ARCADIS

Appendix G

Level 1 Hydrology Protocol Results
for Rustler Canyon Drainage

Presently, an ephemeral classification is not supported for the Rustler Canyon drainages due to the presence of water and associated aquatic life uses observed during the Level 1 field evaluations.

Stream Name: Rustler Canyon-Drainage

Basin: Mimbres

Upstream lat/long: 32.75136/-108.02737

Downstream lat/long: 32.74339/-108.0093

Assessment Unit ID: RC-14A, RC-14B, RC-15

Hydrology Protocol Results		
RC-14A (lat/long): 32.75136/-108.02737	Intermittent	Final score: 12.5, see field form and photos for additional information
RC-14B (lat/long): 32.74923/-108.02615	Intermittent	Final score: 15.5, see field form and photos for additional information
RC-15 (lat/long): 32.74339/-108.0093	Intermittent	Final score: 12, see field form and photos for additional information

Macroinvertebrates: RC14A (snails, striders) and RC14B (beetles, boatman, and striders)

Additional Comments:

Three assessment units were identified along the mainstem of Rustler Canyon (RC-14A, RC-14B and RC15) (Figure G-1) and two assessment units were identified within the West Branch of Rustler Canyon (RC2-22 and RC2-22B) (Figure G-2).

Starting at the upstream end within Rustler Canyon, these assessment units are identified as RC-14A, RC-14B and RC 15. The most upstream assessment unit (RC-14A) was selected to represent the headwater portions of Rustler Canyon. Assessment unit RC-14B was located up gradient from the confluence West Rustler and Rustler Canyon and selected to capture an observed spring and a series of large pools near this location. The lower most assessment unit within Rustler Canyon (RC-15) is located near the confluence with Lampbright Draw and is representative of the hydrologic processes within the entire drainage basin.

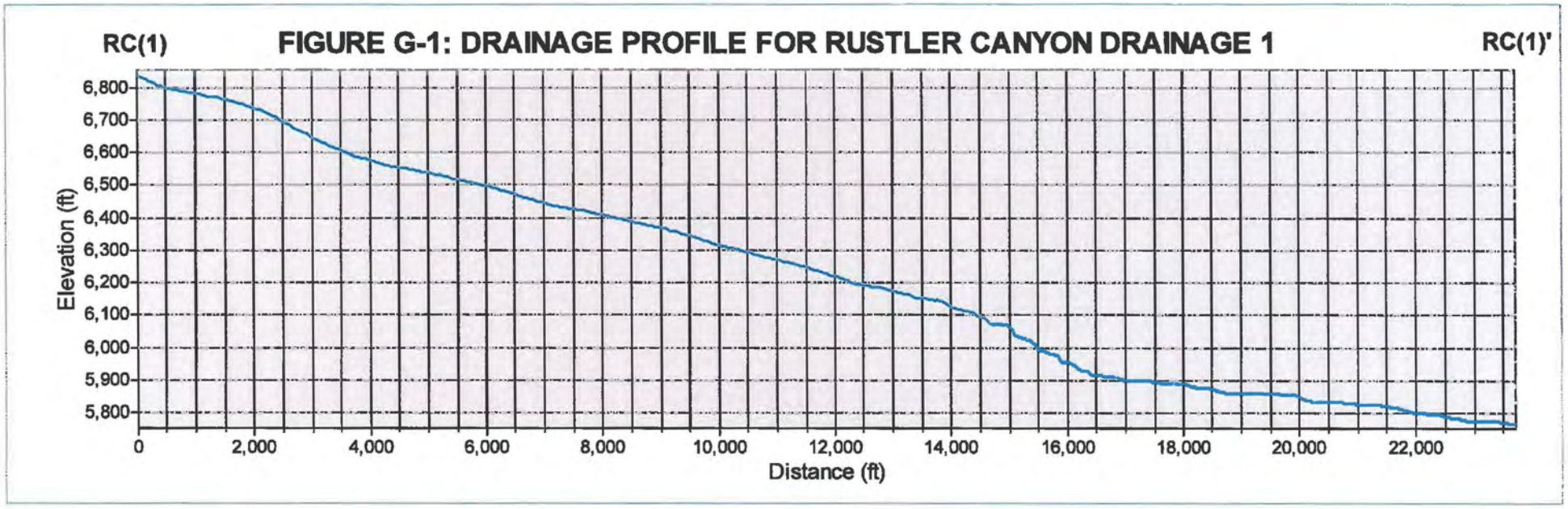
As shown in the plan and profile plots for Rustler Canyon (Figure G-1 and G-2) the basin slope progressively decreases, as expected, in the downstream direction. Similarly, the degree of valley confinement decreases in the downstream direction. These trends in channel slope and confinement are typical and represent the relative dominance of colluvial versus alluvial channel forming processes and are reflected in the composition of the channel bed itself. That is, the upstream reaches of Rustler Canyon (RC-14A and RC-14B) are bedrock and cobble dominated stream channels indicative hill slope processes (Photos RC14A-1 and RC14B-4) whereas the downstream assessment unit (RC-15) is a mixture of sand/gravel/cobble (Photo RC15-1) and reflect the dominance of fluvial processes. Filamentous algae was observed within all three Rustler Canyon assessment units and benthic macro-invertebrates were observed near the pools of standing water near the pools of standing water within assessment units RC-14A and RC-14B, see Photos RC14A-5 and RC14B-5, respectively. Due to the lack of flowing water, or even standing water, throughout the assessment units and the lack of fish all three assessment units within Rustler Canyon can be classified as intermittent. However, upstream of

assessment unit RC-15 but downstream of the confluence with West Branch Rustler Canyon we did identify a single pool of standing water that contained fish. The actual score of assessment unit RC-15 was 12, if the scoring criteria were adjusted to account for the presence of a single pool (i.e., Indicator 1.1 – Water in Channel equal to 2 and indicator 1.2 – Fish equal to 1) the total score of assessment unit RC-15 would increase to 15 which is still indicative of an intermittent stream channel. The weight of evidence across the three assessment units clearly indicate that Rustler Canyon is correctly classified as an intermittent stream channel.

Both assessment units within West Branch Rustler Canyon (RC-22 and RC-22B) represent bedrock controlled stream channels (Photos RC2-22-3 and RC2-22B-4, respectively); however, the location of the downstream assessment unit (RC-22B) was selected to include a number of large standing pools of water (Photos RC2-22B-5 and RC2-22B-6). Based on the presence of standing water and the observed benthic macro-invertebrates within the downstream assessment unit (RC-22B) (Photo RC2-22B-7) the West Branch Rustler Canyon hydrologic classification is indeterminate, assumed to be intermittent until further study indicates ephemeral.

Attachments: Map and photos, hydrology protocol field sheets for all locations, and additional sites and/or documentation (drainage profile and plan view)

RC(1)
RC(1)'
RC-15
RC-14A
RC-14B
Legend
500-foot Drainage Marker
1,000-foot Drainage Marker
Drainage Sample Reaches
Profiled Drainage
Other Drainages
Hanover-Whitewater Subwatershed Boundary
N
0
1,000
2,000
4,000
Feet


RC(1)
FIGURE G-1: DRAINAGE PROFILE FOR RUSTLER CANYON DRAINAGE 1
RC(1)'
Elevation (ft)
6,800
6,700
6,600
6,500
6,400
6,300
6,200
6,100
6,000
5,900
5,800
0
2,000
4,000
6,000
8,000
10,000
12,000
14,000
16,000
18,000
20,000
22,000
Distance (ft)

Rustler Canyon Photographs (RC-14A Reach) – Total HP score of 12.5 (intermittent stream)

RC14A-1: Photographic reference for indicators 1.1 through 1.6 and 1.9. Water and biotic indicators of water were observed along the reach (see subsequent photos). Channel bed is predominantly bedrock. Note the small dry pool area located in the center right of photograph.

Indicator 1.9 scored as 1 - channel is partially confined with an inactive floodplain.

Rustler Canyon Photographs (RC-14A Reach) – Total HP score of 12.5 (intermittent stream)

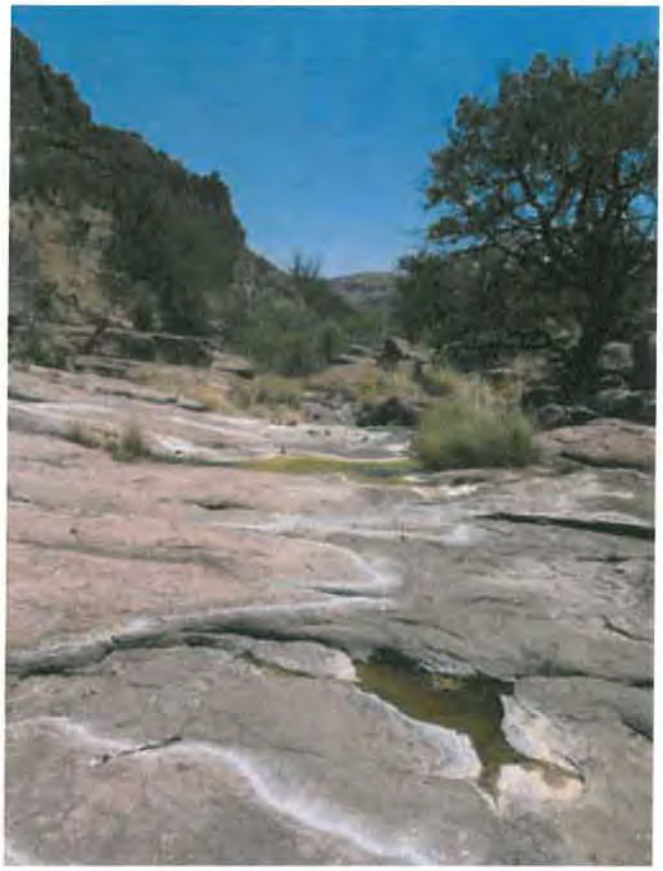
RC14A-2: Photographic reference for indicator 1.5. Indicator 1.5 scored as 1. Vegetation along the reach is compositionally consistent between the bank and the upland area with some differences in density observed. Distinct riparian zone not present.

RC14A-3: Photographic reference for indicator 1.6. Indicator 1.6 scored as 2. A few rooted grasses are present in the streambed but are generally not present because of the bedrock present.

Rustler Canyon Photographs (RC-14A Reach) – Total HP score of 12.5 (intermittent stream)

RC14A-4: Channel is primarily dry with small pools and standing water observed along the stream stretch. Indicator 1.1 scored as 2. No fish were present in the pools but benthic macroinvertebrates and filamentous algae/periphyton were observed after extensive searching. Both indicators 1.3 and 1.4 scored as 1. Seeps were observed to feed the pools; however, the pools are isolated.

Rustler Canyon Photographs (RC-14A Reach) – Total HP score of 12.5 (intermittent stream)



RC14A-5: Channel is primarily dry with small pools and standing water observed along the stream stretch. Filamentous algae/periphyton were observed after extensive searching.

Rustler Canyon Photographs (RC-14B Reach) – Total HP score of 15.5 (intermittent stream)

RC14B-1: Photographic reference for indicators 1.1 through 1.6 and 1.9. Biotic indicators of water and water were observed along the reach (see subsequent photos). Multiple isolated pools present along the stretch and springs/seeps observed. Biotic indicators of water found with little difficulty.

Indicator 1.5 scored as 2 - distinct riparian corridor present for parts of the stretch near pools as bank and upland vegetation is noticeably lush.

Indicator 1.9 scored as 1 – pool sequences likely but difficult to discern. Stream morphology is dominated by bedrock features.

Rustler Canyon Photographs (RC-14B Reach) – Total HP score of 15.5 (intermittent stream)

RC14B-2: Photographic reference for indicator 1.5. Photograph is of channel, bank, and upland area. Indicator 1.5 scored as 2 - distinct riparian zone not evident along portions of stream where pools are not present. Area shown in photograph is noticeably lacking riparian vegetation. Indicates that water is only persistent in areas where pools are maintained by bedrock springs.

RC14B-3: Photographic reference for indicator 1.6. Indicator 1.6 scored as 2. Rooted vegetation present in the streambed, but limited by bedrock rather than persistence of flow.

Rustler Canyon Photographs (RC-14B Reach) – Total HP score of 15.5 (intermittent stream)

RC14B-4: Photographic reference of representative channel bottom characteristics.

RC14B-5: Photographic reference of algae and benthic macro-invertebrates located near standing water.

Rustler Canyon Photographs (RC-14B Reach) – Total HP score of 15.5 (intermittent stream)

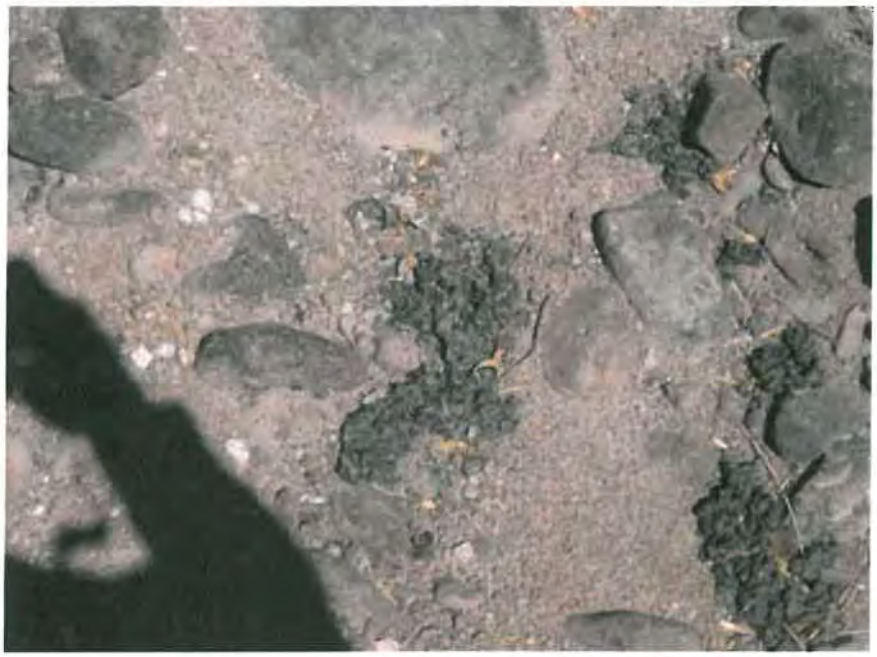
RC14B-6: Photographic reference for indicators 1.1 through 1.6. Filamentous algae/periphyton was observed along the reach. Multiple isolated pools present along the stretch. Biotic indicators of water found with little difficulty.

Rustler Canyon Photographs (RC-15 Reach) – Total HP score of 12 (intermittent stream)

RC15-1: Photographic reference of representative channel bottom characteristics.

RC15-2: Photographic reference for indicators 1.1 through 1.6. No water observed over survey reach. Indicator 1.6 scored as 2 - few rooted plants along streambed. Vegetation limited by streambed material which is primarily course grain material and boulders.

Rustler Canyon Photographs (RC-15 Reach) – Total HP score of 12 (intermittent stream)



RC15-3: Photographic reference for indicator 1.4. Indicator 1.4 scored as 1. Algae is present in stream but is very isolated.

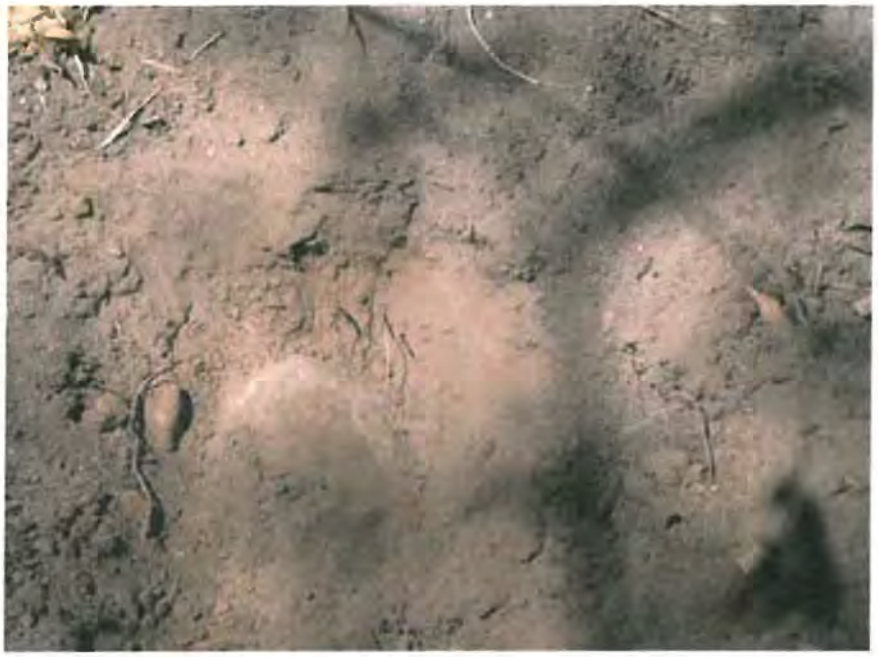
RC15-4: Photographic reference for indicator 1.5. Photograph of stream bank and upland area. Indicator 1.5 scored as 2. Distinct riparian corridor exists over portions of the reach but are not consistent over the entirety of the reach.

Rustler Canyon Photographs (RC-15 Reach) – Total HP score of 12 (intermittent stream)

RC15-5: Photographic reference for indicator 1.8. Photograph of the general proximity of the stream cross-section transect. Indicator 1.8 scored as 1.5. Stream is moderately confined with an inactive flood plain based on vegetative growth.

RC15-6: Photographic reference for indicator 1.9. Relatively deep pool shown in photograph. Indicator 1.9 scored as 1. Some pools are observable over the extent of the survey reach, but a riffle pool sequence is not evident.

Rustler Canyon Photographs (RC-15 Reach) – Total HP score of 12 (intermittent stream)



RC15-7: Photographic reference for indicator 1.10. Photograph is example of soil in the floodplain. Indicator 1.10 scored as 3. Distinct differences observed between soil outside of the streambed and the soil within the streambed. Streambed distribution of substrate material evident where finer material drops in pools and areas of lower velocity flow, while other portions of the steam bed are courser materials.

Rustler Canyon Photographs (RC-15 Reach) – Total HP score of 12 (intermittent stream)

RC15-8: Photographic reference for indicators 1.5 and 1.6. Photographs of the bank/upland area and rooted in channel vegetation. Distinct riparian corridor exists over portions of the reach. Vegetation is inconsistently dispersed throughout the channel.

NMED Surface Water Quality Bureau – LEVEL 1 Hydrology Determination Field Sheet

Date: 6/14/2011	**Stream Name: Rustler Canyon**	**Latitude: N 32.75136**
Evaluator(s): Barry	**Site ID: RC-14A**	**Longitude: W 108.02737**
TOTAL POINTS: 12.5 *Stream is at least intermittent if ≥ 19*	**Assessment Unit: Rustler Canyon Drainage (RC-14A)**	**Drought Index (12-mo. SPI Value): -1.1**

WEATHER CONDITIONS	**NOW:** ___ storm (heavy rain) ___ rain (steady rain) ___ showers (intermittent) ___ %cloud cover _X__ clear/sunny	**PAST 48 HOURS:** ___ storm (heavy rain) ___ rain (steady rain) ___ showers (intermittent) ___ %cloud cover _X__ clear/sunny	**Has there been a heavy rain in the last 48 hours?** ___ YES _X__ NO **Field evaluations should be performed at least 48 hours after the last known major rainfall event. **OTHER:** **Stream Modifications** __ YES _X_ NO **Diversions** ___ YES _X_ NO **Discharges** ___ YES _X__ NO **Explain in further detail in NOTES section

LEVEL 1 INDICATORS	STREAM CONDITION			
	Strong	Moderate	Weak	Poor
1.1. Water in Channel	Flow is evident throughout the reach. Moving water is seen in riffle areas but may not be as evident throughout the runs.	Water is present in the channel but flow is barely discernable in areas of greatest gradient change (i.e. riffles) or floating object is necessary to observe flow.	Dry channel with standing pools. There is some evidence of base flows (i.e. riparian vegetation growing along channel, saturated or moist sediment under rocks, etc)	Dry channel. No evidence of base flows was found.
	6	4	2	0
1.2. Fish	Found easily and consistently throughout the reach.	Found with little difficulty but not consistently throughout the reach.	Takes 10 or more minutes of extensive searching to find.	Fish are not present.
	3	2	1	0
1.3. Benthic Macroinvertebrates	Found easily and consistently throughout the reach.	Found with little difficulty but not consistently throughout the reach.	Takes 10 or more minutes of extensive searching to find.	Macroinvertebrates are not present.
	3	2	1	0
1.4. Filamentous Algae/Periphyton	Found easily and consistently throughout the reach.	Found with little difficulty but not consistently throughout the reach.	Takes 10 or more minutes of extensive searching to find.	Filamentous algae and/or periphyton are not present.
	3	2	1	0
1.5. Differences in Vegetation	Dramatic compositional differences in vegetation are present between the stream banks and the adjacent uplands. A distict riparian vegetation corridor exists along the entire reach – riparian, aquatic, or wetland species dominate the length of the reach.	A distinct riparian vegetation corridor exists along part of the reach. Riparian vegetation is interspersed with upland vegetation along the length of the reach.	Vegetation growing along the reach may occur in greater densities or grow more vigorously than vegetation in the adjacent uplands, but there are no dramatic compositional differences between the two.	No compositional or density differences in vegetation are present between the streambanks and the adjacent uplands.
	3	2	1	0
1.6. Absence of Rooted Upland Plants in Streambed	Rooted upland plants are absent within the streambed/thalweg.	There are a few rooted upland plants present within the streambed/thalweg.	Rooted upland plants are consistently dispersed throughout the streambed/thalweg	Rooted upland plants are prevalent within the streambed/thalweg.
	3	2	1	0
			SUBTOTAL (#1.1 – #1.6)	7

If the stream being evaluated has a subtotal ≤ 2 at this juncture, the stream is determined to be EPHEMERAL.
If the stream being evaluated has a subtotal ≥ 18 at this point, the stream is determined to be PERENNIAL.
YOU MAY STOP THE EVALUATION AT THIS POINT. If the stream has a subtotal between 2 and 18 continue the Level 1 Evaluation.

LEVEL 1 INDICATORS	STREAM CONDITION			
	Strong	Moderate	Weak	Poor
1.7. Sinuosity	**Ratio > 1.4.** Stream has numerous, closely-spaced bends, few straight sections.	**Ratio < 1.4.** Stream has good sinuosity with some straight sections.	**Ratio < 1.2.** Stream has very few bends and mostly straight sections.	**Ratio = 1.0.** Stream is completely straight with no bends.
	3	2	1	0
1.8. Floodplain and Channel Dimensions (N/A)	**Ratio > 2.5.** Stream is minimally confined with a wide, active floodplain.	**Ratio between 1.2 and 2.5.** Stream is moderately confined. Floodplain is present, but may only be active during larger floods.	**Ratio < 1.2.** Stream is incised with a noticeably confined channel. Floodplain is narrow or absent and typically disconnected from the channel.	
	3	1.5	0	
1.9. In-Channel Structure: Riffle-Pool Sequence	Demonstrated by a frequent number of riffles followed by pools along the entire reach. There is an obvious transition between riffles and pools.	Represented by a less frequent number of riffles and pools. Distinguishing the transition between riffles and pools is difficult.	Stream shows some flow but mostly has areas of pools or of riffles.	There is no sequence exhibited.
	3	2	1	0
			SUBTOTAL (#1.1 – #1.9)	**8**

If the stream being evaluated has a subtotal ≤ 5 at this juncture, the stream is determined to be EPHEMERAL.
If the stream being evaluated has a subtotal ≥ 21 at this point, the stream is determined to be PERENNIAL.
YOU MAY STOP THE EVALUATION AT THIS POINT. If the stream has a subtotal between 5 and 21 continue the Level 1 Evaluation.

1.10. Particle Size or Stream Substrate Sorting	Particle sizes in the channel are noticeably different from particle sizes in areas close to but not in the channel. There is a clear distribution of various sized substrates in the stream channel with finer particles accumulating in the pools, and larger particles accumulating in the riffles/runs.	Particle sizes in the channel are moderately similar to particle sizes in areas close to but not in the channel. Various sized substrates are present in the stream channel and are represented by a higher ratio of larger particles (gravel/cobble).	Particle sizes in the channel are similar or comparable to particle sizes in areas close to but not in the channel. Substrate sorting is not readily observed in the stream channel.
	3	1.5	0
1.11. Hydric Soils	Hydric soils are found within the study reach.		Hydric soils are not found within the study reach.
	Present = 3		Absent = 0
1.12. Sediment on Plants and Debris	Sediment found readily on plants and debris within the stream channel, on the streambank, and within the floodplain throughout the length of the stream.	Sediment found on plants or debris within the stream channel although it is not prevalent along the stream. Mostly accumulating in pools.	Sediment is isolated in small amounts along the stream.	No sediment is present on plants or debris.
	1.5	1	0.5	0
			TOTAL POINTS (#1.1 – #1.12)	**11**

SUPPLEMENTAL INDICATORS: **The following indicators do not occur consistently throughout New Mexico but may be useful in the determination of perenniality. If the indicator is present record score below and tally with previous score to compute TOTAL.**

1.13. Seeps and Springs	Seeps and springs are found within the study reach.	Seeps and springs are not found within the study reach.
	Present = 1.5	Absent = 0
1.14. Iron Oxidizing Bacteria/Fungi	Iron-oxidizing bacteria and/or fungi are found within the study reach.	Iron-oxidizing bacteria and/or fungi are not found within the study reach.
	Present = 1.5	Absent = 0
	TOTAL *plus* SUPPLEMENTAL POINTS (#1.1 – #1.14)	**12.5**

NMED Surface Water Quality Bureau – LEVEL 1 Hydrology Determination Field Sheet

Photo Descriptions and NOTES

Photo #	Description (US, DS, LB, RB, etc.)	Notes
RC14A-1	View from upstream extent of assessment unit looking downstream	
RC14A-2	View of vegetation along the reach is compositionally consistent between the bank and the upland area with some differences in density observed.	
RC14A-3	View of in channel vegetation	
RC14A-4	View of primarily dry channels with small pools and standing water observed along the stream stretch.	
RC14A-5	View of primarily dry channel with small pools and standing water observed along the stream stretch.	

NOTES:

Based on further review of field notes and site photograph the scores identified on the field forms were revised. This generally resulted in higher total scores.
It was determined, after visiting a number of bedrock and boulder formed channels, that the application and evaluation of the "entrenchment ratio" was inappropriate at such locations. In channels flowing through material that is transport by the river itself the channel geometry can be viewed as self-formed. That is, sediment transport in alluvial rivers builds and maintains a dynamically stable channel geometry and floodplain that reflects both the quantity and timing of water and the volume and caliber of sediment delivered from the watershed (Leopold et al. 1964; Emmett and Wolman 2001). Accordingly, Leopold (1994) describes alluvial rivers as the architect of their own geometry. In these alluvial situations the measurement of an "entrenchment ratio" is reflective of the relative supply and magnitude of the sediments from upstream versus the capacity of the channel to transport that sediment.
However, in many situations observed during the application of the Hydrology Protocol, the channel was not an alluvial river and the bed and banks were not formed of sediments supplied and transport under the current hydrologic environment but rather were composed of bedrock and large boulders. In bedrock and boulder formed channels where it was necessary to proceed beyond Indicators 1.1 to 1.6 the "entrenchment ratio" indicator was not included in the total score.

NMED Surface Water Quality Bureau – LEVEL 1 Hydrology Determination Field Sheet

Date: 6/14/2011	**Stream Name: Rustler Canyon**	**Latitude: N 32.74923**
Evaluator(s): Barry	**Site ID: RC-14B**	**Longitude: W 108.02615**
TOTAL POINTS: 15.5 *Stream is at least intermittent if ≥ 2*	**Assessment Unit: Rustler Canyon Drainage (RC-14B)**	**Drought Index (12-mo. SPI Value): -1.1**

WEATHER CONDITIONS	**NOW:** ___ storm (heavy rain) ___ rain (steady rain) ___ showers (intermittent) ___ %cloud cover _X__ clear/sunny	**PAST 48 HOURS:** ___ storm (heavy rain) ___ rain (steady rain) ___ showers (intermittent) ___ %cloud cover _X__ clear/sunny	**Has there been a heavy rain in the last 48 hours?** ___ YES _X__ NO **Field evaluations should be performed at least 48 hours after the last known major rainfall event. **OTHER:** **Stream Modifications** __ YES _X_ NO **Diversions** ___ YES _X_ NO **Discharges** ___ YES _X__ NO **Explain in further detail in NOTES section

LEVEL 1 INDICATORS	STREAM CONDITION			
	Strong	Moderate	Weak	Poor
1.1. Water in Channel	Flow is evident throughout the reach. Moving water is seen in riffle areas but may not be as evident throughout the runs.	Water is present in the channel but flow is barely discernable in areas of greatest gradient change (i.e. riffles) or floating object is necessary to observe flow.	Dry channel with standing pools. There is some evidence of base flows (i.e. riparian vegetation growing along channel, saturated or moist sediment under rocks, etc)	Dry channel. No evidence of base flows was found.
	6	4	2	0
1.2. Fish	Found easily and consistently throughout the reach.	Found with little difficulty but not consistently throughout the reach.	Takes 10 or more minutes of extensive searching to find.	Fish are not present.
	3	2	1	0
1.3. Benthic Macroinvertebrates	Found easily and consistently throughout the reach.	Found with little difficulty but not consistently throughout the reach.	Takes 10 or more minutes of extensive searching to find.	Macroinvertebrates are not present.
	3	2	1	0
1.4. Filamentous Algae/Periphyton	Found easily and consistently throughout the reach.	Found with little difficulty but not consistently throughout the reach.	Takes 10 or more minutes of extensive searching to find.	Filamentous algae and/or periphyton are not present.
	3	2	1	0
1.5. Differences in Vegetation	Dramatic compositional differences in vegetation are present between the stream banks and the adjacent uplands. A distict riparian vegetation corridor exists along the entire reach – riparian, aquatic, or wetland species dominate the length of the reach.	A distinct riparian vegetation corridor exists along part of the reach. Riparian vegetation is interspersed with upland vegetation along the length of the reach.	Vegetation growing along the reach may occur in greater densities or grow more vigorously than vegetation in the adjacent uplands, but there are no dramatic compositional differences between the two.	No compositional or density differences in vegetation are present between the streambanks and the adjacent uplands.
	3	2	1	0
1.6. Absence of Rooted Upland Plants in Streambed	Rooted upland plants are absent within the streambed/thalweg.	There are a few rooted upland plants present within the streambed/thalweg.	Rooted upland plants are consistently dispersed throughout the streambed/thalweg	Rooted upland plants are prevalent within the streambed/thalweg.
	3	2	1	0
			SUBTOTAL (#1.1 – #1.6)	**10**

If the stream being evaluated has a subtotal ≤ 2 at this juncture, the stream is determined to be EPHEMERAL.
If the stream being evaluated has a subtotal ≥ 18 at this point, the stream is determined to be PERENNIAL.
YOU MAY STOP THE EVALUATION AT THIS POINT. If the stream has a subtotal between 2 and 18 continue the Level 1 Evaluation.

LEVEL 1 INDICATORS	STREAM CONDITION			
	Strong	Moderate	Weak	Poor
1.7. Sinuosity	**Ratio > 1.4.** Stream has numerous, closely-spaced bends, few straight sections.	**Ratio < 1.4.** Stream has good sinuosity with some straight sections.	**Ratio < 1.2.** Stream has very few bends and mostly straight sections.	**Ratio = 1.0.** Stream is completely straight with no bends.
	3	2	1	0
1.8. Floodplain and Channel Dimensions (N/A)	**Ratio > 2.5.** Stream is minimally confined with a wide, active floodplain.	**Ratio between 1.2 and 2.5.** Stream is moderately confined. Floodplain is present, but may only be active during larger floods.	**Ratio < 1.2.** Stream is incised with a noticeably confined channel. Floodplain is narrow or absent and typically disconnected from the channel.	
	3	1.5	0	
1.9. In-Channel Structure: Riffle-Pool Sequence	Demonstrated by a frequent number of riffles followed by pools along the entire reach. There is an obvious transition between riffles and pools.	Represented by a less frequent number of riffles and pools. Distinguishing the transition between riffles and pools is difficult.	Stream shows some flow but mostly has areas of pools or of riffles.	There is no sequence exhibited.
	3	2	1	0
			SUBTOTAL (#1.1 – #1.9)	11

If the stream being evaluated has a subtotal ≤ 5 at this juncture, the stream is determined to be EPHEMERAL.
If the stream being evaluated has a subtotal ≥ 21 at this point, the stream is determined to be PERENNIAL.
YOU MAY STOP THE EVALUATION AT THIS POINT. If the stream has a subtotal between 5 and 21 continue the Level 1 Evaluation.

1.10. Particle Size or Stream Substrate Sorting	Particle sizes in the channel are noticeably different from particle sizes in areas close to but not in the channel. There is a clear distribution of various sized substrates in the stream channel with finer particles accumulating in the pools, and larger particles accumulating in the riffles/runs.	Particle sizes in the channel are moderately similar to particle sizes in areas close to but not in the channel. Various sized substrates are present in the stream channel and are represented by a higher ratio of larger particles (gravel/cobble).	Particle sizes in the channel are similar or comparable to particle sizes in areas close to but not in the channel. Substrate sorting is not readily observed in the stream channel.
	3	1.5	0
1.11. Hydric Soils	Hydric soils are found within the study reach.		Hydric soils are not found within the study reach.
	Present = 3		Absent = 0
1.12. Sediment on Plants and Debris	Sediment found readily on plants and debris within the stream channel, on the streambank, and within the floodplain throughout the length of the stream.	Sediment found on plants or debris within the stream channel although it is not prevalent along the stream. Mostly accumulating in pools.	Sediment is isolated in small amounts along the stream.	No sediment is present on plants or debris.
	1.5	1	0.5	0
			TOTAL POINTS (#1.1 – #1.12)	14

SUPPLEMENTAL INDICATORS: **The following indicators do not occur consistently throughout New Mexico but may be useful in the determination of perenniality. If the indicator is present record score below and tally with previous score to compute TOTAL.**

1.13. Seeps and Springs	Seeps and springs are found within the study reach.	Seeps and springs are not found within the study reach.
	Present = 1.5	Absent = 0
1.14. Iron Oxidizing Bacteria/Fungi	Iron-oxidizing bacteria and/or fungi are found within the study reach.	Iron-oxidizing bacteria and/or fungi are not found within the study reach.
	Present = 1.5	Absent = 0
		TOTAL *plus* SUPPLEMENTAL POINTS (#1.1 – #1.14) 15.5

NMED Surface Water Quality Bureau – LEVEL 1 Hydrology Determination Field Sheet

Photo Descriptions and NOTES

Photo #	Description (US, DS, LB, RB, etc.)	Notes
RC14B-1	View of middle of assessment unit looking downstream	
RC14B-2	View of channel, bank, and upland area.	
RC14B-3	View of rooted vegetation present in the streambed, but limited by bedrock rather than persistence of flow.	
RC14B-4	View of representative channel bottom characteristics	
RC14B-5	View of algae and benthic macro-invertebrates located near standing water.	
RC14B-6	View of Filamentous algae/periphyton along the reach. Multiple isolated pools present along the stretch.	

NOTES:

Based on further review of field notes and site photograph the scores identified on the field forms were revised. This generally resulted in higher total scores.
It was determined, after visiting a number of bedrock and boulder formed channels, that the application and evaluation of the "entrenchment ratio" was inappropriate at such locations. In channels flowing through material that is transport by the river itself the channel geometry can be viewed as self-formed. That is, sediment transport in alluvial rivers builds and maintains a dynamically stable channel geometry and floodplain that reflects both the quantity and timing of water and the volume and caliber of sediment delivered from the watershed (Leopold et al. 1964; Emmett and Wolman 2001). Accordingly, Leopold (1994) describes alluvial rivers as the architect of their own geometry. In these alluvial situations the measurement of an "entrenchment ratio" is reflective of the relative supply and magnitude of the sediments from upstream versus the capacity of the channel to transport that sediment.
However, in many situations observed during the application of the Hydrology Protocol, the channel was not an alluvial river and the bed and banks were not formed of sediments supplied and transport under the current hydrologic environment but rather were composed of bedrock and large boulders. In bedrock and boulder formed channels where it was necessary to proceed beyond Indicators 1.1 to 1.6 the "entrenchment ratio" indicator was not included in the total score.

NMED Surface Water Quality Bureau – LEVEL 1 Hydrology Determination Field Sheet

Date: 6/14/2011	**Stream Name: Rustler Canyon**	**Latitude: N 32.74329**
Evaluator(s): Barry	**Site ID: RC-15**	**Longitude: W 108.02727**
TOTAL POINTS: 12 *Stream is at least intermittent if ≥ 12*	**Assessment Unit: Rustler Canyon Drainage (RC-15)**	**Drought Index (12-mo. SPI Value): -1.1**

WEATHER CONDITIONS	**NOW:** ___ storm (heavy rain) ___ rain (steady rain) ___ showers (intermittent) ___ %cloud cover _X__ clear/sunny	**PAST 48 HOURS:** ___ storm (heavy rain) ___ rain (steady rain) ___ showers (intermittent) ___ %cloud cover _X__ clear/sunny	**Has there been a heavy rain in the last 48 hours?** ___ YES _X__ NO **Field evaluations should be performed at least 48 hours after the last known major rainfall event. **OTHER:** **Stream Modifications** __ YES _X_ NO **Diversions** ___ YES _X_ NO **Discharges** ___ YES _X__ NO **Explain in further detail in NOTES section

LEVEL 1 INDICATORS	STREAM CONDITION			
	Strong	Moderate	Weak	Poor
1.1. Water in Channel	Flow is evident throughout the reach. Moving water is seen in riffle areas but may not be as evident throughout the runs.	Water is present in the channel but flow is barely discernable in areas of greatest gradient change (i.e. riffles) or floating object is necessary to observe flow.	Dry channel with standing pools. There is some evidence of base flows (i.e. riparian vegetation growing along channel, saturated or moist sediment under rocks, etc)	Dry channel. No evidence of base flows was found.
	6	4	2	0
1.2. Fish	Found easily and consistently throughout the reach.	Found with little difficulty but not consistently throughout the reach.	Takes 10 or more minutes of extensive searching to find.	Fish are not present.
	3	2	1	0
1.3. Benthic Macroinvertebrates	Found easily and consistently throughout the reach.	Found with little difficulty but not consistently throughout the reach.	Takes 10 or more minutes of extensive searching to find.	Macroinvertebrates are not present.
	3	2	1	0
1.4. Filamentous Algae/Periphyton	Found easily and consistently throughout the reach.	Found with little difficulty but not consistently throughout the reach.	Takes 10 or more minutes of extensive searching to find.	Filamentous algae and/or periphyton are not present.
	3	2	1	0
1.5. Differences in Vegetation	Dramatic compositional differences in vegetation are present between the stream banks and the adjacent uplands. A distict riparian vegetation corridor exists along the entire reach – riparian, aquatic, or wetland species dominate the length of the reach.	A distinct riparian vegetation corridor exists along part of the reach. Riparian vegetation is interspersed with upland vegetation along the length of the reach.	Vegetation growing along the reach may occur in greater densities or grow more vigorously than vegetation in the adjacent uplands, but there are no dramatic compositional differences between the two.	No compositional or density differences in vegetation are present between the streambanks and the adjacent uplands.
	3	2	1	0
1.6. Absence of Rooted Upland Plants in Streambed	Rooted upland plants are absent within the streambed/thalweg.	There are a few rooted upland plants present within the streambed/thalweg.	Rooted upland plants are consistently dispersed throughout the streambed/thalweg	Rooted upland plants are prevalent within the streambed/thalweg.
	3	2	1	0
			SUBTOTAL (#1.1 – #1.6)	**5**

If the stream being evaluated has a subtotal ≤ 2 at this juncture, the stream is determined to be EPHEMERAL.
If the stream being evaluated has a subtotal ≥ 18 at this point, the stream is determined to be PERENNIAL.
YOU MAY STOP THE EVALUATION AT THIS POINT. If the stream has a subtotal between 2 and 18 continue the Level 1 Evaluation.

LEVEL 1 INDICATORS	STREAM CONDITION			
	Strong	Moderate	Weak	Poor
1.7. Sinuosity	**Ratio > 1.4.** Stream has numerous, closely-spaced bends, few straight sections.	**Ratio < 1.4.** Stream has good sinuosity with some straight sections.	**Ratio < 1.2.** Stream has very few bends and mostly straight sections.	**Ratio = 1.0.** Stream is completely straight with no bends.
	3	2	1	0
1.8. Floodplain and Channel Dimensions	**Ratio > 2.5.** Stream is minimally confined with a wide, active floodplain.	**Ratio between 1.2 and 2.5.** Stream is moderately confined. Floodplain is present, but may only be active during larger floods.		**Ratio < 1.2.** Stream is incised with a noticeably confined channel. Floodplain is narrow or absent and typically disconnected from the channel.
	3	1.5		0
1.9. In-Channel Structure: Riffle-Pool Sequence	Demonstrated by a frequent number of riffles followed by pools along the entire reach. There is an obvious transition between riffles and pools.	Represented by a less frequent number of riffles and pools. Distinguishing the transition between riffles and pools is difficult.	Stream shows some flow but mostly has areas of pools or of riffles.	There is no sequence exhibited.
	3	2	1	0
			SUBTOTAL (#1.1 – #1.9)	8.5

If the stream being evaluated has a subtotal ≤ 5 at this juncture, the stream is determined to be EPHEMERAL.
If the stream being evaluated has a subtotal ≥ 21 at this point, the stream is determined to be PERENNIAL.
YOU MAY STOP THE EVALUATION AT THIS POINT. If the stream has a subtotal between 5 and 21 continue the Level 1 Evaluation.

1.10. Particle Size or Stream Substrate Sorting	Particle sizes in the channel are noticeably different from particle sizes in areas close to but not in the channel. There is a clear distribution of various sized substrates in the stream channel with finer particles accumulating in the pools, and larger particles accumulating in the riffles/runs.	Particle sizes in the channel are moderately similar to particle sizes in areas close to but not in the channel. Various sized substrates are present in the stream channel and are represented by a higher ratio of larger particles (gravel/cobble).	Particle sizes in the channel are similar or comparable to particle sizes in areas close to but not in the channel. Substrate sorting is not readily observed in the stream channel.
	3	1.5	0
1.11. Hydric Soils	Hydric soils are found within the study reach.		Hydric soils are not found within the study reach.
	Present = 3		Absent = 0

1.12. Sediment on Plants and Debris	Sediment found readily on plants and debris within the stream channel, on the streambank, and within the floodplain throughout the length of the stream.	Sediment found on plants or debris within the stream channel although it is not prevalent along the stream. Mostly accumulating in pools.	Sediment is isolated in small amounts along the stream.	No sediment is present on plants or debris.
	1.5	1	0.5	0
			TOTAL POINTS (#1.1 – #1.12)	12

SUPPLEMENTAL INDICATORS: The following indicators do not occur consistently throughout New Mexico but may be useful in the determination of perenniality. If the indicator is present record score below and tally with previous score to compute TOTAL.		
1.13. Seeps and Springs	Seeps and springs are found within the study reach.	Seeps and springs are not found within the study reach.
	Present = 1.5	Absent = 0
1.14. Iron Oxidizing Bacteria/Fungi	Iron-oxidizing bacteria and/or fungi are found within the study reach.	Iron-oxidizing bacteria and/or fungi are not found within the study reach.
	Present = 1.5	Absent = 0
		TOTAL *plus* SUPPLEMENTAL POINTS (#1.1 – #1.14) 12

NMED Surface Water Quality Bureau – LEVEL 1 Hydrology Determination Field Sheet

Photo Descriptions and NOTES

Photo #	Description (US, DS, LB, RB, etc.)	Notes
RC15-1	View of representative channel bottom characteristics	
RC15-2	View of few rooted plants along streambed. Vegetation limited by streambed material which is primarily course grain material and boulders.	
RC15-3	View of algae in stream but is very isolated	
RC15-4	View of stream bank and upland area	
RC15-5	View of general proximity of the stream cross-section transect	
RC15-6	View of Relatively deep pool	
RC15-7	View of soil in the floodplain.	
RC15-8	View of bank/upland area and rooted in channel vegetation.	

NOTES:

Presently, an ephemeral classification is not supported for the Rustler Canyon drainages due to the presence of water and associated aquatic life uses observed during the Level 1 field evaluations.

Stream Name: Rustler Canyon 2-Drainage

Basin: Mimbres

Upstream lat/long: 32.74936/-108.03393

Downstream lat/long: 32.74339/-108.0093

Assessment Unit ID: RC2-22, RC2-22B

Hydrology Protocol Results		
RC2-22 (lat/long): 32.74936/-108.03393	Ephemeral	Final score: 2, see field form and photos for additional information
RC2-22B (lat/long): 32.74329/-108.02727	Intermittent	Final score: 9, see field form and photos for additional information

Macroinvertebrates: RC22B (snails)

Additional Comments:

Three assessment units were identified along the mainstem of Rustler Canyon (RC-14A, RC-14B and RC15) (Figure G-1) and two assessment units were identified within the West Branch of Rustler Canyon (RC2-22 and RC2-22B) (Figure G-2).

Starting at the upstream end within Rustler Canyon, these assessment units are identified as RC-14A, RC-14B and RC 15. The most upstream assessment unit (RC-14A) was selected to represent the headwater portions of Rustler Canyon. Assessment unit RC-14B was located up gradient from the confluence West Rustler and Rustler Canyon and selected to capture an observed spring and a series of large pools near this location. The lower most assessment unit within Rustler Canyon (RC-15) is located near the confluence with Lampbright Draw and is representative of the hydrologic processes within the entire drainage basin.

As shown in the plan and profile plots for Rustler Canyon (Figure G-1 and G-2) the basin slope progressively decreases, as expected, in the downstream direction. Similarly, the degree of valley confinement decreases in the downstream direction. These trends in channel slope and confinement are typical and represent the relative dominance of colluvial versus alluvial channel forming processes and are reflected in the composition of the channel bed itself. That is, the upstream reaches of Rustler Canyon (RC-14A and RC-14B) are bedrock and cobble dominated stream channels indicative hill slope processes (Photos RC14A-1 and RC14B-4) whereas the downstream assessment unit (RC-15) is a mixture of sand/gravel/cobble (Photo RC15-1) and reflect the dominance of fluvial processes. Filamentous algae was observed within all three Rustler Canyon assessment units and benthic macro-invertebrates were observed near the pools of standing water near the pools of standing water within assessment units RC-14A and RC-14B, see Photos RC14A-5 and RC14B-5, respectively. Due to the lack of flowing water, or even standing water, throughout the assessment units and the lack of fish all three assessment units within Rustler Canyon can be classified as intermittent. However, upstream of assessment unit RC-15 but downstream of the confluence with West Branch Rustler Canyon we did

identify a single pool of standing water that contained fish. The actual score of assessment unit RC-15 was 12, if the scoring criteria were adjusted to account for the presence of a single pool (i.e., Indicator 1.1 – Water in Channel equal to 2 and Indicator 1.2 – Fish equal to 1) the total score of assessment unit RC-15 would increase to 15 which is still indicative of an intermittent stream channel. The weight of evidence across the three assessment units clearly indicate that Rustler Canyon is correctly classified as an intermittent stream channel.

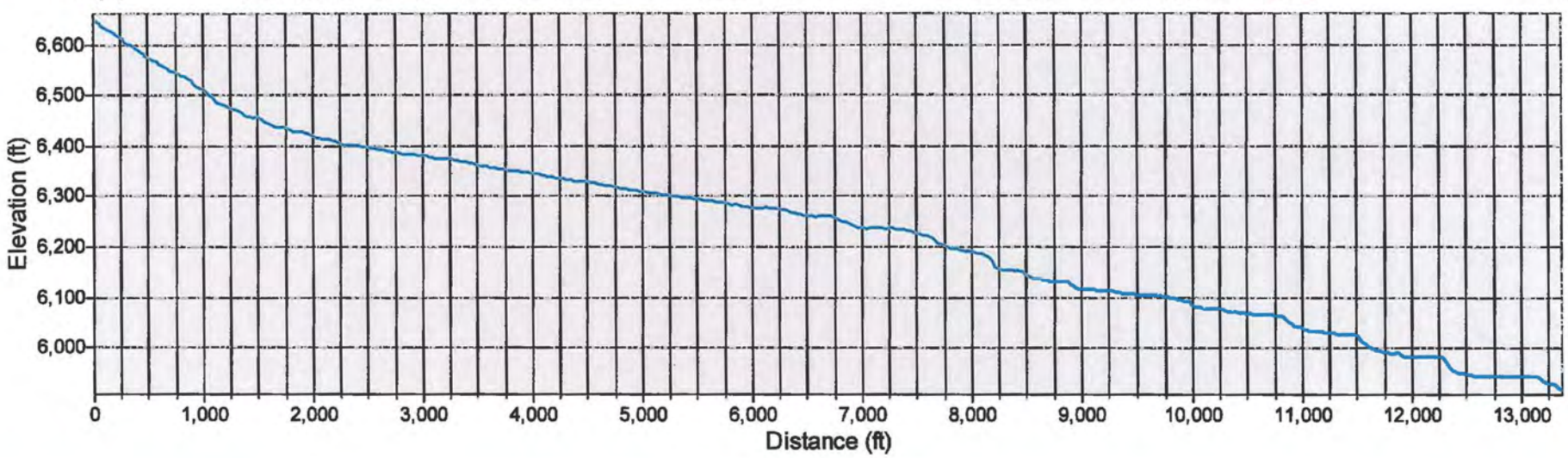
Both assessment units within West Branch Rustler Canyon (RC-22 and RC-22B) represent bedrock controlled stream channels (Photos RC2-22-3 and RC2-22B-4, respectively); however, the location of the downstream assessment unit (RC-22B) was selected to include a number of large standing pools of water (Photos RC2-22B-5 and RC2-22B-6). Based on the presence of standing water and the observed benthic macro-invertebrates within the downstream assessment unit (RC-22B) (Photo RC2-22B-7) the West Branch Rustler Canyon hydrologic classification is indeterminate, assumed to be intermittent until further study indicates ephemeral.

Attachments: Map and photos, hydrology protocol field sheets for all locations, and additional sites and/or documentation (drainage profile and plan view)

RC(2)

FIGURE G-2: DRAINAGE PROFILE FOR RUSTLER CANYON DRAINAGE 2

RC(2)'

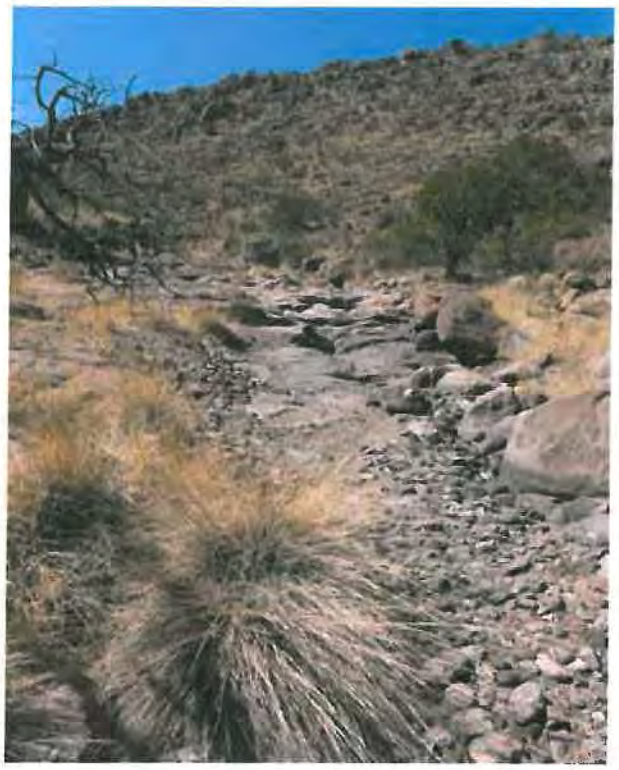


Rustler Canyon Photographs (RC2-22 Reach) – Total HP score of 2 (ephemeral stream)

RC2-22-1: Photographic reference for indicators 1.1 through 1.6. Indicator 1.6 scored as 1 – rooted upland plants consistently dispersed throughout streambed. Channel bed is primarily gravel and boulders. No water or biotic indicators of water observed along survey reach.

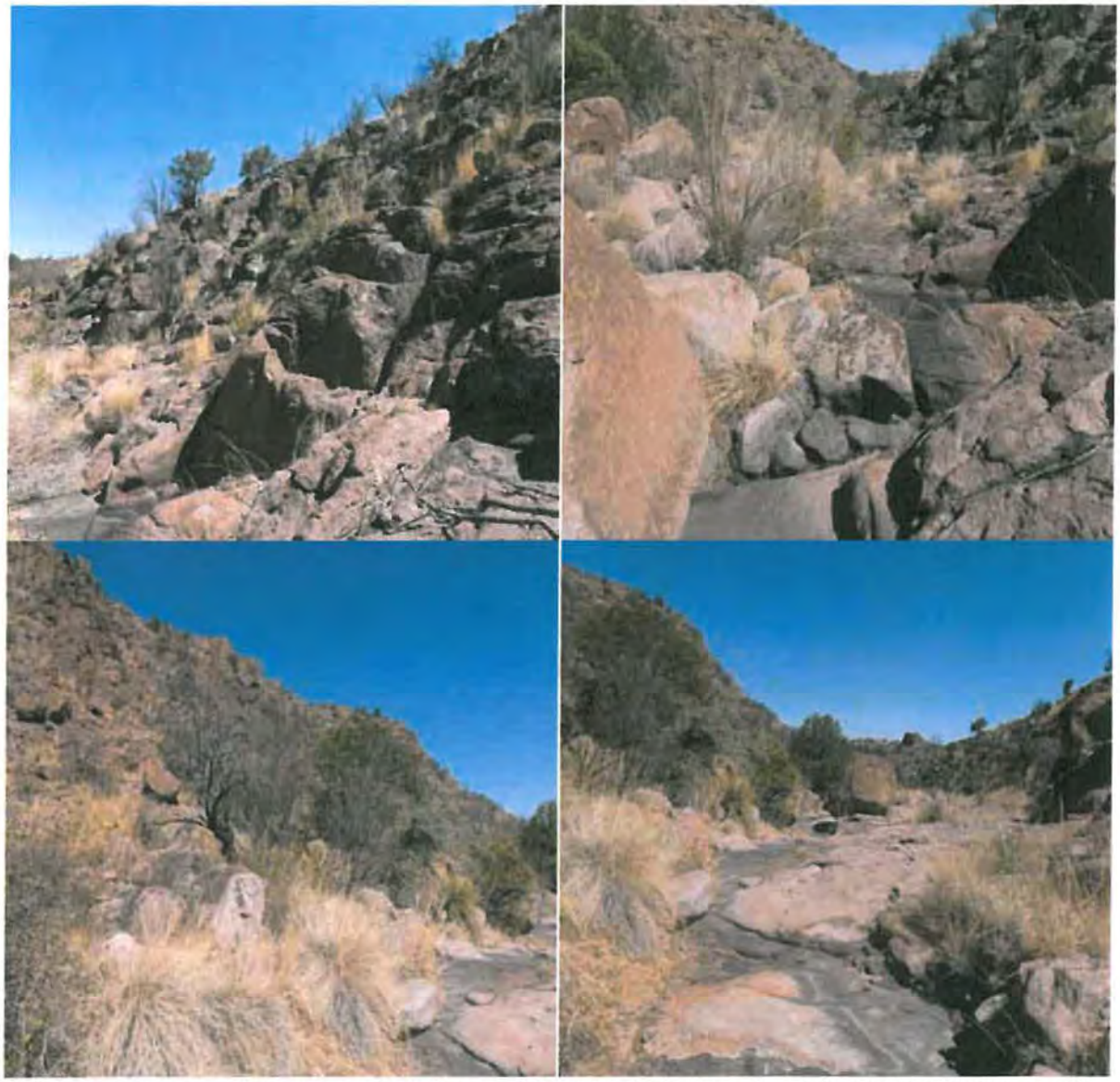
RC2-22-2: Photographic reference for indicator 1.5. Indicator 1.5 scored as 1. Vegetation along banks of the reach is similar in composition as vegetation in the upland areas. Some density differences were evident.

Rustler Canyon Photographs (RC2-22 Reach) – Total HP score of 2 (ephemeral stream)



RC2-22-3: Photographic reference of bedrock controlled channel.

Rustler Canyon Photographs (RC2-22 Reach) – Total HP score of 2 (ephemeral stream)



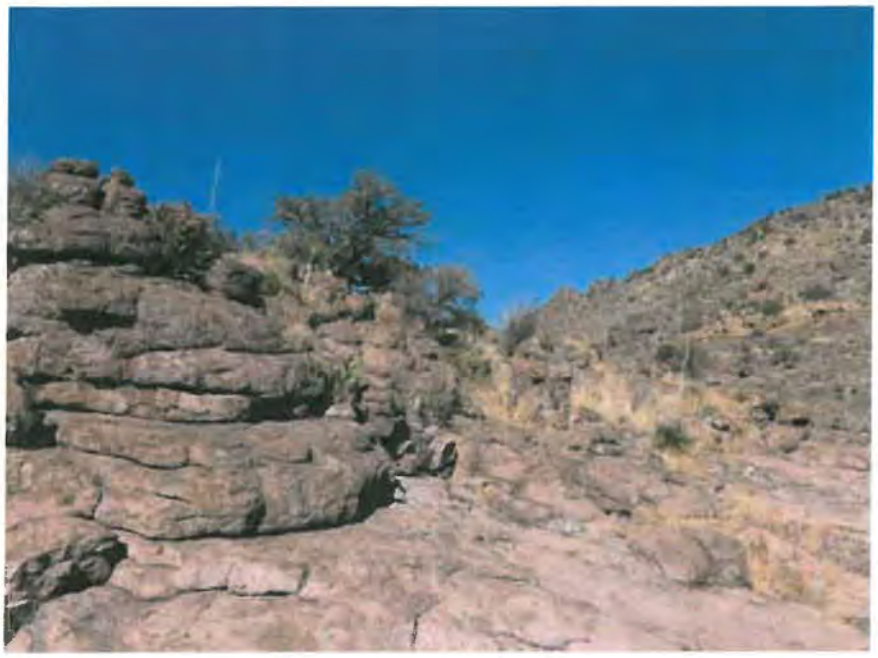
RC2-22-4: Photographic reference for indicators 1.5 and 1.6. Photographs of the bank/upland area and rooted in channel vegetation. Vegetation is similar in composition between the bank and the upland area. Vegetation is consistently dispersed throughout the channel.

Rustler Canyon Photographs (RC2-22B Reach) – Total HP score of 9 (intermittent stream)

RC2-22B-1: Photographic reference for indicator 1.1 through 1.5. Small isolated pools are located along the sample reach. Seeps or springs were not observed along the reach. Biotic indicators of persistent water located with little effort but are not consistent throughout the reach. Indicators 1.1, 1.3, and 1.4 scored as 2.

RC2-22B-2: Photographic reference for indicator 1.6. Streambed and geomorphology is dominated by bedrock. Indicator 1.6 scored as 2. Rooted vegetation is present along some portions of the stream reach, but is inconsistent.

Rustler Canyon Photographs (RC2-22B Reach) – Total HP score of 9 (intermittent stream)



RC2-22B-3: Photographic reference for indicator 1.5. Indicator 1.5 scored as 0 - compositional and density differences in vegetation between stream bank and upland area not evident. No distinct riparian zone present.

RC2-22B-4: Photographic reference of bedrock controlled channel.

Rustler Canyon Photographs (RC2-22B Reach) – Total HP score of 9 (intermittent stream)

RC2-22B-5: Photographic reference of standing pool within downstream West Branch Rustler Canyon assessment unit.

RC2-22B-6: Photographic reference of standing pool within downstream West Branch Rustler Canyon assessment unit.

Rustler Canyon Photographs (RC2-22B Reach) – Total HP score of 9 (intermittent stream)

RC2-22B-7: Photographic reference of algae and benthic macro-invertebrates within downstream West Branch Rustler Canyon assessment unit.

RC2-22B-8: Photographic reference for indicators 1.1 through 1.6. Filamentous algae/periphyton was observed along the reach. Multiple isolated pools present along the stretch. Biotic indicators of water found with little difficulty. Vegetation is inconsistently dispersed throughout the channel.

NMED Surface Water Quality Bureau – LEVEL 1 Hydrology Determination Field Sheet

Date: 6/14/2011	**Stream Name: Rustler Canyon**	**Latitude: N 32.74936**
Evaluator(s): Fulton	**Site ID: RC2-22**	**Longitude: W 108.03393**
TOTAL POINTS: 2 *Stream is at least intermittent if ≥ 2*	**Assessment Unit:** **Rustler Canyon Drainage (RC2-22)**	**Drought Index (12-mo. SPI Value):** **-1.1**

WEATHER CONDITIONS	**NOW:** ___ storm (heavy rain) ___ rain (steady rain) ___ showers (intermittent) ___ %cloud cover _X__ clear/sunny	**PAST 48 HOURS:** ___ storm (heavy rain) ___ rain (steady rain) ___ showers (intermittent) ___ %cloud cover _X__ clear/sunny	**Has there been a heavy rain in the last 48 hours?** **___ YES _X__ NO** **Field evaluations should be performed at least 48 hours after the last known major rainfall event. **OTHER:** **Stream Modifications ___ YES _X__ NO** **Diversions ___ YES _X_ NO** **Discharges ___ YES _X__ NO** **Explain in further detail in NOTES section**

LEVEL 1 INDICATORS	STREAM CONDITION			
	Strong	Moderate	Weak	Poor
1.1. Water in Channel	Flow is evident throughout the reach. Moving water is seen in riffle areas but may not be as evident throughout the runs.	Water is present in the channel but flow is barely discernable in areas of greatest gradient change (i.e. riffles) or floating object is necessary to observe flow.	Dry channel with standing pools. There is some evidence of base flows (i.e. riparian vegetation growing along channel, saturated or moist sediment under rocks, etc)	Dry channel. No evidence of base flows was found.
	6	4	2	0
1.2. Fish	Found easily and consistently throughout the reach.	Found with little difficulty but not consistently throughout the reach.	Takes 10 or more minutes of extensive searching to find.	Fish are not present.
	3	2	1	0
1.3. Benthic Macroinvertebrates	Found easily and consistently throughout the reach.	Found with little difficulty but not consistently throughout the reach.	Takes 10 or more minutes of extensive searching to find.	Macroinvertebrates are not present.
	3	2	1	0
1.4. Filamentous Algae/Periphyton	Found easily and consistently throughout the reach.	Found with little difficulty but not consistently throughout the reach.	Takes 10 or more minutes of extensive searching to find.	Filamentous algae and/or periphyton are not present.
	3	2	1	0
1.5. Differences in Vegetation	Dramatic compositional differences in vegetation are present between the stream banks and the adjacent uplands. A distict riparian vegetation corridor exists along the entire reach – riparian, aquatic, or wetland species dominate the length of the reach.	A distinct riparian vegetation corridor exists along part of the reach. Riparian vegetation is interspersed with upland vegetation along the length of the reach.	Vegetation growing along the reach may occur in greater densities or grow more vigorously than vegetation in the adjacent uplands, but there are no dramatic compositional differences between the two.	No compositional or density differences in vegetation are present between the streambanks and the adjacent uplands.
	3	2	1	0
1.6. Absence of Rooted Upland Plants in Streambed	Rooted upland plants are absent within the streambed/thalweg.	There are a few rooted upland plants present within the streambed/thalweg.	Rooted upland plants are consistently dispersed throughout the streambed/thalweg	Rooted upland plants are prevalent within the streambed/thalweg.
	3	2	1	0
			SUBTOTAL (#1.1 – #1.6)	**2**

If the stream being evaluated has a subtotal ≤ 2 at this juncture, the stream is determined to be EPHEMERAL.
If the stream being evaluated has a subtotal ≥ 18 at this point, the stream is determined to be PERENNIAL.
YOU MAY STOP THE EVALUATION AT THIS POINT. If the stream has a subtotal between 2 and 18 continue the Level 1 Evaluation.

LEVEL 1 INDICATORS	STREAM CONDITION			
	Strong	Moderate	Weak	Poor
1.7. Sinuosity	**Ratio > 1.4.** Stream has numerous, closely-spaced bends, few straight sections.	**Ratio < 1.4.** Stream has good sinuosity with some straight sections.	**Ratio < 1.2.** Stream has very few bends and mostly straight sections.	**Ratio = 1.0.** Stream is completely straight with no bends.
	3	2	1	0
1.8. Floodplain and Channel Dimensions	**Ratio > 2.5.** Stream is minimally confined with a wide, active floodplain.	**Ratio between 1.2 and 2.5.** Stream is moderately confined. Floodplain is present, but may only be active during larger floods.	**Ratio < 1.2.** Stream is incised with a noticeably confined channel. Floodplain is narrow or absent and typically disconnected from the channel.	
	3	1.5	0	
1.9. In-Channel Structure: Riffle-Pool Sequence	Demonstrated by a frequent number of riffles followed by pools along the entire reach. There is an obvious transition between riffles and pools.	Represented by a less frequent number of riffles and pools. Distinguishing the transition between riffles and pools is difficult.	Stream shows some flow but mostly has areas of pools or of riffles.	There is no sequence exhibited.
	3	2	1	0
			SUBTOTAL (#1.1 – #1.9)	2

If the stream being evaluated has a subtotal ≤ 5 at this juncture, the stream is determined to be EPHEMERAL.
If the stream being evaluated has a subtotal ≥ 21 at this point, the stream is determined to be PERENNIAL.
YOU MAY STOP THE EVALUATION AT THIS POINT. If the stream has a subtotal between 5 and 21 continue the Level 1 Evaluation.

1.10. Particle Size or Stream Substrate Sorting	Particle sizes in the channel are noticeably different from particle sizes in areas close to but not in the channel. There is a clear distribution of various sized substrates in the stream channel with finer particles accumulating in the pools, and larger particles accumulating in the riffles/runs.	Particle sizes in the channel are moderately similar to particle sizes in areas close to but not in the channel. Various sized substrates are present in the stream channel and are represented by a higher ratio of larger particles (gravel/cobble).	Particle sizes in the channel are similar or comparable to particle sizes in areas close to but not in the channel. Substrate sorting is not readily observed in the stream channel.
	3	1.5	0

1.11. Hydric Soils	Hydric soils are found within the study reach.		Hydric soils are not found within the study reach.	
	Present = 3		**Absent = 0**	
1.12. Sediment on Plants and Debris	Sediment found readily on plants and debris within the stream channel, on the streambank, and within the floodplain throughout the length of the stream.	Sediment found on plants or debris within the stream channel although it is not prevalent along the stream. Mostly accumulating in pools.	Sediment is isolated in small amounts along the stream.	No sediment is present on plants or debris.
	1.5	1	0.5	0
			TOTAL POINTS (#1.1 – #1.12)	2

SUPPLEMENTAL INDICATORS: **The following indicators do not occur consistently throughout New Mexico but may be useful in the determination of perenniality. If the indicator is present record score below and tally with previous score to compute TOTAL.**

1.13. Seeps and Springs	Seeps and springs are found within the study reach.	Seeps and springs are not found within the study reach.
	Present = 1.5	**Absent = 0**
1.14. Iron Oxidizing Bacteria/Fungi	Iron-oxidizing bacteria and/or fungi are found within the study reach.	Iron-oxidizing bacteria and/or fungi are not found within the study reach.
	Present = 1.5	**Absent = 0**
	TOTAL *plus* SUPPLEMENTAL POINTS (#1.1 – #1.14)	2

NMED Surface Water Quality Bureau – LEVEL 1 Hydrology Determination Field Sheet

Photo Descriptions and NOTES

Photo #	Description (US, DS, LB, RB, etc.)	Notes
RC2-22-1	View of rooted upland plants consistently dispersed throughout streambed.	
RC2-22-2	View of vegetation along banks of the reach is similar in composition as vegetation in the upland areas.	
RC2-22-3	View of bedrock controlled channel	
RC2-22-4	View of bank/upland area and rooted in channel vegetation. Vegetation is similar in composition between the bank and the upland area. Vegetation is consistently dispersed throughout the channel.	

NOTES:

Based on further review of field notes and site photograph the scores identified on the field forms were revised. This generally resulted in higher total scores.

NMED Surface Water Quality Bureau – LEVEL 1 Hydrology Determination Field Sheet

Date: 6/14/2011	**Stream Name: Rustler Canyon**	**Latitude: N 32.74329**
Evaluator(s): Barry	**Site ID: RC2-22B**	**Longitude: W 108.02727**
TOTAL POINTS: 9 *Stream is at least intermittent if ≥ 12*	**Assessment Unit: Rustler Canyon Drainage (RC2-22B)**	**Drought Index (12-mo. SPI Value): -1.1**

WEATHER CONDITIONS	**NOW:** ___ storm (heavy rain) ___ rain (steady rain) ___ showers (intermittent) ___ %cloud cover _ __ clear/sunny	**PAST 48 HOURS:** ___ storm (heavy rain) ___ rain (steady rain) ___ showers (intermittent) ___ %cloud cover _ __ clear/sunny	**Has there been a heavy rain in the last 48 hours?** **___ YES _ X__ NO** **Field evaluations should be performed at least 48 hours after the last known major rainfall event. **OTHER:** **Stream Modifications __ YES _ X_ NO** **Diversions ___ YES _X_ NO** **Discharges ___ YES _X _ NO** **Explain in further detail in NOTES section**

LEVEL 1 INDICATORS	STREAM CONDITION			
	Strong	Moderate	Weak	Poor
1.1. Water in Channel	Flow is evident throughout the reach. Moving water is seen in riffle areas but may not be as evident throughout the runs.	Water is present in the channel but flow is barely discernable in areas of greatest gradient change (i.e. riffles) or floating object is necessary to observe flow.	Dry channel with standing pools. There is some evidence of base flows (i.e. riparian vegetation growing along channel, saturated or moist sediment under rocks, etc)	Dry channel. No evidence of base flows was found.
	6	4	2	0
1.2. Fish	Found easily and consistently throughout the reach.	Found with little difficulty but not consistently throughout the reach.	Takes 10 or more minutes of extensive searching to find.	Fish are not present.
	3	2	1	0
1.3. Benthic Macroinvertebrates	Found easily and consistently throughout the reach.	Found with little difficulty but not consistently throughout the reach.	Takes 10 or more minutes of extensive searching to find.	Macroinvertebrates are not present.
	3	2	1	0
1.4. Filamentous Algae/Periphyton	Found easily and consistently throughout the reach.	Found with little difficulty but not consistently throughout the reach.	Takes 10 or more minutes of extensive searching to find.	Filamentous algae and/or periphyton are not present.
	3	2	1	0
1.5. Differences in Vegetation	Dramatic compositional differences in vegetation are present between the stream banks and the adjacent uplands. A distict riparian vegetation corridor exists along the entire reach – riparian, aquatic, or wetland species dominate the length of the reach.	A distinct riparian vegetation corridor exists along part of the reach. Riparian vegetation is interspersed with upland vegetation along the length of the reach.	Vegetation growing along the reach may occur in greater densities or grow more vigorously than vegetation in the adjacent uplands, but there are no dramatic compositional differences between the two.	No compositional or density differences in vegetation are present between the streambanks and the adjacent uplands.
	3	2	1	0
1.6. Absence of Rooted Upland Plants in Streambed	Rooted upland plants are absent within the streambed/thalweg.	There are a few rooted upland plants present within the streambed/thalweg.	Rooted upland plants are consistently dispersed throughout the streambed/thalweg	Rooted upland plants are prevalent within the streambed/thalweg.
	3	2	1	0
			SUBTOTAL (#1.1 – #1.6)	**8**

If the stream being evaluated has a subtotal ≤ 2 at this juncture, the stream is determined to be EPHEMERAL.
If the stream being evaluated has a subtotal ≥ 18 at this point, the stream is determined to be PERENNIAL.
YOU MAY STOP THE EVALUATION AT THIS POINT. If the stream has a subtotal between 2 and 18 continue the Level 1 Evaluation.

LEVEL 1 INDICATORS	STREAM CONDITION			
	Strong	Moderate	Weak	Poor
1.7. Sinuosity	**Ratio > 1.4.** Stream has numerous, closely-spaced bends, few straight sections.	**Ratio < 1.4.** Stream has good sinuosity with some straight sections.	**Ratio < 1.2.** Stream has very few bends and mostly straight sections.	**Ratio = 1.0.** Stream is completely straight with no bends.
	3	2	1	0
1.8. Floodplain and Channel Dimensions (N/A)	**Ratio > 2.5.** Stream is minimally confined with a wide, active floodplain.	**Ratio between 1.2 and 2.5.** Stream is moderately confined. Floodplain is present, but may only be active during larger floods.	**Ratio < 1.2.** Stream is incised with a noticeably confined channel. Floodplain is narrow or absent and typically disconnected from the channel.	
	3	1.5	0	
1.9. In-Channel Structure: Riffle-Pool Sequence	Demonstrated by a frequent number of riffles followed by pools along the entire reach. There is an obvious transition between riffles and pools.	Represented by a less frequent number of riffles and pools. Distinguishing the transition between riffles and pools is difficult.	Stream shows some flow but mostly has areas of pools or of riffles.	There is no sequence exhibited.
	3	2	1	0
			SUBTOTAL (#1.1 – #1.9)	9

If the stream being evaluated has a subtotal ≤ 5 at this juncture, the stream is determined to be EPHEMERAL.
If the stream being evaluated has a subtotal ≥ 21 at this point, the stream is determined to be PERENNIAL.
YOU MAY STOP THE EVALUATION AT THIS POINT. If the stream has a subtotal between 5 and 21 continue the Level 1 Evaluation.

1.10. Particle Size or Stream Substrate Sorting	Particle sizes in the channel are noticeably different from particle sizes in areas close to but not in the channel. There is a clear distribution of various sized substrates in the stream channel with finer particles accumulating in the pools, and larger particles accumulating in the riffles/runs.	Particle sizes in the channel are moderately similar to particle sizes in areas close to but not in the channel. Various sized substrates are present in the stream channel and are represented by a higher ratio of larger particles (gravel/cobble).	Particle sizes in the channel are similar or comparable to particle sizes in areas close to but not in the channel. Substrate sorting is not readily observed in the stream channel.	
	3	1.5	0	
1.11. Hydric Soils	Hydric soils are found within the study reach.		Hydric soils are not found within the study reach.	
	Present = 3		Absent = 0	
1.12. Sediment on Plants and Debris	Sediment found readily on plants and debris within the stream channel, on the streambank, and within the floodplain throughout the length of the stream.	Sediment found on plants or debris within the stream channel although it is not prevalent along the stream. Mostly accumulating in pools.	Sediment is isolated in small amounts along the stream.	No sediment is present on plants or debris.
	1.5	1	0.5	0
			TOTAL POINTS (#1.1 – #1.12)	9

SUPPLEMENTAL INDICATORS: The following indicators do not occur consistently throughout New Mexico but may be useful in the determination of perenniality. If the indicator is present record score below and tally with previous score to compute TOTAL.		
1.13. Seeps and Springs	Seeps and springs are found within the study reach.	Seeps and springs are not found within the study reach.
	Present = 1.5	Absent = 0
1.14. Iron Oxidizing Bacteria/Fungi	Iron-oxidizing bacteria and/or fungi are found within the study reach.	Iron-oxidizing bacteria and/or fungi are not found within the study reach.
	Present = 1.5	Absent = 0
		TOTAL *plus* SUPPLEMENTAL POINTS (#1.1 – #1.14) 9

NMED Surface Water Quality Bureau – LEVEL 1 Hydrology Determination Field Sheet

Photo Descriptions and NOTES

Photo #	Description (US, DS, LB, RB, etc.)	Notes
RC2-22B-1	View of small isolated pools are located along the sample reach	
RC2-22B-2	View of rooted vegetation is present along some portions of the stream reach, but is inconsistent.	
RC2-22B-3	View of compositional and density differences in vegetation between stream bank and upland area not evident.	
RC2-22B-4	View of bedrock controlled channel.	
RC2-22B-5	View of standing pool within downstream West Branch Rustler Canyon assessment unit.	
RC2-22B-6	View of standing pool within downstream West Branch Rustler Canyon assessment unit.	
RC2-22B-7	View of algae and benthic macro-invertebrates within downstream West Branch Rustler Canyon assessment unit.	
RC2-22B-8	View of Filamentous algae/periphyton was observed along the reach. Multiple isolated pools present along the stretch. Biotic indicators of water found with little difficulty.	

NOTES:

Based on further review of field notes and site photograph the scores identified on the field forms were revised. This generally resulted in higher total scores.
It was determined, after visiting a number of bedrock and boulder formed channels, that the application and evaluation of the "entrenchment ratio" was inappropriate at such locations. In channels flowing through material that is transport by the river itself the channel geometry can be viewed as self-formed. That is, sediment transport in alluvial rivers builds and maintains a dynamically stable channel geometry and floodplain that reflects both the quantity and timing of water and the volume and caliber of sediment delivered from the watershed (Leopold et al. 1964; Emmett and Wolman 2001). Accordingly, Leopold (1994) describes alluvial rivers as the architect of their own geometry. In these alluvial situations the measurement of an "entrenchment ratio" is reflective of the relative supply and magnitude of the sediments from upstream versus the capacity of the channel to transport that sediment.
However, in many situations observed during the application of the Hydrology Protocol, the channel was not an alluvial river and the bed and banks were not formed of sediments supplied and transport under the current hydrologic environment but rather were composed of bedrock and large boulders. In bedrock and boulder formed channels where it was necessary to proceed beyond Indicators 1.1 to 1.6 the "entrenchment ratio" indicator was not included in the total score.