Appendix 7—Information and Data Form for Assessing Riparian Vegetation in the Field

This appendix includes the data form and information for collecting the riparian vegetation data. The riparian vegetation data are collected along the same stream reach as the geomorphic and disturbance data.

The riparian vegetation is collected using data form A.7.1. One form is used for each sampled stream reach. At each sampled reach, identifying information is recorded on the data form. This includes the date, observer, watershed name, the watershed code in the Great Basin watershed database, location within the watershed (e.g., high, mid, low), and the reach length of the observations (typically 30 m). A GPS is used to record the UTM coordinates and elevation where the stream cross sectional profile is drawn for the sampled reach.

Descriptions of the variables recorded and the specific measurements or scores used to describe each variable are in table A.7.1. A list of the dominant riparian species in Great Basin riparian ecosystems and their wetland indicator status, successional status, and bank stability index is in table A.7.2. The vegetation assessment involves collecting information on any apparent decrease in the extent of the riparian area and the degree to which the riparian vegetation occurs in a post-incision trench. Data on the relative cover, vigor, mortality, wetland indicator status, successional status, and bank stability rating of the dominant riparian indicator species are collected for each geomorphic position (valley floor, inset terraces, flood plain). These data provide information on the responses of the riparian vegetation to recent or ongoing disturbances affecting groundwater tables, such as channel incision or avulsion, as well as other disturbances, such as inappropriate livestock grazing.

The riparian vegetation data collected during the field assessment are summarized for each geomorphic position and for the overall sampled reach as described on the data form and in table A.7.1. The data for the overall reach are included in the score sheets for assessing watershed sensitivity and resilience in appendix 10 and for rating ecological integrity in appendix 11. The interpretation of the data and combined scores is discussed in Task 5 in text.

Form A.7.1–RIPARIAN VEGETATION DATA	Date: Observer:
Watershed Name:	Database Code:
UTM Zone:	Elevation (m):
UTMs: Northing	Easting
Location in Basin: Low / Mid / High	Reach Length of Observation (m):

Vegetation type (circle dominant one): Subalpine-montane conifer (SC) *Populus tremuloides* (PT) Cold willow (CW) *Betula occidentalis* (BA) Warm willow (WW); Cottonwood (CT) *Artemisia* (AR) Other: _____ The dominant riparian vegetation types are in table A.3.1.

Decrease in riparian area extent due to incision or drying (circle one): none low (1-10%) moderate (10-30%) high (>30%)

Riparian plants only in incised trench (circle one): 0 = none, 1 = little, 2 = common, 3 = widespread

Record data for six stream geomorphic positions: FP (flood plain), T1 (terrace 1), T2 (terrace 2), T3 (terrace 3), VF (valley floor). See fig. A.6.1 for an illustration of the locations of the flood plain, inset terraces, and valley floor. Make sure the positions coincide with the stream cross sectional profile sketch on the geomorphic data form (A.6.1). Note that not all positions will occur in every sampled stream reach.

Dominant indicator species and aerial cover (%): record as trace < 1 (trace); 1-5; 5-25; 25-50; 50-75; 75-100.
Vigor and mortality of each species: record as high (H), moderate (M), or low (L) as described in table A.7.2.
Wetland Indicator Status (WIS), successional status (Succ), and bank stability (Stab) of each species: record the values for each species from the riparian species list (A.7.3). Descriptions are in table A.7.2.
Nativity of the species: record as yes (Y) or no (N) as indicated in the riparian species list (A.7.3).

Record the following data for the geomorphic position summaries:
Cover: estimate and record the average vegetation cover for the entire geomorphic position.
Vigor and Mortality: record value most indicative of response to disturbance for the geomorphic position as described in table A.7.2.
WIS, Succ, and Stab: record most common value for the geomorphic position.
Native: record total number of nonnative species at the geomorphic position.

Position	Dominant Indicator Species	Cover (%)	Vigor H/M/L	Mort H/M/L	WIS O/F/FW /FU/U	Succ E/M/L	Stab H/M/L	Native Y/N
FP								
FP								
FP								
FP								
FP								
FP								
Stream Bank Summary								
T1								
T1								
T1								
T1								
T1								
T1								
Terrace 1 Summary								

Form A.7.1–RIPARIAN VEGETATION DATA					Date:	Observer:		
Watershed Name:					Database Code:			
UTM Zone:					Elevation (m):			
UTMs: Northing					Easting			
Location in Basin: Low / Mid / High					Reach Length of Observation (m):			
Position	**Dominant Indicator Species**	**Cover (%)**	**Vigor H/M/L**	**Mort H/M/L**	**WIS O/F/FW /FU/U**	**Succ E/M/L**	**Stab H/M/L**	**Native Y/N**
T2								
T2								
T2								
T2								
T2								
T2								
Terrace 2 Summary								
T3								
T3								
T3								
T3								
T3								
T3								
Terrace 3 Summary								
VF								
VF								
VF								
VF								
VF								
VF								
Valley Floor Summary								

R**ecord the following data for the reach summary:**
Cover: estimate and record the average vegetation cover for the entire sample reach.
Vigor and mortality: record value most indicative of reach response to disturbance as described in table A.7.2.
WIS, Succ, and Stab: record value most indicative of reach disturbance response as described in table A.7.2.
Native: record total number of nonnative species observed for all positions.

Reach Summary							
List the Indicator Species for the reach:							

Notes:

Table A.7.1—Descriptions of the variables used to assess the riparian vegetation in the field.

- **Riparian Vegetation Type:** The dominant riparian vegetation types are in table A.3.1. Circle or list the dominant type on the form.
- **Riparian Area Extent:** Channel incision typically results in a drop in the water table and frequently, a decline in areal extent of the riparian area. Record decrease in riparian area extent as none (little evidence of a decrease in the size of the riparian area due to channel incision in the reach), low (some channel incision has occurred and there is evidence of a decrease in riparian extent of 1-10%); moderate (10-30%) (channel incision has resulted in a decrease of riparian area extent by as much as 30% in the reach) or high (incision has resulted in a decrease of riparian area extent greater than 30% in the reach).
- **Riparian Plants in Trench:** Following stream incision, riparian vegetation may occur only in the incised trench. Circle yes or no to indicate whether or not the riparian plants occur only in the incised trench.
- **Dominant indicator Species:** Indicator riparian species are those that provide information on water availability for a given geomorphic position, where water availability is determined by depth to groundwater and substrate characteristics. Identify and record the dominant indicator species for each geomorphic position by walking the entire extent of the sample stream reach. No additional information is needed for the geomorphic position summary. For the reach summary, list the species that are most indicative of the reach response to stream incision or avulsion. Note if the dominant indicator species also reflect anthropogenic disturbances such as livestock grazing in the notes section.
- **Aerial Cover:** The cover of riparian vegetation provides valuable information on response to disturbance. For each geomorphic position, estimate and record the average aerial cover (%) of each dominant indicator species as < 1 (trace); 1-5; 5-25; 25-50; 50-75; 75-100. For the geomorphic position summary, estimate and record the average vegetation cover for the geomorphic position as a whole. For the reach summary, estimate and record the average vegetation cover for the entire sample reach.
- **Vegetation Vigor:** Provides information on potential effects of decreases in water tables, insects, disease, weather extremes, or other disturbances, such as inappropriate grazing or recreational overuse. Reduced vigor is indicated by low height, production (leaf area or leader growth), or root growth and signs of stress, such as chlorosis or yellowing. For each geomorphic position, record the vigor of each dominant indicator species as high (later successional herbaceous and woody species are vigorous), moderate (later successional herbaceous and woody species are less vigorous than appropriate), or low (vigor of later successional herbaceous and woody species is low). For the geomorphic position and reach summaries, record the value that is most indicative of the reach response to disturbance. Note the apparent cause of any loss in vigor in the notes section.
- **Vegetation Mortality:** Increased mortality is indicated by patches of dying or dead herbaceous and/or woody species. Mature willows with good vigor often have dead stems and this should not be interpreted as a sign of increased mortality. For each geomorphic position, record the mortality of each dominant indicator species as high (later successional herbaceous and woody species show no evidence of increased mortality), moderate (later successional herbaceous and woody species show evidence of increased mortality), or low (mortality of later successional herbaceous and woody species is high). For the geomorphic

position and reach summaries, record the value that is most indicative of the reach response to disturbance. Note the apparent cause of any increase in mortality in the notes section.

- **Riparian or Wetland Indicator Status (WIS):** Descriptions of the wetland indicator status values are in table 2 and the indicator status values for the riparian species are in table A.7.3. WIS provides general insights into flow regimes, groundwater dynamics, and the responses of the riparian vegetation within the stream reach. For each geomorphic position, record the WIS value of each dominant indicator species from table A.7.3. For the geomorphic position summary, record the most common value. For the reach summary, record wetland indicator status as high (wetland obligate, facultative wetland, and facultative upland species are found on appropriate geomorphic positions), moderate (greater number of facultative upland and upland species than appropriate) or low (many more facultative upland and upland species than appropriate).
- **Successional Status:** Descriptions of the successional status values are in table 4 and the successional status values for the riparian species are in the table A.7.3. Successional status ratings for individual plants provide information on responses of the riparian ecosystems to past and present disturbance (table 4). Record the successional status value for each dominant indicator species from table A.7.3. For the geomorphic position summary, record the most common value. For the reach summary, record the average successional status as high (a large number or cover of late seral species with few mid and early seral species), moderate (a reduced number or cover of late seral species and an increase in mid and early seral species, or low (very low numbers or cover of late seral species – dominance by mid and early seral species). Note the apparent cause of any reduction in successional status in the notes section.
- **Bank Stability Rating:** The bank stability ratings are based on table 5 and values for the riparian species are in table A.7.3. Most perennial streams require 70% to 90% stabilizing cover (vegetation, large or anchored rock, anchored wood) to buffer the erosive force of water (Winward 2000; Burton et al. 2011). Root strength and rooting depth of the riparian vegetation on streambanks contributes to overall streambank stability. Record the bank stability rating for each dominant indicator species from table A.7.3. For the geomorphic position summary, record the most common value. For the reach summary, record the bank stability rating as high (a large proportion or cover of species with high stability ratings), moderate (a large proportion or cover of species with a medium stability rating), or low (a high proportion or cover of species with a low stability rating). Note the apparent cause of any loss of bank stability in the notes section.
- **Nativity:** Species designations as nonnative-invasive or noxious weed are in table A.7.3. Record all nonnative-invasive species and noxious weeds as nonnative. For the geomorphic position summaries, record the total number of nonnative species on the geomorphic position. For the reach summary, record the total number of nonnative species for the entire reach.

Table A.7.2–The dominant riparian species in Great Basin riparian ecosystems based on Swanson (2016). The information in this table is used to complete the riparian vegetation data form (A.7.1). Included are the scientific name, symbol, and common name (USDA 2020) of the dominant riparian species followed by their wetland indicator status, successional status, and stability index. Wetland indicator status (WIS): OBL = obligate; FAC = facultative; FACW = facultative wetland; FACU = facultative upland; UPL = upland (Lichvar and Minkin 2008). Successional status (Succ): E = early seral; M = mid-seral, L = late seral. Bank stability index (Stab): L = low stability; M = moderate stability; H = high stability (Burton et al. 2011; Swanson 2016). *Nonnative-invasive; **Noxious weed.

Species	Symbol	common name	Wetland Indicator Status (WIS)	Successional Status (Succ)	Stability Index (Stab)
Shrubs and Trees					
Acer glabrum	ACGL	Rocky Mountain maple	FAC	M	M
Acer negundo	ACNE2	boxelder	FACW	L	H
Alnus incana	ALIN2	mountain alder	FACW	L	H
Artemisia tridentata ssp. *tridentata*	ARTRT	basin big sagebrush		E	L
Baccharis salicifolia	BASA4	willow baccharis (mule-fat)	FAC	L	H
Betula occidentalis	BEOC2	water birch	FACW	L	H
Chrysothamnus viscidiflorus	CHVI8	yellow rabbitbrush		E	L
Cornus sericea	COSE16	red osier dogwood		L	H
Crataegus douglasii	CRDO2	black hawthorn	FAC	M	M
*Elaeagnus angustifolia***	ELAN	Russian olive	FAC	E	M
Ericameria nauseosa	ERNA10	rubber rabbitbrush		E	L
Ledum glandulosum	LEGL	trapper's tea (western Labrador tea)		M	M
Lonicera involucrata	LOIN5	black twinberry	FAC	M	M
Populus acuminata	POAC5	Lance leaf cottonwood		L	H
Populus angustifolia	POAN3	Narrowleaf cottonwood		L	H
Populus balsamifera ssp. *trichocarpa*	POBAT	Black cottonwood	FAC	L	H
Populus fremontii	POFR2	Fremont cottonwood		L	H
Populus tremuloides	POTR5	Quaking Aspen	FACU	L	H
Prunus virginiana	PRVI	chokecherry		L	H
Ribes aureum	RIAU	goldern currant	FAC	E	M
Ribes hudsonianum	RIHU	northern black currant	FACW	M	M
Ribes inerme	RIIN2	whitestem gooseberry	FAC	E	M
Rosa woodsii	ROWO	Wood’s rose	FACU	E	M
Salix boothii	SABO2	Booth's willow	FACW	E	M

Salix drummondiana	SADR	Drummonds willow	FACW	E	M
Salix eastwoodiae	SAEA	Mountain willow		E	M
Salix exigua	SAEX	narrowleaf willow	FACW	E	M
Salix geyeriana	SAGE2	Geyer's willow	OBL	L	H
Salix lasiolepis	SALA6	Arroyo willow	FACW	E	M
Salix lemmonii	SALE	Lemmon's willow	FACW	E	M
Salix lucida	SALU	Shining(pacific/whiplash) willow		E	M
Salix lutea	SALU2	yellow willow	OBL	L	H
Salix orestera	SAOR	Sierra willow	FACW	E	M
Symphoricarpos spp.	SYMPH	snowberry		M	M
*Tamarix ramosissima***	TARA	saltcedar		E	H
Forbs					
Aconitum columbianum	ACCO4	Columbian monkshood		L	M
Angelica kingii	ANKI	King's angelica	FACW	M	M
Aquilegia formosa	AQFO	western columbine	FAC	L	L
Argentina anserina	ARAN7	silverweed cinquefoil	OBL	E	L
Arnica spp.	ARNIC	arnica		M	M
Artemisia cana	ARCA13	silver sagebrush	FACU	M	L
Caltha leptosepala	CALE4	White marsh marigold	OBL	E	M
Camassia quamash	CAQU2	common camas	FACW	M	M
*Cardaria draba***	CADR	whitetop		E	L
*Carduus nutans***	CANU4	nodding plumeless thistle	FACU	E	L
Chamerion angustifolium	CHAN9	fireweed		M	L
Cicuta douglasii	CIDO	western water hemlock	OBL	M	M
*Cirsium arvense***	CIAR4	Canada thistle	FACU	E	L
*Conium maculatum***	COMA2	poison hemlock	FACW	E	L
Dodecatheon spp.	DODEC	shootingstar		E	L
Epilobium glaberrimum	EPGL	glaucus willowherb	FACW	M	L
Erigeron spp.	ERIGE2	fleabain	FACW	L	M
Geranium viscosissimum	GEVI2	sticky geranium		E	M
Geum macrophyllum	GEMA4	largeleaf avens	FACW	E	L
Heracleum maximum	HEMA80	cow parsnip	FACW	L	M
Iris missouriensis	IRMI	Rocky Mountain iris	FACW	M	L
Iva axillaris	IVAX	poverty weed	FAC	E	L
Kalmia microphylla	KAMI	bog laurel	OBL	M	M
*Lepidium latifolium***	LELA2	broadleaved pepperweed	FAC	E	L
Maianthemum racemosum	MARA7	feathery false lily of the valley	FAC	L	L
Mentha arvensis	MEAR4	wild mint	FACW	M	L
Mertensia ciliata	MECI3	streamside bluebells	FACW	M	M
Mimulus primuloides	MIPR	primrose monkeyflower	FACW	M	L
*Nasturtium officinale**	NAOF	watercress	OBL	E	L

Pedicularis groenlandica	PEGR2	elephant head lousewort	OBL	L	L
*Plantago major**	PLMA2	common plantain	FAC	E	L
Polygonum bistortoides	POBI6	American bistort		M	L
Argentina anserina	ARAN7	silverweed cinquefoil	OBL	E	L
Potentilla gracilis	POGR9	slender cinquefoil	FAC	E	L
Ranunculus cymbalaria	RACY	alkali buttercup		M	L
Rudbeckia occidentalis	RUOC2	coneflower/blackhead	FAC	E	L
*Rumex crispus**	RUCR	curly dock	FAC	E	L
Rumex paucifolius	RUPA6	alpine sheep sorrel	FAC	E	L
Saxifraga odontoloma	SAOD2	brook saxifrage		M	L
Sphenosciadium capitellatum	SPCA5	woolyhead parsnip	FACW	E	L
Taraxacum officinale	TAOF	common dandelion	FACU	E	L
Thalictrum fendleri	THFE	Fendler's meadowrue	FAC	E	L
Urtica dioica	URDI	stinging nettle	FAC	M	L
Veratrum californicum	VECA2	California false hellebore	FACW	M	H
Veronica americana	VEAM2	American speedwell	OBL	M	M
Viola palustris	VIPA4	marsh violet	FACW	M	L
Grasses					
Agrostis exarata	AGEX	spike bentgrass		E	L
Agrostis scabra	AGSC5	rough bentgrass		E	L
*Agrostis stolonifera**	AGST2	creeping bentgrass		E	L
Alopecurus aequalis	ALAE	short-awned foxtail	OBL	E	L
*Bromus tectorum***	BRTE	cheatgrass		E	L
Calamagrostis canadensis	CACA4	blue-joint reedgrass	FACW	L	H
Calamagrostis stricta	CAST36	slimstem reedgrass	FACW	L	H
Catabrosa aquatica	CAAQ3	water whorlgrass		E	L
Deschampsia cespitosa	DECE	tufted hairgrass		L	M
Distichlis spicata	DISP	inland saltgrass	FAC	M	M
Leymus triticoides	ELTR3	beardless wildrye	FAC	E	M
Festuca rubra	FERU2	red fescue	FAC	M	M
Glyceria grandis	GLGR	American mannagrass	OBL	L	H
Glyceria striata	GLST	fowl mannagrass	OBL	L	M
Hordeum brachyantherum	HOBR2	meadow barley	FACW	E	L
Hordeum jubatum	HOJU	foxtail barley	FAC	E	L
Leymus cinereus	LECI4	basin wildrye	FAC	M	M
Muhlenbergia richardsonis	MURI	mat muhly	FAC	M	L
Phalaris arundinacea	PHAR3	reed canarygrass		E	M
Phleum alpinum	PHAL2	alpine timothy	FAC	E	L
*Phragmites australis**	PHAU7	common reedgrass	FACW	L	H
Poa pratensis	POPR	Kentucky bluegrass	FAC	E	L
Poa secunda	POSE	Sandberg bluegrass (rush blue grass)	FACU	E	L

*Polypogon monspeliensis**	POMO5	annual rabbitsfoot grass	FACW	E	L
Grasslike					
Carex aquatilis	CAAQ	water sedge	OBL	L	H
Carex athrostachya	CAAT3	slenderbeak sedge	FACW	L	H
Carex aurea	CAAU3	golden sedge	OBL	L	L
Carex canescens	CACA11	gray sedge	OBL	M	L
Carex disperma	CADI6	softleaf sedge	OBL	L	M
Carex douglasii	CADO2	Douglas' sedge	FAC	M	L
Carex lenticularis	CALE8	tufted sedge	OBL	L	M
Carex microptera	CAMI7	small-winged sedge	FAC	M	M
Carex nebrascensis	CANE2	Nebraska sedge	OBL	L	H
Carex pellita	CAPE42	wooly sedge	OBL	L	H
Carex praegracilis	CAPR5	cluster field sedge	FACW	L	H
Carex scopulorum	CASC12	mountain sedge	FACW	L	H
Carex simulata	CASI2	short-beaked sedge	OBL	L	H
Carex spp.	CAREXRH	rhizomatous sedge		L	H
Carex utriculata	CAUT	Northwest Territory sedge	OBL	L	H
Carex vesicaria	CAVE6	blister sedge	OBL	L	H
Eleocharis palustris	ELPA3	common spikerush	OBL	E	M
Eleocharis quinqueflora	ELQU2	fewflower spikerush	OBL	M	M
Equisetum arvense	EQAR	field horsetail	FAC	M	M
Equisetum hyemale	EQHY	scouringrush horsetail	FACW	M	M
Equisetum laevigatum	EQLA	smooth horsetail	FACW	E	L
Juncus arcticus	JUAR2	mountain (Baltic) rush		L	H
Juncus bufonius	JUBU	toad rush	FACW	E	L
Juncus ensifolius	JUEN	swordleaf rush	FACW	E	L
Juncus longistylis	JULO	longstyle rush	FACW	E	L
Juncus nevadensis	JUNE	Sierra rush	FACW	L	M
Juncus orthophyllus	JUOR	straightleaf rush	FACW	M	L
Juncus tenuis	JUTE	poverty rush	FACW	E	L
Schoenoplectus acutus	SCAC3	hardstem bulrush	OBL	L	M
Schoenoplectus pungens	SCPU10	threesquare bulrush	OBL	L	M
Schoenoplectus tabernaemontani	SCTA2	softstem bulrush	OBL	L	M
Scirpus microcarpus	SCMI2	panicled (small fruited) bulrush	OBL	L	M
Scirpus nevadensis	SCNE	Nevada bulrush	OBL	L	M
Triglochin maritima (or *palustris*)	TRMA20	arrowgrass		E	M
Typha latifolia	TYLA	broadleaf cattail	OBL	M	H

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