WQDB Site Number:_____

Arizona Department of Environmental Quality
Stream Ecosystem Monitoring
Field Data Sheets

Site Code_____ Date_____ (MM/DD/YYYY) Water Sample Time _____

Site Name_____ Field Crew_____

Elevation_____

Entered:	Approved:

Meter Results					
E. coli		Cfu/100 ml	TDS		Mg/L
Air Temp		◦C	Conductivity		µmos/cm
Water Temp		◦C	pH		SU
D.O.		Mg/L	Turbidity	Average = Sig. Avg. =	NTU
% D.O.		%	Multiple Turbidity Results =		
Deviations from SOP					

Field Calibrations – Hydrolab and Turbidity Meter			
% D.O. →	Precal Reading =	Barometric Press. in. Hg = X 25.4 = mm Hg	Postcal reading =
Turbidity →	Standard =	Standard solution reading =	% Difference =

Field Meter Documentation			
Meter Type	Model	Serial Number	DEQ Name
Hydrolab			
Turbidimeter			
Incubator			
Flow Meter			
Camera Make :			
Chlorine Colorimeter			
Laser Level			

Sample Collection Information				
Sample Method		Quality Control		Bottle Label Identification
Equal Width Increment (EWI)		Equipment Churn Blank		
Modified EWI		Sample Split		
Equal Discharge Increment		Sample Duplicate		
Grab		DI Blank		
If Grab Sample - distance (1/4, 1/3, ½, etc.) from REW = _____; Taken from – run ☐ pool ☐ riffle ☐				
Parameter Sets if not FSN suite	Inorganics ☐; Nutrients ☐; Total metals ☐; Dissolved metals ☐; Bacteria ☐; Other -			
DRY CHANNEL ☐		PONDED WATER – NO FLOW ☐		

Revised 4 October 2004

Flow Measurements

Marsh-McBirney Flow Meter

Measurement from: riffle ☐ run ☐ pool ☐

Station	Distance from Initial Pt., ft.	Width, ft.	Depth, ft.	Velocity, ft/s	Discharge, cfs
1					
2					
3					
4					
5					
6					
7					
8					
9					
10					
11					
12					
13					
14					
15					
16					
17					
18					
19					
20					
21					
22					
23					
24					
25					
26					
27					
28					
29					
30					
	Total Width	QC width	Average	Average	Total Q

From USGS Gage

USGS Gage Height =	USGS Discharge =

Float Method Discharge Measurement

Timed Measurements, seconds								Avg. time (s)	Float distance (ft)	Avg. velocity(ft/s)

Avg. Velocity X 0.85 correction factor = Corrected velocity (ft/sec)

Width (ft) X Depth (ft) X Corrected Velocity (ft/sec) = Discharge (ft3/s)

GPS measurements			
Location on reach	Lat/Long (dms)	Method (Garmin/Geoexplorer)	Error (epe')

Reach Photos	Prints ☐ Digital ☐
Photo number	Description
	Upstream looking downstream
	Upstream, look at Right bank cross-section
	Upstream, look at Left bank cross-section
	Upstream, Riffle substrate
	Downstream Looking upstream
	Downstream, look at Right bank cross-section
	Downstream, look at Left bank cross-section
	Downstream, Riffle substrate
	At Cross-Section discharge location, looking upstream
	At Cross-Section discharge location, looking downstream

Field Conditions at Time of Visit
Flood Evidence w/in Last Month → None ☐; Fresh debris line in channel abv Bankfull elevation ☐; Grasses Laid Over ☐; Fresh debris line in bushes/trees ☐; Flood Width_____ Riparian Vegetation Scoured away ☐
Weather Conditions :
Precipitation at sample time : None ☐; Light ☐; Moderate ☐; Heavy ☐; Cloud Cover (%) =
Previous Precipitation (w/in 24 hrs.) : None ☐; Light ☐; Moderate ☐; Heavy ☐

Reach Observations	
General appearance in the channel (check all that apply) (GAS)	No refuse visible ☐; Small refuse visible ☐; Small volume refuse common ☐; large volume refuse (tires, carts) rare ☐; large volume refuse common ☐
General appearance along the banks (check all that apply) (GAB)	No refuse visible ☐; Small refuse visible ☐; Small volume refuse common ☐; large volume refuse (tires, carts) rare ☐; large volume refuse common ☐
Water Clarity (WAP)	Clear ☐; Milky ☐; Light brown ☐; Dark brown ☐; Oily sheen ☐; Greenish ☐; Other_____
Water odor (check all that apply) (WOD)	None ☐; Sewage ☐; Chlorine ☐; Fishy ☐; Rotten eggs ☐; Other_____
Appearance at water's edge (check one) (AWE)	No evidence of salt crusts ☐; White crusty deposits rare ☐; Numerous white crusty deposits ☐; banks covered with white crusty deposits ☐
Fish presence	Absent ☐; rare ☐; Common ☐
Crayfish presence	Absent ☐; rare ☐; Common ☐
Sunfish presence	Absent ☐; rare ☐; Common ☐
Leopard frog presence	Absent ☐; Number observed alive _____; Dead_____
Floating leaves or other organic mater (not algae)	Absent ☐; rare ☐; Common ☐
Leaves or other organic matter on streambed	Absent ☐; rare ☐; Common ☐

Notes

Flow Regime	
☐	Perennial stream channel. Surface water persists all year long (P)
☐	Intermittent stream channel. One which flows only seasonally or occasionally. Surface source includes springs, snow melt, and flows that reappear along various locations of a reach, then run subterranean (interrupted) (I)
☐	Subterranean stream channel. Flows parallel to and near the surface for various seasons (S)
☐	Ephemeral stream channel. Flows only in response to precipitation (E)
Category	
☐	Seasonal variation in stream flow dominated primarily by snowmelt runoff (1)
☐	Seasonal variation in stream flow dominated primarily by stormflow runoff (2)
☐	Uniform stage and associated stream flow due to spring fed conditions (3)
☐	Regulated stream flow due to diversions, dam releases, dewatering, effluent dominated, etc. (4)
☐	Altered flows due to development, such as urban streams, cut-over watersheds, vegetation conversions (e.g. forested to grassland) that changes flow response to precipitation events (5)

Stream Type Identification

Walk the reach and flag all likely bankfull indicators. Select the riffle with the best bankfull indicators to collect measurements. A measuring tape, stadia rod, and calculator are sufficient, although a laser level can also be used. Calculate the classification variables and use Rosgen stream type classification chart to identify stream type.

		Valley Type				
Watershed Area:						
Predicted Cross-section Area:		☐ I	☐ III	☐ V	☐ VII	☐ IX
Which regional curve used?	☐ Central / Southern ☐ Eastern AZ / New Mexico	☐ II	☐ IV	☐ VI	☐ VIII	☐ X

Measurements for Determining Stream Type

Measurement	Riffle Cross-section #1	Riffle Cross-section #2	Bankfull Indicators Used
Bankfull Width			☐ Top of point bars
Bankfull Max. Depth			☐ Change in particle size
Correction Factor			☐ Slope break
Bankfull Mean Depth			☐ Vegetation line
Cross-sectional Area			☐ Rock stains
Floodprone Width (2x BKF max depth)			☐ Undercut banks
STREAM TYPE =			☐ Presence of a floodplain at the elevation of incipient flooding

Organic Debris / Channel Blockages in Active Channel

☐	No organic debris or channel blockages (1)	☐	Extensive, large debris dams either continuous or influencing over 50% of channel area. Forces water onto flood plain even with moderate flows. Generally presents a fish migration blockage. (6)
☐	Infrequent debris, what's present consists of small, floatable organic debris. (2)	☐	Beaver dams. Few and/or infrequent. Spacing allows for normal stream/flow conditions between dams. reduced between dams. (7)
☐	Moderate frequency, mixture of small to medium size debris affects less than 10% of active channel area. (3)	☐	Beaver dams - Frequent. Back water occurs between dams - stream flow velocities (8)
☐	Numerous debris mixture of medium to large sizes - affecting up to 30% of the area of the active channel. (4)	☐	Beaver dams - abandoned where numerous dams have filled in with sediment and are causing channel adjustments of lateral migration, evulsion, and degradation etc. (9)
☐	Debris dams of predominantly large material affecting over 30% to 50% the channel area and often occupying the total width of the active channel. (5)	☐	Man made structures - diversion dams, low dams, controlled by-pass channels, baffled bed configuration with gabions (10)

Decision Criteria for Sampling Macroinvertebrates

The target stream habitat for collecting macroinvertebrates must be wadeable, perennial, contain riffle habitat, contain heterogeneous substrates, and must be sampled during the spring index period. Spring index period is April - May for warm water streams and May - June for cold water streams. Use the following specific decision criteria to determine whether to collect a macroinvertebrate sample. Where you have found the stream conditions to be inappropriate for macroinvertebrate sampling, circle the reason or record a comment indicating the rationale for not collecting.

Item	Condition	Action to Take
Bankfull or Extreme Flood	Baseflow conditions occurring approximately 4 or more weeks after a bankfull flow event is the target sampling condition. Using known watershed area, use appropriate Regional Curve and field bankfull indicators to estimate bankfull elevation. Look for high flow indicators at or below this elevation as an indicator of a bankfull flow event.	Collect macroinvertebrates
	A bankfull magnitude flow event has recently occurred.	Do not collect
Substrate Type	A substrate consisting of a mixture of some of the following particle sizes is the target condition: boulder, cobble, gravel, sand, clay, silt, bedrock.	Collect macroinvertebrates
	Streams which have substrates dominated (consisting of >50% of that substrate type) by bedrock, travertine, or sand are considered non-target conditions.	Do not collect
Waterbody Type	The target waterbody type is a flowing stream with riffle or run (erosional) habitats present.	Collect macroinvertebrates
	We do not have methods developed for the following waterbody types and are not sampling them at this time: Effluent dependent streams, wetlands, ephemeral streams, lakes, seasonally intermittent streams.	Do not collect

Comments: (indicate rationale for not collecting macroinvertebrate sample, if different from the above descriptions)

Biological Sampling and Observations			
Biological Samples Collected			
Macroinvertebrates	☐ Riffle Sample	☐ Pool Sample	☐ Edge Sample
	Riffle field split: ☐ ¼ Field split ☐ 1/2 Field split	Pool field split: ☐ ¼ Field split ☐ 1/2 Field split	Edge field split: ☐ ¼ Field split ☐ 1/2 Field split
Algae	Diatoms-natural substrate: ☐ Riffle ☐ Pool	Diatoms-artificial substrate: ☐ Riffle ☐ Pool Incubation period (days):	Filamentous algae – Natural substrate: ☐ Riffle ☐ Pool ☐ Composite
Comments (Excess filamentous algae or organic debris in sample, insects seen):			

Algae Observations	
Filamentous Algae Covering Streambed throughout the reach	1) <1% 2) 1-25% 3) 26-50% 4) 51-75% 5) 76-100%
Floating algae (detached clumps/mats) floating downstream	1) <1% 2) 1-25% 3) 26-50% 4) 51-75% 5) 76-100%
Algal slime on rocks, wood, etc. (diatoms, not filamentous)	Absent ☐; thin coating ☐; thick coating ☐
Comments:	

Macrophytes	
Macrophytes covering streambed, within wetted channel, throughout the reach	1) <1% 2) 1-25% 3) 26-50% 4) 51-75% 5) 76-100%
Comments:	

Identification of Algae (A) and Macrophytes (M)			
☐ A	Cladophora (hairlike feel, long beards)	☐ M	Watercress (Rorippa)
☐ A	Spirogyra (slimy to touch, bright green)	☐ M	Monkey flower (Mimulus, yellow flower)
☐ A	Nostoc (looks like jelly beans or round black to blue colored nodules)	☐ M	Pondweed (Potomogeton, submerged water grass)
☐ A	Blue-greens (blue-green to black in colo, e.g. Oscillatoria, Anabena)	☐ M	Columbine (yellow fower)
☐ A	Stoneworts (feels gritty, looks like a vascular plant, found in upwelling zones)	☐ M	White water buttercup (Ranunculus, white flower)
☐ A	Vaucheria (dark green felt-like mats)	☐ M	Eurasian water milfoil (Myriophyllum)
☐ A	Hydrodictyon (bright green, net forming algae)	☐ M	Hydrilla
☐ A	Praesiola (cold water algae, looks like sea lettuce)		

Site Sketch

Include location of riffles, pools, snags, submerged logs, undercut banks, areas of stable cobble habitat, type of bar formations, location and types of riparian vegetation, and areas with cut or eroding banks. Pace off length of eroding banks, length and width of riffles.

NON-POINT SOURCE CODES

Circle sources directly impacting the site, asterisk sources located in the watershed. Source Group is bolded, Category Code is italicized, and Sub-category Code is regular style font.

Code	Source Category	Code	Source Category	Code	Source Category
1000	**Agriculture** *(Agriculture)*	7350	Upstream impoundment	6600	Hazardous waste storage/disposal
1050	Crop-related sources	7400	Flow regulation/Modification/Diversions	8000	Highway salt storage/use
1100	Non-irrigated crop production	7550	Habitat Modification	8200	Storage tank leaks
1200	Irrigated crop production	7555	Erosion materials from tributaries	8250	Underground storage tank leaks
1300	Specialty crop production	7600	Removal of riparian vegetation	8275	Above ground storage tank leaks
1350	Grazing-related sources	7700	Streambank modification or destabilization	**0100**	**Wastewater** *(Industrial Point Source)*
1400	Pasture grazing - riparian and/or upland	7750	Highway/Road/Bridge-erosion or aggradation	0110	Major industrial point source
1410	Pasture grazing - riparian	7800	Drainage/Filling of wetlands	0120	Minor industrial point source
1420	Pasture grazing - upland	*7900*	*Marinas and recreational boating*	0200	Municipal point source
1500	Range grazing - riparian and/or upland	7910	Boating with in-water releases	0210	Major municipal point source
1510	Range grazing - riparian	7920	Boating with on-land releases	0220	Minor municipal point source
1520	Range grazing - upland	**5000**	**Mining** *(Resource extraction)*	0230	Package plants (small flows)
1600	*Intensive Animal feeding Operations*	5075	Active Mining operation	*0300*	*Other Wastewater*
1620	Concentrated Animal Feeding Operations point source/permitted)	5100	Surface Mining	0400	Combined system (sewage and stormwater)
1640	Confined animal feeding operations (non-point source	5150	Sand and gravel operations	0500	Collection system failure
1700	*Aquiculture/Fish Hatchery*	5200	Subsurface mining	0900	Sewage lagoons
2000	**Forestry** *(Silviculture)*	5300	Placer mining	0975	Reuse (Effluent to lakes, golf courses, artificial
2100	Harvesting, restoration (residue management)	5400	Dredge mining	6500	Septic systems
2200	Forest management (fertilization, pesticide use)	5500	Petroleum activities	6700	Septage disposal (e.g. from septic tank trucks)
2300	Logging roads	5600	Mill tailings	**8100**	**Other (Atmospheric deposition)**
2500	Clear cutting	5650	Mill or mine tailings	**8400**	**Spills**
8610	Wildfires or controlled burns	5700	Mine tailings	**8500**	**Contaminated sediments**
3000	**Hydro/Habitat Modification/Runoff** *(Construction)*	5800	Acid mine drainage	8510	
3100	Highway/Road/Bridge construction	5900	Abandoned mining operation	8530	
3200	Land development/Land clearing	5950	Inactive mining operation	8540	
4000	**Urban runoff/Stormwater sewers**	**8700**	**Recreation** (non-boating)	8600	
4100	Non-industrial (NPDES) stormwater runoff	8710	Golf courses	8910	
4200	Industrial (NPDES) stormwater runoff	8720	Camping/Campground recreation	**Other Non-point Source Observations at the site or within the reach**	
4300	Other urban runoff	8730	All terrain vehicles/Off road vehicles/Biking		
4400	Illicit connections to stormwater sewers (dry weather flows)	**6000**	**Storage and Disposal** (Land disposal/Storage)		
4500	Urban Highway/Road/Bridge runoff	6100	Sludge disposal/storage		
4600	**Non-urban runoff/Erosion and sedimentation**	6300	Landfills		
8300	Non-urban (highway/Road/Bridge Runoff/Maintenance)	6350	Inappropriate waste disposal/Wildcat dumping		
7000	*Hydrological modifications*	6400	Industrial land treatment		

Albion Sample Documentation					
Metals	Blank_____	; Grab_____	; Composite_____	; Duplicate_____	; Split_____
Hg	Blank_____	; Grab_____	; Composite_____	; Duplicate_____	; Split_____

E. Coli		
Collection Time_____	Distance (1/4, 1/3, ½, etc) from REW_____	From run ☐; riffle ☐; pool ☐
Incubation Period is 24 hours for membrane filter technique and 18 hours for colilert technique		
Beginning Incubation Time _____; Enumeration Time _____		

Membrane Filter Results

Dilution, ml	Number of colonies	Dilution Used in Calculation	Quality Control		
		☐		Pass	Fail
		☐	Equipment Blank	☐	☐
		☐	Technique Blank	☐	☐
Calculated Colony Forming Units/100 ml ⇨			Comments:		

Colilert Results

Sample Number	Number Large Wells Positive	Number Small Wells Positive	Most Probable Number form Table
1			
2			
3			
4			

Average Most Probable Number = cfu / 100 ml

Comments

Riffle Pebble Count

For transect method, tally 100-pebbles in riffle habitat only. Measure particles at equal increments across multiple transects within the wetted width of available riffle habitat throughout the reach.

Size Class	Size Range	Tally	Count	Percent	Cum. %
Silt/Clay *	<0.062				
Sand **	0.063 – 2.0				
Very Fine Gravel	3 – 4				
Fine Gravel	5 – 8				
Medium Gravel	9 – 16				
Coarse Gravel	17 – 32				
Very Course Gravel	33 – 64				
Small Cobble	65 – 96				
Medium Cobble	97 – 128				
Large Cobble	129 – 180				
Very Large Cobble	181 – 256				
Small Boulder	257 – 512				
Medium Boulder	513 – 1024				
Large Boulder	1025 – 2048				
Very Large Boulder	2049 – 4096				
Bedrock	>4097				
	Totals				

Comments:

% fines <2 mm	
# Size Classes	
D15	
D50	
D84	

Note: * Silt / clay particles feel slick when rubbing between thumb and forefinger.
** Sand Particles feel gritty when rubbing between thumb and forefinger.

Riffle Embeddedness

Embeddedness measurements are collected concurrently with particle sizes within wetted width of riffle transects, from which macroinvertebrates have been collected. Count sand and fines as 100% embedded, bedrock and travertine as 0% embedded, and gravel from a gravel patch as 100% embedded. Embeddedness is taken as a visual estimate. Calculate average embeddedness from 100 particles.

Particle Number	Percent Embedded	Particle Number	Percent Embedded	Particle Number	Percent Embedded	Particle Number	Percent Embedded
1		26		51		76	
2		27		52		77	
3		28		53		78	
4		29		54		79	
5		30		55		80	
6		31		56		81	
7		32		57		82	
8		33		58		83	
9		34		59		84	
10		35		60		85	
11		36		61		86	
12		37		62		87	
13		38		63		88	
14		39		64		89	
15		40		65		90	
16		41		66		91	
17		42		67		92	
18		43		68		93	
19		44		69		94	
20		45		70		95	
21		46		71		96	
22		47		72		97	
23		48		73		98	
24		49		74		99	
25		50		75		100	
						Avg. Embeddedness	

Riffle Geometry			
Riffle #	Length	Width	Length / Width ratio
1			
2			
3			
4			
		Average length / width ratio	

Reach Channel / Habitat Complexity		
Reach length equals 2 meander lengths or 20-30 times bankfull width. Use minimum of 300 foot reach to identify habitat types for large streams		
Habitat	Number of paces	Total
Pool		
Riffle		
Run		
Riffle / Run Ratio =		

Segment Habitat Quality				
Segment length equals 2 meander lengths or 20-30 times bankfull width of the stream. Use a minimum 300-feet reach to identify habitat types for large streams or rivers.				
Cobble	Absent ☐;	rare ☐;	Common ☐;	Abundant ☐
Undercut banks	Absent ☐;	rare ☐;	Common ☐;	Abundant ☐
Leaf packs	Absent ☐;	rare ☐;	Common ☐;	Abundant ☐
Root masses	Absent ☐;	rare ☐;	Common ☐;	Abundant ☐
Macrophyte beds	Absent ☐;	rare ☐;	Common ☐;	Abundant ☐
Submerged logs / snares	Absent ☐;	rare ☐;	Common ☐;	Abundant ☐
Sand dominated substrate	Absent ☐;	rare ☐;	Common ☐;	Abundant ☐
Filamentous algae beds	Absent ☐;	rare ☐;	Common ☐;	Abundant ☐

Notes

Depositional Features			
Check off the feature that is most appropriate for the reach condition.			
☐ Point Bars (1)			☐ Diagonal Bars (5)
☐ Point Bars with Few Mid-Channel Bars (2)			☐ Main Channel Branching with Numerous Mid-Bars and Islands (6)
☐ Numerous Mid-Channel Bars (3)			☐ Side Bars and Mid-Channel Bars with Length Exceeding 2 to 3 times Channel Width (7)
☐ Side Bars (4)			☐ Delta Bars (8)
			☐ No bars present (9)
Illustrations from D. Rosgen, 1996. Applied River Morphology. Wildland Hydrology. Pagosa Springs, CO.			

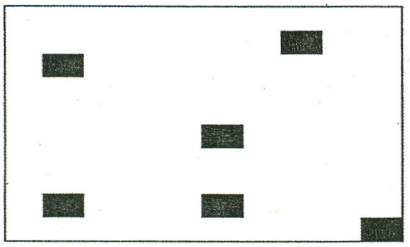
Canopy Density			
	Number of Points Intercepted Along the Transect		
Position	Upper Reach	Mid-Reach	Lower Reach
Right Edge Water			
Middle – Looking Upstream			
Middle – Looking Downstream			
Left Edge Water			
Sum			
Mean Number of Points = Sum of the three columns_____ ÷ 3 =			
If stream order <5	Percent Canopy Density = Mean Number of Points * 1.5 =		%
If stream order >5	Percent Canopy Density = Mean Number of Points * 0.75 =		%

Habitat Assessment Field Data Sheet

Habitat Parameter	Condition Category			
	Optimal	Sub-optimal	Marginal	Poor
Habitat Quality	Large variety of habitats available for colonization which may include cobble, undercut banks, snags, submerged logs, leaf packs, root masses, macrophyte beds or other organic material.	Moderate variety of habitats which may include cobble, leaf packs, root masses, macrophyte beds or other organic material.	Habitat has minimal variety, substrate dominated by one particle size, may have some cobble, macrophyte beds, or algae beds.	Homogeneous substrate dominated by sand, shallow with uniform velocity, no shade on riffles, may have extensive filamentous algae beds.
Score	④	③	②	①
Extent of Riffle Habitat	Well developed riffle that is as wide as stream and its length extends 2x the wetted width of the stream.	Riffle is as wide as stream, but is less than 2x stream width; abundance of cobble; boulders and gravel are common.	Reduced riffle area does not extend across entire cross-section and is less than 2x width; gravel or large boulders and bedrock prevalent; cobble present.	Riffles virtually non-existent; sand, gravel, large boulders or bedrock prevalent; cobble lacking.
Score	④	③	②	①
Embeddedness of Riffles	Gravel, cobble, and boulder particles are 0-25% surrounded by fine sediment (bedrock is 0% embedded).	Gravel, cobble, and boulder particles are 25-50% surrounded by fine sediment.	Gravel, cobble, and boulder particles are 50-75% surrounded by fine sediment.	Gravel, cobble, and boulder particles are more than 75% surrounded by fine sediment (sand is 100% embedded).
Score	④	③	②	①
Sediment Depostion	Point bars in C type channel maintained, no mid-channel or side bars. No bimodal particle size distribution. No excess sediment in riffles and pools of A, B, or C type channels.	Point bars with few mid-channel bars or side bars in C type channels. No bimodal particle size distribution. Some filling in of pools in A, B, and C type channels.	Numerous mid-channel or diagonal bars in C type channels. Some loss of pool and riffle habitat in A, B, and C type channels. Bimodal distribution may be present with excess fines in the substrate.	Branched or braided C channel with numerous mid-channel bars and islands, some exceeding 2-3x channe width in length. Heavy deposites of finae material evident with bimodal particle distribution. Pools and riffles filled in, with run habitat dominating.
Score	④	③	②	①
Bank Stability within the active bankfull channel (score each bank)	Banks stable; no evidence of erosion or bank failure; <5% of bank affected.	Banks moderately stable; infrequent, small areas of erosion mostly healed over. 5-30% of bank in reach has areas of erosion.	Banks moderately unstable; 30-60% of bank in reach has areas of erosion; high erosion potential during floods.	Unstable; many eroded areas; "raw" areas frequent along straight sections and bends; 60-100% of bank has erosional scars.
Score_____ Left Bank	④	③	②	①
Score_____ Right Bank	④	③	②	①

Sum of Habitat Category Scores_____ ⇨	Rating Category		
	0 – 7	8 – 14	15 - 20
	☐ Very Impaired	☐ Impaired	☐ Good Condition

Riparian Vegetation Cover	
Record the percent cover of each vegetation type within the floodplain. Consider each vegetative layer separetly with a score of 0 – 100% for each. The object is to identify what vegetation type is holding the banks and floodplain together.	
Riparian Vegetation Cover	Estimated Percent Cover
Canopy of riparian trees > 15 feet high	
Understory of woody shrubs, saplings, herbs, grasses and forbs – 1.5 to 15 feet high	
Ground cover of woody shrubs, seedlings, herbs, and forbs - < 1.5 feet high	
Barren or bare dirt	



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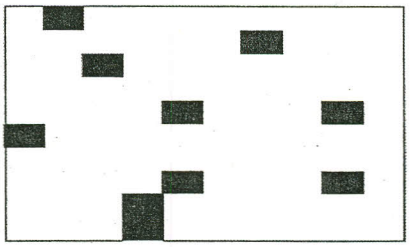

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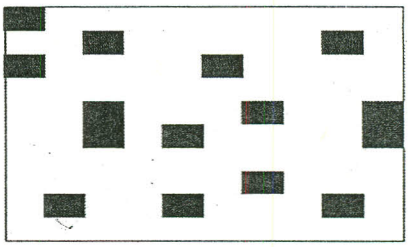

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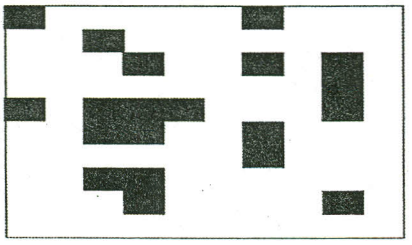

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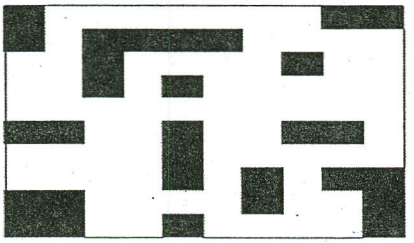

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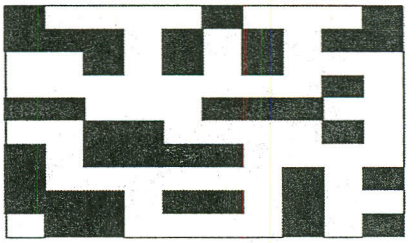

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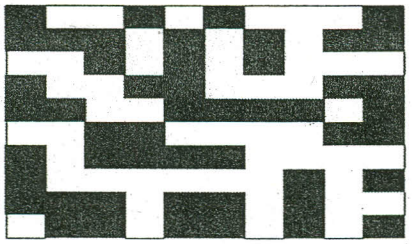

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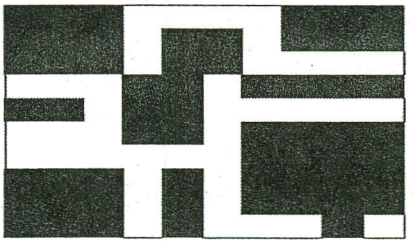

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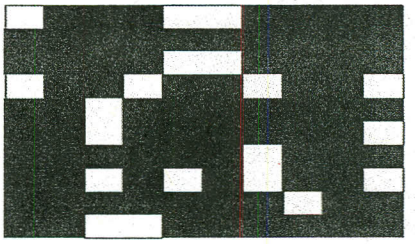


80%

Riparian Association			
Place a check beside the most appropriate association using the riparian species list and elevation.			
☐	Sonoran riparian deciduous forest (1) Cottonwood-Willow & Mesquite located at <3280′ elevation	☐	Montane riparian deciduous forest (3) mixed broadleaf species such as Big-tooth Maple; Narrowleaf Cottonwood; Box-elder; SW Choke Cherry; Arizona Alder; Pacific, Coyote, Red, or Bebb's Willow; located at 5740′ – 8200′ elevation
☐	Interior riparian deciduous forest (2) Cottonwood-Willow & mixed broadleaf species such as Sycamore, Ash, Walnut, Alder, Soapberrry, and Hackberry located at 3280′ – 5740′ elevation	☐	Actic – Boreal forest (4) Distinctive riparian communities are not present however there are some indicator species such as shrubby Scouler and Bebb's willows, Red Elderberry, Shrubby Cinquefoil, Goose-berry Currant, Raspberry, and Thin-leaf Alder located along streams of subalpine forests and meadows at >8200′.

Riparian Species											
☐	Alder, Thinleaf	☐	Cinquefoil	☐	Hawthorn, River	☐	Tamarisk	☐	Willow, Peachleaf	☐	Equisetum
☐	Alder, Arizona	☐	Cottonwood, Fremont	☐	Maple, Big-tooth	☐	Walnut, Arizona	☐	Willow, Red	☐	Monkeyflower
☐	Ash, Lowell	☐	Cottonwood, Lanceleaf	☐	Maple, Rocky Mountain	☐	Willow, Arizona	☐	Willow, Scouler	☐	Phragmites
☐	Ash, velvet	☐	Cottonwood, Narrowleaf	☐	Mesquite	☐	Willow, Arroyo	☐	Willow, Seep	☐	Rushes
☐	Birch	☐	Elder, Blueberry	☐	Netleaf Hackberry	☐	Willow, Bebb	☐	Willow, Yewleaf	☐	Sedges
☐	Boxelder	☐	Elder, Mexican	☐	New Mexican Locust	☐	Willow, Bonpland	☐	Willow, Unknown	☐	Sacaton
☐	Buckthorn, Birchleaf	☐	Elderberry	☐	Raspberry	☐	Willow, Coyote	☐	Bamboo	☐	
☐	Buckthorn, California	☐	Elderberry, Desert	☐	Red-osier Dogwood	☐	Willow, Desert	☐	Carex	☐	
☐	Burro bush	☐	Gooseberry	☐	Soapberry	☐	Willow, Gooding	☐	Cattail	☐	
☐	Chokecherry	☐	Hawthorn, Cerro	☐	Sycamore, Arizona	☐	Willow, Pacific	☐	Deer Grass	☐	

Regeneration Potential of Riparian Trees					
	Species	Mature Trees >16″ @ 3 ft height	Young Trees ~1 ¼″ @ 3 ft. height	Saplings < 1 ¼″	Seedlings New growth
1					
2					
3					
4					
5					

Age Classes of the Dominant Riparian Tree Species							
☐	Species abundant in 3 age classes (1)	☐	Abundant in 2 age classes (2)	☐	One age class present (3)	☐	No regeneration evident, few mature trees present, no saplings or seedlings, or if present, they are heavily grazed (4)

GUIDELINES FOR COMPLETING THE PFC CHECKLIST

General guidance: If 75% or more of stream reach is PFC, classify entire reach as PFC. All "No" answers must have comments in notes section. Answers can go on the line between "Yes" and "No", but consider it a "No" and comment in notes section.

Q1. Instantaneous peak flows don't count. Inundation means to bankfull depth. Bankfull can be identified from top of the point bars, changes in vegetation, topographic break in slope, change in size of bank materials, evidence of an inundation feature such as small benches, exposed root hairs below an intact soil layer indicating exposure to erosive flow, and bank undercuts. "No" if channelization or entrenchment. "N/A" if a "V"-canyon without floodplain development.

Q2. Usually "N/A", but may be applicable at high altitude sites; also, consider the present environment (could they be present).

Q3. Based on the stream type expected & the regional curves, all three features must be present for a "YES". Use bankfull width, not wetted width. "NO" if straightness, excessive sediment, or entrenched channel.

Q4. Widening can mean encroaching on the channel as well as moving toward the terraces. The age of the vegetation in an indicator. "NO" if upland species encroaching on the floodplain or Kentucky bluegrass present. "YES" if recruitment of wetland/riparian species on new landforms. "N/A" if an A1 stream type.

Q5. Need to look at upland ground cover and erosion signs (e.g. plants on pedestals, debris dams around plants, rills, gullies). "NO" if side channel and mid-channel bars, gullies, fan shaped deposits from tributaries, braided channels, overloading of point bars, or cementing of streambed.

Q6. "YES" if 3 age classes (mature, young, saplings) present for a single species, or young and sapling classes if recruitment & replacement is occurring, or dense matting of herbaceous riparian/wetland plants. "NO" if individual plants. "N/A" if A1 Stream Type.

Q7. Maintenance means recruitment. Is it occurring? "YES" if several different species present (e.g. willows, rushes, sedges). It depends on the elevation and the potential natural community that might be present if all constraints are removed. In some environments, 2 species could be a "YES". Usually "NO" if 1 species present.

Q8. "YES" if sedges, rushes, willows, seep willows, alders, cottonwoods, etc. Don't consider quantity. Do you see any at all?

Q9. A high stream flow event is one that occurs once in 25-30 years. Q9 is similar to Q*, but you are now looking for quantity. "NO" if presence of upland species. "YES" if willows, alder, aspen, birch, cottonwood, sedge, rush, bulrush, and wetland grasses.

Q10. Are the plants healthy and dense? "NO" if yellow leaves, stunted plants, many dead stems and branches, a thin crown, infested with insects, diseased, or grazed down by browsers.

Q11. This is a quantity question. Use 80% cover as a guide. Look for riparian plants, herbaceous cover, salt cedar (tamarisk), seep willows, etc. "NO" if "NO" on Q9. If Q6-Q10 are "NO", this is probably a "NO".

Q12. "N/A" for meadows, desert streams, and probably intermediate elevation streams, or sedge/grass community streams. "YES" if fallen trees. For some locations consider living and dead trees and trees along banks out of the water.

Q13. "YES" if large boulders, roughness of the floodplain, large trees & dense vegetation along stream banks. "NO" if incision & no access of stream to floodplain.

Q14. "YES" if sedge/rush components. Consider potential, height and newness of the point bar. Sandy soils don't hold water well and there may be no potential for revegetation. A1 Stream Type is "N/A".

Q15. "NO" if straight channel, not confined geologically, and channel movement with every high flow event. "YES" if single channel, stable banks (especially on straight segments), & natural deposition.

Q16. "NO" if entrenchment, down cutting (some is natural), excessive aggradation, unstable vertical banks. "YES" if streambed is armored with large rock, bedrock, heavy gravel. Don't consider old down cutting. If a bedrock stream then "N/A".

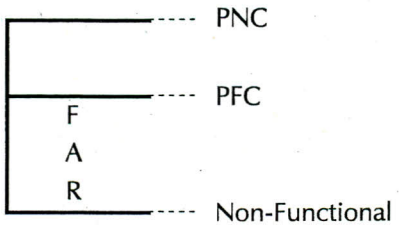
Q17. "NO" if excessive sediment from side drainages, excessive aggradation, mid-channel bars, braiding, or unstable banks. "NO" if Q5 is "NO".

Proper Functioning Condition Worksheet

Yes	No	N/A	Hydrologic
			1) Flood plain inundated in "relatively frequent" events (1-3 years)
			2) Active/stable beaver dams
			3) Sinuosity, width/depth ratio, and gradient are in balance with the landscape setting (i.e., landform, geology, and bioclimatic region)
			4) Riparian zone is widening or has achieved potential extent.
			5) Upland watershed not contributing to riparian degradation
			Vegetative
			6) Diverse (3) age structure of vegetation (Recruitment for maintenance/recovery)
			7) Diverse composition of vegetation (For maintenance/recovery)
			8) Species present indicate maintenance of riparian soil moisture characteristics
			9) Streambank vegetation is comprised of those plants or plant communities that have root masses capable of withstanding high streamflow events
			10) Riparian plants exhibit high vigor
			11) Adequate vegetative cover present to protect banks and dissipate energy during high flows
			12) Plant communities in the riparian area are an adequate source of coarse and/or large woody debris
			Erosion Deposition
			13) Flood plain and channel characteristics (i.e., rocks, coarse and/or large woody debris) adequate to dissipate energy
			14) Point bars are revegetating
			15) Lateral stream movement is associated with natural sinuosity
			16) System is vertically stable
			17) Stream is in balance with the water and sediment being supplied by the watershed (i.e., no excessive erosion or deposition)

Functional Rating

☐	Proper Functioning Condition	☐	Functional at risk, downward trend
☐	Functional at risk, upward trend	☐	Non-Functional
☐	Functional at risk, no apparent trend	☐	Unknown



Channel cross-section sketch:

PFC Remarks:	
Checklist #	Comment