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MEMORANDUM

TO: **Kris Pintado, Standards, Planning, and Reporting Team Leader**

FROM: **Bryan Dail and Gary Schiffmiller, Environmental Scientists**

DATE: **March 6, 2014**

SUBJECT: **Triennial Review – Gila River segment description and associated Specific Conductivity criteria**

Introduction and Purpose

The purpose of this memo is to address a geographic error in the New Mexico Administrative Code identifying segment-specific criteria for specific conductivity in tributaries of the Gila River.

Background and Problem Description

The segment description in New Mexico's Water Quality Standards, 20.6.4.503 NMAC, misidentifies a perennial reach of the West Fork Gila River. Correcting the description requires the associated specific conductivity criterion also be evaluated. The 20.6.4.503 NMAC currently states:

20.6.4.503 GILA RIVER BASIN - All perennial tributaries to the Gila river above and including Mogollon creek.
A. Designated Uses: domestic water supply, high quality coldwater aquatic life, irrigation, livestock watering, wildlife habitat and primary contact.
B. Criteria: the use-specific numeric criteria set forth in 20.6.4.900 NMAC are applicable to the designated uses, except that the following segment-specific criteria apply: specific conductance 300 µS/cm or less for the **main stem of the Gila river above Gila hot springs** and 400 µS/cm or less for other reaches; 32.2°C (90°F) or less in the east fork of the Gila river and Sapillo creek below Lake Roberts; the monthly geometric mean of E. coli bacteria 126 cfu/100 mL or less, single sample 235 cfu/100 mL or less.
[20.6.4.503 NMAC - Rp 20 NMAC 6.1.2503, 10-12-00; A, 05-23-05; A, 12-01-10]

Segment Description: The current language indicates a segment-specific criterion (for specific conductivity) on the **main stem Gila River above Gila hot springs**. However, this portion of the segment (i.e., above and below the Gila Hot Springs to the confluence with the East Fork Gila River) is identified on USGS maps as the West Fork of the Gila River (see Figure 1 below). The segment description should be corrected to be consistent with USGS maps of the Gila River system.

SWQB EXHIBIT 64

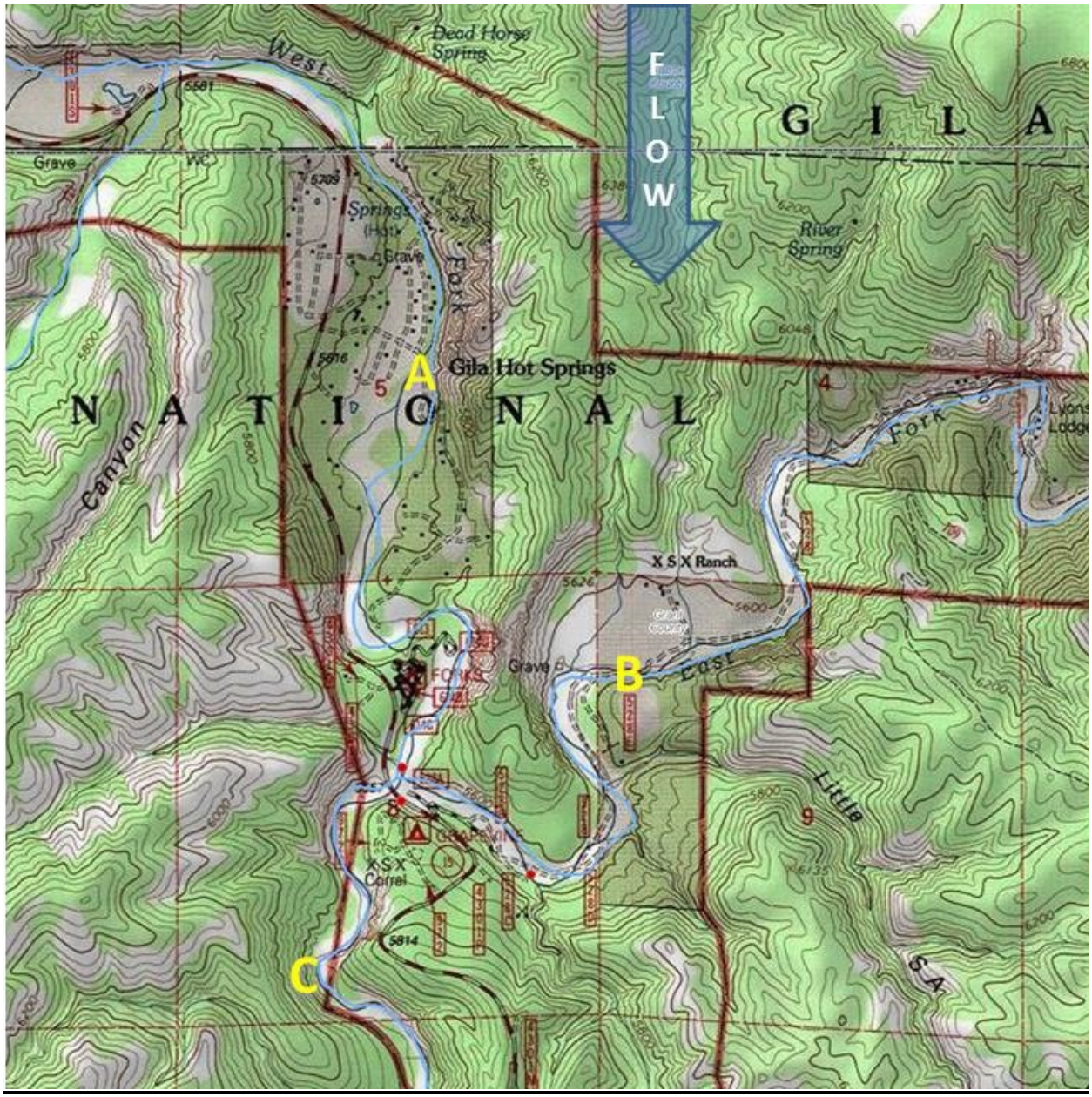

Figure 1. USGS topographic map quadrangle o33208b2, Gila Hot Springs, NM (scale: 1:24,000) showing the West Fork Gila River at Gila Hot Springs (A) the East Fork Gila River (B) and below the confluence of the W. Fork and E. Fork forming the Gila River (C). Red dots (●) indicate SWQB Water Quality sampling sites.

The roadway paralleling this segment of the West Fork Gila River is also identified on maps as “W Fork Road” (see Figure 2 below).

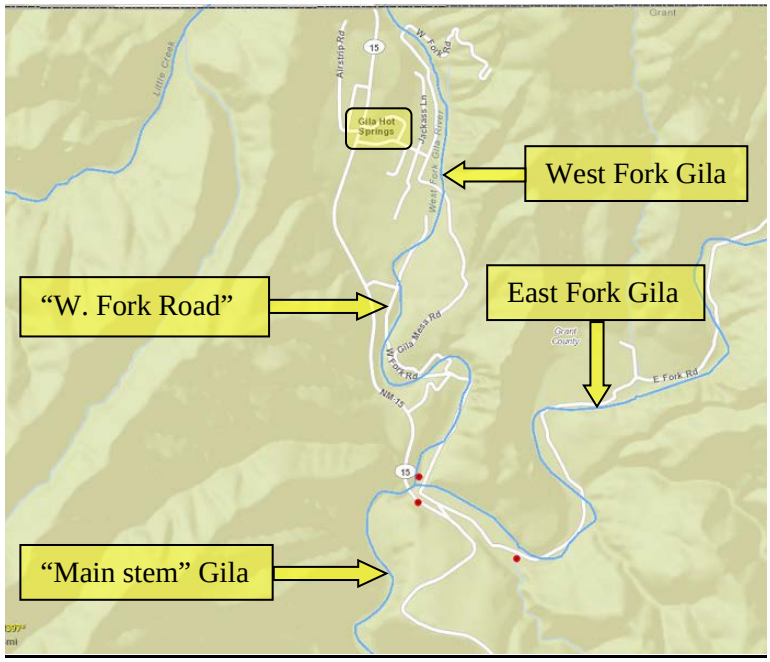

Figure 2. Road map with labels showing W Fork Gila River, W. Fork Rd, East Fork Gila River, E. Fork Rd. and main stem Gila River. Red dots (●) indicate SWQB Water Quality sampling sites.

<u>Specific Conductivity Revision</u>

The language misidentifying a segment of the West Fork Gila River as “main stem” has been present since the New Mexico Water Quality Standards were first adopted and criteria for specific conductivity (SC) have been part of this segment since 1976. As a statement of basis was not available, the presumption is that the influence of Gila Hot Springs Complex (GHSC; a series of geothermal springs near the town of Gila Hot Springs) was considered to be a possible contributor to high specific conductivity downstream of its confluence with the West Fork Gila River. Specific conductivity of thermal waters is often many times that of cold spring-fed, snow melt and rain-fed waters, and data exist for several hot springs in the Gila area. To evaluate the assignment of SC criteria to the West Fork Gila River segment, previously misidentified as the main stem Gila River, SWQB investigated the water quality data for hot springs in the area (Table 1a) and the West Fork Gila River below the GHSC and summarized the available data (Table 1b).

Data indicate that the relatively small volume of GHSC water entering the West Fork Gila River does not increase SC in the West Fork Gila River appreciably. West Fork Gila River below the GHSC maintains a SC well below 300 µS/cm (Table 1b). The average SC is 214 µS/cm and the maximum is 259 µS/cm. The total flow of GHSC waters to the West Fork Gila River has been documented as an average of 0.44 cfs; the GHSC main source has a rate of 0.17 cfs at peak flow (Schwab et al., 1982; Lund et al., 1991; Witcher 2002;). Average annual flow at the most upstream available gage in the Gila watershed, Gila River near Gila, NM (090430500), was 156 cfs (1929-2012). Thus, even at the lowest recorded flows, the addition of higher specific conductivity water from GHSC is minimal, and the existing segment-specific SC criterion (400 µS/cm) below this source does not reflect actual conditions. While the average SC measured below GHSC (214±27 µS/cm) is different from the average SC measured above the confluence (165±22 µS/cm), both are consistently well below a 300 µS/cm criterion including standard deviation around the mean.

Table 1a. Specific conductivity (µS/cm) of grab samples at select hot springs in the Gila drainage (Summers, 1972)

Water body	Specific conductivity* 1	Specific conductivity 2	Specific conductivity 3	Specific conductivity 4
Hot Springs				
Gila Hot Springs (W. Fork Gila)	640	560	620	590
Hot Springs (E. Fork Gila)	560	560	581	574
Hot Springs (M. Fork Gila)	720	735	771	762

Table 1b. Specific conductivity (µS/cm) of grab samples at select water quality sites in Gila River tributaries performed by the New Mexico Surface Water Quality Bureau

Water body	Specific conductivity* 1	Specific conductivity 2	Specific conductivity 3	Specific conductivity 4
Gila tributaries				
West Fk Gila River (bel GHSC)	**204**	**239**	**259**	**204**
Middle Fk Gila River (abv W. Fk Gila)	105	255	171	247
East Fk Gila River (abv Gila River)	213	221	319	313

*SC measurements are reported in µS/cm; river samples were conducted by SWQB and are from 4 grab sample taken between March and October of 2011; Hot Springs sampling was reported in W.K. Summers, 1972 as measured by several contract labs (1 through 4). Data in **green** highlight that the West Fork Gila River is consistently able to attain the "300 or below" SC criteria.

In addition, assessed perennial tributaries to the West Fork Gila (Middle Fork Gila) and tributaries thereto all consistently show SC below 300 µS/cm (Table 2).

Table 2. Specific conductivity (µS/cm) of tributaries of the West Fork Gila River (Middle Fork Gila and tributaries thereto) performed by the Surface Water Quality Bureau

Water Body:	Middle Fork Gila	Iron Creek	Gilita Creek	Willow Creek
Specific Conductivity (µS/cm ±SD*)	215±21.1	99±5.0	95±0.9	78±0.8

*SD= Standard deviation of the mean

Additional tributaries to the West Fork Gila River, (White Creek, Turkey Feather Creek and Cub Creek) are not currently assessed, however their combined influence on the West Fork are such that West Fork Gila SC below these tributaries is well below the 300 µS/cm criteria (Table 1b).

The segment specific SC of 400 µS/cm for all other perennial tributaries (other than the West Fork Gila River and its tributaries) above and including Mogollon creek is appropriate given SWQB's most recent survey data for those tributaries (Table 3).

Table 3. Specific conductivity statistics for East Fork, Middle Fork and main stem Gila River and tributaries; SWQB data from 2005 and 2011 surveys.

Specific Conductivity (µS/cm)	E. Fork Gila River (abv Gila River)	Gila River (abv Turkey Creek.)	Sapillo Creek	Turkey Creek	Middle Fork Gila River (abv West Fork Gila River)	Beaver Creek
Average:	286	324	336	298	216	304
Max:	319	326	368	301	250	306

Recommended Revisions

To be consistent with USGS maps and local knowledge; the segment description should be revised as follows (strikeout indicates a change). According to analyses of SC and flow data, the West Fork Gila River and its tributaries currently maintain SC criteria of 300 µS/cm. The segment specific SC of 400 µS/cm for all other perennial tributaries (other than the West Fork Gila River and its tributaries) upstream of and including Mogollon Creek is appropriate.

20.6.4.503 GILA RIVER BASIN - All perennial tributaries to the Gila river ~~above~~ upstream of and including Mogollon creek.

A. Designated Uses: domestic water supply, high quality coldwater aquatic life, irrigation, livestock watering, wildlife habitat and primary contact.

B. Criteria: the use-specific numeric criteria set forth in 20.6.4.900 NMAC are applicable to the designated uses, except that the following segment-specific criteria apply: specific conductance of 400 µS/cm or less for all perennial tributaries except West Fork Gila and tributaries thereto, specific conductance of 300 µS/cm or less. **~~main stem of the Gila river above Gila hot springs and 400 µS/cm or less for other reaches~~; 32.2°C (90°F) or less in the east fork of the Gila river and Sapillo creek below Lake Roberts; the monthly geometric mean of E. coli bacteria 126 cfu/100 mL or less, single sample 235 cfu/100 mL or less.**

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