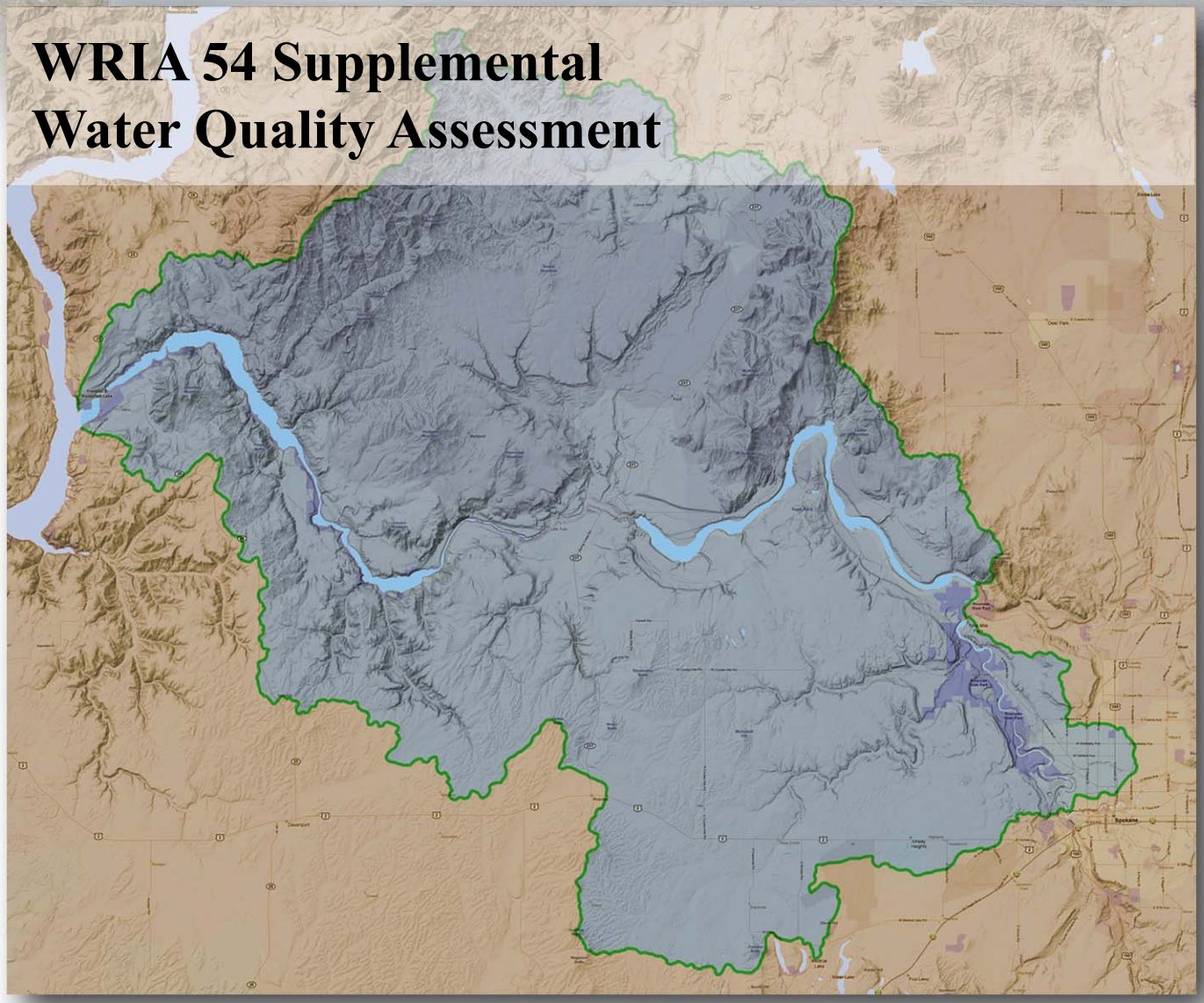
WRIA 54 Planning Unit

WRIA 54 Supplemental Water Quality Assessment



July 2009

Ecology Grant No. G0800004

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WRIA 54 SUPPLEMENTAL WATER QUALITY ASSESSMENT

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July 2009

Prepared for:

WRIA 54 Planning Unit

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Project #3640027

Spokane County
WRIA 54 Supplemental Water Quality Assessment

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CHAPTER 1.
INTRODUCTION

Washington State law requires assessment of water quality conditions for watershed planning if the planning unit for the effort opts to take on the water quality element. The Initiating Governments group for Water Resource Inventory Area (WRIA) 54 did opt to include the water quality element in its watershed planning.

Some water quality information was previously summarized, in the Phase 2 Level 1 Assessment (Tetra Tech, 2007), but it was limited to a brief description of water quality issues and activities related to total maximum daily loads (TMDLs, or water cleanup plans) in the Spokane River basin. This supplemental report provides a more comprehensive compilation and assessment of water quality conditions in the Lower Spokane River from existing data and studies.

This compilation and summary was funded through the first phase of Department of Ecology (Ecology) Supplemental Water Quality Grant No. G0800004. The scope of work under this grant calls for the following components:

- Identify and document water quality concerns
  - Identify water quality concerns not documented in Phase 2 Level 1
  - Determine possible causes
  - Develop preliminary recommendations for possible remedies
- Develop a water body inventory
  - Document characteristic uses for major WRIA 54 water bodies
  - Document where water quality standards are met, not met, and unknown
- Prioritize water quality issues
  - Draft a priority list, a water quality problem statement, and determine monitoring options

CHAPTER 2.
WATER BODY INVENTORY

WRIA 54 water bodies were inventoried for designated characteristic uses, water quality standards classifications, and known water quality problems. Note that this inventory was based on existing published data; no new sampling was conducted for this assessment.

WATER QUALITY STANDARDS

The federal Clean Water Act requires that the water quality standards be adopted to protect beneficial uses, such as swimming, fishing, aquatic life habitat, and agricultural and drinking water supplies. In WRIA 54, water bodies outside the Spokane Indian Reservation are evaluated against the standards and criteria contained in the Water Quality Standards for Surface Waters of the State of Washington (Chapter 173-201A Washington Administrative Code, Amended November 20, 2006). These standards set limits on pollution in lakes and rivers in order to protect water quality.

The Spokane Tribe uses its own Surface Water Quality Standards (Resolution 2003-259, March, 2003) to manage and regulate the quality and use of water bodies within the Spokane Indian Reservation. These standards are similar to the Washington State standards, both having originated from guidelines developed by the U.S. Environmental Protection Agency (EPA). Specific differences exist, such as the Spokane Tribe's Surface Water Standards contain lower acceptable levels for metals and PCBs because of the higher fish consumption that is typical for tribal members.

Washington State Water Quality Standards

To protect water quality, Washington State's Quality Standards for Surface Waters establish narrative criteria, designated uses, and an anti-degradation policy for all State surface waters. Based on the designated uses, numeric and narrative criteria are assigned to each water body. Designated uses include:

- Aquatic life—based on the presence of, or the intent to provide protection for the key uses:
  - Char spawning and rearing
  - Core summer salmonid habitat
  - Salmonid spawning, rearing, and migration
  - Salmonid rearing and migration only
  - Non-anadromous interior redband trout
  - Indigenous warm water species
- Recreation, which includes:
  - Primary contact recreation, such as swimming, and
  - Secondary contact recreation, such as wading or fishing
- Water Supply—domestic, agricultural, industrial, and stock watering
- Miscellaneous—wildlife habitat, harvesting, commerce and navigation, boating, and aesthetics

The Washington State Surface Water Quality Standards establish criteria for several classes of substances:

- Toxic substances
- Radioactive substances
- Temperature
- Dissolved oxygen
- Turbidity
- Total dissolved gas
- pH
- Bacteria (fecal coliform)
- Aesthetic values

Provision for natural or irreversible human conditions that prevent a water body from meeting its assigned water quality criteria are included in the State Water Quality Standards. When a natural climatic or landscape attribute is the reason, then natural conditions constitute the water quality criteria. For cases where human structural changes that cannot be effectively remedied are the reason for a water body not meeting its assigned criteria, then alternative estimates of the attainable water quality conditions, plus possible further allowances for human effects may be used to establish an alternative criterion for the water body.

The Washington State Water Quality Standards designate uses for three reaches along the main stem Spokane River (Figure 2-1):

- Reach 1—Spokane River mouth to Long Lake Dam
- Reach 2—Long Lake Dam to Nine Mile Bridge
- Reach 3—Nine Mile Bridge to the Idaho border

Other water bodies (outside the Spokane Reservation) are subject to general standards contained in the regulation. Table 2-1 summarizes the designated uses and numerical water quality standards for WRIA 54 water bodies. Note that an alternative temperature criterion of 20ºC due to human activities has been established for the Spokane River main stem. The normal temperature standard for these aquatic life uses would be 16.0 or 17.5 degrees C. (1-day maximum).

TABLE 2-1.
WASHINGTON STATE WRIA 54 WATER BODY DESIGNATED USES AND ASSOCIATED WATER QUALITY STANDARDS

Designated Uses	Numeric Criteria
Spokane River—Mouth to Long Lake Dam	
Aquatic Life—Salmonid Spawning/Rearing	Temperature—20.0 deg C due to human activities (1-day maximum)[a]
	Dissolved Oxygen—8.0 mg//L (lowest 1-day minimum)
	Turbidity—5 NTU (nephelometric turbidity units) over background when background is 50 NTU or less; or 10% increase in turbidity when the background turbidity is more than 50 NTU
	Total Dissolved Gas—Not exceed 110% of saturation at any point
	pH—6.5 to 8.5 with human-caused variation within this range of less than 0.5 units
Recreation—primary contact	Fecal coliform organism levels must not exceed a geometric mean value of 100 colonies/100 mL, with not more than 10% of all samples (or any single sample when less than ten sample points exist) obtained for calculating he geometric mean value exceeding 200 colonies /100 mL
Water supply—domestic, industrial, agricultural, and stock Miscellaneous—Wildlife, harvesting, Commerce/Navigation, Boating, aesthetics	Toxic, radioactive, and deleterious materials—below those which have the potential, either singularly or cumulatively, to adversely affect characteristic water uses, cause acute or chronic conditions to the most sensitive biota dependent upon those waters, or adversely affect public health (see WAC 173-201A-240 and 173-201A-250)
	Aesthetic values—must not be impaired by the presence of materials or their effects, excluding those of natural origin, which offend the senses of sight, smell, touch, or taste
Spokane River—Long Lake Dam to Nine Mile Bridge	
Aquatic Life—Core Summer Habitat	Temperature—20.0 deg C due to human activities (1-day maximum)[a]
	The average euphotic zone concentration of total phosphorus (as P) shall not exceed 25 micrograms/L during the period of June 1 to October 31.
	Dissolved Oxygen—9.5 mg//L (lowest 1-day minimum)
	Turbidity—5 NTU over background when background is 50 NTU or less; or 10% increase in turbidity when the background turbidity is more than 50 NTU
	Total Dissolved Gas—Not exceed 110% of saturation at any point
	pH—6.5 to 8.5 with human-caused variation within this range of less than 0.2 units
Recreation—extraordinary primary contact	Fecal coliform organism levels must not exceed a geometric mean value of 50 colonies/100 mL, with not more than 10% of all samples (or any single sample when less than ten sample points exist) obtained for calculating the geometric mean value exceeding 100 colonies /100 mL

TABLE 2-1 (continued).
WASHINGTON STATE WRIA 54 WATER BODY DESIGNATED USES AND ASSOCIATED WATER QUALITY STANDARDS

Designated Uses	Numeric Criteria
Spokane River—Long Lake Dam to Nine Mile Bridge (continued)	
Water supply—domestic, industrial, agricultural, and stock Miscellaneous—Wildlife, harvesting, Commerce/Navigation, Boating, aesthetics	Toxic, radioactive, and deleterious materials—below those which have the potential, either singularly or cumulatively, to adversely affect characteristic water uses, cause acute or chronic conditions to the most sensitive biota dependent upon those waters, or adversely affect public health (see WAC 173-201A-240 and 173-201A-250) Aesthetic values—must not be impaired by the presence of materials or their effects, excluding those of natural origin, which offend the senses of sight, smell, touch, or taste
Spokane River—Nine Mile Bridge to Idaho border	
Aquatic Life—Salmonid Spawning/Rearing	Temperature—20.0 deg C due to human activities (1-day maximum)[a] Dissolved Oxygen—8.0 mg//L (lowest 1-day minimum) Turbidity—5 NTU over background when background is 50 NTU or less; or 10% increase in turbidity when the background turbidity is more than 50 NTU Total Dissolved Gas—Not exceed 110% of saturation at any point pH—6.5 to 8.5 with human-caused variation within this range of less than 0.5 units
Recreation—primary contact	Fecal coliform organism levels must not exceed a geometric mean value of 100 colonies/100 mL, with not more than 10% of all samples (or any single sample when less than ten sample points exist) obtained for calculating he geometric mean value exceeding 200 colonies /100 mL
Water supply—domestic, industrial, agricultural, and stock Miscellaneous—Wildlife, harvesting, Commerce/Navigation, Boating, aesthetics	Toxic, radioactive, and deleterious materials—below those which have the potential, either singularly or cumulatively, to adversely affect characteristic water uses, cause acute or chronic conditions to the most sensitive biota dependent upon those waters, or adversely affect public health (see WAC 173-201A-240 and 173-201A-250) Aesthetic values—must not be impaired by the presence of materials or their effects, excluding those of natural origin, which offend the senses of sight, smell, touch, or taste
All non-reservation lakes and feeder streams to lakes (including reservoirs with a mean detention time of more than 15 days)	
Aquatic Life—core summer salmonid habitat	Temperature—16.0 deg C (1-day maximum) Dissolved Oxygen—9.5 mg//L (lowest 1-day minimum) Turbidity—5 NTU over background when background is 50 NTU or less; or 10% increase in turbidity when the background turbidity is more than 50 NTU Total Dissolved Gas—Not exceed 110% of saturation at any point pH—6.5 to 8.5 with human-caused variation within this range of less than 0.2 units

TABLE 2-1 (continued).
WASHINGTON STATE WRIA 54 WATER BODY DESIGNATED USES AND ASSOCIATED WATER QUALITY STANDARDS

Designated Uses	Numeric Criteria
All non-reservation lakes and feeder streams to lakes (including reservoirs with a mean detention time of more than 15 days) (continued)	
Recreation—extraordinary primary contact	Fecal coliform organism levels must not exceed a geometric mean value of 50 colonies/100 mL, with not more than 10% of all samples (or any single sample when less than ten sample points exist) obtained for calculating the geometric mean value exceeding 100 colonies /100 mL
Water supply—domestic, industrial, agricultural, and stock Miscellaneous—Wildlife, harvesting, Commerce/Navigation, Boating, aesthetics	Toxic, radioactive, and deleterious materials—below those which have the potential, either singularly or cumulatively, to adversely affect characteristic water uses, cause acute or chronic conditions to the most sensitive biota dependent upon those waters, or adversely affect public health (see WAC 173-201A-240 and 173-201A-250) Aesthetic values—must not be impaired by the presence of materials or their effects, excluding those of natural origin, which offend the senses of sight, smell, touch, or taste
All other non-reservation surface waters	
Aquatic Life—Salmonid Spawning/Rearing	Temperature—17.5 deg C (1-day maximum) Dissolved Oxygen—8.0 mg//L (lowest 1-day minimum) Turbidity—5 NTU over background when background is 50 NTU or less; or 10% increase in turbidity when the background turbidity is more than 50 NTU Total Dissolved Gas—Not exceed 110% of saturation at any point pH—6.5 to 8.5 with human-caused variation within this range of less than 0.5 units
Recreation—primary contact	Fecal coliform organism levels must not exceed a geometric mean value of 100 colonies/100 mL, with not more than 10% of all samples (or any single sample when less than ten sample points exist) obtained for calculating he geometric mean value exceeding 200 colonies /100 mL
Water supply—domestic, industrial, agricultural, and stock Miscellaneous—Wildlife, harvesting, Commerce/Navigation, Boating, aesthetics	Toxic, radioactive, and deleterious materials—below those which have the potential, either singularly or cumulatively, to adversely affect characteristic water uses, cause acute or chronic conditions to the most sensitive biota dependent upon those waters, or adversely affect public health (see WAC 173-201A-240 and 173-201A-250) Aesthetic values—must not be impaired by the presence of materials or their effects, excluding those of natural origin, which offend the senses of sight, smell, touch, or taste

a. When natural conditions exceed a one-day maximum temperature of 20.0ºC, no temperature increase will be allowed that will raise the receiving water temperature by more than 0.3ºC; nor shall such temperature increases, at any time, exceed $t = 34/(T+9)$

Spokane Tribe Water Quality Standards

Washington State Water Quality Standards do not apply to water bodies located within the boundaries of the Spokane Indian Reservation. Here, federally approved water quality standards are more stringent and based on a combination of previous Washington State and EPA standards. Limits for metals and PCBs are lower because of higher levels of fish consumption. To protect water quality on tribal lands, the Spokane Tribe of Indians Surface Water Quality Standards designate water uses and criteria classes as follows:

- **Class AA (Extraordinary)**
  - General Characteristics: Class AA water quality shall markedly and uniformly exceed the requirements for all or substantially all designated uses.
  - Designated uses:
    - Primary contact ceremonial and spiritual
    - Cultural
    - Water supply (domestic, industrial, agricultural)
    - Stock watering
    - Fish and shellfish
      - Salmonid migration, rearing, spawning, and harvesting
      - Other fish migration, rearing, spawning, and harvesting
      - Clam and mussel rearing, spawning, and harvesting
      - Mollusks, crustaceans, and other shellfish rearing, spawning, and harvesting
    - Primary contact recreation
    - Commerce and navigation
  - Water quality criteria:
    - E. coli levels must not exceed a geometric mean value of 126/100 mL with not more than 10% of all samples obtained for calculation the geometric mean value exceeding 406/100 mL
    - Dissolved oxygen shall not be less than 9.5 mg/L
    - Total dissolved gas shall not exceed 110% of saturation
    - Water used for salmon and trout spawning and rearing shall not exceed a 7 day average of the daily maximum temperature values greater than 16.5 C from June 1 to September 1. Water shall not exceed a 7-day average of the daily maximum temperature values greater than 13.5 C from September 1 to October 1 and between April 1 and June 1. Water is not to exceed 11 C from October 1 and April 1, with no single daily maximum temperature exceeding 18.5 C. In waters where the only salmonid present is non-anadromous form of naturalized rainbow or redband trout, temperatures from June 1 to September 1 may be allowed to reach a 7-day average of the daily maximum temperature of 18.5 C
    - pH to be within 6.5 to 8.5 with a human-caused variation within a range of less than 0.2 units
    - Aesthetic value shall not be impaired excluding materials of natural origin
- **Class A (Excellent)**
  - General Characteristics: Class A water quality shall meet or exceed the requirements for all or substantially all designated uses.
  - Designated uses:
    - Primary contact ceremonial and spiritual
    - Cultural
    - Water supply (domestic, industrial, agricultural)

  - Stock watering
  - Fish and shellfish
    - Salmonid migration, rearing, spawning, and harvesting
    - Other fish migration, rearing, spawning, and harvesting
    - Clam and mussel rearing, spawning, and harvesting
    - Mollusks, crustaceans, and other shellfish rearing, spawning, and harvesting
  - Primary contact recreation
  - Commerce and navigation
- Water quality criteria:
  - E. coli levels must not exceed a geometric mean value of 126/100 mL with not more than 10% of all samples obtained for calculation the geometric mean value exceeding 406/100 mL
  - Dissolved oxygen shall not be less than 8.0 mg/L
  - Total dissolved gas shall not exceed 110% of saturation
  - Water used for salmon and trout spawning and rearing shall not exceed a 7 day average of the daily maximum temperature values greater than 16.5 C from June 1 to September 1. Water shall not exceed a 7-day average of the daily maximum temperature values greater than 13.5 C from September 1 to October 1 and between April 1 and June 1. Water is not to exceed 11 C from October 1 and April 1, with no single daily maximum temperature exceeding 18.5 C. In waters where the only salmonid present is non-anadromous form of naturalized rainbow or redband trout, temperatures from June 1 to September 1 may be allowed to reach a 7-day average of the daily maximum temperature of 18.5 C.
  - pH to be within 6.5 to 8.5 with a human-caused variation within a range of less than 0.5 units.
  - Aesthetic value shall not be impaired excluding materials of natural origin

- **Lake Class**
  - General Characteristics: Lake Class water quality shall meet or exceed the requirements for all or substantially all designated uses, particularly cultural, fish or shellfish, and domestic water supply uses.
  - Designated uses:
    - Primary contact ceremonial and spiritual
    - Cultural
    - Water supply (domestic, industrial, agricultural)
    - Stock watering
    - Fish and shellfish
      - Salmonid migration, rearing, spawning, and harvesting
      - Other fish migration, rearing, spawning, and harvesting
      - Mollusks, crustaceans, and other shellfish rearing, spawning, and harvesting
    - Primary contact recreation
    - Commerce and navigation
  - Water quality criteria:
    - E. coli levels must not exceed a geometric mean value of 126/100 mL with not more than 10% of all samples obtained for calculation the geometric mean value exceeding 406/100 mL
    - Dissolved oxygen shall exhibit no measurable decrease from natural conditions
    - Total dissolved gas shall not exceed 110 percent of saturation
    - Temperature shall not exhibit measurable changes from natural conditions

- pH shall not exhibit measurable changes from natural conditions
- Aesthetic value shall not be impaired excluding materials of natural origin
- Nutrient criteria (see Table 2-2)

TABLE 2-2.
NUTRIENT CRITERIA FOR LAKES

Trophic State:	If Ambient Total Phosphorus Range of Lake is:	Then Criteria Should be Set at:
Ultra-oligotrophic	0-4	4 or less
Oligotrophic	>4-10	10 or less
Lower mesotrophic	>10-20	20 or less
Upper mesotrophic	>23-35	35 or less

- **General Classifications—**General classifications applying to all water bodies not specifically classified under "Specific Classifications" are as follows:
  - All lakes and their feeder streams are classified as Lake Class, except when specifically classified otherwise.
  - All reservoirs with a mean detention time greater than 15 days are classified as Lake Class.
  - All reservoirs with a mean detention time of 15 days or less are classified the same as the river section in which they are located.
  - All other unclassified waters are classified as Class A.
- **Specific Classifications—**Specific surface waters on the Spokane Indian Reservation are classified as follows:
  - Blue Creek — Class AA
  - Chamokane (Tshmkn) Creek — Class A
  - Cottonwood Creek — Class A
  - Deep Creek — Class A
  - Little Chamokane Creek — Class A
  - Moses Creek — Class A
  - Orazada Creek — Class AA
  - Owl Creek — Class AA
  - Oyachen Creek — Class AA
  - Rail Creek — Class AA
  - Sams Creek — Class A
  - Sand Creek — Class AA
  - Sheep Creek — Class A
  - Thomas Creek — Class A
  - Wellpinit Creek — Class A
  - Benjamin Lake — Lake Class
  - Mathew Lake — Lake Class
  - McCoy Creek — Class A
  - Turtle Lake — Lake Class
  - Spokane River — Class A

SPOKANE RIVER DESIGNATED USES

Spokane River Main Stem

Per Washington State Water Quality Standards, the designated use analysis for this report divides the Lower Spokane River into three reaches: Reach 1, from the Spokane River mouth to Long Lake Dam (river mile 33.9); Reach 2, from Long Lake Dam (river mile 33.9) to Nine Mile Bridge (river mile 58.0), and; Reach 3, from Nine Mile Bridge to the Idaho border (river mile 96.5). Designated uses under State Water Quality Standards for each reach are shown in Figure 2-1.

The Spokane Tribe's Surface Water Quality Standards classify the Spokane River as Class A, with designated uses as indicated above and in Figure 2-1. These standards apply to portions of the Lower Spokane River within the Reservation, downstream from the confluence with Chamokane Creek.

Tributaries

Water quality in tributary streams is regulated by Spokane Tribe Surface Water Quality Standards for streams on the Spokane Reservation, and Washington State Water Quality Standards for tributary streams not on the Reservation. The State's standards rely on designated uses, as shown in Figure 2-2. The Spokane Tribe's standards specify Class A (Excellent) or Class AA (Extraordinary) for tributary streams, with the designated uses as shown in Figure 2-2. Actual water quality criteria are similar for the two classes, with a slightly higher dissolved oxygen criterion for Class AA streams.

WATER QUALITY ASSESSMENTS

The formal process for documenting water quality conditions is derived from the federal Clean Water Act, Section 305(b) and Section 303(d). Under these two Clean Water Act sections, on a two-year cycle, the State Department of Ecology prepares an assessment report, known as the 305(b) Report, and develops a list of impaired water bodies, known as the 303(d) list.

The purpose of the 305(b) report is to present to the U.S. Congress and the public the current conditions of the state's waters. Each state must prepare a water quality assessment report every two years. Within the 305(b) report is the 303(d) list of impaired water bodies.

The Spokane Tribe conducts similar water quality assessments, developing a 305(b), which is subsequently used by Tribal staff to establish priorities for water quality monitoring and corrective actions.

State Water Quality Assessment Categories for WRIA 54

Water quality standards are set by States, Territories, and Tribes and they identify the uses for each water body. When a water body fails to meet one or more state water quality standards it is categorized as a level 5 on a water quality scale of 1 to 5. Categories 1 through 4 show state water quality efforts and inform the public about the known condition of state waters. Category 5 water bodies are placed on the Washington State Water Quality Assessment 303(d) list and require the preparation of a TMDL.

A summary of water quality assessment data for WRIA 54 is shown in Table 2-3 and Figures 2-3 through 2-7. The most serious problems appear in Category 5, and include low dissolved oxygen, elevated total dissolved gas, PCBs, fecal coliform, and TCDD (a flame retardant found in many common articles). All of these are currently being addressed. Many of the Category 2 items originate from older data; more recent data has not indicated a continuing problem.

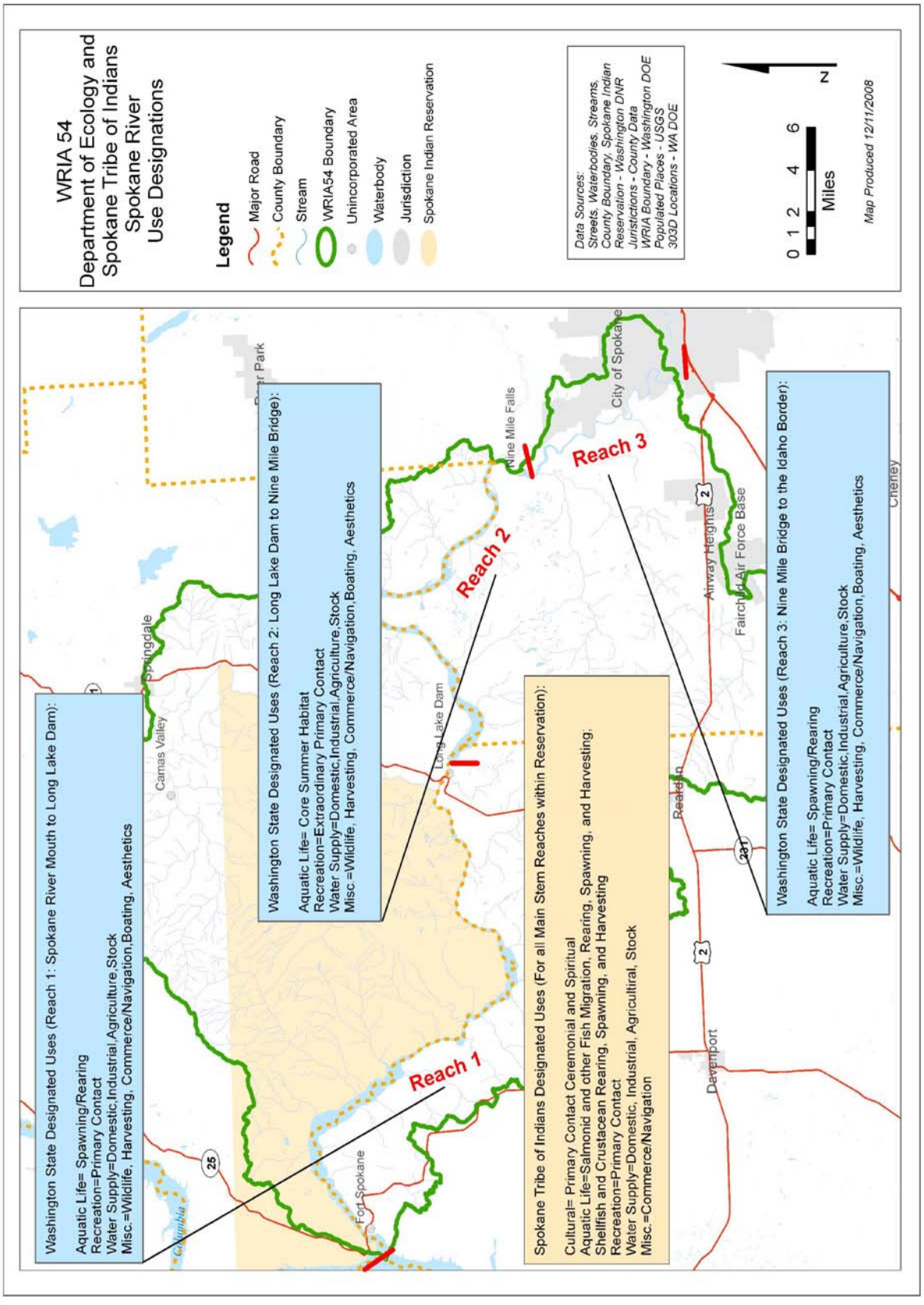

Figure 2-1. WRIA 54 Main Stem Use Designations

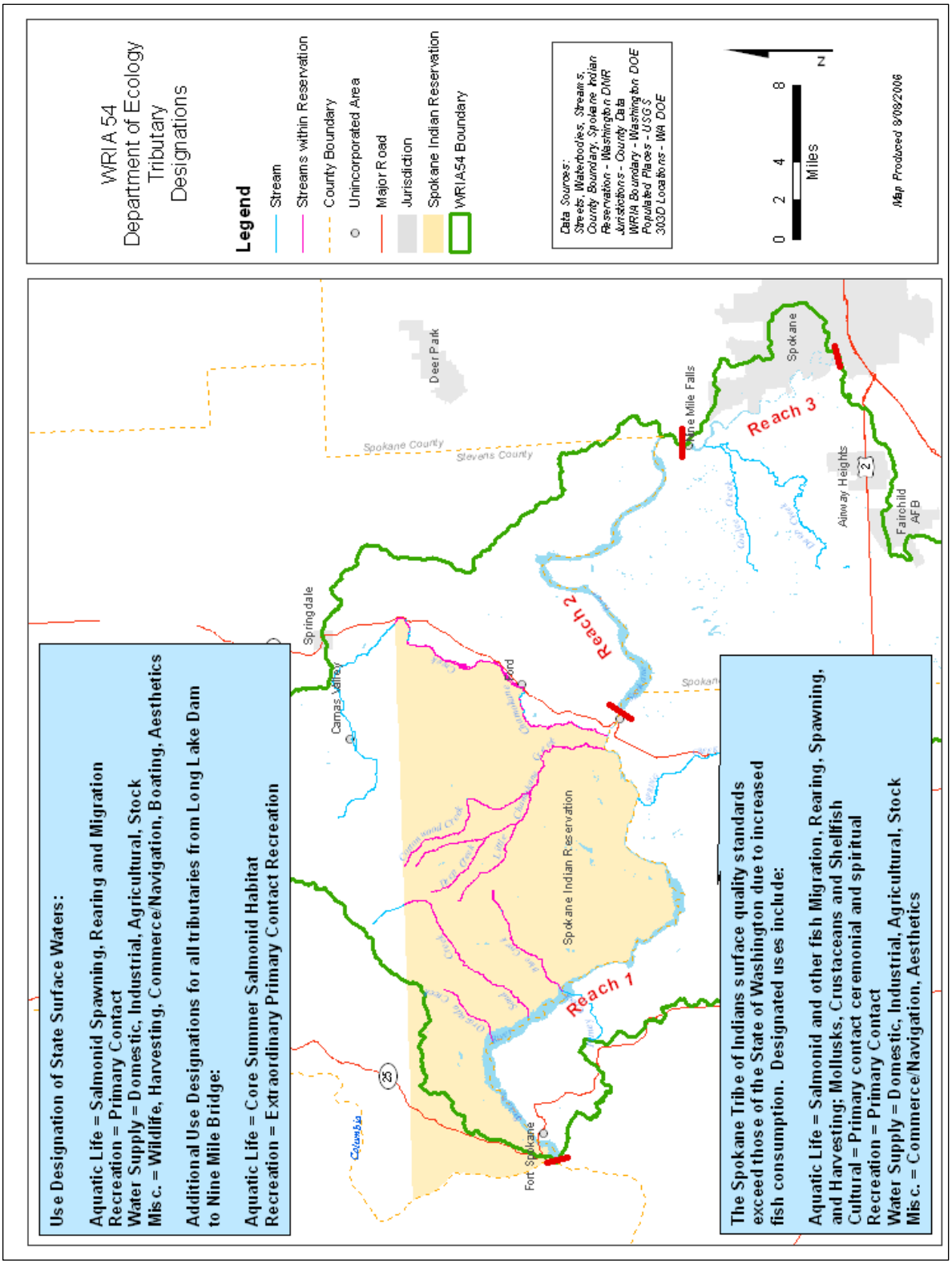

Figure 2-2. WRIA 54 Reservation and Non-Reservation Tributary Use Designations

TABLE 2-3.
2008 303(D) LISTINGS FOR WATER BODIES IN WRIA 54

Water Body Name	Parameter of Concern	Sample Dates	Sample no.	Medium	Source
Category 5 – Polluted Waters that Require a TMDL (also known as "the 303(d) list")					
Lake Spokane (Reservoir)	2,3,7,8-TCDD	6/18/2001	-	Tissue	Seiders (2004)
Lake Spokane (Reservoir)	Dissolved Oxygen	-	-	Water	Cusimano (2003)
Lake Spokane (Reservoir)	Total PCBs	1993	-	Tissue	Johnson, et al. (1994)
Spokane River	2,3,7,8-TCDD	2001, 2005	-	Tissue	Seiders (2004 & 2007)
Spokane River	Dissolved Oxygen	-	-	Water	Dept. of Ecology
Spokane River	Fecal Coliform	1993-2003	94	Water	Hallock (2004)
Spokane River	Total Dissolved Gas	2000	-	Water	Pickett, ECY/EAP (2003)
Swamp Creek	Fecal Coliform	1997-1999	-	Water	Stevens County Conservation District
Swamp Creek	Dissolved Oxygen	1997-1999	-	Water	Stevens County Conservation District
Chamokane Creek, S.F.	Fecal Coliform	1997-1999	-	Water	Stevens County Conservation District
Chamokane Creek	Fecal Coliform	1997-1999	-	Water	Stevens County Conservation District
Chamokane Creek	Dissolved Oxygen	1997-1999	-	Water	Stevens County Conservation District
Chamokane Creek	pH	1997-1999	-	Water	Stevens County Conservation District
Spokane River	Total PCBs	2000-2001	-	Tissue	Johnson, et al. ('94 & '00)
Category 4C – Impaired by Causes That Cannot be Addressed Through a TMDL					
Lake Spokane (Reservoir)	Invasive Exotic Species	2000	-	Habitat	Parsons/O'Neal (2000)

TABLE 2-3 (continued).
WATER QUALITY CATEGORIES FOR WATER BODIES IN WRIA 54

Water Body Name	Parameter of Concern	Sample Dates	Sample no.	Medium	Source
Category 4A – Approved TMDL in Place and Actively Being Implemented					
Lake Spokane (Reservoir)	Total Phosphorus	-	-	Water	Patmont, et al. (1987)
Lake Spokane (Reservoir)	Zinc	1993-2000	16	Water	USGS
Spokane River	Lead	1997	11	Water	Hopkins/Johnson (1997), Johnson/Golding (2002),Pelletier (1994)
Spokane River	Total Phosphorus	1992-1993	-	Water	Soltero, et al. (1992)
Spokane River	Zinc	1992-1997	7	Water	Hopkins/Johnson (1997), Pelletier (1994)
Category 2 – Waters of Concern					
Blue Creek	Lead	1993-2000	1	Water	USGS
Chamokane Creek	Fecal Coliform	1997-1999	-	Water	Stevens County Conservation District
Chamokane Creek	Dissolved Oxygen	1997-1999	-	Water	Stevens County Conservation District
Chamokane Creek	pH	1997-1999	-	Water	Stevens County Conservation District
Lake Spokane (Reservoir)	4,4'-DDD	1969-1971	-	Water	-
Lake Spokane (Reservoir)	4,4'-DDE	1969-1972	-	Water	-
Lake Spokane (Reservoir)	Aldrin	1970-1971	-	Water	-
Lake Spokane (Reservoir)	Chlordane	1980	-	Water	-
Lake Spokane (Reservoir)	DDT	1969-1971	-	Water	-
Lake Spokane (Reservoir)	Dieldrin	1969-1971	-	Water	-
Lake Spokane (Reservoir)	Endrin	1971	-	Water	-
Lake Spokane (Reservoir)	Heptachlor	1970-1971		Water	-
Lake Spokane (Reservoir)	Heptachlor Epoxide	1970-1971	-	Water	-
Lake Spokane (Reservoir)	Temperature	1993-2001	16	Water	Cusimano (2001), Hallock (2001)
Lake Spokane (Reservoir)	Total PCBs	1978	-	Water	-
Spokane River	DDT	1972	-	Water	-
Spokane River	Mercury	1991		Water	-
Spokane River	pH	1993-2001	4	Water	Cusimano (2001)
Spokane River	Temperature	1993-2007	89	Water	Cusimano (2001), Hallock (2001)

TABLE 2-3 (continued).
WATER QUALITY CATEGORIES FOR WATER BODIES IN WRIA 54

Water Body Name	Parameter of Concern	Sample Dates	Sample no.	Medium	Source
Category 1 – Meets Tested Criteria					
Chamokane Creek	Fecal Coliform	1997-1999	-	Water	Stevens County Conservation District
Swamp Creek	pH	1997-1999	-	Water	Stevens County Conservation District
Chamokane Creek	pH	1997-1999	-	Water	Stevens County Conservation District
Lake Spokane (Reservoir)	Ammonia-N	1993-2000	18	Water	USGS, Hallock (2001), Cusimano (2001)
Lake Spokane (Reservoir)	Chlordane	2002	-	Tissue	Seiders (2004)
Lake Spokane (Reservoir)	Mercury	2001-2002	-	Tissue	Seiders (2004), Seiders (2002), Jack/Roose (2002)
Lake Spokane (Reservoir)	pH	1993-2001	32	Water	USGS, Hallock (2001), Cusimano (2001)
Spokane River	Aldrin	2003	-	Tissue	Seiders (2004)
Spokane River	Ammonia-N	1993-2001	66	Water	Hallock (2001), Cusimano (2001)
Spokane River	Mercury	2003	-	Tissue	Seiders (2004)
Spokane River	pH	2000-2001	60	Water	Dept. of Ecology, Cusimano (2001), Hallock (2001)
Spokane River	Temperature	1999-2001	12	Water	Dept of Ecology, Cusimano (2001)

Note: Category 3 is "lack of sufficient data." These waters are not itemized as this category would apply to all situations where data does not yet exist.

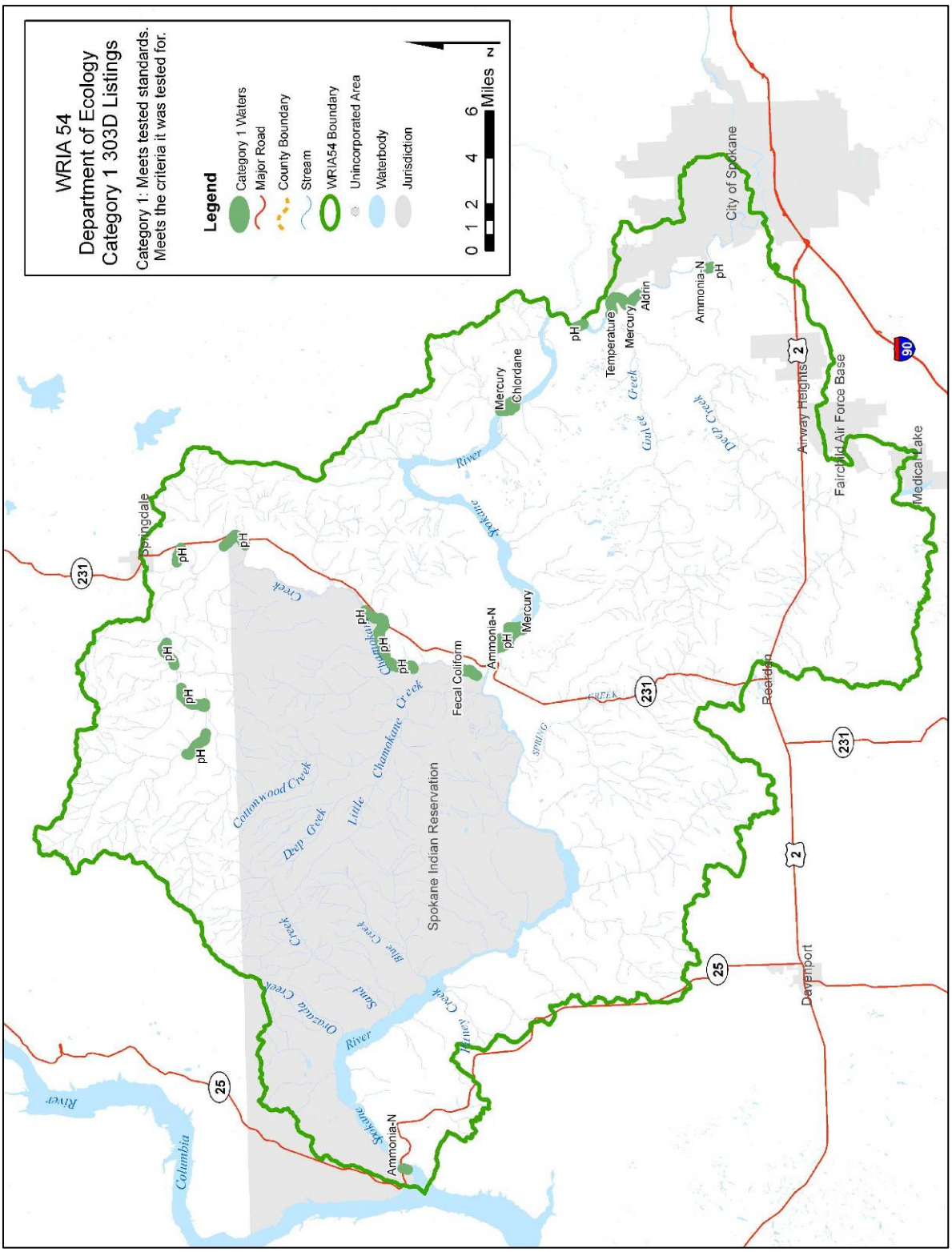

Figure 2-3. 2008 WRIA 54 Category 1 303(d) Listings: Meets Tested Standards

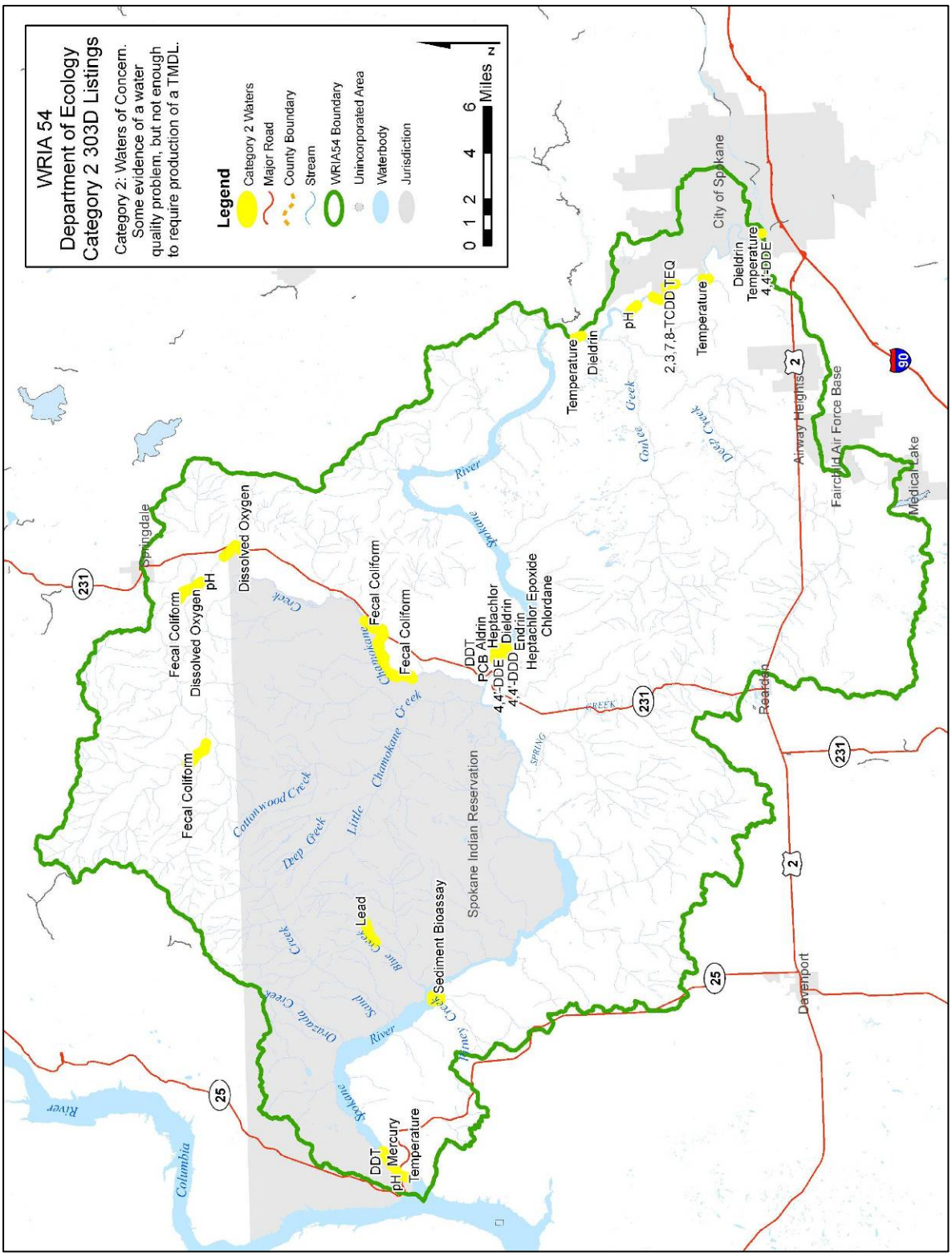

Figure 2-4. 2008 WRIA 54 Category 2 303(d) Listings: Meets Tested Standards

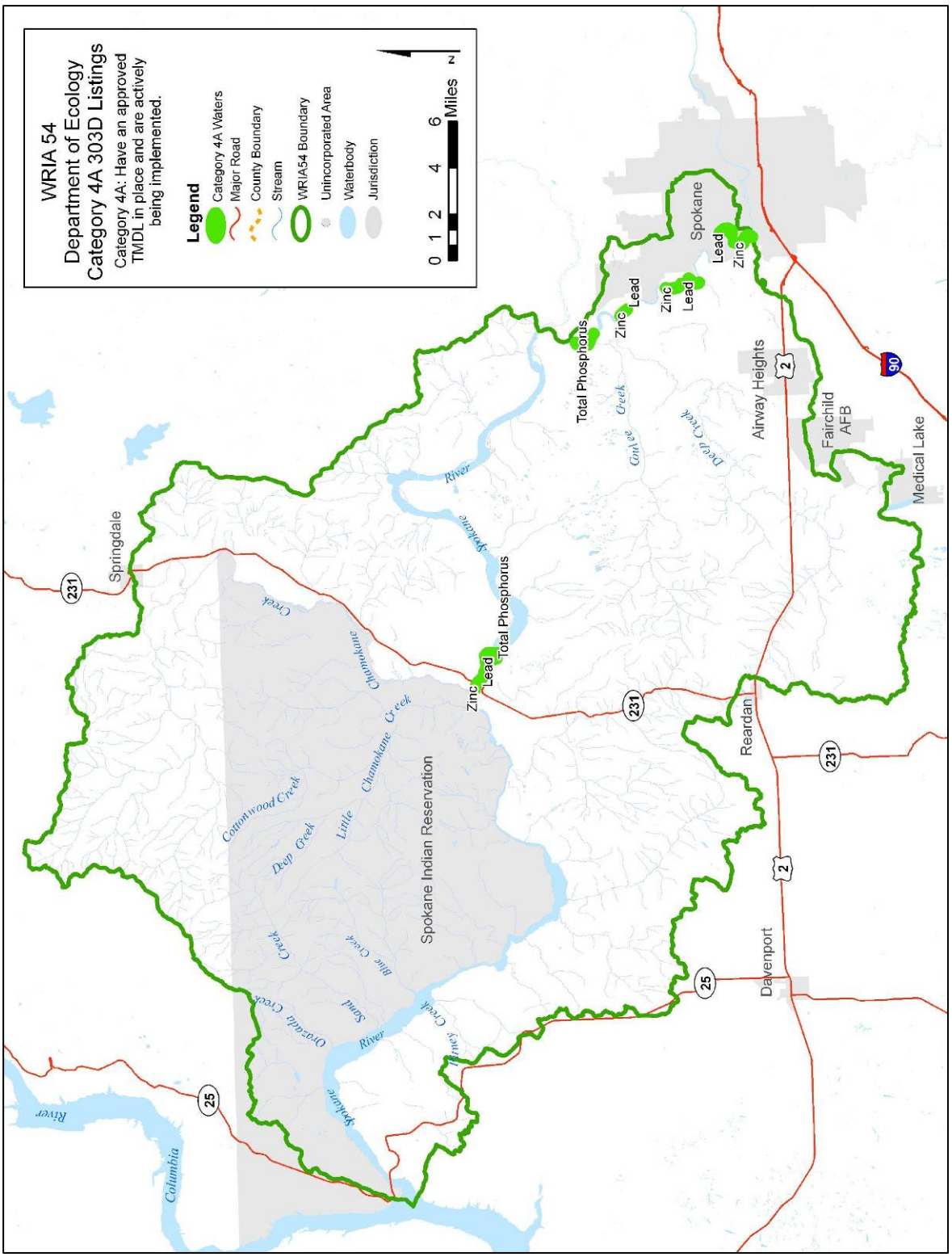

Figure 2-5. 2008 WRIA 54 Category 4A 303(d) Listings: Meets Tested Standards

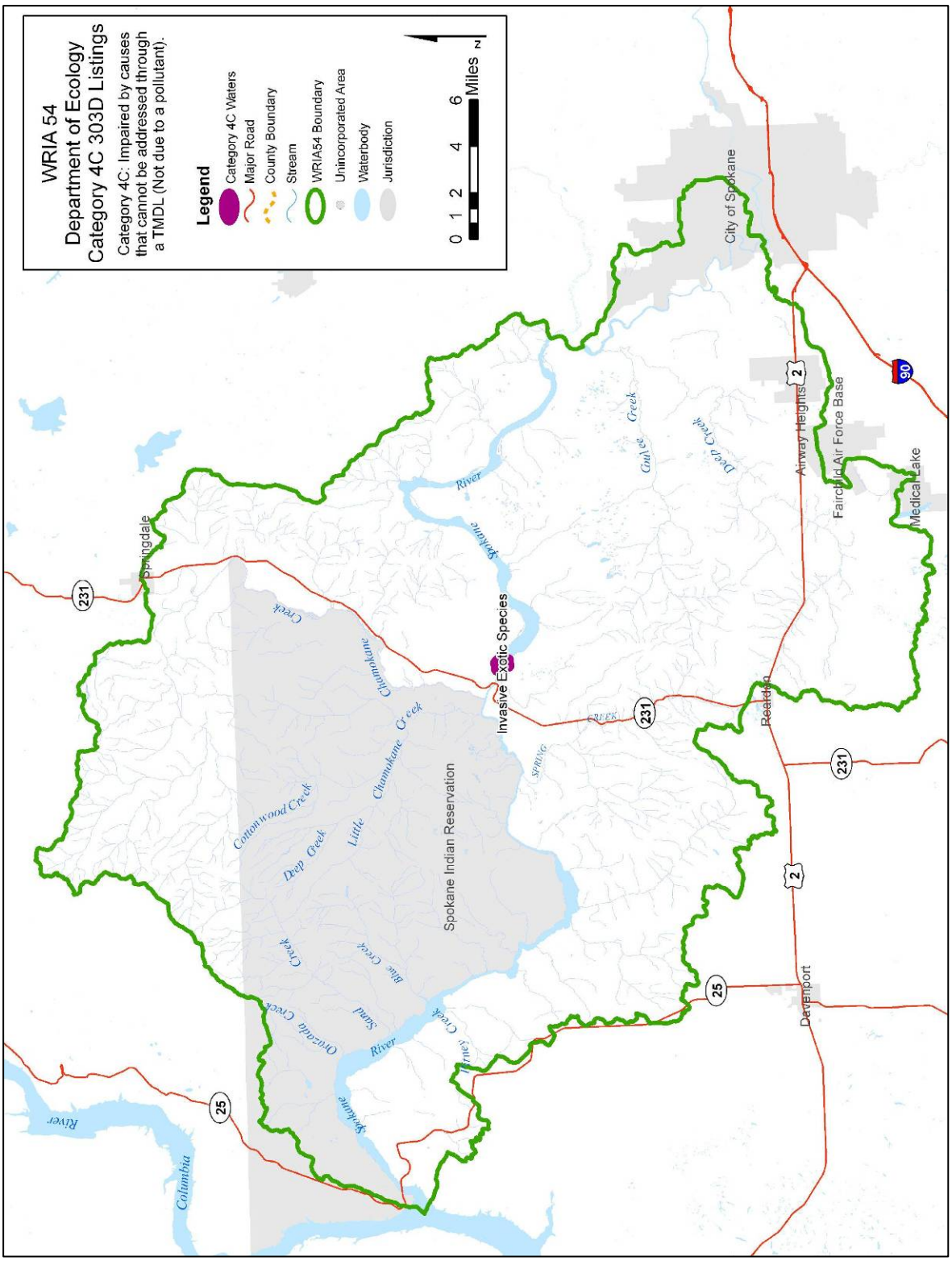

Figure 2-6. 2008 WRIA 54 Category 4C 303(d) Listings: Meets Tested Standards

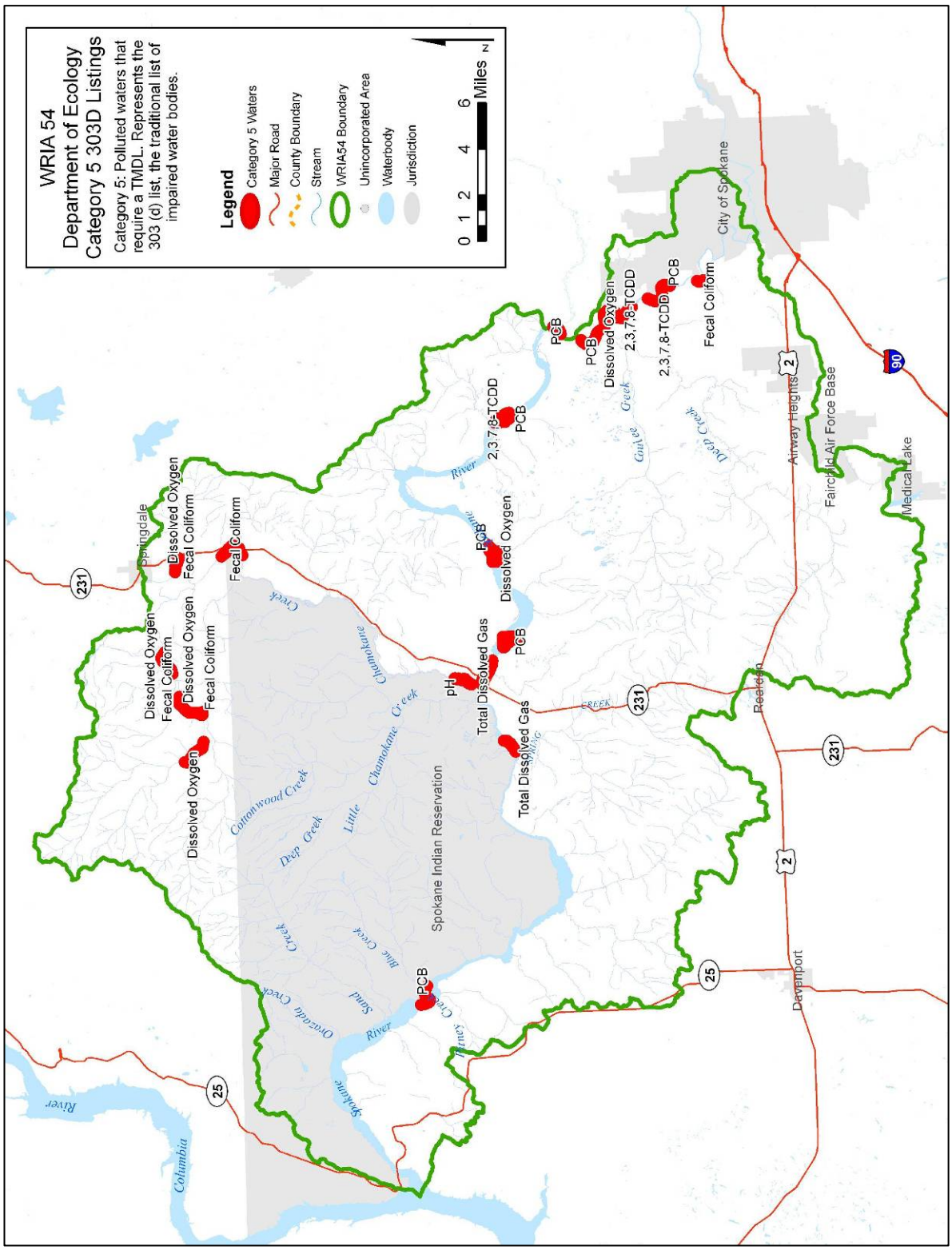

Figure 2-7. 2008 WRIA 54 Category 5 303(d) Listings: Meets Tested Standards

CHAPTER 3.
WATER QUALITY ISSUES

Water quality problems identified in WRIA 54 include low dissolved oxygen throughout the entire length of the Spokane River, elevated metal concentrations in Spokane River sediment, aquatic weed growth in Lake Spokane, elevated PCB levels in fish tissue, and possible groundwater contamination on the West Plains. Several of these problems are being addressed through non-WRIA actions. For example, the low dissolved oxygen in the river and Lake Spokane and metals in sediment are being addressed through state administered total maximum daily load (TMDL) assessments (water quality cleanup plans). This chapter provides a brief description of water quality issues and current status in the WRIA.

LOW DISSOLVED OXYGEN LEVELS IN SPOKANE RIVER AND LAKE SPOKANE

Background, Issues and Consideration of Options

The Spokane River water quality criterion for dissolved oxygen is that it shall exceed 8.0 mg/L unless "natural conditions" are below that level. The criterion for Lake Spokane is no less than 0.2 mg/L below "natural conditions." In the past, dissolved oxygen levels have been as low as 3.0 mg/L, with recurring minimums below 4.0 mg/L.

To address the problem, Ecology began developing a TMDL in 1998. Based on field sampling and numerical modeling of different pollutant loading scenarios (CE-QUAL-W2 model), Ecology released the *Draft Spokane River and Lake Spokane Dissolved Oxygen Total Maximum Daily Load Water Quality Improvement Report* (September 2007). In September 2008, the U.S. Environmental Protection Agency (EPA) announced that it would be revising some of its earlier TMDL-related decisions, which also impact the Ecology 2007 draft Water Quality Improvement Report (cited above). Currently Ecology is evaluating how and what revisions to the 2007 draft Water Quality Improvement Report will be necessary. Resolution of this issue is likely to take at least a year.

The 2007 draft Water Quality Improvement Report describes the causes of the pollution and specifies how much pollution needs to be reduced or eliminated to achieve clean water. It lays out an overall approach to control the pollution and a monitoring plan to assess the effectiveness of the water quality improvement activities. It recommends three categories of actions:

- Phosphorus reductions for wastewater dischargers permitted through the National Pollutant Discharge Elimination System (NPDES)
- Regional non-point source pollution reduction program
- Septic tank elimination program (for those located over the Spokane Valley/Rathdrum Prairie (SVRP) Aquifer).

The Water Quality Improvement Report focuses on corrective actions upstream from Lake Spokane (Long Lake), in part relying on the assumption that these actions will resolve dissolved oxygen problems downstream throughout the Spokane River system. The Spokane Tribe is conducting separate modeling (CE-QUAL-W2) on the Spokane Arm of Lake Roosevelt to evaluate the potential effectiveness of Spokane River and Lake Spokane Dissolved Oxygen TMDL implementation on resolving downstream dissolved oxygen problems and to determine if additional corrective actions are needed.

Dissolved oxygen levels at the Long Lake Dam discharge are also being addressed through the FERC relicensing process for the Spokane River Project. Ecology has issued the 401 certification that includes additional recommendations related to dissolved oxygen in Lake Spokane. Related to this, Avista's FERC license calls for a Sediment Management Plan for the Nine-Mile and Long Lake Reservoirs to address accumulating sediments in the reservoirs. Since some of the dissolved oxygen problems in Lake Spokane may be caused by oxygen demand from the accumulated sediments, this will also contribute to solving the dissolved oxygen problem.

Several data gaps were identified by the WRIA 54 Planning Unit; these are areas that may not have been fully evaluated and addressed through the proposed dissolved oxygen TMDL:

- What is the contribution of non-point source pollutants to Lake Spokane?
- What is the baseline non-point contribution from tributaries?
- What is the contribution of surface flow to the Spokane River from a number of natural springs?
- How would flow affect dissolved oxygen levels in the Spokane Arm of Lake Roosevelt?
- What is responsible for the anoxic conditions in the lower Spokane Arm of Lake Roosevelt?
- Do the tributaries below Lake Spokane make a significant contribution of nutrients to the lake?

DISSOLVED METALS IN SPOKANE RIVER

Historical mining activities in Idaho have resulted in elevated levels of dissolved metals such as lead and zinc in Spokane River water, including in WRIA 54. An EPA-approved TMDL, dating from 1999, is currently being implemented to correct this problem. The cleanup approach relies primarily on source control and cleanup of selected Spokane River beaches upstream from WRIA 54, where contaminated sediments had accumulated.

ELEVATED PCB LEVELS

All reaches of the Spokane River have been found to have polychlorinated biphenyls (PCBs) well above the National Toxics Rule (NTR) criterion. The NTR set the PCB criteria at 5.3 ng/g in fish tissue samples, 170 pg/L water concentration, and 0.0065 kg/day fish consumption rate. The Spokane Tribe Water Quality Standards set PCB criteria at 0.1 ng/g in fish tissue samples, 3.37 pg/L water concentration, and 0.0863 kg/day fish consumption rate.

Ecology is in the process of developing a TMDL to address PCBs in the Spokane River system (*Draft Spokane River PCBs Total Maximum Daily Load Water Quality Improvement Report*, June 2006). The TMDL assessment has consisted of additional sampling in river water, industrial and municipal effluents, stormwater, suspended particulate matter, bottom sediments, sediment cores, and fish tissue. Preliminary results indicate that PCB concentrations may increase as you move downstream from the Idaho border to lower Long Lake. In the draft report, Ecology proposed a PCB loading scenario based on meeting the Spokane Tribe water criterion for PCBs. This work is still in draft form, and it is uncertain when the TMDL will be finalized.

TEMPERATURE, TURBIDITY, PH AND FECAL COLIFORM IN THE LITTLE SPOKANE RIVER

The Little Spokane River is the largest tributary to the Spokane River in WRIA 54. To address these water quality concerns, a TMDL study was begun in 2004, with water quality sampling. Washington

State University, the Spokane County Conservation District, and the Little Spokane Water Quality Management Plan Committee are participating in the study and development of a water quality management plan. Once the assessment work is completed, a TMDL advisory group will be formed to work on the TMDL Water Quality Improvement Plan and Implementation Strategy.

AMMONIA, DISSOLVED OXYGEN, FECAL COLIFORM BACTERIA, PH, TEMPERATURE AND TURBIDITY IN LATAH CREEK

Spokane County Conservation District is leading development of a TMDL water quality improvement plan for water quality problems in Latah Creek. Latah Creek is a tributary to the Spokane River at the upstream boundary of WRIA 54. The TMDL assessment began in 2004, and an advisory committee is actively contributing to development of the draft plan, expected to be released in 2009.

TOTAL DISSOLVED GAS (TDG)

Total dissolved gas (TDG) levels exceed state and tribal water quality standards in reaches of the Spokane River below Long Lake and Little Falls Dams. Elevated TDG levels are usually caused by spill events on the river at hydroelectric projects. This occurs as air is entrained in the water during its fall, and as the water plunges to depth in the pool below the dam, air carried within the water column is compressed and forced into solution. TDG may also be affected by high biological primary productivity, natural waterfalls and cascades, and atmospheric barometric pressure drops or water temperature increases. Washington State and Spokane Tribal Water Quality Standards establish that TDG levels should not exceed 110 percent.

Avista Utilities has commissioned analysis to address the high TDG levels below Lake Spokane and Little Falls Dams. Sampling between 1999 and 2007 indicates high TDG levels below Long Lake Dam (Golder Associates, 2004; Spokane Tribe, 2007) that are essentially passed through Little Falls Dam. It appears that higher TDG levels are produced from specific spillway gates at Long Lake Dam. To address this situation, Avista Utilities evaluated several alternatives for reducing TDG production (EES Consulting, 2006). A process for resolving the TDG problem is addressed in the 401 Water Quality Certification issued by Ecology as part of Avista's FERC relicensing.

MIDNITE AND SHERWOOD MINES

Midnite Mine is an open-pit, hard-rock uranium mine that was active between 1956 and 1962 and again between 1971 and 1982. Mining operations physically disturbed about 350 acres of a 466-acre area leased by the Dawn Mining Company from the Spokane Tribe and tribal allotment owners. Waste rock was dumped in piles, used to fill mine pits, or spread on the surface. This changed surface water and groundwater flow and caused acid mine drainage.

Once mining had stopped at the site, the several open pits left at the site filled with water. Currently the Dawn Mining Company treats contaminated water from these pits on site, and discharges into Blue Creek, disposing of the sludge from the water treatment process at the Dawn Mill in Ford, Washington.

Reclamation has been difficult due to the penetration of the aquifer during mining operations. This has created perpetual seepage creating two lakes of standing contaminated water which flow into Blue Creek and the Spokane River. The Midnite Mine site contamination has spread beyond its 466-acre area through surface water and sediments, ground water, and road dust. Contaminants include the radionuclides radium-226, lead-210, uranium-234, and uranium-238. Non-radioactive metals are also present, as well as high sulfate and high conductivity levels, an indication of acid mine drainage.

Acid mine drainage is produced by the chemical and biochemical oxidation of stockpiled iron sulfide materials- pyrite, marcasite, and black amorphous pyrite. When these materials are exposed to oxygen in the atmosphere and combined with moisture, ferrous sulfate (Fe SO_4) and hydrosulphuric acid (H_2 SO_4) are produced. These then undergo extensive and continual oxidation. The effects of acid mine drainage on the chemistry of receiving water bodies include: 1) the depletion of the water body's bicarbonate buffer system; 2) an increase in the water body's titratable acidity and hydrogen-ion concentration; 3) the introduction of metal ions, as the low pH of the drainage water can cause the solubility of aluminum, iron, and other heavy metals; 4) and, may also cause the reduction of dissolved oxygen. Drainage from the mine has had a negative impact on benthic macroinvertebrate and fish populations.

EPA began investigating the site in 1999 and issued its Record of Decision for the superfund site in 2006. Site remediation activities will include:

- Removal of mine waste from the surface
- Contain the waste in two open pits at the site
- Slope and cover the waste with clean soil
- Cover waste in existing waste-filled pits with clean soil
- Plant native plants on the cover and in areas where waste was removed
- Pump water entering the pits to a water treatment plant at or near the site
- Treat water to remove contaminants and pipe to nearby stream or river
- Dispose of sludge from the treatment plant in an engineered facility
- Protect and maintain the soil covers
- Prevent human exposure to contamination in water until cleanup levels are met.

Five miles from Midnite Mine, the Sherwood Mine was operated by Western Nuclear from 1978 until 1984 and has since been successfully reclaimed.

The Dawn Mining Company uranium mill site near Ford and alongside Chamokane Creek is a third uranium mining-related cleanup site in WRIA 54. Dawn Mining Company conducted uranium milling at this 820-acre site from the mid-1950s to the early 1980s. Most of the uranium ore processed at the site was obtained from the Midnite Mine. Since the mill was shut down, Dawn Mining Company has been in the process of cleaning up the mill site, including demolition and burial of site buildings, contaminated soil removal and disposal, and contaminated groundwater remediation. During the late 1980s, groundwater contamination was found in seeps and springs discharging to Chamokane Creek. Cleanup and reclamation activities are ongoing at the site, with a targeted completion date in 2013 (Washington Department of Health, 2008).

WEST PLAINS MISSILE SITE

Trichloroethylene (TCE), perchlorate, and N-nitrosodimethylamine (NDMA) have been detected in several West Plains wells located in the Deep Creek area west of Spokane county. This combination of chemicals is unique and can be associated with rocket motor facilities. An association with the l Fairchild Nike Battery 87 anti-aircraft guided missiles that were historically located near this site is suspected by local residents.

TCE levels were as high as 210 parts per billion, with EPA's maximum contaminate level at 5 parts per billion. Perchlorate levels were up to 2.1 parts per billion, below the preliminary remediation goal of 3.6

parts per billion. NDMA was found to be up to 2.6 parts per trillion with a tentative remediation goal at 1.3 parts per trillion- the EPA has not determined a maximum level considered safe for NDMA.

Thus far, the Spokane Regional Health District states that the long-term health risks appear to be low at those levels, but filters have been installed at wells where elevated contaminant levels were found. EPA has not concluded its investigation at this time.

NON-POINT SOURCE POLLUTION

Non-point source pollution is pollution which cannot be traced back to a single origin or source. It occurs when rainfall, snowmelt, or irrigation collect pollutants and deposit them into streams, rivers, lakes, ground water and coastal waters.

In WRIA 54, non-point source pollution contributes to the low oxygen condition of the Spokane River and Lake Spokane. Partially because of non-point source pollution, these water bodies contain excessive phosphorus and other nutrients. These nutrients promote high growth rates of algae and other aquatic weeds using up the oxygen in the water.

Fish survival is compromised without adequate oxygen. In addition, unsightly algae blooms can become toxic, closing the lake to swimming and compromising the ecological balance of the lake.

Non-point source pollution diffuses from the following sources:

- Septic systems
- Riparian management/bank erosion
- Land use/wetland preservation
- Stormwater from developed areas.

Stormwater

Stormwater runoff occurs during and following precipitation and snowmelt events. Common pollutants that are released and carried with stormwater include the following:

- Nutrients: Phosphorus and nitrogen are the nutrients most often associated with stormwater runoff. When introduced into water bodies, heavy nutrient loads can lead to eutrophication—increased algae growth and decay that leads to low dissolved oxygen levels and severe reductions in water quality and fish populations.
- Sediment: In stormwater runoff, sediments are considered the largest pollutant load. Sediment loads inflict numerous impacts on surface waters including increased turbidity levels, effects on aquatic habitat, and reduction in capacity of impoundments.
- Organic Matter: Like high nutrient loading, decomposition of organic matter by organisms in surface waters results in depleted oxygen levels and reduced water quality and habitat.
- Bacteria: High bacteria levels present in stormwater runoff may impose health risks and affect recreational uses and aquatic life. Sources of bacteria include pet and other animal waste.
- Oil and grease: Oil, grease, and lubricating agents that may be present on roads, parking lots, and other impervious surface, are readily transported by stormwater.
- Heavy Metals: Heavy metals such as arsenic, cadmium, chromium, copper, lead, and zinc are often present in urban stormwater runoff. These heavy metals can be toxic for aquatic life and

also can accumulate in aquatic animals and fish. The consumption of fish containing heavy metals can be toxic for humans.

- Temperature: As stormwater runoff flows over impenetrable surfaces it may increase in temperature. Increased water temperatures can alter a water body's ability to support fish and aquatic organisms.
- Toxic Substances: Toxic substances that can be carried in stormwater include herbicides, pesticides, metals and hydrocarbons. These toxic compounds accumulate in the bottom sediments of surface waters.

Both the City of Spokane and Spokane County have regulations and programs designed to prevent drainage and water quality problems associated with stormwater runoff. EPA General Permits for Industrial Stormwater Discharges are required everywhere, including on the Spokane Reservation.

City of Spokane Stormwater Management Plan

In 2004 the City completed its Stormwater Management Plan. This plan offers a comprehensive program to guide stormwater activities. Goals of the City of Spokane Stormwater Management Plan include the following:

- Develop a policy that provides clear direction on stormwater management in the City of Spokane that is compatible with the City's other water resources management programs
- Decrease flood and drainage-related damages and hazards
- Decrease maximum amounts of pollutants in stormwater discharges
- Minimize the effects of stormwater pollution on the beneficial uses of local receiving water bodies, including the Spokane River, the Little Spokane River, Latah Creek, various tributary streams and other water bodies, and the Spokane-Rathdrum Aquifer
- Prepare the City for potential future federal and state mandates on stormwater management and total maximum daily load (TMDL) development.

The City of Spokane Stormwater Management Plan contains objectives that are designed to be specific actions to meet the above goals. These objectives include:

- Identify and implement cost effective opportunities to decrease flood and drainage hazards and pollutants to surface water bodies and ground water
- Establish and implement program control strategies that apply the key elements of the Federal Clean Water Act Regulations for municipal stormwater management [40 Code of Federal Regulations (CFR) Part 122.26(d)(2)]
- Control new development and redevelopment to minimize construction-phase and post-construction effects to stormwater quantity and quality
- Create a priority list of drainage basins and a defined framework for administering future analyses and development of more refined Capital Improvements Plan recommendations
- Improve public awareness on the need to properly manage stormwater to protect the beneficial uses of water bodies and groundwater
- Improve stormwater management among City departments and between the City of Spokane and other agencies and organizations
- Identification and preservation of natural drainageways in existing basins

- Identification of sources of funding for the plan

The existing City drainage system is composed of combined sanitary/storm sewers, separated storm sewers, dry wells, and regional infiltration basins. Initially, stormwater runoff flowed into a combined sanitary/storm sewer system. Water quality problems with this combined system were evident as early as 1890. In 1992, the City of Spokane separated substantial portions of its combined sewer system. Under WAC 173-245, the City was required to develop a plan to address the combined sewer overflows that remained in operation. The City of Spokane Stormwater Management Plan provides guidelines for the evaluation of separation projects in order to ensure that they comply with stormwater goals and policies.

Spokane County Stormwater Management Plan

The Spokane Board of County Commissioners saw to the establishment of a Stormwater Utility in 1992 to manage stormwater discharge in the developing areas of unincorporated Spokane County. The Stormwater Utility develops regional stormwater management plans for the major planning areas within the county. Included in these management plans is the West Plains Stormwater Management Plan (WPSMP). Like the City of Spokane Stormwater Management Plan, the WPSMP contains goals and objectives that are designed to ensure appropriate and cost-effective stormwater management measures. The WPSMP also contains structural and non-structural recommendations for plan components. Goals of the WPSMP are as follows:

- Mitigate existing drainage and water quality problems
- Avoid potential future problems with expected new development

To meet these goals, the West Plains Stormwater Management Plan has defined the following objectives:

- Identify cost-effective capital improvements for stormwater management
- Identify non-structural measures (basin specific development standards) to minimize future property damage
- Prescribe mechanisms to fund recommendations

In much of the West Plains area, infiltration facilities are unlikely to work due to shallow bedrock and high groundwater levels. Currently, evaporation facilities are one of the only means available for on-site stormwater removal. However, evaporation ponds require very large areas of land and pose concerns about impacts on domestic water wells and mosquito breeding. Recent information has drawn a target around the decrease in the static water table in many areas of the West Plains. The proposed use of evaporative facilities with impermeable liners anywhere near existing wells has become a water quantity concern. In addition, since evaporation ponds may increase the potential for bird-strike issues surrounding airports (i.e. Fairchild Air Force Base (FAFB) and Spokane International Airport (SIA)), finding alternate ways to manage and dispose of stormwater in the West Plains continues to be a high priority.

As a result of this dilemma, a paleo-channel north of the airport was investigated as a possible stormwater infiltration site in 2001. Seismic refraction and well drilling were used to learn more about the sub-surface geology and topography associated with this lobe of the paleo-channel. This was done to study the depth, extent, and permeability of the paleo-channel with the conceptual idea of siting an infiltration facility in this area. Because infiltration rates varied from less than one inch per hour to over 200 inches per hour, additional investigation including water quality analysis was needed before land was purchased for the potential regional facility site. Once the facility was constructed within this piece of the paleo-channel, developments within the tributary drainage area may be able to, for a fee, disconnect their on-site infiltration or evaporation facilities and direct their stormwater to the new regional infiltration facility.

The land previously maintained for on-site infiltration or evaporation facilities could thus be available for development.

The idea of using the paleo-channel north of the airport for receiving regional stormwater runoff was put on hold in 2006. In the last few years, commercial and residential development has occurred at a faster rate in the more densely developed areas along Highway 2 and south of I-90 near the Westbow and Aero Road intersection than anticipated. During this period of rapid development, the County has accepted on-site stormwater management systems that incorporate low rates of infiltration in order to avoid the use of evaporation facilities. In addition, some of the natural drainageways that were desired for future gravity conveyance to the paleo-channel did not get preserved. This posed the additional expense of designing and building a standard hard-structure conveyance system in some areas versus using the natural land features for a regional stormwater system.

Also, part of the original plan associated with using the paleo-channel north of the highway was related to the recommendation within the WPSMP that gravity flow be used to convey stormwater from as far south as the Westbow-Aero Road intersection. A feasibility study was completed in the summer of 2007 that revealed a variety of significant problems with trying to convey stormwater across, over or under the SIA property. It was determined by SIA that additional open channel conveyance in or around the aircraft and runways was not a viable alternative. The economic feasibility of constructing a pipe under airport facilities was also a major point of discussion.

Therefore, the County decided that since stormwater management for the area surrounding the paleo-channel was being addressed individually on-site, and the concept to cross SIA property was no longer a reasonable solution, it did not make sense to continue (at this time) with the intense level of investigation at the paleo-channel site.

Considering this change from the WPSMP, the County's focus has shifted to two areas: south of the airport, specifically south of I-90 (referred to as the Airport West South Basin) and to the west of the airport in the vicinity that includes the newly aligned Geiger Spur (referred to as the Craig Road Basin). The County foresees major development potential in these areas, as well as the need to get ahead of some of the existing failing on-site systems by providing regional solutions within the area south of I-90.

As the ability to infiltrate due to sub-surface constraints will continue to be a design problem in the West Plains area, the County intends to focus on using (and preserving) existing natural drainageways and wetlands within the area as much as possible; enhancing their area of influence and possibly constructing created wetlands that will have the potential for very slow infiltration.

Existing Non-Point Source Assessments

Very little work has been done historically to identify and evaluate the pollution impacts from non-point sources on WRIA 54 water bodies. Spokane County has initiated a study to evaluate non-point source phosphorus loading in the Spokane River and Lake Spokane watershed, including that portion within Idaho (over two-thirds of the watershed is in Idaho), Latah Creek and the Little Spokane River.

The only completed non-point source assessment lies in work done by Stevens County Conservation District for the Chamokane Creek watershed. The Spokane Tribe is also working on a reservation-wide non-point source assessment and reduction program. This work is described in the following sections.

Chamokane Creek Watershed Management Plan

The Chamokane Creek Watershed Management Plan (Stevens County Conservation District, 2000) was developed to be used as a tool in protecting, maintaining, and improving the quality of surface water in

the Chamokane Creek Watershed, both on and off the Spokane Reservation. The Plan addressed all identified potential water quality concerns; most of these were related to non-point sources. In developing the Plan, the District employed the following methodologies:

- Delineation of six subwatersheds
- Review and consideration of existing data on soils, land use activity such as forestry, building and development, septic system numbers and locations, and well production and nitrate levels.
- Visual stream assessment, using the Natural Resources Conservation Service Stream Visual Assessment Protocol (NRCS, 1998) of approximately 10,000 feet of stream representing 25 stream miles.
- Water quality sampling over an 18-month period, which included:
  - Stream flow
  - Temperature
  - pH
  - Turbidity
  - Dissolved oxygen
  - Fecal coliform bacteria
  - Specific conductance
  - Total nitrogen
  - Total phosphorus

The results of this assessment and water quality sampling are summarized in Table 3-1 and Figure 3-1. Most of the water quality concerns documented for the Chamokane Creek Watershed are likely to originate from non-point sources such as unstable stream banks, and degraded riparian and channel conditions.

The Chamokane Creek Watershed Management Plan provides specific recommendations to correct the identified water quality concerns. A large component of these recommendations relies on technical assistance and public education. The Stevens County Conservation District is currently pursuing grant funding to implement portions of the Chamokane Creek Watershed Management Plan, and conduct non-point source assessment work in the Lake Spokane area of WRIA 54.

Spokane Tribe Non-Point Source Assessment Program

The Spokane Tribe is conducting watershed-based non-point source assessments and developing management plans to address identified non-point source pollution sources. Work completed to-date includes the Reservation lands within the Chamokane Creek watershed (described above). Roads and associated erosion from logging is one of the major sources of non-point source pollution on the reservation. Abatement efforts focus on educating road builders about appropriate road sediment control structures, surfacing and culvert maintenance and stream bank and vegetation restoration.

TABLE 3-1.
WATER QUALITY SUMMARY FOR CHAMOKANE CREEK

	Lower Chamokane	Ford to Reservation Road	Middle Chamokane	Camas Valley	South Fork Chamokane Creek	Upper Chamokane Creek	Potential Causes and Remedies
Sediment and Turbidity	X						High levels of total suspended solids and turbidity have been measured in the downstream reach. Sediment load from eroding stream banks in the "Ford to Reservation Road" and "Middle Chamokane" stream segments were identified as the probable cause.
Water Temperature	X	X	X				Lack of shade in riparian zone is thought to be main cause. Lack of shade was reported in the "Ford to Reservation Road" and "Middle Chamokane" stream segments. Measured temperatures exceeded state standards for Class A waters even during times of sufficient stream flow. Springs contribute cooler water at the two hatcheries in the "Lower Chamokane" segment.
Nutrients	X	X	X	X	X	X	Measured phosphorus levels exceeded EPA recommendations. This is believed to be associated with sediment load from eroding stream banks in the "Ford to Reservation Road" ,"Middle Chamokane", and "Camas Valley" stream segments and from other sediment contributions in the "South Fork Chamokane" and "Upper Chamokane" subwatersheds.
pH	X						High pH believed to be associated with sediment load coming from upstream.
Dissolved Oxygen (DO)				X	X	X	Warm water temperatures, high nutrient concentrations, and low stream gradient may be causing low dissolved oxygen. Beaver ponds in "South Fork" and "Upper Chamokane" subwatersheds were also identified to be creating an environment contributing to low dissolved oxygen.
Fecal Coliform			X	X	X	X	Not clearly identified – possibilities include livestock grazing and septic systems.

TABLE 3-1 (continued).
WATER QUALITY SUMMARY FOR CHAMOKANE CREEK

	Lower Chamokane	Ford to Reservation Road	Middle Chamokane	Camas Valley	South Fork Chamokane Creek	Upper Chamokane Creek	Potential Causes and Remedies
Channel Condition		X	X		X		Channel is actively downcutting and growing wider, causing low summer flows to spread out over a wide channel bottom. Bank armoring is common, and this has led to further downcutting and erosion. The solution is to restore the channel to an appropriate width-to-depth ratio and stabilize stream banks to establish riparian vegetation.
Canopy Cover			X	X			Only 20% to 50% of these stream reaches receive shade from streamside vegetation.
Instream fish Cover				X			Channel straightening and armoring have reduced the cover and pools for fish habitat. These features should be restored.
Riparian Zone					X		Little or no riparian vegetation

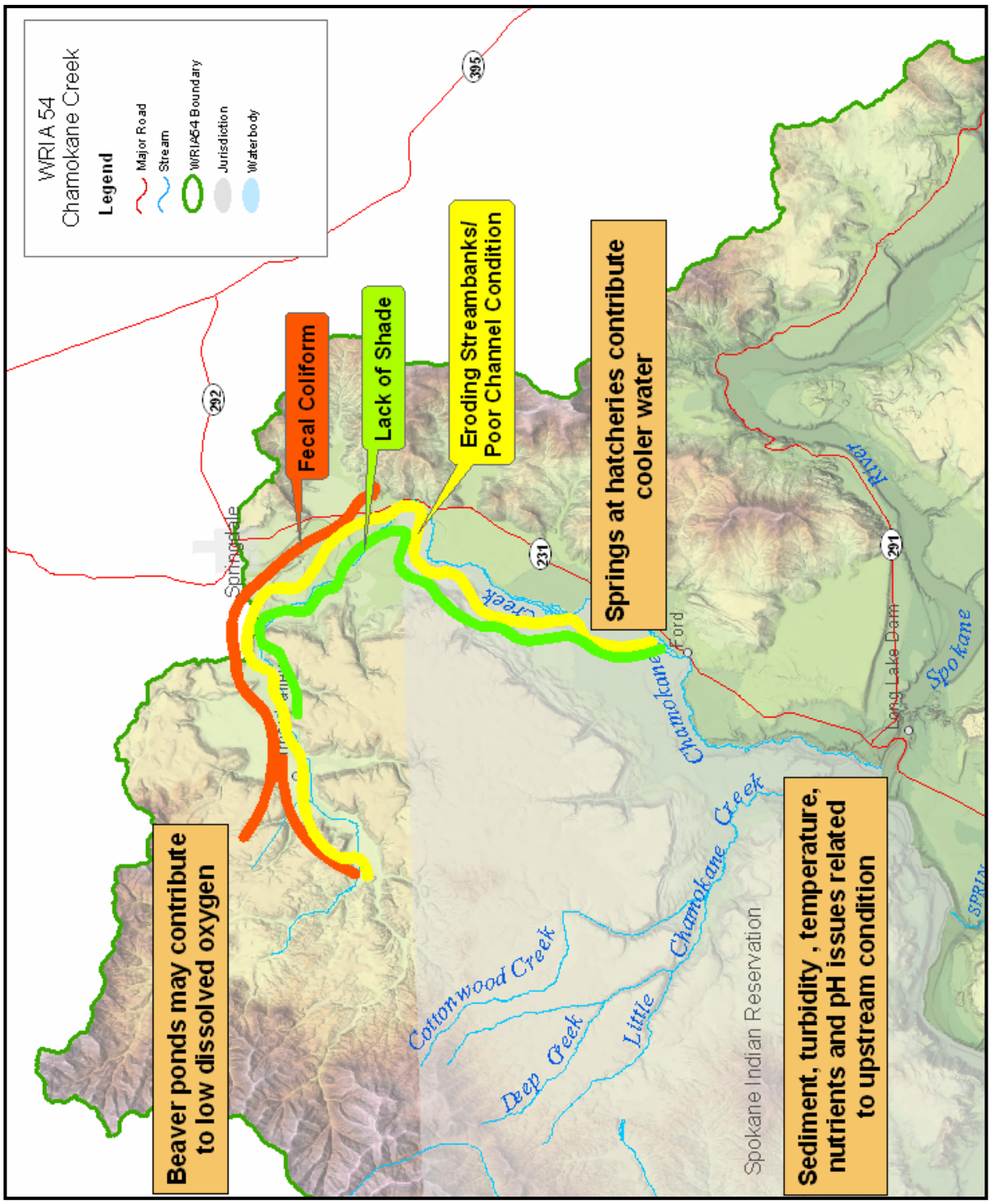

Figure 3-1. Chamokane Creek Watershed Plan

CHAPTER 4.
WATER QUALITY MONITORING

Ambient water quality monitoring is currently conducted by Ecology, the Spokane Tribe, and Spokane County (Figure 4-1). The Spokane Tribe has the most extensive network of sample stations, including sites on most tributaries within the Reservation as well as within the Spokane Arm of Lake Roosevelt.

Ecology's ambient monitoring program includes active sites on the main stem Spokane River at Long Lake Dam, Nine Mile Bridge, and Riverside State Park. The Riverside State Park site is the only long-term Ecology site in WRIA 54, with continuous data since 1972. The Fort Spokane site has been inactive since 1994, and the Fort Wright site has been inactive since 1973.

Spokane County maintains a groundwater sampling network; three wells and one spring site are located within WRIA 54. Water quality samples and water level measurements are obtained on a quarterly schedule as part of the Coordinated Compliance Monitoring Program associated with the SVRP aquifer's sole source aquifer designation.

Not shown on the map above, the City of Spokane collects water quality data regularly at its wastewater treatment plant outfall near Riverside State Park as required by its NPDES discharge permit.

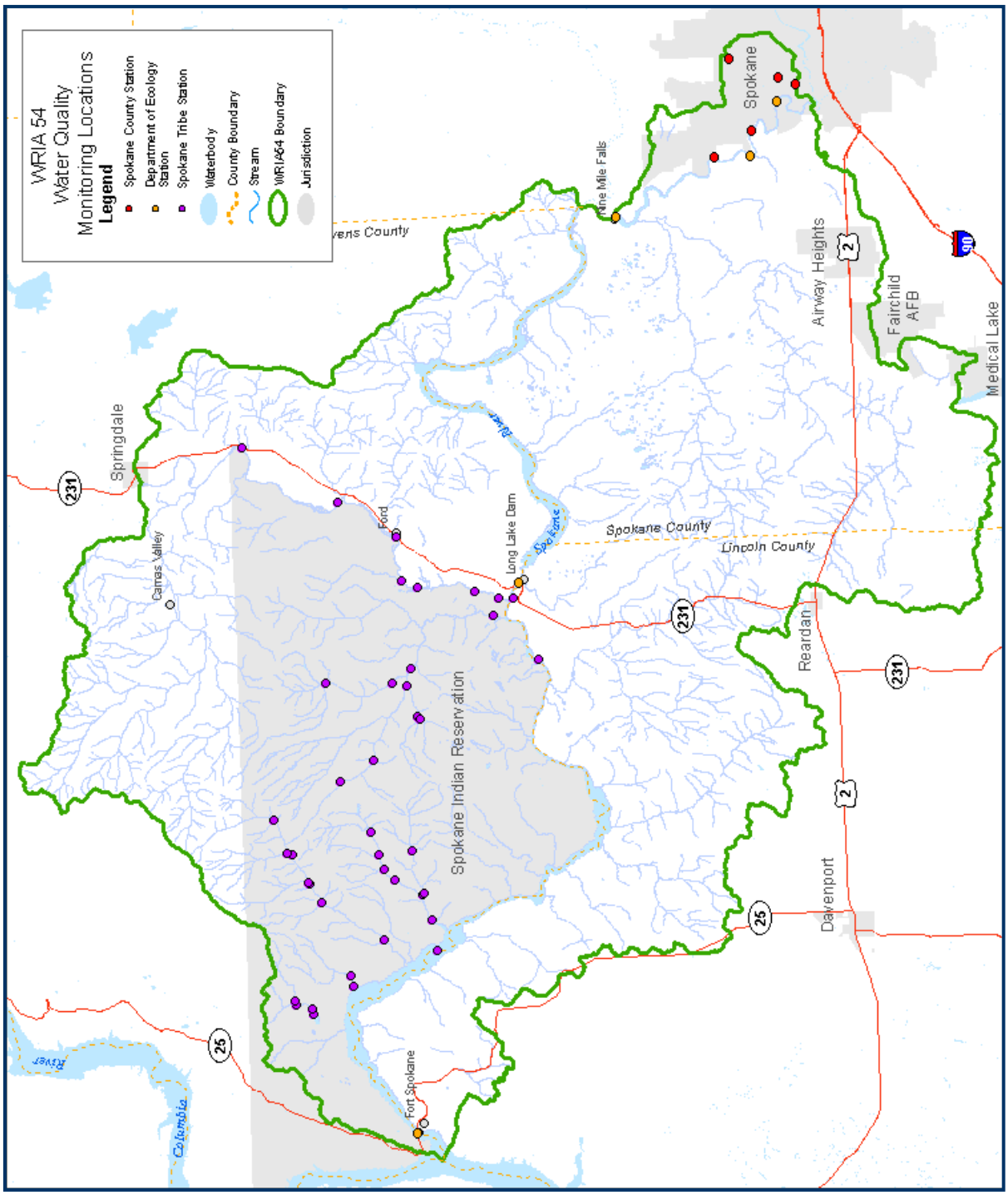

Figure 4-1. Water Quality Monitoring in WRIA 54

CHAPTER 5.
CONCLUSIONS

The results of this supplemental water quality assessment for WRIA 54 indicate that water quality concerns in WRIA 54 fall into two broad categories:

- ***Problems or concerns that are currently being addressed through a separate formal process.*** These include the TMDL water cleanup plans for the Spokane River, Lake Spokane, Little Spokane River and Latah Creek, as well as water quality issues related to hydropower production (being addressed through FERC relicensing and 401 Water Quality Certification), and EPA evaluation/cleanup activities associated with the Midnite Mine and West Plains missile site.
- ***Problems or concerns that are not currently being addressed in a comprehensive manner, and in most cases, have not been adequately evaluated.*** This category represents the biggest data gaps related to water quality in WRIA 54, and is mainly associated with potential non-point source pollution sources.

DATA GAPS

The major data gaps in WRIA 54 include the following general categories:

- Assessment and monitoring for non-point source pollution contributions and impacts;
- Specific on-the-ground information about stream, riparian, and channel conditions in WRIA 54 tributary watersheds or other subareas of WRIA 54. such as is contained in the Chamokane Creek Watershed Plan;
- Water quality data for WRIA 54 water bodies outside the main stem Spokane River and Spokane Reservation water bodies.

Several conceptual projects were identified to address these data gaps; these are described below under "Monitoring Options."

WATER QUALITY PROBLEM STATEMENT

Water quality impacts from urbanizing land uses, agricultural practices, and other sources have not been evaluated in a comprehensive manner, nor are they currently being monitored so as to enable future evaluation and prevention/mitigation of water quality problems.

MONITORING OPTIONS

Several projects were identified that would provide the needed information about non-point source impacts and other potential water quality problems within WRIA 54. These include the following conceptual projects:

- **Non-point source data compilation and assessment to evaluate non-point source phosphorus loading in the Spokane River and Lake Spokane** – this project has been initiated by Spokane County through EPA grant funding. It will provide the basis for better understanding about non-point source phosphorus loading, however because the study area is very large (the entire Spokane River watershed, including Idaho), it is unlikely that detailed focus will be placed on the WRIA 54 portion of the watershed.

- **Non-point source assessment, monitoring, and reduction plan for Spokane Reservation and throughout WRIA 54** - Throughout WRIA 54, non-point source pollution is a significant data gap that impacts water quality throughout the WRIA. Assessment, monitoring, and reduction plans will benefit the surface and ground water receiving water bodies, and reduce cumulative impacts.
- **Implementation and monitoring of the Chamokane Creek Watershed Management Plan** – Stevens County Conservation District has requested grant funding for this project, and if funded, would begin in summer, 2009.
- **Development of a water quality monitoring program for the paleo-channel features within the West Plains region**. This program would provide a means to better understand the relationship of the paleo-channels to surround hydrographic features such as the basalt aquifers, Deep Creek and Coulee Creek, and the Spokane River. It would also provide necessary data to evaluate potential impacts from neighboring land uses, stormwater infiltration, and water supply projects.
- **Development of a non-point source assessment monitoring program for the Lake Spokane drainage area**. This project would provide needed information about the impacts of non-point sources of phosphorus and other nutrients that may be impacting the dissolved oxygen in Lake Spokane.
- **Water quality and riparian assessment of the Deep Creek and Coulee Creek watersheds** – Similar to the Chamokane Creek Watershed Plan, this assessment would include a stream visual assessment, collection of water quality data, and analysis of existing data on surrounding land uses. Problem areas would be identified, and recommendations developed to correct problems within the watershed.
- **Water quality and riparian assessment for other WRIA 54 tributaries** (Spring Creek, Mill Creek, Little Chamokane Creek) – Development of a Watershed Plan similar to the Chamokane Creek Watershed Plan would be beneficial for all of these WRIA 54 tributaries. While of lesser urgency than Deep and Coulee Creeks because of the presence of lower intensity land uses, there is currently almost no data on these tributaries. Current land uses could be impacting these creeks through agricultural practices, road encroachment (Spring Creek), and low instream flow.
- **Ambient water quality monitoring program for WRIA 54 tributaries, lakes and wetlands** – Outside of the ambient water quality monitoring program conducted by Ecology for main stem Spokane River sites and the Spokane Tribe for Spokane Reservation water bodies, no regular water quality monitoring is done in WRIA 54. This project would develop and implement an ambient water quality monitoring program to address this data gap.

PRIORITY LIST

The WRIA 54 Water Quality Work Group and Planning Unit evaluated the above monitoring options and prioritized two projects to pursue within its Supplemental Water Quality grant:

- Development of a Quality Assurance Project Plan (or Sampling and Analysis Plan) for a Paleo-channel water quality monitoring program within the West Plains region of WRIA 54
- Development of a Quality Assurance Project Plan to establish a non-point source monitoring program for the contributing drainage area to Lake Spokane.

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