Issues with riparian ecological site descriptions

Synthesis comments prepared by:

Brandon Bestelmeyer, Tamzen Stringham, Sherm Swanson, and Homer Sanchez

Based on discussions/presentations at the workshop

Proposals

1) Riparian ESD concepts

a. Rosgen valley and stream type (including substrate type), in combination with climate/elevation characteristics within an MLRA, provide the foundation for establishing site potential of the riparian complex including the meadow.

b. ESD unit delineation is defined longitudinally by changes in valley type and laterally by transition to pre-Holocene upland soils or abandoned floodplains (e.g., no recent evidence of riparian/wetland soil processes, although redoximorphic features may persist long after natural shifts from riparian to upland have occurred).

c. Channel morphology and adjacent stream dependent meadows are linked by hydrological processes and so change as a strongly coupled unit from potential in many cases, and so should be treated as single site. In other cases meadows are not hydrologically dependent on the stream channel and can be treated as distinct associated sites. Degradation may decouple channel from meadow dynamics, but restoration or aggradation can re-couple them.

d. A stable riparian complex features several communities that exist simultaneously with more-or-less stable proportions and dynamic spatial organization at potential and in alternative states, so we need to characterize the complex within each phase and state (complex components are not phases or states).

Proposals

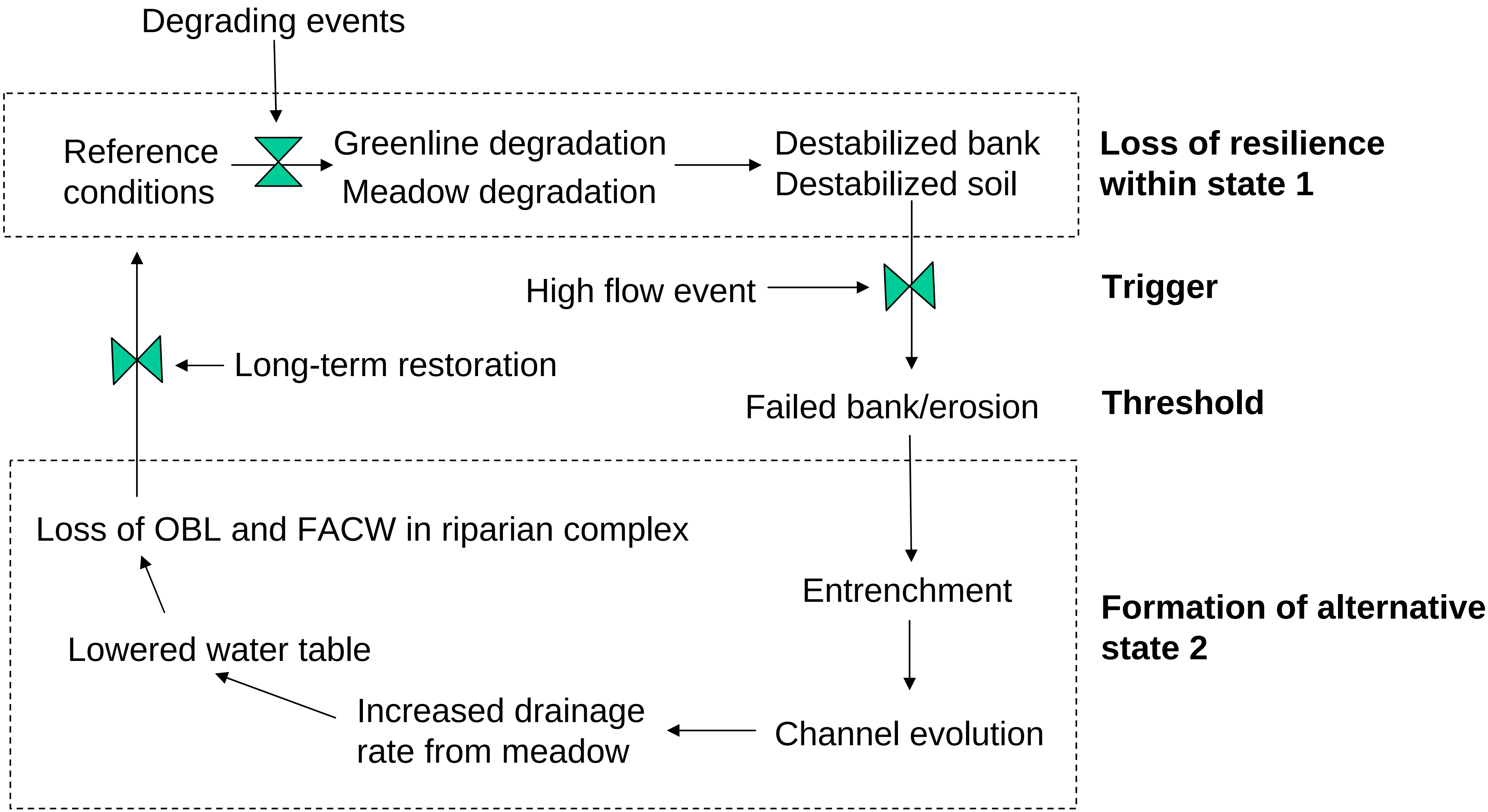
2) How to design state-and-transition models (STMs)?

a. start with a general ecosystem model describing channel-meadow relationships, incorporating Schumm channel evolution model (CEM) and Rosgen models for limited number of types that may vary in channel-meadow coupling and dominant process sequences (e.g., Rosgen types A vs. C and E).

b. describe how resilience is lost, triggers, thresholds, and formation of alternative state for each model: some Rosgen types are inherently resilient, others rapidly form alternative states.

c. in CEM, Rosgen channel type may recover without active restoration, but adjacent meadow exists in alternative state due to decreased water table, so coupled system exists in alternative state (the distinguishing state characteristic would be meadow condition, terrace profiles, and water table depths, magnitude of the accessible floodplain, storage capacity of the alluvial aquifer, etc. rather than channel morphology)

Example: a draft general riparian channel-meadow model



A set of general models can be adapted to MLRA-specific STMs by including species and STM formatting

Proposals

3. S&T model proposals

a. The state = a series of varying riparian complex types that can shift from one to the other without intensive restoration or channel morphologies that have not crossed a threshold of incision and can therefore recover without intensive restoration. An alternative state develops after incision (a threshold) and includes a set of stream types as per a CEM. An alternative state may involve a variable set of community types on the different fluvial surfaces.

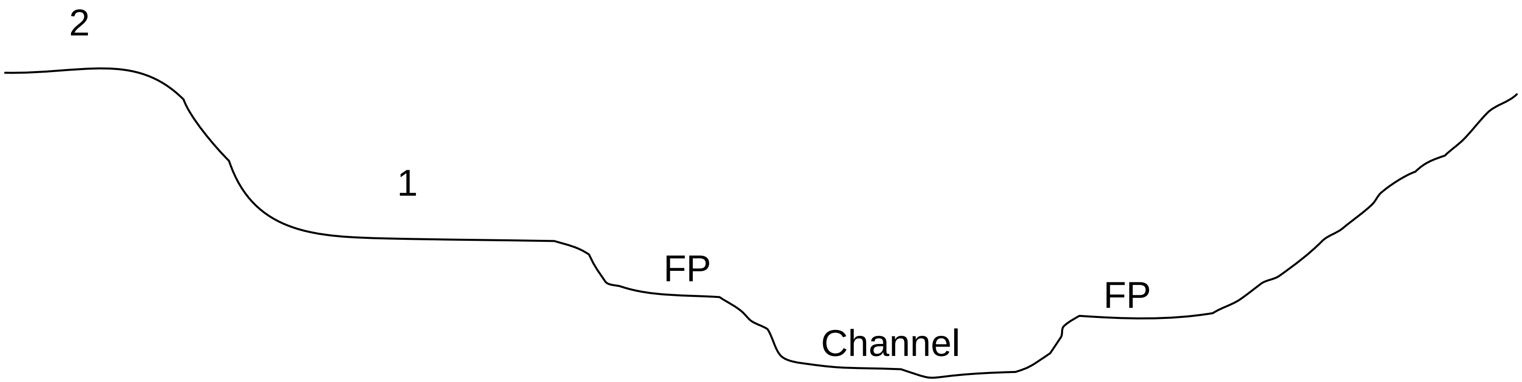
The “community phase” = a riparian complex type with specific community proportions, channel morphologies, etc. Note that bank-height ratio is an excellent tool for gauging the level of risk in a transitional phase in certain valley types.

b. Riparian cross-section diagram as new part of model narrative that describes spatial relationships of vegetation, water table, and channel. Also need to represent longitudinal spatial organization (i.e., channel pattern or planform).

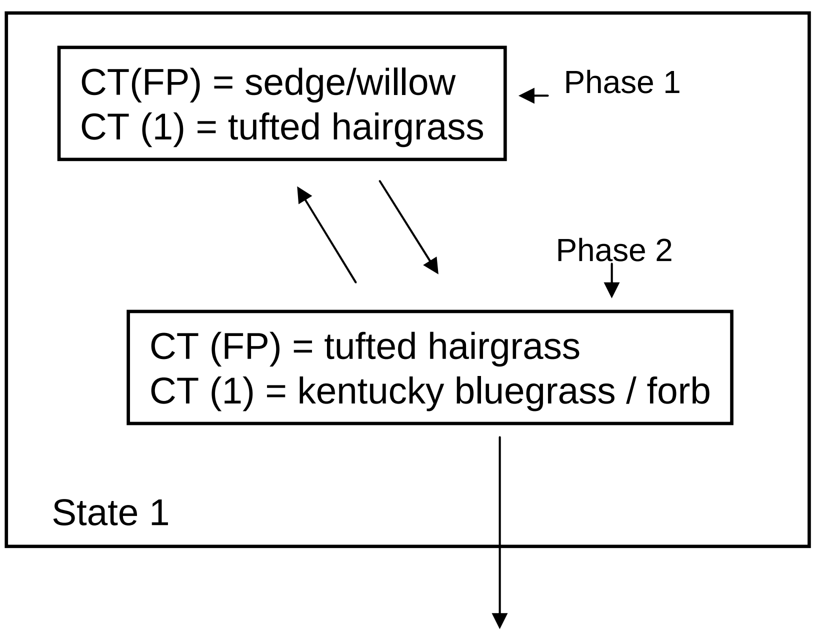
c. Impacts on channel are usually correlated with direct impacts on meadow, can be treated in same state.

d. Short-term restoration can fix a channel, but maybe not the floodplain meadow. This partial restoration would therefore not recover the reference state, but may precede it.

Example: state-and-transition model components (state 1 part)



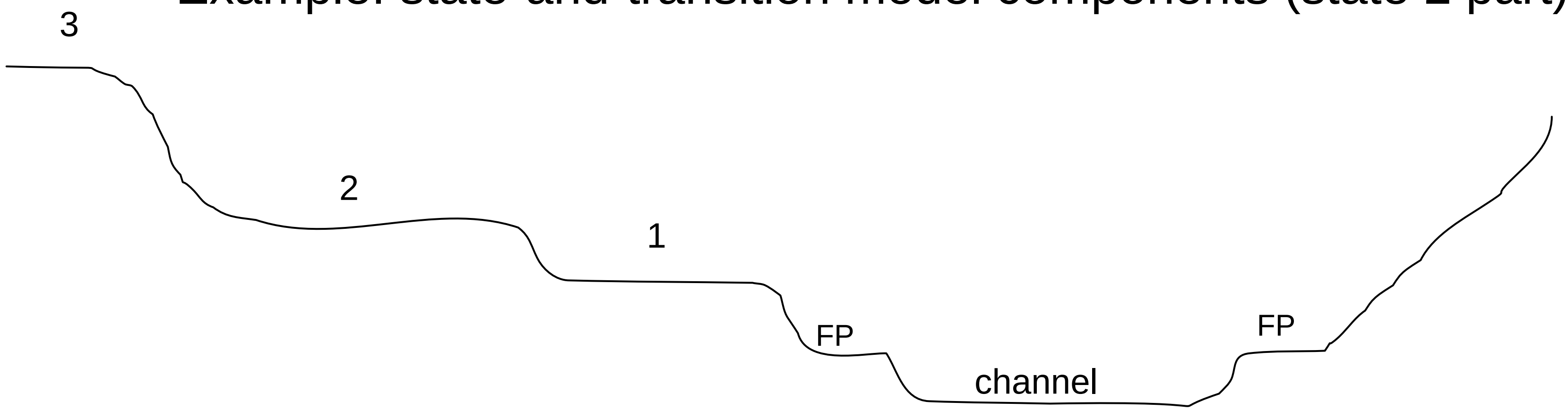
Landform associated with State 1: FP=active floodplain; 1 = tufted hairgrass meadow; 2 = pleistocene terrace



CT = community types found within the riparian complex that includes both the active floodplain and the associated meadow

Phases potentially contain multiple CT's. The shift from phase 1 to phase 2 is a caused by a slight incision and/or widening of the channel bed causing a slight lowering of the water table and a shift in species Composition (OBL's to FACW to FAC). Phase 2 is the at-risk phase due to the lack of bank holding plants such as sedges and willows. Proper management of the floodplain area will promote channel narrowing and potentially bed aggradation through sediment trapping by riparian plants.

Example: state-and-transition model components (state 2 part)



Landform associated with State 2: FP = active floodplain; 1 = kentucky bluegrass meadow; 2 = western wheatgrass meadow; 3 = pleistocene terrace. Channel incision and stabilization has occurred creating a new terrace and disconnecting the meadow from channel processes (flooding and meadow recharge).

CT(FP) = tufted hairgrass /sedges

CT(1) = kentucky bluegrass

CT(2) = western wheatgrass

← Phase 1: F-type channel

CT(FP) = sedges / willow / hairgrass

CT(1) = kentucky bluegrass

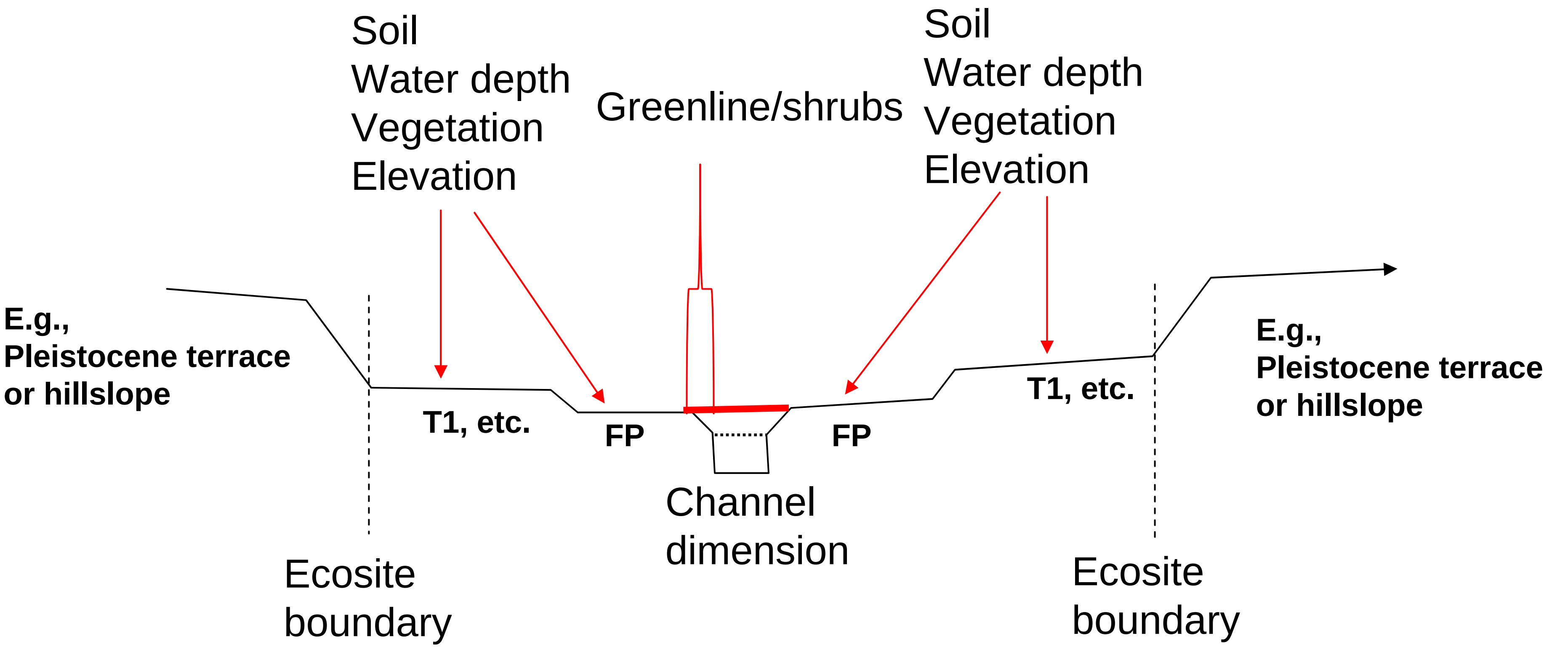
CT(2) = western wheatgrass

State 2

Channel incised and widened from
State 1: Rosgen type C to G to F.
State 2: Phase 1reflects a stabilizing F with
the associated decoupled meadow (terrace1).

Phase 2 reflects the current stable analog
of a Rosgen type C (C to G to F to C) channel.
With proper management of the FP community
the F channel narrowed and stabilized to the
stable C channel. The riparian meadow present
In state 1 has crossed a threshold to a drier
CT and cannot repair with a change in grazing
management alone.

Proposed ESD field measurements



Qualitative or quantitative-derived class measurements

Valley type/stream substrate

Channel evolution model

Rosgen classification