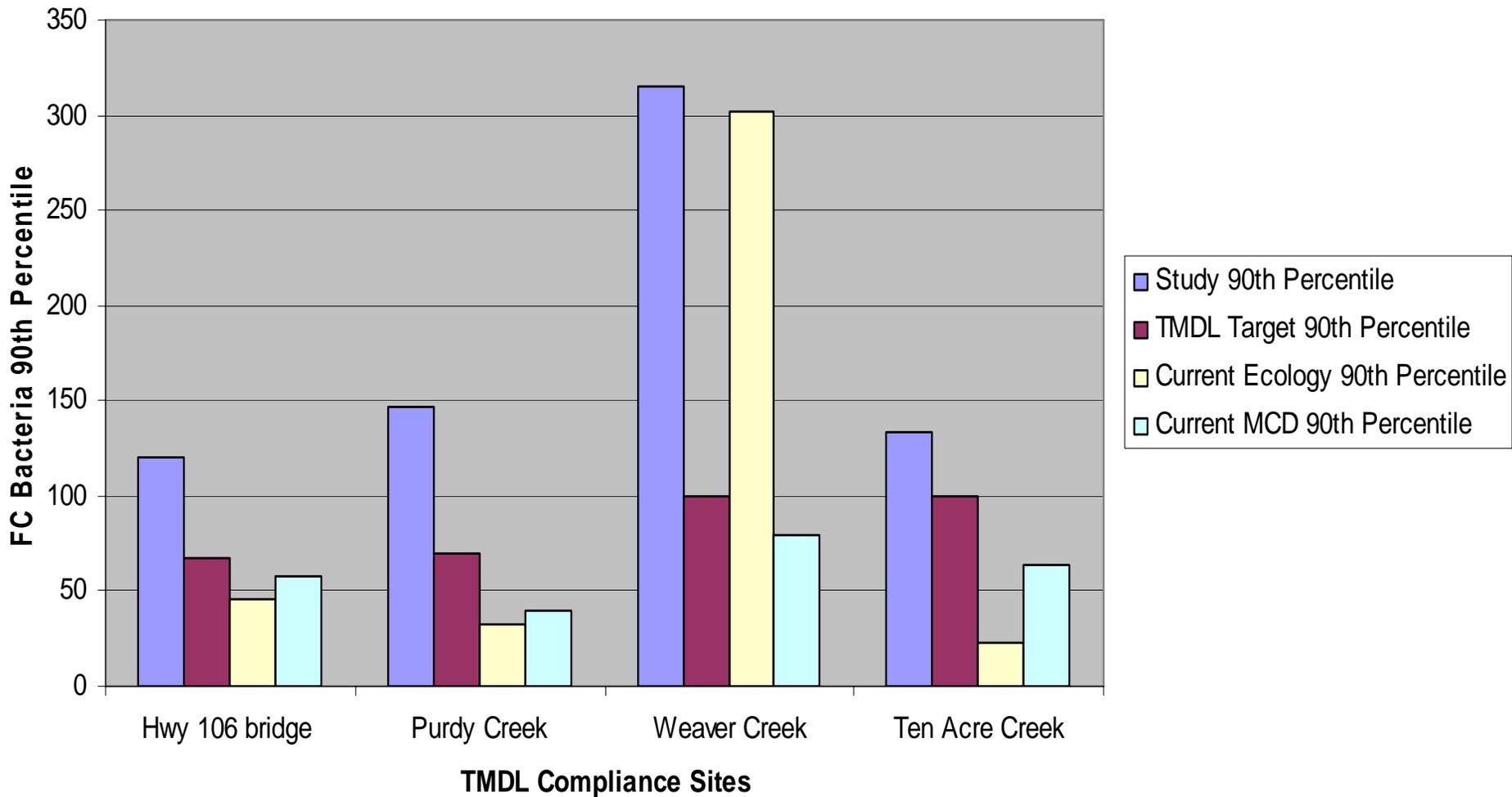
Results (Cont'd)

Comparison of Geometric Mean Values at TMDL Compliance Sites



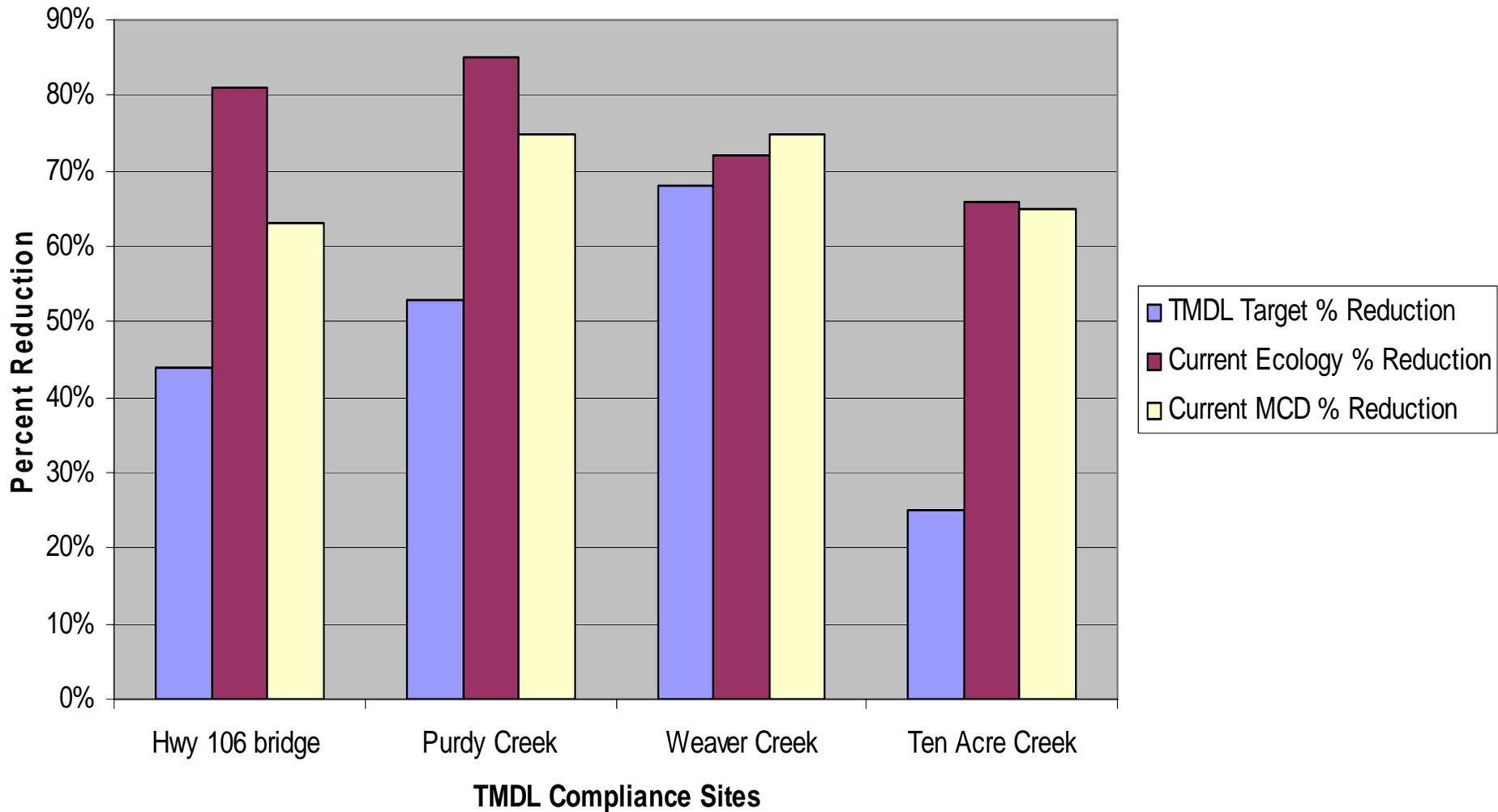
Results (Cont'd)

Comparison of 90th Percentile Values at TMDL Compliance Sites



Results (Cont'd)

Fecal Coliform Bacteria Percent Reductions at TMDL Compliance Sites



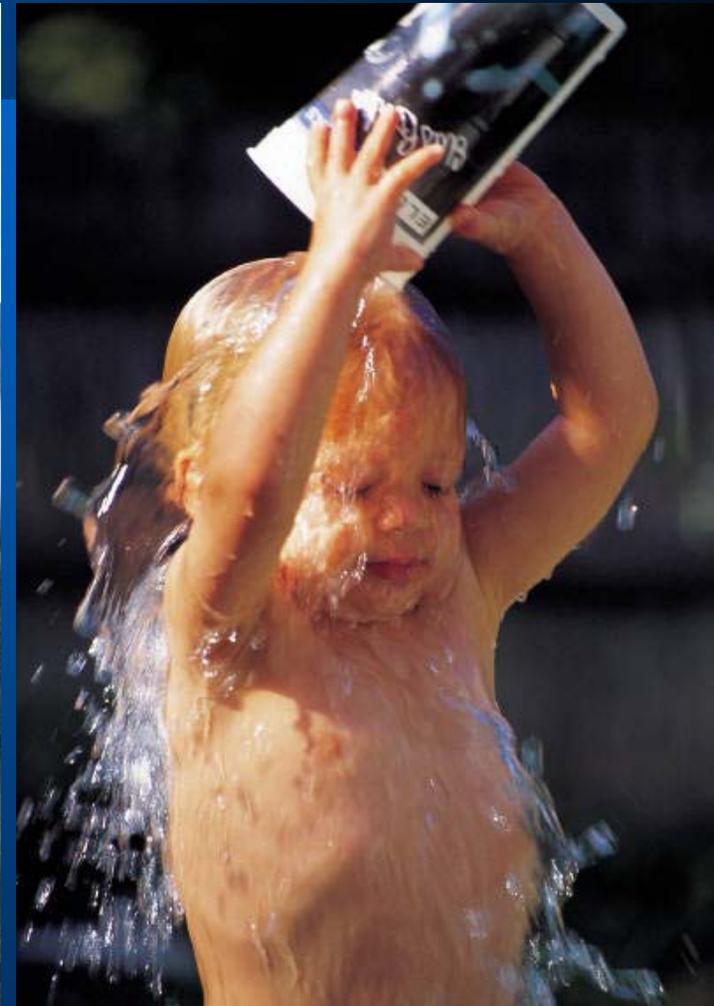
Conclusions

- FC bacteria concentrations comply with TMDL target limits for all the **compliance sites**.
- FC bacteria concentrations comply with both parts of the state water quality criterion
 - **GMV of 50 cfu/100mL**
 - **Not more than ten percent of the samples used to calculate the GMV should exceed 100 cfu/100mL, except for Weaver Creek**
- Implementation of best management practices responsible for the observed water quality improvements.

Recommendation

- Continue the **implementation of Watershed Best Management Practices** to control nonpoint sources of water pollution.

Resource Protection & Recreation



WASHINGTON STATE
DEPARTMENT OF
ECOLOGY

Questions??

Washington State Department of Ecology TMDL Information.

TMDL Website:

<http://www.ecy.wa.gov/programs/wq/tmdl/index.html>

TMDL Effectiveness Monitoring Website:

<http://www.ecy.wa.gov/programs/eap/tem/index.html>



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