Fish Passage at Road Crossings Assessment

Winema National Forest
FY2001

By
Tom Gorman
Terry Smith

Fy2001 Culvert Inventory Summary
Winema National Forest

Introduction: The Fish Passage at Road Crossings Assessment Project for FY2001 on the Winema National Forest evaluated 39 culverts at 28 locations on fish bearing streams (Tables 1 and 2). Some locations had multiple culverts at one crossing. All culverts on roads that are maintained either directly or through cost share on the Winema National Forest on fish bearing streams were inventoried. Crossings on private property or County, State and Federal Highways were not evaluated, however, these "other crossings" that may affect fish passage are tabulated in Table 1. Trail crossings were not evaluated. Fish bearing streams that have no crossings on National Forest are not included in this inventory.

Table 1. Inventoried crossings on fish bearing streams on the Winema National Forest

Stream	# Culvert Locations Inventoried	# Bridges	# Fords	Other Crossings
Annie Creek		1		3
Billie Creek	2			2
Cherry Creek		1		1
Clover Creek			2	3
Deep Creek	1			1
Deep Creek ditch	1			
Fourmile Creek		1	1	2
Gideon Creek	1			
Hog Creek	1			
Irving Creek	1			1
Jack Creek	3	2		1
Jackson Creek	1		1	
Jackson Creek ditch	1			
Miller Creek	3			
Rainbow Creek	1			1
Rock Creek/Klamath RD		1		1
Rock Creek/Dams Mdw			3	
Rock Creek north fork			1	
Scott Creek	1			1
Seldom Creek	1			3
Sevenmile Creek		1		3
Sink Creek	2			
Spencer Creek	1		1	4
Threemile Creek	3	1		1
Trout Creek middle fork	1			
Trout Creek north fork	1			
Trout Creek south fork	1		1	
Varney Creek	1	2		1
Williamson River		3	1	7
Totals	28	13	11	36

Of the 39 individual culverts, 28 do not meet the criteria to pass fish (RED), 11 culverts rate as "GREY". The "GREY" culverts require additional evaluation to determine fish passage. None of the culverts surveyed on the Winema National Forest rate as "GREEN" indicating that no culvert has conditions considered to be adequate for fish passage.

Table 2. Fish Passage Rating of inventoried culverts on Winema National Forest

Stream	Road #	# Pipes	Fish Passage Rating
Billie Creek	3661-060	1	GREY
	3633-000	1	RED
Deep Creek	4648-000	1	GREY
Deep Creek ditch	4648-000	2	RED
Gideon Creek	9772-000	1	RED
Hog Creek	4300-000	2	RED
Irving Creek	4900-000	1	RED
Jack Creek	9418-000	1	RED
	8821-000	3	RED
	8676-000	1	GREY
Jackson Creek	4900-000	2	RED/GREY
Jackson Creek ditch	4900-000	1	RED
Miller Creek	9771-620	1	GREY
	9772-000	1	GREY
	9770-000	2	RED
Rainbow Creek	3750-000	1	GREY
Scott Creek	2308-060	1	RED
Seldom Creek	3704-000	3	GREY
Sink Creek	9775-000	2	RED
	9777-000	3	RED
Spencer Creek	3809-000	1	RED
Threemile Creek	3449-000	1	RED
	3449-000	1	RED
	3413-110	1	RED
Trout Creek middle fork	2228-250	1	RED
Trout Creek north fork	5850-000	1	RED
Trout Creek south fork	2228-000	1	RED
Varney Creek	3610-000	1	GREY

Construction of Copco 1 Dam in 1918 on the Klamath River blocked upstream migration of salmon into the upper Klamath Basin. There are no longer any surviving populations of salmon above Iron Gate Dam which was built seven miles downstream of Copco 1 Dam in 1962. Currently, both migratory and resident populations of native redband trout reside in tributaries to the Klamath River, upper Klamath Lake and in the lake itself. Other fish endemic to the upper Klamath basin include bull trout, five species of suckers, speckled dace, four lamprey species, three sculpin species, and chub (ODFW 1997). Most, if not all, perennial streams have been stocked with exotic brook trout and brown trout, even if there were no naturally occurring populations of fish. Of the streams where culverts were inventoried, only five have native fish populations. All other streams inventoried are inhabited solely with introduced trout. Fish species and status on Winema National Forest streams with road crossings are displayed in Table 3. The five streams with native fish populations are highlighted.

Although this survey concentrated on documenting road crossings that restrict fish passage, it is important to understand that, at least in the upper Klamath basin, other factors are probably more limiting to fish passage. Most streams on the Winema National Forest have flows diverted to provide irrigation water within and out of the Klamath basin. These streams often no longer have connection to other streams or lakes except in extreme high flow events. Additionally, many are naturally isolated from other water due to geology, such as deep pumice deposits from the eruption of Mt. Mazama (Crater Lake) 9,000 years ago. Several streams are very closely tied to annual precipitation for duration and volume of flow. These streams maintain flows throughout the

summer one year, only to be dry by May the following year. The result of this is a system of tributaries that do not provide flow to their main stems, streams that may flow for miles only to become subsurface in the pumice before reaching another stream or lake, and streams that are reduced to short channels near spring sources during dry years. However, some passage barriers are desired. Culverts, other constructed barriers and natural barriers have prevented introduced fish from moving into water occupied by resident fish species.

Table 3. Fish species in streams with inventoried culverts on Winema National Forest land. Highlighted streams support native fish populations.

Fish Species	Status	Streams	Culvert Present?
Bull trout	threatened	**Threemile Creek**	YES
Redband trout	sensitive	*Cherry Creek*	
		Clover Creek	
		Rock Creek/Klamath	
		Rock Creek/Dams mdw	
		Sevenmile Creek	
		Spencer	YES
		Trout Creek	YES
		Williamson River	
Speckled Dace/ Lamprey		**Hog Creek**	YES
		Jack Creek	YES
Brook/Brown trout	introduced	*Annie Creek*	
		Billie Creek	YES
		Deep Creek	YES
		Deep Creek ditch	YES
		Fourmile Creek	
		Gideon Creek	YES
		Irving Creek	YES
		Jackson Creek	YES
		Jackson Creek ditch	YES
		Miller Creek	YES
		Rainbow Creek	YES
		Scott Creek	YES
		Seldom Creek	YES
		Sink Creek	YES
		Varney Creek	YES

Forest Priority Ranking of Assessment Site: The Winema National Forest is in the process of completing a Roads Analysis. A Key Issue is "Fish Passage and Road Crossings". As part of the Roads Analysis, event tables have been built to map fish species and distribution at the 6th Field Hydrologic Unit Code (HUC). Our initial GIS query for number of road crossings on fish bearing streams provided us with 109 crossing points. Reviewing these points on maps showed that several points were known bridges. We did not prioritize culverts to assess, but visited every crossing listed to verify what type and if it was truly a road crossing. We found that many of the displayed points were not actually crossings but places where the road comes close to the stream (i.e. water chance). At bridges and fords, we documented and photographed that crossing. Other crossing points were eliminated from the list because the road had been obliterated and no longer crossed the stream. All culverts encountered on fish bearing streams were evaluated. The GIS layer is

being updated to identify crossings by type so that future road crossing queries will be more accurate.

Results: We encountered only two culvert structure types, circular and squashed pipe arch. Table 4 displays culvert types and widths. Circular pipes are the most common culverts encountered and 20 of 23 circular pipes rated "RED". All the smaller diameter pipes rated "RED". The squashed pipe arches are evenly divided between either "RED" or "GREY" designation (8 of 16 pipes for both).

Table 4. Culvert type by fish passage criteria

Culvert Type	GREEN	GREY	RED
Circular			
< 48" diameter	~	~	17
> 48" diameter	~	3	3
Box	~	~	~
Open Bottom Arch	~	~	~
Pipe Arch(squashed)			
< 58" span	~	5	3
> 58" span	~	3	5

Table 5. Culverts with "RED" Rating

Type and Size	Gradient	Perch	Bankfull	# GREY	Total
Circular culvert					
< 48" diameter	14 at > 1% grade	3 with > 4" perch and low BF ratio		0	17
> 48" diameter	2 at > 2% grade	1 with > 4" perch		3	6
Pipe Arch (squashed)					
< 58" span	3 at > 1 % grade			5	8
> 58" span	2 at > 2 % grade	3 with > 4" perch		3	8
Total	21	7		11	39

Table 5 above shows the how the inventoried culverts rated "RED". Twenty-one of 28 (75%) "RED" culverts have gradients steeper than 1.0 %. Oregon Department of Fish and Wildlife *Guidelines and Criteria for Stream-Road Crossings*, requires than non-embedded culverts are placed at less than 0.50% slope (Robison *et. al.*). Our inventory found three culverts with less than 0.50 % slope, yet these rated RED or GREY due to other passage criteria (Table 6). Only one culvert inventoried had any baffles (Billie Creek 3661-060). None had substrate within the culvert.

Table 6. Culverts with less than 0.50% slope.

Stream	Road #	Bankfull Ratio	Perch	Slope
Rainbow Creek	3750-000	0.4 RED	0.03' GREEN	0.30%
Miller Creek	9772-000	0.5 GREY	0.1' GREY	0.30%
Jack Creek	9418-000	2.5 GREEN	0.6' RED	0.30%

There is about 50 miles of stream habitat above all inventoried culverts combined. Eighteen of 28 culvert locations are at least partial barriers to more than 1 mile of upstream habitat (Table 7). Of these, three crossings are so far from perennial (or even consistent seasonal) flows that it is doubtful that fish inhabit these reaches. The culverts with less than 1 mile of upstream habitat are high in the watershed where it is generally less than 1 mile to headwater springs. Miller Creek 9772-000 crosses near the outlet of Miller Lake. Seldom Creek 3704-000 is unique in that a falls downstream blocks passage up to the meadow that 3704-000 crosses. This meadow has water only in spring after snowmelt when Lake of the Woods overflows. One culvert that stands out as a total barrier to upstream migration is the culvert at Threemile Creek 3413-110. This barrier is required to prevent upstream movement of introduced brook trout into threatened bull trout habitat, but also prevents the return of any bull trout that may pass downstream.

Table 7. Miles of upstream habitat and presence of downstream barriers for Winema National Forest streams with inventoried culverts

Fish Status Group	Stream	Road #	Upstream Habitat (miles)	Downstream Barrier(s)	Comments
1-bull trout	Threemile Creek	3413-110	2.3	yes	Required barrier
		3449-000	0		intermittent flow at culvert
		3449-000	0		intermittent flow at culvert
2-redband trout	Spencer Creek	3809-000	0.1		intermittent flow at culvert
	Trout Creek south fork	2228-000	0.25		
	Trout Creek middle fork	2228-250	0.1		intermittent flow at culvert
	Trout Creek north fork	5850-000	1.5	yes	irrigation diversions
3-other native species	Hog Creek	4300-000	1.2	yes	irrigation diversions
	Jack Creek	8676-000	Unsure if fish present		intermittent flow at culvert
		8821-000	7		intermittent flow at culvert
		9418-000	2.4		
4-introduced trout	Jackson Creek	4900-000	6	yes	irrigation diversions
	Jackson Creek ditch	4900-000	6	yes	irrigation diversions
	Irving Creek	4900-000	0.75	yes	irrigation diversions
	Deep Creek	4648-000	1.8	?	unknown diversions
	Deep Creek ditch	4648-000	2	?	on private property
	Billie Creek	3661-060	2.5		flows are captured upstream
		3633-000	0.25		by Cascade Canal
	Rainbow Creek	3750-000	1		
	Seldom Creek	3704-000	NA	yes	falls
	Miller Creek	9770-000	Unsure if fish present	yes	flows subterranean in pumice
		9771-620	5	yes	flows subterranean in pumice
		9772-000	0.2	yes	man-made barrier ~0.5 mile downstream
	Gideon Creek	9772-000	<0.1		
	Varney Creek	3610-000	3.5	yes	diversion
	Scott Creek	2308-060	2.5	yes	flows subterranean in pumice
	Sink Creek	9775-000	Unsure if fish present	yes	flows subterranean in pumice
		9777-000	3.5	yes	flows subterranean in pumice

In streams with water, we found fish above every culvert that we inventoried except for the culvert on Gideon Creek 9772-000. Gideon Creek is a very small spring tributary to Miller Lake. Miller Lake is managed as a recreational fishery for stocked brown trout and kokanee. Jack Creek

8821-000 was dry at the culvert but had dace and lamprey residing upstream in isolated pools in an otherwise dry meadow. Other than fish passage criteria, we are unable to determine the extent that a culvert blocks passage, since fish were found upstream. Certainly fish swim downstream when there is water through the culvert, whether they are able to swim back upstream is unknown. Migratory fish do not use the streams at the locations that were inventoried, either access is prevented downstream of National Forest land, or the stream is naturally isolated.

Proposal for Rehabilitation/Reconstruction: We attempted to develop a matrix to prioritize culvert replacement. Since many upper Klamath basin streams have unique circumstances, this proved difficult. We decided to first group culverts in relation to the status of the fish inhabiting the stream. Table 8 lists fish status priorities.

Table 8: Initial prioritization of culverts based on fish species status.

Group	Criteria
1 ~	Threatened species: bull trout
2 ~	Sensitive species: redband trout
3 ~	Other native species: speckled dace and lamprey
4 ~	Introduced species: brook and brown trout

Once streams were divided into fish species groupings, further ranking used the criteria listed below.

1: Any management direction outlined in the Forest Plan or other Plans.
2: Potential for stream to provide habitat to native species from adjacent streams if current barriers were removed or renovated.
3: Stocked fish from lakes could utilize stream habitat with adequate culvert passage.
4: Culvert is in poor condition.
5: Stream has perennial flow at culvert location

Tables 9-12 and discussions explain the culvert priority system that we propose for the Winema National Forest.

Table 9: Group 1-Culverts with threatened species; bull trout.

Stream	Road #	Passage Rating	Comments
Threemile Creek	3449-000	RED	no upstream habitat
	3449-000	RED	no upstream habitat
	3413-110	RED	required barrier

The culvert on 3413-110 has a vertical leap distance of greater than 6 feet. This prevents upstream migration of introduced brook trout into occupied bull trout habitat. The other two culverts on 3449-000 are upstream of bull trout habitat in an intermittent section of stream.

Ironically, although Threemile Creek ranked as Group #1, stream with threatened bull trout, these culverts rank low for replacement to provide passage. The 3413-110 culvert needs to remain in place until brook trout are completely removed from the downstream reaches. The upper two culverts only have flow during spring run-off therefore bull trout will not seek passage. Although upstream passage is not required of these upper culverts, this area is a source of sediment into the stream, which should be controlled.

Table 10: Group 2-Culverts with sensitive species; redband trout.

Stream	Road #	Passage Rating	Comments
Trout Creek			
middle fork	2228-250	RED	Road closed, REMOVE CULVERT
north fork	5850-000	RED	Management Area 4
south fork	2228-000	RED	Management Area 4
Spencer Creek	3809-000	RED	

Two systems with redband trout have culvert crossings on the Winema National Forest. Trout Creek flows through Management Area 4, Saddle Mountain Cultural Resource Area. Winema National Forest Plan direction for Management Area 4 Facilities state:

> *1. Arch culverts, bridges, or similar open bottom structures should be required on all permanent road crossings on all Class I and II perennial streams to provide for fish passage.*

Spencer Creek has both migratory and resident populations of redband trout. The migratory fish travel upstream from the Klamath River about 9 miles. The culvert at 3809-000 is at river mile 15, and should provide passage for resident redband trout. Both of the culverts on 2228-000 and 3809-000 have been replaced in recent years with the intent of providing fish passage. However, the replacement culverts rated RED. The culvert at 3809-000 has a slope of 2.7%.

Table 11: Group 3-Other native species; speckled dace, lamprey.

Stream	Road #	Passage Rating	Comments
Jack Creek	9418-000	RED	perennial flow
	8821-000	RED	intermittent, severe erosion
	8676-000	GREY	unsure if fish inhabit this intermittent section
Hog Creek	4300-000	RED	intermittent

Jack Creek and Hog Creek are channels that flow through wet meadow/pasture systems. Flows vary between years, dependent upon precipitation. At the time of the culvert inventory all locations were dry, except for 9418-000. Although speckled dace are able to occupy a wide range of habitats, recent genetic work (Prefender *et.al.*, 2002), discussed the possibility of two

reproductively isolated sympatric lineages of dace in the Klamath basin. With this in mind, it is important to provide access for speckled dace to as much habitat as possible.

The remaining inventoried culverts are on streams that have been stocked with introduced trout (Table 10). Native species no longer have access to these streams. Some of these streams were probably 'fishless' prior to fish stocking programs.

Table 12: Group 4- Introduced species; brook trout and brown trout

Stream	Road #	Passage Rating	Additional Habitat?	Perennial Flow at Culvert?	Culvert Condition
			1 or 2 **	yes=1	poor=1
Deep Creek ditch	4648-000	RED	2	1	1
Jackson Creek ditch	4900-000	RED	2	1	
Jackson Creek	4900-000	RED	2	1	
Irving Creek	4900-000	RED	2	1	
Deep Creek	4648-000	GREY	2	1	
Rainbow Creek	3750-000	GREY	1	1	
Miller Creek	9771-620	GREY	1	1	
Gideon Creek	9772-000	RED	1	1	
Billie Creek	3661-060	GREY	1	1	
Miller Creek	9772-000	GREY		1	
Sink Creek	9777-000	RED		1	
Varney Creek	3610-000	GREY		1	
Scott Creek	2308-060	RED		1	
Seldom Creek	9704-000	GREY			1
Miller Creek	9770-000	RED			
Sink Creek	9775-000	RED			
Billie Creek	3633-000	RED			

** 2= potential to provide additional habitat for native species
1= access to stocked lake habitat

Jackson Creek and Irving Creek systems flow through an irrigation network that blocks passage to and from the upper Williamson River. Deep Creek has potential to provide redband trout habitat also. If redband trout were provided access into these tributary streams, at least 8 miles of coldwater habitat would become available. However, care must be taken to remove or at least reduce the current populations of brook trout that inhabit these three streams, **before** access is provided, so that the native redband trout in the upper Williamson River are not overwhelmed.

Recommendation for Top 5 culverts.

1. North Fork Trout Creek (Tag #3, Road 5850-000). This culvert should be replaced with an open bottom structure as stated in the Winema National Forest Plan. This culvert rated as "RED". Culvert slope is 3.2% with a jumping height of 1.1 ft. Although it flows less than 2 miles, this stream provides good quality habitat for sensitive redband trout. Trout Creek flows through Management Area 4.

2. South Fork Trout Creek ford at 5850-000 crossing. Since this crossing is in Management Area 4, an open bottom structure should be considered. This crossing was not evaluated as part of the inventory. South Fork Trout Creek is often dry at this location by late summer. During spring run off, if redband trout move upstream out of Trout Creek or the Sprague

River, they must negotiate this ford. The ford is wide and shallow and the road has considerable traffic.

3. Threemile Creek (Tag# 17 & 18, Road 3449-000). These two culverts are upstream of threatened bull trout occupied habitat. Water is present only during spring run-off. These culverts do not need to provide passage for fish but this area is a serious source of sediment into the stream.

4. Jack Creek (Tag #10, Road 9481-000). Jack Creek has a relatively short section of stream that maintains perennial flow. Any fish that pass downstream through the culvert need to be able to return upstream as flows diminish during the summer. Although this culvert rated "RED", it has a slope of only 0.3%. The jumping height as measured between the pool tail crest and the lip of the culvert is about 7inches, although the outlet is submerged. Directly downstream of the culvert is a water chance. Need to review whether modifying the water chance would improve fish passage through culvert.

5. Middle Fork Trout Creek (Tag #2, Road 2228-250). This road is closed. The stream drains a seasonal meadow. REMOVE CULVERT.

Additional Recommendations

Jack Creek (Tag#11, Road 8821-000). This crossing suffered from severe erosion during summer 2001 thunderstorms. Native surface material (pumice) was transported down the road and into the channel. The fill around the culverts has washed out.

Deep Creek ditch (Tag #5, Road 4648-000). Although this channel is an irrigation ditch, it provides good quality habitat for introduced brook trout. This crossing has two side by side culverts that are different diameters. One of the culverts is damaged. A single larger pipe or arch would provide improved fish passage, as long as fish passage criteria were met.

Seldom Creek (Tag#28, Road 3704-000). Three very rusted pipes drain a seasonal meadow. Multiple culverts receive a "GREY" rating. The current slope and jumping height allow fish passage, but the bankfull ratio is low. This crossing may need larger or additional pipes, something suited for meadow crossings.

Spencer Creek, ford downstream of Buck Lake. This crossing was not evaluated with the inventory. The road has been closed for a number of years, but cattle and four-wheelers cross at the ford. Raw, unstable banks at this crossing allow fine sediments to enter the stream. This ford needs to be hardened and the banks re-vegetated and protected from grazing.

Cost estimates for these recommended sites are found in Appendix 1.

Literature Cited

Oregon Department of Fish and Wildlife. 1997. Klamath River Basin, Oregon. Fish Management Plan.

Oregon Department of Fish and Wildlife. 1997. Guidelines and Criteria for Stream-Road Crossings. IN: Robison, E.G., A. Mirati, and M. Allen. 1999. Oregon Road/Stream Crossing Restoration Guide. Advanced Fish Passage Version.

Prefender, M.E., J. Hicks, M. Lynch. 2001. Biogeographic patterns and current distribution of molecular genetic variation among populations of Speckled Dace (*Rhinichthys osculus*).

The Winema National Forest Land and Resource Management Plan (LRMP 1990, as amended).

Appendix 1.

STREAM CROSSING PROPOSALS – RECOMMENDED FIXES

Prepared by: Karl Buehler, Civil Eng Tech., Winema NF 02/22/01

General Notes:

These sites are generally categorized by two conditions: (1) existing culverts unsuitable for fish passage, and (2) sites with sedimentation conditions unrelated to fish passage. Sites meeting Condition No. 2 can be improved by road maintenance as described.

Sites meeting Condition No. 1 (fish passage issues) can be improved by installation of open-bottom structural steel-plate arches with a span equal-to or greater-than the measured fullbank width of the stream. Existing culverts were assumed to be of adequate capacity for 100-year storm events; capacity of the new arches meets or exceeds current flow capacities, but additional analysis should be performed during actual design of the structures.

Estimated construction costs include:

- Removal of existing structures
- Required sitework (clearing and excavation, etc.)
- Materials and installation of the SSPA
  - Concrete Footings, structural-plate arch
- Rock Riprap for protection of inlet/outlet and slopes
- Surfacing (crushed aggregate)
- Other items as noted
- 15% Mobilization

Glossary:

CMPA – Corrugated Metal Pipe Arch
SSPA – Steel Structural-Plate Arch (open bottom)

SITES

1. North Fork Trout Creek (Road 5850-000) - FISH PASSAGE IMPROVEMENTS

Replace existing CMPA with bottomless SSPA (6.0’ span X 3’-2” rise X 34’)
Estimated Construction cost: $19500
Note: Installation will require some pool modifications at outlet due to current perched condition to prevent headcutting upon removal of existing culvert.

2. South Fork Trout Creek (Road 5850) - FISH PASSAGE IMPROVEMNTS

Replace existing FORD with bottomless SSPA (10.0’ span X 3’-5 1/2” rise X 32’)
Estimated Construction cost: $25000
Note: Installation will require construction of road approaches and other minor drainage work.

3. Threemile Creek (Road 3449-000) - SEDIMENTATION
Construct addition drainage features to prevent sedimentation. Look at fix with road maintenance (additional crossdrains, spot-surfacing, etc. to eliminate sediment source.
Estimated Construction cost: $2000

4. Jack Creek (Road 9481-000) FISH PASSAGE IMPROVEMENTS

Modify pool configuration if feasible.
Estimated Construction cost: $2000

5. Middle Fork Trout Creek (Road 2228-250) - FISH PASSAGE IMPROVEMENTS

Alt a: Remove existing CMPA with closure of road.
This will require review/modification of Road Management Objectives and some level of Roads Analysis and NEPA decision for road closure.
Estimated Construction cost: $2000

Alt b: Replace existing CMPA with bottomless SSPA (6.0' span X 3'-2" rise X 40')
Estimated Construction cost: $15500

6. Jack Creek (Road 8821-000) - SEDIMENTATION
Construct addition drainage features to prevent sedimentation. Look at fix with road maintenance (additional crossdrains, spot-surfacing, etc. to eliminate sediment source.
Estimated Construction cost: $2000

7. Deep Creek Ditch (Road 4648-000) - FISH PASSAGE IMPROVEMENTS
Replace existing CMPAs with bottomless SSPA (6.0' span X 3'-2" rise X 32')
Estimated Construction cost: $20000
Note: Road 4648 is Klamath County Road of Public Use. Construction by Forest Service requires memorandum of agreement.

8. Seldom Creek (Road 3704-000) – UNSERVICABLE CONDITION OF CULVERTS
Replace existing CMPAs with bottomless two SSPA (6.0' span X 3'-2" rise X 60')
Estimated Construction cost: $55500
Note: Will also require pavement patching.

9. Spencer Creek Ford - SEDIMENTATION
Enforce grazing permit/fencing and harden ford crossing with suitable rock.
Estimated Construction cost: $2000 (?)