

Tributary Flow Patterns Ukiah Groundwater Basin Water Year 2018

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During the 2018 water year several member of the Ukiah farming community documented flow status in the various tributaries that flow into and across the Ukiah Groundwater Basin. The goal of the data collection effort was to identify the flow patterns of the main tributaries in the region to aid our understanding of the timing of recharge to the aquifer and discharge to the Russian River.

The observations made for this study show that tributary discharge to the Russian River is largely limited to the months with substantial rainfall. However, many of the tributaries were observed to flow into the Ukiah Groundwater Basin in June, July, and August, indicating that the aquifer receives recharge flow even during months with no rainfall. Three tributaries were observed to flow year-round into the Basin. No attempt was made to quantify this flow, which could be a goal for a future study. The observations also showed instances where wet sections of the creek bed were located downstream of dry sections. This non-linear drying pattern suggests complexity with the subsurface geology or instances where the creek bed intersects a high groundwater surface.

2018 was a relatively dry water year for the region, although rainfall in the Spring was higher than normal. Some winter months were notably dry. The following table compares average rainfall with the actual values recorded for the 2018 water year.

Documented rainfall Ukiah station E7513

Month	10	11	12	1	2	3	4	5	6	7	8	9
Water Year 2018	0.6	6.5	0.3	6.9	0.4	7	5.8	0.1	0	0	0	0.1
Average	2.1	5.1	7.9	7.4	7.0	5.4	2.6	1.5	0.4	0.0	0.1	0.4

An Excel dataset, with 130 documented observations of tributary status, accompanies this document.

Eastern Tributaries (from North to South)

West Fork Russian River

Size	Surface Flow Into Basin	Surface Flow Into River
24 sq mi	too many branches to observe	Oct 2017 to July 2018

The West Fork of the Russian is the original headwaters of the Russian River. Smaller first order streams flow into the Basin and combine to create the West Fork. The majority of the reach is located within the basin boundaries. Due to the rural residential and agricultural nature of this region the West Fork and its tributaries are dammed in numerous places and direct diversion of water from the stream is common. Flow at the end of the West Fork is gauged by the USGS. In the 2018 water year flow commenced in October 2017 and ceased in July 2018. Wet pools may be found in the streambed during the dry periods.

Sulphur Creek (Vichy Creek)

Size	Surface Flow Into Basin	Surface Flow Into River
7.5 sq mi	Nov 2017 to June 2018	Nov 2017 to June 2018

Sulphur Creek drains from the Eastern mountains – only a small portion of the reach is within the Groundwater Basin. One source of the stream is noted for its high mineral and carbon dioxide content and the stream channel has a “cemented” aspect in several areas – probably due to the mineral content of the water. The streamflow is consistent in the winter months, even during dry periods between storms. In the summer months wet sections of creek bed can be found downstream of dry sections.

McClure & Mill Creek

Size	Surface Flow Into Basin	Surface Flow Into River
18 sq mi	Year round	Intermittent Dec 2017 to Apr 2018

McClure and Mill Creeks drain from Cow Mountain on the Eastern side of the Ukiah Groundwater basin. The creeks join and discharge to the Russian River just North of the Talmage bridge. Mill Creek is dammed at two locations outside the groundwater basin. Both the Mill branch and the McClure branch flow year round into the basin. The creek only discharges to the river intermittently during the wet months; for the 2018 water year this flow ceased in late April.

Howel

Size	Surface Flow Into Basin	Surface Flow Into River
10 sq mi	Wet season only	Intermittent. Only during/after strong rain events.

Howel Creek enters the basin as four (maybe five) separate tributaries, each of which is very seasonal. The course of the creek has been modified over the decades, and the USGS maps available do not accurately define the course of the stream. The agricultural land in this area exhibits high permeability, probably due to the alluvial nature of the sand and gravels. However, clay beds are mixed into the geology, adding some complexity to this region. The creek connects to the river only during periods of strong rainfall. The creek flows into the Basin for a longer period, but only in winter to spring. This creek has noncontiguous pools when it is in a drying phase.

Morrison

Size	Surface Flow Into Basin	Surface Flow Into River
10 sq mi	Year round	Intermittent Dec 2017 to March 2018

Morrison Creek presents a textbook transition from a mountainous confined streambed to an alluvial unconfined streambed. The confined area flows year round. The final one mile of the stream length traverses a high permeability alluvial fan of gravels and sands. Surface / groundwater interactions have been studied at this location by Laurel Marcus and her CLSI group.

Western Tributaries (from North to South)

Forsyth Creek

Size	Surface Flow Into Basin	Surface Flow Into River
28 sq mi	Through late summer	Through June

Forsyth is the largest drainage that enters the Ukiah Groundwater Basin. Land owners in the area report that the creek typically disconnects from the river in late Spring. The creek has a pathway, once inside the basin, before it intersects with the West Fork of the Russian. Flows into the basin typically ends in late summer.

York Creek

Size	Surface Flow Into Basin	Surface Flow Into River
14 sq mi	Probably year round	Through June

York, like Forsyth, has a relatively long pathway across the basin before the confluence with the Russian River. No observations are available at the location where the creek enters the basin, but year round flow is likely. Flow into the Russian River continued through June in 2018.

Hensley Creek

Size	Surface Flow Into Basin	Surface Flow Into River
7.5 sq mi	Probably though mid Spring	Prior to 6/24/2018

Hensley Creek is the smallest of the Western subsheds. Limited monitoring data was collected in 2018.

Ackerman Creek

Size	Surface Flow Into Basin	Surface Flow Into River
20 sq mi	unknown	To June 2018

Ackerman Creek comes from a larger watershed and has a short route to traverse the basin before the confluence with the river. Flows can be significant. In the Spring wet stretches of creek bed can be seen downstream of dry stretches.

Orrs

Size	Surface Flow Into Basin	Surface Flow Into River
20 sq mi	Through late summer	To 5/7/2018

Orrs Creek drains from a larger watershed in the Western hills before passing through residential neighborhoods and agricultural land before it reaches the river. The channel has fewer artificial structures (culverts, bridges, cement walls, etc) than does neighboring Gibson Creek. The Creek flows to the river into May. Surface flow into the basin ends in the late summer.

Gibson and Doolan

Size	Surface Flow Into Basin	Surface Flow Into River
8 sq mi	through late summer	To 5/1/2018

The Gibson/Doolan Creeks enter the Basin at the city limits of Ukiah with three separate tributaries. While traversing the Ukiah area the creek is contained to artificial channels and culverts. During storm events a large portion of the flow is storm runoff from impervious surfaces in the urban area. All the branches of the creek combine into a single channel before the confluence with the Russian River, immediately North of the Talmage bridge. Some sections of the creek were observed to flow in the Spring when upstream sections were observed as dry.

Robinson

Size	Surface Flow Into Basin	Surface Flow Into River
26 sq mi	Year Round	To 6/12/2018

Discharging from a sizeable watershed, Robinson Creek has very high flows in the winter. However, in the summer months the creek must traverse a long stretch of alluvial land prior to its confluence with the Russian River. The creek dries in this stretch each spring/summer. Flow into the basin continues year round during typical years.

McNab

Size	Surface Flow Into Basin	Surface Flow Into River
13 sq mi	Unknown	unknown

No observations of McNab were taken during 2018.