Photo 1—Alternative 1—FS Road 2010618 at upper crossing with Vinegar Creek pictured below has typical barrier problems for fish passage (juvenile fish cannot pass upstream). For comparison with the proposed action see a description of Alternative 2, Project Point 2 page 13.

Chapter 2—Alternatives

2.1 Alternative Design, Evaluation, and Selection Criteria

The Interdisciplinary Team process identified two alternatives, the no action alternative and proposed action. The proposed action should meet, or exceed the purpose and need. There is no alternative actions to the proposed action and still meet the Purpose and need in terms of establishing stream connectivity for threatened fish species. Leaving part or all of the streams in these subwatersheds untreated would not meet the underlying needs for this project—therefore a no action and an action alternative that established connectivity to streams that had threatened species was a reasonable range of alternatives for the proposed action. Additionally after eliminating portions of the original proposed action a consensus was reached in public concerns.

2.2 Alternatives Considered but Eliminated from Detailed Study

An alternative to place large woody debris in stream was considered; this alternative has been eliminated from detail study in accordance with public concern (see 1.5. Response to Public Comments, page 3). This action may be considered when the Forest Service seeks to establish more complex stream habitat for improving fish habitat for stream complexity at another time. The Forest Service has decided the enhancing of aspen habitat would be postponed to a later date and covered under another analysis.

2.3 Alternatives

The following are the two alternatives formulated by the Interdisciplinary Team. Explained in detail are: Alternative 1) the No Action Alternative; and Alternative 2) the Proposed Action Alternative.

2.3.1 Alternative One—No Action (Existing Condition)

The Blue Culverts Interdisciplinary Team (IDT) field verified culverts with potential problems among other culverts, which were functioning appropriately in the Granite Boulder, Vincent, and Vinegar Creek subwatersheds. Malheur National Forest Engineering personnel completed a Forest-wide culvert survey in 2002 to assess fish passage conditions at road crossing. The survey measures and compares bankfull width of the stream to culvert to determine ability of the culvert to pass a 100 year flow event, as well as culvert slope, distance, water velocities and culvert bottom roughness. These surveys identified culverts (displayed on Map 2, No Action, Alternative 1, Appendix A) that were potential barriers to some life stage of fish at some flow.

Bull Trout *Salvelinus confluentus*

Bull trout, are reduced in both numbers and distribution within the subwatersheds of project area. The United States Fish and Wildlife Service (USFWS) has listed this species as threatened under the Endangered Species Act of 1973. Species listed as Threatened or Endangered species, which periodically utilize the analysis area, or their habitats occur within the analysis area are managed after consultation with USFWS scientists. Currently, bull trout are found in Granite Boulder Creek year-round and in the mainstem Middle Fork John Day River during winter and spring. Granite Boulder Creek has a small resident population of Bull trout as well as, other fish, which travel into this creek from the mainstem of the Middle Fork of the John Day River and other Creeks. Oregon Department of Fish and Wildlife (ODF&W) radio telemetry studies show that some bull trout move into the Middle Fork John Day River (as far as 60 miles downstream) and possibly other tributaries when water temperatures begin to cool during late fall. Bull trout currently inhabit Granite Boulder. A culvert on the FR4559283 presents a fish passage barrier that was not originally considered in the letter sent to the public June 21, 2002. Including the existing condition of this important stream was thought to be vital for species recovery in this area. Although historically bull trout inhabited Vinegar Creek, no current resident population of this species was thought to be present (Galena Watershed Analysis 1999). However, surveys conducted by ODF&W in the summer of 2000 found a single adult bull trout in Vinegar Creek (Galena Watershed Analysis—Supplement 2002), see page 10. . If Alternative 1, is selected this species would continue to be affected by the lack of connectivity on Granite Boulder, Vinegar and Vincent Creeks. Six culverts identified in 2.3.1.2 Existing Condition—Site Specific, page 9 in each of these streams will not currently pass all life stages of Threatened fish.

Summer-run Steelhead *Oncorhynchus mykiss*

Steelhead are the anadromous form of the redband trout. The National Oceanic and Atmospheric Administration's (NOAA) subdivision agency, NOAA Fisheries, formerly called the National Marine Fisheries Service (NMFS), a federal agency that regulates anadromous fish concerns, has listed this species as Threatened, under the Endangered Species Act of 1973. Species listed as Threatened or Endangered species, which periodically utilize the project area, (or if their habitat occurs within the project area) are managed after consultation with NOAA Fisheries scientists. Verbal concurrence has been given to he Forest Service and a Biological Opinion being written by the consulting agency while the EA is distributed for a 30 review. Consultation is ongoing and will be complete before a decision document is signed. In the John Day River the steelhead population is Mid-Columbia summer run steelhead. This indicates the time of year when individual fish from this particular stock enter the Columbia River from the ocean. The time of entry into freshwater from the Pacific Ocean to actually spawn in tributaries of the Middle Fork John Day River takes from 10 to 12 months. Individual steelhead are usually present in the Middle Fork and tributaries in April and May. Spawning throughout the John Day River sub-basin occurs shortly thereafter. Under this alternative, this species would continue to be affected by the lack of connectivity on Granite Boulder, Vinegar and Vincent Creeks. Six culverts identified in 2.3.1.2 Existing Condition—Site Specific, page 9 in each of these streams will not currently pass all life stages of Threatened fish.

Spring Chinook *Oncorhynchus tshawytsha*

Spring Chinook are the only run of salmon in the John Day River system. This name is taken from the time of year the adults enter the fresh water of the Columbia River on their spawning migration. The total migration time usually takes them seven to eight months. They arrive in the Middle Fork John Day River sometime in May. Spring Chinook are considered a Sensitive species on the Malheur National Forest.

Spawning occurs during late August and early September in the Middle Fork John Day River—on both Forest Service and private land. Spawning ground surveys by Oregon Department of Fish and Wildlife (ODF&W) indicate that runs of adult spring Chinook in the John Day River declined from 1974 through 1985. Since that time numbers have been on the

increase in the John Day basin with approximately 4,000 spawners returning in 1993. The results of year 2000 spawning surveys in the North Fork and Middle Fork John Day subbasins by ODF&W estimated 5,931 individuals that accounted for approximately 30% of the return. This was the highest return since 1959. Currently culvert conditions, culvert types and culvert placement can be barriers which limit connectivity of streams in the project area. Under this alternative, this species would continue to be affected by the lack of connectivity on Granite Boulder, Vinegar and Vincent Creeks. Six culverts identified in 2.3.1.2 Existing Condition—Site Specific, page 9 in each of these streams will not currently pass all life stages of Threatened fish.

Interior Redband Trout *O. mykiss gairdneri*

There are four different populations of redband trout in the Blue Mountains. These are: 1) sympatric populations with steelhead, 2) isolated allopatric populations in anadromous watersheds, 3) allopatric populations in the Great Basin portion of the Blue Mountains, and 4) allopatric populations in watersheds that formally supported anadromous populations (N.F. Malheur and Upper Malheur Rivers). There is little data on current population trends of the redband, however, the four population types do not face the same level of threats from management activities. Subpopulations of the Great Basin redband are probably at the greatest threat of listed as threatened under the ESA. These fish are located in Trout Creek, a tributary to the Silvies River. Redband populations in this project area are primarily of sympatric origin. Overall, the Interior redband trout have the most extensive area of all game fishes in the Blue Mountains. They are in the smallest headwater areas as well as in the largest rivers of the Blue Mountains.

2.3.1.2 Existing Condition—Site Specific

Alternative 1—FS Road 2010618 at lower crossing with Vinegar Creek (Alternative 2 Project Point 1).
Currently, this culvert blocks fish passage because the length and rapid water velocity has no slow water for juvenile fish to rest during an upstream movement. There are nearly 2 miles of good summer rearing and spawning habitat upstream of this site.

Alternative 1—FS Road 2010618 at upper crossing with Vinegar Creek (Alternative 2 Project Point 2)
Currently, the jump height at the culvert outlet and the slope of the culvert limits fish passage upstream. The individual bull trout found during ODF&W surveys was captured less than ½ mile downstream of this location. This culvert is reducing summer rearing habitat available for bull trout and steelhead as there is over 0.5 miles of cold water, providing summer rearing habitat upstream of this culvert.

Alternative 1—FS Road 2010618 at crossing on Blue Gulch (Alternative 2 Project Point 3)
This site is in the fish-bearing portion of Blue Gulch (Vinegar Creek Tributary), even though it has less than ½ mile of low quality summer rearing habitat. The high gradient and length of the culvert create an upstream passage barrier to fish. The size of the culvert is somewhat inadequate to handle high flows but there were no signs of water overtopping the culvert and flowing across the road. Failure of the culvert to handle high flows could cause rilling gullying across road surface and fill slope or mass failure of road prism. Sediment would be transported downstream due to stream gradient, potentially impacting fish.

Alternative 1—FS Road 2010873 at crossing on Blue Gulch (Alternative 2-Project Point 4)
This Project Point is above the fish-bearing portion of Blue Gulch(Vinegar Creek Tributary). This site shows signs of past overflows and engineering personnel have seen water run over road during high flows. Failure of the culvert to handle high flows could cause rilling/gullying across road surface and fill slope or mass failure of road prism. Sediment would be transported downstream due to stream gradient, potentially impacting fish.

Alternative 1—FS Road 2010159 at crossing on Vincent Creek (Alternative 2-Project Point 5)
This structure is undersized for 100-year flow events and may present a barrier under some flow conditions as well as potential culvert failure. MNF engineering and hydrology personnel have observed ponding upstream of culvert on several locations. This section is heavily channelized from historic mining activities and commonly goes dry during drought years (including 2002).

Alternative 1—FS Road 2010292 at crossing on Vincent Creek (Alternative 2-Project Point 6)
This crossing is located on private land and contains 2 culverts on the fish-bearing portion of Vincent Creek. One culvert is failing and water is running alongside the structure underground (chronic sediment producer). The culverts are undersized posing a risk of failure at high flows that could impact fish and habitat downstream. Both culverts have jump heights that are barriers to upstream migration of fish.

Alternative 1—FS Road 2010292 (101) at crossing on Vincent Creek (Alternative 2-Project Point 7)
The culvert is undersized for high flow events as evidenced by signs of ponding above the culvert and rilling/gulling (chronic sediment producer) of the road surface over the culvert. This poses a risk of failure at high flows that could impact fish and habitat downstream.

Alternative 1—FS Road 2010429 at crossing on Vincent Creek (Alternative 2-Project Point 8)
The culvert is undersized for high flow events based on bankfull measurements. This poses a risk of failure at high flows that could impact fish and habitat downstream.

Alternative 1—FS Road 2010986 at crossing on Vincent Creek (Alternative 2 Project Point 9)
This culvert is upstream of falls that presents a barrier for anadromous fish. The culvert is undersized for 100 year events therefore posing a risk of failure at high flows that could impact fish and habitat downstream.

Alternative 1—FS Road 2010993 at crossing on Vincent Creek (Alternative 2 Project Point 10)
This Culvert is above the fish-bearing portion of Vincent Creek. The culvert is undersized for high flow events. Failure of the culvert to handle high flows could cause rilling gullying across road surface and fill slope or mass failure of road prism. Sediment would be transported downstream due to stream gradient, potentially impacting fish.

Alternative 1—FS Road 4559283 at crossing on Granite Boulder Creek (Alternative 2 Project Point 11)
This culvert is on the fish-bearing portion of Granite Boulder Creek; habitat provided includes summer/winter rearing and spawning for bull trout and steelhead. The culvert is a passage barrier to fish during low flows when the water in the structure is less than 1 inch deep and several feet wide, and a barrier at high flow due to high stream velocity. MNF personnel have noted rubble-sized material moving downstream of the culvert implying high velocities during peak flow periods.

Noxious Weeds

Noxious weeds may arrive from many sources. The potential for recreation and other forest users to transport weeds or weed seeds into the project area exists. This is due to hikers, hunters, & campers and Forest Service as well as contractor project vehicles from other foreseeable projects. Weeds that may affect the area are described in Appendix B Vegetation Management Strategy, Blue Culverts

2.3.2 Alternative 2 —Proposed Action

Vincent, Vinegar and Granite Boulder Creeks host threatened species of steelhead, Columbia River bull trout, and a sensitive species, Chinook salmon and redband trout. Currently, 2 road crossings Vinegar Creek, 2 road crossings on Blue Gulch and 1 road crossing on Granite Boulder Creek are passage barriers to various life stages of these threatened fish at several stream flow conditions; and/or these crossings do not meet current Regional and State guidance (for 100-year flow events). A need exists to correct road crossings identified as passage barriers which reestablishes stream connectivity for all life stages of protected and threatened fish species. A further need exists in these subwatersheds to ensure high water flow relief at crossings that exhibit a potential of erosion and sedimentation. If implemented, these projects would also reduce the need for maintenance of the culverts, which can be a disturbance to the stream. A culvert on FR4559283 presents a fish passage barrier that was not originally considered in the letter sent to the public June 21, 2002. Including the existing condition of this important stream and proposing corrective action to the fish barrier, when bull trout were present, was thought to be vital for bull trout recovery in the project area while culvert replacement was being considered.

Alternative 2 includes the following activities on Vincent Creek, Vinegar Creek, Blue Gulch a tributary of, Vinegar Creek and Granite Boulder Creek (see Table 3 below and Map 3, Alternative 2, Appendix A):

- Replacing 5 culverts with single span structures such as bottomless arches
- Replace 3 culverts with low water rock crossings (engineered rocked fords)
- Install 3 armored drain dips in roads over existing culverts upstream of fish bearing reaches

Table 3 Alternative 2 Proposed Actions by subwatershed.

Subwatershed	Replace Culvert with Single Span Structure	Replace Culvert with Engineered Rock Ford	Reinforce culvert by creating armored overflow drain dips
Vinegar Creek	3 (project points)	0	1(project point)
Vincent Creek	1(project points)	3(project points)	2(project points)
Granite Boulder Creek	1(project points)	0	0

Photo 2 Example of open bottom arch used on the Wenatchee National Forest.

2.3.2.1 Project Objectives

(cf. 2.3.1.2 Existing Condition—Site Specific, page 13)

The first site for implementation is tentatively scheduled for mid July 2003—the site selected to begin will be decided when the contract is awarded.

Alternative 2 Project Point 1—Alternative 1—FS Road 2010618 at lower crossing with Vinegar Creek

This alternative would improve fish passage by replacing the current structure with an open-bottom arch that has a natural streambed for juvenile fish to rest during upstream movement. There are about 2 miles of good summer rearing and spawning habitat upstream of this site. All life stages of threatened fish will be able use water upstream of this culvert. Because stream gradient would be the same or similar to the natural grade, and there would be a natural substrate stream bed under this crossing, fish passage for all species and life stages would be possible during normal low flow and spring flow conditions that has a natural streambed for juvenile fish to rest during an upstream movement. This stream crossing would be designed to accommodate an estimated 100-year return interval peak flow, with a provision made for overtopping at the culvert or at a nearby low spot in the road if debris loads cause the culvert capacity to be exceeded. This new bottomless arch culvert would have a span of approximately 15-20 feet and a height of 6-8 feet and would be about 50 feet long. Disturbed ground around this stream crossing will be planted with native and/or non-invasive grass seed, native trees or shrubs if available, and mulch will be placed on bare soils to reduce erosion and moisture loss.

Alternative 2 Project Point 2—FS Road 2010618 at upper crossing with Vinegar Creek

This alternative would improve fish passage at this project point by replacing the current structure with a bottomless arch that has a natural streambed for juvenile fish to rest during an upstream movement. . The individual bull trout found during electro-shocking surveys was captured less than ½ mile downstream of this location. Because stream gradient would be the same or similar to the natural grade, and there would be a natural substrate stream bed under this crossing, fish passage for all species and life stages would be possible during normal low flow and spring flow conditions. These stream crossings would be designed to accommodate an estimated 100-year return interval peak flow, with a provision made for overtopping at the culvert or at a nearby low spot in the road if debris loads cause the culvert capacity to be exceeded. This new arch culvert would have a span of approximately 15-20 feet and a height of 6-8 feet. This culvert if replaced with this alternative would be about 50 feet long and provide another 0.5 miles of cold water for summer rearing habitat upstream of this culvert—important for the viability of declining populations of bull trout and steelhead. Disturbed ground around this stream crossing will be planted with native and/or non-invasive grass seed, native trees or shrubs if available, and mulch will be placed on bare soils to reduce erosion and moisture loss.

Alternative 2 Project Point 3—FS Road 2010618 at crossing on Blue Gulch

This site is in the fish-bearing portion of Blue Gulch (Vinegar Creek Tributary), even though it has less than ½ mile of low quality summer rearing habitat. By replacing this inadequate culvert with an open bottom arch that can handle high flows it will also prevent rilling, gullying across road surface, and possibly prevent fill slope, or mass failure of road prism. No longer would there be a high risk of large amounts of sediment being transported to downstream habitat. This stream crossings would now be designed to accommodate an estimated 100-year return interval peak flow, with a provision made for overtopping at the culvert or at a nearby low spot in the road if debris loads cause the culvert capacity to be exceeded. Because the stream gradient would be the same or similar to the natural grade, and there would be a natural substrate stream bed under this crossing— fish passage for all species and life stages of fish would be possible during normal low flow, and spring flow conditions that have a natural streambed for juvenile fish to rest during an upstream movement. This arch culvert would have a span of approximately 15-20 feet and a height of 6-8 feet it would be about 80 feet long. Disturbed ground around this stream crossing will be planted with native and/or non-invasive grass seed, native trees or shrubs if available, and mulch will be placed on bare soils to reduce erosion and moisture loss.

Alternative 2-Project Point 4—FS Road 2010873 at crossing on Blue Gulch

This Project Point is above the fish-bearing portion of Blue Gulch (Vinegar Creek Tributary). However, this site shows signs of past overflows and engineering personnel have seen water run over road during high flows. At this location material will be placed across the road at a location outside the bank full width of the stream and compacted so that a mound is created which will prevent water from running down the road. Grid-rolled, or pit-run road material will be placed in the dip created by this mound and on the fill slope below it to armor it against erosion should water flow across the road. By armoring the road with this drain dip the likelihood that sediment would be transported downstream due to

stream gradient, potentially impacting fish and bull trout proposed critical habitat will be greatly diminished. By installing an armored drain dip over the top of this culvert to handle high flows, this culvert will no longer pose the risk of rilling, gullying across road surface, and possibly prevent fill slope, or mass failure of road prism. No longer would there be a high risk of large amounts of sediment being transported to downstream habitat. Disturbed ground around this stream crossing will be planted with native and/or non-invasive grass seed, native trees or shrubs if available, and mulch will be placed on bare soils to reduce erosion and moisture loss.

Alternative 2-Project Point 5—FS Road 2010159 at crossing on Vincent Creek

This structure is undersized for 100-year flow events and may present a barrier under some flow conditions as well as potential culvert failure. MNF engineering and hydrology personnel have observed ponding upstream of culvert on several locations. At this location the existing culvert will be removed and existing fill material removed to the bank full width of the stream channel. Pit-run or grid-rolled material will be placed in the stream channel to provide a surface resistant to erosion—in this manner a rocked ford will be implemented in place of the existing culvert allowing fish to pass at any time of the year. The location of this road crossing does not receive traffic in an amount to warrant a new culvert—by installing a rocked ford in lieu of a culvert all fish passage concerns will be met. All imported and on-site construction material not used in the project shall be hauled out upon completion. Disturbed ground around each new stream crossing will be planted with native and/or non-invasive grass seed, native trees or shrubs if available, and mulch will be placed on bare soils to reduce erosion and moisture loss. This section is heavily channelized from historic mining activities and commonly goes dry during drought years (including 2002). Disturbed ground around this stream crossing will be planted with native and/or non-invasive grass seed, native trees or shrubs if available, and mulch will be placed on bare soils to reduce erosion and moisture loss.

Alternative 2-Project Point 6—FS Road 2010292 at crossing on Vincent Creek

The owners of the property where this crossing is located on private land have agreed to let the Forest Service upgrade these culverts for Fish passage purposes. The 2 culverts here on the fish-bearing portion of Vincent Creek would no longer be a barrier to fish with this alternative's implementation because stream gradient would be the same or similar to the natural grade, and there would be a natural substrate stream bed under the single culvert crossing, fish passage for all species and life stages of fish would be possible during normal low flow and spring flow conditions. This stream crossing would now be designed to accommodate an estimated 100-year return interval peak flow, with a provision made for overtopping at the culvert, or at a nearby low spot in the road if debris loads cause the culvert capacity to be exceeded. At this location the existing culvert will be removed and existing fill material removed to the bank full width of the stream channel. Pit-run or grid-rolled material will be placed in the stream channel to provide a surface resistant to erosion. All imported and on-site construction material not used in the project would be hauled out upon completion. Disturbed ground around this stream crossing will be planted with native and/or non-invasive grass seed, native trees or shrubs if available, and mulch will be placed on bare soils to reduce erosion and moisture loss. This new pipe arch culvert would be installed and have a span of approximately 15-20 feet and a height of 6-8 feet and would be about 40 feet long. With the cooperation of the landowners (Mr. and Mrs. Wampler) this poorly functioning culvert would no longer be a fish barrier on Vincent Creek and additionally this site would meet 100 year flood concerns. Disturbed ground around this stream crossing will be planted with native and/or non-invasive grass seed, native trees or shrubs if available, and mulch will be placed on bare soils to reduce erosion and moisture loss.

Alternative 2-Project Point 7—FS Road 2010292 (101) at crossing on Vincent Creek

The culvert is undersized for high flow events as evidenced by signs of ponding above the culvert and rilling/gulling (chronic sediment producer) of the road surface over the culvert. This poses a risk of failure at high flows that could impact fish and habitat downstream. At this location the existing culvert will be removed and existing fill material removed to the bank full width of the stream channel. Pit-run or grid-rolled material will be placed in the stream channel to provide a surface resistant to erosion—in this manner a rocked ford will be implemented in place of the existing culvert allowing fish to pass at any time of the year. The location of this road crossing does not receive traffic in an amount to warrant a new culvert—by installing a rocked ford in lieu of a culvert all fish passage concerns will be met. All imported and on-site construction material not used in the project shall be hauled out upon completion. Disturbed ground around this new stream crossing will be planted with native and/or non-invasive grass seed, native trees or shrubs if available, and mulch will be placed on bare soils to reduce erosion and moisture loss. Disturbed ground around each stream crossing will be planted with native and/or non-invasive grass seed, native trees or shrubs if available, and mulch will be placed on bare soils to reduce erosion and moisture loss.

Alternative 2-Project Point 8—FS Road 2010429 at crossing on Vincent Creek

The culvert is undersized for high flow events based on bankfull measurements. This poses a risk of failure at high flows that could impact fish and habitat downstream. At this location the existing culvert will be removed and existing fill material removed to the bank full width of the stream channel. Pit-run or grid-rolled material will be placed in the stream channel to provide a surface resistant to erosion—in this manner a rocked ford will be implemented in place of the existing culvert allowing fish to pass at any time of the year. The location of this road crossing does not receive traffic in an amount to warrant a new culvert—by installing a rocked ford in lieu of a culvert all fish passage concerns will be met. All imported and on-site construction material not used in the project shall be hauled out upon completion. Disturbed ground around this new stream crossing will be planted with native and/or non-invasive grass seed, native trees or shrubs if available, and mulch will be placed on bare soils to reduce erosion and moisture loss.

Alternative 2 Project Point 9—FS Road 2010986 at crossing on Vincent Creek

This culvert is upstream of falls that presents a barrier for anadromous fish. The culvert is undersized for 100 year events, therefore posing a risk of failure at high flows that could impact fish and habitat downstream. At this location material will be placed across the road at a location outside the bank full width of the stream and compacted so that a mound is created which will prevent water from running down the road. Grid-rolled, or pit-run road material will be placed in the dip created by this mound and on the fill slope below it to armor it against erosion should water flow across the road. By armoring the road with this drain dip the likelihood that sediment would be transported downstream due to stream gradient, potentially impacting fish and bull trout proposed critical habitat will be greatly diminished. Disturbed ground around this stream crossing will be planted with native and/or non-invasive grass seed, native trees or shrubs if available, and mulch will be placed on bare soils to reduce erosion and moisture loss.

Alternative 2 Project Point 10—FS Road 2010993 at crossing on Vincent Creek

This Culvert is above the fish-bearing portion of Vincent Creek. The culvert is undersized for high flow events. Failure of the culvert to handle high flows could cause rilling gullying across road surface and fill slope or mass failure of road prism. At this location material will be placed across the road at a location outside the bank full width of the stream and compacted so that a mound is created which will prevent water from running down the road. Grid-rolled, or pit-run road material will be placed in the dip created by this mound and on the fill slope below it to armor it against erosion should water flow across the road. By armoring the road with this drain dip the likelihood that sediment would be transported downstream due to stream gradient, potentially impacting fish and bull trout proposed critical habitat will be greatly diminished. Disturbed ground around this stream crossing will be planted with native and/or non-invasive grass seed, native trees or shrubs if available, and mulch will be placed on bare soils to reduce erosion and moisture loss.

Alternative 2 Project Point 11—FS Road 4559283 at crossing on Granite Boulder Creek

This alternative replaces the fish barriers of the present culvert with an open-bottom arch, or box culvert. This culvert is on an important tributary to the Middle Fork of the John Day River which provides habitat for summer/winter rearing as well as spawning for bull trout and steelhead on the fish-bearing portion of Granite Boulder Creek. If this alternative is implemented this crossing will no longer be a passage barrier to fish during low flows when the water in the structure is less than 1 inch deep and several feet wide; nor will this crossing be a barrier at high flow due to high stream velocity. Additionally, if this alternative is implemented, the culvert will maintain a 100-year return interval peak flow, with a provision made for overtopping at the culvert or at a nearby low spot in the road if debris loads cause the culvert capacity to be exceeded. The new culvert will be about 50 feet long and would have a span of approximately 25-30 feet and a height of 6-8 feet. Because stream gradient would be the same or similar to the natural grade and the natural substrate stream bed, is under the crossing—fish passage for all species and life stages would be possible during normal low flow and spring flow conditions. Disturbed ground around each stream crossing will be planted with native and/or non-invasive grass seed, native trees or shrubs if available, and mulch will be placed on bare soils to reduce erosion and moisture loss.

Photo 3 Example of box culvert used on the Wenatchee National Forest.

2.3.2.2 Proposed Alternative Activities

2.3.2.2.1 Replace Culverts with Single Span Structures

This alternative proposes activities on 5 culverts in Blue Gulch, Vinegar, Vincent and Granite Boulder Creeks. Project Site locations and numbers are displayed on Map 3, Alternative 2, Proposed Action, Appendix A) , Appendix A.

Project Point 1—FS Road 2010618 at lower crossing with Vinegar Creek

Project Point 2—FS Road 2010618 at upper crossing with Vinegar Creek

Project Point 3—FS Road 2010618 at crossing on Blue Gulch (Vinegar Creek Tributary)

Project Point 6—FS Road 2010292 at crossing on Vincent Creek

Project Point 11—FS Road 4559283 at crossing on Granite Boulder Creek

Existing culverts would be removed using an excavator. New structures, called bottomless arches and box culverts will be aligned with stream channel profile (vertical and horizontal) and be designed to handle 100-year flow events. Each site will be prepared for installation including widening location for new structure and excavation for footings. Installation will include rocking the inlet and outlet ends and catch basin, and stabilizing the fill slope with straw mulch and short-term grass seeding as needed. Structures would include use of native materials for natural stream bottom simulation to mimic natural conditions upstream and downstream of the project site. Sites would be backfilled with materials removed from existing road fill.

2.3.2.2.2 Remove Culvert and Install engineered rock ford

This action proposes activities on 3 culverts in Vincent. Project Site locations and numbers are displayed on Map 3, Alternative 2, Proposed Action, Appendix A), Appendix A.

Project Point 5 — FS Road 2010159 at crossing on Vincent Creek. This road will remain closed to motor vehicles.

Project Point 7—FS Road 2010292 (101) at crossing on Vincent Creek. The road closure device will be moved to block vehicle access to the road/stream crossing.

Project Point 8—FS Road 2010429 at crossing on Vincent Creek. The road closure device will be moved to block vehicle access to the road/stream crossing.

Culverts would be removed, and crossings widened to match natural channel width upstream/downstream and accommodate 100-year flow events within the channel and floodplain. The approach, stream banks and stream bottom would be hardened by applying to the stream-bed, grid-rolled or pit run rock to allow high clearance vehicle passage and reduce potential for erosion and sedimentation.

2.3.2.2.3 Reinforce culvert by constructing armored overflow drainage dip at crossing.

This action proposes activities on 3 culverts in Vincent Creek and Blue Gulch. Project Site locations and numbers are displayed on Map 3, Alternative 2,Proposed Action, Appendix A.

Project Point 4 – FS Road 2010873 at crossing on Blue Gulch

Project Point 9 – FS Road 2010986 at crossing on Vincent Creek

Project Point 10 – FS Road 2010993 at crossing on Vincent Creek

Armored overflow drainage dips would be constructed on the road prism with a backhoe, or excavator at stream crossings to direct excess flows and channel back into streams. Drainage dips and road fills would be hardened using grid-rolled or pit run rock to allow high clearance vehicle passage and reduce potential for erosion and sedimentation. No instream work would be associated with these actions but activities would occur on the stream bank where the overflow ditch and rock would come down to the stream.

2.3.2.3 Standards and Guidelines

The following items describe PACFISH, Regional, state or Forest direction for implementing these projects and design criteria.

- PACFISH RF-4 -- "Construct new, and improve existing, culverts, bridges, and other stream crossings to accommodate a 100-year flood..."
- PACFISH RF-5 -- "Provide and maintain fish passage at all road crossings of existing and potential fish-bearing streams."
- PACFISH RA-2 --"Trees may be felled in RHCAs when they pose a safety risk. Keep felled trees on site when needed to meet woody debris objectives.
- PACFISH RA-4 -- "Prohibit storage of fuels and other toxicants within RHCAs. Prohibit refueling within RHCAs unless there are no other alternatives. The Forest Service must approve refueling sites within a RHCA and have an approved spill containment plan.
- Best Management Practices R-3 -- "... Contractors are to schedule and conduct operations to minimize erosion and sedimentation..."
- Best Management Practices R-14 -- "...Excavation is a common requirement for the installation of bridges, culverts, ... excavated materials shall be kept out of live streams unless they are designed to be placed there... sediment producing materials will not be left within reach of anticipated flood flows... it is sometimes necessary to divert flowing water around work sites to minimize erosion and downstream sedimentation... culverts will be installed only during flow periods specified in the project plan..."
- Best Management Practices R-18 -- "...maintain roads in a manner which provides for water quality protection by controlling the placement of waste material, keeping drainage facilities open, and by repairing ruts and failures to reduce sedimentation and erosion..."
- Forest Plan, MA3B standard 42 -- "Design and maintain roads to protect fisheries values and riparian area habitat."
- Forest Plan, MA3B standard 45 -- "Apply erosion seeding on... all disturbed soil that occurs within 100-200 feet of... stream or where eroded material could reach a stream..." Note: Straw mulching will be used as a ground cover and some short-term grass seeding applied. Follow up seeding or transplanting of native grasses and shrubs is planned within one year.

2.3.2.4 Mitigation and Project Design Criteria

2.3.2.4.1—Mitigation for Working Within RHCAs

Actions would occur within stream channels (e.g. in-stream structure placement, culvert removal), from July 15 through August 15 reducing possible stress on fish populations due to potential sediment delivery (*Oregon Guidelines for Timing of In-Water Work to Protect Fish and Wildlife Resources,* 1997). By accomplishing project work during this time, when stream flows are at their lowest levels, sediment input to streams would be minimized. This time is outside fish spawning periods, reducing possible impacts to spawning adults and their eggs. Exact timing may be altered depending on stream conditions, fish movement, and depth of water flow. Changes in timing will require a recommendation by a fisheries biologist or hydrologist, consultation with appropriate agencies and approval of the Responsible Official. Disturbed ground around each stream crossing will be planted with native and/or non-invasive grass seed, native trees or shrubs if available, and mulch will be placed on bare soils to reduce erosion and moisture loss.

2.3.2.4.2—Sediment Mitigation for Project Points 1, 2, 3, 5, 6, 7, 8 and 11 (see also Table 1, page 2; 1.6 Issues Studied in Detail, page 4 and Appendix A Map 3)

- Erosion control measures, such as hay bales and filter cloth, will be used to prevent soil erosion into the stream channel. All imported and on site construction material not used in the project shall be hauled out upon completion. Disturbed ground around each new stream crossing will be planted with native and/or non-invasive grass seed,

native trees or riparian shrubs if available, and mulch will be placed on bare soils to reduce erosion and moisture loss.

- Riprap will be provided from clean, erosion resistant rock from an upland source.
- The concrete foundations will be allowed to cure before backfilling and contact with stream water. Once the concrete foundations are complete and cured the stream will be rerouted between them.
- Pumped water will pass through filter bags and/or catch basins to settle out solids before returning to the stream or the water will be pumped to a flat area where it would seep into the soil.
- Each culvert removal and replacement will be completed in the same manner. The existing pipe will be removed with an excavator and all excavated material will be stored on the existing roadway above the high water line. The stream will be redirected away from the foundation area and isolated with sandbags and plastic sheeting. Concrete foundation sites will be excavated and then dewatered by pumping.
- The natural stream gradient based on measurements up and downstream, would be restored to the extent possible at each of the sites.

2.3.2.4.2—Sediment Mitigation for Project Points 4, 5, 7, 8, 9, and 10 (see Table 1, page 2; 1.6 Issues Studied in Detail, page 4 and Appendix A Map 3)

- Erosion control measures, such as hay bales and filter cloth, will be used to prevent soil erosion into the stream channel.
- All imported and on site-construction material not used in the project shall be hauled out upon completion. Disturbed ground around each new stream crossing will be planted with native and/or non-invasive grass seed, native trees or shrubs if available, and mulch will be placed on bare soils to reduce erosion and moisture loss.

2.3.2.4.3—Best Management Practices

Throughout the project, Best Management Practices (BMPs) will be used to minimize adverse impacts to aquatic habitat. Some of those not previously completely disclosed in this document are listed below:

- Operate machinery in road prism.
- Install temporary structures to protect the creek from construction sediment. Sediment filter fences or sediment traps will be installed at the downstream end of all culverts prior to beginning culvert installations, catch basin cleaning, and inlet/outlet ditch cleaning or construction. Sediment devices will remain in place until soils become stabilized. Soils may be stabilized by natural seed processes or promoted by artificial methods.
- A Forest Service employee qualified/certified in road construction will monitor the construction activities to ensure work is conducted in a workman-like manner and resource objectives are met.
- Require a delivery/storage/application plan to prevent petroleum products or other deleterious materials from entering water systems.
- Excess and unsuitable material will be taken to an upland disposal area.
- Areas of streambank disturbance will be seeded or planted. Existing vegetation will be retained, as possible, and replanted to promote vegetation.
- An oil and hazardous substance spill contingency plan will be in place.
- Accomplish any instream work between July 15 and August 15 in Granite Boulder Creek (bull trout spawning), Vinegar Creek and Blue Gulch (potential bull trout spawning) and July 15 until September 15 in Vincent Creek.
- There is an existing borrow pit on FS Road 2010 that will be used to get grid-rolled or pitrun rock for project sites. No waste sites have been identified if there is excess soil at project sites after implementation.

In addition to the above BMPs, this alternative will employ the following standard Regional BMPs (General Water Quality Best Management Practices, Pacific Northwest Region 1988) to protect water quality will be implemented (see Appendix B for a complete description of BMPs):

R-1. General Guidelines for the Location and Design of Roads

R-2. Erosion Control Plan

R-3. Timing of Construction Activities

R-4. Road Slope Stabilization (Planning)

R-5. Road Slope and Waste Area Stabilization (Preventive)

R-7. Control of Surface Road Drainage Associated with Roads

R-10. Construction of Stable Embankments (Fills)

R-11. Control of Side cast Material

R-12. Control of Construction in Streamside Management Units

R-13. Diversion of Flows Around Construction Sites

R-14. Bridge and Culvert Installation and Protection of Fisheries

R-15. Disposal of Right-of-Way and Roadside Debris

R-16. Specifying Riprap Composition

R-17. Water Source Development Consistent with Water Quality Protection

R-18. Maintenance of Roads

R-19. Road Surface Treatment to Prevent Loss of Materials

R-22. Restoration of Borrow Pits and Quarries

2.3.2.4.4—Traffic Mitigation

- During construction, appropriate traffic control signs will be used at the following road junctions: FR 2010 and FR 2010618 (two locations); FR 4559 and FR 4550; FR 2010 and FR 2010292 (two locations).

2.3.2.4.5—Mitigation for historic mining concerns

- If mercury from historic mining is found during project work, it would be treated in the appropriate and legal manner and the contractor would report such a finding to the Contracting Officers Representative (COR).

2.3.2.4.6—Mitigation for Noxious Weeds

Prior to implementation of this project, all vehicles and equipment would be washed and inspected for noxious weed seed or vegetative material. After implementation surveys would be conducted twice per year (spring and fall to pick up different flowering/seed dispersal times of plants) to locate noxious weeds. These surveys would be conducted for two years following project completion. If noxious weeds are found they would be hand pulled, plastic bagged and disposed of in a landfill or approved site. Seeding of disturbed ground will be performed following operations. Local native species seed will be used. See also Appendix B--Vegetation Management Strategy

2.3.2.4.6.1 PREVENTION

This strategy refers to detection or amelioration of site conditions that stimulate or favor competing vegetation. Prevention does not involve direct treatment of competing vegetation, but anticipates potential vegetation problems and takes steps to avoid reaching a damage threshold. Use of natural controls is the key concept behind this approach.

The spread of noxious weeds are mainly due to vehicle traffic, recreational use, and ground disturbing activities. Several things may be done to prevent the invasion of noxious weeds on disturbed ground: 1) require vehicles and equipment be washed and inspected, 2) not park or stage vehicles with known infestations and 3) seed or mulch & seed the disturbed area with local native plants.

2.3.2.4.6.2 EARLY TREATMENT

Early treatment involves initiating action to control competing vegetation before a damage threshold is reached. Control during the early development stages is usually easier, less costly, and can require fewer treatments.

Noxious weeds could occupy the disturbed ground created by this project by moving in from adjacent areas or carried in on equipment.

Principal species include dalmatian toadflax, yellow toadflax, tansy, perennial pepperweed, hound's-tongue, bull thistle, Canada thistle, white top, knapweed, tarweed and sulfur cinquefoil. Disturbed soil should be surveyed twice per year to inspect for the presence of noxious weeds. Surveys should continue after two years after the project is completed.

2.3.2.4.6.3 Monitoring and Detection:

Is proposed for twice a year for two years following ground disturbing activities to determine whether noxious weeds were introduced onto the disturbed soil or have expanded from adjacent locations. This monitoring would require a person to walk around/over the disturbed ground twice per year, spring and fall, to check for the presence of noxious weeds. Survey once for earlier season weeds (late May to early June) and once in summer (late June to early July). This will ensure detection of species with different life cycles and blooming periods.

If monitoring detects noxious weeds, the surveyors would fill out a Weed Location Form, and then remove the plants at that time by their roots, place them in a plastic bag, and dispose of them in an approved landfill. If large infestations are found that would take a more significant investment or resources and time to eradicate, the Forest Noxious Weed Coordinator will be consulted and the appropriate control actions will be planned. Pay particular attention to remove all roots on those species spreading through rhizomes and to avoid spreading seed from all species. Clothing of the those performing treatment should be monitored to ensure they do not contain seed/vegetative material.

2.3.2.4.7—Mitigation for Cultural Resources

In the event that previously undiscovered cultural resources are inadvertently encountered during the course of the project, the Forest Service will halt all ground disturbing activities. At such time, a qualified archaeologist will evaluate the cultural resource property and the agency will initiate SHPO consultation. If necessary, the project may be modified in order to protect sites in order to avoid or mitigate impacts to properties that are eligible or potentially eligible for an NRHP listing.