FISHERIES MANAGEMENT AND EVALUATION PLAN

Middle Columbia River
Distinct Population Segment

Deschutes River

Small Direct Columbia Tributaries

Fifteenmile, Mill and Chenoweth creeks

Summer Steelhead, Trout and Salmon Fisheries

Prepared by

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Mid Columbia River Steelhead DPS

Fishery Management and Evaluation Plan,

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Responsible Management Agency.

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SECTION 1. FISHERIES MANAGEMENT

1.1) General objectives of the FMEP include:

The general objective of this FMEP is to conduct a consumptive sport fishery on hatchery steelhead consistent with recovery of the ESA listed steelhead. This FMEP includes all freshwater sport fisheries that affect or could potentially affect the survival and recovery of the listed steelhead in the Deschutes River subbasin and small Columbia River tributaries between the Hood River and the Deschutes River.

Specific objectives are to:

1) Recover naturally produced steelhead to maximum sustainable levels. Maintain an estimated escapement of 6,575 wild adult summer steelhead over Sherars Falls (river mile 43) annually (Objective 1, Summer Steelhead section, Lower Deschutes River Fish Management Plan, ODFW 1997).

2) Provide for harvest of hatchery summer steelhead in a manner that does not jeopardize the survival and recovery of ESA listed summer steelhead in the Middle Columbia or Snake River Distinct Population Segments (DPS). The intent of this FMEP would be to continue current harvest management approach.

3) Provide fisheries for redband trout and Chinook salmon that do not jeopardize the survival and recovery of the ESA listed summer steelhead in the Middle Columbia or Snake River DPSs. The intent of this FMEP would be to continue the current harvest management approach.

4) Provide fisheries for redband trout in small Columbia River tributaries between the Hood River and Deschutes River that do not jeopardize the survival and recovery of the ESA listed summer steelhead in the Middle Columbia or Snake River DPSs. The intent of this FMEP would be to continue the current harvest management.

1.1.1) List of the "Performance Indicators" for the management objectives.

The performance indicator for Objective 1 will be escapement of naturally produced steelhead past Sherars Falls located at river mile 43 of the Deschutes River (see sections 1.3.1 and 1.3.2 for thresholds).

Annual escapement estimates of wild summer steelhead passing Sherars Falls are calculated using a modified Peterson mark-recapture population estimation procedure. A subsample of the annual wild steelhead run is tagged with individually numbered tags at the Sherars Falls adult migrant trap. Second event capture of tagged and untagged fish at upstream locations provides the data needed to calculate the estimated number of wild steelhead passing Sherars Falls. Most steelhead spawning in the Deschutes River subbasin occurs in the mainstem and tributaries upstream of Sherars Falls. This estimation procedure is thought to provide data of sufficient accuracy and precision to constitute a reliable performance indicator.

Performance indicators for Objectives 2 and 3 are harvest and catch estimates of steelhead, Chinook salmon, and redband trout in the lower Deschutes River. These estimates are based on angler effort, catch and harvest data collected as part of a statistical harvest sampling program. Data are collected on landings of wild and hatchery summer steelhead, Chinook salmon and redband trout by sport anglers and tribal fishers.

The performance indicator for Objective 4 will be to monitor continued compliance with conservative angling regulations currently in place on the small Columbia River tributaries.

1.1.2) Description of the relationship and consistency of harvest management with artificial propagation programs.

Harvest Management

Summer steelhead angling and harvest has been historically popular and important for recreational anglers and tribal fishers. Wild summer steelhead could be retained by recreational anglers prior to 1978, under a two fish per day regulation. Natural bait and barbed hooks were legal in the bulk of the lower Deschutes River during this period. An anticipated low return of wild summer steelhead to the lower Deschutes River in 1978 resulted in closure of the lower Deschutes River to summer steelhead angling on 20 August 1978. The season reopened 1 July 1979, with a wild fish release rule that has remained in effect to date. The use of natural bait and barbed hooks was also prohibited starting in 1979 except that bait was allowed in a one-mile reach downstream from Sherars Falls. This area was expanded to a three-mile reach of river from Sherars Falls downstream to the upstream most railroad trestle in 1990. Angling from a floating device has been illegal since 1936 in the Deschutes River. This regulation effectively

lowers catch rates on adult summer steelhead and provides significant protection from angling mortality to juvenile summer steelhead.

Currently, the bag limit for steelhead is three adipose fin clipped hatchery summer steelhead per day and no annual bag limit on hatchery steelhead. Hatchery steelhead are legal to retain year-around in waters of the Deschutes open to angling. Currently, that portion of the Deschutes River not bordering the Warm Springs Reservation is open to angling (and retention of hatchery origin steelhead) year-around. The portion of the Deschutes River bordering the Warm Springs Reservation (river mile 71 to river mile 100) is currently closed to all angling by non-tribal members from 1 January until the fourth Saturday in April each year. Harvest regulations for recreational fisheries in the subbasin are set by the Oregon Fish and Wildlife Commission.

Redband trout in the lower Deschutes River are very abundant with population levels averaging 2,000 fish (greater than eight inches fork length) per mile. Total abundance of redband trout in the lower 100 miles of the Deschutes likely exceeds 100,000 individuals, and the magnitude of that population provide an effective buffer against juvenile steelhead angling mortality in the redband trout fishery. Hatchery trout have not been released in the lower Deschutes since 1978.

Deschutes River redband trout angling regulations provide maximum protection for juvenile steelhead. Only redband trout between 10 and 13 inches in length can be retained, all other fish must be released unharmed. This regulation has been in effect since 1984. Most wild steelhead smolts are less than eight inches in length (Busby et al. 1996). The lower length limit of the slot length regulation is great enough to protect most juvenile steelhead from direct angling mortality. Less than 2% of age 2 and age 3 juvenile steelhead migrants captured at a weir in Bakeoven Creek were greater than 10 inches fork length (unpublished data). Further, data from the Warm Springs River juvenile trapping efforts show that only 12% of all migrants presumed to be juvenile steelhead are greater than 8 inches fork length (unpublished data).

The lower Deschutes River has a wild spring Chinook population as well as two hatchery programs that produce spring Chinook for subbasin harvest augmentation. Round Butte Hatchery (RBH) produces spring Chinook to mitigate for losses caused by the Pelton/Round Butte hydroelectric complex. Warm Springs National Fish Hatchery (WSNFH) produces spring Chinook to provide tribal harvest opportunities greater than that which the wild run would support. Spring Chinook are harvested principally from 15 April through 15 June and virtually all of the sport and tribal spring Chinook harvest takes place in the one mile reach immediately downstream from Sherars Falls. Some level of sport spring Chinook harvest has been allowed 14 out of the last 21 years.

The potential for the spring Chinook fishery to impact adult wild summer steelhead is low given the time of year and the restricted fishery area. Deep, high velocity areas where the river is constrained between bedrock cliffs characterize the reach of river where this fishery takes place. This habitat is likely not utilized by significant numbers of juvenile steelhead. Further, even though natural bait is legal in this reach, anglers tend to use rather large hooks and baits when angling for Chinook. The potential for hooking mortality to juvenile steelhead is likely low under these circumstances.

Fall Chinook return to the Deschutes River each year starting in late June and early July. There has been no hatchery fall Chinook program in the Deschutes River. The sport harvest scenario for fall Chinook is very similar to that for spring Chinook, with the vast majority of sport angler harvest taking place in the one mile reach immediately downstream from Sherars Falls. As mentioned above, natural bait is legal in this reach. Greater numbers of wild summer steelhead are caught and released during this fishery than during the spring Chinook fishery, given the greater number of summer steelhead present at the time of this fishery. The increased hooking mortality to wild summer steelhead due to the use of bait is unknown but is likely very small given the spatial and temporal constraints on the fishery.

Catch and harvest of summer steelhead, fall Chinook and redband rainbow in the lower Deschutes River have been estimated by statistical harvest estimation procedures since 1970. Statistical harvest estimates have been calculated for fisheries taking place at Sherars Falls for both recreational anglers and tribal fishers, at the start of the Macks Canyon Road (river mile 42) and at the west bank at the mouth of the Deschutes River (Heritage Landing at river mile 0). The harvest sample at Heritage Landing produces an estimate of all land based, power boat, and drift craft angler effort and catch for those anglers fishing downstream from Macks Canyon (river mile 24). The harvest sample at the start of the Macks Canyon Road produces an estimate of all angler effort and catch leaving the river via the Macks Canyon Road. The Sherars Falls harvest sample produces an estimate of effort and catch by both sport anglers and tribal fishers in the area from Sherars Falls to Buck Hollow Creek. Minor effort and catch takes place in the Kloan area (river mile 6), and on the east bank near the mouth. Past sampling has suggested that it was not cost effective to sample these locations and these data have not gathered for many years.

All samples are standardized on a 1 July to 31 October statistically random schedule designed to estimate total effort and catch at each sample point. Catch is categorized by wild, RBH origin, and stray hatchery origin. If the three samples are completed on a given year, their sum is an estimate of total catch and effort for the period of the sample from Sherars Falls downstream to the mouth of the river. Minor catch of summer steelhead does occur after the sample period, therefore, these figures are not estimates of total catch but are valuable as indices of catch. Additionally, steelhead are harvested upstream from Sherars Falls, principally in the Maupin, South Junction, Trout Creek, and Warm Springs areas. Harvest from these areas can be estimated from catch record cards (punch card) but insufficient resources are available to complete total harvest estimates for the entire lower 100 miles of the Deschutes River.

Catch of RBH origin summer steelhead has been estimated by expanded harvest census since 1970, although not at all sites all years. Catch of RBH origin summer steelhead by recreational anglers in years when total catch below Sherars Falls was estimated ranged from a low of 84 in 1998 to a high of 3,287 in 1974. The percentage of RBH origin steelhead in the sport catch in years when sport catch was sampled at all sites has ranged from a low of 11% in 1993 and 1998 to a high of 92% in 1974. During years of unconstrained harvest, tribal fishers harvested a low of 221 RBH origin summer steelhead in 1976 and a high of 1,925 in 1974. It has not been possible to separate RBH origin steelhead from other hatchery steelhead harvested by tribal fishers in recent years. The percentage of RBH origin adults in the fisheries has decreased over time, due largely to the increasing percentage of stray origin hatchery summer steelhead in the catch.

Stray hatchery summer steelhead have become more numerous in the catch of recreational anglers and tribal fishers since 1982. During years when recreational catch was sampled at all sites, harvest of stray hatchery summer steelhead ranged from a low of 289 in 1974 to a high of 2,661 in 1989. The percentage of stray steelhead in the sport catch in years when sport catch was sampled at all sites has ranged from a low of 8% in 1974 to a high of 89% in 1994. During years when tribal fishers had unrestricted seasons, a low of 11 stray hatchery summer steelhead was harvested in 1975 and a high of 2,407 was harvested in 1983. It has not been possible to separate stray origin steelhead from RBH origin steelhead harvested by tribal fishers in recent years.

Currently no specific harvest management goals or harvest allocation agreements exist for hatchery produced summer steelhead in the lower Deschutes River. ODFW works closely with the Confederated Tribes of Warm Springs Reservation of Oregon (CTWSRO) to encourage harvest of hatchery origin summer steelhead while protecting wild summer steelhead in the Deschutes River sport and tribal fisheries. This plan does not address in-river tribal harvest. Tribal harvest will be included in other agreements or plans. Harvest impacts proposed in this FMEP are consistent with and do not preclude proposed future harvest of Deschutes River steelhead by tribal interests. The actions and objectives of this FMEP are subject to and are consistent with provisions of the Columbia River Fish Management Plan (*US v Oregon*).

Very conservative angling regulations currently in effect on Rock, Mosier, Chenoweth, Mill, Threemile and Fifteenmile creeks provide a high level of protection for steelhead juveniles.

Chenoweth, Mill, and Fifteenmile creeks open to trout angling the fourth Saturday in May through October. It is believed that most steelhead smolts have emigrated for their natal streams prior to this date. Further, these streams are restricted to catch and release angling with artificial lures only.

Rock, Mosier and Threemile creeks have very limited areas that are accessible to steelhead. Rock Creek has a porous alluvial fan at its mouth and fish passage across this fan is possible only at high winter and spring flows and natural barriers that are not passable to steelhead are present a short distance upstream. Anadromous fish are blocked from accessing all but the lower 400 meters of Mosier Creek by an impassable falls. Steelhead access in Threemile Creek is severely restricted by improperly functioning culverts under Interstate 84 and culverts under Highway 197 block access approximately 300 meters above that point. Trout fishing in these streams does not open until the fourth Saturday in May but is not restricted to catch and release or artificial lures. Five trout can be harvested per day with an 8-inch minimum length limit. Managers are not aware of any trout angling effort in the portions of these streams that are accessible to steelhead. Steelhead have not been documented to be present in Mosier, Rock or Threemile creeks.

Artificial Propagation Programs

RBH, completed in 1972 to mitigate loss of fish production caused by the Pelton/Round Butte hydroelectric project, is the only hatchery releasing summer steelhead in the lower Deschutes River subbasin. Portland General Electric (PGE) funded construction of the hatchery and continues to finance operation and maintenance. ODFW operates the hatchery. All hatchery

smolts released into the Deschutes River from RBH are marked with distinctive double external marks using a combination of fin and/or maxillary bone clips.

RBH summer steelhead broodstock is currently collected from known RBH fish returning to Pelton trap, the hatchery trap for RBH. Both wild and RBH stock summer steelhead were held for broodstock prior to the 1984 brood year. Broodstock for the 1984 through 1987 brood years were selected only from RBH origin steelhead due to concerns about introducing foreign strains of the Infectious Hematopoietic Necrosis virus into the RBH program. Starting with the 1988 brood year, a portion the hatchery production was from wild by wild pairings. This experiment was discontinued after the 1993 brood year. From then until the 1998 brood year, wild fish were incorporated egg take at varying rates. Wild summer steelhead used for brood stock at RBH were collected at the Sherars Falls trap several years in the 1990's.

No wild steelhead are currently incorporated into the RBH broodstock because of the potential genetic and disease risks posed by out of subbasin stocks. Presumptive evidence suggests that wild summer steelhead from other river systems stray into the Deschutes River as far upstream as the Pelton trap each year. There is currently no quick, effective method of distinguishing between wild Deschutes River and upriver adult steelhead when they are handled at the Sherars Falls or Pelton traps. The conservative position then, is to not use any wild summer steelhead in the hatchery program.

As mentioned above, stray hatchery steelhead have become more numerous in the Deschutes River since 1982 (Table 1). The mechanisms that contribute to this straying are poorly understood. Likely causes could include smolt transportation in the Columbia River, failure to acclimate smolts prior to release, using non-native hatchery stocks and returning adults using the Deschutes as a thermal refuge during the summer. While the causes of increased straying may be poorly understood, the magnitude of hatchery straying in the Deschutes River has been well documented. The number of non-Deschutes origin hatchery steelhead estimated to pass Sherars Falls each year has increased (Table 1). Stray hatchery steelhead (as identified fin mark) are observed in large numbers each year in spawning ground counts and at the Pelton trap and at the WSNFH trap. Potential ecological and more importantly genetic injury to Deschutes River steelhead as a result of this phenomena are also poorly understood but are assumed to be serious. As detailed below, Chilcote (2001) calculates increased probability of extinction of Deschutes River wild steelhead with increasing numbers of stray hatchery steelhead. This single issue may pose the greatest danger to the continued survival of Deschutes wild steelhead.

WSNFH discontinued release of summer steelhead into the Deschutes River after 1982 due to disease problems and the apparent physical limitations of the facility to rear 2-year smolts. Future steelhead production at that facility is not planned.

WSNFH may no longer release summer steelhead juveniles but the facility is important for meeting steelhead management objectives. WSNFH utilizes a barrier dam and trap to collect spring Chinook returning to the facility. This trap is also used to capture adult steelhead migrating up the Warm Springs River each winter and spring. All hatchery steelhead are denied access into the Warm Springs River upstream from the facility and only wild steelhead are

allowed into the spawning grounds upstream from the facility. This allows the Warm Springs River to remain as a reservoir for potentially less diluted genetic material.

The lower Deschutes River has a wild spring Chinook population as well as two hatchery programs that produce spring Chinook for subbasin harvest augmentation. RBH currently releases approximately 320,000 spring Chinook smolts annually to mitigate for losses caused by the Pelton/Round Butte hydroelectric complex. WSNFH produces spring Chinook to provide tribal harvest opportunities greater than that which the wild run would support and releases about 750,000 spring Chinook smolts annually.

No hatchery fall Chinook are released into the Deschutes River.

No hatchery steelhead, salmon or trout are released in Rock, Mosier, Chenoweth, Mill, Threemile or Fifteenmile creeks.

1.1.3) General description of the relationship between the FMEP objectives and Federal tribal trust obligations. (This will be further addressed in section 4).

The ceded lands of the CTWSRO contain all of the anadromous fish portion of the Deschutes River subbasin. A treaty between the US government and the three tribes comprising the CTWSRO guarantees tribal members the exclusive rights to fish in waters on and bordering the Warm Springs Reservation. In addition the treaty guarantees that tribal members retain fishing rights within their ceded lands. The Warm Springs Tribal Council regulates off-reservation tribal fishery harvest.

In 1997 ODFW prepared and the Oregon Fish and Wildlife Commission adopted the Lower Deschutes River Subbasin Fish Management Plan. This plan established management goals, objectives and strategies for resident and anadromous fisheries in the lower Deschutes River subbasin. The CTWSRO were consulted throughout this planning process. The plan was never formally adopted by the Warm Springs Tribal Council even though CTWSRO concurred with the specific provisions of this plan. ODFW and CTWSRO have based management decisions in recent years on the provisions contained within this plan.

Currently no specific harvest management goals or harvest allocation agreements exist for hatchery produced summer steelhead in the lower Deschutes River. ODFW works closely with CTWSRO to encourage harvest of hatchery origin summer steelhead while protecting wild summer steelhead in the Deschutes River sport and tribal fisheries. This plan does not address in-river tribal harvest. Tribal harvest will be included in other agreements or plans. Harvest impacts proposed in this FMEP are consistent with and do not preclude proposed future harvest of Deschutes River steelhead by tribal co-managers. The actions and objectives of this FMEP are subject to and are consistent with provisions of the Columbia River Fish Management Plan (*US v Oregon*).

1.2) Fishery management area(s).

1.2.1) Description of the geographic boundaries of the management area of this FMEP.

The steelhead, salmon and trout fisheries (except those on the Warm Springs Reservation) associated with this FMEP are confined to the lower 100 miles of the Deschutes River and tributaries, extending from the confluence with the Columbia River upstream to the base of the Pelton Reregulating Dam.

Rock, Mosier, Chenoweth, Mill, Threemile, and Fifteenmile creeks are minor Columbia River tributaries between Hood River and the Deschutes River. The western-most stream, Rock Creek enters the Columbia River at river mile 174 and the eastern-most stream, Fifteenmile Creek, enters the Columbia River at river mile 192.

1.2.2) Description of the time periods in which fisheries occur within the management area.

Summer steelhead begin entering the Deschutes River in late June and are present in the river until spawning is concluded by the end of April the following year. Sport and tribal in-river fisheries generally occur from July through December. The bulk of the sport angler effort and harvest is completed by the end of October.

Sport angling for steelhead and redband trout is open year around on the portion of the Deschutes River not bordering the Warm Springs Reservation. Mandatory wild steelhead release applies during this season throughout the river. Sport angling for steelhead on the portion of the Deschutes River bordering the Warm Springs Reservation (river mile 71 to river mile 100) is open from the fourth Saturday in April through December of each year. Again, mandatory wild release applies. Sport angling for redband trout on waters bordering the Warm Springs Reservation is open from the fourth Saturday in April through October.

Spring Chinook are harvested principally from 15 April through 15 June and virtually all of the sport and tribal spring Chinook harvest takes place in the one mile reach immediately downstream from Sherars Falls. Some level of sport spring Chinook harvest has been allowed 14 out of the last 21 years.

Wild fall Chinook return to the Deschutes River each year starting in late June and early July. The sport harvest scenario for fall Chinook is very similar to that for spring Chinook; the vast majority of sport angler harvest taking place in the one mile reach immediately downstream from Sherars Falls. Some level of sport harvest of fall Chinook has been authorized 5 of the last 11 years. Season length on years of sport harvest has ranged from the month of October to three days per week from 1 August to 31 October to seven days per week 1 August to 31 October.

Trout angling is allowed in the minor Columbia River tributaries covered by this plan from the fourth Saturday in May through October each year.

1.3) Listed salmon and steelhead affected within the Fishery Management Area specified in section 1.2.

The only known ESA listed salmon or steelhead affected within the Deschutes River FMEP are the Middle Columbia River steelhead and Snake River summer steelhead DPSs. Hatchery summer steelhead from the Middle Columbia River and Snake River co-mingle with natural populations in this FMEP area. The Deschutes River hatchery summer steelhead stock produced at RBH has been identified as part of the DPS. Winter steelhead are also present in Fifteenmile, Mill and Chenoweth creeks.

1.3.1) Description of "critical" and "viable" thresholds for each population (or management unit) consistent with the concepts in the technical document "Viable Salmonid Populations and the Recovery of Evolutionarily Significant Units."

Chilcote (2001) has calculated the viable threshold value as described by McElhany et al. (2000) for the lower Deschutes River wild summer steelhead to be 1,149 individuals escaping past Sherars Falls. His analysis also determined the critical threshold value for wild summer steelhead to be 398 individuals escaping past Sherars Falls (Table 2).

The public review draft (March 2001) of this FMEP specified critical and viable abundance thresholds as shown below in Table 2. Upon further discussions with NOAA Fisheries, our critical thresholds were lower than NOAA Fisheries was comfortable with as "trigger points" to further reduce fishery impacts when wild steelhead populations declined to critically low levels. Based on the guideline in McElhaney et al (2000), the viable thresholds were more aligned with NOAA's intentions for critical thresholds. Therefore, "Viable" threshold levels identified in the original FMEP were also classified as "Critical Fishery Conservation Thresholds" in this revised FMEP and included in Table 2. Subsequent discussions of "viable" and critical" thresholds refer to the "population viable and "critical" thresholds listed in Table 2, with the recognition that for fishery conservation triggers, the critical threshold recommenced by NOAA Fisheries (1,149 for the 6-year average wild steelhead abundance) will be used.

Critical and viable thresholds were not identified for steelhead in the minor Columbia River tributaries between Hood River and the Deschutes River due to insufficient information.

1.3.2) Description of the current status of each population (or management unit) relative to its "Viable Salmonid Population thresholds" described above. Include abundance and/or escapement estimates for as many years as possible.

Over 95% of the summer steelhead spawning in the Deschutes River subbasin is thought to occur upstream from Sherars Falls (river mile 43). Steelhead spawning takes place in the mainstem Deschutes River and tributaries upstream from Sherars Falls. The estimated number of wild summer steelhead escaping above Sherars Falls is thought to be the best measure of their abundance and/or escapement. The estimated number of wild summer steelhead escaping upstream from Sherars Falls has dropped below the proposed viable threshold of 1,149 twice in the 27 years of record and was very close one other year (Table 1). The estimated escapement had never dropped below the critical threshold in 27 years of data but was very close in the 1994-

95 run year (Table 1). The average annual wild escapement for the past 27 years has been approximately 4,465 (Table 1).

The population of Deschutes River wild summer steelhead appears viable based on estimated numbers of wild steelhead escapement above Sherars Falls. However, these escapement numbers are likely inflated by stray, out-of-basin stray wild steelhead also passing Sherars Falls. The magnitude of this inflation is currently unknown. Stray hatchery and wild steelhead from outside the basin were identified as a major limiting factor for the Deschutes River summer steelhead populations (Carmichael *et al.* 2006)

The current status of steelhead in the minor Columbia River tributaries (Fifteenmile, Mill and Chenoweth creeks) is unknown. Steelhead are not documented to be present in Mosier, Rock or Threemile creeks.

The Interior Columbia Technical Recovery Team (ICTRT) was charged by NOAA Fisheries to delineate historical steelhead populations within the MCR steelhead DPS and to develop viability criteria for recovery of the populations and the DPS. The ICTRT identified three populations within area covered by this FMEP: Fifteenmile Creek, Eastside Deschutes River and Westside Deschutes River (ICTRT 2005). The Fifteenmile Creek population includes all of the small tributaries between Hood River and the Deschutes River. The Eastside Deschutes River population encompasses the mainstem Deschutes River from its mouth to the confluence of Trout Creek and the tributaries enter from the east including Willow Creek which is above Pelton Dam. The population in the Crooked River basin was considered to be an independent population that was extirpated. The Westside population includes mainstem spawners from the mouth of Trout Creek upstream to Pelton Dam and the Warm Springs River and Shitike Creek. Also included are the tributaries above Pelton Dam including Wychus Creek (formally Squaw Creek) and historically used portions of the Metolius River (ICTRT 2003; 2005). The ICTRT also categorized the populations based on the size of historic spawning habitat, and identified the minimum population abundance thresholds for those categories, with Fifteenmile being considered Basic (500 adults), Eastside as Intermediate (1,000 adults), and the Westside as Large (1,500 adults) (ICTRT 2005).

Table 1. Estimated number of steelhead that migrated past Sherars Falls, by run year.

Run Year	Wild	Round Butte Hatchery	Stray Hatchery	Total
1977-78	6,600	6,100	900	13,600
1978-79	2,800	3,200	300	6,300
1979-80	4,200	5,400	600	10,200
1980-81	4,100	5,500	500 a/	10,100
1981-82	6,900	3,800	1,200 a/	11,900
1982-83	6,567	3,524	1,249 a/	11,340
1983-84	8,228 b/	7,250	7,684 a/	23,162
1984-85	7,721 b/	7,563	3,824 a/	19,108
1985-86	9,624 b/	7,382	5,056 c/	22,062
1986-87	6,207 b/	9,064	9,803 c/	25,074
1987-88	5,367 b/	9,209	8,367	23,943
1988-89	3,546	3,849	2,909	10,304
1989-90	4,278	2,758	3,659	10,695
1990-91	3,653	1,990	2,852	8,495
1991-92	4,826	3,778	8,409	17,049
1992-93	904	2,539	4,261	7,704
1993-94	1,487	1,159	4,293	6,936
1994-95	482	1,781	4,391	6,654
1995-96	1,662	2,708	11,855	16,225
1996-97	3,458	5,932	23,618	33,008
1997-98	1,820	5,042	17,703	24,465
1998-99	3,800	3,527	11,110	18,437
1999-2000	4,790	2,628	13,785	21,203
2000-2001	8,749	4,380	15,072	28,437
2001-2002	8,749	9,373	25,263	43,385
2002-2003	9,363	8,880	15,203	33,446
2003-2004	5,524	5,265	6,542	17,331
2004-2005	3,161	4,942	4,949	13,052

a/ May include some AD CWT marked steelhead that originated from Warm Springs NFH although few of these ever returned to that facility.

b/ May include some unmarked hatchery steelhead outplanted as fry into the Warm spring River from Warm Springs NFH.

c/ May include adults from a release of 13,000 smolts from Round Butte Hatchery that were accidentally marked with the same fin clip as steelhead released from other Columbia basin hatcheries.

Table 2. List of the natural fish populations, "Viable Salmonid Population" thresholds, Critical Fishery Conservation Thresholds, and associated hatchery stocks included in this FMEP.

Natural Populations (or Management Units	Population Critical Thresholds	Population Viable Thresholds	Critical Fishery Conservation Thresholds	Associated hatchery stock(s)	Hatchery stock essential for recovery? (Y or N)
Deschutes River wild summer steelhead	398	1,149	1,149	Round Butte Fish Hatchery summer steelhead (stock 53)	Y
Minor Columbia tributaries	Unknown	Unknown	Unknown	none	N

1.4) Harvest Regime

The primary focus of this FMEP is on fisheries that target adult summer steelhead although managers recognize the potential for trout fisheries to significantly impact juvenile steelhead (Cramer et al. 1998). The majority of potential fishery-related impacts to wild steelhead are thought to take place in these fisheries.

As will be discussed below, managers believe that sport angler harvest is an effective way to reduce the number of stray hatchery origin summer steelhead in the Deschutes River. The magnitude of the stray hatchery steelhead problem in the Deschutes River has been well documented and the potential genetic and ecological damage from this phenomenon could be very large. Managers further believe that sport anglers can continue to harvest and remove stray hatchery steelhead under the current regulatory scheme without jeopardizing the survival and recovery of ESA listed summer steelhead.

The best available scientific information suggests hook and release mortality of adult steelhead is low. Reingold (1975) showed adult steelhead hooked, played to exhaustion, and then released returned to their target spawning stream as well as steelhead not hooked and played to exhaustion. Hooton (1987) found catch and release mortality of adult steelhead to be 3.4% (n= 3,715 fish) on average when using a variety of fishing tackle, including barbed and barbless hooks, bait and artificial lures. Hooton concluded that catch and release of adult steelhead was an effective mechanism for maintaining angling opportunity without negatively impacting stock recruitment.

The clear intent of present and future harvest management is to not jeopardize the survival and recovery of ESA listed summer steelhead present in the Deschutes River and any steelhead that may be present in the minor Columbia River tributaries discussed in the is plan. Deschutes River

fisheries will be managed to selectively harvest adult hatchery steelhead. The selective fisheries on hatchery steelhead require the mandatory release of incidentally caught wild fish. This regime has been structured and implemented over a number of years to provide highly significant protection to both adult and juvenile steelhead. ODFW believes the proposed harvest regime will not jeopardize the survival and recovery of the ESA listed steelhead in the Deschutes River or minor Columbia River tributaries covered by this plan.

This FMEP proposes to continue status quo harvest management for the term of this document as long wild steelhead spawner escapement is above the Critical Fishery Conservation threshold of 1,149 fish. However, if there is a downward trend of wild adult steelhead below the objective of 1,149 fish, the fishery can be modified to reduce impacts to wild steelhead. Possible adjustments could be additional gear restrictions, restriction of the open area and or season length. The Critical Fishery Conservation threshold is expected to be updated in the future based on the development of the MCR steelhead recovery plan and from the work done by the ICTRT.

1.4.1) Provide escapement objectives and/or maximum exploitation rates for each population (or management unit) based on its status.

The Lower Deschutes River Subbasin Fish Management Plan (ODFW 1997) contains a spawner escapement objective of 6,575 wild summer steelhead over Sherars Falls. This escapement objective was developed during the *US v. Oregon* negotiations and is scientifically derived. Sport angling and tribal fisher regulations are in effect to protect wild summer steelhead and aid in meeting this objective.

Chilcote (2001) preformed Population Viability Analysis for the Deschutes River wild summer steelhead population. This analysis made it possible to determine viable and critical threshold values for the wild summer steelhead population (Table 2). Chilcote recommended a viable threshold of 1,149 and a critical threshold of 398 wild summer steelhead escaping over Sherars Falls as the triggers for additional measures to protect wild summer steelhead from angler induced mortality. These additional measures could include season and area closures, additional gear restrictions or complete angling closures. As described above these additional measures would go into effect when wild returns neared the Critical Fishery Conservation threshold of 1,149 adults.

There are no exploitation rate objectives for wild steelhead in the Deschutes River other than to minimize the hook and release mortality associated with the catch and release fishery.

Specific exploitation rate goals for hatchery summer steelhead in the Deschutes River have not been identified. It is, however, specifically recognized that maximizing removal of hatchery summer steelhead through angling is important to maintain the genetic health of the wild population. Removing hatchery steelhead utilizing harvest will reduce number of hatchery fish available to spawn in the wild. Continuing sport angler removal of hatchery steelhead from the Deschutes River is an important tool to meet management objectives. This concept will be discussed in detail in the following section.

No escapement objectives or exploitation rates are available for the minor Columbia River tributaries discussed in this plan. Adult steelhead are only present in Mill, Chenoweth and Fifteenmile creeks, and are not legal to retain in any of these streams. Juvenile steelhead are protected by seasonal closures, gear restrictions and harvest restrictions.

1.4.2) Description of how the fisheries will be managed to conserve the weakest population or management unit.

Summer steelhead

Summer steelhead angling and harvest has been historically popular and important for recreational anglers and tribal fishers. Sport harvest of wild summer steelhead was allowed by recreational anglers prior to 1978 under a two fish per day regulation. Natural bait and barbed hooks were legal throughout most of the lower Deschutes River during this period. Anticipated low returns of wild summer steelhead in 1978 resulted in closure of the Deschutes River to summer steelhead angling on 20 August, 1978. The season reopened 1 July, 1979 with a mandatory wild fish release rule. This rule has remained in effect to date. The use of natural bait and barbed hooks was also prohibited starting in 1979, except that bait was allowed in a one mile reach downstream from Sherars Falls. This area was expanded to a three mile reach from Sherars Falls downstream to the upstream most railroad trestle in 1990. The daily bag limit has been restricted to two adipose fin-marked hatchery summer steelhead after 1978 up until 2003 when it was changed to three adipose fin-marked fish per day.

Other restrictive angling regulations are also in place to effectively reduce total catch and catch rates on wild steelhead. Angling from a floating device has been banned in the Deschutes River since 1936. This regulation alone significantly reduces catch of summer steelhead in a river as large as the lower Deschutes.

Tribal fishers are required by tribal resolution to release wild steelhead caught by hook and line or by dipnet.

Sport angling in the Deschutes River has a number of restrictions aimed at protecting wild steelhead adults and juveniles. Mandatory release of sport caught wild steelhead adults has been in effect since 1979. Anglers are encouraged to harvest hatchery steelhead, rather than practicing catch and release for hatchery summer steelhead. This practice aids in reducing the number of hatchery steelhead available to potentially spawn with wild steelhead.

Natural bait has been banned on 97% of the lower Deschutes River since 1979, substantially lowering the catch rates and cumulative hooking mortality of juvenile steelhead. It has been widely demonstrated that catch rates are lower on artificial lures than on natural bait (Hooton 1987). Hooking mortality studies (summarized in NMFS 1998) have shown bait to result in significantly higher mortality rate for trout (and juvenile steelhead) than other gear types. Wydoski (1977) showed the average mortality of trout when using bait to be more than four times greater than the mortality associated with using artificial lures and flies. Taylor and White (1992) showed average mortality of trout to be 31.4% when using bait versus 4.9% and 3.8% for lures and flies, respectively. Schisler and Bergersen (1996) reported average mortality of trout

caught on passively fished bait to be higher (32%) than mortality from actively fish bait (21%). Mortality of fish caught on artificial flies was only 3.9%.

Specific exploitation rate goals for hatchery summer steelhead in the Deschutes River have not been identified. It is, however, specifically recognized that maximizing removal of hatchery origin summer steelhead through angling is important to maintain the genetic health of the wild population. Removing hatchery steelhead utilizing harvest will reduce number of hatchery fish available to spawn in the wild. Continuing sport angler removal of hatchery steelhead from the Deschutes River is an important tool to meet management objectives.

This importance of sport angler removal of hatchery steelhead in the Deschutes River is underscored by Population Viability Analysis conducted by Chilcote (2001). The current long-term average percentage of hatchery steelhead in the spawning population is 54%. At that rate of potential hatchery genetic contribution, the probability of extinction of the wild population 50 years into the future is 85%. However, if the percentage of hatchery fish in the spawning population is lowered to 40%, the 50 year probability of extinction is lower significantly to 26%. To further illustrate the importance of removing hatchery steelhead from the spawning population, if the percentage of hatchery fish in the spawning population is lowered to 30%, the 50 year probability of extinction falls to 0%. It is crucial that subbasin fish managers continue to use sport anglers as a tool to maintain and even increase removal of hatchery fish from the spawning population. We feel that with the low hook and release mortality rates demonstrated below, sport angler removal of hatchery fish from the spawning population can continue with no jeopardy to the wild steelhead population.

In contrast if all fisheries were closed in the Deschutes, the selective removal of hatchery fish would end. This would cause the proportion of hatchery fish on the spawning grounds to increase to 0.60. Although, there would be some benefits because wild fish would no longer be subjected to hook and release mortality, the increase in hatchery spawners would cancel nearly all of the biological gains. For example, Chilcote (2001) found that with a zero percent harvest rate in the Deschutes (all fisheries closed), the probability of extinction would still be quite high, 28.3%.

Therefore, it appears that the most effective strategy to conserve wild Deschutes steelhead would be to devise means to further reduce the number of naturally spawning hatchery fish in this basin. If an additional 43% of the current hatchery return could be removed from the spawning areas, this would be sufficient to bring the proportion of naturally spawning hatchery fish down to 0.40. As stated above, such a reduction would be sufficient to cause a substantial decrease in the probability of extinction. Increased angler utilization of hatchery steelhead should be encouraged. Additionally, managers feel it is very important to construct facilities in Bakeoven, Buck Hollow, and Trout creeks that would make it possible to exclude hatchery summer steelhead from the spawning populations in those streams. These facilities would make it possible to “harvest” more of the hatchery steelhead escaping upstream from Sherars Falls and reduce the percentage in the spawning population.

Estimates of steelhead harvest by sport anglers from the mouth upstream 43 miles are available for many years. Estimates of the number of hatchery origin steelhead, by either stray hatchery or

RBH origin, and wild steelhead passing Sherars Falls are made each year since 1977. Average sport angler catch rate of RBH origin steelhead from the mouth to river mile 43 has been an estimated 9.3% for the last 5 years (unpublished data). Assuming that wild steelhead are also caught at this rate and assuming an average hooking mortality of 10%, then, on the average, **slightly less than 1% of the average escapement of wild steelhead over Sherars Falls would succumb to hook and release mortality each year. At this low in-river impact rate, selective steelhead fisheries designed to maximize harvest of stray hatchery origin steelhead are an important fish management tool used to help maintain the genetic independence of Deschutes River wild summer steelhead.**

Using a 10% hook and release mortality rate for Deschutes River steelhead fisheries may be justified. Water temperatures in the Deschutes River can approach 21 ^{o}C. during parts of the summer although for relatively brief periods. Hooking mortality may approach the 10% value rather than the 5% figure seen in much of the literature for colder water (Hooton 1987). In a study conducted on the catch and release mortality of steelhead in a California river, Taylor and Barnhart (1999) reported over 80% of the observed mortalities occurred at stream temperatures greater than 21 ^{o}C. Catch and release mortality during periods of elevated water temperature are likely to result in post-release mortality rates greater than reported by Hooton (1987). The *US v. Oregon* Technical Advisory Committee typically applies a catch and release mortality rate of 10% during high stream temperatures in Columbia Basin salmon and steelhead fisheries.

Compliance with sport fishery regulations is excellent and compliance with tribal resolutions requiring wild release is generally good. These regulations should combine to keep catch rates of wild summer steelhead to less than 10%.

Adult steelhead are not legal to retain in any of the minor Columbia River tributaries (Fifteenmile, Mill or Chenoweth creeks) discussed in this plan.

Redband Trout

Redband trout are very abundant in the lower Deschutes River. Estimated population densities of more than 2,000 trout (greater than or equal to eight inches) per mile have been measured. Total abundance of redband trout in the lower 100 miles of the Deschutes likely exceeds 100,000 individuals, and the magnitude of that population provides an effective buffer against juvenile steelhead mortality in the redband trout fishery.

Deschutes River redband trout angling regulations protect juvenile steelhead from angling mortality. Redband trout between 10 and 13 inches in length can be retained; all other trout must be released unharmed. Most wild steelhead smolts are less than eight inches in length (Busby et al. 1996). The lower length limit of the slot length regulation is great enough to protect most juvenile steelhead from direct angling mortality. Less than 2% of age 2 and age 3 juvenile steelhead migrants captured at a weir in Bakeoven Creek were greater than 10 inches fork length (unpublished data). Further, data from the Warm Springs River juvenile trapping efforts show that only 12% of all migrants presumed to be juvenile steelhead are greater than 8 inches fork length (unpublished data).

Effort and harvest data from redband trout anglers in the lower Deschutes River have been collected for many years. The current trout slot length limit and bait ban combine to nearly eliminate consumptive trout angling. Data from harvest samples in the lower 43 miles of the Deschutes consistently show that anglers release approximately 97% of their total redband trout catch. This harvest rate would translate into an actually harvest of less than 1% of the redband trout population of the river each year. This very low harvest rate also protects juvenile steelhead caught incidentally by redband trout anglers.

Stocking hatchery catchable rainbow in the Deschutes River was eliminated after 1978. The most significant effect of releasing catchable trout in waters home to listed steelhead is the inadvertent harvest of juvenile steelhead in catchable trout fisheries. Cramer and Willis (1998) observed that the release of catchable trout attracts anglers to release locations and that harvest rates of juvenile steelhead are generally proportional to angler effort. In a study of effects to juvenile steelhead from catchable trout fisheries in the Wenatchee River, Washington, Don Chapman Consultants (1989) concluded that sport anglers remove 61% to 87% of wild steelhead longer than 125 mm and kill 2% to 28% of steelhead larger than 100 mm by hook and release. Furthermore, it was found that anglers harvest 72% to 91% of the hatchery rainbow trout soon after release. Cramer et al. (1997) noted that this quick removal of hatchery trout leaves only juvenile steelhead as the targets for fishermen attracted by the reports of high angler success. This observation is supported by Don Chapman Consultants (1989) finding that "although catchable trout did not displace wild steelhead by direct interaction for space, hatchery trout attracted anglers that killed a large fraction of the juvenile steelhead in the river." Their underwater observations also indicated that wild steelhead were more susceptible to angling that hatchery trout because steelhead reacted faster to lures and bait. Pollard and Bjornn (1973) made similar observations, noting in a study on the Crooked Fork of the Lochsa River, Idaho, that most of the larger juvenile steelhead trout present in the retention area of the river were caught at a faster rate than the smaller age 1 steelhead and the hatchery trout given the same level of effort.

Fisher (1961, as described by Cramer et al. 1997) surveyed angler effort in the Big Sur River, California, observing that anglers caught an estimated 90% of the catchable trout released, but wild trout made up 24% of total catch. The angler catch of wild fish was 7 times greater than the number of wild fish counted as outmigrants to the river during the same period. This experiment was conducted during the peak spring migration period for steelhead smolts. All these studies show that natural steelhead are more susceptible to angling than catchable trout when the two are present together and that angler effort is directly related to the presence of catchable trout releases. These studies lead to the conclusion that removing the catchable trout program from the Deschutes River will benefit ESA listed steelhead.

Juvenile steelhead are afforded other significant protections from angling mortality. As noted above, anglers are restricted to artificial flies and lures for all angling on 97 of 100 miles on the lower Deschutes River. Wydoski (1977) showed the average mortality of trout when using bait to be more than four times greater than the mortality associated with using artificial lures and flies. Taylor and White (1992) showed average mortality of trout to be 31.4% when using bait versus 4.9% and 3.8% for lures and flies, respectively. Schisler and Bergersen (1996) reported average mortality of trout caught on passively fished bait to be higher (32%) than mortality from actively fish bait (21%). Mortality of fish caught on artificial flies was only 3.9%. Even though

bait is legal in the three mile reach below Sherars Falls, there is very little documented angling that targets trout in this area.

Competitive interaction between juvenile steelhead and hatchery trout was also eliminated after hatchery trout stocking was stopped.

Principle eastside steelhead spawning tributaries Bakeoven, Buck Hollow and Trout creeks have significant angling closures designed and implemented to protect adult and juvenile wild summer steelhead. Bakeoven and Buck Hollow creeks are closed year around to all angling. Trout Creek is open to catch and release trout angling with artificial flies and lures from the fourth Saturday in May through October. This management strategy provides very significant protection through the harvest prohibition and the late May opening date. Smolt trapping studies on Trout Creek demonstrate that nearly all steelhead smolts have left Trout Creek prior to the late May time period.

The amount of mainstem steelhead spawning in the Deschutes River is thought to be variable from year to year and dependent on tributary inflow. In years of high tributary inflow and good passage conditions for steelhead into the tributaries, the proportion of spawning in the mainstem is believed to be relatively low. It is further believed that the vast majority of mainstem steelhead spawning occurs in that portion of the Deschutes River bordering the Warm Springs Reservation (river mile 71 to 100). This river reach is closed to all angling from January 1 to the fourth Saturday in April each year. This closure minimizes disturbance to holding and spawning steelhead and this closure covers a significant portion of the smolt outmigration period.

Very conservative angling regulations currently in effect on Rock, Mosier, Chenoweth, Mill, Threemile and Fifteenmile creeks provide a high level of protection for steelhead juveniles.

Chenoweth, Mill, and Fifteenmile creeks open to trout angling the fourth Saturday in May. It is believed that most steelhead smolts have emigrated for their natal streams prior to this date. Further, these streams are restricted to catch and release angling with artificial lures only.

Rock, Mosier and Threemile creeks have very limited areas that are accessible to steelhead. Rock Creek has a porous alluvial fan at its mouth and fish passage across this fan is possible only at high winter and spring flows and natural barriers that are not passable to steelhead are present a short distance upstream. Anadromous fish are blocked from accessing all but the lower 400 meters of Mosier Creek by an impassable falls. Steelhead access in Threemile Creek is severely restricted by improperly functioning culverts under Interstate 84 and access is blocked by culverts under Highway 197 approximately 300 meters above that point. Trout fishing in these streams does not open until the fourth Saturday in May but is not restricted to catch and release or artificial lures. Five trout can be harvested per day with an 8 inch minimum length limit. Managers are not aware of any trout angling effort in the portions of these streams that are accessible to steelhead. Steelhead have not been documented to be present in Mosier, Rock or Threemile creeks.

Chinook Salmon

The lower Deschutes River has a wild spring Chinook population as well as two hatchery programs that produce spring Chinook for subbasin harvest augmentation. RBH produces spring Chinook to mitigate for losses caused by the Pelton/Round Butte hydroelectric complex. WSNFH produces spring Chinook to provide tribal harvest opportunities greater than that which the wild run would support. Spring Chinook are harvested principally from 15 April through 15 June and virtually all of the sport and tribal spring Chinook harvest takes place in the one mile reach immediately downstream from Sherars Falls. Some level of sport spring Chinook harvest has been allowed 14 out of the last 21 years. Very few wild adult summer steelhead have historically been caught in this fishery due principally to the time of year this fishery operates. The potential for this fishery to impact wild summer steelhead is low given the time of year and the restricted area of the fishery. The reach of river where this fishery takes place is characterized by very deep, high velocity areas where the river is constrained between bedrock cliffs. This habitat is likely not utilized by significant numbers of juvenile steelhead. Further, even though natural bait is legal in this reach, anglers tend to use rather large hooks and baits when angling for Chinook. The potential for hooking mortality to juvenile steelhead is likely low under these circumstances.

Wild fall Chinook return to the Deschutes River each year starting in late June and early July. The sport harvest scenario for fall Chinook is very similar to that for spring Chinook, with the vast majority of sport angler harvest taking place in the one mile reach immediately downstream from Sherars Falls. As mentioned above, natural bait is legal in this reach. Greater numbers of wild summer steelhead are caught and released during this fishery, given the greater number of summer steelhead present at the time of this fishery. The increased hooking mortality to wild summer steelhead due to the use of bait is unknown but is likely small given the spatial and temporal constraints on the fishery.

Both Chinook salmon harvest opportunities primarily take place in the Sherars Falls reach. This area is subject to significant law enforcement oversight by the Oregon State Police Wildlife Division. Anglers in this reach have historically have had excellent compliance wild steelhead release rules owing to this enforcement presence and the close proximity of the area to paved roads.

Salmon angling is closed in all the minor Columbia River tributaries between Hood River and the Deschutes River.

1.4.3) Demonstrate that the harvest regime is consistent with the conservation and recovery of commingled natural-origin populations in areas where artificially propagated fish predominate.

The harvest strategy for Deschutes River steelhead is based solely on the harvest of fin-marked hatchery steelhead. Only steelhead with a missing adipose fin can be legally retained by the angler. Gear restrictions, season restrictions and a consistent high level of fishery law enforcement all work together to minimize the loss of wild summer steelhead. While it is

important to not jeopardize the recovery of ESA listed steelhead through hooking mortality, it may be equally important in the Deschutes River to harvest large numbers of hatchery steelhead.

Chilcote (2001) preformed Population Viability Analysis for the Deschutes River wild summer steelhead population. This analysis made it possible to determine viable and critical threshold values for the wild summer steelhead population (Table 2). Chilcote recommended a viable threshold of 1,149 (NOAA Fisheries recommended Critical Fishery Conservation Threshold) and a critical threshold of 398 wild summer steelhead escaping over Sherars Falls as the triggers for additional measures to protect wild summer steelhead from angler induced mortality. These additional measures could include season and area closures, additional gear restrictions or complete angling closures.

There are no exploitation rate objectives for wild steelhead in the Deschutes River other than to minimize the hook and release mortality associated with the catch and release fishery. Even though no specific exploitation rates for hatchery steelhead are stated, it is specifically recognized by subbasin fish managers that maximizing removal of hatchery origin summer steelhead through angling from the population is important to maintain the genetic health of the wild population. Removing hatchery steelhead utilizing harvest will reduce number of hatchery fish available to spawn in the wild. Continuing to use sport anglers to remove hatchery steelhead from the Deschutes River is an important tool available for managers to meet management objectives.

This importance of sport angler removal of hatchery steelhead in the Deschutes River is underscored by Population Viability Analysis conducted by Chilcote (2001). The current long-term average percentage of hatchery steelhead in the spawning population is 54%. At that rate of potential hatchery genetic contribution, the probability of extinction of the wild population 50 years into the future is 85%. However, if the percentage of hatchery fish in the spawning population is lowed to 40%, the 50 year probability of extinction is lower significantly to 26%. To further illustrate the importance of removing hatchery steelhead from the spawning population, if the percentage of hatchery fish in the spawning population is lowered to 30%, the 50 year probability of extinction falls to 0%. It is crucial that subbasin fish managers continue to use sport anglers as a tool to maintain and even increase removal of hatchery fish from the spawning population. We feel that with the low hook and release mortality rates demonstrated below, sport angler removal of hatchery fish from the spawning population can continue with no jeopardy to the wild steelhead population.

In contrast if all fisheries were closed in the Deschutes, the selective removal of hatchery fish would end. This would cause the proportion of hatchery fish on the spawning grounds to increase to 0.60. Although, there would be some benefits because wild fish would no longer be subjected to hook and release mortality, the increase in hatchery spawners would cancel nearly all of the biological gains. For example, Chilcote (2001) found that with a zero percent harvest rate in the Deschutes (all fisheries closed), the probability of extinction would still be quite high, 28.3%.

Therefore, it appears that the most effective strategy to conserve wild Deschutes steelhead would be to devise means to further reduce the number of naturally spawning hatchery fish in this

basin. If an additional 43% of the current hatchery return could be removed from the spawning areas, this would be sufficient to bring the proportion of naturally spawning hatchery fish down to 0.40. As stated above, such a reduction would be sufficient to cause a substantial decrease in the probability of extinction. Increased angler utilization of hatchery steelhead should be encouraged. Additionally, managers feel it is very important to construct facilities in Bakeoven, Buck Hollow, and Trout creeks that would make it possible to exclude hatchery summer steelhead from the spawning populations in those streams. These facilities would make it possible to "harvest" more of the hatchery steelhead escaping upstream from Sherars Falls and reduce the percentage in the spawning population.

The CTWSRO, through tribal resolutions allowing various fisheries to proceed, have required tribal fishers to release wild steelhead unharmed since 1995. Compliance from the tribal fishers has been generally good. CTWSRO and US Fish and Wildlife Service prevent all hatchery origin summer steelhead from accessing natural steelhead spawning habitat in the Warm Springs River system upstream of the WSNFH barrier dam.

1.5) Annual Implementation of the Fisheries

No reliable pre-season run prediction techniques have been developed to project future run sizes for summer steelhead in the Deschutes River. Managers rely on run trend data from previous years to annually implement sport angling regulations. This is not a precise methodology, but has been adequate for regulating sport angling to protect wild steelhead when their harvest has been prohibited. Harvest census and the operation of the Sherars Falls adult migrant trap take place during the steelhead run and these data could be use to make in-season harvest adjustments, if needed.

Deschutes River summer steelhead sport and tribal subsistence fisheries target only hatchery origin summer steelhead. Sport harvest of hatchery summer steelhead has yet to approach levels that would impact hatchery brood stock collection for RBH summer steelhead. Fishing regulations governing gear and methods have been restrictive enough that ample escapement of hatchery brood stock has reached RBH. The requirement that anglers use artificial flies and lures on 97% of the river and the prohibition of angling from a floating devise effectively limits steelhead harvest opportunities and reduces catch rate and hook and release mortality of wild steelhead.

The Oregon Fish and Wildlife Commission (Commission) adopts angling regulations every four years after an extensive public review process. This process begins about one year in advance of when specific regulations are actually adopted. Current regulations require release of wild (unmarked) steelhead in the Deschutes River.

There is also a process in place to implement regulations on a much shorter time schedule than every four years that addresses emergency conditions. These emergency regulations can be adopted by the Commission within 2 weeks if a Commission meeting is scheduled near the same date. The Commission has also delegated to the Director of ODFW the authority to adopt emergency regulations. If the Director adopts emergency regulations, they can be implemented within a matter of days from the time they are submitted.

SECTION 2. EFFECTS ON ESA-LISTED SALMONIDS

2.1) Description of the biologically-based rationale demonstrating that the fisheries management strategies will not appreciably reduce the likelihood of survival and recovery of the affected ESU(s) in the wild.

Chilcote (2001) preformed Population Viability Analysis for the Deschutes River wild summer steelhead population. This analysis made it possible to determine viable and critical threshold values for the wild summer steelhead population (Table 2). Chilcote recommended a viable threshold or 1,149 (NOAA Fisheries recommended Critical Fishery Conservation Threshold) and a critical threshold of 398 wild summer steelhead escaping over Sherars Falls as the triggers for additional measures to protect wild summer steelhead from angler induced mortality. These additional measures could include season and area closures, additional gear restrictions or complete angling closures.

The Lower Deschutes River Subbasin Management Plan (ODFW 1997) specifies both minimum and maximum run size values that will trigger harvest management action. Minimum run size values described above will be the adopted as triggers for management action. These are expected to be updated as part of the MCR steelhead recovery plan development and from the work done by the ICTRT.

The summer steelhead sport fishery in the lower Deschutes River has fished on a mixture of hatchery and wild fish for approximately 35 years. Anglers have been required to release all wild steelhead since 1978. The average wild summer steelhead escapement estimated at Sherars Falls for the past has been 4,465. This average wild escapement is well above the Critical Fisheries threshold of 1,479, and the combine eastside and westside population abundance of 2,500. This escapement occurs after the fish have been exposed to approximately 75% of the total steelhead angling effort on the Deschutes River.

Estimates of steelhead harvest by sport anglers from the mouth upstream 43 miles are available for many years. Estimates of the number of hatchery steelhead, by either stray hatchery or Round Butte Hatchery origin, and wild steelhead passing Sherars Falls are made each year since 1977. Average sport angler catch rate of Round Butte Hatchery origin steelhead from the mouth to river mile 43 has been an estimated 9.3% for the last 5 years (unpublished data). Assuming that wild steelhead are also caught at this rate and assuming an average hooking mortality of 10%, then, on the average, slightly less than 1% of the average escapement of wild steelhead over Sherars Falls would succumb to hook and release mortality each year.

Chilcote (2001) found that the probability of extinction for nearly all steelhead populations modeled throughout Oregon was found to be zero when harvest rates were restricted to 20% or less. At harvest rates high than this, the risk of extinction as modeled increased exponentially.

Removal of hatchery summer steelhead by sport and tribal harvest is viewed as an important means of protecting the genetic resources present in the wild population. If a greater number or

proportion of the hatchery population is removed through angling, a lower number of hatchery origin steelhead remain at large in the population to potentially interact with wild steelhead on the spawning grounds. In this way, angler harvest of hatchery fish is of great benefit to the wild population and its ability to persist.

2.1.1) Description of which fisheries affect each population (or management unit).

Deschutes River fisheries that affect the listed summer steelhead population include the sport summer steelhead, redband trout, and Chinook salmon fisheries. In addition, the CTWSRO tribal subsistence fishery also affects the steelhead population.

The summer steelhead fishery in the lower Deschutes River is described in detail in Section 1.1.2 of this document.

As noted above, regulations currently in effect for redband trout angling in the Deschutes are believed to provide highly significant levels of protection to juvenile steelhead from angling mortality. Additionally, trout angling is closed in the approximately 30 miles of the Deschutes River that border the Warm Springs Reservation from 1 November until the fourth Saturday in April each year. This closure offers additional protection from angling mortality to steelhead juveniles.

Several Chinook salmon harvest opportunities in the subbasin have the potential to impact wild summer steelhead.

The lower Deschutes River has a wild spring Chinook population as well as two hatchery programs that produce spring Chinook for subbasin harvest augmentation. RBH produces spring Chinook to mitigate for losses caused by the Pelton/Round Butte hydroelectric complex. WSNFH produces spring Chinook to provide tribal harvest opportunities greater than that which the wild run would support. Spring Chinook are harvested principally from 15 April through 15 June, and virtually all of the sport and tribal spring Chinook harvest takes place in the one mile reach immediately downstream from Sherars Falls. Some level of sport spring Chinook harvest has been allowed 14 out of the last 21 years. Very few wild adult summer steelhead have historically been caught in this fishery and the potential for this fishery to impact wild summer steelhead is low given the time of year and the restricted area of the fishery. The reach of river where this fishery takes place is characterized by very deep pools and high velocity areas where the river is constrained between bedrock cliffs. This habitat is likely not utilized by significant numbers of juvenile steelhead. Further, even though natural bait is legal in this reach, anglers tend to use rather large hooks and baits when angling for Chinook. The potential for hooking mortality to juvenile steelhead is likely low under these circumstances.

Wild fall Chinook return to the Deschutes River each year starting in late June and early July. The sport harvest scenario for fall Chinook is very similar to that for spring Chinook, with the vast majority of sport angler harvest taking place in the one mile reach immediately downstream from Sherars Falls. As mentioned above, natural bait is legal in this reach. Greater numbers of wild summer steelhead are caught and released during this fishery, given the greater number of summer steelhead present at the time of this fishery. The increased hooking mortality to wild

summer steelhead due to the use of bait is unknown, but is likely small given the constrained nature of the fishery.

Regulations planned for the time period covered by this FMEP will be as restrictive as those described above. This FMEP proposes to maintain status quo for harvest management in the lower Deschutes River.

2.1.2) Assessment of how the harvest regime will not likely result in changes to the biological characteristics of the affected ESUs.

Any fisheries management strategy that includes harvest has both direct and indirect harvest. Direct harvest takes place when legally caught fish are retained as part of the daily limit. This FMEP does not propose direct harvest of wild steelhead in the Deschutes River. This FMEP focuses on maintaining wild harvest (hook and released) rates that are consistent with recovery of the population. The small hook and release mortality rates to Deschutes River steelhead covered under this plan are not expected to exert selective pressure on any single characteristic that will affect genetic diversity.

The current and harvest proposed regime for Deschutes River steelhead are structured to prevent changes to the biological characteristics of the population. Wild summer steelhead retention by sport anglers has been prohibited by state law since 20 August, 1978. Since no harvest has been allowed that would result in potential selection for or against any character expressed by the population, no alteration or change of the biological characteristics currently expressed by the population is anticipated from recent past, present, or future harvest. Past, present and likely future harvest regimes in the subbasin, at least sport fisheries on that potion of the Deschutes not bordering the Confederated Tribes of Warm Springs Reservation, encompasses the entire run timing of adult summer steelhead. Even incidental hook and release mortality would be random and not selective for run timing or other heritable characteristic. Changes in the current harvest regime are not proposed for the life of this FMEP.

Harvest of adult steelhead is prohibited in all the minor Columbia River tributaries discussed in this plan. Harvest of juvenile steelhead by trout fisheries in these streams is believed to be small enough to prevent changes to the biological characteristics of steelhead present there.

2.1.3) Comparison of harvest impacts in previous years and the harvest impacts anticipated to occur under the harvest regime in this FMEP.

Harvest rates of adult steelhead in the Deschutes River prior to the start of mandatory wild release in 1979 are unknown. Cramer et al (1997) reviewed harvest rates of adult steelhead in sport fisheries in Oregon and Washington prior to wild release regulations and concluded that harvest rates on wild winter and summer steelhead were in the neighborhood of 50%. Harvest rates in the Deschutes River may have been of this magnitude.

It is technically not possible to calculate catch and release mortality, as such, for Deschutes River wild summer steelhead. The number of stray or out of subbasin wild summer steelhead entering the Deschutes and the ultimate fate of these fish is unknown. What is known, however, is that at

least some stray wild summer steelhead enter the Deschutes and subsequently leave. This changing baseline population makes calculating rate data impossible. Harvest impacts must be discussed more generally.

Estimates of steelhead harvest by sport anglers from the mouth upstream 43 miles are available for many years. Estimates of the number of hatchery origin steelhead, by either stray hatchery or Round Butte Hatchery origin, and wild steelhead passing Sherars Falls are made each year since 1977. Average sport angler catch rate of Round Butte Hatchery origin steelhead from the mouth to river mile 43 has been an estimated 9.3% for the last 5 years (unpublished data). Assuming that wild steelhead are also caught at this rate and assuming an average hooking mortality of 10%, then, on the average, slightly less than 1% of the average escapement of wild steelhead over Sherars Falls would succumb to hook and release mortality each year.

Harvest of wild adult steelhead in the lower Deschutes River has been prohibited since 20 August 1978. Harvest of wild steelhead since that time has been limited to three categories: illegal sport take, hook and release mortality and tribal harvest.

Past harvest impacts to juvenile steelhead as a result of trout fisheries in the unknown. Cramer et al. (1997) were of the opinion that the greatest sport harvest of steelhead in recent times may have been on juveniles taken in trout fisheries, rather than on adults. Angling mortality to juvenile steelhead in the Deschutes River was likely heightened as the result of legal trout stocking and the use of bait in much of the river prior to 1979. The more restrictive angling regulations presently in place provide significantly greater protection to juvenile steelhead from angling mortality. Tributary closures, bait restrictions, the slot length limit for trout and small trout bag limit, the seasonal closure of waters bordering the Warm Springs Reservation and large redband population buffering juvenile steelhead from angling mortality all combine to provide juvenile steelhead very significant protection from angling mortality.

Hatchery trout stocking was discontinued in Fifteenmile Creek after 1991 and in Mill Creek after 1996. Both streams have had catch and release regulations and bait bans in effect since 1999. These management changes combine to provide significant new protections to juvenile steelhead in these streams.

Angling regulations currently in place cause much lower harvest impacts to both adult and juvenile steelhead than past regimes. The only remaining regulatory option that would offer greater protection from angling mortality is complete closure of the Deschutes River and the minor Columbia River tributaries to all angling.

Illegal sport take of adult steelhead has been reduced to extremely low levels through a combination of education, peer pressure and aggressive enforcement. Hook and release mortality has also been reduced to what managers believe to be a low level through education and peer pressure. Tribal fishers have been asked to not harvest wild steelhead in their fisheries and compliance with this request has been demonstrably high. Harvest impacts to the wild population should be lower in more recent times since tribal fishers are asked to release wild steelhead. Harvest rates are anticipated to not change and remain low under the harvest regime described by this document (see hooking mortality estimates in Section 2.1, page 14).

Harvest impacts anticipated under this FMEP will not be significantly different than the impacts described above.

2.1.4) Description of additional fishery impacts not addressed within this FMEP for the listed ESUs specified in section 1.3. Account for harvest impacts in previous year and the impacts expected in the future.

Other fisheries that could impact overall mortality of Deschutes River steelhead include sport fisheries and Zone 6 Treaty Tribal gillnet fisheries in the mainstem Columbia River. Mortality associated with the Zone 6 fishery has averaged 8.3% for the last 5 years. No retention of wild steelhead is permitted in mainstem Columbia River sport fisheries, and mortality is assumed to be approximately 10% of the fish caught and released. The combined Zone 6 Treaty and mainstem Columbia River sport fishery mortality has averaged 9.6% for the last 10 years (Chilcote 2001, ODFW and WDFW 2000). An agreement has been reached with Treaty Tribes to limit harvest of steelhead in the Zone 6 fishery to less than 15% (ODFW 2000). Mortality associated with the catch and release sport fishery in the Columbia River is expected to remain at approximately 10% of wild steelhead handled in the sport fishery. These impacts when combined with the expected <1% harvest impact from the proposed tributary fisheries are still well below the maximum harvest rate of 20% identified by Chilcote (2001) to have little or no risk to wild populations.

CTWSRO tribal subsistence fisheries occur in the Deschutes River primarily in the Sherars Falls area, but also in the section of river bordering the Warm Springs Reservation. The Sherars Falls fisheries consist primarily of dip net fisheries, but some tribal hook and line fisheries do occur. These fisheries target spring and fall Chinook salmon, and summer steelhead. In recent years, a tribal resolution has required the release of wild origin steelhead by tribal members. In addition, a limited amount of hook and line tribal subsistence fishing occurs along the Deschutes River bordering the reservation, in the Warm Springs River, and in Shitike Creek. These fisheries primarily target trout and steelhead; however, some Chinook are also taken.

Wading by anglers has been identified as a potential impact on salmonid spawning habitat or the survival of eggs and alevins while incubating in the gravel. Laboratory simulations of trout eggs in artificial redds have indicated potential for serious mortalities when anglers wade over redds containing developing eggs and fry, with pre-emergent fry being especially sensitive to wading pressure (Roberts and White 1994). Mortalities of up to 96 percent were reported by twice-daily wading every day of the development period and a single wading event timed just before eggs hatched killed 43 percent of the embryos in the test. Brown, rainbow and cutthroat trout eggs were used in the test. The gravel substrate used was fairly small, with 70% less than 38.10 mm in diameter, and uniformly mixed. Trout eggs were buried 15.5 cm deep in 25 cm of gravel placed in concrete tanks. The wading test consisted of a 75 kg wader stepping directly on the eggs that were confined in a 15.5 by 31.0 cm enclosure.

Generally, anadromous salmon and steelhead choose larger substrate and bury their eggs deeper in the gravel than do resident trout. Briggs (in Healey 1991) reports Chinook eggs buried 20 to 36 cm deep (average 28 cm), while other studies reported eggs buried 10 to 80 cm depending on

substrate and intergravel flows. Bell (1990) suggests 3/4 to 4 inch gravel (18 mm to 100 mm) as preferable for most salmon spawning. The redd building and spawning activity flushes fine sediment from the redd and leaves larger gravel particles with larger and more open interstices where the eggs are deposited. Healey (1991) reports redds with large cobble left in the areas where eggs are to be deposited after the redd digging activity has removed fine sediment and smaller gravel. Cleaning the gravel of finer particles and sorting the larger gravel into the egg deposition area provides larger interstices for the eggs, improves intergravel water flows to irrigate the incubating eggs and creates a more stable formation than uniformly graded gravel. These factors of natural spawning should make the eggs of naturally spawning salmon less susceptible to disturbance or crushing by wading anglers than were the trout eggs in the laboratory test.

Steelhead spawning in the mainstem lower Deschutes River has frequently been observed in areas where wading by anglers would be precluded by water depth and/or water velocity. Additionally, steelhead spawning in the mainstem lower Deschutes appear to display a preference for constructing redds in sites protected by overhanging tree cover. These areas likely would be difficult for anglers to wade in and would be actively be selected against as good locations to angle. Further, Zimmerman and Reeves (2000) found that most steelhead in the Deschutes River not only displayed a preference for overhead cover but also spawned at night. This would serve to minimize the amount of angler disturbance to spawning steelhead since angling for salmonids at night (one hour after sunset until one hour before sunrise) is illegal in Oregon.

Steelhead in the Deschutes River and tributaries spawn in the spring at the start of spring runoff and most of the egg incubation takes place in higher flows. These flows would also serve to discourage all but the most aggressively wading fishers. Trout Creek is the only significant spawning tributary that is open to sport angling where redds may be damaged by trampling. Nearly all of Trout Creek within the range of steelhead migration is on private land with very limited angling opportunity.

A high percentage of steelhead spawning in the mainstem lower Deschutes River has been observed upstream from the Warm Spring Bridge at river mile 97. Public access to this area is very limited and as a result, the volume of angling is limited. This would serve to effectively minimize angler disturbance to spawning pairs and trampling redds.

Powerboat operation is a long-standing tradition on the lower Deschutes River. Although regulations have been enacted to variously ban or restrict powerboat operation, either seasonally or entirely on sections of the Deschutes, questions on fish mortality from powerboat operation remain. Boat operation can cause local displacement of juvenile salmon and can cause direct mortality to eggs and alevins when powerboats are operated in shallow water. Eggs and developing alevins may be killed by substrate movement, displaced or buried in fine sediment caused by the turbulence of passing powerboats (Horton 1994). The impacts reported by Horton were in depths less than 44 cm for propeller driven boats and less than 36 cm for jet-driven boats. Impacts were greatest immediately under the center line of the passing boat and were primarily related to displacement and movement of the stream bottom substrate by the water jet or prop-wash of the passing boat. Impacts to egg survival decreased rapidly on either side of the

centerline of the boat. Horton reviewed other studies which had proposed pressure waves under passing power boats as a detriment to egg and alevin survival, but could not confirm this hypothesis in his field testing. The species studied was sockeye salmon and the substrate in the study stream was generally small with 87 percent reported between 1 and 50 mm in diameter.

The effects of boat traffic on survival, stress, habitat choice and susceptibility to predation of juvenile salmonids was studied on the Rogue and Chetco rivers in Oregon (Satterthwaite 1995). No stranding or other direct mortality was found. Stress indicators increased when powerboats were passed through side channels, but not in the main channels where most boat traffic usually occurs. Some juvenile salmonids were displaced by boats passing directly overhead, but few fish showed behavioral response to boats passing at a lateral distance of 5 m or more. The juvenile salmon were more likely to show a behavioral response to an oar powered drift boat or kayak than powerboats, but the reaction responses were more pronounced among fish displaced by powerboats passing directly overhead.

In summary of this section, we conclude fisheries management strategies outlined above will not appreciably reduce the likelihood of survival and recovery of Deschutes River wild steelhead.

SECTION 3. MONITORING AND EVALUATION

3.1) Description of the specific monitoring of the "Performance Indicators" listed in section 1.1.1.

The estimated number of summer steelhead, by group, escaping upstream from Sherars Falls has been calculated annually since 1977 (Table 1)

This estimate is calculated by utilizing a modified Peterson mark-recapture procedure utilizing steelhead captured and tagged at the Sherars Falls adult migrant trap as the first event capture. Second event captures take place at WSNFH, located at river mile 9 of the Warm Springs River and the Pelton trap, the hatchery trap for RBH. Individual estimates of the wild, total hatchery, stray hatchery, and RBH origin components of the run escaping upstream from Sherars Falls are calculated. All estimated parameters are bounded by 95% confidence intervals to better assess the precision of the estimates. With the exception of known steelhead spawning in Buck Hollow Creek, which enters the Deschutes River downstream from Sherars Falls, this estimation procedure accounts for all potential spawners available to the primary spawning areas. Very little if any steelhead spawning is thought to take place in the mainstem Deschutes River below Sherars Falls.

This monitoring activity is the foundation for assessing the affects of past, present, and future fishery management and harvest strategies. Compliance with current statewide management objectives is measured using estimated escapements produced by this activity. The current fishery management plan for the subbasin relies on data generated by this monitoring activity as the measure of plan success. Managers recognize the inherent uncertainties associated with managing populations using estimated values, however, current funding, physical and social constraints preclude other options and this monitoring activity will continue to form the

backbone of monitoring efforts in the subbasin into the future. Mangers recognize that this monitoring activity has been and will continue to be valuable for assessing future harvest management strategies. Estimates of the various components of the summer steelhead run passing Sherars Falls will continue to be made annually utilizing a combination of funding sources that are currently secured including Sport Fish Restoration funding from USFWS and state funding.

Estimated harvest of summer steelhead, by group, has been calculated most years since 1974 for the lower 43 miles of the Deschutes River. These estimates of harvest include both sport and tribal harvest.

These harvest estimates are calculated utilizing data collected at three discrete points – at the river mouth, at start of the Macks Canyon Road near river mile 42 and in the Sherars Falls reach from river mile 43 to river mile 42. The physical distribution of access points and the pattern of angler ingress and egress this distribution dictates allows these three sample points access to the vast majority of angler harvest in the lower 43 miles of the Deschutes. Data collected at all three locations include sport anglers but the Sherars Falls sample also collects data to estimate tribal harvest of steelhead. Data are collected in such a manner and at such a frequency that it is possible to statistically expand effort and harvest. Data are stratified by angler type and by weekday and weekend day. Data are further stratified by two-week period and estimates of effort and catch are calculated and reported biweekly. All estimated values are bounded by 95% confidence intervals in order to more accurately assess the precision of the estimated parameter. Estimates of the number of anglers, their effort in hours, the number of hatchery or wild steelhead landed and released and the number of steelhead retained, by fin mark, are calculated for the period 1 July to 31 October each year. Expanded catch estimates from these samples are presented in tables 3 through 6.

Harvest data allow managers to make in-season adjustment to fishery strategies by providing an early indication of angler success and hence, run strength. Harvest estimates have proved sufficient to make management decisions regarding the accomplishment of management objectives in the past. Further, combining estimates of RBH origin summer steelhead harvested in the various subbasin fisheries with returns to that facility make it possible to more accurately estimate smolt to adult survival. This, in turn, makes it possible to more accurately assess the affects of the hatchery program on the wild population. Additionally, these harvest estimates coupled with estimated escapement data discussed above make it possible to more accurately assess the number of RBH origin summer steelhead escaping the fisheries and remaining in the wild.

These data are critical to helping managers characterize and document the magnitude of the stray hatchery origin steelhead problem in the lower Deschutes. Coded wire tags are routinely recovered from out of subbasin stray hatchery fish at all three sample locations. Analysis of these tags has shed considerably light on which hatchery programs contribute to the straying problem and have given managers potential answers on how to minimize this phenomenon in the Deschutes. Additional collection and analysis of coded wire tags and potentially passive integrated transponder tags may hold the keys to solving this problem.

Harvest samples are conducted utilizing funding from a combination of funding sources that are currently secured including Sport Fish Restoration funding from USFWS and state funding.

The performance indicator for Objective 4 will be to monitor continued compliance with conservative angling regulations currently in place on the small Columbia River tributaries.

3.2) Description of other monitoring and evaluation not included in the Performance Indicators (section 3.1) which provides additional information useful for fisheries management.

Pelton trap, the trap for RBH, and the trap facility at WSNFH both serve vital roles in the monitoring and evaluation of steelhead management in the subbasin. Both facilities serve as final end points for the capture, enumeration, biosampling and disposition of hatchery summer steelhead captured there. Data outputs to facilitate monitoring and evaluation of fishery programs include numbers of steelhead by origin, run timing and overall run strength relative to long term data sets.

Coded wire tags, whose importance is discussed above, are routinely collected from stray hatchery summer steelhead captured at both facilities.

A screw trap has been operated in the Trout Creek system annually since 1998 to estimate juvenile steelhead production from that stream. Beginning in 2005, an adult trap was constructed and operated in the Lower Trout Creek Subbasin to better estimate steelhead escapement. While the data string is currently limited, managers hope this effort may eventually yield smolt to adult survival data and spawner-recruit modeling.

Steelhead spawning ground counts have been conducted for many years on Bakeoven, Buck Hollow and Trout creeks as a relative measure of steelhead spawning success. Additionally, CTWSRO Department of Natural Resources conducts steelhead spawning ground counts on selected tributaries both on and off reservation.

Table 3. Deschutes River expanded summer steelhead catch data from the mouth, west bank, July 1 – October 31, by year. Since 1979, wild steelhead catch estimates are for fish caught and released. The hatchery catch estimates do not include hatchery fish that were voluntarily released.

			Bank		Boat		Total	
Year	Anglers	Hours	Wild	Hatchery	Wild	Hatchery	Wild	Hatchery
1977	10,571	54,724	933	225	1,643	478	2,576	703
1978a/								
1979b/								
1980	6,984	42,819	1,322	435	1,946	600	3,268	1,035
1981	7,435	56,537	704	215	3,300	686	4,004	901
1982	6,937	47,622	691	142	2,751	629	3,442	771
1983	8,752	60,353	932	308	4,716	1,315	5,648	1,623
1984c/								
1985c/								
1986c/								
1987	11,856	87,799	922	314	7,416	1,536	8,338	1,850
1988								
1989	10,407	73,841	407	305	3,600	1,833	4,007	2,138
1990	6,568	44,300	205	200	1,185	939	1,386	1,139
1991	8,855	61,362	667	465	3,121	1,568	3,788	2,033
1992	6,837	44,265	153	281	1,352	1,097	1,505	1,378
1993	6,604	45,505	264	243	1,520	1,044	1,788	1,287
1994	5,980	36,488	103	209	758	1,166	861	1,375
1995	6,447	40,080	180	381	1,126	1,639	1,306	2,020
1996	6,813	46,080	208	558	1,785	3,099	1,993	3,657
1997	7,491	51,283	289	399	1,926	1,980	2,215	2,379
1998	4,877	27,909	77	115	867	470	944	585
1999	6,905	44,262	373	232	2,360	1,359	2,733	1,591
2000	7,318	53,208	259	186	3,157	1,485	3,146	1,671
2001	8,097	62,240	484	361	4,213	2,532	4,697	2,893
2002	7,926	56,327	340	310	3,219	2,546	3,559	2,856
2003	4,561	38,301	158	121	1,799	833	1,957	954
2004	5,198	41,165	203	226	2,205	1,067	2,408	1,293

a/ Steelhead retention season closed August 20, 1978.
b/ Wild steelhead release regulation began in 1979
c/ No sample.

Table 4. Deschutes River expanded summer steelhead catch data from Macks Canyon Road July 1 to October 31, by year. Since 1979, wild steelhead catch estimates are for fish caught and released. The hatchery catch estimates do not include hatchery fish that were voluntarily released.

			Bank		Boat		Total	
Year	Anglers	Hours	Wild	Hatchery	Wild	Hatchery	Wild	Hatchery
1977	7,774	41,110	853	379	524	205	1,377	584
1978a/	3,976	24,277	296	301	71	71	367	404
1979b/	4,755	26,596	877	545	467	292	1,344	837
1980	5,130	36,714	778	462	826	331	1,604	793
1981	5,876	40,405	1,567	395	1,114	207	2,681	602
1982	5,042	37,367	665	236	1,184	332	1,849	568
1983	5,405	36,170	788	383	1,504	466	2,292	849
1984								
1985								
1986								
1987	7,508	50,419	1,210	266	1,697	352	2,898	618
1988								
1989	4,893	34,705	530	228	489	127	1,019	355
1990	3,073	22,679	261	113	317	103	578	216
1991								
1992	3,058	21,914	157	134	347	116	504	250
1993	2,722	22,083	186	112	168	78	354	190
1994	2,326	16,984	138	121	193	149	331	270
1995	2,877	19,965	268	212	319	397	587	609
1996	3,806	28,333	230	690	451	773	681	1,463
1997	4,856	35,326	316	376	493	408	809	784
1998	2,444	15,549	206	137	314	57	520	194
1999	5,242	35,995	649	310	527	190	1,176	500
2000	5,315	39,239	541	229	828	229	1,369	458
2001	7,912	30,795	1,034	638	794	332	1,828	970
2002	7,794	30,755	699	377	1,088	521	1,787	898
2003	5,637	22,458	560	147	852	151	1,312	298
2004	3,695	21,191	394	185	195	165	589	350

a/ Steelhead retention season closed August 20, 1978.
b/ Wild release regulation in effect since 1979.

Table 5. Deschutes River summer steelhead sport catch data, by year. Since 1979, wild steelhead catch estimates are for fish caught and released. The hatchery catch estimates do not include hatchery fish that were voluntarily released.

	Fish per 100 Angler Hours				
	Mouth		Macks Canyon		Total
Year	Wild	Hatchery	Wild	Hatchery	W : H
1977	4.71	1.28	3.35	1.42	
1978			1.51	1.66	
1979			5.05	3.15	
1980	7.63	2.42	4.37	2.16	
1981	7.08	1.59	6.64	1.49	
1982	7.23	1.62	4.95	1.52	
1983*	9.36	2.69	6.34	2.35	
1984*					
1985*					
1986*					1.94 : 1
1987	9.50	2.28	5.75	1.23	4.08 : 1
1988*					3.30 : 1
1989	6.01	3.69	2.94	1.02	1.93 : 1
1990	3.13	2.60	2.55	0.95	1.31 : 1
1991	6.17	3.31			1.68 : 1
1992	3.40	3.11	2.30	1.32	1.02 : 1
1993	3.93	2.83	1.60	0.86	1.45 : 1
1994	2.36	2.96	1.95	0.94	0.96 : 1
1995	3.30	3.96	2.62	2.27	0.91 : 1
1996	4.33	8.00	2.40	5.16	0.52 : 1
1997	4.29	4.61	2.29	2.22	0.96 : 1
1998	3.38	2.10	2.02	0.37	1.88 : 1
1999	6.17	3.60	3.43	1.52	1.85 : 1
2000	5.91	3.14	3.49	1.17	2.12 : 1
2001	7.55	4.65	5.93	3.15	1.69 : 1
2002	6.32	5.07	5.81	2.92	1.15 : 1
2003	5.11	2.49	3.43	0.78	2.61 : 1
2004	5.85	3.14	2.78	1.65	1.82 : 1

* Not all statistically expanded creel.
Weekday and weekend data expansions combined

Table 6. Deschutes River expanded rainbow trout angler use and harvest data, rivermile 0–42, July 1 to October 31, by year.

			Rainbow Trout			
Year	Anglers	Hours	Kept	Released	Total	Fish/Hour
1989	2,432	11,999	580	8,228	8,808	0.73
1990	2,036	10,259	464	6,507	6,971	0.68
1991	INCOMPLETE		SAMPLE			
1992	1,434	8,766	156	4,613	4,769	0.54
1993	2,164	11,852	132	5,340	5,472	0.46
1994	2,623	12,663	164	7,593	7,758	0.61
1995	3,339	17,015	178	8,331	8,509	0.50
1996	2,703	13,934	112	6,403	6,515	0.46
1997	2,689	12,809	86	5,625	5,712	0.45
1998	2,040	8,368	58	5,189	5,247	0.63
1999	2,829	11,385	102	7,512	7,614	0.67
2000	3,227	14,194	90	9,452	9,542	0.67
2001	3,254	9,943	185	9,606	9,791	0.98
2002	3,193	9,342	149	9,244	9,393	1.01
2003	2,428	9,857	137	7,100	7,237	0.73
2004	1,626	8,972	26	5,702	5,728	0.58

3.3) Public Outreach

The harvest samples discussed above are our first line of public outreach and provide an opportunity to explain to fishers our fishery management objectives and their importance in the subbasin. Harvest samplers are trained to respond correctly to questions relative to fishery regulation, the purpose and intent of these regulations and how the individual angler can help meet our management objectives. A variety of handouts covering specific management objectives and intent for Deschutes summer steelhead have been produced by Field Office personnel over the years. These materials are made available to the harvest samplers as a point of contact handout when dealing with the angling public.

The Dalles Field Office of the Oregon Department of Fish and Wildlife, given its close proximity to and its management responsibilities on the lower Deschutes River, is another vital component of our public outreach. Countless phone call, personal contacts, and correspondence detailing our management objectives are satisfied by Field Office personnel each year.

Many summer steelhead tagged at the Sherars Falls adult migrant trap are recovered by anglers each year. A large number of these tags find their way back to The Dalles Field Office each season with requests for information on the tagging program. This has proven to be an excellent opportunity to inform and educate anglers on the management objective for steelhead on the Deschutes.

The Salem office of the Oregon Department of Fish and Wildlife maintains an Information and Education Division that is staffed with professionals who produce a variety of educational and outreach materials annually. Field Office personnel frequently call on Information and Education Division staff to produce news releases informing the angling public of changes in angling regulations as well as to generally inform the public of management intent.

The Oregon Sport Fishing Regulation pamphlet has proven itself to be more than a compendium of angling regulations. It has been put to a more creative use as an instrument to disseminate information on the purpose and intent of angling regulations and management objectives as well.

Finally, signage is a tried and true method of reaching anglers with a message. In addition to the traditional signage dealing with methods, bag limits, and seasons, we have incorporated signs describing our programs and their intent for many years.

3.4) Enforcement

The Fish and Wildlife Division of the Oregon State Police enforces wildlife statutes and administrative rules in Oregon. Troopers assigned to the Fish and Wildlife Division check anglers for compliance with laws governing all aspects of angling on the Deschutes River. The Dalles Patrol Office of the Oregon State Police houses six troopers and a sergeant that have

either primary or secondary responsibility to patrol the lower Deschutes. An additional trooper with primary responsibility to enforce wildlife law on the Deschutes is stationed in Madras. Up to six seasonal Fish and Wildlife Division Cadets patrol the Deschutes each summer during peak use months with primary responsibility to enforce general law with special emphasis on fish and wildlife law.

The Oregon State Police Fish and Wildlife Division and the Oregon Department of Fish and Wildlife maintain very close contact and enjoy an excellent and cooperative working relationship. One key component to cement and formalize that relationship is the Cooperative Enforcement Plan process. At least once each calendar year, local representatives of both agencies formally agree on enforcement priorities, by month, and assign levels of importance to those priorities. In this way, all participants are aware of the enforcement priorities and their importance to each other.

3.5) Schedule and process for reviewing and modifying fisheries management.

3.5.1) Description of the process and schedule that will be used annually to evaluate the fisheries, and revise management assumptions and targets if necessary.

Fisheries and management assumptions discussed in this plan will be evaluated each year by Mid-Columbia District staff in consultation with appropriate Salem Headquarters and CTWSRO staff. The above-discussed suite of monitoring activities will provide adequate data at a sufficient level of detail to evaluate whether this plan is accomplishing the stated objectives.

3.5.2) Description of the process and schedule that will occur every 5 years to evaluate whether the FMEP is accomplishing the stated objectives. The conditions under which revisions to the FMEP will be made and how the revisions will likely be accomplished should be included.

A revision of this FMEP will be initiated after completion of Mid Columbia River Steelhead DPS Conservation/Recovery Plan. One of the preliminary steps in completion of this conservation plan is development of ODFW's Oregon Native Fish Status Report (completed in early 2006), which evaluates Species Management Units (SMU) to specific "Interim Criteria". These criteria include an assessment of population distribution (comparison of existing to historical number of populations, population distribution, (percentage of historical range occupied), population abundance, population productivity, reproductive independence, and hybridization. ODFW's Stock Status Report includes information on the Deschutes River summer steelhead population. It is likely that criteria in the Conservation/Recovery Plan will differ somewhat from interim criteria used in ODFW's Oregon Native Fish Status Report but will incorporate criteria that address conservation and recovery issues.

It is anticipated that ODFW will complete Mid Columbia River Steelhead DPS Conservation/Recovery Plan within the five-year FMEP evaluation time-period. This

conservation plan will include updates to steelhead population and fishery monitoring parameters listed in this FMEP as well as updates to the Population Viability Analysis. It is expected that the revised FMEP will incorporate all of Oregon's summer steelhead populations within the mid Columbia River Summer Steelhead ESU (Deschutes, Umatilla, Walla Walla, and John Day rivers). Revisions to mid Columbia FMEPs will also incorporate of elements of the Interior Columbia Basin Technical Recovery Team Report on the Viability Criteria for Application to Interior Columbia Basin Salmonid ESU's (ICTRT July, 2005). A significant portion of the ICTRT's viability assessment methodology is included in ODFW's Native Fish Conservation Policy interim criteria. Also important to Deschutes River component of the revised mid Columbia Summer Steelhead FMEP will be an updated assessment of stray hatchery fish in the Deschutes River Basin.

Subsequent comprehensive reviews of the Mid Columbia River Summer Steelhead FMEP will be conducted every five years. Brood year survival for wild summer steelhead in the Deschutes River can be assessed during this five year period, given average lengths of summer steelhead freshwater and ocean residency. Comprehensive reviews will be repeated at that interval until such time as the ESU is declared recovered and is de-listed. Revisions to the Deschutes River component of the Mid Columbia River Summer Steelhead FMEP will be made as performance indicators suggest that the stated objectives are not being met. Revisions will we undertaken in cooperation with appropriate ODFW Fish Division and Region staff, NOAA Fisheries staff, the interested public and our tribal co-managers. The Technical Recovery Team will be consulted during the periodic review process. Revision of FMEP will include changes and updates in the Population Viability Analysis and viable and critical thresholds.

This FMEP was initially submitted in March of 2001 and has been pending NOAA Fisheries review and approval. This revised FMEP includes some of the changes requested of NOAA Fisheries but do not include updates to all population or fishery monitoring data sets. Complete updates and re-assessments of population viability will be included in Conservation Plans developed as part of Native Fish Conservation Policy Implementation. Given the current low impact rates for the existing steelhead fishery in the Deschutes River sport fisheries (estimated at 1% for the area above Scherar Falls) and mainstem Columbia River sport and Tribal Zone 6 fisheries (9.6%), it is unlikely that any re-assessment of these fisheries using new data collected since this FMEP was originally submitted will result in wild steelhead impacts rates that will exceed 20%. Also, the current selective steelhead fishery (adipose fin-marked) in the Deschutes River is a valuable management tool to reduce the number of hatchery origin fish escaping to spawn.

SECTION 4. CONSISTENCY OF FMEP WITH PLANS AND CONDITIONS SET WITHIN ANY FEDERAL COURT PROCEEDINGS

The objectives and actions in this FMEP are consistent with provisions of the Columbia River Fish Management Plan (*US v Oregon*). This FMEP was developed in cooperation with the Confederated Tribes of the Warm Springs Reservation of Oregon.

This plan is consistent with applicable federal court proceedings.

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