

APPENDIX A

Field Data sheets of individual erosion features with photographs.

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Field Data sheets of individual erosion features with photographs.

FIELD DATA SHEET EROSION FEATURES ON TRAILS AND WATERCOURSES

Feature Number: 01

Date: 6/16/2000

Initials: RDK

Location of feature: In Upper Meadow, across from the bathrooms, on Palo Seco Creek. Feature is on the east side of the creek approximately 30 feet downstream from the culvert that drains Palo Seco Creek under the meadow.

Type of erosion feature and description: A rill that leads to a bank failure at the creek. The rill and bank failure are being created by surface runoff and possibly seepage from the meadow. This surface runoff could be caused by overflow at feature #22 during large rainfall events. Groundwater seepage from the meadow is another source of water that may contribute to this erosion.

Volume of past erosion (length X width X depth):

Rill - 45ft X 0.6ft X 0.6ft = 16.2 ft³ = **0.6 yd³**

Bank failure - 4ft X 3ft X 2ft = 24 ft³ = **0.9 yd³**

Total = **1.5 yd³**

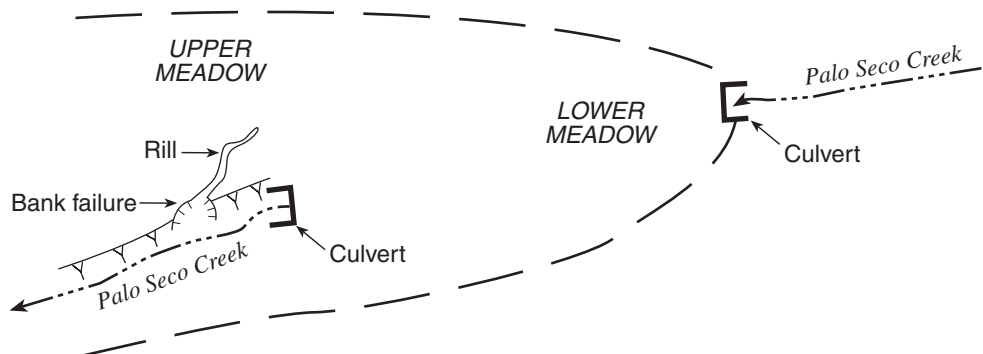
Potential for future erosion (low, moderate, high): Low

Ease of access for repair crew: Easy

Priority for repair (low, moderate, high): Low

Potential mitigation: Future bank failure can be minimized by armoring the bank with large boulders. Additionally cleaning the culvert at feature #22 may prevent excessive runoff and prevent rill development.

Sketch:



FIELD DATA SHEET
EROSION FEATURES ON TRAILS AND WATERCOURSES

Feature Number: 02

Date: 6/16/2000

Initials: RDK

Location of feature: On Palo Seco Creek at the crossover between Sinawik Trail and Lower Palos Colorados Trail.

Type of erosion feature and description: Fill emplaced across creek is being eroded away. It is possible that there was previously a culvert in place at the site that has been removed. Presently there are vertical banks of fill approximately 2.5 ft. high that are susceptible to bank erosion. Bank erosion will continue until the creek reestablishes its natural banks.

Volume of past erosion (length X width X depth):

Fill erosion - 20ft X 4ft X 2.5ft = 200 ft³ = **7.4 yd³**

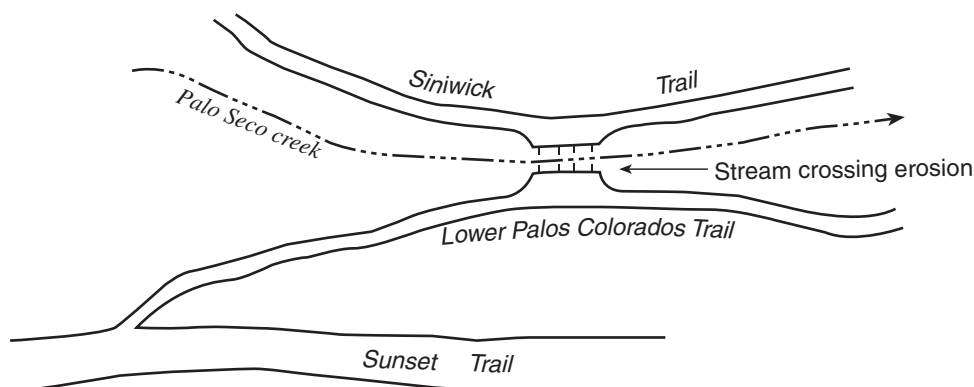
Potential for future erosion (low, moderate, high): High potential for erosion during high stream flow

Ease of access for repair crew: Easy

Priority for repair (low, moderate, high): Moderate priority due to relatively small volume of sediment available for erosion

Potential mitigation: Bank erosion could be minimized by removing the leftover fill and sloping the banks back a few feet to restore gradual stream bank slopes. A small bridge could be constructed to maintain access between the two trails.

Sketch:



FIELD DATA SHEET
EROSION FEATURES ON TRAILS AND WATERCOURSES

Feature Number: 06

Date: 6/16/2000

Initials: RDK

Location of feature: East bank of Fern Trail creek upstream of Harold Ireland Trail crossing.

Type of erosion feature and description: Bank failure caused by high stream flows eroding the base of a steep slope. Bulk of the debris is in stream channel and will be transported downstream in winter flows. Debris is fresh and feature probably occurred in the winter of 1999 or 2000.

Volume of past erosion (length X width X depth):

$$12\text{ft} \times 12\text{ft} \times 3\text{ft} = 720 \text{ ft}^3 = 16 \text{ yd}^3$$

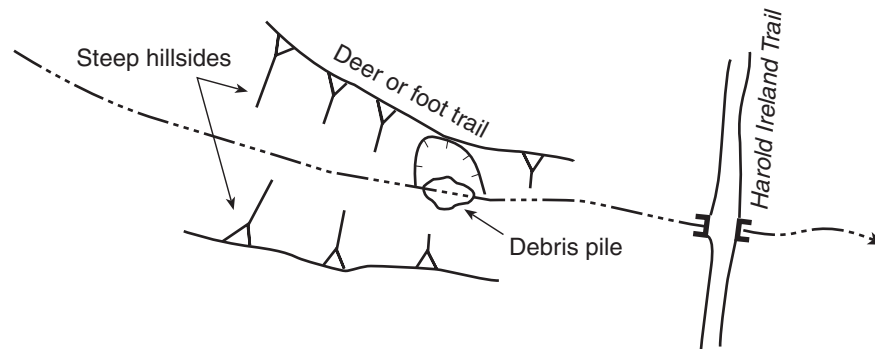
Potential for future erosion (low, moderate, high): High for debris in stream channel,
Low for debris left on sideslope.

Ease of access for repair crew: Difficult, there is no trail access.

Priority for repair (low, moderate, high): Low

Potential mitigation: None

Sketch:



FIELD DATA SHEET
EROSION FEATURES ON TRAILS AND WATERCOURSES

Feature Number: 07

Date: 6/16/2000

Initials: RDK

Location of feature: Culvert at the junction of Cinderella Trail and Sunset Trail.

Type of erosion feature and description: Fill failure at stream crossing. There are concrete slabs on the margins of the fill that may be old bridge abutments or retaining structures. There is evidence (small rills) that the stream overtops the culvert in high flow. Culvert flow capacity is reduced by approximately 20% by a large rock and sticks blocking the inlet. Concrete culvert may be too small, (sediment has accumulated upstream).

Volume of past erosion (length X width X depth):

$$15\text{ft} \times 20\text{ft} \times 8\text{ft} = 2,400 \text{ ft}^3 = 88.9 \text{ yd}^3$$

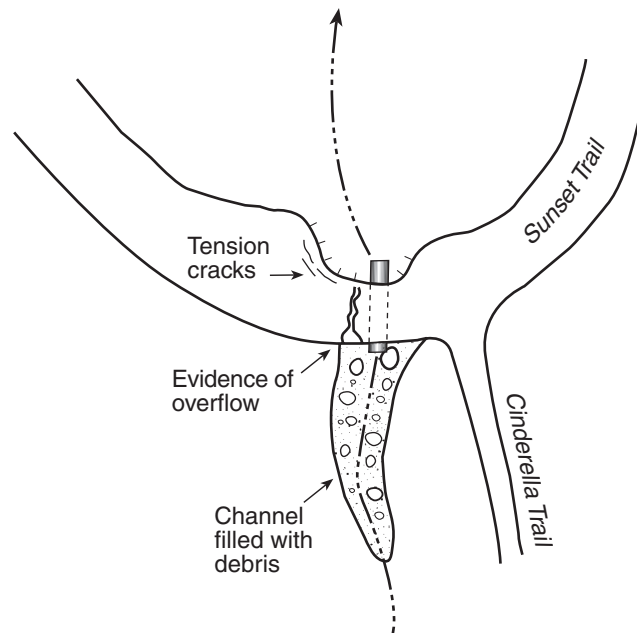
Potential for future erosion (low, moderate, high): High, potential future volume approximately $15\text{ft} \times 10\text{ft} \times 8\text{ft} = 1,200 \text{ ft}^3 = 44.4 \text{ yd}^3$

Ease of access for repair crew: Easy access on Sunset Trail for small backhoe.

Priority for repair (low, moderate, high): High

Potential mitigation: A backhoe should be used to remove crossing fill. Fill could be replaced with a wooden bridge. If fill is not removed, then sediment upstream of culvert should be removed and culvert should be replaced with a larger one.

Sketch:



FIELD DATA SHEET
EROSION FEATURES ON TRAILS AND WATERCOURSES

Feature Number: 08

Date: 6/16/2000

Initials: RDK

Location of feature: Bottom 150 ft of Cinderella Trail from Sunset Trail junction.

Type of erosion feature and description: Rills have formed along the fall line of the trail by surface flow running down steep slopes and over dysfunctional water bars. Existing water bars are filled with gravels and soil and do not funnel water off the trail. Rills transport water across Sunset Trail and have contributed to a small fill failure on outer edge of road.

Volume of past erosion (length X width X depth):

$$\begin{aligned} 62\text{ft} \times 1\text{ft} \times 0.3\text{ft} &= 18.6 \text{ ft}^3 = \mathbf{0.7 \text{ yd}^3} \\ 8\text{ft} \times 1\text{ft} \times 0.3\text{ft} &= 2.4 \text{ ft}^3 = \mathbf{0.1 \text{ yd}^3} \\ 8\text{ft} \times 1\text{ft} \times 0.3\text{ft} &= 2.4 \text{ ft}^3 = \mathbf{0.1 \text{ yd}^3} \\ 60\text{ft} \times 0.5\text{ft} \times 0.2\text{ft} &= 6 \text{ ft}^3 = \mathbf{0.2 \text{ yd}^3} \\ 30\text{ft} \times 1.5\text{ft} \times 0.3\text{ft} &= 13.5 \text{ ft}^3 = \mathbf{0.5 \text{ yd}^3} \\ \text{Total} &= \mathbf{1.6 \text{ yd}^3} \end{aligned}$$

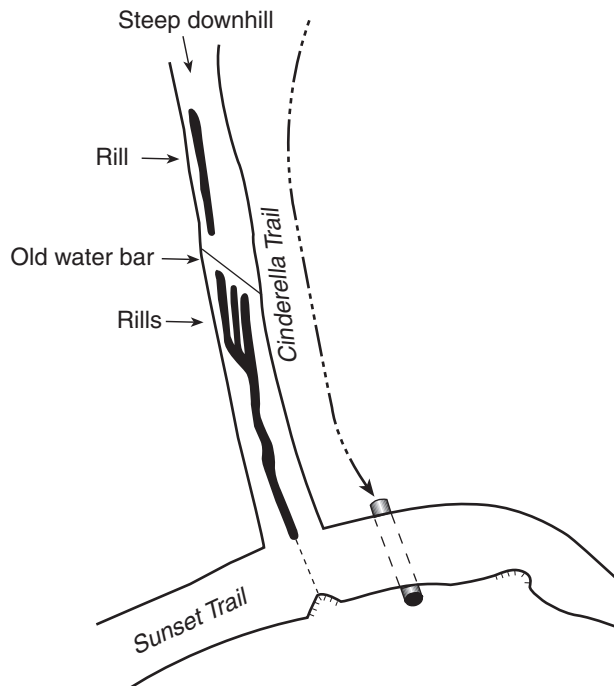
Potential for future erosion (low, moderate, high): Moderate because future sediment volume will be low. Rills will enlarge with time.

Ease of access for repair crew: Easy

Priority for repair (low, moderate, high): High

Potential mitigation: Clean out 4 water bars and cut them deeper. Water bars should be maintained yearly.

Sketch:



FIELD DATA SHEET
EROSION FEATURES ON TRAILS AND WATERCOURSES

Feature Number: 09

Date: 6/16/2000

Initials: RDK

Location of feature: Stream crossing on Cinderella Trail approximately 600 feet uphill from the junction of Cinderella Trail and Sunset Trail.

Type of erosion feature and description: This site is a stream crossing site that has seen storm flows overtop the trail in the past. Presently, the culvert is clear and functioning properly. The stream carries a coarse bed load and is approximately 6 feet wide bank to bank. Based on the size of the canyon, width of the stream, and coarseness of the bedload, the culvert may be too small to handle extreme flows.

Volume of past erosion (length X width X depth): Unknown, the culvert and crossing have been repaired in the past.

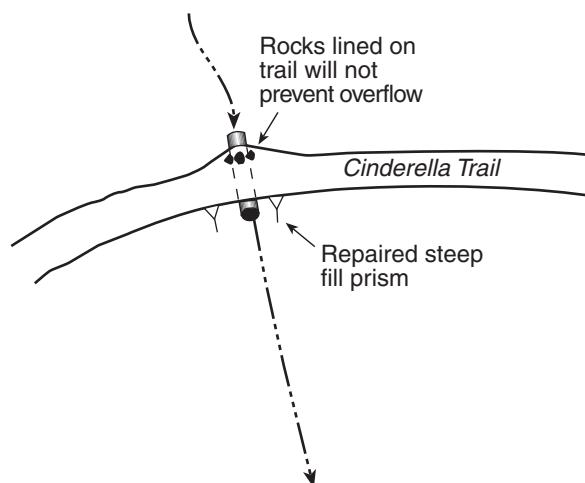
Potential for future erosion (low, moderate, high): Moderate, if the culvert is overtopped by stormflow the trail fill could wash out. Potential volume = $14\text{ft} \times 8\text{ft} \times 5\text{ft} = 560\text{ft}^3 = 20.7\text{yd}^3$

Ease of access for repair crew: Easy trail access for hand crew. No heavy equipment.

Priority for repair (low, moderate, high): Moderate priority for repair based on high cost due to limited equipment access.

Potential mitigation: Culvert should be inspected after large storms and cleaned and maintained as necessary. If problems persist, culvert can be replaced by a short wooden bridge.

Sketch:



FIELD DATA SHEET
EROSION FEATURES ON TRAILS AND WATERCOURSES

Feature Number: 10

Date: 6/16/2000

Initials: RDK

Location of feature: Approximately 500 feet uphill from site # 09 there is a section of trail that is very steep.

Type of erosion feature and description: Rills and small gullies forming in trail. There is a 200 foot long section of trail that has no way for water to drain off of it. Therefore, water runs down the trail causing small rills. The largest rill in this section occurs where the trail gradient changes from moderate to steep. Recreational trail use contributes to the raveling of loose material existing in rills created by surface runoff.

Volume of past erosion (length X width X depth):

$$40\text{ft} \times 1.5\text{ft} \times 0.5\text{ft} = 30 \text{ ft}^3 = 1.1 \text{ yd}^3$$

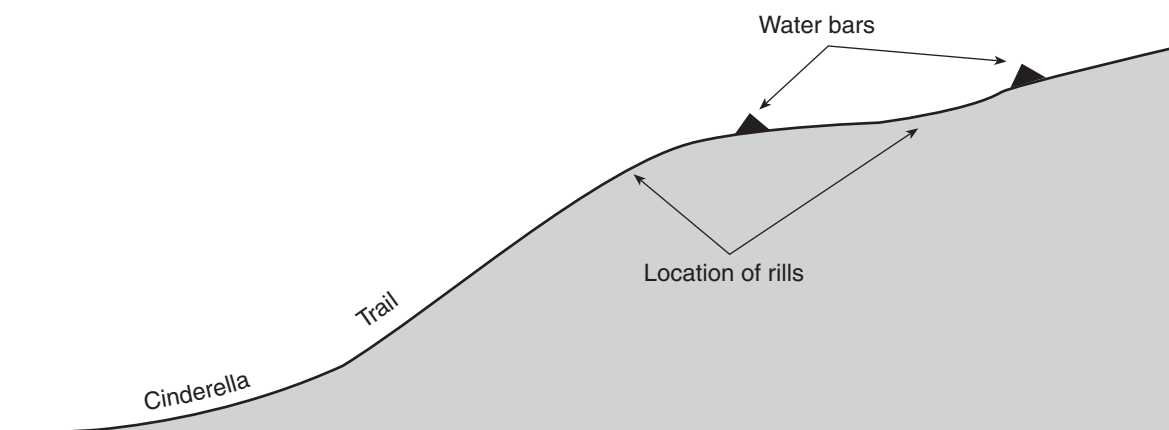
Potential for future erosion (low, moderate, high): High. Rilling will continue if no action is taken to divert water flowing down trail. Rilling will not erode very deep because of shallow bedrock conditions.

Ease of access for repair crew: Easy access along trail. Heavy equipment not possible.

Priority for repair (low, moderate, high): High

Potential mitigation: The streamside edge of the trail should be cut in at least 2-3 places upslope of the rills to allow water to flow off the trail. Water bars should be installed to direct the water to the new flow exit channels. One water bar should be installed at the top of the steepest section.

Sketch:



Profile View

FIELD DATA SHEET
EROSION FEATURES ON TRAILS AND WATERCOURSES

Feature Number: 11

Date: 6/16/2000

Initials: RDK

Location of feature: Cinderella Trail, approximately 400 feet uphill from site # 10, downhill from an old tree root ball on the edge of the trail.

Type of erosion feature and description: Small rill caused by water flowing down steep section of trail. The water has no possible way to exit the trail.

Volume of past erosion (length X width X depth):

$$50\text{ft} \times 0.5\text{ft} \times 0.2\text{ft} = 5 \text{ ft}^3 = 0.2 \text{ yd}^3$$

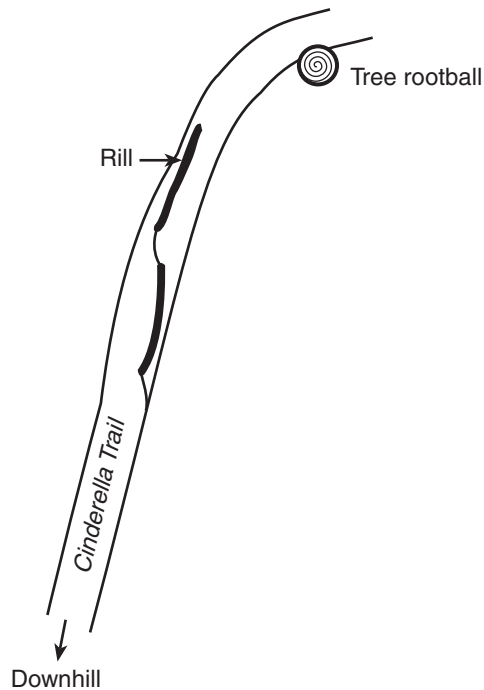
Potential for future erosion (low, moderate, high): Moderate, but with low volume.

Ease of access for repair crew: Easy access on Cinderella Trail. Heavy equipment not possible

Priority for repair (low, moderate, high): Low

Potential mitigation: Two waterbars should be installed above the root ball. The berm on the outside edge of the trail should be cut to allow passage of water. Trail below the root ball could also be regraded.

Sketch:



**FIELD DATA SHEET
EROSION FEATURES ON TRAILS AND WATERCOURSES**

Feature Number: 12

Date: 6/16/2000

Initials: RDK

Location of feature: Cinderella Trail at the junction with Pine View Flat Road

Type of erosion feature and description: Rilling on the trail. Small rills persist from Pine View Flat Road downhill on Cinderella Trail for 140 feet. The rills are caused by improper drainage of storm water on a steep trail. Waterbars and cross-trail ditches constructed in the past have filled with sediment and are no longer efficient at removing water from the trail.

Volume of past erosion (length X width X depth):

$$20\text{ft} \times 0.6\text{ft} \times 0.2\text{ft} = 2.4 \text{ ft}^3 = \mathbf{0.1\text{yd}^3}$$

$$48\text{ft} \times 1\text{ft} \times 0.5\text{ft} = 24 \text{ ft}^3 = \mathbf{0.9 \text{ yd}^3}$$

$$15\text{ft} \times 0.5\text{ft} \times 0.2\text{ft} = 1.5 \text{ ft}^3 = \mathbf{0.05 \text{ yd}^3}$$

$$9\text{ft} \times 0.5\text{ft} \times 0.2\text{ft} = 0.9 \text{ ft}^3 = \mathbf{0.03 \text{ yd}^3}$$

$$20\text{ft} \times 1\text{ft} \times 0.3\text{ft} = 6 \text{ ft}^3 = \mathbf{0.2 \text{ yd}^3}$$

$$\text{Total} = \mathbf{1.28 \text{ yd}^3}$$

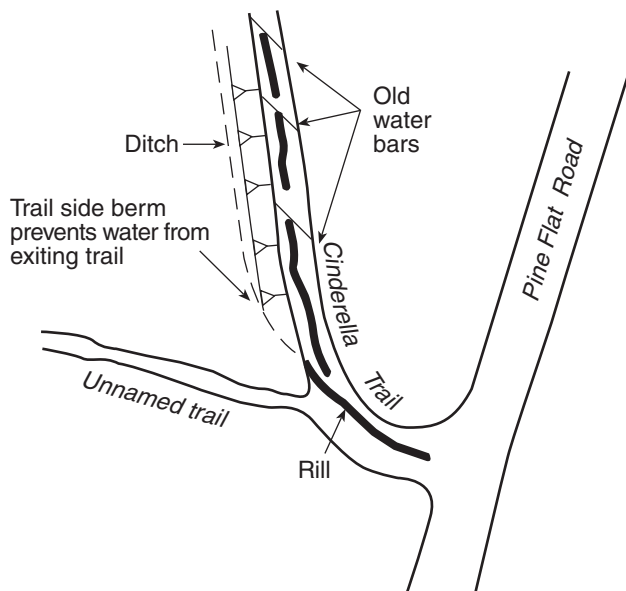
Potential for future erosion (low, moderate, high): High

Ease of access for repair crew: Easy trail access off Pine View Flat Rd. Heavy equipment is not possible, however a small tractor (bobcat) could be used on the gully at the junction of Cinderella trail and Pine View Flat Rd.

Priority for repair (low, moderate, high): High

Potential mitigation: Repair existing waterbars and maintain channels through the high berm on the streamside of the trail. Also clean out existing cross-trail ditches and outboard ditch.

Sketch:



**FIELD DATA SHEET
EROSION FEATURES ON TRAILS AND WATERCOURSES**

Feature Number: 13

Date: 6/16/2000

Initials: RDK

Location of feature: Sequoia Bayview Trail, at the beginning of the trail near the Sequoia Arena.

Type of erosion feature and description: Rills and gullies forming around tree roots. Feature begins at a break in slope and continues down the trail for approximately 150 ft. Leaves and sticks have accumulated in rills and gullies. Bike tracks are observed on the trail but not in the gullies. Rills and gullies are caused by water runoff from the flat meadow area above flowing down the trail with no way to get through side trail berm. The water flows through channels confined within roots. Based on the proximity to the horse arena, we suspect these channels may have originally been created by recreational horse traffic.

Volume of past erosion (length X width X depth):

$$15\text{ft} \times 1\text{ft} \times 0.3\text{ft} = 4.5 \text{ ft}^3 = \mathbf{0.2 \text{ yd}^3}$$

$$10\text{ft} \times 1\text{ft} \times 0.3\text{ft} = 3 \text{ ft}^3 = \mathbf{0.1 \text{ yd}^3}$$

$$12\text{ft} \times 2\text{ft} \times 0.5\text{ft} = 12 \text{ ft}^3 = \mathbf{0.4 \text{ yd}^3}$$

$$15\text{ft} \times 1.5\text{ft} \times 0.5\text{ft} = 11.3 \text{ ft}^3 = \mathbf{0.4 \text{ yd}^3}$$

$$5\text{ft} \times 1\text{ft} \times 0.3\text{ft} = 1.5 \text{ ft}^3 = \mathbf{0.05 \text{ yd}^3}$$

$$30\text{ft} \times 2\text{ft} \times 0.5\text{ft} = 30 \text{ ft}^3 = \mathbf{1.1 \text{ yd}^3}$$

$$\text{Total} = \mathbf{2.25 \text{ yd}^3}$$

Potential for future erosion (low, moderate, high): High

Ease of access for repair crew: Easy access from horse arena. Heavy equipment (i.e. bobcat) may be able to access site from horse arena.

Priority for repair (low, moderate, high): High

Potential mitigation: Install two waterbars (one at the top of the feature near the break in slope and the other half way down the rilled length of trail). Channels need to be excavated through the high berm on the outside edge of the trail to provide a path for water to escape the trail. Additionally, the trail could be regraded.

Sketch:

FIELD DATA SHEET
EROSION FEATURES ON TRAILS AND WATERCOURSES

Feature Number: 14

Date: 6/16/2000

Initials: RDK

Location of feature: Sequoia Bayview trail directly east of the junction with Chaparral Trail

Type of erosion feature and description: Rills and Gullies. Old wooden erosion control beams were placed in the trail, but have not been maintained. One large rill occurs where there is a gap in these structures. A gully occurs where one of the structures is broken. Surface water runoff is the main source of erosion presently contributing to rill development. Storm water flows through channels created through years of land use. Based on the proximity of the site to the horse arena, we suspect that the channels were originally created by recreational horse traffic.

Volume of past erosion (length X width X depth):

$$8 \text{ ft} \times 1 \text{ ft} \times 0.6 \text{ ft} = 4.8 \text{ ft}^3 = \mathbf{0.2 \text{ yd}^3}$$

$$8 \text{ ft} \times 0.5 \text{ ft} \times 0.2 \text{ ft} = 0.8 \text{ ft}^3 = \mathbf{0.03 \text{ yd}^3}$$

$$13 \text{ ft} \times 2 \text{ ft} \times 0.6 \text{ ft} = 15.6 \text{ ft}^3 = \mathbf{0.6 \text{ yd}^3}$$

$$\text{Total} = \mathbf{0.83 \text{ yd}^3}$$

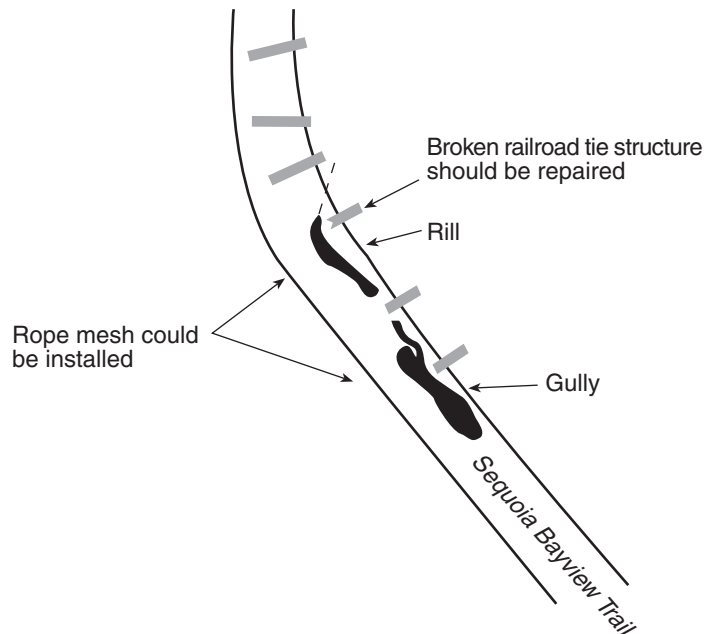
Potential for future erosion (low, moderate, high): High

Ease of access for repair crew: Easy access from horse arena. Heavy equipment (i.e. bobcat) may be able to access site from horse arena.

Priority for repair (low, moderate, high): Moderate, based on low volume of expected future erosion.

Potential mitigation: There is no good location to divert the water that is causing the erosion. Sediment retention structures, such as rope mesh could help keep some of the soil in place. Broken beam should be replaced. The trail could be regraded and locally covered in a layer of gravel.

Sketch:



FIELD DATA SHEET
EROSION FEATURES ON TRAILS AND WATERCOURSES

Feature Number: 15

Date: 6/16/2000

Initials: RDK

Location of feature: Junction of Chaparral Trail and Sequoia Bayview Trail. Feature is on Sequoia Bayview Trail.

Type of erosion feature and description: Rills and gullies. Water is confined to the trail above a steep section at the junction of the two trails and has to flow down the steep section causing gullies. The upper portion of the steep section is underlain by shallow sandstone bedrock. The lower portion of the steep section is underlain by softer substrate materials. The softer substrate materials are more susceptible to erosion than the sandstone. Based on the proximity of this site to the horse arena, we suspect that gullies were initially started by recreational horse traffic. Surface water flowing into these gullies has caused the gullies to expand. Presently, trail use (horse, biker, and hiker) further contributes to the gullying at this site.

Volume of past erosion (length X width X depth):

$$18\text{ft} \times 1\text{ft} \times 1\text{ft} = 18 \text{ ft}^3 = \mathbf{0.7 \text{ yd}^3}$$

$$10\text{ft} \times 2\text{ft} \times 0.6\text{ft} = 12 \text{ ft}^3 = \mathbf{0.4 \text{ yd}^3}$$

$$15\text{ft} \times 1\text{ft} \times 0.5\text{ft} = 7.5 \text{ ft}^3 = \mathbf{0.3 \text{ yd}^3}$$

$$10\text{ft} \times 1\text{ft} \times 0.3\text{ft} = 3 \text{ ft}^3 = \mathbf{0.1 \text{ yd}^3}$$

$$25\text{ft} \times 5\text{ft} \times 1.5\text{ft} = 187.5 \text{ ft}^3 = \mathbf{6.9 \text{ yd}^3}$$

$$20\text{ft} \times 2\text{ft} \times 1\text{ft} = 40 \text{ ft}^3 = \mathbf{1.5 \text{ yd}^3}$$

$$\text{Total} = \mathbf{9.9 \text{ yd}^3}$$

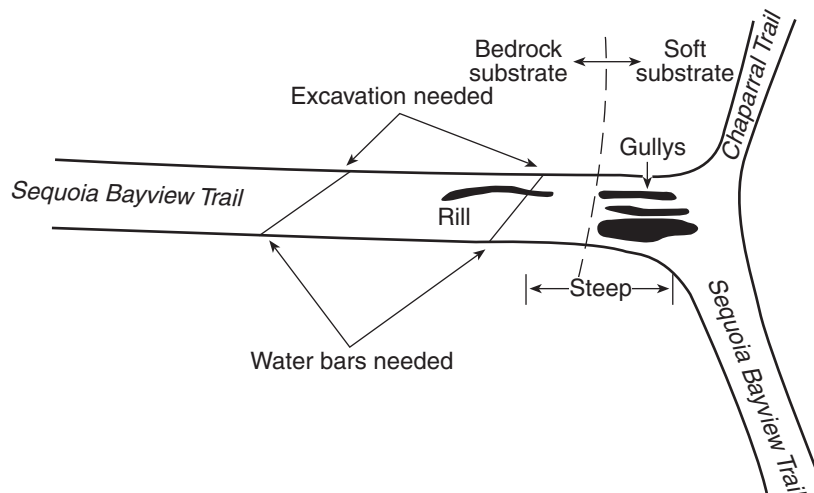
Potential for future erosion (low, moderate, high): High

Ease of access for repair crew: Easy access from horse areana.

Priority for repair (low, moderate, high): High

Potential mitigation: Install a water bar at the top of the steep section and one about 40 feet up trail from the steep section. At each waterbar, the high outside berm has to be excavated to provide a path for water to exit the trail. The steep lower section should be regraded. Water bars will keep water away from steep section and minimize future gully development. Alternatively, stairs or armor structures could be installed at the site.

Sketch:



FIELD DATA SHEET
EROSION FEATURES ON TRAILS AND WATERCOURSES

Feature Number: 16

Date: 6/16/2000

Initials: RDK

Location of feature: A small road connecting Sequoia Arena to Sequoia Bayview Trail

Type of erosion feature and description: Rills and gullies in Sequoia Bayview Trail fill.

Shortcut road runs down the thalweg of a swale. The fill on Sequoia Bayview Trail is placed on an old channel. Streamflow in the channel is eroding a gully in the trail fill. Surface water runoff on the Sequoia Arena Shortcut Road is causing rills to develop. Dead branches have been piled on outside edge of trail.

Volume of past erosion (length X width X depth):

$$30\text{ft} \times 0.5\text{ft} \times 0.2\text{ft} = 3 \text{ ft}^3 = \mathbf{0.1 \text{ yd}^3}$$

$$15\text{ft} \times 1\text{ft} \times 0.3\text{ft} = 4.5 \text{ ft}^3 = \mathbf{0.2 \text{ yd}^3}$$

$$15\text{ft} \times 1\text{ft} \times 0.5\text{ft} = 7.5 \text{ ft}^3 = \mathbf{0.3 \text{ yd}^3}$$

$$\text{Total} = \mathbf{0.6 \text{ yd}^3}$$

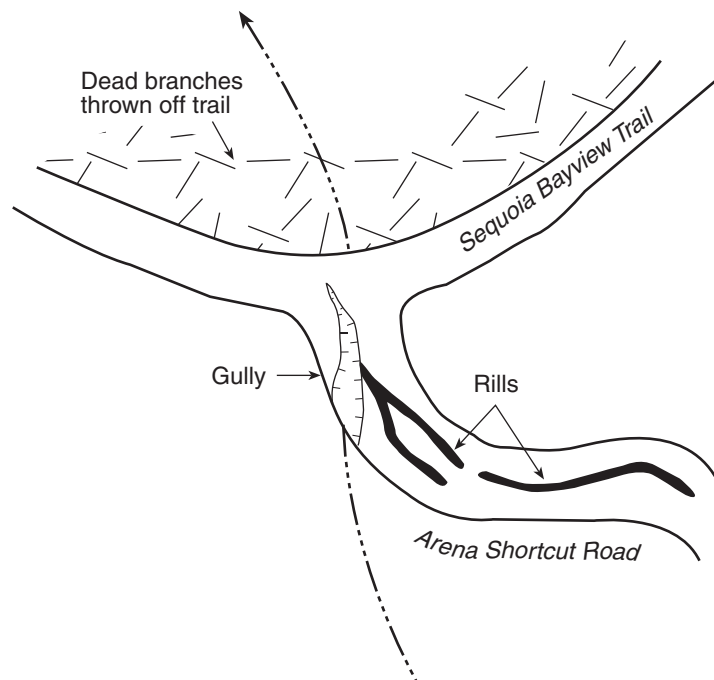
Potential for future erosion (low, moderate, high): High

Ease of access for repair crew: Easy, heavy equipment can access site from horse arena.

Priority for repair (low, moderate, high): High

Potential mitigation: The drainage of the entire junction could be redone. Drainage from the stream channel could be diverted through a culvert across the fill to maintain the road configuration. Alternatively, the stream could be left alone. This would allow the stream to eventually recapture its old channel. A bridge could be constructed when the gully becomes too deep.

Sketch:



FIELD DATA SHEET
EROSION FEATURES ON TRAILS AND WATERCOURSES

Feature Number: 21

Date: 6/16/2000

Initials: RDK

Location of feature: Top of Palos Colorados Trail (northwest of Sequoia point)

Type of erosion feature and description: Rills around roots. At the top of the trail water cannot exit trail. This flow of water down the trail is the initial cause of the rilling. Landuse over the top of the rills has helped them to expand.

Volume of past erosion (length X width X depth):

$$32\text{ft} \times 0.3\text{ft} \times 0.2 = 2 \text{ ft}^3 = \mathbf{0.07 \text{ yd}^3}$$

$$20\text{ft} \times 1\text{ft} \times 0.2\text{ft} = 4 \text{ ft}^3 = \mathbf{0.1 \text{ yd}^3}$$

$$\text{Total} = \mathbf{0.17 \text{ yd}^3}$$

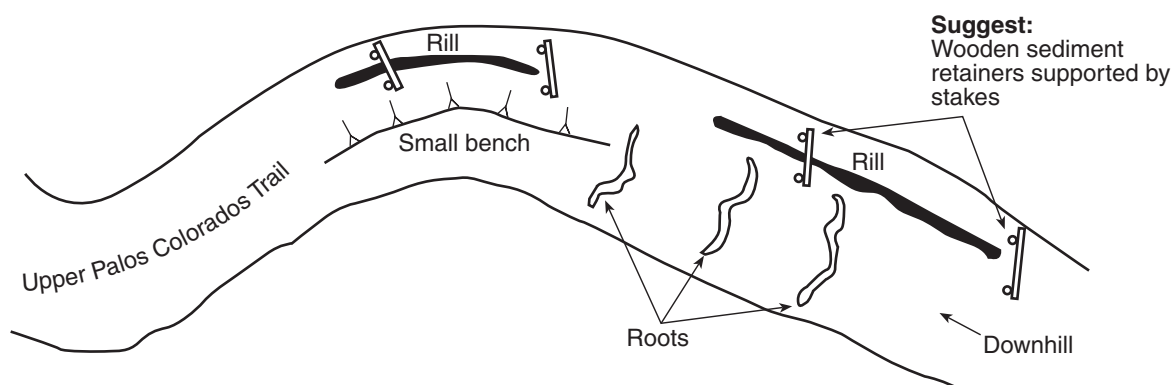
Potential for future erosion (low, moderate, high): High

Ease of access for repair crew: Easy access from park entrance near Sequoia Point. Heavy equipment not possible.

Priority for repair (low, moderate, high): High

Potential mitigation: Install sediment retaining structures such as wooden boards supported by rebar stakes. These will help keep loosened soil on the trail. The sediment retainers should be angled off the trail to be used as water diverters at the same time. Wooden retention structures can function as steps for hikers in addition to holding soil on the trail. Regrading is not possible because redwood roots could be damaged.

Sketch:



FIELD DATA SHEET
EROSION FEATURES ON TRAILS AND WATERCOURSES

Feature Number: 22 and 22A

Date: 7/07/2000

Initials: RDK

Location of feature: Sunset Trail in the vicinity of Mark David Lee Grove. Feature 22A is located on Sunset Trail where small tributary meets Palo Seco Creek next to concrete culvert.

Type of erosion feature and description: Rill is eroding road and depositing material (silts and sands) on the lower trail (see sketch)

Volume of past erosion (length X width X depth):
 $70\text{ft} \times 0.5\text{ft} \times 0.2\text{ft} = 7\text{ft}^3 = 0.3\text{yd}^3$

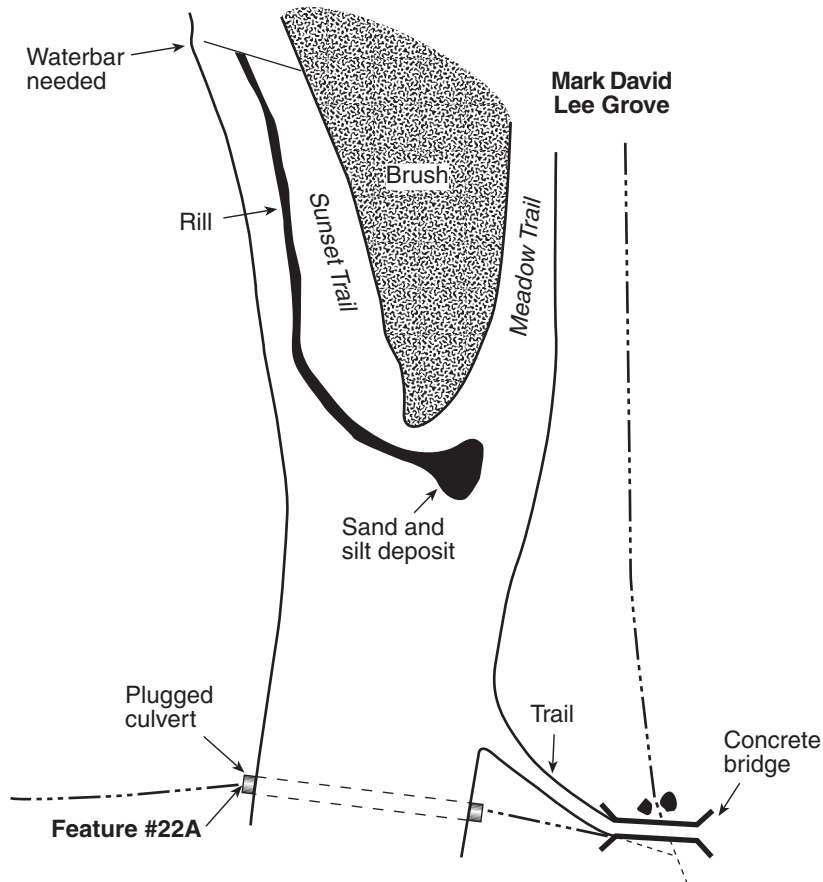
Potential for future erosion (low, moderate, high): Moderate

Ease of access for repair crew: Easy access on Sunset Trail. Heavy equipment possible.

Priority for repair (low, moderate, high): Low, small volume expected in the future

Potential mitigation: Install water bar at top of small hill at the beginning of the rill to divert runoff into the brush. Existing inboard ditch will not function properly without installing a ditch relief culvert. The culvert near the concrete bridge should be cleaned out.

Sketch:



**FIELD DATA SHEET
EROSION FEATURES ON TRAILS AND WATERCOURSES**

Feature Number: 23

Date: 7/07/2000

Initials: RDK

Location of feature: Harold Ireland Trail downhill of junction with Wild Rose Trail.

Type of erosion feature and description: Rill caused by improper drainage.

Volume of past erosion (length X width X depth):

$$40\text{ft} \times 0.5\text{ft} \times 0.1\text{ft} = 2 \text{ ft}^3 = \mathbf{0.07 \text{ yd}^3}$$

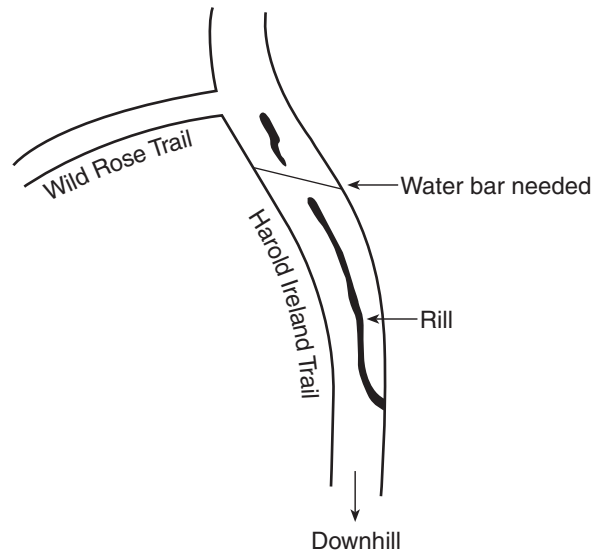
Potential for future erosion (low, moderate, high): Low

Ease of access for repair crew: Easy access on Harold Ireland Trail.

Priority for repair (low, moderate, high): Low

Potential mitigation: Install small water bar near top of feature to prevent future rill development.

Sketch:



FIELD DATA SHEET
EROSION FEATURES ON TRAILS AND WATERCOURSES

Feature Number: 24

Date: 7/07/2000

Initials: RDK

Location of feature: Harold Ireland Trail at first stream crossing north of the Wild Rose Trail.

Type of erosion feature and description: Rill and gully. These features are caused by water flowing over trail fill. The trail fill blocks the natural channel and forces water down the trail. Water flows out of the stream channel and onto the trail.

Volume of past erosion (length X width X depth):

$$20\text{ft} \times 1\text{ft} \times 0.8\text{ft} = 16 \text{ ft}^3 = \mathbf{0.6 \text{ yd}^3}$$

$$17\text{ft} \times 1.5\text{ft} \times 0.6\text{ft} = 15.3 \text{ ft}^3 = \mathbf{0.6 \text{ yd}^3}$$

$$7\text{ft} \times 1\text{ft} \times 0.8\text{ft} = 5.6 \text{ ft}^3 = \mathbf{0.2 \text{ yd}^3}$$

$$5\text{ft} \times 0.8\text{ft} \times 0.3\text{ft} = 1.2 \text{ ft}^3 = \mathbf{0.04 \text{ yd}^3}$$

$$40\text{ft} \times 0.6\text{ft} \times 0.2\text{ft} = 4.8 \text{ ft}^3 = \mathbf{0.2 \text{ yd}^3}$$

$$\text{Total} = \mathbf{1.64 \text{ yd}^3}$$

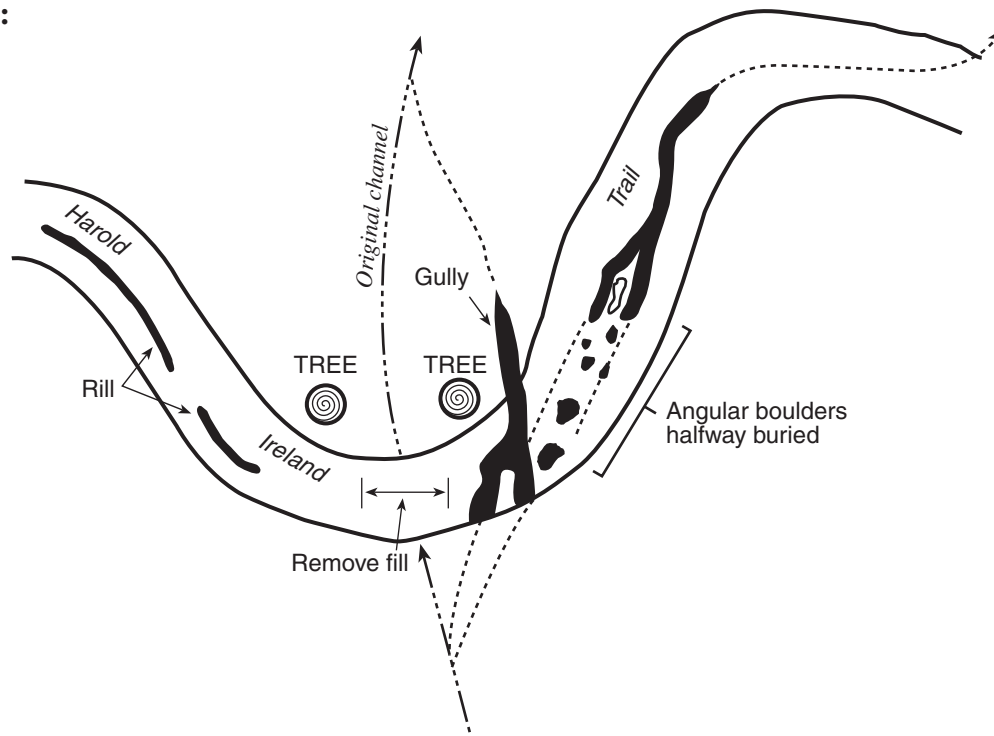
Potential for future erosion (low, moderate, high): High

Ease of access for repair crew: Easy trail access on Harold Ireland Trail. Heavy equipment not possible.

Priority for repair (low, moderate, high): High

Potential mitigation: Remove fill in stream channel to restore original channel. Place fill in existing gully to prevent runoff from following the trail. Excavate between the two big trees (see sketch) to help the stream reoccupy its original channel. Trail should gently slope into and out of the stream channel. Also install a small water bar at top of rill on south side of stream

Sketch:



FIELD DATA SHEET
EROSION FEATURES ON TRAILS AND WATERCOURSES

Feature Number: 25

Date: 7/07/2000

Initials: RDK

Location of feature: Harold Ireland Trail at the first stream crossing north of erosion feature 24.

Type of erosion feature and description: Erosion of trail fill at stream crossing.

Volume of past erosion (length X width X depth):

$$6\text{ft} \times 3\text{ft} \times 2\text{ft} = 36 \text{ ft}^3 = \mathbf{1.3 \text{ yd}^3}$$

$$6\text{ft} \times 1.5\text{ft} \times 0.8\text{ft} = 7.2 \text{ ft}^3 = \mathbf{0.3 \text{ yd}^3}$$

$$6\text{ft} \times 1.5 \text{ ft} \times 0.6\text{ft} = 5.4 \text{ ft}^3 = \mathbf{0.2 \text{ yd}^3}$$

$$8\text{ft} \times 3\text{ft} \times 2 \text{ ft} = 48 \text{ ft}^3 = \mathbf{1.7 \text{ yd}^3}$$

$$\text{Total} = \mathbf{3.5 \text{ yd}^3}$$

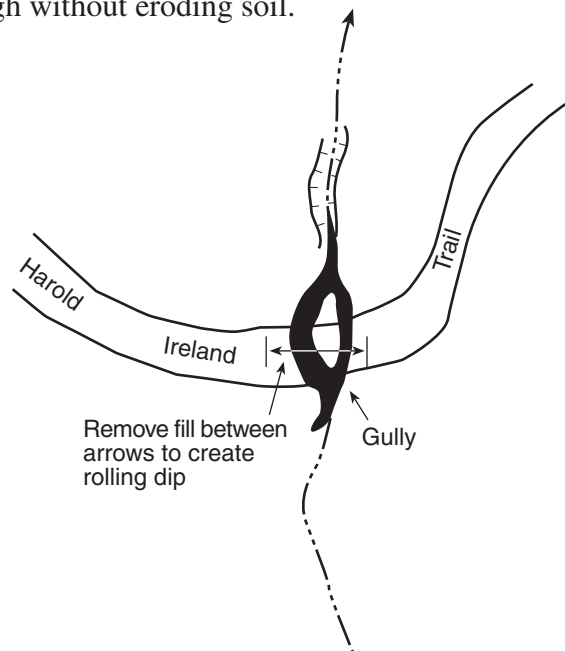
Potential for future erosion (low, moderate, high): High

Ease of access for repair crew: Easy trail access on Harold Ireland Trail. Heavy equipment not possible.

Priority for repair (low, moderate, high): High

Potential mitigation: Remove trail fill existing in channel to create a rolling dip. Trail should gently slope into and out of stream channel. Winter flows can then pass through without eroding soil.

Sketch:



FIELD DATA SHEET
EROSION FEATURES ON TRAILS AND WATERCOURSES

Feature Number: 26

Date: 7/07/2000

Initials: RDK

Location of feature: Junction of Harold Ireland Trail and Sunset Trail

Type of erosion feature and description: Rill caused by water flowing down the compacted trail. There is a disfunctional water bar at the beginning of the rill.

Volume of past erosion (length X width X depth):

$$30\text{ft} \times 0.6\text{ft} \times 0.2\text{ft} = 3.6 \text{ ft}^3 = \mathbf{0.1 \text{ yd}^3}$$

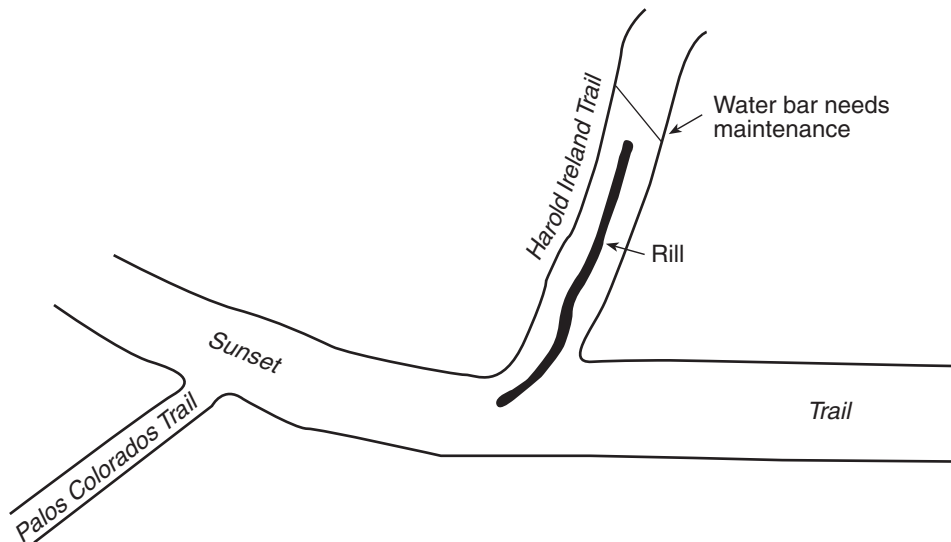
Potential for future erosion (low, moderate, high): Low

Ease of access for repair crew: Easy access from Sunset trail.

Priority for repair (low, moderate, high): Low

Potential mitigation: Deepen existing water bar so that it diverts water off the trail into the brush.

Sketch:



FIELD DATA SHEET
EROSION FEATURES ON TRAILS AND WATERCOURSES

Feature Number: 03 and 03A

Date: 6/16/2000

Initials: RDK

Location of feature: Features are located on the edge of Sinawick Trail approximately 200ft. downstream of feature #02.

Type of erosion feature and description: Both feature #03 and #03A are bank failures caused by high flows on Palo Seco Creek, possibly enhanced by ground water seepage into the creek from beneath the trail.

Volume of past erosion (length X width X depth):

Feature #03: 4ft X 3ft X 2ft = 24 ft³ = **0.9 yd³**

Feature #03A: 3ft X 2ft X 2ft = 12 ft³ = **0.4 yd³**

Total= **1.3 yd³**

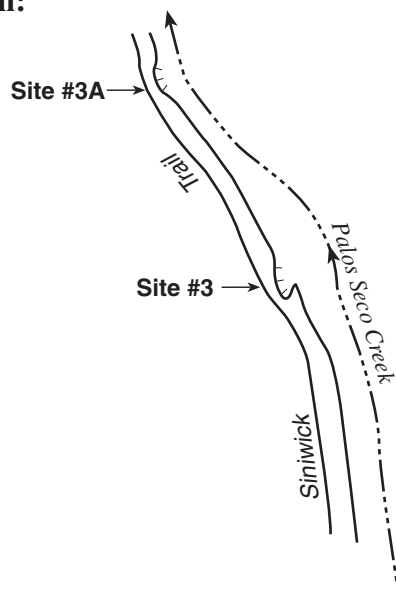
Potential for future erosion (low, moderate, high): Moderate

Ease of access for repair crew: Easy

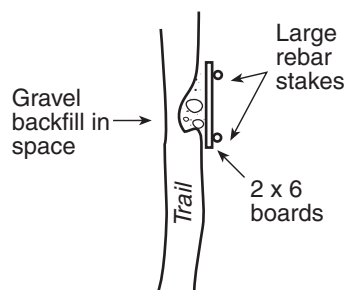
Priority for repair (low, moderate, high): Moderate, repair will assure that the trail is not eroded any further

Potential mitigation: Bank retention structures could be built to minimize bank erosion and maintain trail width. Possible retention structures include rebar stakes and lumber (see below), boulders placed in eroded void, or timber crib walls.

Sketch:



Example:
Retainment structure



FIELD DATA SHEET
EROSION FEATURES ON TRAILS AND WATERCOURSES

Feature Number: 04

Date: 6/16/2000

Initials: RDK

Location of feature: On Palo Seco Creek approximately 1000 ft. downstream of Sinawik Cabin.

Type of erosion feature and description: Stream bank landslide. Lower Palos Colorados Trail trends across the head scarp of the slide and has been stabilized with timbers. Slide was most likely caused by natural stream erosion at the base of a steep slope. The slide does not appear to have been affected by Palos Colorados Trail. Approximately 25% of the slide material is piled up in the stream channel. The majority of the slide material has been transported downstream.

Volume of past erosion (length X width X depth):

$$22\text{ft} \times 16\text{ft} \times 3\text{ft} = 1,056 \text{ ft}^3 = 39 \text{ yd}^3$$

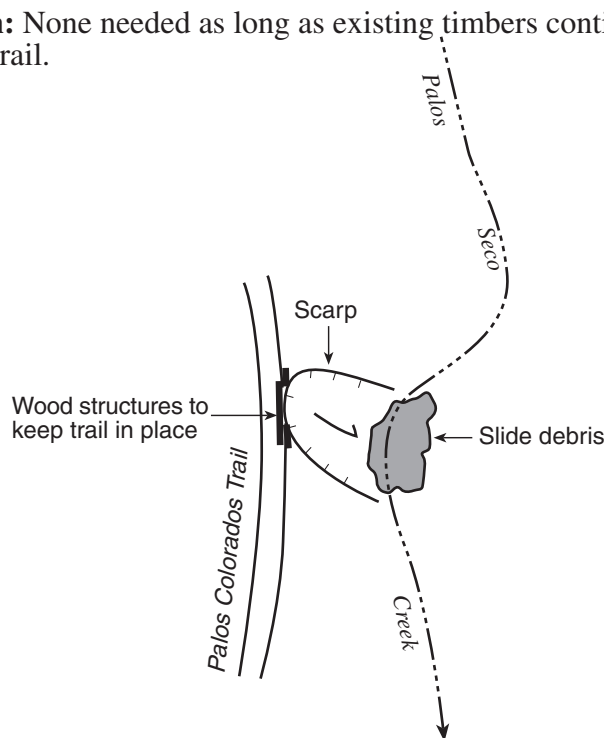
Potential for future erosion (low, moderate, high): High potential for remobilization of slide material in stream channel. Low potential for future erosion of inner gorge slope at this location because bedrock is now exposed on the stream bank.

Ease of access for repair crew: Difficult

Priority for repair (low, moderate, high): Low

Potential mitigation: None needed as long as existing timbers continue to effectively stabilize the trail.

Sketch:



**FIELD DATA SHEET
EROSION FEATURES ON TRAILS AND WATERCOURSES**

Feature Number: 04A

Date: 6/16/2000

Initials: RDK

Location of feature: On Palo Seco Creek approximately 300 ft. downstream of Sinawik Cabin.

Type of erosion feature and description: Inner gorge landslide. This is an old landslide scar and most of the slide debris has been transported downstream. The slide was likely caused by bank erosion at the base of the inner gorge by high flows.

Volume of past erosion (length X width X depth):
 $25 \text{ ft} \times 25 \text{ ft} \times 3 \text{ ft} = 1,875 \text{ ft}^3 = 69.4 \text{ yd}^3$

Potential for future erosion (low, moderate, high): Low

Ease of access for repair crew: Difficult

Priority for repair (low, moderate, high): Low

Potential mitigation: None

Sketch:

FIELD DATA SHEET
EROSION FEATURES ON TRAILS AND WATERCOURSES

Feature Number: 05

Date: 6/16/2000

Initials: RDK

Location of feature: In the channel of Cinderella Trail creek approximately 150 ft upstream of the culvert at Sunset Trail.

Type of erosion feature and description: Feature is a deposit of rocky sediment in the stream channel with a landslide scarp above it. The deposit is fairly flat and littered with cut logs. The feature is old and may date back to the early logging days. The relationship between the scarp and the deposit is unclear, however the deposit may be the debris from the slide. The stream has eroded a deep channel through the deposit.

Volume of past erosion (length X width X depth):

Original volume of slide (old) - 20ft X 20ft X 6ft = 2,400 ft³ = **89 yd³**

Volume of deposit eroded by stream - 15ft X 8ft X 5ft = 600 ft³ = **22 yd³**

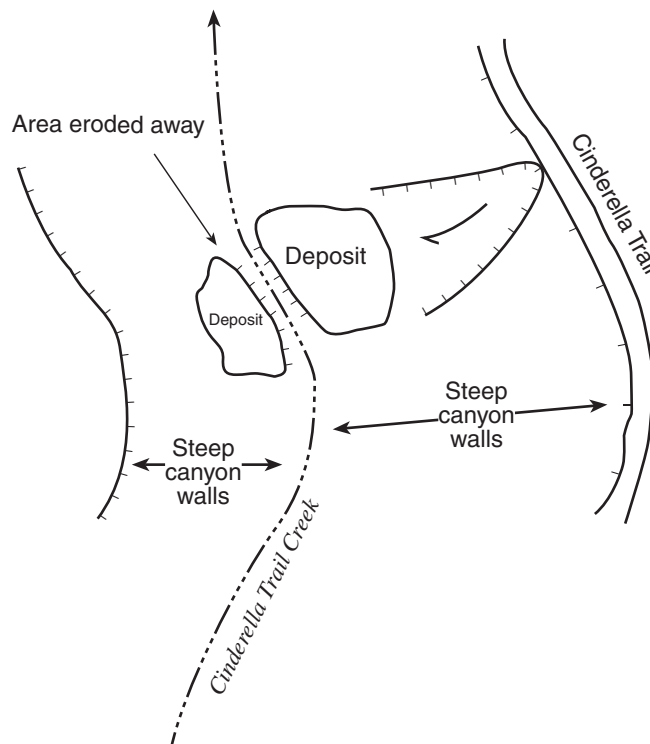
Potential for future erosion (low, moderate, high): High, stream will continue to erode into this deposit.

Ease of access for repair crew: Difficult

Priority for repair (low, moderate, high): Low

Potential mitigation: None recommended. There is no trail access to the feature and any repair attempt would cause unnecessary damage to the stream.

Sketch:



**FIELD DATA SHEET
EROSION FEATURES ON TRAILS AND WATERCOURSES**

Feature Number: 17

Date: 6/16/2000

Initials: RDK

Location of feature: Creek culvert crossing on Sequoia Bayview Trail near intersection with Fern Trail.

Type of erosion feature and description: Culvert has been eroded by stream flow at both the upstream and downstream ends. Additionally, the top of the culvert is exposed at the surface of the trail and the bottom is rusted throughout.. Approximately 15% of the culvert inlet is plugged with debris. The culvert can easily be overtopped during high flow.

Volume of past erosion (length X width X depth): Because the original height of the road is unknown the volume of past erosion is not calculated.

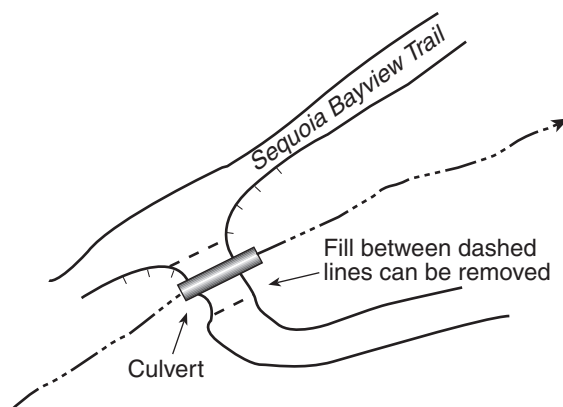
Potential for future erosion (low, moderate, high): moderate

Ease of access for repair crew: Easy trail access on Sequoia Bayview Trail. Heavy Equipment (i.e. bobcat) might be able to access the site.

Priority for repair (low, moderate, high): low

Potential mitigation: The culvert could be pulled out. Fill material could be sloped back to original grade to prevent the transport of fill material downstream. A small wooden bridge could be constructed over the channel. Alternatively, the culvert could be replaced with a larger culvert that was set in more deeply.

Sketch:



**FIELD DATA SHEET
EROSION FEATURES ON TRAILS AND WATERCOURSES**

Feature Number: 18

Date: 6/16/2000

Initials: RDK

Location of feature: Junction of Sequoia Bayview Trail and Big Trees Trail. Feature on Big Trees Trail.

Type of erosion feature and description: Rill in the middle of the trail. It ends at Sequoia Bayview Trail. About 30 ft. upslope from this feature there is another small rill. Both features are hard to see in the field. Bike tracks observed on both sides of the rill but not inside it. Based on the sinuous shape of the rill, we suspect surface runoff flowing down the trail is the primary cause of the rill.

Volume of past erosion (length X width X depth):

$$13\text{ft} \times 1\text{ft} \times 0.3\text{ft} = 3.9 \text{ ft}^3 = \mathbf{0.1 \text{ yd}^3}$$

$$5\text{ft} \times 0.5\text{ft} \times 0.2\text{ft} = 0.5 \text{ ft}^3 = \mathbf{0.02 \text{ yd}^3}$$

$$30\text{ft} \times 0.5\text{ft} \times 0.1\text{ft} = 1.5 \text{ ft}^3 = \mathbf{0.06 \text{ yd}^3}$$

$$\text{Total} = \mathbf{0.18 \text{ yd}^3}$$

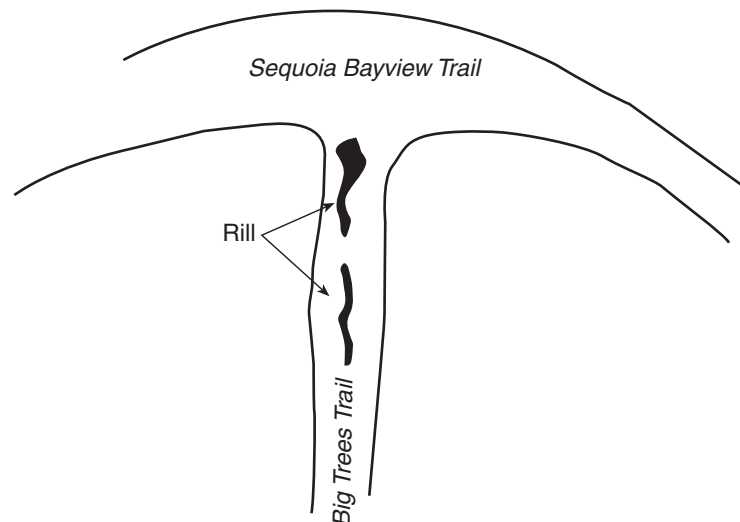
Potential for future erosion (low, moderate, high): Low

Ease of access for repair crew: Easy access at the junction of Sequoia Bayview Trail and Big Trees Trail

Priority for repair (low, moderate, high): Low

Potential mitigation: None. Future rill development is limited by shallow bedrock conditions.

Sketch:



FIELD DATA SHEET
EROSION FEATURES ON TRAILS AND WATERCOURSES

Feature Number: 19

Date: 6/16/2000

Initials: RDK

Location of feature: Big Trees Trail south of Redwood Glen, a low spot in the trail where it crosses a small swale.

Type of erosion feature and description: Small rills (one on north side of swale and one on south side of swale). The site is at the top of the drainage basin. Surface water flow over the compacted trail appears to be the primary cause of rill development.

Volume of past erosion (length X width X depth):

$$30\text{ft} \times 1.5\text{ft} \times 0.2\text{ft} = 9 \text{ ft}^3 = \mathbf{0.3 \text{ yd}^3}$$

$$10\text{ft} \times 1\text{ft} \times 0.2 = 2 \text{ ft}^3 = \mathbf{0.07 \text{ yd}^3}$$

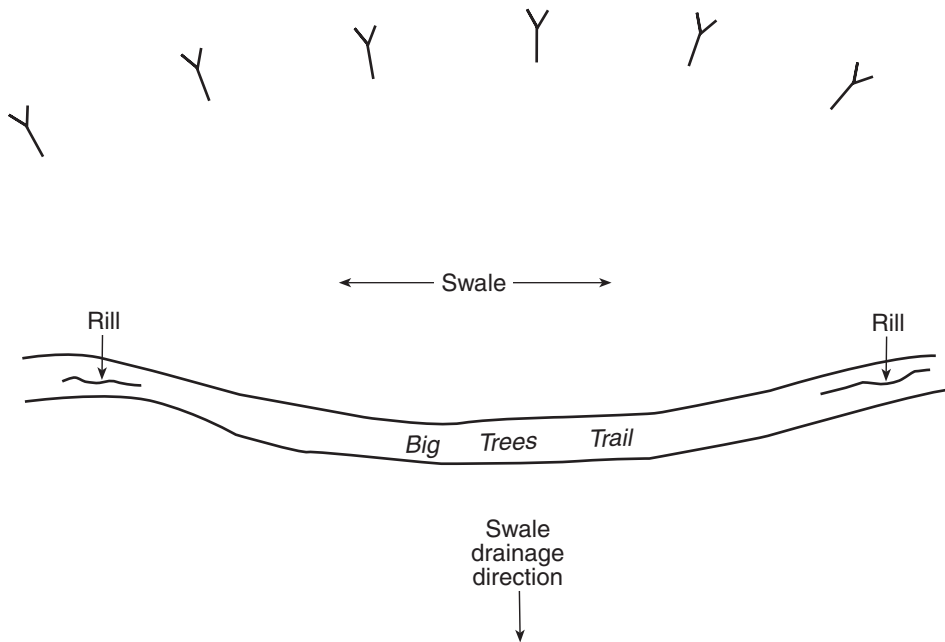
Potential for future erosion (low, moderate, high): Low

Ease of access for repair crew: Easy access from Skyline Boulevard. Use of heavy equipment is possible.

Priority for repair (low, moderate, high): Low

Potential mitigation: No immediate action is needed. Site could be regraded to remove rills.

Sketch:



FIELD DATA SHEET
EROSION FEATURES ON TRAILS AND WATERCOURSES

Feature Number: 20A and 20B

Date: 6/16/2000

Initials: RDK

Location of feature: Big Trees Trail approximately 800 ft downslope from feature # 19.
(Big Trees trail is very close to Skyline Boulevard at this site).

Type of erosion feature and description: Large grooves. The trail has a series of tight switchbacks. There is one large groove on two consecutive corners. The soil is soft redwood soil. The groove appears to have been dug by bikes braking on a tight corner. Fluvial erosion does not appear to be enlarging the grooves

Volume of past erosion (length X width X depth):

$$12\text{ft} \times 1.5\text{ft} \times 0.3\text{ft} = 5.4 \text{ ft}^3 = \mathbf{0.2 \text{ yd}^3}$$

$$6\text{ft} \times 1\text{ft} \times 0.3\text{ft} = 1.8 \text{ ft}^3 = \mathbf{0.07 \text{ yd}^3}$$

$$\text{Total} = \mathbf{0.09 \text{ yd}^3}$$

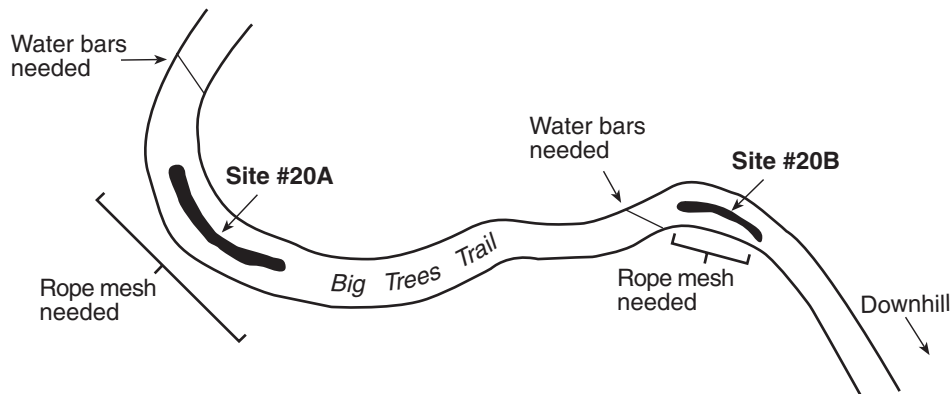
Potential for future erosion (low, moderate, high): High

Ease of access for repair crew: Easy access on Big Trees Trail. Heavy equipment not possible.

Priority for repair (low, moderate, high): High

Potential mitigation: Install rope mesh in and around the existing rills. This will serve as a sediment retainer and prevent the rills from growing larger. Also a water bar at the top of each feature would prevent water from feeding the rill. Alternatively, rills can be filled with gravel.

Sketch:



FIELD DATA SHEET
EROSION FEATURES ON TRAILS AND WATERCOURSES

Feature Number: 27

Date: 7/07/2000

Initials: RDK

Location of feature: Approximately 150 ft uphill from the junction of Siniwick Loop and Siniwick Trail. Feature is on Siniwick Loop Trail.

Type of erosion feature and description: Rill, upslope from exposed rocks. The rill is caused by water running down the steep trail. Bicycles may brake before the rocks which may contribute to rill development.

Volume of past erosion (length X width X depth):

$$30\text{ft} \times 0.6\text{ft} \times 0.2\text{ft} = 3.6 \text{ ft}^3 = 0.1 \text{ yd}^3$$

Potential for future erosion (low, moderate, high): Low

Ease of access for repair crew: Easy access on Siniwick Loop Trail.

Priority for repair (low, moderate, high): Low. Small volume of expected future erosion.

Potential mitigation: A sediment retention structure would prevent future rill development by trapping sediment.

Sketch:

