

APPENDIX C - Aquatic Habitat

The following are National Marine Fisheries Service Matrices of Factors and Indicators used to document baseline stream and watershed conditions. For a discussion of the applicability of these indicators see Step 5, Riparian Areas.

Listed below are the 7th Field Watersheds in Horse Creek for which Matrix's have been completed.

Lower Horse
Upper Horse
Collins/Lime
Middle Creek
Buckhorn Creek
Kohl/Dona
Doggett

There is insufficient data available at this time to complete Matrix's for the Quigley and Blue Heron watersheds.

CHECKLIST FOR DOCUMENTING ENVIRONMENTAL BASELINE AND EFFECTS OF PROPOSED ACTION(S) ON RELEVANT INDICATORS

<u>Pathways:</u> INDICATORS	ENVIRONMENTAL BASELINE 7th Field			EFFECTS OF THE ACTION(S) 7th Field		
	<u>Lower Horse Creek</u> Mouth to Salt Gulch			<u>Lower Horse Creek</u> Mouth to Salt Gulch		
	PROPERLY FUNCT	AT RISK	NOT PROP FUNCT	RESTORE	MAINTAIN	DEGRADE
<u>Water Quality</u> Temperature	Temp data					
Sediment			WA SCI			
Chemical Contam	PJ					
<u>Habitat Access</u> Physical Barrier		SCI				
<u>Habitat Elements</u> Substrate		WA SCI				
LWD			SCI, WA			
Pool Frequency			WA, SCI SP98, FR			
Pool Quality			WA SCI			
Off-channel Habitat	N/A					

Refugia	WA					
<u>Channel Cond & Dynamics</u>	WA					
Streambank Cond.	SCI, WA					
Floodplain Cond.	WA					
<u>Flow /Hydrology</u>						
Peak/Base Flow	WA					
Drainage Net Incls	WA					
<u>Watershed Cond.</u>						
Road Dens/Loc	WA					
Disturbance History	WA					
Riparian Reserves	WA					

SCI: Horse Creek Stream Channel Condition Inventory (1989-90), USFS (Klamath National Forest) – Oak Knoll Ranger District.

WA: Horse Creek Watershed Analysis 2002, USFS (Klamath National Forest) – Scott River Ranger District

PJ: Professional Judgement.

Temp Data: Temperature monitoring data for Horse Creek and Middle Creek. 1989-90 SCI Surveys, USFS (Klamath National Forest) – Oak Knoll Ranger District

SP98: Fall Chinook Spawning Surveys 1998, USFS (Klamath National Forest) – Scott River Ranger District.

N/A: Not Applicable. The Rosgen Channel Type and gradients found within the Horse Creek Watershed do not support this type of habitat.

FR: Field review of Lower Horse Creek (Bill Hunt-Fisheries, NMFS 2002)

Lower Horse Environmental Baseline Elements:

Temperature: Percent average shade from SCI (1989) is 56%, which is below the Forest Standard. Past temperatures (temp monitoring data from 1990's, USFS-Oak Knoll Ranger District) for Horse Creek have been recorded in the high 50's to low 60's from July to October, which is within the desired range. Temperature monitoring done in Middle Creek and other tributaries in this watershed show maximum temperatures in the low 60's.

Sediment: The 1989 SCI data showed a %fines value of 20.4%, and an embeddedness value of 36% for this reach. This 7th Field watershed is 5.5% roaded at a density of 4.07 miles/square mi (**the road density does not include state or county roads**). It was burned in both the 1977 and 1987 fires and consists of granitic soils. ERA/TOC = 0.61 (52% from roads, 11% from harvest), (Horse Creek WA). The watershed has high fisheries values, containing Chinook salmon, coho salmon and steelhead trout populations. The resident fisheries values are also high due to the number of tributaries containing resident rainbow trout populations.

ERA/TOC provides a simplified accounting system for tracking disturbances that affect watershed processes, in particular, estimates in changes in peak runoff flows influenced by disturbance activities. This model is not intended to be a process-based sediment model, however it does provide an indicator of watershed conditions. This model compares the current level of disturbance within a given watershed (expressed as %ERA) with the theoretical maximum disturbance level acceptable (expressed as %TOC – threshold of concern). ERA/TOC (or "risk ratio") estimates the level of hydrological disturbance or relative risk of increased peak flows and

consequent potential for channel alteration and general adverse watershed impacts. TOC is calculated based on channel sensitivity, beneficial uses, soil erodibility, hydrologic response, and slope stability. An ERA/TOC ratio of greater than 1.00 indicates that disturbance levels have exceeded the natural capacity of the watershed to “absorb” these disturbances. A basin is assumed to be healthy again as soon as sub-threshold ERA values are re-attained.

Chemical contamination: No or little opportunity for chemical contamination to occur (PJ).

Physical Barriers: 1989-90 SCI surveys noted several man-made barriers in the lower section of Horse Creek. The most notable is a dam (Gary Rainy) made by a Cat Tractor which crosses the entire creek in the lower one-half mile. This dam is built up in May, restricting fish migration upstream and is breached in early fall to allow Horse Creek to flow through and allows fish passage.

Substrate: ERA/TOC = 0.61, road density of 4.07 mi/sq. mi., The streambed substrate in Lower Horse Creek is cobble, boulders and gravel (Horse Creek WA, 1989 SCI Data). Average embeddedness value of 36%, and average %fines of 20.4% (Horse Creek WA, 1989 SCI Data).

Lower Horse Environmental Baseline Elements: (continued)

LWD: 1989 SCI Survey indicate that Lower Horse Creek contains an average of 6 pieces of LWD per mile which is below Forest standards and properly functioning condition. The smaller tributaries may have adequate amounts of LWD but have not been surveyed. Past timber harvest activities in the watershed is affecting future LWD recruitment (Horse Creek WA).

Pool Frequency: 1989 SCI surveys showed primary pool frequency of 0.37 pools per 300 meters. From fall spawning surveys conducted in 1998 by crews familiar with this section of stream, little change from the 1997 flood was observed (SP98). The system has been recovering from the 1964 flood and subsequent smaller floods in the 1970's (Horse Creek WA).

Physical characteristics of the stream system make it unlikely that pools of 36+” depth will be created (Hunt, field review). Therefore, the stream is considered to be functioning within its physical capabilities.

Pool Quality: ERA/TOC value of 0.61, road density of 4.07 sq. mi./mi. Less than 30% of the pools in Lower Horse Creek have a max depth of 3 feet or greater. Avg. % fine = 20.4% (Horse Creek WA, 1989 SCI Data).

Off-Channel Habitat: This channel system does not have the features for off-channel habitat to develop.

Refugia: The watershed has high fisheries values, containing Chinook salmon, coho salmon and steelhead trout populations. Important spawning reach for fall chinook salmon (Horse Creek WA).

W/D Ratio: Ratio for Lower Horse Creek ranges from 20 to 30. Rosgen stream types B to C (1989 SCI Data). ERA/TOC = 0.61, road density of 4.07 sq. mi./mi., avg. % fine = 20.4% (Horse Creek WA).

Streambank condition: ERA/TOC = 0.61, road density of 4.07 sq. mi./mi, Avg. % fine = 20.4%. The streambank is composed of bedrock, large boulder, and cobble (Horse Creek WA, 1989 SCI Data).

Floodplain condition: ERA/TOC = 0.61, road density of 4.07 sq. mi./mi. The floodplain in Lower Horse Creek has been disturbed by past mining activities. Avg. % fine = 20.4% (Horse Creek WA).

Peak Base Flow: ERA/TOC = 0.61, road density of 4.07 sq. mi./mi. The watershed has high fisheries values, containing Chinook salmon, coho salmon and steelhead trout populations (Horse Creek WA).

Drainage Network Increase: Road density = 4.07 sq. mi./mi (Horse Creek WA).

Road density/Location: 7th field is 5.5% roaded, road density = 4.07 sq. mi./mi (Horse Creek WA)

Disturbance History: ERA/TOC = 0.61 (52% from roads, 11% from harvest), road density = 4.07 sq. mi./mi (Horse Creek WA).

Riparian Reserves: This area was impacted by historic mining (mainly on Lower Horse Creek). The riparian vegetation is recovering to site potential in the mined over areas as well as those burned in 1977 and 1987-tributaries to Horse Creek (Horse Creek WA).

Pathways: INDICATORS	ENVIRONMENTAL BASELINE 7th Field			EFFECTS OF THE ACTION(S)		
	<u>Upper Horse</u> Salt Gulch to Headwaters			<u>Upper Horse</u> Salt Gulch to Headwaters		
	PROPERLY FUNCT	NOT PROP AT RISK	FUNCT	RESTORE	MAINTAIN	DEGRADE
<u>Water Quality</u> Temperature	Temp data					
Sediment			WA, SCI			
Chemical Contam.	PJ					
<u>Habitat Access</u> Physical Barrier	SCI					
<u>Habitat Elements</u> Substrate		SCI, WA				
LWD			SCI			
Pool Frequency			WA, SCI STH			
Pool Quality		WA, SCI				
Off-channel Habitat	N/A					
Refugia	WA					
<u>Channel Cond & Dynamics</u> W/D Ratio	WA					
Streambank Condition	WA, SCI					
Floodplain Connectivity	WA					
<u>Flow /Hydrology</u> Peak/Base Flow		WA				
Drainage Net Increase		WA				
<u>Watershed Cond.</u> Road Dens/Loc		WA				

Disturbance History		WA				
Riparian Reserves		WA				

1989 SCI: Horse Creek Stream Channel Condition Inventory, 1989. USFS (Klamath National Forest) - Oak Knoll Ranger District

WA: Horse Creek Watershed Analysis, 2002. USFS (Klamath National Forest) – Scott River Ranger District.

PJ: Personal Judgement

Temp Data: Temperature monitoring data for Horse Creek and Middle Creek. 1989-90 SCI Surveys, USFS Klamath National Forest – Oak Knoll Ranger District

STH: Steelhead Spawning Surveys 2002, USFS (Klamath National Forest) – Scott River Ranger District

N/A: Not Applicable. The Rosgen Channel Type and gradients found within the Horse Creek Watershed do not support this type of habitat.

Lower Horse Environmental Baseline Elements:

Temperature: Percent average shade from SCI (1989) is 55.3%, which is below the Forest Standard. Past temperatures (temp monitoring data from 1989-90) for Horse Creek have been recorded in the high 50's to low 60's, which is within the desired range.

Sediment: The 1989 SCI data showed a %fines value of 17%, and an embeddedness value of 47.2% for this reach. This 7th Field watershed is 4.7% roaded at a density of 3.13 miles/square mi (**the road density does not include state or county roads**). It was burned in both the 1977 and 1987 fires and consists of granitic soils. ERA/TOC = 0.59 (56% from roads, 4% from harvest). The watershed has high fisheries values, containing steelhead trout populations. The resident fisheries values are also high due to the number of tributaries containing resident rainbow trout populations (Horse Creek WA).

ERA/TOC provides a simplified accounting system for tracking disturbances that affect watershed processes, in particular, estimates in changes in peak runoff flows influenced by disturbance activities. This model is not intended to be a process-based sediment model, however it does provide an indicator of watershed conditions. This model compares the current level of disturbance within a given watershed (expressed as %ERA) with the theoretical maximum disturbance level acceptable (expressed as %TOC – threshold of concern). ERA/TOC (or “risk ratio”) estimates the level of hydrological disturbance or relative risk of increased peak flows and consequent potential for channel alteration and general adverse watershed impacts. TOC is calculated based on channel sensitivity, beneficial uses, soil erodibility, hydrologic response, and slope stability. An ERA/TOC ratio of greater than 1.00 indicates that disturbance levels have exceeded the natural capacity of the watershed to “absorb” these disturbances. A basin is assumed to be healthy again as soon as sub-threshold ERA values are re-attained.

Chemical contamination: No or little opportunity for chemical contamination to occur (PJ).

Physical Barriers: 1989 SCI surveys noted no man-made barriers in the upper section of Horse Creek.

Substrate: ERA/TOC = 0.59, road density of 3.13 mi/sq. mi (Horse Creek WA). , The streambed substrate in Upper Horse Creek is boulders, cobble and gravel. Average embeddedness value of 47.2%, and average %fines of 17% (1989 SCI Data).

LWD: 1989 SCI Survey indicate that Upper Horse Creek contains an average of 6 pieces of LWD per mile which is below Forest standards and properly functioning condition. If the NMFS criteria for LWM on the East side is used, then this section of Horse Creek meets the NMFS criteria for LWM. The smaller tributaries may have adequate amounts of LWD but have not been surveyed.

Lower Horse Environmental Baseline Elements: (continued)

Pool Frequency: 1989 SCI surveys showed primary pool frequency of 2.13 pools per 300 meters. From steelhead spawning surveys conducted in 2002 by crews familiar with this section of stream, little change from the 1997 flood was observed (Steelhead Spawning Surveys 2002) . The system has been recovering from the 1964 flood and subsequent smaller floods in the 1970's (Horse Creek WA).

Pool Quality: ERA/TOC value of 0.59, road density of 3.13 sq. mi./mi. Less than 50% of the pools in Upper Horse Creek have a max depth of 3 feet or greater. Avg. % fine = 17% (Horse Creek WA, 1989 SCI Data).

Off-Channel Habitat: This channel system does not have the features for off-channel habitat to develop.

Refugia: The watershed has high fisheries values, containing steelhead trout populations (Horse Creek WA).

W/D Ratio: Ratio for Upper Horse Creek is 18.70. ERA/TOC = 0.59, road density of 3.13 sq. mi./mi., avg. % fine = 17% (Horse Creek WA).

Streambank condition: ERA/TOC = 0.59, road density of 3.13 sq. mi./mi, Avg. % fine = 17%. Streambank is composed of bedrock, large boulder, and cobble (Horse Creek WA, 1989 SCI Data).

Floodplain condition: ERA/TOC = 0.59, road density of 3.13 sq. mi./mi. The floodplain in Upper Horse Creek has been disturbed by past mining activities. Avg. % fine = 17% (Horse Creek WA).

Peak Base Flow: ERA/TOC = 0.59, road density of 3.13 sq. mi./mi. The watershed has high fisheries values, containing steelhead trout populations (Horse Creek WA).

Drainage Network Increase: Road density = 3.13 sq. mi./mi (Horse Creek WA).

Road density/Location: 7th field is 4.7% roaded, road density = 3.13 sq. mi./mi (Horse Creek WA).

Disturbance History: ERA/TOC = 0.59 (56% from roads, 4% from harvest), road density = 3.13 sq. mi./mi (Horse Creek WA).

Riparian Reserves: This area was impacted by historic mining (mainly on Lower Horse Creek). The riparian vegetation is recovering to site potential in the mined over areas as well as those burned in 1977 and 1987 (tributaries to Horse Creek) (Horse Creek WA).

<u>Pathways:</u> INDICATORS	ENVIRONMENTAL BASELINE <u>7th Field</u> <u>Middle Creek</u> Mouth to Headwaters			EFFECTS OF THE ACTION(S) <u>Middle Creek</u> Mouth to Headwaters		
	PROPERLY FUNCT	AT RISK	NOT PROP FUNCT	RESTORE	MAINTAIN	DEGRADE
<u>Water Quality</u> Temperature		Temp data				
Sediment			WA 1989 SCI			
Chemical Contam	PJ					
<u>Habitat Access</u> Physical Barrier	2002 Surveys					
<u>Habitat Elements</u> Substrate	1989 SCI					

LWD		1989 SCI				
Pool Frequency			WA 1989 SCI			
Pool Quality		WA 1989 SCI				
Off-channel Habitat	N/A					
Refugia	WA					
<u>Channel Cond & Dynamics</u>	WA					
Streambank Cond.	1989 SCI					
Floodplain Cond.		WA				
<u>Flow /Hydrology</u>		WA				
Peak/Base Flow		WA				
Drainage Net Incrs		WA				
<u>Watershed Cond.</u>		WA				
Road Dens/Loc		WA				
Disturbance History		WA				
Riparian Reserves		WA				

2002 Steelhead Redd Surveys (USFS – Klamath NF; Scott River RD)

1989 SCI: Horse Creek Stream Channel Condition Inventory, 1989 (USFS – Klamath NF; Oak Knoll RD)

WA: Horse Creek Watershed Analysis, 2002 (USFS – Klamath NF; Scott River RD).

PJ: Personal Judgement

Temp Data: Temperature monitoring data for Horse Creek and Middle Creek, early 1990's (USFS – Klamath NF; Oak Knoll RD).

N/A: Not Applicable. The Rosgen Channel Type and gradients found within the Horse Creek Watershed do not support this type of habitat.

Middle Creek Environmental Baseline Elements:

Temperature: Percent average shade from SCI (1989) is 55.3%, which is below the Forest Standard. Past temperatures (temp monitoring data from 1990's) for Middle Creek have been recorded in the high 50's to low 60's, which is within the desired range.

Sediment: The 1989 SCI data showed a %fines value of 18%, and an embeddedness value of 42.3% for the section of Horse Creek downstream from the Middle Creek confluence. This 7th Field watershed is 6.1% roaded at a density of 5.6 miles/square mi (**the road density does not include state or county roads**). It was burned in both the 1977 and 1987 fires and consists of granitic soils. ERA/TOC = 0.76 (67% from roads, 4% from harvest). The watershed has high fisheries values, containing steelhead trout populations. The resident fisheries values are also high due to the number of tributaries containing resident rainbow trout populations. ERA/TOC provides a simplified accounting system for tracking disturbances that affect watershed processes, in

particular, estimates in changes in peak runoff flows influenced by disturbance activities. This model is not intended to be a process-based sediment model, however it does provide an indicator of watershed conditions. This model compares the current level of disturbance within a given watershed (expressed as %ERA) with the theoretical maximum disturbance level acceptable (expressed as %TOC – threshold of concern). ERA/TOC (or “risk ratio”) estimates the level of hydrological disturbance or relative risk of increased peak flows and consequent potential for channel alteration and general adverse watershed impacts. TOC is calculated based on channel sensitivity, beneficial uses, soil erodibility, hydrologic response, and slope stability. An ERA/TOC ratio of greater than 1.00 indicates that disturbance levels have exceeded the natural capacity of the watershed to “absorb” these disturbances. A basin is assumed to be healthy again as soon as sub-threshold ERA values are re-attained.

Chemical contamination: No or little opportunity for chemical contamination to occur.

Physical Barriers: 2002 steelhead redd surveys noted no man-made barriers in Middle Creek.

Substrate: ERA/TOC = 0.76, road density of 5.6 mi/sq. mi., The streambed substrate in Horse Creek downstream of the Middle Creek confluence is cobble, boulders, and gravel. Average embeddedness value of 42.3%, and average %fines of 18%.

LWD: 2002 steelhead spawning surveys noted that Middle Creek contains an average of 5 pieces of LWD per mile which is below Forest standards and properly functioning condition. If the NMFS criteria for LWM on the East side is used, then this section of Middle Creek surveyed meets the NMFS criteria for LWM. The upper sections of Middle Creek and the smaller tributaries may have adequate amounts of LWD but have not been surveyed.

Lower Horse Environmental Baseline Elements: (continued)

Pool Frequency: 1989 SCI surveys showed primary pool frequency of 2.13 pools per 300 meters in the section of Horse Creek downstream from the Middle Creek confluence. From steelhead spawning surveys conducted in 2002 by crews familiar with this section of stream, little change from the 1997 flood was observed. The system has been recovering from the 1964 flood and subsequent smaller floods in the 1970's.

Pool Quality: ERA/TOC value of 0.76, road density of 5.60 sq. mi./mi. Less than 50% of the pools in the section of Horse Creek downstream from the Middle Creek confluence have a max depth of 3 feet or greater. Avg. % fine = 17%.

Off-Channel Habitat: This channel system does not have the features for off-channel habitat to develop.

Refugia: The watershed has high fisheries values, containing steelhead trout populations.

W/D Ratio: Ratio for the section of Horse Creek downstream from the Middle Creek confluence is 18.70. ERA/TOC = 0.76, road density of 5.60 sq. mi./mi., avg. % fine = 17%.

Streambank condition: ERA/TOC = 0.76, road density of 5.60 sq. mi./mi, Avg. % fine = 17%. Streambank is composed of bedrock, large boulder, and cobble.

Floodplain condition: ERA/TOC = 0.76, road density of 5.60 sq. mi./mi. The floodplain in Middle Creek and Horse Creek downstream of the Middle Creek confluence has been disturbed by past mining activities. Avg. % fine = 17%.

Peak Base Flow: ERA/TOC = 0.76, road density of 5.60 sq. mi./mi. The watershed has high fisheries values, containing steelhead trout populations.

Drainage Network Increase: Road density = 5.60 sq. mi./mi.

Road density/Location: 7th field is 6.1% roaded, road density = 5.60 sq. mi./mi

Disturbance History: ERA/TOC = 0.76 (67% from roads, 4% from harvest), road density = 5.60 sq. mi./mi.

Riparian Reserves: This area was impacted by historic mining (mainly on Lower Horse Creek). The riparian vegetation is recovering to site potential in the mined over areas as well as those burned in 1977 and 1987 (tributaries to Horse Creek).

<u>Pathways:</u> INDICATORS	ENVIRONMENTAL BASELINE <u>Buckhorn</u> 7 th Field			EFFECTS OF THE ACTION(S) <u>Buckhorn</u> 7 th Field		
	PROPERLY PROP		NOT	RESTORE	MAINTAIN	DEGRADE
<u>Water Quality</u> Temperature						
Sediment		WA				
Chemical Contam	WA, HCW, PJ					
<u>Habitat Access</u> Physical Barrier	WA, HCW					
<u>Habitat Elements</u> Substrate		WA, HCW				
LWD						
Pool Frequency			PJ			
Pool Quality			WA			
Off-channel Habitat	N/A					
Refugia	WA					
<u>Channel Cond & Dyn</u> W/D Ratio						
Streambank Cond.						
Floodplain Cond.						
<u>Flow /Hydrology</u> Peak/Base Flow		WA				
Drainage Net Incrs		WA				
<u>Watershed Cond.</u> Road Dens/Loc		WA				
Disturbance History		WA				
Riparian Reserves		WA				

Buckhorn 7th Field Environmental Baseline Elements:

Note: All data is compared to the Mid-Klamath River Tributaries Matrix of Factors and Indicators. Referred hereafter as "Klamath matrix"

HCW: 2001 Horse Creek Watershed Assessment (USFS – Klamath NF; Scott River RD).

WA: Horse Creek Watershed Analysis, 2002 (USFS – Klamath NF; Scott River RD).

PJ: Personal Judgment.

N/A: Not Applicable. The Rosgen Channel Type and gradients found within the Horse Creek Watershed do not support this type of habitat.

Buckhorn Environmental Baseline Elements:

Temperature: No temp monitoring data present.

Sediment: This 7th Field watershed is 5.9% roaded at a density of 4.38 miles/square mi (**the road density does not include state or county roads**). It was burned in both the 1977 and 1987 fires and consists of granitic soils. ERA/TOC = 0.79 (Horse Creek WA). The watershed is an AWWC. It has high fisheries values, containing steelhead trout in the lower 0.5 miles. The resident fisheries values are also high due to the stream containing resident rainbow trout populations in the lower 2.2 miles (Horse Creek Watershed Assessment)

The Buckhorn Creek Watershed produces an estimated 967 cubic yards of sediment per year from surface erosion, which is 808% over the background level. The landslide sediment potential is 125% over background (Horse Creek WA).

ERA/TOC provides a simplified accounting system for tracking disturbances that affect watershed processes, in particular, estimates in changes in peak runoff flows influenced by disturbance activities. This model is not intended to be a process-based sediment model, however it does provide an indicator of watershed conditions. This model compares the current level of disturbance within a given watershed (expressed as %ERA) with the theoretical maximum disturbance level acceptable (expressed as %TOC – threshold of concern). ERA/TOC (or "risk ratio") estimates the level of hydrological disturbance or relative risk of increased peak flows and consequent potential for channel alteration and general adverse watershed impacts. TOC is calculated based on channel sensitivity, beneficial uses, soil erodibility, hydrologic response, and slope stability. An ERA/TOC ratio of greater than 1.00 indicates that disturbance levels have exceeded the natural capacity of the watershed to "absorb" these disturbances. A basin is assumed to be healthy again as soon as sub-threshold ERA values are re-attained.

Chemical contamination: No or little opportunity for chemical contamination to occur. No indications of contamination are stated in the Horse Creek Watershed Analysis or in the Horse Creek Watershed Assessment).

Physical Barriers: No man-made barriers in Buckhorn Creek were noted (Horse Creek WA, Horse Creek Watershed Assessment).

Substrate: ERA/TOC = 0.79, road density of 4.38 mi/sq. mi (Horse Creek WA). No actual numbers are available from the surveys, only overall descriptions.

LWD: The Horse Creek Watershed Assessment does not include LWD data. No data currently available.

Buckhorn Creek Environmental Baseline Elements: (continued)

Pool Frequency: Due to the small size of the stream channel and the shallow average depth, pools 3' deep or greater are unlikely to form (PJ).

The system has been recovering from the 1964 flood and subsequent smaller floods in the 1970's (Horse Creek WA).

Pool Quality: ERA/TOC value of 0.79. Road density of 4.38 sq. mi./mi (Horse Creek WA). See comments

above on Pool Frequency.

Off-Channel Habitat: This channel system does not have the features for off-channel habitat to develop (PJ).

Refugia: The watershed has high fisheries values, containing steelhead trout populations (Horse Creek WA).

W/D Ratio: ERA/TOC = 0.79, road density of 4.38 sq. mi./mi (Horse Creek WA). No data currently available.

Streambank condition: ERA/TOC = 0.79, road density of 4.38 sq. mi./mi (Horse Creek WA). No data currently available.

Floodplain condition: ERA/TOC = 0.79, road density of 4.38 sq. mi./mi (Horse Creek WA). No data currently available.

Peak Base Flow: ERA/TOC = 0.79 road density of 4.38 sq. mi./mi. The watershed has high fisheries values, containing steelhead trout populations (Horse Creek WA). Flow figures in volume/unit time are not available.

Drainage Network Increase: Road density = 4.38 sq. mi./mi (Horse Creek WA).
Almost every road in the drainage is insloped with a drainage ditch running alongside, extending the drainage lengths dramatically.

Road density/Location: 7th field is 5.9% roaded, road density = 4.38 sq. mi./mi (Horse Creek WA).

Disturbance History: ERA/TOC = 0.79, road density = 4.38 sq. mi./mi. Road distribution is very dense. Surface erosion is 802% over the background level due to current road density and past timber harvest activities. The landslide sediment potential is low at 125% over background. Combined CWE index is 0.74 (Horse Creek WA).

Riparian Reserves: The overall health of the riparian system is good, however, the potential for recruitment of LWD is poor for several years to come, since the watershed was heavily burned and salvaged in the late 1970's (Horse Creek WA).

<u>Pathways:</u> INDICATORS	ENVIRONMENTAL BASELINE <u>Collins/Lime</u> 7 th Field			EFFECTS OF THE ACTION(S) <u>Collins/Lime</u> 7 th Field		
	PROPERLY FUNCT	AT RISK	NOT PROP FUNCT	RESTORE	MAINTAIN	DEGRADE
<u>Water Quality</u> Temperature						
Sediment		WA				
Chemical Contam	WA, HCW, PJ					
<u>Habitat Access</u> Physical Barrier			WA			
<u>Habitat Elements</u> Substrate		WA, HCW				
LWD						
Pool Frequency			PJ			
Pool Quality			WA			

Off-channel Habitat	N/A					
Refugia	WA, FR					
<u>Channel Cond & Dyn</u> W/D Ratio						
Streambank Cond.						
Floodplain Cond.						
<u>Flow /Hydrology</u> Peak/Base Flow		WA				
Drainage Net Incrs		WA				
<u>Watershed Cond.</u> Road Dens/Loc		WA				
Disturbance History		WA				
Riparian Reserves						

Collins/Lime 7th Field Environmental Baseline Elements:

Note: All data is compared to the Mid-Klamath River Tributaries Matrix of Factors and Indicators. Referred hereafter as "Klamath matrix"

HCW: 2001 Horse Creek Watershed Assessment (USFS – Klamath NF; Scott River RD).

WA: Horse Creek Watershed Analysis, 2002 (USFS – Klamath NF; Scott River RD).

PJ: Personal Judgment.

N/A: Not Applicable. The Rosgen Channel Type and gradients found within the Horse Creek Watershed do not support this type of habitat.

Collins/Lime Environmental Baseline Elements:

Temperature: No temp monitoring data present.

Sediment: This 7th Field watershed is 3.80% roaded at a density of 3.37 miles/square mi (**the road density does not include state or county roads**). It was burned in both the 1977 and 1987 fires and consists of granitic soils. ERA/TOC = 0.36 (Horse Creek WA). The watershed is an AWWC. It has high fisheries values, containing steelhead trout in the section of Collins Creek below the dam blockage. The resident fisheries values are also high due to the stream containing resident rainbow trout populations in the lower 2.0 miles (Horse Creek Watershed Assessment)

The Collins/Lime Watershed produces an estimated 503 cubic yards of sediment per year from surface erosion, which is 741% over the background level. The landslide sediment potential is 144% over background (Horse Creek WA).

ERA/TOC provides a simplified accounting system for tracking disturbances that affect watershed processes, in particular, estimates in changes in peak runoff flows influenced by disturbance activities. This model is not intended to be a process-based sediment model, however it does provide an indicator of watershed conditions. This model compares the current level of disturbance within a given watershed (expressed as %ERA) with the theoretical maximum disturbance level acceptable (expressed as %TOC – threshold of concern). ERA/TOC (or

“risk ratio”) estimates the level of hydrological disturbance or relative risk of increased peak flows and consequent potential for channel alteration and general adverse watershed impacts. TOC is calculated based on channel sensitivity, beneficial uses, soil erodibility, hydrologic response, and slope stability. An ERA/TOC ratio of greater than 1.00 indicates that disturbance levels have exceeded the natural capacity of the watershed to “absorb” these disturbances. A basin is assumed to be healthy again as soon as sub-threshold ERA values are re-attained.

Chemical contamination: No or little opportunity for chemical contamination to occur. No indications of contamination are stated in the Horse Creek Watershed Analysis or in the Horse Creek Watershed Assessment).

Physical Barriers: There is a dam in Lower Collins Creek which is a barrier to anadromous fish migration (Horse Creek WA).

Substrate: ERA/TOC = 0.36, road density of 3.37 mi/sq. mi (Horse Creek WA). No actual numbers are available from the surveys, only overall descriptions.

LWD: The Horse Creek Watershed Assessment does not include LWD data. No data currently available.

Collins/Lime Environmental Baseline Elements: (continued)

Pool Frequency: Due to the small size of the stream channel and the shallow average depth, pools 3' deep or greater are unlikely to form (PJ).

The system has been recovering from the 1964 flood and subsequent smaller floods in the 1970's (Horse Creek WA).

Pool Quality: ERA/TOC value of 0.36. Road density of 3.37 sq. mi./mi (Horse Creek WA). See comments above on Pool Frequency.

Off-Channel Habitat: This channel system does not have the features for off-channel habitat to develop (PJ).

Refugia: The watershed has high fisheries values, containing steelhead trout populations (Horse Creek WA).

W/D Ratio: ERA/TOC = 0.36, road density of 3.37 sq. mi./mi (Horse Creek WA). No data currently available.

Streambank condition: ERA/TOC = 0.36, road density of 3.37 sq. mi./mi (Horse Creek WA). No data currently available.

Floodplain condition: ERA/TOC = 0.36, road density of 3.37 sq. mi./mi (Horse Creek WA). No data currently available.

Peak Base Flow: ERA/TOC = 0.36 road density of 3.37 sq. mi./mi. The watershed has high fisheries values, containing steelhead trout populations (Horse Creek WA). Flow figures in volume/unit time are not available.

Drainage Network Increase: Road density = 3.37 sq. mi./mi (Horse Creek WA). Almost every road in the drainage is insloped with a drainage ditch running alongside, extending the drainage lengths dramatically.

Road density/Location: 7th field is 3.80% roaded, road density = 3.37 sq. mi./mi (Horse Creek WA).

Disturbance History: ERA/TOC = 0.36, road density = 3.37 sq. mi./mi. Road distribution is very dense. Surface erosion is 741% over the background level due to current road density and past timber harvest activities. The landslide sediment potential is low at 144% over background. Combined CWE index is 0.64 (Horse Creek WA).

Riparian Reserves: No data currently available.

Pathways: INDICATORS	ENVIRONMENTAL BASELINE <u>Doggett Creek</u> 7 th Field			EFFECTS OF THE ACTION(S) <u>Doggett Creek</u> 7 th Field		
	PROPERLY FUNCT	AT RISK	NOT PROP FUNCT	RESTORE	MAINTAIN	DEGRADE
<u>Water Quality</u> Temperature						
Sediment		WA				
Chemical Contam	WA, HCW, PJ					
<u>Habitat Access</u> Physical Barrier	WA, HCW					
<u>Habitat Elements</u> Substrate		WA, HCW				
LWD						
Pool Frequency			PJ, WA			
Pool Quality			PJ, WA			
Off-channel Habitat	N/A					
Refugia	WA					
<u>Channel Cond & Dyn</u> W/D Ratio						
Streambank Cond.		WA				
Floodplain Cond.		WA				
<u>Flow /Hydrology</u> Peak/Base Flow		WA				
Drainage Net Incrs		WA				
<u>Watershed Cond.</u> Road Dens/Loc		WA				
Disturbance History		WA				
Riparian Reserves						

Doggett Creek 7th Field Environmental Baseline Elements:

Note: All data is compared to the Mid-Klamath River Tributaries Matrix of Factors and Indicators. Referred hereafter as "Klamath matrix"

HCW: 2001 Horse Creek Watershed Assessment (USFS – Klamath NF; Scott River RD).

WA: Horse Creek Watershed Analysis, 2002 (USFS – Klamath NF; Scott River RD).

PJ: Personal Judgment.

N/A: Not Applicable. The Rosgen Channel Type and gradients found within the Horse Creek Watershed do not support this type of habitat.

Doggett Creek Environmental Baseline Elements:

Temperature: No data available

Sediment: This 7th Field watershed is 7.5% roaded at a density of 5.67 miles/square mi (**the road density does not include state or county roads**). It was burned in both the 1977 and 1987 fires and consists of granitic soils. ERA/TOC = 0.94 (Horse Creek WA). The watershed is an AWWC. It has high fisheries values, containing steelhead trout in the lower 1.8 miles. The resident fisheries values are also high due to the number of tributaries containing resident rainbow trout populations in the lower 3.2 miles (Horse Creek Watershed Assessment)

The Doggett Creek Watershed produces an estimated 732 cubic yards of sediment per year from surface erosion, which is 882% over the background level. The landslide sediment potential is 148% over background (Horse Creek WA).

ERA/TOC provides a simplified accounting system for tracking disturbances that affect watershed processes, in particular, estimates in changes in peak runoff flows influenced by disturbance activities. This model is not intended to be a process-based sediment model, however it does provide an indicator of watershed conditions. This model compares the current level of disturbance within a given watershed (expressed as %ERA) with the theoretical maximum disturbance level acceptable (expressed as %TOC – threshold of concern). ERA/TOC (or “risk ratio”) estimates the level of hydrological disturbance or relative risk of increased peak flows and consequent potential for channel alteration and general adverse watershed impacts. TOC is calculated based on channel sensitivity, beneficial uses, soil erodibility, hydrologic response, and slope stability. An ERA/TOC ratio of greater than 1.00 indicates that disturbance levels have exceeded the natural capacity of the watershed to “absorb” these disturbances. A basin is assumed to be healthy again as soon as sub-threshold ERA values are re-attained.

Chemical contamination: No or little opportunity for chemical contamination to occur. No indications of contamination are stated in the Horse Creek Watershed Analysis or in the Horse Creek Watershed Assessment).

Physical Barriers: No man-made barriers in Doggett Creek were noted (Horse Creek WA, Horse Creek Watershed Assessment).

Substrate: ERA/TOC = 0.94, road density of 5.67 mi/sq. mi (Horse Creek WA). No actual numbers are available from the surveys, only overall descriptions.

LWD: The Horse Creek Watershed Assessment does not include LWD data. No LWD data is currently available for Doggett Creek.

Pool Frequency: Due to the small size of the stream channel and the shallow average depth, pools 3' deep or greater are unlikely to form (PJ).

The system has been recovering from the 1964 flood and subsequent smaller floods in the 1970's (Horse Creek WA).

Pool Quality: ERA/TOC value of 0.94. Road density of 5.67 sq. mi./mi (Horse Creek WA). See comments above on Pool Frequency.

Off-Channel Habitat: This channel system does not have the features for off-channel habitat to develop (PJ).

Refugia: The watershed has high fisheries values, containing steelhead trout populations (Horse Creek WA).

W/D Ratio: ERA/TOC = 0.94, road density of 5.67 sq. mi./mi (Horse Creek WA). No data for W/D Ratio is currently available for Doggett Creek.

Streambank condition: ERA/TOC = 0.94, road density of 5.67 sq. mi./mi (Horse Creek WA). The system has been recovering from the 1964 flood and subsequent smaller floods in the 1970's (Horse Creek WA).

Floodplain condition: ERA/TOC = 0.94, road density of 5.67 sq. mi./mi (Horse Creek WA). No data is currently available for Floodplain condition for Doggett Creek. The system has been recovering from the 1964 flood and subsequent smaller floods in the 1970's (Horse Creek WA).

Peak Base Flow: ERA/TOC = 0.94 road density of 5.67 sq. mi./mi. The watershed has high fisheries values, containing steelhead trout populations (Horse Creek WA). While flow figures in volume/unit time are not available, the 1995 Horse Creek WA yields data on normal runoff (historical) versus the present increased runoff due to timber harvest. The % change in runoff is an increase of 28.8%.

Drainage Network Increase: Road density = 5.67 sq. mi./mi (Horse Creek WA).

Road density/Location: 7th field is 7.5% roaded, road density = 5.67 sq. mi./mi (Horse Creek WA).

Disturbance History: ERA/TOC = 0.94, road density = 5.67 sq. mi./mi. Road distribution is very dense. Surface erosion is 882% over the background level due to current road density and past timber harvest activities. The landslide sediment potential is low at 148% over background. Combined CWE index is 0.90 (Horse Creek WA).

Riparian Reserves: No data currently available for riparian reserves. The watershed is recovering from 1964 flood.

<u>Pathways:</u> INDICATORS	ENVIRONMENTAL BASELINE			EFFECTS OF THE ACTION(S)		
	<u>Kohl/Dona</u> 7 th Field PROPERLY FUNCT	AT RISK	NOT PROP FUNCT	<u>Kohl/Dona</u> 7 th Field RESTORE	MAINTAIN	DEGRADE
<u>Water Quality</u> Temperature						
Sediment		WA				
Chemical Contam	WA, HCW, PJ					
<u>Habitat Access</u> Physical Barrier	WA, HCW					
<u>Habitat Elements</u> Substrate		WA, HCW				
LWD						
Pool Frequency			WA, PJ			
Pool Quality			WA			
Off-channel Habitat	N/A					
Refugia	WA, R					
<u>Channel Cond & Dyn</u> W/D Ratio						
Streambank Cond.		WA				

Floodplain Cond.		WA				
Flow /Hydrology Peak/Base Flow		WA				
Drainage Net Incrs		WA				
Watershed Cond. Road Dens/Loc		WA				
Disturbance History		WA				
Riparian Reserves						

Kohl/Dona 7th Field Environmental Baseline Elements:

Note: All data is compared to the Mid-Klamath River Tributaries Matrix of Factors and Indicators. Referred hereafter as “Klamath matrix”

HCW: 2001 Horse Creek Watershed Assessment (USFS – Klamath NF; Scott River RD).

WA: Horse Creek Watershed Analysis, 2002 (USFS – Klamath NF; Scott River RD).

PJ: Personal Judgment.

N/A: Not Applicable. The Rosgen Channel Type and gradients found within the Horse Creek Watershed do not support this type of habitat.

Kohl/Dona Environmental Baseline Elements:

Temperature: No temp monitoring data present.

Sediment: This 7th Field watershed is 4.3% roaded at a density of 2.55 miles/square mi (**the road density does not include state or county roads**). It was burned in both the 1977 and 1987 fires and consists of granitic soils. ERA/TOC = 0.48 (Horse Creek WA). The watershed is an AWWC. It has high fisheries values, containing steelhead trout in the lower 1.8 miles. The resident fisheries values are also high due to the number of tributaries containing resident rainbow trout populations in the lower 3.2 miles (Horse Creek Watershed Assessment)

The Kohl/Dona Watershed produces an estimated 756 cubic yards of sediment per year from surface erosion, which is 865% over the background level. The landslide sediment potential is 169% over background (Horse Creek WA).

ERA/TOC provides a simplified accounting system for tracking disturbances that affect watershed processes, in particular, estimates in changes in peak runoff flows influenced by disturbance activities. This model is not intended to be a process-based sediment model, however it does provide an indicator of watershed conditions. This model compares the current level of disturbance within a given watershed (expressed as %ERA) with the theoretical maximum disturbance level acceptable (expressed as %TOC – threshold of concern). ERA/TOC (or “risk ratio”) estimates the level of hydrological disturbance or relative risk of increased peak flows and consequent potential for channel alteration and general adverse watershed impacts. TOC is calculated based on channel sensitivity, beneficial uses, soil erodibility, hydrologic response, and slope stability. An ERA/TOC ratio of greater than 1.00 indicates that disturbance levels have exceeded the natural capacity of the watershed to “absorb” these disturbances. A basin is assumed to be healthy again as soon as sub-threshold ERA values are re-attained.

Chemical contamination: No or little opportunity for chemical contamination to occur. No indications of contamination are stated in the Horse Creek Watershed Analysis or in the Horse Creek Watershed Assessment).

Physical Barriers: No man-made barriers in Kohl/Dona were noted (Horse Creek WA, Horse Creek Watershed Assessment).

Substrate: ERA/TOC = 0.48, road density of 2.55 mi/sq. mi (Horse Creek WA). No actual numbers are available from the surveys, only overall descriptions.

LWD: The Horse Creek Watershed Assessment does not include LWD data. No data currently available.

Kohl/Dona Environmental Baseline Elements: (continued)

Pool Frequency: Due to the small size of the stream channel and the shallow average depth, pools 3' deep or greater are unlikely to form (PJ).

The system has been recovering from the 1964 flood and subsequent smaller floods in the 1970's (Horse Creek WA).

Pool Quality: ERA/TOC value of 0.48. Road density of 2.55 sq. mi./mi (Horse Creek WA). See comments above on Pool Frequency.

Off-Channel Habitat: This channel system does not have the features for off-channel habitat to develop (PJ).

Refugia: The watershed has high fisheries values, containing steelhead trout populations (Horse Creek WA).

W/D Ratio: ERA/TOC = 0.48, road density of 2.55 sq. mi./mi (Horse Creek WA). No data currently available. The system has been recovering from the 1964 flood and subsequent smaller floods in the 1970's (Horse Creek WA).

Streambank condition: ERA/TOC = 0.48, road density of 2.55 sq. mi./mi (Horse Creek WA). The system has been recovering from the 1964 flood and subsequent smaller floods in the 1970's (Horse Creek WA).

Floodplain condition: ERA/TOC = 0.48, road density of 2.55 sq. mi./mi (Horse Creek WA). The system has been recovering from the 1964 flood and subsequent smaller floods in the 1970's (Horse Creek WA).

Peak Base Flow: ERA/TOC = 0.48 road density of 2.55 sq. mi./mi. The watershed has high fisheries values, containing steelhead trout populations (Horse Creek WA). While flow figures in volume/unit time are not available, the 1995 Horse Creek WA yields data on normal runoff (historical) versus the present increased runoff due to timber harvest. The % change in runoff is an increase of 28.8%.

Drainage Network Increase: Road density = 2.55 sq. mi./mi (Horse Creek WA).

Road density/Location: 7th field is 4.3% roaded, road density = 2.55 sq. mi./mi (Horse Creek WA).

Disturbance History: ERA/TOC = 0.48, road density = 2.55 sq. mi./mi. Road distribution is very dense. Surface erosion is 865% over the background level due to current road density and past timber harvest activities. The landslide sediment potential is moderate at 169% over background. Combined CWE index is 0.76 (Horse Creek WA).

Riparian Reserves: No data currently available. The system has been recovering from the 1964 flood and subsequent smaller floods in the 1970's (Horse Creek WA).