BONAPARTE CREEK RELOCATION:
NATURAL STABILIZATION AND CHANNEL EVOLUTION
River mile 16; Watershed area = 57 sq. mi.

Old channel length ~ 3,700 ft
New floodplain length ~ 4,300 ft
New channel length ~ 5,400 ft

Mt McCoy~16,000 c.y.
COOPERATORS:

- Colville Confederated Tribes (Project Management)
- [Washington Department of Fish & Wildlife (Design & Implementation Oversight)]
- Okanogan Conservation District (Revegetation)
- Washington Department of Transportation (Survey & Mapping)
- Washington Department of Ecology (Funding)
- David & Melinda Gladstone (Property owners)
PROJECT OBJECTIVES

1. Establish initial conditions supporting evolution toward dynamic equilibrium.

“fostering natural physical processes”? 
2. Rely entirely on natural stability - no large rock or engineered structures.

Rocked bank line (burlap-wrapped)
PROJECT OBJECTIVES

3. Minimize costs, consistent with other objectives
PROJECT COSTS

Project administration, design & oversight: $25,000 (13%)

Construction: $90,000 (48%)

Revegetation grant: $73,000 (39%)

TOTAL: $188,000*

*Not included: site survey & backfilling old channel
DESIGN APPROACH
‘Late successional’ (mature meander)
‘Early successional’ (post-avulsion)
DESIGN CONSIDERATIONS

- Slightly undersized channel
- Moderate sinuosity
- Sediment continuity
- Floodplain capacity
- Minimum excavation cost
DESIGN OUTCOME: 3 Sub-Reaches

Slope
0.33% - 0.5%

Bankfull width
10 - 11 ft

Bankfull depth
1 - 1.25 ft

Sinuosity
1.2 - 1.4

Meander wavelength
59 - 64 ft

Meander amplitude
10 - 18 ft

Floodplain width
36 - 40 ft
CONSTRUCTION

1. Excavate floodplain to design elevation
2. Stake channel alignment, varying (slightly) at whim from design planform
3. Excavate channel 1 ft below design elevation
4. Install 1 ft of streambed material
Revegetation & woody debris
Spring, 2011
Revegetate, WAIT, & maintain your vegetation
A Modest Innovation
ADDING WATER at low flow,
December 2011
WSDOT FILLS OLD CHANNEL
April 2013
BED SURFACE TEXTURE

Increasing energy

deposition

reworking

winnowing

fines

gravel

cobble/gravel

small cobble

cobble

large cobble