Upper Tellico River OHV Area Trail Condition Assessment

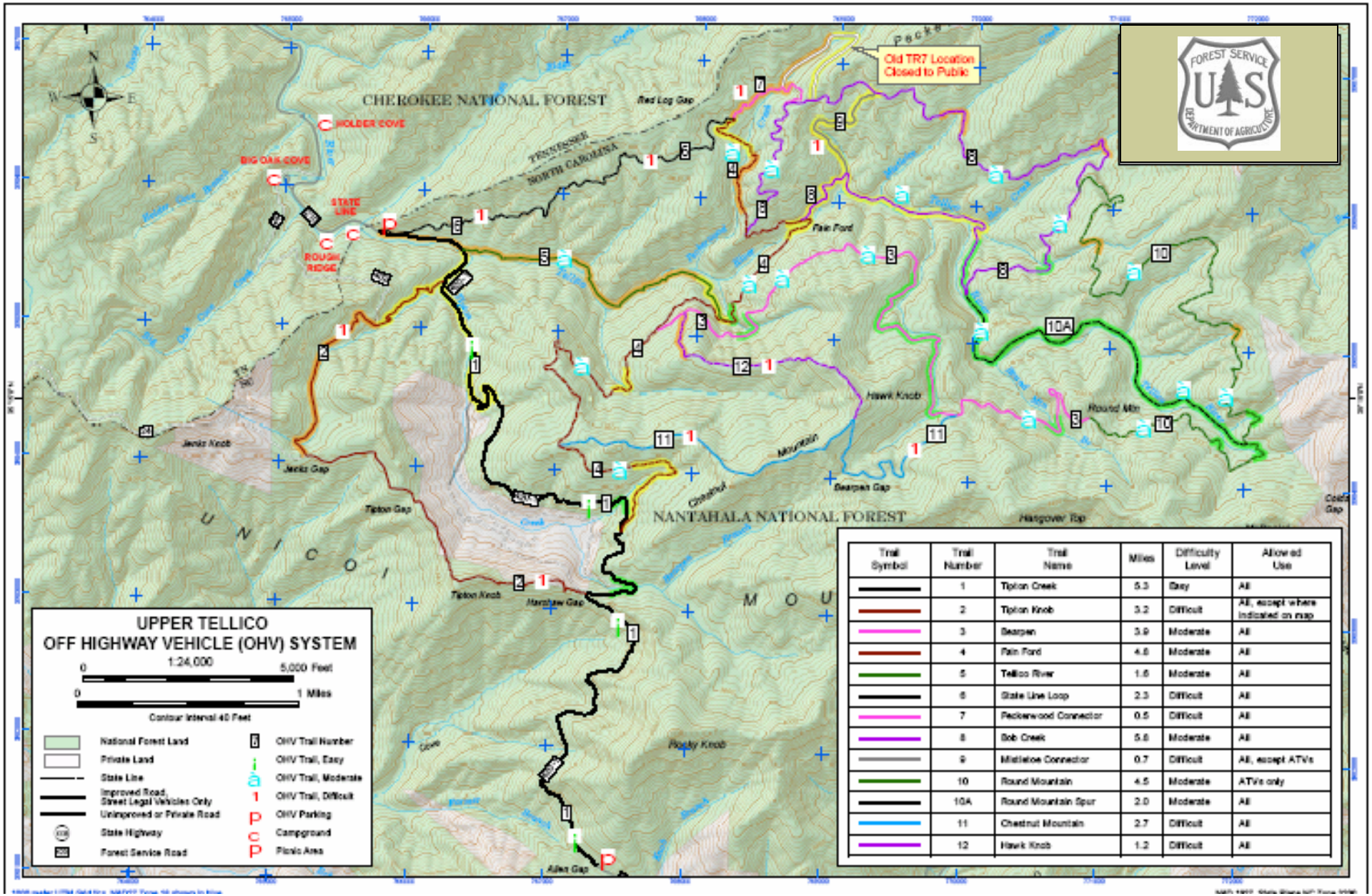
Objective:

Evaluate erosion and sediment yield from the entire trail system in the Upper Tellico OHV Area

Methodology:

- Trail condition and sediment transport assessment protocol were developed, field tested, and modified.
- A team of US Forest Service personnel and volunteers was assembled, representing engineering, fisheries, hydrology, soils, GPS, and other experience.
- Summarize data in tabular form.

Trail Locations



Trail Symbol	Trail Number	Trail Name	Miles	Difficulty Level	Allowed Use
	1	Tipton Creek	5.3	Easy	All
	2	Tipton Knob	3.2	Difficult	All, except where indicated on map
	3	Bearpen	3.9	Moderate	All
	4	Pain Ford	4.6	Moderate	All
	5	Tellico River	1.6	Moderate	All
	6	State Line Loop	2.3	Difficult	All
	7	Pickerwood Connector	0.5	Difficult	All
	8	Bob Creek	5.6	Moderate	All
	9	Mistletoe Connector	0.7	Difficult	All, except ATVs
	10	Round Mountain	4.5	Moderate	ATVs only
	10A	Round Mountain Spur	2.0	Moderate	All
	11	Chestnut Mountain	2.7	Difficult	All
	12	Hawk Knob	1.2	Difficult	All

Assessment Protocol – Field Measurements

- Trail Condition Assessment
  Data Collected:
  - Trail template & Surface type
  - Presence of rutting
  - Trail gradient, length, & width
  - Fill gradient & length
  - Trail drainage feature & functionality
  - Change in trail volume post construction
- Sediment Transport Assessment
  Data Collected:
  - Distance from trail to stream channel (buffer length)
  - Distance sediment is traveling from trail
  - Buffer gradient
  - Stream flow type (perennial, intermittent, or ephemeral)
  - Note of any depositional feature in the stream
  - Potential for sediment entering the stream channel
  - Note of trail runoff contributing to slope or channel instability

Results:

Trail Condition Assessment:

Trail Number	Miles Surveyed	Road Template	Road Surface Type	Drainage Dips	% Non Functioning Drainage Dips*
1	3.61	Outsloped	Aggregate Surface	49	14
2	3.17	Outsloped/Entrenched	Native Surface	110	71
3	4.15	Outsloped/Entrenched	Native Surface	223	75
4	4.97	Outsloped/Entrenched	Native Surface	358	34
5	1.51	Outsloped/Entrenched	Agg. & Riprap Surface	67	36
6	2.25	Outsloped/Entrenched	Native Surface	143	61
7	0.59	Entrenched	Native Surface	23	22
8	5.97	Outsloped/Entrenched	Native Surface	242	49
9	0.73	Entrenched	Native Surface	36	33
10	4.79	Outsloped/Entrenched	Native Surface	43	100
10a	2.74	Outsloped/Entrenched	Native Surface	123	38
11	2.74	Outsloped/Entrenched	Native Surface	86	77
12	1.27	Outsloped/Entrenched	Native Surface	46	85
Total:	38.49			1,549	53

* Dips functioning at less than 100 percent efficiency.

Estimated Cumulative Soil Loss from Trails since Construction

(change in volume from constructed road prism (outsloped, not entrenched) to current condition)

Trail #	Miles Surveyed	Soil Loss Entrenched Sections (tons/mile)	Soil Loss Entrenched Sections (tons)
1	3.61	0	0
2	3.17	2,030	6,431
3	4.15	596	2,473
4	4.97	622	3,090
5	1.51	1,539	2,317
6	2.25	9,051	20,386
7	0.59	4,113	2,426
8	5.97	1,185	7,081
9	0.73	8,487	6,173
10	4.79	1,186	5,676
10a	2.74	692	1,894
11	2.74	2,531	6,925
12	1.27	7,615	9,677
Total:	38.48	1,938	74,550

Results (continued):

Sediment Transport Assessment:

Sediment Travel Distances & Potential for Sediment Delivery to Stream

Trail #	# Sites Surveyed	Sediment Travel Distance (ft) max	mean	Potential for Sediment Delivery to Stream* # high	*% high*	# med	*% med*	# low	*% low*
1	114	252	37	48	*42*	30	*26*	36	*32*
2	120	284	31	20	*17*	21	*18*	79	*66*
3	238	310	41	93	*39*	49	*21*	96	*40*
4	334	300	52	122	*37*	55	*16*	157	*47*
5	81	121	45	45	*56*	17	*21*	19	*23*
6	160	315	46	26	*16*	12	*8*	122	*76*
7	34	186	56	18	*53*	9	*26*	7	*21*
8	327	375	36	111	*34*	59	*18*	157	*48*
9	47	337	48	22	*47*	11	*23*	14	*30*
10	185	270	31	75	*41*	21	*11*	89	*48*
10a	146	185	48	51	*35*	52	*36*	42	*29*
11	110	261	62	34	*31*	5	*5*	71	*65*
12	61	>500	92	19	*31*	0	*0*	42	*69*

* Surveyor's estimate of the likelihood of sediment traveling to the nearby stream.

Sediment Transport Assessment:

Sediment to Streams & Channel and Slope Instability

Trail #	# Sites Surveyed	% of sites within 100' of stream	Sediment Entering Stream		Channel or Slope Instability*	
			# sites	*% sites*	# yes	*% yes*
1	114	60	48	*42*	36	*32*
2	120	26	15	*12*	9	*8*
3	238	59	102	*43*	17	*7*
4	334	39	129	*39*	58	*17*
5	81	79	51	*63*	20	*25*
6	160	18	19	*12*	19	*12*
7	34	56	23	*68*	8	*24*
8	327	47	101	*31*	46	*14*
9	47	68	26	*62*	12	*26*
10	185	50	68	*37*	41	*22*
10a	146	57	53	*36*	34	*23*
11	110	24	30	*27*	2	*2*
12	61	2	1	*2*	0	*0*

* Often the result of increased water yield from trail surface.

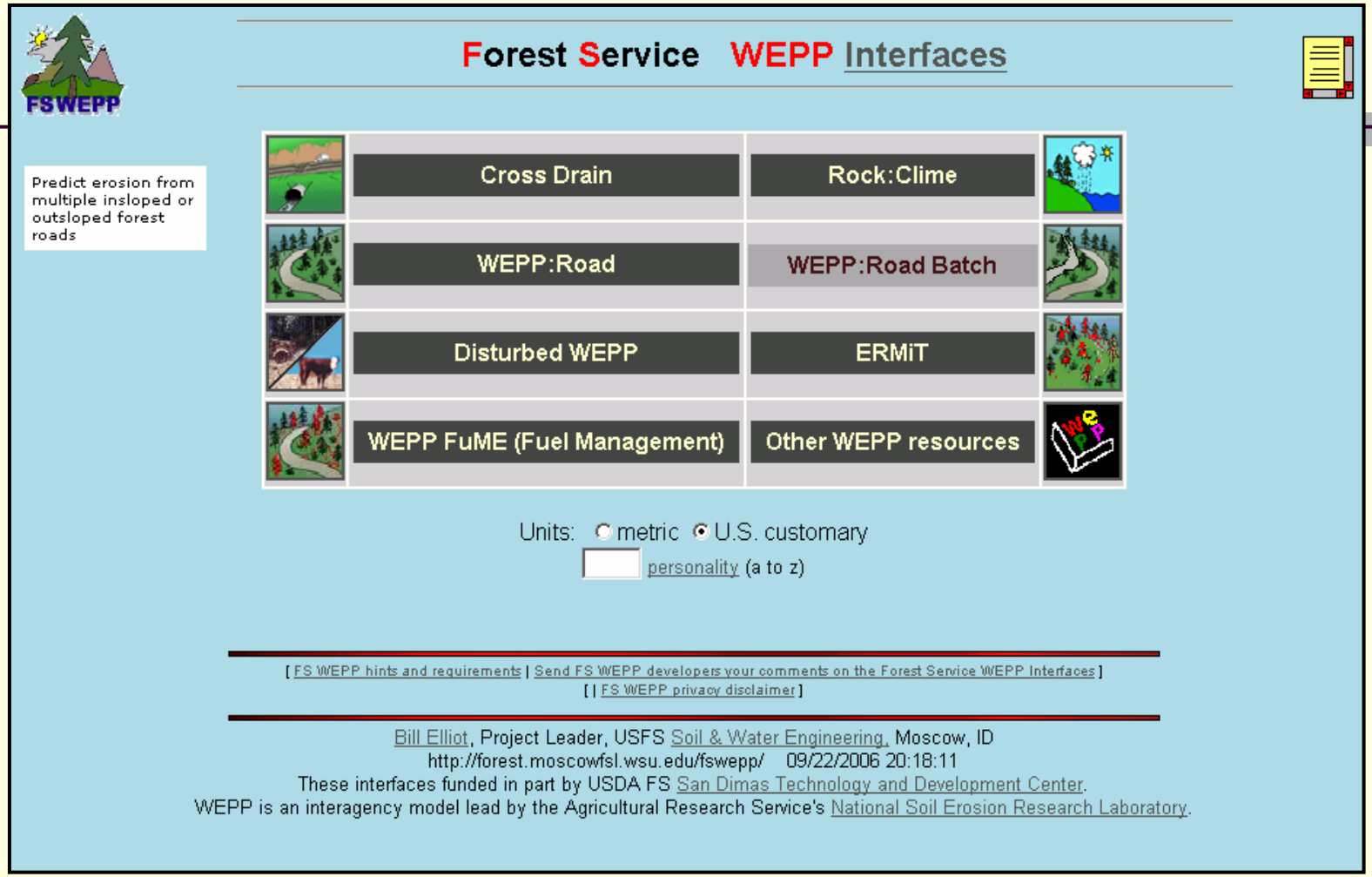
Findings:

- Estimated soil loss from trails since construction is extensive (>2,000 tons) in all trails except trails 420-1 and 10a.
- Many sites (45%) are within 100 ft of a stream channel. Trails 1, 3, 5, 7, 9, 10, & 10a have $\geq$ 50% of runoff sites within 100'.
- The greatest number of sites delivering sediment to streams is occurring on Trails 3, 4, & 8.
- From Trail 4, more than 50% of the 334 sites are contributing to channel or slope instability.
- Most trails have failing drainage structures requiring maintenance.

Findings (continued):

- Sediment from trail erosion entering stream channels is a function of trail proximity to stream, trail gradient, & the frequency & functionality of trail runoff drainage structures, e.g., drainage dips and silt traps.
- Silt traps were effective at reducing sediment only when associated dips were functioning, they were properly sized, they were maintained, a sufficient buffer between trail and stream was available, and removed sediment was placed in a stable area.
- Three bridges were found deficient and needing repair/replacement.

Future Assessment Protocol – WEPP computer model



FS WEPP is a set of interfaces designed to allow users to quickly evaluate erosion and sediment delivery potential from forest roads. The erosion rates and sediment delivery are predicted by the Water Erosion Prediction Project (WEPP) model, using input values for forest conditions. The WEPP model will be used in the analysis of management alternatives during the NEPA process.

Questions?