Appendix 9—Information and Data Forms for Assessing Meadow Complexes in the Field

This appendix includes the data form and information for collecting the meadow geomorphic and hydrologic data and the vegetation data. The geomorphic data described in appendix 6 and disturbance data described in appendix 8 also are collected for each meadow. The geomorphic assessment is conducted for a representative reach within the meadow and should reflect the conditions observed for the meadow as a whole. The disturbance assessment characterizes the effects of disturbances in adjacent stream reaches upstream and downstream of the meadow. The sensitivity and resilience of meadow complexes within a watershed are evaluated for up to four meadows that represent the dominant meadow types and their responses to disturbance within a focal watershed.

The meadow data form A.9.1 is used to collect meadow geomorphic and hydrologic data and form A.9.2 is used to collect meadow vegetation data). At each sampled stream reach, identifying information is recorded on the data forms. This includes the date, observer, watershed name, the watershed code in the Great Basin watershed database, meadow name, location within the watershed (e.g., high, mid, low). A GPS is used to record the UTM coordinates and elevation where the stream cross section is drawn for the sampled reach.

An explanation of the variables recorded in the geomorphic and hydrologic assessment is in table A.9.1. Geomorphic and hydrologic data are collected on the geomorphic position of the meadow, groundwater sources and springs, relationship of the stream to the meadow, meadow complexity and hydrologic traits, and evidence of incision. Illustrations and descriptions of meadow hydrologic types – their hydrologic setting, hydrology, and connection of the stream to the meadow vegetation – are in table A.9.2.

An overview of the meadow vegetation types is in table A.3.1 and the dominant species within each type are in table A.9.4. The meadow vegetation types and their relative abundances within the meadow complex are determined by walking through the meadow and estimating the percentage of each vegetation type. Aerial photos of the meadow can be used delineate the different meadow types and help estimate their percentages.

The meadow vegetation is assessed by walking through each meadow type, recording the dominant indicator species within the type, and estimating the percentage cover of the species as indicated on data form A.9.2. Species vigor, mortality, successional status, and bank stability status are recorded as described in table A.9.3. Successional status and bank stability status for the dominant Great Basin meadow species are in appendix A.9.4.

The information collected for each meadow vegetation type on the relative cover, vigor, and mortality of the dominant or indicator species increases understanding of the response of the meadow vegetation to recent or ongoing disturbances affecting water availability. The information on the relative cover, successional status, and bank stability rating provide information on the longer-term responses of the meadow vegetation to a variety of different disturbances.

The watershed characteristics, stream geomorphic, and meadow vegetation data can be used to evaluate the incision and avulsion sensitivity of individual meadows as described in appendix 10. In addition, the watershed characteristics, meadow vegetation and disturbance data can be used to rate meadow ecological integrity as described in appendix 11.

Form A.9.1–MEADOW GEOMORPHIC & HYDROLOGIC DATA Date: Observer:

Watershed Name: Database Code:

Meadow Name:

UTM Zone: Elevation (m):

Coordinates (UTMs): Northing Easting

Location in Watershed: Low / Mid / High

Definitions of terms and methods of data collection are in appendix A.9.2 and illustrations of meadow hydrologic types are in appendix A.9.3. Definitions of the meadow vegetation types are in table A.3.1 and the species contained within each meadow vegetation type are in table A.9.5.

Meadow Size

Length parallel to valley (m): _____ Approximate area (ha): _____

Length perpendicular to valley (m): _____

Geomorphic Position (circle 1, 2, or 3)

(1) Large meadow upstream of an alluvial fan or bedrock constriction

(2) Large meadow in the valley bottom with no alluvial fan or bedrock constriction present

(3) Spring-fed meadow on part of valley floor with no stream contact

Groundwater Sources and Springs

Groundwater source is down valley; meadow gradually becomes wetter down valley: no____ yes____

Springs located along edge of valley floor (#): none ____ 1-3 ____ 4-6 ____ >6 ____

Springs not located along edge of valley floor (#): none ____ 1-3 ____ 4-6 ____ >6____

Stream Connection to Meadow (circle 1, 2, or 3):

(1) Stream bisects meadow (2) Stream on one side of meadow (3) Stream in valley but doesn't contact meadow (4) No stream in same part of valley as meadow

Stream and Groundwater Influence on Meadow Hydrology (circle 1, 2, 3, or 4)

(1) Gaining stream – dryer meadow vegetation types near stream (2) Losing stream - wetter meadow vegetation types near stream (3) No obvious pattern (4) Stream does not bisect meadow

Meadow Complexity (circle 1, 2, or 3)

(1) Simple (2) Moderate (3) Complex

Vegetation/incision Patterns Perpendicular to Stream (circle 1, 2, or 3)

(1) No change in vegetation type crossing stream (2) Minor shift from wetter to drier vegetation types adjacent to stream (3) Major shift from wetter to drier vegetation types adjacent to stream (4) N/A

Meadow Hydrologic Type (circle 1, 2, 3, 4, or 5, or describe the type)

Use answers above and information in appendix A.9.3 to determine type.

(1) Simple, not degraded by stream (2) Simple, minimally degraded by stream (3) Simple, degraded by stream (4) Complex, minimally degraded by stream (5) Complex, degraded by stream

(6) Other (describe): _____

Notes:

Form A.9.1–MEADOW GEOMORPHIC & HYDROLOGIC DATA	Date:	Observer:
Watershed Name:	Database Code:	
Meadow Name:		
UTM Zone:	Elevation:	
Coordinates (UTMs): Northing	Easting	
Location in Watershed: Low / Mid / High		

Meadow Drawing: A map of the meadow is drawn in the field that includes the stream, meadow types, relation of stream to meadow vegetation types, and locations of springs in the meadow. The scale is shown. Ideally, an aerial photograph of the meadow is used to illustrate these features (see below). Alternatively, a sketch of the meadow can be drawn by hand.

Figure A.9.1–Illustration of the outlines of different meadows on aerial photographs. Meadow dimensions are estimated using aerial imagery by positioning a best-fit oval or rectangle over the meadow (illustrated by dashed gray lines). The area is calculated by multiplying width by length for a rectangle shape, or by multiplying half of the width by half of the length by pi for an oval shape. The photographs show the meadow (M), valley (V), side-slope (S), north arrow, and scale. In photograph (a) the alluvial fan is also shown.

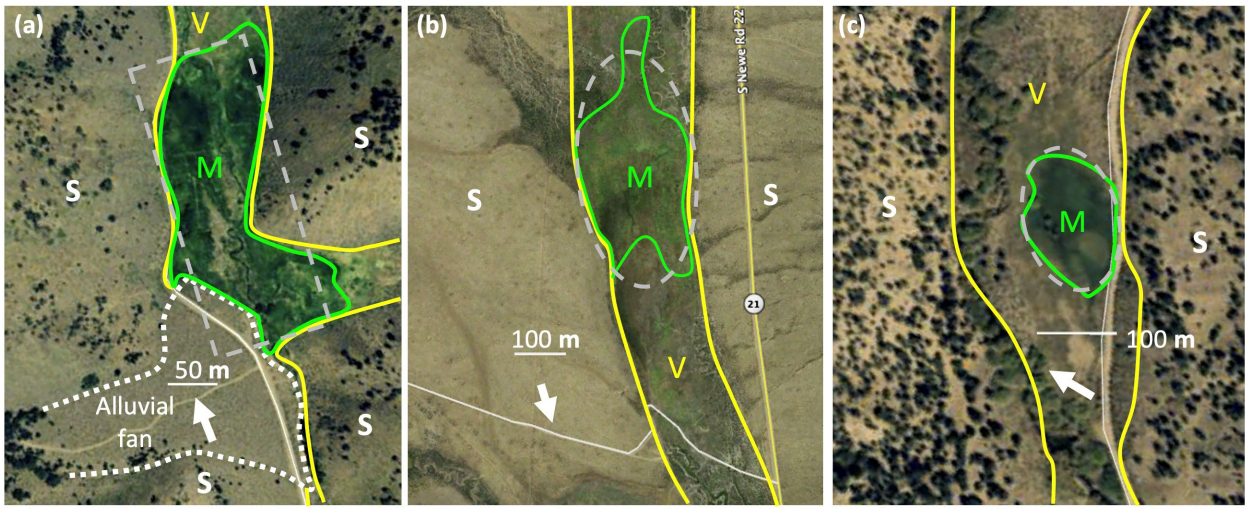


Figure A.9.2–Illustration of using an aerial photograph of the sample meadow to map the locations of the stream, springs, meadow types, and relation of stream to meadow vegetation types. The scale should always be included.

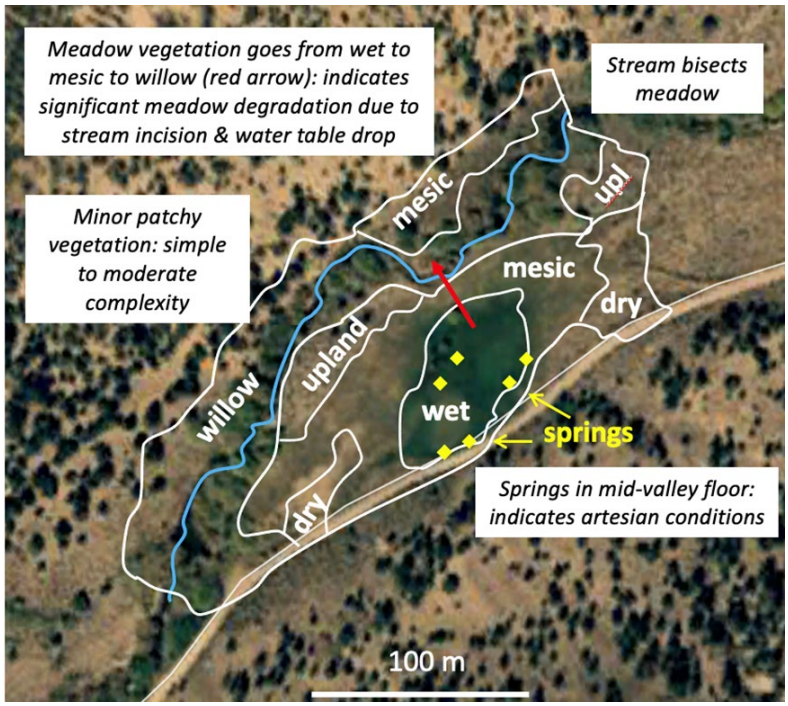
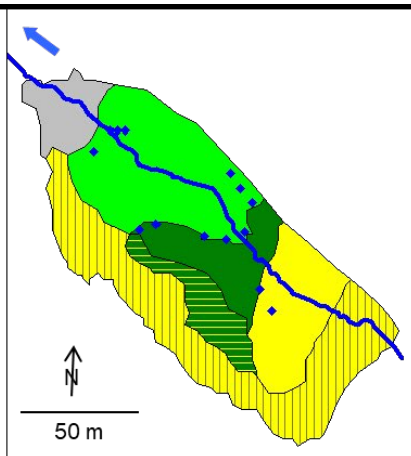
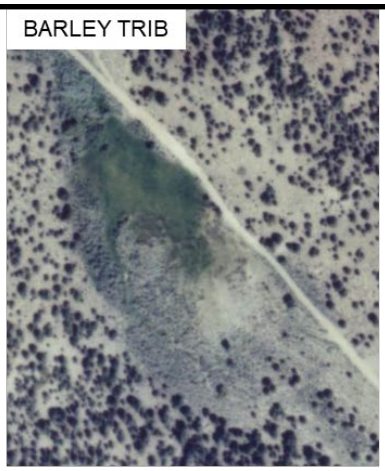
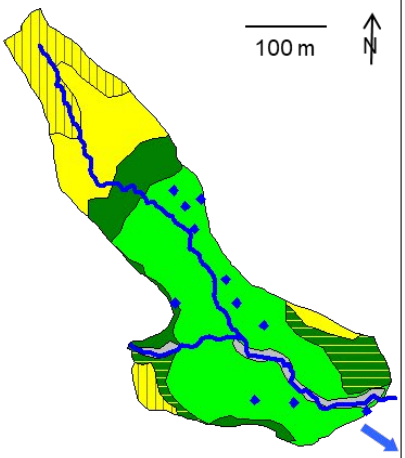
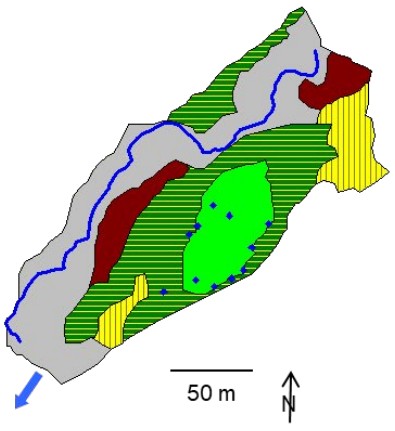


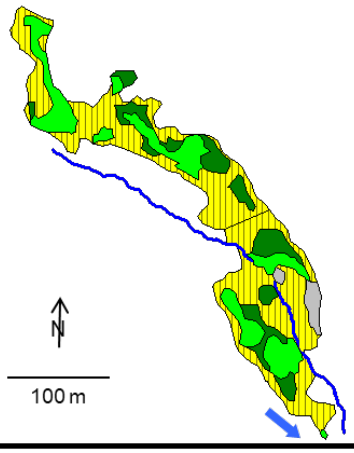
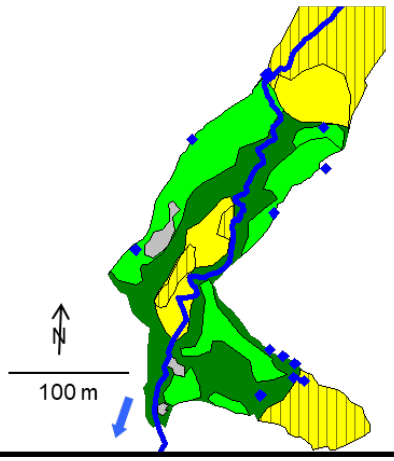
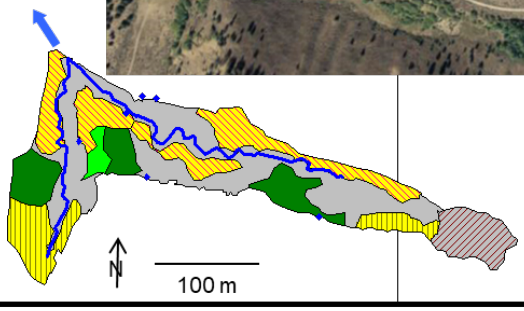
Table A.9.1– Descriptions of the geomorphic and hydrologic data needed to complete the data form for the meadow assessment (A.9.1).

- **Meadow Size:** The ecological importance and potential for impacts by natural and human-caused disturbance are often related to a meadow's size**.** To estimate meadow area, the approximate dimensions of the meadow are estimated from aerial imagery by positioning a best-fit oval or rectangle over the meadow (see fig. A.9.1). The area is calculated by multiplying width by length for a rectangle shape, or by multiplying half of the width by half of the length by pi for an oval shape.
- **Geomorphic Position:** The geomorphic setting of a meadow has a strong influence on its hydrology and connection to the stream and meadow vegetation types. The most common geomorphic settings in the Great Basin are: (1) large meadow upstream of an alluvial fan; (2) large meadow in the valley bottom with no alluvial fan present; and (3) spring-fed meadow on part of valley floor with no stream contact. The annotated aerial images in table A.9.3 show the three settings. In all figures, downstream is at the bottom. Arrows point north; M=meadow; V=valley floor; S=side-valley slopes.
- **Groundwater Sources and Springs:** Observations about springs (abundance and location) and general vegetation patterns can be used to infer groundwater sources for meadows and hydrogeologic conditions. An abundance of springs located at valley side margins or within the valley floor likely reflect a localized groundwater discharge area, whereas their absence may indicate that the primary source of groundwater is through upstream valley floor sediments. Areas with springs, especially on valley floors, are indicative of artesian conditions that form where fine-grained, confining sediment layers cap coarser-grained sediments. Breaching of the confining layer, whether by backhoe or stream incision, may cause significant changes in the groundwater and, therefore, vegetation. To locate springs, walk throughout the meadow, especially in areas of wet or mesic vegetation. Note the number of springs along the edges of valley floor and in middle of the valley floor.
- **Stream Connection to Meadow:** The relationship of a stream to a meadow is important because changes in stream channels (e.g., incision, avulsion, migration) can influence meadow hydrology and vegetation. One of four possible relationships is recorded: (1) stream bisects meadow; (2) stream is on one side of meadow; (3) stream is in valley but doesn't contact meadow; and (4) no stream in same part of valley as meadow.
- **Stream and Groundwater Influence on Meadow:** Hydrologic traits of meadows, such as the source of groundwater and groundwater flow directions can be assessed from vegetation patterns. For example, areas where groundwater flow is toward a stream (i.e., the stream is gaining) will have wetter vegetation types at the valley margins and drier types adjacent to the stream. In contrast, a losing stream will have wetter vegetation types adjacent to the stream. To assess whether groundwater flow in a meadow is toward a stream (gaining) or away from a stream (losing), observe the overall relationship of the groundwater-dependent vegetation from the valley side to the stream. Do not include inset stream terraces in the assessment as they do not typically reflect the same groundwater relationships as the meadow overall.
- **Meadow Complexity:** Describes the degree to which meadow vegetation types are contiguous (simple) or patchy (complex). Patchiness of vegetation types reflects underlying complexity in the hydrologic and geologic conditions. Use the following descriptions and figures of the distribution of plant types to select the complexity type that best matches the

conditions within the meadow. See table A.9.3 for additional descriptions, figures, and photographs of the meadow hydrologic types.
    - In simple meadows, meadow vegetation types are mostly contiguous. This pattern reflects systematic shifts in the depth to the groundwater table over the meadow and low lateral variability of underlying sediments. Because of this simplicity, declines in groundwater tables and shifts in vegetation types due to stream incision have higher predictability.
    - In complex meadows, meadow vegetation types occur in patches throughout the meadow. This pattern reflects high variability in depth to groundwater table and underlying sediments; some plant patches may be isolated because of dissection by past stream incision. In this setting, declines in the groundwater table and shifts in vegetation due to stream incision are difficult to predict, and may include major change with little incision. Complex meadows are common upstream of alluvial fans.
    - Moderate meadows have intermediate complexity.
- **Vegetation patterns perpendicular to stream:** Assessment of impacts of stream incision on the meadow groundwater table and meadow vegetation types can be made by observing meadow vegetation type patterns associated with streams that bisect or adjoin a meadow. Stream incision causes a lowering of the groundwater table. The magnitude of the drop and the consequent shift in vegetation types is a function of the amount of incision, direction of groundwater flow, sediment permeability, and meadow vegetation types. If meadow vegetation type shows no change on either side of a stream, it typically indicates that any incision that has occurred did not cause enough of a decline in the groundwater table to cause a shift in meadow vegetation type, such as where wet meadow vegetation occurs adjacent to both sides of the stream. A meadow with moderate degradation by stream incision may show a shift in meadow type from wet to mesic or dry. In a meadow significantly degraded by incision, willows or upland vegetation may be adjacent to the stream channel. Assess the overall impact of stream incision by observing plant patterns adjacent to the stream. Do not include inset stream terraces in the assessment as they do not typically reflect the same groundwater relationships as the meadow overall. Select the incision category that best matches the distribution of plant types. See table A.9.3 for additional descriptions, figures, and photographs of types.
- **Meadow Hydrologic Type:** Use the answers in form A.9.1 "Meadow geomorphic and hydrologic data," and table A.9.3 "The meadow hydrologic types in the Great Basin" to determine the meadow hydrologic type. These are: (1) simple, not degraded by stream; (2) simple, minimally degraded by stream; (3) simple, degraded by stream; (4) complex, minimally degraded by stream; (5) complex, degraded by stream; or (6) other.

Table A.9.2–The meadow hydrologic types in the Great Basin (Lord et al. 2011). The information in this table is used to complete the meadow geomorphic and hydrologic data form (A.7.2). The left column describes key hydrologic characteristics and the current relationship of the stream to meadow hydrology and vegetation patterns. The middle and right columns show maps of the plant communities and aerial photographs of the setting. The aerial photographs are from meadows in central Nevada. GW = groundwater.

Meadow Traits	Meadow Plant Map	Meadow Aerial Photograph
A. Simple, Not Degraded by Stream Hydrogeologic Setting • Bedrock constriction down valley • Continuous geologic units Hydrology • GW source is down-valley • Springs common in low permeability sediment layer Stream Connections • Gaining • Incision has little affect on GW and vegetation patterns		
B. Simple, Minimally Degraded by Stream Hydrogeologic Setting • Bedrock constriction • Continuous geologic units Hydrology • GW source is down and side-valley • Springs common • Perched GW table down-meadow Stream Connections • Gaining some locations; perched in others • >1 m of incision - little affect on GW and vegetation patterns		
C. Simple, Degraded by Stream Hydrogeologic Setting • Downstream valley constriction and alluvial fan Hydrology • GW source is center and down-valley • Artesian conditions and springs common Stream Connections • Gaining • Incision has likely breached confined aquifer and has affected riparian GW and vegetation patterns		

Meadow Traits	Meadow Plant Map	Meadow Aerial Photograph
D. Complex; Minimally Degraded by Stream Hydrogeologic Setting • draped, old alluvial fans • dominantly fine-grained geologic units Hydrology • GW source is down-valley and center-valley upwelling • perched water tables Stream Connections • losing, perched • incision has had little affect on GW and vegetation patterns		
E. Complex, Stream Degraded Hydrogeologic Setting • upstream of alluvial fan • complex geologic setting • discontinuous hydrogeologic units with high variability in permeability; includes low permeability units Hydrology • direct GW source is valley sides and springs • artesian conditions common Stream Connections • gaining overall • incision has affected riparian GW and vegetation patterns		
F. Complex, Degraded by Stream Hydrogeologic Setting • upstream of alluvial fan • heterogeneous geologic units Hydrology • GW source mostly side-valley • few springs Stream Connections • gaining • incision has altered GW and vegetation patterns • GW support for most meadows on valley floor is lost		

Legend: Plant Communities and Water Features							
	Wet		Mesic Shrub		Dry Shrub		Willow
	Mesic		Dry		Rose Shrub		Aspen
	Upland Plants	◆	Spring		Stream	↘	stream flow

Form A.9.2–MEADOW VEGETATION DATA	Date: Observer:
Watershed Name:	Database Code:
UTM Zone:	Elevation (m):
UTMs: Northing	Easting
Location in Basin: Low / Mid / High	

Record the relative aerial cover of the meadow complex by meadow type (%):
Standing Water (SW) _____ Wet Meadow _____ Mesic Meadow _____ Dry Meadow _____
Shrub Meadow _____
The meadow types are described in table A.3.1, and their characteristic species are in table A.9.6.

Record the following data for each meadow type that occurs in the meadow complex:
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.9.5.
Record the Wetland Indicator Status (WIS), successional status (Succ), and bank stability (Stab) of each species: record values for each species from the meadow species list (A.9.6). Descriptions are in table A.9.5.
Nativity of the species: record as yes (Y) or no (N) as indicated in the meadow species list (A.9.6).

Record the following data for the meadow type summaries:
Cover: estimate and record average vegetation cover for the entire meadow type.
Vigor and Mortality: record value most indicative of response to disturbance for the meadow type as described in table A.9.5.
WIS, Succ, and Stab: record most common values for the meadow type.
Native: record total number of nonnative species for the meadow type.

Meadow Type	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
SW								
SW								
SW								
SW								
SW								
SW								
Standing Water Meadow Summary								
Wet								
Wet								
Wet								
Wet								
Wet								
Wet								
Wet Meadow Summary								

Form A.9.2–MEADOW VEGETATION DATA			Date:		Observer:			
Watershed Name:			Database Code:					
UTM Zone:			Elevation (m):					
UTMs: Northing			Easting					
Location in Basin: Low / Mid / High								
Meadow Type	**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**
Mesic								
Mesic								
Mesic								
Mesic								
Mesic								
Mesic								
Mesic Meadow Summary								
Dry								
Dry								
Dry								
Dry								
Dry								
Dry								
Dry Meadow Summary								
Shrub								
Shrub								
Shrub								
Shrub								
Shrub								
Shrub								
Shrub Meadow Summary								
Record the following data for the meadow summary: **Cover:** estimate and record the average graminoid and forb vegetation cover for the entire meadow. **Vigor and mortality:** record the value that is most indicative of the meadow response to disturbance as described in table A.9.5. **WIS, Succ, and Stab:** record value most indicative of reach disturbance response as described in table A.9.5. **Native:** record total number of nonnative species for the entire meadow.								
Meadow Summary Values								
Indicator Species:								
Notes:								

Table A.9.3—Descriptions of the variables used to assess the meadow vegetation in the field.

- **Aerial Cover of Each Meadow Type (%):** The meadow types are described in table A.3.1, and their dominant indicator species are in table A.9.6. The percentage cover of each meadow type is estimated in the field or from aerial imagery. This estimate can be made from the drawing of the meadow on form A.9.1.
- **Dominant indicator Species:** The indicator species for each meadow type are listed in table A.9.6. Meadow indicator species provide information on water availability for a particular meadow type, where water availability is determined primarily by depth to the water table. For each meadow type, record the native meadow species that indicate water availability over the duration of the growing season. No additional information is needed for the meadow type summary. For the overall meadow summary, record the species that are most indicative of the meadow's 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 meadow vegetation provides information on response to disturbance. For each meadow type, record the average aerial cover (%) for each dominant indicator species as < 1 (trace); 1-5; 5-25; 25-50; 50-75; 75-100. For the meadow type summary, estimate and record the average cover for the meadow vegetation type as a whole. For the meadow summary, estimate and record the total vegetation cover for the entire meadow.
- **Vegetation Vigor:** Provides information on potential 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, low production (leaf area or leader growth), or signs of stress, such as chlorosis or yellowing. For each meadow type, 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 meadow type summaries and the overall meadow summary, record the value that is most indicative of the meadow's 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 meadow type, 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 meadow type summaries and the overall meadow summary, record the value that is most indicative of the meadow's response to disturbance. Note the apparent cause of any increases 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 meadow species are in the table A.9.6. WIS provides general insights into flow regimes, groundwater dynamics, and the responses of the vegetation within the meadow. For each meadow type, record the WIS value of each dominant indicator species from table A.9.6. For the meadow type summaries, record the most common values for the type. For the overall meadow summary, record wetland indicator status as high (wetland obligate, facultative wetland, and facultative upland species

are found in appropriate locations and numbers within the medow), 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 meadow species are in the table A.9.6. Successional status ratings for individual plants provide information on the riparian ecosystems past and present responses to disturbance (table 4). Record the successional status value for each dominant indicator species from table A.9.6. For the meadow type summaries, record the most common value for the type. For the overall meadow 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 late seral species and 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 meadow species are in table A.9.6. 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 meadow vegetation contributes to overall stability. Record the bank stability rating for each dominant indicator species from table A.9.6. For the meadow type summaries, record the most common value for the type. For the overall meadow 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 the 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 overall meadow summary, record the total number of nonnative species for the entire meadow.

Table A.9.4–The dominant plant species in Great Basin meadow complexes. The information in this table is used to complete the meadow vegetation data form (A.9.4). The plant species are grouped by meadow type. Included for the species in each meadow type are the scientific name, symbol, and common name (USDA 2020) of the dominant meadow 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 Rating (Stab)
Standing Water Meadow (Depth to water table — +10 to 0 cm)					
Grasslike					
Carex aquatilis	CAAQ	water sedge	OBL	L	H
Carex utriculata	CAUT	Northwest Territory sedge	OBL	L	H
Scirpus microcarpus	SCMI2	panicled bulrush	OBL	L	H
Associated Shrubs					
Salix geyeriana	SAGE2	Geyer willow	OBL	L	H
Salix wolfii	SAWO	Wolf's willow	OBL	L	H
Forbs					
Mimulus guttatus	MIGU	seep monkeyflower	OBL	M	L
Nasturtium officinale	NAOF	water cress	OBL	M	L
Veronica americana	VEAM2	American speedwell	OBL	M	L
Disturbance Indicators					
Eleocharis quinqueflora	ELQU2	few flower spikerush		E	L
Senecio hydrophilus	SEHY2	water ragwort	OBL	E	L
Wet Meadow (Depth to water table — 0 to 30 cm)					
Grasslike					
Carex nebrascensis	CANE2	Nebraska sedge	OBL	L	H
Carex praegracilis	CAPR5	clustered field sedge	FACW	L	H
Carex scopulorum	CASC12	mountain sedge	FACW	L	H
Carex utriculata	CAUT	Northwest Territory sedge	OBL	L	H
Juncus longistylis	JULO	Longstyle rush	FACW	L	M
Juncus nevadensis	JUNE	Sierra rush	FACW	L	M
Grasses					

Deschampsia elongata	DEEL	Slender hairgrass	FACW	L	L
Glyceria striata	GLST	fowl mannagrass	OBL	L	M
Forbs					
Caltha leptosepala	CALE4	white marsh marigold	OBL	M	M
Epilobium ciliatum	EPCI	fringed willowherb	FACW	M	L
Mimulus guttatus	MIGU	seep monkeyflower	OBL	M	L
Mimulus primuloides	MIPR	primrose monkeyflower	FACW	M	L
Veronica americana	VEAM2	American speedwell	OBL	M	M
Associated Shrubs					
Salix boothii	SABO2	Booth's willow	FACW	L	H
Salix exigua	SAEX	narrowleaf willow	FACW	L	H
Salix geyeriana	SAGE2	Geyer willow	OBL	L	H
Salix lasiolepis	SALA6	arroyo willow	FACW	L	H
Salix lemmonii	SALE	Lemmon's willow	FACW	L	H
Salix lutea	SALU2	yellow willow	OBL	L	H
Disturbance Indicators					
Agrostis stolonifera	AGST2	creeping bentgrass	FACW	E	L
Alopecurus spp.	ALOPE	foxtail		E	L
Geum macrophyllum	GEMA4	largeleaf avens	FACW	E	L
Equisetum spp.	EQUIS	horsetail		E	M
Juncus ensifolius	JUEN	swordleaf rush	FACW	E	L
Thermopsis spp.	THERM	goldenbanner		E	L
Mesic Meadow (Depth to water table – 30 to 90 cm)					
Grasslike					
Carex athrostachya	CAAT3	slenderbeak sedge	FACW	L	M
Carex microptera	CAMI7	smallwing sedge	FAC	M	M
Carex praegracilis	CAPR5	clustered field sedge	FACW	L	H
Juncus arcticus ssp. *littoralis*	JUARL	mountain rush (Baltic Rush)		L	H
Grasses					
Elymus trachycaulus	ELTR7	slender wheatgrass	FACU	E	L
Deschampsia cespitosa	DECE	tufted hairgrass		M	L
Poa pratensis	POPR	Kentucky bluegrass	FAC	E	L
Poa secunda ssp. *juncifolia*	PONE3	Nevada blue grass		E	L
Forbs					
Achillea millefolium	ACMI2	common yarrow		E	L
Potentilla gracilis	POGR9	slender cinquefoil	FAC	E	L
Stellaria longipes	STLO2	longstalk starwort	FACW	M	M
Symphyotrichum spathulatum var. *spathulatum*	SYSPS	western mountain aster		E	L

Trifolium monanthum	TRMO2	mountain carpet clover	FAC		
Trifolium wormskioldii	TRWO	cows clover	FACW	M	L
Associated Shrubs					
Ribes aureum	RIAU	golden currant	FAC	E	M
Ribes inerme	RIIN2	whitestem gooseberry	FAC	E	M
Salix boothii	SABO2	Booth's willow	FACW	L	H
Salix exigua	SAEX	narrowleaf willow	FACW	L	H
Salix geyeriana	SAGE2	Geyer willow	OBL	L	H
Salix lasiolepis	SALA6	arroyo willow	FACW	L	H
Salix lucida	SALU	Shining willow	OBL	L	H
Salix lutea	SALU2	yellow willow	OBL	L	H
Disturbance Indicators					
Agrostis stolonifera	AGST2	creeping bentgrass		E	L
Alopecurus spp.	ALOPE	foxtail		E	L
Carduus nutans	CANU4	nodding plumeless thistle	FACU	E	L
Bromus inermis	BRNI2	smooth brome	FACU	E	L
Cirsium arvense	CIAR4	Canada thistle	FACU	E	L
Erigeron divergens	ERDI4	spreading fleabane		E	L
Hordeum brachyantherum	HOBR2	meadow barley	FACW	E	L
Iris missouriensis	IRMI	Rocky Mountain iris	FACW	M	M
Poa bulbosa	POBU	Bulbous bluegrass	FACW	E	L
Rosa woodsii	ROWO	Woods' rose	FACU	E	M
Juncus arcticus ssp. *littoralis*	JUARL	mountain rush (Baltic Rush)		L	H
Rumex spp.	RUMEX	dock		E	L
Taraxacum officinale	TAOF	common dandelion	FACU	E	L
Urtica dioica	URDI	stinging nettle	FAC	E	L
Viola nephrophylla	VINE	northern bog violet	FACW	M	L
Dry Meadow (Depth to water table – 90 to 170 cm)					
Grasslike					
Carex douglasii	CADO2	Douglas' sedge	FAC	M	L
Grasses					
Leymus triticoides	LETR5	beardless wildrye	FAC	E	L
Muhlenbergia richardsonis	MURI	mat muhly	FAC	L	H
Pascopyrum smithii	PASM	western wheatgrass	FAC	M	M
Poa secunda ssp. *juncifolia*	PONE3	Nevada blue grass		E	L
Forbs					
Achillea millefolium	ACMI2	common yarrow		E	L

Erigeron divergens	ERDI4	spreading fleabane		E	L
Penstemon rydbergii	PERY	Rydberg's penstemon	FACU	M	L
Associated Shrubs					
Ribes aureum	RIAU	golden currant	FAC	E	M
Disturbance Indicators					
Bromus inermis	BRNI2	smooth brome	FACU	E	L
*Bromus tectorum**	BRTE	cheatgrass		E	L
*Cardaria draba**	CADR	whitetop		E	M
Carduus nutans	CANU4	nodding plumeless thistle	FACU	E	L
Cirsium arvense	CIAR4	Canada thistle	FACU	E	L
Cirsium scariosum	CISC2	meadow thistle	FAC	E	L
Elymus lanceolatus	ELLA3	thickspike wheatgrass	UPL	E	L
Poa bulbosa	POBU	Bulbous bluegrass	FACW	E	L
Iris missouriensis	IRMI	Rocky Mountain iris	FACW	M	M
*Iva axillaris**	IVAX	povertyweed	FAC	E	L
*Lepidium latifolium**	LELA2	broadleaved pepperweed	FAC	E	M
Taraxacum officinale	TAOF	common dandelion	FACU	E	L
Rosa woodsii	ROWO	Woods' rose	FACU	E	M
Urtica dioica	URDI	stinging nettle	FAC	E	L

Shrub Meadow (Depth to water table – 125 to 275 cm)					
Grasslike					
Carex douglasii	CADO2	Douglas' sedge	FAC	M	L
Juncus arcticus ssp. *littoralis*	JUARL	mountain rush (Baltic Rush)		L	H
Grasses					
Elymus lanceolatus	ELLA3	thickspike wheatgrass	UPL	E	L
Leymus cinereus	LECI4	basin wildrye	FAC	M	M
Leymus triticoides	LETR5	beardless wildrye	FAC	E	L
Muhlenbergia richardsonis	MURI	mat muhly	FAC	L	H
Pascopyrum smithii	PASM	western wheatgrass	FAC	M	M
Poa pratensis	POPR	Kentucky bluegrass	FAC	E	L
Poa secunda	POSE	Sandberg bluegrass	FACU	E	L
*Thinopyrum intermedium**	THIN6	intermediate wheatgrass		M	L
Forbs					
Achillea millefolium	ACMI2	common yarrow		E	L
Allium bisceptrum	ALBI2	twincrest onion		M	L
Astragalus lentiginosus	ASLE8	freckled milkvetch	UPL		
Cryptantha flavoculata	CRFL6	roughseed cryptantha		M	L

Erigeron divergens	ERDI4	spreading fleabane		E	L
Lupinus argenteus	LUAR3	silvery lupine		M	L
Penstemon rydbergii	PERY	Rydberg's penstemon	FACU	M	L
Associated Shrubs					
Artemisia tridentata ssp. *tridentata*	ARTRT	basin big sagebrush		E	L
Artemisia tridentata ssp. *vaseyana*	ARTRV	mountain big sagebrush		E	L
Chrysothamnus viscidiflorus	CHVI8	yellow rabbitbrush		E	L
Ribes aureum	RIAU	golden currant	FAC	E	M
Symphoricarpos oreophilus	SYOR2	mountain snowberry		M	M
Disturbance Indicators					
*Bromus tectorum**	BRTE	cheatgrass		E	L
*Cardaria draba**	CADR	whitetop		E	M
Carduus nutans	CANU4	nodding plumeless thistle	FACU	E	L
Cirsium arvense	CIAR4	Canada thistle	FACU	E	L
Poa bulbosa	POBU	Bulbous bluegrass	FACW	E	L
Iris missouriensis	IRMI	Rocky Mountain iris	FACW	M	M
Ericameria nauseosa	ERNA10	rubber rabbitbrush		E	L
*Iva axillaris**	IVAX	poverty weed	FAC	E	L
Taraxacum officinale	TAOF	common dandelion	FACU	E	L
Rosa woodsii	ROWO	Woods' rose	FACU	E	M
Urtica dioica	URDI	stinging nettle	FAC	E	L

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