LOWER YAKIMA RIVER SUSPENDED SEDIMENT TMDL

USEPA Submittal Document

VOLUME 1

Publication # 98-10-202 - Vol. 1

SULPHUR CREEK ENTERING THE LOWER YAKIMA RIVER

WASHINGTON STATE DEPARTMENT OF ECOLOGY

Prepared by the Washington Department of Ecology

August 1998

LOWER YAKIMA RIVER SUSPENDED SEDIMENT TMDL

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LOWER YAKIMA RIVER SUSPENDED SEDIMENT TMDL

Fact Sheet

Washington State Department of Ecology
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Developed pursuant to 40 CFR 130.7 and the Federal Clean Water Act

WATERBODY SEGMENTS:

WA-37-1010 Yakima River	Mouth to Toppenish Creek (RM 80.4).
WA-37-1020 Yakima River	Toppenish Creek (RM 80.4) to Sunnyside Dam Bridge (RM 103.8).
WA-37-1040 Yakima River	Sunnyside Dam Bridge (RM 103.8) to the Naches River (RM 116.3).
WA-37-1012 Snipes Creek	All
WA-37-1014 Spring Creek	All
WA-37-1024 Granger Drain	All
WA-37-1030 Sulphur Creek	All
WA-37-1047 Wide Hollow Creek	All
WA-37-1048 Moxee Drain	All

TMDL PARAMETERS:	**APPLICABLE RULES:**
Turbidity	WAC 173-201A-030(2)(c)(vi)
DDT (and metabolites)	WAC 173-201A-040(3)

SOURCES COVERED BY THIS TMDL:

Allocation Type	Source Description
LA	Nonpoint source from agricultural activities during the normal irrigation season.

PROBLEM ASSESSMENT:

Suspended sediment and persistent pesticide loads from irrigated agricultural areas of the lower Yakima River basin have long been recognized as serious impairments to water quality. The effects of soil erosion on the landscape, and the effects of sediment and dichlorodiphenyl-trichloroethane (DDT) on aquatic resources have been the focus of numerous activities by several agencies.

However, few of these past actions have been coordinated between agencies or systematically directed within the basin. As a result, the basin-wide effectiveness of these actions in alleviating suspended sediment and DDT problems has not been documented. In addition, *The Yakima River Basin Water Quality Plan* (Yakima Valley Council of Governments, 1995) and water quality evaluations by the US Geological Survey (USGS) and Ecology have indicated that beneficial uses are still impaired by sediment and sediment-borne pollutants like DDT from irrigation returns. Consequently, several reaches of the lower Yakima River and several of its tributaries do not meet numerous state water quality criteria and federal guidelines.

Ecology has determined that turbidity, suspended sediment and DDT are the priority water quality impairments in the lower Yakima River basin. Ecology has undertaken a TMDL process to control suspended sediment as the primary cause of the turbidity standard violations, and a major source of DDT transport in the lower basin during the irrigation season. Ecology believes that the control of suspended sediment generation and transport during the irrigation season will result in far-reaching water quality and fish habitat improvements in the Yakima.

TECHNICAL DOCUMENTS:

Surface-Water-Quality Assessment of the Yakima River Basin, Washington: Analysis of Available Water-Quality Data through 1985 Water Year; Rinella, J.F., S.W. McKenzie, and G.J. Fuhrer, 1992a; USGS Open File Report 91-453, Portland, OR.

Surface-Water-Quality Assessment of the Yakima River Basin, Washington: Pesticide and other Trace-Organic-Compound Data for Water, Sediment, Soil, and Aquatic Biota, 1987-91; Rinella, J.F., S.W. McKenzie, J.K. Crawford, W.T. Foreman, P.M. Gates, G.J. Fuhrer, and M.L. Janet, 1992b; USGS Open File Report 92-644, Portland, OR.

Persistence of the DDT Pesticide in the Yakima River Basin Washington; Rinella, J.F., P.A. Hamilton, and S.W. McKenzie, 1993; US Geological Survey Circular 1090, U.S. Government Printing Office, Washington D.C.

Yakima River Basin Water Quality Plan, Volumes I-IV; Yakima Valley Conference of Governments, 1995, Yakima, WA.

A Suspended Sediment and DDT Total Maximum Daily Load Evaluation Report for the Yakima River; Joe Joy and Barbara Patterson, 1997; Washington Department of Ecology, Publication No. 97-321, Olympia, WA.

THE TMDL:

The project area for this TMDL is the Yakima River drainage from the confluence of the Yakima and the Naches Rivers, at the city of Yakima, to its mouth at Richland, WA, excluding those drainages and tributaries on the Yakama Indian Reservation. Of the three mainstem waterbody segments within this reach WA 37-1010 is listed on the 1996 303(d) list as impaired due to turbidity. This TMDL addresses this turbidity listed segment and is being submitted as a preventative TMDL for turbidity on the other two mainstem segments, WA 37-1020 and WA 37-1040. Also addressed herein are the mainstem Yakima River segments, WA-37-1010 and WA-37-1020, six drains and tributaries within the project area, WA-37-1012, Snipes Creek; WA-37-1014, Spring Creek; WA-37-1024, Granger Drain; WA-37-1030, Sulphur Creek; WA-37-1047, Wide Hollow Creek; and WA-37-1048, Moxee Drain, all of which are on the 1996 303(d) list for DDT. All of these segments listed for DDT are being addressed for chronic aquatic toxicity criterion. In addition, this submittal will serve as a preventative TMDL for DDT, chronic aquatic toxicity criterion, on segment WA-37-1040 on the mainstem Yakima River.

This TMDL will reduce turbidity and DDT by implementing actions that reduce the erosion and transport of suspended sediment (TSS) from irrigated agricultural lands within the project area during the irrigation season. TSS is being addressed through the state turbidity standards because of the strong correlation found between turbidity and TSS in the lower Yakima River. A strong relationship was also shown to exist between DDT and TSS. The details of these relationships are discussed in the TMDL "Evaluation Report" contained within this submittal document.

Using the correlation between TSS and turbidity in the TMDL project area, it was determined that the mainstem Yakima River will meet turbidity standards, as listed in WAC 173-201A-030(2)(c)(vi), if the major drains and tributaries contributing sediment to the river were allocated a maximum of 25 NTU where they enter the Yakima River. Twenty five NTU equates to a load allocation of 56 mg/L TSS and has been determined to be the maximum turbidity allowable to protect aquatic health. Background turbidity will be measured just above the project area. Compliance points will be established at several sites within the project area and in the lower reaches of the river, below the influence of the last major drain.

A margin of safety (MOS) is a required component of a TMDL load allocation. This TMDL assessment and allocation complied with the MOS requirement in the following ways:

- The State of Washington turbidity criterion was applied to the entire lower Yakima irrigation project rather than drain by drain.

- The proposed targets of 56 mg/L TSS and 25 NTU are more protective than USEPA guidance of 100 mg/L TSS, and are based on harm to local sensitive species of concern.
- The SMPTOX3 model simulations of contaminant loading (both of TSS and DDT) assume the 90th percentile flow and concentration which are conservative assumptions since no relationship was found between flow and concentration (for either TSS or DDT). Upstream concentrations of DDT and TSS in the DDT model calibration were based on data collected 20 miles upstream of Granger Drain at the Yakima River above Ahtanum Creek. Two large diversion structures occur within those 20 miles that could reduce DDT and TSS concentrations.

Reductions in suspended sediment, and thus in DDT and turbidity, in drains and tributaries will progress over a 15 year period with established targets set at 5 year increments. A major element of the first 5 year target is that all drains and tributaries within the project area comply with the 90th percentile turbidity target of 25 NTU at their mouths. Meeting this target will bring the mainstem into compliance with State turbidity standards.

At 10 years all points within basin tributaries and drains will comply with the 90th percentile target of 25 NTU. Meeting DDT chronic aquatic toxicity criteria of 1 ng/L DDT will eventually require a correlative TSS of 7 mg/L. Because the possible variability of the DDT/TSS correlation at lower sediment concentrations the correlation will be re-evaluated at the 10 year mark.

The 15 year target includes having all drains and tributaries meeting the 7 mg/L TSS target (or its modified form) and complying with state chronic aquatic toxicity criteria for DDT.

Background levels of DDT in the mainstem Yakima River above the TMDL project area have not been shown to exceed chronic toxic aquatic criteria, however the pesticide has been found to be present. A preliminary assessment of the upper Yakima Basin has been initiated by Ecology in preparation for a future TMDL process.

Much of the main stem of the Yakima River included in this TMDL is within or borders on the Yakama Indian Reservation. TSS in the lower Yakima River is influenced by flows from drains and tributaries on reservation lands. The success of meeting the targets for the mainstem as set out in this TMDL is predicated on the assumption that the Yakama Nation and USEPA will achieve similar sediment load restrictions on drains and tributaries within the reservation boundaries.

Public Participation:

A public participation and educational program has been, and continues to be, conducted within the watershed. This includes public workshops, educational displays, informational presentations, mailings, Ecology's participation in the Tri-County Water Resource Agency, the Yakima River Watershed Council, the Interagency Council and representation in the Roza-Sunnyside Valley Irrigation District Board of Joint Control Work Group. Fact sheets inviting participation and comment on the TMDL process and the proposed TMDL implementation strategy have been distributed to interested public at numerous venues. Ecology has dedicated two full time technical assistance specialists to actively work in the community, educating growers and other stakeholders on water quality regulations, TMDL implementation requirements and pollution prevention practices. (see Section 3, Public Involvement)

Implementation:

Implementation of this TMDL will involve major changes in irrigation water management in the lower Yakima River Basin. Conservation Districts and associated Natural Resource Conservation Service offices are active within the TMDL project area. North Yakima Conservation District, South Yakima Conservation District and Benton Conservation District all have ongoing projects designed to promote and facilitate "best management practices" (BMP) implementation, including conversion of furrow irrigated lands to sprinkler or drip. These agencies are administering the distribution of cost-share funds available through the USDA EQIP Program to facilitate the conversions. Other funding sources are continually being sought. (see Section 4, Summary Implementation Plan)

The Roza-Sunnyside Valley Irrigation District Board of Joint Control (BOJC) has instituted major policy changes to address water quality issues in the lower Yakima River Basin. Changes include requiring the piping of field runoff discharges to drains and tributaries; meeting acceptable water quality parameters for waters leaving farm fields; requiring permits for farm return water discharges to drains; and maintaining buffer zones along waterways including livestock exclusion and no-till zones. The BOJC has accepted the TMDL target turbidity levels of 25 NTU as the maximum allowable for return flows to drains and canals within the irrigation project. The newly adopted policies will be enforced by the Roza and the Sunnyside Valley irrigation districts. The BOJC is also seeking funding sources to assist local growers in irrigation conversion projects. Roza-Sunnyside BOJC is taking a leadership roll in implementing the practices

necessary to make the Lower Yakima Suspended Sediment TMDL a success. (see Appendix 7)

Ecology has initiated a Yakima Watershed Agriculture Water Quality Education Program that will provide technical assistance and grower referrals to agencies involved in BMP implementation. The Dept. of Ecology will increase its presence in the project area, following up complaints and making referrals to Conservation Districts and irrigation districts. Ecology will issue enforcement actions when efforts to achieve compliance through other means fail. (see Appendix 9)

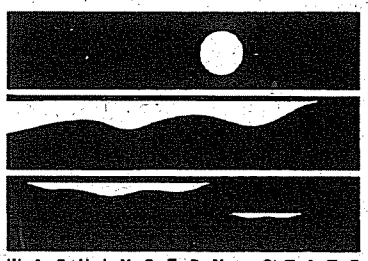
Monitoring:

The Lower Yakima Basin is geographically divided into several drainages. Four of these drainages, Moxee Drain, Granger Drain, Sulphur Creek and Snipes/Spring Creek are major contributors of suspended sediment to the lower Yakima River. At several sites in each of these drainages one or more public entities, other than Ecology, is conducting regular water quality monitoring for a number of parameters, including suspended solids and turbidity. North Yakima, South Yakima and Benton Conservation Districts and the Roza-Sunnyside Joint Board of Control are conducting this monitoring under Centennial Clean Water Fund, 319 Clean Water Fund and local funding. Ecology will help facilitate continuation of these monitoring activities and incorporate the efforts into the TMDL plan. Ecology is currently conducting monthly ambient monitoring on the Yakima River at the upper and the lower end of the TMDL project area. Ecology will also, with the cooperation of the Yakama Nation where applicable, establish one to three additional monitoring sites on the mainstem Yakima within the project area to measure compliance with the TSS allocations established.

As implementation proceeds Ecology will assess the effectiveness of the existing monitoring effort, identify gaps, facilitate coordination between entities and supplement the monitoring as necessary to comply with the TMDL Monitoring Plan. As TMDL target dates and allocations are neared, monitoring methodology, including TSS/turbidity and TSS/DDT correlations, in the mainstem and tributaries will be evaluated and adjusted as necessary to insure that TMDL goals are met. (see Section 5, Monitoring Plan)

Section 2 - Evaluation Report

Section 2 - Evaluation Report



WASHINGTON STATE
DEPARTMENT OF
ECOLOGY

A Suspended Sediment and DDT Total Maximum Daily Load Evaluation Report for the Yakima River

July 1997
Publication No. 97-321

Printed on Recycled Paper

LOWER YAKIMA RIVER SUSPENDED SEDIMENT TMDL

Addendum to:

A Suspended Sediment and DDT Total Maximum Daily Load Evaluation Report for the Yakima River

Items contained in this addendum reflect changes in the "Evaluation Report" which have occurred since it was published in July of 1997. These changes are the result of comments received during the public comment period. Comments and the applicable responses are contained within this submittal document.

Title: It was noted that this report was specific to the "lower" Yakima River and the title should reflect the specificity. The title should be changed to read "*A Suspended Sediment and DDT Total Maximum Daily Load Evaluation Report for the Lower Yakima River*"

Page 68, Table 14: Change Table 14 to reflect the TSS limits as being less than 56 mg/L for Wide Hollow Creek, Ahtanum Creek, and DID #7.

Page 77, 5 years (2002), first bullet: Add the words "*for the 90th percentile*" to read "*Yakima River main stem will comply with the turbidity target of not more than a 5 NTU increase for the 90th percentile between the confluence of the Yakima and Naches Rivers (RM 116.3) and the Kiona gage at Benton City (RM 30).*"

Page 77, 5 years (2002), first bullet: Add a second sentence to read, "*Use of the 90th percentile frequency in the turbidity compliance target for the main stem will be evaluated.*"

August 26, 1998

Section 3 - Public Involvement

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Items abridged from this section include:

- **Lower Yakima TMDL Mailing List**
- **Granger Drain News**
- **Granger Town Meeting announcement (English and Spanish)**
- **1998 Tri-Cities Sportsmen Show flyer**
- **Comment Period extension notice**
- **Letter to Mailing List recipients**
- **1997 Central Washington Sportsmen Show program**
- **Educational Service District #123 bulletin**

LOWER YAKIMA RIVER SUSPENDED SEDIMENT TMDL

Public Involvement

In developing this TMDL Ecology has followed a process intended to allow and encourage public participation and at the same time educate groups and individuals within the Lower Yakima Watershed on pertinent WQ issues.

A mailing list has been developed over the duration of this project which, to date, includes over 400 names of individuals, organizations, businesses and governmental agencies. Many of the listed entities, such as the Yakima River Watershed Council, the Yakima Watershed Information Office, grower organizations, irrigation districts and environmental organizations have successive mailing lists. We believe that information dissemination goes far beyond the scope of Ecology's TMDL list.

The TMDL mailing list was and continues to be developed by giving individuals the opportunity to "sign up" for inclusion at public workshops; public meetings (Conservation Districts/NRCS board meetings, irrigation district board meetings); booths at regional fairs; displays at recreational shows, grower conferences and agricultural education seminars; and during numerous presentations to groups throughout the area.

To date, three mailings have been made to all current addresses on the list. The first mailing included an announcement of the release and availability of the TMDL Evaluation Report, a copy of the Executive Summary of the report and an information sheet on the TMDL. The second mailing provided an updated information sheet and announced a deadline for comments on the Evaluation Report and the TMDL process. The third mailing announced an extension of the comment period deadline.

The Dept. of Ecology held a public workshop in the city of Granger on May 14, 1996, specifically to inform the local public and government officials about this project and the TMDL process. Over 2200 notices of the workshop were mailed to area residents and advertisements were put in local media. This primary effort to involve the public resulted in a disappointing turnout. The strategy of public involvement was changed to a program of including the TMDL message in other public meetings which included the target audiences. TMDL presentations and informational announcements were and continue to be included in numerous grower educational seminars and conferences sponsored by entities other than Ecology. TMDL information was also included in a general watershed education program developed by the Yakima Watershed Local Action Team lead.

In conjunction with Ecology's Yakima Watershed Agriculture Water Quality Education Program, developed in late 1997, over 3300 brochures discussing

TMDL issues and Best Management Practices have been distributed to growers, conservation districts, irrigation districts and ag-chemical dealers.

A Yakima Watershed internet web page has been created by Ecology with links to Yakima TMDL information including the Executive Summary of the Evaluation Report and an informational report.
(http://www.wa.gov/ecology/cro/yrblat/index.htm)

A continuing effort has been made to educate and encourage participation in the TMDL process. Numerous presentations to groups and the media have, and continue to be given. A chronology of public, private and media events in which TMDL information has been disseminated follows:

1/27/95	TMDL presentation and discussion with the Yakama Indian Nation environmental managers.
2/7/95	Watershed workshop in Granger for agriculturists, with discussions on the TMDL project and upcoming activities. (Public meeting)
4/95	TMDL and Yakima River pollution presentation to the water quality committee of the Yakima River Watershed Council.
4/4/95	Yakima River sediment and TMDL presentation to the Environmental Education Workshop Group with the Educational Service Districts #105 and #123.
4/4/95	Yakima River suspended sediment and TMDL presentation to the Kittitas, Yakima and Benton County vocational agricultural teachers group.
4/4/95	Meeting with WSU Extension Service in Yakima County to discuss coordination of the Yakima River TMDL project and related riparian activities with local 4H projects.
4/13/95	TMDL presentation in Prosser to area agriculture teachers from Educational Service Districts #105 and #123.
4/13/95	Public phone-in radio talk show interview on Yakima Valley station KUTI on TMDL issues and implications.
5/95	Meeting with WSU Extension and Kittitas-Yakima RC&D to discuss potential rolls in this TMDL process.
5/4/95	Yakima River TMDL project and pollution presentation to the Roosevelt Elementary School math and science teachers.
5/8/95	Presentation to Lewis and Clark Middle School students on the TMDL project and water quality issues in the Yakima Basin.
5/25/95	Lewis and Clark Middle School field trip to lower Yakima River to observe suspended sediment pollution problems.
6/23/95	TMDL presentation to Central Region Office of the Dept. of Ecology.
7/5/95	Wapato High School field trip to lower Yakima River to observe suspended sediment pollution problems.
7/9/95	TMDL presentation to the Water Quality Committee of the Yakima River Watershed Council.

8/95	Presentation of TMDL issues and implications to the Yakima River Joint Board of Control. (Kennewick ID, Kittitas ID, Roza ID, Sunnyside Division, Yakima Tieton ID, Cascade ID, Ellensburg Water Company, City of Yakima)
8/25/95	Presentation of TMDL issues and implications to the Sunnyside Valley Irrigation District Board of Directors. (Public meeting)
9/95	Instructional seminar on ground truthing of land use and irrigation practices for Educational Service Districts #105 and #123.
9/21-31/95	Central Washington State Fair in Yakima, Dept. of Ecology booth and TMDL display.
9/23/95	TMDL poster display and information booth at the Granger Water Day fair.
10/95	Presentation to Selah High School Students on Yakima River pollution and the TMDL.
11/14/95	Presentation to area school teachers at Educational Service District #105 on TMDLs and land use and irrigation ground-truthing.
1/19-24/96	Tri-Cities Sportsmen's Show display booth on the Yakima River TMDL.
1/26/96	Presentation to the League of Women Voters on the Yakima River TMDL.
2/8/96	Presentation to the Kittitas County Conservation District on the Yakima River TMDL.
2/13/96	Presentation to the Tri-County Water Resources Agency (Kittitas, Yakima and Benton Co. Commissioners representation) on the Yakima River TMDL.
2/16-18/96	Yakima Sportsmen's Show display booth on the Yakima River TMDL.
4/18/96	Yakima River TMDL presentation to the Governor's Council on Environmental Education.
5/14/96	Town meeting and TMDL workshop in Granger.
7/9/96	Interview on TMDL issues for local Yakima television.
7/10/96	Yakima River water quality presentation to the Water Quality Committee of the Yakima River Watershed Council.
7/29/96	Yakima River water quality and TMDL presentation to Wapato High School students.
7/30/96	Yakima River TMDL presentation given to the Conservation Advisory Group of the Yakima River Basin Water Enhancement Project.
8/2/96	TMDL television interview given to KNDU news.
8/7/96	TMDL television interview given to KAPP news.
8/7/96	One half hour television news program on TMDLs, water quality and partnerships in the Yakima watershed on station KAPP.
8/13/96	News Release on the public release of the TMDL Evaluation Report for the Lower Yakima River.
9/24/96	Yakima River TMDL presentation given to Bureau of Reclamation - Yakima Project staff.

10/4/96	Presentation and update to the Tri-County Water Resources Agency (Kittitas, Yakima and Benton Co. Commissioners representation) on the Yakima River TMDL.
10/9/96	Granger Waterfest, TMDL and Yakima River information booth.
11/6/96	TMDL presentation to the Washington Apple Commission.
11/15/96	Presentation to the Tri-County Board of Commissioners on the Yakima River TMDL and Ecology's Local Action Team.
11/18/96	TMDL presentation to the Yakima County Commissioners.
12/30/96	Interview on TMDL issues for local Yakima television.
1/17-19/97	Tri-Cities Sportsmen's Show display booth on the Yakima River TMDL.
1/31/97	Update of TMDL project to the Yakima River Joint Board of Control. (Kennewick ID, Kittitas ID, Roza ID, Sunnyside Division, Yakima Tieton ID, Cascade ID, Ellensburg Water Company, City of Yakima)
2/4/97	Presentation on the Lower Yakima TMDL project to the Richland Rod & Gun Club.
2/20/97	Presentation on the Lower Yakima TMDL project to the Department of Ecology Joint Management Team in Lacey.
2/21-23/97	Yakima Sportsmen's Show display booth on the Yakima River TMDL.
5/13/97	Presentation on the Lower Yakima TMDL project to the Roza-SVID Joint Board of Control.
5/14/97	TMDL and water quality presentation to Mabton High School students.
5/23/97	One hour call-in radio talk show and interview on Spanish language station KDNA in Granger on the lower Yakima River TMDL and water quality issues.
6/8/97	TMDL presentation to the Master Watershed Stewards class.
8/13-20/96	Media interviews about the Lower Yakima TMDL on the release of the TMDL Evaluation Report. (Television-KNDO, KIMA, KAPP and KNDU; radio- KIT, KNOA and KEPR; newspapers- Yakima Herald Republic, Tri-Cities Herald, Capital Press and Toppenish Review; magazines- Washington CEO and Water Environment & Technology).
10/14/97	Presentation and information exchange on the Yakima TMDL with the Yakama Reservation Irrigation District Board of Directors.
10/21/97	Presentation and distribution of the Yakima River TMDL Evaluation Report to the Roza/SVID Board of Joint Control Work Group.
11/12/97	Lower Yakima TMDL literature distribution at a Kittitas County Conservation District growers meeting.
11/20/97	Presentation of the TMDL process and overview of the Lower Yakima TMDL to the Washington State Water Resources Association annual conference in Leavenworth.

1/22-23/97	Provided a booth and poster display for the Hop Growers Convention in Yakima highlighting the Yakima River TMDL and Ecology's Agricultural Water Quality Education Program.
1/16-18/98	Tri-Cities Sportsmen's Show display booth on the Yakima River TMDL.
1/26-2/11/97	Participated with Roza/SVID Board of Joint Control and WSU Extension in 8 landowner meetings designed to educate growers on the TMDL, water quality issues, irrigation district policy changes designed to address WQ problems and irrigator responsibilities in erosion control.
2/12/98	Presented TMDL and WQ issues at a combined irrigation district coordinating meeting in Kittitas Co.
2/27-29/98	Yakima Sportsmen's Show display booth on the Yakima River TMDL
3/31-4/1/98	Provided poster display on Yakima TMDL for the Non-point Pollution Conference in Wenatchee.
5/12/98	TMDL presentation to the Columbia Basin Anglers in Kennewick, WA.
7/15/98	Slide show presentation to Ecology director and the media on the Yakima TMDL project.
7/16/98	Yakima TMDL presentation to Moxee area hop growers.
7/27/98	Interview with KNDU television on Yakima River pollution and implementation planning.

WASHINGTON STATE DEPARTMENT OF ECOLOGY

News Release

FOR IMMEDIATE RELEASE:
August 13, 1997

CONTACT:

Chris Coffin, Project Coordinator, (509) 454-7860

Lower Yakima River Pollution Addressed in New Report

Yakima, WA -- A long-awaited report on pollution in the lower Yakima River has been released by the Washington State Department of Ecology, signaling major changes in water management for many farmers in the Yakima River basin. The report identifies sediment and the associated pesticide DDT as the river's biggest pollution problems. It details the amount and sources of sediment and DDT released to the river during the irrigation season, and sets limits and a schedule for reducing those pollutants. The goal is to restore the quality of the lower Yakima River water so that it meets state water quality standards.

"The most obvious sign of pollution in the lower Yakima is the muddy water entering the river at the mouths of irrigation return drains and tributaries," said Chris Coffin, Yakima River water quality project coordinator.

"Our sampling indicates tens of thousands of tons of top soil are eroded from valley farms during the irrigation season. The soil is carried down the drains and ends up in the Yakima River. That's bad for agriculture and it's bad for the fishery that we're trying to restore in the river.

"Sediment from farmland also carries with it residual amounts of the banned pesticide DDT. Tissue samples of bottom fish in the lower Yakima have among the highest concentrations of DDT in the nation," Coffin said.

The new report is called *A Suspended Sediment and DDT Total Maximum Daily Load Evaluation Report for the Yakima River*. "Total Maximum Daily Loads" are estimates of the

amount of specific pollutants that a body of water can safely take in without threatening the beneficial uses of the water such as stock water, irrigation, fishing, swimming and aesthetic enjoyment.

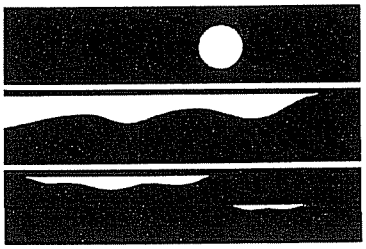
Sediments and "suspended solids" harm the respiratory systems of fish and aquatic insects. Particles can also settle and clog spawning gravel or suffocate fish eggs. Muddy water makes it difficult for fish to migrate and find food.

Ecology, Yakama Indian Nation and several other state, federal and local agencies now will be working together with area growers to identify the best and most cost-effective ways to reduce soil erosion and runoff from farms.

"We are looking to the community for participation and support as we develop effective pollution controls," Coffin added. "Public comment and involvement is an essential ingredient in the success of this project. Ecology and the other agencies will provide guidance and help farmers to implement new, less polluting irrigation practices."

According to the report, most of the sediment is eroded from farmland by poor irrigation water management and is carried back to the river through the irrigation return drains. One of the early recommendations is for growers to convert to sprinkler and drip irrigation where appropriate to eliminate tail water runoff and the resulting top soil erosion. Other options are also being explored.

For a copy of the executive summary of the report or a fact sheet on the Total Maximum Daily Load process on the Yakima River, contact Chris Coffin at (509) 454-7860.



A Suspended Sediment and DDT Total Maximum Daily Load Evaluation Report for the Yakima River

Executive Summary

July 1997
Publication No. 97-321


Printed on Recycled Paper

Executive Summary

Purpose and Approach

The lower Yakima River basin is located in south-central Washington State. It is one of the most intensively irrigated and agriculturally diverse areas in the United States. Suspended sediment and persistent pesticide loads from irrigated agricultural areas of the lower Yakima River basin have long been recognized as serious impairments to water quality. Recent water quality evaluations by the US Geological Survey (USGS) have indicated that some improvements have been made, but beneficial uses are still impaired by sediment and sediment-borne pollutants like DDT from irrigation returns (Rinella *et al.*, 1992b, 1993). Consequently, several reaches of the lower Yakima River and several of its tributaries do not meet numerous state water quality criteria and federal guidelines (Ecology, 1994a, 1995). As a result, these water bodies have been placed on the Washington State's 303(d) list.

The Clean Water Act directs Ecology to perform a total maximum daily load (TMDL) analysis for contaminated waters on the 303(d) list. Ecology had determined that turbidity and DDT represent key water quality impairments on the 303(d) list in the lower Yakima River basin. In response, Ecology conducted a TMDL study to evaluate controls of suspended sediment, the primary cause of the turbidity criteria violations, and a major source DDT transport in the lower basin during the irrigation season. Ecology believes the control of suspended sediment generation and transport during the irrigation season will result in far-reaching water quality and fish habitat improvements in the Yakima Basin.

In addition, the TMDL needed to be coordinated with the Yakama Indian Nation (YIN) since the Yakama Indian Reservation covers over forty percent of basin, but is outside of the state's jurisdiction. The Yakama Indian Nation and Ecology joined in a data-sharing and cooperative monitoring agreement for the project. Like Ecology, the YIN and the US Environmental Protection Agency (USEPA) share similar Clean Water Act and TMDL responsibilities on the Yakama Indian Reservation. They are developing plans, and are undertaking actions to address suspended sediment loads in drains and tributaries from the Reservation. Ecology, the YIN, and the USEPA will continue to coordinate their efforts to improve water quality in the Yakima River

The TMDL evaluation project was undertaken in two phases by the Environmental Investigations and Laboratory Services (EILS) program at Ecology. Phase I tasks included:

- water quality monitoring,
- a historical data review,
- suspended sediment criteria development based on beneficial use impairments, and

- ranking of subbasins relative to their suspended sediment problems.

Phase I results focused work for Phase II. The main objective of Phase II was to recommend suspended sediment reduction targets to protect aquatic life in the main stem and in tributaries of the lower Yakima project area. Targets were to be based on relationships between suspended solids and Washington State criteria for turbidity and DDT. Tasks during Phase II included:

- additional turbidity and suspended sediment monitoring to establish TMDL control and compliance sites,
- a comparison of turbidity results between agency laboratories,
- additional pesticide data collection in major return drains,
- development of a suspended sediment mass balance for the lower Yakima basin during the 1995 irrigation season, and
- establishment of cooperative working relationships with tribes, federal agencies, conservation districts, and other groups in the lower basin.

Additional data were obtained from the USGS, US Bureau of Reclamation (USBR), the YIN, and the North and South Yakima Conservation Districts. Monitoring and evaluation focused on drains and tributaries in the most heavily irrigated areas of the lower Yakima. Data evaluation, jurisdictional issues, and the TMDL strategy were discussed with, and reviewed by technical staff from the Ecology Central Regional Office (CRO), Region 10 of USEPA, and the YIN Environmental Protection Program.

Findings

Flow, Turbidity and TSS

The Yakima River and Naches River serve as irrigation supply water for approximately 339,200 acres of cropland in the lower Yakima Valley. From 50% to 100% of the water delivered to the lower basin from the Naches River and upper Yakima River is diverted for irrigation and hydropower generation during the irrigation season (Molenaar, 1985). In some past years, nearly all water was diverted out of the main stem at the Sunnyside Dam. This became a concern among fishery and water resource managers. Diversion limits were placed in 1994, so that at least 300 cubic feet per second (cfs) must spill over the dam to the lower river. The lower basin slowly recovers some of the water diverted for irrigation through surface and subsurface returns. Many irrigation return drains and tributaries enter the river from the project area and the Yakama Indian Reservation. Most of the returning water contains elevated levels of suspended sediments, pesticides, nutrients, bacteria, and oxygen demanding substances. Several small municipalities and industrial sources also discharge into the river, but supply a fairly small cumulative volume (10 cfs) during the irrigation season.

Two very different irrigation season flow regimes were monitored during 1994 and 1995. Irrigation diversions were severely limited in 1994 because water availability for irrigation was the lowest on record. The 1995 season saw normal water availability. Water availability and use had a direct impact on suspended sediment loading from tributaries and irrigation return drains. Tributaries and drains associated with lands with senior water rights (*i.e.*, only minor reductions in water use) maintained elevated TSS concentrations and turbidities both years. For example, the median turbidities at Moxee Drain and Granger Drain exceeded 50 NTU, the level at which displacement of salmonids can occur, in 1994 and 1995. However, tributaries and return drains from lands affected by lower water use in 1994 resulted in lower mean TSS concentrations and turbidities. In 1994, Sulphur, Spring, and Snipes creeks had median turbidities below 25 NTUs. Salmonid feeding and growth are affected at turbidities above 25 NTUs. In 1995, the median turbidities of Sulphur Creek and Spring Creek were above 25 NTU, while the 90th percentile turbidities for Sulphur, Spring, and Snipes creeks exceeded 50 NTU. In turn, main stem concentrations of TSS and turbidity increased between 1994 and 1995 as TSS loading from tributaries increased. Median and 90th percentile turbidities at main stem sites monitored in 1994 remained below 25 NTU. In 1995, 90th percentile turbidities of the four sites below the Yakima River at Parker exceeded 25 NTU. In both years, turbidity increased by more than 5 NTUs between the confluence of the Yakima and Naches River and Benton City.

A TSS loading balance was calculated from the data collected during the 1995 irrigation season. The cumulative impact of tributary and drain loadings on reaches of the lower Yakima River was clearly seen. For example, in the later part of the irrigation season, the Moxee Drain TSS load (35 tons/day) exceeded the Naches River's load (27 tons/day), even though the average water volume of the Naches River was 14 times that of Moxee Drain. Granger Drain contributed an average 60 tons of TSS /day. The TSS load from Sulphur Creek was 110 tons/day, and Spring and Snipes Creeks' combined TSS load was 46 tons/day. The combined TSS load from the Yakama Reservation drains and tributaries was 75 tons/day. Approximately 1.5 tons/day came from municipal or industrial sources. Ungaged tributaries and instream sources also accounted for substantial loads during the irrigation season.

Using 1994 and 1995 monitoring data generated in this TMDL evaluation, a regression was developed of turbidity as a function of TSS. The following linear regression equation was based on 646 data pairs from river, canal, drain, and tributary sites with TSS concentrations less than 1000 mg/L:

$$\log_{10} \text{Turbidity} = 0.871 * \log_{10} \text{TSS} - 0.145$$

The equation had a coefficient of determination (r^2) of 0.956, which means 96% of the data variability is explained by the TSS data. Such a high correlation is somewhat unusual, but it may be because a ratio turbidimeter was used for all analyses, and because

the geographic and seasonal scope of the data was more focused than other studies of this kind.

Pesticides

Nonionic pesticides have been used extensively on the agricultural crops of the Yakima Valley since at least the 1950s. In general, the organochlorine compounds, such as DDT, dieldrin, and endosulfan, have been the most frequently detected pesticides in basin waters, sediments, and biota due to their persistence in the environment and heavy use in the past. Concentrations of total DDT in the water were highest in the early 1970s. In the mid-1970s and early 1980s, DDT was not detected in samples routinely collected by the USGS, most likely because of the higher detection limit. Samples collected by USGS during the NAWQA survey indicate that DDT is still present in the main stem at concentrations above criteria. There is some indication that t-DDT burdens in fish tissues are declining, although there are not enough data to confirm this trend. Fish in the lower Yakima River still have one of the highest concentrations of DDT in the country (Rinella *et al.*, 1993). These findings resulted in a Washington State Department of Health advisory in 1993 recommending that people eat fewer bottom fish from the lower basin (Department of Health, 1993).

In 1995, whole water samples were analyzed for 46 pesticides at Granger Drain, Spring Creek, Sulphur Creek, and the Yakima River at Euclid Bridge as part of the TMDL evaluation. Organochlorine, organophosphate, and nitrogen-containing pesticides were frequently detected at all sites. Total DDT was detected above the human health and aquatic life chronic toxicity criteria at all sites on three or more sampling dates. The t-DDT samples analyzed had concentrations from 0.004 µg/L to 0.357 µg/L, and a median of 0.0083 µg/L. The median concentration, and most sample results, were similar to what has been reported in recent years for these sites. However, one sample collected at Granger Drain contained 0.357 µg/L t-DDT. It was twice the previously highest concentration of t-DDT detected since 1968.

Additional pesticides detected in water at concentrations above criteria or guidelines were: azinphos-methyl, chlorpyrifos, malathion, diazinon, and propargite. Both azinphos-methyl and chlorpyrifos are highly toxic insecticides used on many fruit and vegetable crops. Preventing seasonal entry of these newer pesticides into basin waters deserves further investigation.

The t-DDT concentrations in the small mouth bass and carp tissue samples collected in 1995 from the Yakima River at Euclid exceeded the Ecology screening guideline by an order of magnitude. The bass sample had a higher concentration than bass previously analyzed in the lower basin, and the carp sample was at the higher end of the range of values observed. Dieldrin was also detected in the bass and carp samples at concentrations exceeding the 0.7 µg/kg screening guideline by an order of magnitude.

The carp samples 15 µg/kg total chlordane concentration exceeded the human health screening level of 8.3 µg/kg. Total PCBs (polychlorinated biphenyls) in both the carp and bass also exceeded the screening guideline for human health risk. Other pesticides detected, but below guideline concentrations, were: heptachlor expoxide, hexachlorobenzene, and trifluralin.

The three largescale sucker composite samples collected from the Yakima River at Euclid in 1995 contained from 2.276 µg/kg to 3.728 µg/kg t-DDT. Dieldrin and total PCB concentrations in the 1995 samples also exceeded wildlife guidelines. These data indicate that pisciverous wildlife are still likely at risk from exposure to t-DDT, dieldrin, and other pesticides in Yakima River fish.

Using 1995 monitoring data generated in this TMDL evaluation and previous USGS and Ecology data a regression was developed of t-DDT as a function of TSS. The best linear regression equation based on 71 data pairs from river and tributary sites with detectable t-DDT concentrations (expressed as nanograms per liter, or ng/L) was:

$$\log_{10} \text{t-DDT} = 0.953 * \log_{10} \text{TSS} - 0.820$$

The equation had a coefficient of determination (r^2) of 0.747. Data collected in 1995 were not significantly different from previously collected data, and tributary data were not significantly different from main stem data, so all data were grouped. Other pesticides either had too few data, or no significant association with TSS was found.

Total Maximum Daily Load Recommendations

Since suspended sediment and DDT are two of the most significant pollutants in the Yakima River Basin, it is necessary to set nonpoint source reduction targets through load allocations in the study area. Three approaches were used to recommend TSS and DDT targets and nonpoint source load allocations for the Yakima River and its tributaries in the study area:

1. ***Turbidity criterion*** -Using the correlation of TSS concentrations to turbidity values, TSS targets on the main stem Yakima River will be based on the turbidity standard of 5 NTU above background.
2. ***Fisheries (aquatic biota) support*** - Using the narrative criteria to protect aquatic life, a 25 NTU turbidity or 56 mg/L TSS target will apply to irrigation return drains and tributaries as a fish health threshold consistent with the scientific literature.
3. ***Pesticides criteria*** - Based on the correlation of TSS to t-DDT, long-term TSS reduction goals will be set for return drains and tributaries to achieve the t-DDT water quality criterion for protection of aquatic life from chronic toxicity. Targets to meet human health criteria will be assessed as progress to the aquatic life criterion is made.

The TMDL-related activities include re-evaluation work and further target development. The targets based on aquatic community effects should be met in 15 years so that an evaluation of ways to meet DDT human health criteria can be done within 20 years. Limiting DDT uptake by aquatic organisms may require an entirely different approach, but that will be difficult to know until substantial reductions in TSS and associated DDT loadings are accomplished. These are necessary components of the phased-TMDL approach. The effectiveness of individual control measures to reduce soil erosion in irrigated agricultural areas is fairly well understood, but the overall effectiveness of all measures implemented in the basin, and the rate at which they will be adopted under current economic and political conditions is uncertain. The scheduling of targets and TMDL-related activities are proposed as follows:

5 years (2002)

- Yakima River main stem will comply with the turbidity target of not more than a 5 NTU increase between the confluence of the Yakima and Naches Rivers (RM 116.3) and the Kiona gage at Benton City (RM 30).
- All drains and tributaries within the project area will comply with the 90 th percentile turbidity target of 25 NTU at their mouths, especially Moxee Drain, Granger Drain, Sulphur Creek, and Spring Creek.
- The efficacy of using TSS load targets for tributaries and drains where the 25 NTU target is not representative of total load reductions will be evaluated.
- Agreements between the State of Washington, Yakama Indian Nation, and the U.S. Environmental Protection Agency that sets load allocations for the Yakama Reservation, and management of basin water quality will be completed.

10 years (2007)

- The mouths of all tributaries and drains, and all points within all basin tributaries and drains will comply with the 90 th percentile turbidity target of 25 NTU.
- The 7 mg/L TSS target developed to meet the DDT chronic aquatic toxicity criterion will be re-evaluated using additional data and historical pesticide use analysis.
- Target controls and a strategy to meet the DDT human health criteria in fish and water will be developed.
- Yakima River main stem will comply with the turbidity target of not more than a 5 NTU increase between the confluence of the Yakima and Naches Rivers and the Van Geisan Road bridge at West Richland (RM 8.4).

15 years (2012)

- All tributaries and drains, and the Yakima River main stem will comply with the 1 ng/L DDT chronic aquatic toxicity criterion by the 7 mg/L TSS target or its modified form (see 10 year);
- A control strategy to meet DDT human health criteria using TSS or other targets will be established.

20 years (2017)

- The DDT human health criteria in fish and water will be met.

TSS reductions necessary to meet the turbidity TMDL targets were estimated from the 1994 and 1995 data. Main stem TSS concentrations in both years would have required reductions of approximately 50% to stay within the 5 NTU limit at Kiona. The main stem loading would be adequately reduced to meet the 5 NTU limit if project area and Yakama Reservation tributaries complied with the recommended 25 NTU target. The TSS load from project area tributaries and drains to the Yakima River would have been reduced by approximately 207 tons/day in 1995. The 25 NTU target will require the largest return drains to reduce TSS loads 13% to 93% in an irrigation season with normal water availability, like 1995. Under conditions of limited water availability like in 1994, some of these same return drains would have easily meet the target while others would still have needed reductions of 25% to 90%.

Based on the regression equation, the turbidity-related TMDL target of 56 mg/L TSS at mouths of drains could reduce t-DDT concentrations to 7 ng/L. That would reduce t-DDT loading to the Yakima River by more than 66%. The 7 mg/L TSS target for compliance with the 1 ng/L aquatic toxicity criterion for DDT will require substantial reductions of TSS loads in most tributaries --from 30% to 99%. However, model simulation results suggest the 1 ng/L DDT criterion might not be attained in the river, even if the TSS concentrations in the drains were reduced to the 7 mg/L TSS target. Background t-DDT residuals carried in the river from upstream or in resuspended sediment would become the dominant sources of t-DDT in the lower Yakima River. These inputs could continue to cause DDT concentrations to exceed the criterion. Instream and out-of-basin sources are more difficult to predict and control, and could likely prevent complete water quality compliance in the main stem.

The TSS to t-DDT regression developed from data collected to date shows a greater variability in the lower region of the regression where TSS concentrations are less than 70 mg/L. DDT data are lacking for the lower TSS concentration range. Therefore, as more DDT samples are collected from return drains and tributaries that approach compliance with the interim turbidity TMDL target of 25 NTU (56 mg/L TSS), the regression can be re-calculated.

The suspended sediment and turbidity reductions recommended in the TMDL evaluation provide direction to Ecology for planning, funding, and executing specific actions in priority subbasins. Ecology will hold public workshops in cooperation with conservation and agricultural outreach agencies to discuss all aspects of the TMDL with local growers, water purveyors, and other interested parties in the lower Yakima River basin. At that time, implementation plans and schedules for these recommendations (or alternatives that meet water quality standards, protect fish health and habitat, and protect designated uses) will be formulated.

Implementation of the TMDL will remove turbidity, DDT, DDE, and DDD from the list of contaminants impairing water quality in the lower Yakima River and several of its tributaries. Other pesticide and nutrient-caused impairments on the 303(d) list may be eliminated by implementing this TMDL. For example, future monitoring may show that concentrations of endosulphan, heptachlor, endrin and other chlorinated pesticides similar to DDT are reduced by measures set-up for suspended sediment and DDT removal.

The YIN and USEPA have similar Clean Water Act responsibilities on the Yakama Indian Reservation. They are developing plans, and are undertaking actions to address suspended sediment loads in drains and tributaries from the Yakama Reservation. Ecology, the Yakama Indian Nation, and the USEPA will continue to coordinate their efforts to improve water quality in the Yakima River. Some TSS load allocations in the lower Yakima River will need to be negotiated between these governments and agencies as part of the public process.

WASHINGTON STATE DEPARTMENT OF ECOLOGY

Lower Yakima River Water Quality Project — *Update*

Introduction

The Yakima River drainage is one of the most important recreational, cultural, agricultural, fishery, and visually stunning resources in the state. But the Yakima River is seriously threatened by pollution. High suspended solids, turbidity, DDT and other pesticides, high temperatures, and other kinds of pollution have been documented for several decades in the lower Yakima. If these pollutants are not soon controlled, all or most of the benefits we now enjoy from the Yakima River will certainly be lost.

With the publication of a new report about the lower Yakima River, the Washington State Department of Ecology has reached an important milestone in a process to restore water quality in the lower Yakima River from the mouth of Naches River at the city of Yakima, downstream to the Columbia River. The report details the amount and sources of several pollutants in the lower Yakima and prescribes limits and a schedule for reducing those pollutants to return water quality in the Yakima to state standards.

Since an overwhelmingly high percentage of the pollution in the lower Yakima comes from erosion of soil from farms, many growers will need to make significant changes in irrigation practices and irrigation water management. Sediment from farmland, including pesticides that adhere to the sediment particles, must be reduced 75% to 95% in some of the major drains and tributaries to meet targets outlined in the Ecology report. Doing so will result in far-reaching water quality improvements in the Yakima basin.

Ecology is asking growers in the Yakima basin and other members of the community to work with us to identify the best and most cost-effective methods of reducing erosion of soil and runoff into the river. Numerous other local, state, federal and tribal agencies are working with Ecology to provide guidance and to help growers implement new, less polluting practices.

A muddy plume of irrigation return water enters the Yakima River at Granger Drain.

Facts about TMDLs

❖Surface waters can assimilate pollutants to some extent through a natural process of self-purification. The amount of pollutants that a body of water can assimilate without violating state water quality standards is called loading capacity. TMDLs are usually equal to a waterbody's loading capacity, with a safety margin to allow for error and impacts from unknown sources.

❖Loading capacities and TMDLs are based on water quality data. Ecology uses historical and current data to determine loading capacities and TMDLs. Mathematical modeling to simulate critical conditions of stream flow and pollutant loading is often used to determine a TMDL.

❖A TMDL can be developed for part of a body of water, like one section of a river, or for a watershed that includes numerous rivers, lakes, and streams.

❖The number and kinds of pollutants covered by a TMDL varies.

Targets and Goals

The new report is called *A Suspended Sediment and DDT Total Maximum Daily Load Evaluation Report for the Yakima River* (*TMDL Evaluation Report*). Although the title is a mouthful, the bottom line is less complicated. The *TMDL Evaluation Report* sets targets for amounts of sediment and pesticides in the river that must be met during the irrigation season. Two different targets were set: one for turbidity, or cloudiness, of water, and one for pesticides (DDT). Because we know that both DDT and turbidity have a direct mathematical correlation to total suspended solids (or TSS, the eroded particles suspended in water) in the lower Yakima, the targets are expressed in terms of reduced TSS. Attaining these target reductions is the next challenge in the process of meeting water quality standards in the Yakima River.

Background turbidity from the upper reaches of the river basin will be measured at Harrison Bridge, above Selah, and Nelson Bridge, one mile northwest of Yakima on the Naches River. Results will be compared to samples taken down stream, at the Kiona Bridge at Benton City. This will allow us to measure the effect of irrigation returns on turbidity in the mainstem of the lower Yakima. Targets to meet water quality standards require that turbidity will increase no more than 5NTU between Harrison Bridge and Kiona Bridge. (An NTU, or nephelometric turbidity unit, is a measurement of the light scattering ability of suspended particles in water.)

Since suspended solids from eroded agricultural soils carry attached DDT and other pesticides into the water, a target reduction of DDT in the river will be achieved by limiting suspended solids. The *TMDL Evaluation Report* identifies needed TSS reductions at various drain, tributary and mainstem sites in order to meet existing state water quality standards for rivers and lakes.

Washington Water Quality Standards

Standards for Washington's surface waters are found in Chapter 173-201A WAC, *Water Quality Standards for Surface Waters of the State of Washington. Water Quality Standards* has three main elements:

❖All waterbodies in the state are assigned to one of five waterbody classes. Classification is based on the expected beneficial uses of each waterbody.

❖An antidegradation policy, which states that existing beneficial uses of all waters of the state will be maintained.

❖Water quality criteria, which are estimated concentrations of pollutants above which harmful effects on aquatic life or human health are observed. Specific criteria are set to support the uses described for each class of waterbody.

Total Maximum Daily Load

Ecology is using a *Total Maximum Daily Load (TMDL)* process to address impaired water quality in the lower Yakima River. Total Maximum Daily Loads are estimates of the amount of specific pollutants that a waterbody can "safely" take up without threatening the beneficial uses of a waterbody.

The Total Maximum Daily Loads are used to protect water quality by setting a limit on the amount of specific poliutants that may be discharged to the river.

Total Maximum Daily Load Report

Ecology published the *TMDL Evaluation Report* in July, 1997. The report is based on data from both Phase I and Phase II of the project. The report:

❖provides an estimate of how much suspended sediment is currently being discharged to the lower Yakima River during the irrigation season;

❖details how total suspended solids measurements correlate to concentrations of DDT and turbidity;

❖provides an estimate of how much suspended sediment the Yakima River can take up and still meet state water quality standards for turbidity and DDT — the Total Maximum Daily Load; and

❖provides targets for reducing suspended sediments from drains and tributaries that are needed to meet water quality standards in the mainstem Yakima River.

State Water Quality Standards and the Lower Yakima

The Department of Ecology sets standards to protect the quality of lakes, rivers, and other surface waters in Washington. The standards identify the beneficial uses of each waterbody, such as use for domestic water supply, irrigation, recreation, navigation and fish habitat. The standards then specify criteria that must be met to protect those beneficial uses.

The lower Yakima River is classified as a Class A waterbody. Class A waters must meet or exceed the requirements for all or substantially all uses including domestic, industrial and agricultural water supply; stock watering; salmonid and other fish migration, rearing, spawning and harvesting; wildlife habitat; recreation; sport fishing; boating and esthetic enjoyment.

Due to pollution associated with suspended sediment, water quality in the Yakima is not meeting standards for Class A waters and the beneficial uses of the river are threatened. The sediment entering the Yakima River is primarily eroded soil carried to the river via irrigation return drains or tributaries affected by irrigation runoff. Other sources of the suspended solids pollution are sand and gravel mining, urban runoff, erosion from construction sites, road building, forestry practices and natural causes.

Suspended Solids are the Link to Other Yakima River Pollution

Suspended solids degrade water quality in many ways. Suspended particles impair fish and aquatic insect respiration. Particles can also settle and clog spawning gravel or suffocate fish eggs.

As bad as these effects are, however, the striking plumes of discolored water entering the Yakima River from irrigation return drains and tributaries are also a symptom of other problems. Less visible kinds of pollution are linked directly to the suspended sediments. The less visible problems include turbidity and pesticides.

Pesticides

Numerous pesticides in Yakima River water and bottom sediments pose a threat to both animals and people. The problem pesticides include DDT that enters the Yakima River attached to suspended soil particles.

Even though agricultural use of DDT was banned in 1972, DDT makes up the bulk of the pesticides sampled. That is because, unlike pesticides used today which break down relatively quickly, DDT takes a long time to break down in the environment. DDT attached to soil particles decades ago when it was commonly used. It remains there today along with other more recently applied pesticides.

Turbidity

The relationship between turbidity, or water clarity, and suspended solids is easy to imagine. Suspended matter in the water is the source of the cloudy, muddy-looking plumes that are so apparent where irrigation drains and some tributaries enter the clearer Yakima. Turbidity reduces light penetration and can interfere with natural productivity in the river. Turbidity also makes it more difficult for fish to move and find food.

Valuable top soil is eroded from a Yakima Valley hop field. The fine soil particles will move with the irrigation runoff becoming suspended and bottom sediment in the tributaries and the mainstem of the Yakima River.

How We Got Here

Phase I

The US Geological Survey, US Bureau of Reclamation, Yakama Indian Nation, Washington State Department of Ecology, and others have been sampling water quality in the lower Yakima River for several decades. Most of those studies were reviewed in the extensive *Yakima River Basin Water Quality Plan* prepared by the Yakima Valley Conference of Governments. Many of the studies reviewed in *the Yakima River Basin Water Quality Plan* clearly indicated that Washington's state water quality standards were not being met in the Lower Yakima.

Because studies showed that state water quality standards were not being met, the federal Clean Water Act required Ecology to list the lower Yakima River as an *impaired waterbody*. Once the lower Yakima was listed as an impaired waterbody the Clean Water Act further required Ecology to determine Total Maximum Daily Loads for that part of the river.

The first phase of the lower Yakima Total Maximum Daily Load process was completed in 1994. Ecology evaluated historical water quality data from many sources. In addition, Ecology increased its own sampling in the Yakima River and some tributaries to verify water quality problems and to more clearly identify sources of the pollutants found in the river.

Ecology's 1994 sampling confirmed that water quality standards were not being met. Ecology's sampling also reinforced conclusions in *the Yakima River Basin Water Quality Plan* that erosion from agricultural areas was the primary source of water pollution in the lower Yakima River.

Phase II

In 1995, Ecology further intensified its studies of pollution in the lower Yakima River. The 1995 studies helped to clarify how suspended solids pollution is related to DDT and turbidity in the Yakima River ecosystem.

The 1995 studies included Granger Drain and other Yakima River sub-basins that receive large volumes of irrigation return waters. *The Yakima River Basin Water Quality Plan* identified irrigation returns as the primary source of suspended solids and sediment-related pollution in the Yakima. According to the report, most of the sediment is eroded from farmland by rill, furrow and other irrigation practices and carried to the river via return drains and tributaries. Growers are being urged to convert to sprinkler and drip irrigation, where appropriate, and to eliminate tail water runoff and its resulting top soil erosion. Correctly managed, sprinkler and drip irrigation systems also can help conserve water and reduce the need for fertilizers. Other alternatives for better irrigation water management are also being explored.

— continued next page

How We Got Here (continued)

Phase II Study Data
Data from the Yakima River Phase II studies were used to determine the Yakima River's assimilative capacity, or Total Maximum Daily Load. The data also reinforced how agricultural water management and irrigation practices affect water quality in the Yakima River.

Continuing the Yakima River TMDL Process

The *TMDL Evaluation Report* sets the stage for those actions that must follow. Since the pollutants of concern in the lower Yakima River are primarily from agricultural runoff, Washington State University, local conservation districts, the Natural Resources Conservation Service and other agencies are already working, both alone and with Ecology, to help irrigators to convert to more environmentally sound irrigation practices.

How you can participate

Ecology wants the Yakima Valley community to lead in shaping the solutions and setting the schedules that will be used to reduce pollution in the lower Yakima River. Over the past two years, Ecology has provided opportunities for the Yakima Valley community to learn more about the water quality improvement process and to voice their interests and opinions.

Ecology is eager to continue that process by meeting with others to describe the lower Yakima water quality project, and discuss the quality of the water in the river. Speakers are available to address larger groups and staff are available to meet with small groups or individuals. Ecology is also helping to organize water quality projects for students and volunteers in the lower Yakima River Valley.

Ecology maintains a mailing list of people and groups interested in the lower Yakima project. Everyone on the mailing list receives informational publications and notices of upcoming public events related to the Yakima River TMDL project as they become available.

Simple tools, such as this Imhoff Cone, can be used by irrigators to demonstrate top soil loss from irrigated agricultural lands.

Who to Contact
Chris Coffin is Ecology's coordinator for the lower Yakima River TMDL project. Please call or write to Chris if you have questions or comments, would like to be placed on the project mailing list, or would like to make arrangements for a speaker.

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Section 4 -
Summary Implementation Plan

Section 4 - Summary Implementation Plan

LOWER YAKIMA RIVER SUSPENDED SEDIMENT TMDL

Summary Implementation Strategy

This TMDL, the Endangered Species Act and watershed planning activities in the basin have focused attention on the resources provided by the Yakima River, illustrated the interrelationships between the many uses of the watershed and have brought a broad and diverse collection of groups together to work on issues. Implementation of this nonpoint TMDL involves the participation of several of these organizations and agencies. Many projects currently underway or proposed by these groups relate directly to sediment reduction and improving watershed conditions. There is a high level of cooperation and communication between project participants and other interested groups. Several groups, such as the Yakima River Watershed Council, the Interagency Council, the Roza-Sunnyside Board of Joint Control Work Group and the Tri-County Water Resource Agency have formed within the basin to promote discussion, disseminate information, and provide comment to current and proposed projects and planning. All are working within the Yakima Watershed on water related issues. The Bureau of Reclamation, Yakama Indian Nation, local Conservation Districts, Washington State University Cooperative Extension, Natural Resource Conservation Service, local irrigation districts, Educational Service Districts and the Dept of Ecology all have ongoing projects within in the watershed aimed at improving the resource.

Three interrelated areas of irrigation water management are critical to successfully controlling sediment transport from Yakima Valley agricultural fields to the Yakima River: (1) **developing modern and efficient delivery systems** which will allow on-demand or near on-demand water delivery to the farm fields; (2) careful **on-farm management of irrigation water and the conversion of furrow irrigation systems to drip or sprinkler irrigation methods**; and (3) **management of sediment laden tail-water runoff** in agriculture return drains. In each of these areas there are practices that will aid in reducing erosion and sedimentation. In many cases, the same practices being implemented in Yakima Basin water conservation projects will provide sediment loading reductions as a co-benefit. Sediment reduction in the lower Yakima River is and will continue to be addressed in each of these three areas.

- **Water Delivery Modernization**

  YRBWEP

  The Congressionally authorized Title XII-Yakima River Basin Water Enhancement Project (YRBWEP) was implemented to achieve several specific goals including improving the reliability of water supply for irrigation, improving the efficiency of water delivery and use, and improving water quality and fish habitat. Many of the

resources made available for this project are being directed to irrigation districts to develop modernization plans and the associated feasibility studies for delivery system upgrades. In some districts system modernization will include upgrading farm turnouts to allow water to be delivered to fields as needed to satisfy specific crop requirements, in an on-demand basis. On-demand water delivery facilitates or improves the functionality of drip and sprinkler systems which makes conversion to these methods more attractive to irrigators. Several of the irrigation districts within the TMDL project area, including Sunnyside and Roza Irrigation Districts, are participating in the YRBWEP process and are in the process of upgrading their delivery systems.

Roza Irrigation District Closed Conduit Project

The Roza Irrigation District is midway through a project to install closed conduit water delivery systems throughout the district. To date, approximately 28,000 acres, or 39% of the irrigated project area, has been converted to metered, pressurized pipe delivery. Conversion has been progressing at 1200 to 2000 acres per year and Roza has proposed to double that rate. Piped, pressurized systems will facilitate on farm conversion of furrow irrigated ground to more efficient methods and provide an opportunity for accurate measurement of water delivery. This project is scheduled to continue through the year 2010 and beyond.

Modernization Education

Many smaller irrigation districts throughout the TMDL project area and the region often lack staffing, budget or time to attend the modernization clinics and workshops necessary to stay informed on the changing techniques of water delivery. Major conferences are offered in distant locals such as Denver or Southern California making participation difficult. Problems and solutions associated with water delivery, water conservation and water quality often go unheard or unheeded because of the lack of ready technical assistance or knowledge of the issues. The Department of Ecology, the Bureau of Reclamation and the local Resource Conservation and Development office are collaborating on a project to provide delivery system modernization education to irrigation districts in the Central Washington region. This project will bring educators and consultants from the Irrigation Training and Research Center at California Polytechnic State University to the Yakima area. One or two day classes will be offered locally, on a periodic basis, to irrigation district personnel. This will not only avail state of the art information to the participants but it will create a point of information exchange between the districts. This project is funded for startup with the first class tentatively scheduled in October of 1998.

- **Water Management and Conversion of furrow to drip and sprinkler.**

As indicated in the TMDL "Evaluation Report", 1994 was a very lean water year. Water reductions were in effect for all of the prorated (junior water rights) water users within the Yakima Basin. Water was used conservatively and carefully managed throughout the prorated areas to prevent wasteful runoff and excessive deliveries. **During the 1994 irrigation season the major drains and tributaries targeted in this TMDL were nearly achieving the TMDL target turbidity levels.** Some agricultural lands had been taken out of production during this water shortage but those were primarily annual row crops normally irrigated using furrow irrigation. **This indicated that if irrigation water in the lower Yakima Valley were properly managed, using conservation practices, and furrow irrigated grounds were converted to non-erosive methods the 5 year TMDL turbidity targets could be met at the mouths of the tributaries.**

The conversion of furrow irrigated agricultural lands to sprinkler or drip will have the single largest effect on reducing agricultural sediment transport in the lower Yakima Basin. When properly managed, sprinkler and drip irrigation have little to no tail water runoff, thus eliminating most top soil erosion and the resulting suspended sediment in agricultural return drains. Drip irrigation has been found to be very adaptable to many of the crops which traditionally used furrow techniques and which have also been responsible for a high percentage of the sediment load. Research and the personal experience of local growers have shown increases in productivity and the ease of application of fertilizer and pesticides after converting to drip systems for certain crops. The quantity of fertilizer needed for some crops have been reduced by 50% when using fertigation techniques associated with drip irrigation. These benefits make conversion to drip and sprinkler very attractive to many growers. Several agencies and groups within the TMDL area have ongoing projects to promote and facilitate conversion of furrow irrigated lands. Funding and technical assistance are being made available to growers and educational opportunities dealing with water quality and water conservation issues are increasing in scope and frequency.

Moxee Drain Project

The North Yakima Conservation District (NYCD) is very active in the Moxee Drain sub-basin promoting and securing funding for the conversion of furrow to drip irrigation on hop fields. Because of the combination of frequent tillage and the traditional furrow irrigation techniques, hop fields have experienced high rates of erosion and caused excessive sediment loads in the tributaries and drains. Conversion of hop fields to drip will reduce sediment load delivery by 100% as tailwater runoff is eliminated. Of the 19,000 acres of irrigated lands in the Moxee Basin before 1993, hops (7400 acres) and grapes (175 acres) comprised essentially all of the furrow irrigated lands. Within the last 5 years, since the NYCD has begun the Moxee Drain Project, approximately 50% of all of the acreage originally under furrow irrigation

has been converted to drip or sprinkler. Another 23% of the furrow irrigated lands have been committed for conversion by landowners as cost share funds become available. At current and projected funding levels NYCD predicts that 90+% of the acreage originally under furrow will be following BMP irrigation methods (sprinkler or drip) in the next 5 years. Additional cost share funding will increase the rate of this change. As an important component of the implementation of this TMDL, Ecology will support the NYCD in the completion of this project.(see Appendix 1, Moxee Drain Project)

Monitoring of Moxee Drain by NYCD, ongoing since 1994, has shown a reduction in sediment levels (see Appendix 2, Moxee Drain report). It is fully expected that sediment loads will continue to decrease as more lands are converted to drip, buffer zones along drains are established and the Roza-SVID Board of Joint Control begins enforcement of new tail-water return policies

Granger Drain

Granger Drain has been the subject of intensive study and sediment improvement projects since 1991. The South Yakima Conservation District, Natural Resource Conservation Service (NRCS) and Washington State University Cooperative Extension have been conducting irrigation workshops, water quality monitoring, developing irrigation demonstration projects and assisting growers in converting irrigated lands from furrow to drip. In the last year within this drainage, over 1000 acres of formerly furrow irrigated lands have been converted to drip and sprinkler. The number of converted acres continues to rise and in-drain sediment loads continue to decrease.(see Appendix 3, Granger Drain HUA; also see BOJC Policy Statement at Appendix 7). Ecology considers this sub-basin critical in the implementation of this TMDL and will continue to support and promote the activities in this area necessary to reduce sediment loads.

Snipes/Spring Creeks

The Benton Conservation District is working within the Spring Creek and Snipes Creek drainages on a project to reduce sediment and nutrient transport to the Yakima River (also see BOJC Policy Statement at Appendix 7). A primary emphasis of the BCD project is to assist growers in the conversion of furrow irrigated ground to drip. Also within the scope of this effort are irrigator workshops, stream restoration projects and water quality monitoring. Ecology is supporting this project and will continue to assist with funding and resources when possible. (see Appendix 5, Spring Creek Water Quality and GIS Mapping Project)

Sulphur Creek

South Yakima Conservation District and the NRCS are active in the Sulphur Creek sub-basin developing demonstration projects to show the benefits and feasibility of alternative methods of irrigation to furrow systems. They are also distributing cost share money and offering technical assistance in this area to growers converting from furrow systems. Similar to Granger Drain and Snipes/Spring Creeks, the BOJC is applying their new improvement policies to Sulphur Creek.

Wide Hollow Creek

This drainage was listed for DDT and included on the 1996 303(d) list due to excursions beyond criteria found during the USGS NAWQA study in the late 1980s. At that time the lands drained by Wide Hollow Creek were of mixed uses including rangeland, irrigated agricultural, suburban, urban and light industrial. Fruit orchards, pastures and row crops were the primary agricultural uses through the mid '70s and into the '80s, with furrow irrigation employed as a common but diminishing practice. In the last two decades this area has experienced intensive growth and the agricultural uses have increasingly given way to urban and suburban development throughout the drainage. Row crop acreage has been reduced to minimal numbers and most of the remaining orchards and pasture lands now use sprinkler irrigation as their primary technique. These changes are expected to reduce suspended sediment and DDT transport in the waterbody. Because this waterbody flows through residential areas and past several schools and parks, there is growing interest in developing volunteer monitoring projects in the drainage. Ecology will assist in promoting and facilitating these projects. Also, the North Yakima Conservation District is developing plans for riparian restoration projects within the watershed and the Educational Service District 105 is working with local schools to develop the waterbody as a salmon spawning stream. These are all positive signs for future improvement in water quality. This waterbody will be included in future monitoring to confirm compliance with TMDL goals.

Polyacrylamide

As an interim solution to on-farm erosion and the associated suspended sediment load from furrow irrigated lands the local Conservation Districts in the TMDL project area and Washington State University Cooperative Extension have begun a campaign to promote the use of the water additive, polyacrylamide. This polymer, added to irrigation water at the head of the furrow, has been shown to dramatically decrease the amount of soil moved off the farm during irrigation. Reduction of 90 to 95% of non-treated sediment loads have been observed. While this fix is seen as temporary it is an important tool in the reduction of sediment while growers convert irrigation systems to drip and sprinkler.(see Appendix 4, Polyacrylamide)

Roza-Sunnyside Board of Joint Control

A significant contribution to the implementation of this TMDL comes from the Roza-Sunnyside Valley Irrigation District Board of Joint Control (BOJC). These two irrigation districts, united by the formation of a joint board in 1996, are the primary water purveyors in the TMDL project area. This year the BOJC has taken a major step in addressing water quality in the lower Yakima Basin by adopting new policies which will change the way tail water and agricultural drains are managed. Changes include irrigator requirements to pipe field runoff discharges to drains and tributaries; meet acceptable water quality parameters for waters leaving fields; obtain permits to discharge to irrigation project waterways; maintain buffer zones along waterways including fencing out livestock and no-till zones; and participate in water user awareness programs. The BOJC has accepted the TMDL allocated turbidity levels of 25 NTU as the maximum allowable for return flows to drains and canals within the irrigation project. **This includes Granger Drain, Snipes/Spring Creeks, and Sulphur Creek.** Growers will be given 1 to 2 seasons to adapt to the new policy changes and formulate farm compliance plans while being offered education, technical assistance and funding incentives to convert to drip or sprinkler systems or construct water treatment structures. After that time the BOJC will begin enforcement of the policies (See Appendix 7). Ecology will develop referral procedures with BOJC to insure that all out of compliance irrigators are reached. Ecology will continue to support and encourage the efforts of the BOJC.

- **Management of sediment in tail water and drains**

Sedimentation Basins

The BOJC constructed 2 experimental sedimentation basins in 1997. The goal of the basins is to remove farm soil from drains before the water is returned to delivery canals or the Yakima River. While one of these original basins was found to be undersized and the other poorly designed, pre and post monitoring showed they were trapping 80% of the sediment load moving down the drain. The larger of these 2 basins removed an average of 6 tons of sediment per day from the drain system. Two new, larger sedimentation basins have been constructed in 1998 to replace the originals. These will be monitored through the irrigation season and if found to be effective others basin sites will be considered. These basins are considered an interim tool until on-farm fixes are implemented. They also serve as an effective demonstration to irrigators on the severity of the sediment problem. Ecology is helping fund the construction of these basins.

In 1997, the BOJC initiated a water quality monitoring project, including hiring a water quality specialist and technician, building a water lab, and designing an ambitious sampling and monitoring program. This project will be used to monitor and track reductions in sediment loads as implementation of management practices proceed and as necessary to identify pollution sources for referral or corrective action. Ecology will collaborate on monitoring projects with all the involved agencies, providing and sharing resources as available.(see Appendix 8, BOJC WQ Monitoring Plan)

- **Further incentives**

Recent legislation, HB 1557, provides tax exemptions for property improvements used for water quantity or water improvements. By working with Conservation Districts and installing approved, less polluting irrigation systems, the corresponding increase in property values will not increase taxation values. This is seen as another incentive, encouraging growers to move to drip irrigation systems.

- **Other projects**

Ecology has initiated the scoping and funding process to begin an assessment of the upper Yakima Watershed, specifically in Kittitas County agricultural areas, in preparation for nonpoint TMDL Evaluations on 303(d) listed waters. This assessment will look specifically at suspended sediment, turbidity and pesticides. The project is scheduled to begin in the late summer of 1998.

The US Forest Service is formulating a project to address 303(d) listed waterbodies on the National Forest. These listings deal primarily with flow and temperature issues but other pollutants will be tied in where they occur. Ecology has been meeting with the USFS to coordinate activities.

Ecology has initiated a Yakima Watershed Agriculture Water Quality Education Program that will provide technical assistance and grower referrals to agencies involved in BMP implementation. The Dept. of Ecology will increase its presence in the project area following up complaints and making referrals to Conservation Districts and irrigation districts.

All of the above listed programs, projects and incentives will be employed to implement this TMDL. Progress toward the TMDL targets, as out lined in the TMDL "Evaluation Report", will be monitored and adjustments in implementation practices will be made as necessary. A "Detailed Implementation Plan", as required by the USEPA/Ecology MOA will be developed in the next year and submitted to EPA as part of this TMDL submittal.

Schedule for monitoring and evaluation of TMDL effectiveness. Ecology will begin or facilitate full scale monitoring in the year 2000 as described in the enclosed Monitoring Strategy. Monitoring data collected by local entities will also be used as a supplement. Current ongoing monitoring by these local entities now provides data for annual trend analyses of changes in suspended sediment loads in all of the major drainages. An annual trend analysis will be continued to track achievement of the above stated targets. Based on annual results, adaptive management strategies will be developed as needed.

Section 5 - Monitoring Strategy

Section 5 - Monitoring Strategy

LOWER YAKIMA RIVER SUSPENDED SEDIMENT TMDL

Monitoring Strategy

Monitoring is a required component of the TMDL process. Monitoring allows direct evidence of target compliance or control measure effectiveness. It also can provide the data necessary to modify or adjust targets in specific situations. The TMDL schedule contains elements requiring monitoring for both compliance, and target re-evaluation and development

Turbidity and TSS monitoring will be necessary to check progress with the turbidity criterion compliance along the main stem Yakima River. Compliance monitoring requires establishing a background turbidity site, and at least one compliance check point at the Kiona gage at Benton City (RM 29.9). Ecology proposes establishment of three more sites to ensure turbidity compliance within the reach: 1) the abandoned Parker railroad trestle below the Sunnyside Dam (RM 103.7); 2) a site between the mouths of Granger Drain and Toppenish Creek (approximately RM 81); and 3) Euclid bridge (RM 55). Any mainstem monitoring at sites on or bordering the Yakama Reservation will be carried on in cooperation with the Yakama Nation. Full scale monitoring as outlined in this plan will be initiated in the two years preceding the five-year target date. Until that time, ambient monitoring by Ecology on the mainstem will proceed on a monthly basis. Background turbidity and TSS will be measured at 2 sites, at Harrison Bridge on the Yakima River (RM 121.2) and at Ramblers Park Bridge on the Naches River (RM 3.7). From data gathered at these sites the theoretical mixed TSS and turbidity will be calculated. Monthly ambient monitoring has already been initiated at these sites.

The TMDL monitoring and evaluation concluded that most TSS effects from irrigated agriculture are observed by Yakima mainstem RM 29.9, the Kiona gage at Benton City. However, West Richland at Van Giesen bridge (RM 8.4) could be an alternative compliance site since it would place controls on the entire lower main stem except for the Kennewick Irrigation District return via the Amon Wasteway (RM 2.1). Sampling will be expanded or moved to West Richland as progress is made upstream of Benton City. Data will be used to ensure that water quality improvements are transferred downstream by the year 2007. Amon Wasteway will be evaluated and will be monitored as part of the assessment. If it is considered a significant TSS input, it will be placed under the same reduction schedule as the returns and tributaries upstream.

Drains and tributaries will be monitored at locations used for the TMDL evaluation unless more appropriate sites are chosen. To the extent possible, tributaries and drains will be sampled for TSS and turbidity at the same time as main stem sites. Continuous discharge monitoring stations will be established at the water quality monitoring sites or instantaneous discharge measurements will be obtained at the time samples are collected.

Monitoring will be conducted every two weeks during the irrigation season (*i.e.*, usually between March 20 and October 20). This will normally provide 15 data points per site to calculate 90th percentile values for control and compliance checks. Sampling order should follow upstream to downstream. Sample timing will be roughly synchronized with discrete blocks of water by evaluating gage data or calculating river time of travel (Hubbard *et al.*, 1982).

A depth integrating sampler will be employed for sampling at main stem sites at three or more points along the cross-section. Sulphur Creek, Spring Creek, Granger Drain and Moxee Drain will also be sampled at multiple points along the site cross-section. The smaller drains require only one depth integrated grab sample. A ratio turbidimeter will be used to continue to check the TSS to turbidity relationship.

Pesticide samples will be collected in conjunction with turbidity and TSS samples, especially in the priority drains and tributaries as turbidity and TSS levels are reduced. Main stem sample collection will continue as well. Historically, the peak concentrations of DDT and other organochlorine pesticides occur in June and July, so samples will be collected at that time. Analytical quantification limits must be at or below the chronic aquatic life criteria for the DDT metabolites and dieldrin.

Monitoring of organophosphorus pesticides detected in the TMDL "Evaluation Report" will continue to document any further water quality problems related to their use. Sampling periods will occur during periods of application to crops.

Of the several drainages in the Lower Yakima Basin within the jurisdiction of the State of Washington, four of these, Moxee Drain, Granger Drain, Sulphur Creek and Snipes/Spring Creek are major contributors of suspended sediment to the lower Yakima River. At several sites in each of these drainages one or more public entities, other than Ecology, is conducting regular water quality monitoring for a number of parameters, including suspended solids and turbidity. North Yakima, South Yakima and Benton Conservation Districts and the Roza/Sunnyside Valley Irrigation District Joint Board of Control are conducting monitoring, currently funded under local support, Centennial Clean Water Fund and 319 Clean Water Fund grants. Monitoring resources need to be coordinated so that data collected by other agencies and groups are useful to the TMDL effort and vice versa. Ecology will support efforts to coordinate monitoring, and be a key participant in developing data quality standards, data storage and exchanges, geographical information system (GIS) coverages, and cooperative monitoring agreements.

The North Yakima Conservation District includes the areas drained by Moxee Drain. NYCD has been sampling for turbidity and sediment at several sites in the drain since 1994. This monitoring project is in conjunction with the NYCD's ongoing project to educate growers and facilitate the conversion of furrow irrigated lands to drip or sprinkler. The monitoring program is funded through a Centennial Clean Water Grant and is budgeted through the irrigation season of 1999. (see Appendix 1, Moxee Watershed Plan and Assessment)

South Yakima Conservation District is conducting a sampling and monitoring program at 18 sites in the Sulphur Creek Drainage and 2 additional sites in the Giffin Lake Drainage. This project has been underway since 1997 and is funded through December 1999 under a 319 Clean Water Fund grant. The purpose of the project is to monitor reductions in sediment and nutrient transport in the return drains as irrigation conversion progresses. SYCD is facilitating demonstration projects in this drainage which emphasize alternatives to furrow irrigation. Partnering with SYCD, the Natural Resource Conservation Service is providing cost share money as incentives for farmers to switch from furrow irrigation techniques.

Benton Conservation District is continuing its monitoring program at 6 sites on Spring and Snipes Creeks for several parameters, including suspended sediment and turbidity. This monitoring is the continuation of a project originally funded and undertaken to track sediment loads associated with furrow irrigation and measure improvements attributable to changes in irrigation practices.

Roza-SVID Board Joint of Control (BOJC) has undertaken a monitoring program in the Granger Drain, Sulphur Creek and Spring/Snipes Creek drainages. Twenty-seven sites are being monitored on a biweekly or monthly basis for several parameters including flow, turbidity and TSS. This is an ongoing project initiated in 1997. Also, BOJC is working with the Bureau of Reclamation and Ecology to establish a permanent monitoring site with building and instrumentation near the mouth of Granger Drain. When completed, this will provide continual monitoring and data collection for a number of parameters. (See Appendix 7, BOJC)

Section 6 - Public Comments

Section 6 - Public Comments

Roza-Sunnyside Board of Joint Control
P.O. Box 810 ■ Sunnyside, WA 98944 ■ (509) 837-5141 ■ FAX: (509) 837-8541

April 20, 1998

Chris Coffin
TMDL Coordinator
Department of Ecology
15 West Yakima Ave., Suite 200
Yakima, WA 98902

Dear Mr. Coffin:

The Roza-Sunnyside Board of Joint Control (Board) requests your consideration of the comments listed below relative to the Department of Ecology (Ecology) draft report No. 97,321. A Suspended Sediment and DDT Total Maximum Daily Load Evaluation Report for the Yakima River.

We first compliment Ecology and its authors on preparing a report that is based on the use of good data sets and analyses techniques. For example, the report has sections on quality assurance and quality control stating its quality assurance goals and the assessment of differences between integrated and grab samples. The authors also made good use of historical data in an effective manner.

Specific technical comments and suggestions that we believe could strengthen the report, remove uncertainties, and allow for some additional scenarios are as follows:

1. Page 77, 5 year (2002), first bullet – We suggest the following alternate wording: "Yakima River main stem will comply with the turbidity target of not more than a 5 NTU increase for the 90th percentile between the confluence of the Yakima and Naches Rivers (RM 116.3) and the Kiona gage at Benton City (RM 30)." This addition is consistent with your discussion of the turbidity criterion on pages 65 and 66 of the draft report. We also note your discussion is with reference to the "irrigation season". Is it intended a different criterion applies for the non-irrigation season?
2. Page 78, 5 year (2002), second bullet – The Board has no specific recommendation to replace the percentile value, now set at 90. However, we suggest that when we analyze the data for 2002, we may wish to amend this value and/or this method of setting a target, such as "the discharge weighted mean for ____ percentile of the time shall not exceed 25 NTU".
3. Page 78, 5 year (2002), third bullet – The Board suggest adding to the current wording to read as follows: "The efficacy of using TSS load targets for

tributaries and drains where the 25 NTU target is not representative of total load reductions will be evaluated, such as is likely to occur where there are significant reductions in flow due to changing irrigation methods." It is the goal of the Board to minimize runoff from each farm by encouraging the use of drip and sprinkler irrigation methods and to consider reuse of return flow. The use of reregulating reservoirs along the main canals will also reduce the use of these drainage ways to return operational spill to the Yakima River. These efforts will likely result in much reduced flows from drains into the Yakima River. These efforts have two very significant benefits to the TMDL targets and aquatic organisms in the basin.

a) Less water is diverted for irrigation, and
b) With less return flow the load of TSS and DDT will be significantly reduced. As we understand the Clean Water Act and the TMDL process, if the loads of TSS or DDT were met and the turbidity levels were exceeded, this would be preferred to meeting the turbidity target but exceeding the TSS or DDT load target.

4. Page 78, 10 years (2007), first bullet – The Board wonders why this target is desirable if concentrations are being met where the water enters the Yakima River main stem.
    a) The enforcement of the 25 NTU at all points within a sub-basin removes certain options of encouraging water reuse available to the Board and its member districts. It would seem that if the system can meet its goal, the boards should be allowed as much management flexibility as possible.

5. Page 78, 10 years (2007), second bullet – The Board agrees that the 7 mg/L TSS target needs to be evaluated. This is especially true because background TSS measured values exceeded the proposed targets for the Kiona gage when 1995 conditions were 9 and 14 NTU at background and Kiona respectively (18 and 30 mg/L TSS).

6. The monitoring section of the report, pages 79 and 80, is well done. What is missing is a specific, recommended program and implementation timeline. If other agencies collecting water-quality data are expected to work with Ecology in meeting the stated TMDL targets, they need to have, at a minimum, the turbidity and TSS values associated with background and the Kiona gage now. Having these data would allow Ecology and agencies assessing their data to determine if incremental steps are likely to result in meeting the stated targets. Alternatively, if data is not collected until 2002 and assessed in 2003, it will be 2004 (half way to 2007) before we find out how we are doing.

In addition to the above technical comments, the following general observations are provided:

1. The title of your report suggests the entire Yakima River system is addressed. The text is limited to the river basin below the confluence of the Yakima and Naches Rivers. The report title should be revised to conform with Ecology's intent with respect to basin planning (see further comments below regarding Ecology – EPA Memorandum of Agreement).

2. The relationships of the recommended target TMDLs to the states' overall water quality management program for the lower Yakima River Basin should be described in sufficient detail to enable implementing agencies to understand the "big picture". It is recognized that the Yakima TMDL studies preceded the October 29, 1997 Memorandum of Agreement between Ecology and EPA regarding implementation of Section 303(d) of the Federal Clean Water Act. However, this Agreement, which is now operative, sets forth a uniform, statewide planning process to be followed in developing water quality management plans. In general terms this process appears to be:

- A watershed approach to water quality management is to be followed; the state is divided into 23 Water Quality Management Areas (WQMA); the Upper and Lower Yakima WQMAs represent two of the 23 geographical areas.
- Point and nonpoint source problems and needs are to be addressed by WQMA on a cyclical, sequential basis; developing and implementing TMDLs is only one aspect of a WQMA program.
- A five step/five year program which includes the following activities is to be conducted in each WQMA: Year 1 – Scoping; Year 2 and 3 – Data Collection and Analysis; Year 4 – Develop WQMA Plan of Action, and Year 5 – Implementation.
- The Agreement schedule indicates the products of Year 4 and Year 5 activities are to be submitted to EPA for approval in Year 5. Provision is made that TMDLs may be completed on a basis other than a 5-Year watershed cycle.
- The final WQMA Plan of Action must include (1) a TMDL strategy, (2) a waste discharge permit strategy, and (3) a nonpoint source strategy.
- In Year 6, Ecology is to initiate a repeat of the 5-Year cycle.

The draft lower Yakima River TMDL report was issued July 1997 and prior to the Ecology – EPA Agreement. Discussion beginning on page 77 (TMDL Priorities and Schedule) summarizes 5, 10, 15 and 20-year targets/goals. The final TMDL report should clarify whether a WQMA plan is being prepared for the lower Yakima River basin in response to the Ecology – EPA Agreement and, if so, the timing for development of the Plan of Action, EPA approval and the implementation schedule for TMDL activities. The Board has adopted policies and initiated activities on the assumption the TMDL targets will be adopted as Ecology – EPA water quality criteria within the current year (1998).

Your consideration of the above comments will be appreciated as you prepare the final report. Should you have questions, please advise. Also, the Board would welcome an Ecology presentation of the adopted program and implementation strategy following issuance of the final TMDL report.

Sincerely,

James W. Trull

James W. Trull
Treasurer

(9804DOE-gf)

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION 10
1200 Sixth Avenue
Seattle, Washington 98101

APR 10 1998

Reply To
Attn Of: OW-134

Chris Coffin, TMDL Coordinator
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OPTIONAL FORM 99 (7-90)

FAX TRANSMITTAL # of pages ► 4

To Chris Coffin	From Alan Hemming
Dept./Agency	Phone # 206-553-8273
Fax # 509-575-2809	Fax #

NSN 7540-01-317-7368 5099-101 GENERAL SERVICES ADMINISTRATION

Dear Mr. Coffin:

The U.S. Environmental Protection Agency, Region 10 (EPA) appreciated working with the Washington Department of Ecology (Ecology) and the Yakama Indian Nation in developing the Lower Yakima River Study-A Suspended Sediment and DDT Total Maximum Daily Load Evaluation Report for the Yakima River, July 1997 (study). We believe that it is through such efforts that governments and regulatory agencies can work together to achieve common clean water goals. We also concur with the "jurisdictional language" included on the bottom of page 7 and the top of page 8. It was the intent of this collaborative effort to work together to address water quality concerns in the Lower Yakima Basin, not to establish jurisdictional claims. EPA will continue working with the Yakama Indian Nation to address these pollutants originating from waters within the reservation.

EPA also commends Ecology's ongoing efforts to work with irrigators and others in the basin to implement controls to address turbidity, total suspended sediments/solids and t-DDT in the Lower Yakima River and its tributaries.

Relative to the referenced study and a subsequent TMDL, we offer the following comments:

1. It was noted in the study that the turbidity standard in the Lower Yakima River had to be met at all points in the river, not just at Kiona. However, project modeling showed that under certain simulations, the 25 NTU at the mouth of tributaries would not achieve the 5 NTU over background. Would you please clarify what may be an inconsistency in the study?

2. The TSS modeling (p.70) uses the 90th percentile TSS concentrations for the two drains that were below the 56 mg/l target. The fourth sentence in the second paragraph on page 71 states that these drains will be expected to remain below the target. This is consistent with both the modeling and the State's anti-degradation policy. However, the sentence is buried in the document and this expectation is not clearly displayed elsewhere. To clearly define the levels that cannot be exceeded in order. We recommend that the numerical targets for these drains be clearly specified in the final TMDL submittal.

3. A "margin of safety" (MOS) is a required element of any TMDL. Ecology implicity applied MOSs at various points in the study but does not clearly define which MOSs were used and when they were applied. EPA requests that Ecology add a paragraph to the study or the accompanying TMDL fact sheet that defines how all of the MOSs were applied.

4. In the second paragraph on page 3 of the Introduction, Ecology indicates that "Implementation of the TMDL will remove turbidity, DDT, DDE and DDD from the list of contaminants impairing water quality in the Lower Yakima River and several of its tributaries." (Note: total DDT=t-DDT=DDT+DDD). Table 2 on page 10 identifies the specific §1996 303(d) list of contaminants for each water body in the Lower Yakima Basin. With the exception of t-DDT for the Yakima River, EPA agrees that the TMDL will address TSS/turbidity and t-DDT for aquatic life as defined in Table 2. Because modeled simulations show that the chronic aquatic toxicity criterion might not be attained in the Yakima River at the proposed reduced TSS concentration loadings from the tributaries and return drains (see page 74), EPA's position is that the Yakima River remain listed for t-DDT for aquatic life. If future monitoring and subsequent model simulations show that control measures will result in meeting the t-DDT criterion for aquatic life in the mainstemYakima River, it need not be listed for this parameter and beneficial uses.

   It is EPA's position that the Yakima River segments and applicable tributaries remain on the State's §303(d) list for t-DDT for human health protection. Although this TMDL is the first step in addressing t-DDT for all beneficial uses, too many uncertainties exist at this point in time for the assessment to conclude that the t-DDT criterion can be achieved.

   It should be noted that the TMDL also addresses TSS/trurbidity in the Yakima River, water body segments WA-37-1020, and WA-37-1040, as well as almost all, if not all of the tributaries included in the study area. These water bodies are clearly impacted, if not impaired by TSS/turbidity. For these water bodies, EPA would consider the TMDL as preventative in nature.

   In the following table we have identified the specific 1996 §303(d) listed water bodies and respective pollutants that we believe have been addressed by the Lower Yakima River TMDL Study.

WATER BODY SEGMENT NUMBER	NAME	1996 §303(d) LISTED PARAMETER ADDRESSED BY THE TMDL STUDY
WA-37-1010	Yakima River from Mouth to Toppenish Creek	turbidity
WA-37-1012	Snipes Creek	DDT*
WA-37-1014	Spring Creek	DDT*
WA-37-1024	Granger Drain	DDT*, 4-4' DDE*, 4-4' DDD*
WA-37-1030	Sulphur Creek	DDT*, 4-4' DDE*, 4-4' DDD*
WA-37-1047	Wide Hollow Creek	DDT*, 4-4' DDE*, 4-4' DDD*
WA-37-1048	Moxee Drain	DDT*, 4-4' DDE*, 4-4' DDD*

* establishes TMDL at criterion for aquatic life protection

5. EPA recommends that Ecology summarize, in its TMDL fact sheet, its reasons for using TSS as a surrogate measure for turbidity and t-DDT. Ecology should also provide a statement explaining the following: (1) how the diminutive contributions from point sources; (i.e., the waste load allocations) will be maintained at the current discharge concentrations, (2) that the load allocations for the nonpoint sources are applied to all pollutant-contributing agriculture sources within each tributary, and (3) that load allocations are set to achieve the turbidity targets at the mouth of each tributary.

6. Based on the October 29, 1997, MOA between the Ecology and EPA regarding "The Implementation of § 303(d) of the Federal Clean Water Act" a "Summary Implementation Plan" must be included as part of the TMDL submittal package. EPA recommends that the summary implementation and subsequent implementation efforts focus on those tributaries/return drains contributing the greatest pollutant loading; (i.e., Granger and Moxee drains). EPA also suggests that the summary implementation plan include data sources which indicate that the pollution reduction targets will be achieved using conventional soil and water conservation practices for irrigated agriculture. See page 67.

7. Throughout the study, it appears that Ecology uses the terms TSS, total suspended sediments, suspended sediments and total suspended solids interchangeably. Please clarify if this were Ecology's intention. If not, please define the differences in the terms.

Again, we wish to express our appreciation to Ecology for the effort that has gone into this study. Should you have questions regarding these comments, please contact Alan Henning at (206) 553-8293.

Sincerely,

Timothy Hamlin, Manager
Water Quality Unit

cc: Joe Joy
Moses Squeochs

March 6, 98

Dear Mr. Coffin,

I'm a landowner, (11 acres) bordering the Naches River across from Gleed. I keep several horses on my land it is a non irrigated parcel. I keep my horses away from the river with fences. I've noticed what I think are very destructive patterns along the Yakima River near Granger where they have a public park. Just below the bridge there is a cattle ranch the fences go into the river, cattle are allowed to go into the river. This destroys the riparian zone and put fecal material into the river. How can this be legal? I believe this is not uncommon. Also I feel there are wasteful irrigation practices along the Naches and Yakima River.

Thank You for the opportunity to comment

Marco Polo

[illegible]
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PM
19 MAR
1998

TMDL Coordinator
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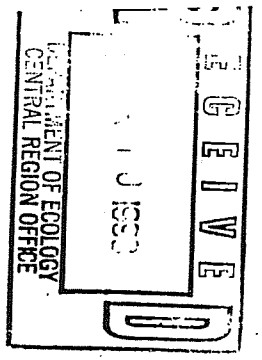
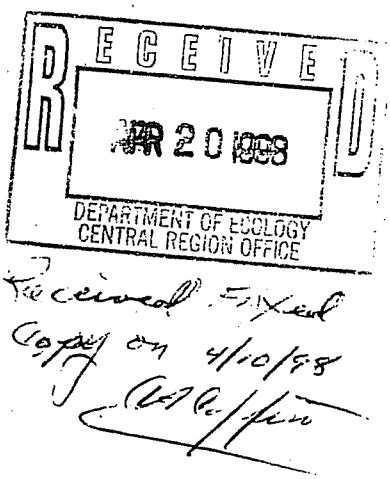


American Rivers



Received Faxed Copy on 4/10/98

April 9, 1998

Chris Coffin, Lower Yakima River TMDL Coordinator
Washington Department of Ecology
Central Regional Office
15 West Yakima Avenue, Suite 200
Yakima, WA 98902

Re: Proposed TMDL for the Lower Yakima River

Dear Mr. Coffin:

American Rivers is a national not-for-profit membership organization founded in 1973, with its principle place of business in Washington, D.C., and regional offices in Seattle, Washington, and Phoenix, Arizona. Its mission is to protect and restore North American rivers and their associated watersheds and ecosystems, and to foster a stewardship ethic in the public for river conservation.

The Northwest office of American Rivers, working in the states of Washington, Oregon, and Idaho, houses the organization's Endangered Salmon Project. The focus of its efforts on behalf of endangered Northwest salmon is the improvement of in-river conditions for salmon spawning, rearing and migration. The disastrous effects of dams, and water diversions and withdrawals on salmon life cycle needs are at the center of its work.

A. American Rivers Has a Special Interest in the Yakima Basin

American Rivers has a special interest in the Yakima River Basin. It has been included on the organization's annual list of the 10 Most Endangered Rivers in North America twice in the past several years because it exemplifies the water quality and allocation problems of many rivers in the arid West.

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By my representation, American Rivers serves as a member of the Board of the Yakima River Watershed Council and of its Executive Committee. The Council is a group of business, agricultural, government, Tribal, and environmental interests whose mission is to collaborate on a watershed plan for the Yakima River Basin. We have contributed to the Council's drafting of a consensus watershed plan, which is still taking shape.

As Co-Director of American Rivers' Northwest Regional office, I was appointed by the Secretary of the Interior to represent environmental interests on the Secretary's Conservation Advisory Group (CAG). The CAG was created by the Congress in Title XII of P.L. 103-434 (October 31, 1994), the Yakima River Basin Water Enhancement Project (hereinafter YRBWEP), to advise the Secretary on implementation of YRBWEP. *Id.* at §1203(c). The purpose of the legislation is to improve fish and wildlife habitat, water quality, wetlands, instream flows, and the reliability of water supply for irrigation through water conservation projects and voluntary water transfers in the Yakima Basin. *Id.* at §1201.

B. Summary of Efforts to Restore Yakima River Fish and Flows

And there is no question that it needs improvement. The Yakima's wild coho, summer chinook and sockeye salmon are now extinct, and the surviving fish hover at between 1% and 2% of their original numbers.[1] Yakima steelhead are proposed for listing under the Endangered Species Act,[2] and agricultural development has literally poisoned the fish that remain, threatening their human and animal predators. The Yakima is found on the Clean Water Act's list of "water quality impaired" water bodies for an array of pollutants;[3] and the U.S. Geological Survey reports that Yakima River fish

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[1] H.R. Rep. No. 644, 103rd Cong., 2d Sess. 14 (1994).

[2] *Id.*

[3] Wash. Department of Ecology, *1994 Section 303(d) List* 48-51 (May 9, 1994)(e.g., DDT, 4,4-DDE, PCB-1254, PCB-1260, Dieldrin, Endosulfan, Malathion, Temperature, Dissolved Oxygen, Chlorine, Ammonia-N), and again in 1996 (e.g., temperature, pH, fecal coliform, turbidity, ammonia-N, DDT, 4,4'-DDE, 4,4'-DDD, PCB-1254, PCB-1260, Endosulfan, Heptachlor, Heptachlor Expoxide, Parathion, Endrin, Aldrin, Dieldrin (5/31/96); and 1998 (draft)(e.g., all of the above and copper)

have among the highest concentrations of DDT in the Nation, commonly exceeding toxicity standards for aquatic life and fish predators by as much as 10 times EPA-recommended levels.[4] Soil eroded from agricultural land is the major source of these pollutants, particularly in the lower 110 miles of the river where farming is intensive and mainstream flow is dominated by agricultural runoff.[5]

Several forces converged in the late 1970s to set the stage for recovering the Yakima's once bountiful anadromous fish resource. In 1979, the Congress created the Yakima River Basin Water Enhancement Project (YRBWEP) to study water needs of the Basin.[6] Congress enacted the Northwest Power Planning and Conservation Act a year later, creating the Northwest Power Planning Council and its energy and fish planning authorities.[7] The Council targeted the Yakima River Basin for major restoration efforts,[8] and at least $70 million in public funds are going to construct fish ladders and screens at irrigation diversion dams to implement Phase I of the YRBWEP, authorized by the Congress in 1984.[9]

Phase II of YRBWEP, enacted in 1994,[10] and which created the CAG, authorizes some $150 million for acquisition of water rights, water conservation projects, and other strategies to improve river flows for anadromous fish and water quality.[11] And in 1996, the Bonneville Power Administration began construction of a multi-million dollar fish supplementation facility to boost salmon production in the Yakima.[12]

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[4] *U.S. Geological Survey Circular 1090, Persistence of the DDT Pesticide in the Yakima River Basin Washington* 13, 16-17 (1993).
[5] *Id.* at 11.
[6] H.R. 644 at 12.
[7] Pub. L. No. 96-501, 94 Stat. 2697 (December 5, 1980).
[8] H.R. 644 at 14.
[9] *Id.* at 12; Pacific Northwest Region Bureau of Reclamation, *On Course for the 90's* 24 (undated).
[10] Pub. L. No. 103-434, 108 Stat. 4550 (October 31, 1994).
[11] *Id.*
[12] Lester, David, *A Hatchery of Hope*, Yakima Herald-Republic, June 20, 1996 at 1A, 2A.

If these public funds are to have been well spent, and water is to be available to recover anadromous fish and water quality, the basin must be closed to new appropriative rights, a flow regime must be established for the Yakima mainstem and its tributaries, illegal diversions must be stopped, and current water users in the basin must adhere to the best available technologies for conveyance and application of agricultural water and the use of industrial and municipal supplies. The Yakima River has been notorious for "paper" water rights and wasteful irrigation practices for almost 100 years;[13] with millions in public funds and the Yakima's salmon in the balance, the public can no longer afford such private extravagance.

One of CAG's principle endeavors, on which its members spent over two years and which was just completed, was preparing a Yakima Basin Conservation Plan. That Plan, signed by the managers of the two largest irrigation districts in the Yakima Basin on behalf of the irrigation community, as well as by representatives of the Yakama Indian Nation, the State Department of Fish & Wildlife, Washington State University Agricultural Extension Service, and American Rivers on behalf of the environmental community, further details the serious flow problems in the Yakima River basin. For the lower Yakima River, corresponding to the area encompassed by the proposed TMDL (although the TMDL takes in the lower river to RM127.9, whereas the area referred to in the CAG Basin plan as the lowerYakima Subarea ends at RM 103.8, from Sunnyside Diversion Dam to the confluence with the Columbia River.), CAG states:

> The Yakima River from Prosser Diversion Dam to the mouth is the passage corridor for all salmonid species moving to and from all upstream areas. Streamflows and water quality in this reach have the potential to influence anadromous fish production in the entire Yakima River basin.
>
> In addition to passage, salmonid fish use of the river downstream from Prosser Diversion Dam includes fall chinook spawning, incubation, and rearing and overwintering of spring chinook and steelhead. . . .
>
> At times, water quality, particularly high water temperatures, makes much of the lower Yakima River unsuitable for salmonids, acting as a barrier to both upstream and downstream migration. During July and August, water temperature can exceed 75 degrees Fahrenheit . . . which constitutes at least a partial thermal block to late summer spawning runs of adult anadromous fish and movement of rearing and migrating juveniles (BPA 1990).

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[13] *See, e.g.*, Washington State Experiment Station, Bulletin 61, *A Report on Irrigation Conditions in the Yakima Valley, Washington* 12-17 (1904); U.S. Department of Agriculture, Bulletin 188, *Irrigation in the Yakima Valley* 21-23(1907); Whitley, Edward C., Washington Pacific Northwest Quarterly, *National Irrigation in Yakima Valley* 100 (April, 1951); *United States v. Ahtanum Irrigation District*, 236 F.2d 321, 341 (9th Cir. 1956).

> Lichatowich et al. (1995) theorized that at higher flows, a complex floodplain and localized inflow of cool water from the hyporheic zone would have mitigated the natural warming of the lower river in summer. Further, regional patterns of hyporheic flow appear to be critical to rivers of the high desert of the Columbia plateau such as the Yakima River where late summer instream temperatures may be too high for salmonids. Relative to surface temperatures, ground water from the hyporheic zone is cool in the summer and warm in the winter. The up welling zones provide cool refuge for salmonids on hot summer days and exhanges [sic] winter growth by keeping the water warm and some habitats ice free.[14]

The lower Yakima River was listed in 1996 and is proposed for listing again in 1998 by the Department of Ecology as out of compliance with water quality standards because, among other things, instream flows are too low to support the designated uses of the standards for salmonid spawning, rearing, migration and harvest. In those listings, Ecology states in part: [15]

> [L]ow summer flows below Sunnyside Diversion Dam are a problem in most years because all but about 200 cfs of the Yakima River flow above Sunnyside is diverted out of thousands of cfs at RM 103.8. And the flows below the Prosser Division Dam at RM 47 are usually 50 to 200 cfs *when 800-1000 cfs is needed for spawning and rearing . . . . These flows also severely hinder up migration of adult salmon and out migration of smolts causing high mortalities* (emphasis added).

C. The Need for Setting a Flow Regime that will Support the Designated Uses of the Lower Yakima River and an Implementation Schedule Could not be More Critical

With these facts in mind, we turn to the current state of water rights applications in the Yakima basin. Applications for water rights are still accepted, processed and granted by the Department of Ecology in the Yakima Basin despite the fact that:

- Yakima steelhead have been proposed for listing by the NMFS as endangered species;

- The mainstem Yakima and many of its tributaries are listed under the Clean Water Act as flow impaired;

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[14] Draft Basin Conservation Plan for the Yakima River Basin Water Conservation Program, Report to the Secretary of the Interior (June 25, 1997) at 4-33.

[15] Impaired and Threatened Waterbodies Requiring Additional Pollution Controls, ECY#WQ-R-95-84, at 287, 292.

- Hundreds of millions of dollars have been and/or are proposed to be spent by federal and state governments to increase instream flows for anadromous fish restoration in the Yakima River.

Currently there are hundreds of applications for surface and groundwater permits pending before the Department of Ecology, totaling well over 1,300 cfs. The Declaration of Rachael Paschal Re: Pending Applications, submitted in Yakama Indian Nation v. Department of Ecology, PCHB No. 93-157, et al., on February 12, 1998, details these applications from the Department of Ecology's Water Rights Application Tracking System. There is considerable scientific evidence that verifies that large areas of the Yakima Basin's groundwater aquifers are in hydrologic continuity with surface water of the River, including those aquifers from which the pending water rights would be drawn (as well as those contested in the above styled case). *See, e.g.,* Ring, T., *Review of Literature Pertinent to Impacts of Further GroundwaterDevelopment Black Rock-Moxee Study Area, Washington*, (June 2, 1993)(and submitted to the PCHB in *Yakama Indian Nation v. Department of Ecology,* 93-157, *et al*). *See also Den Beste v. PCHB*, 81 Wn.App. 330, 33-334 (1996).

Despite the condition of and interrelationship among impaired and substandard flows, temperature, and other pollution in the Yakima river, and the critical status of salmon in the lowerYakima River, a part of the river particularly crucial to *all* anadromous fish in the basin, the Department of Ecology has ignored the flow listing in this TMDL. Indeed, instead of addressing the flow issues in the TMDL, it continues to grant rights to groundwater that is hydraulically connected to Yakima river surface waters, which will result in further depletion of this critical habitat.

D. American Rivers Opposes Approval of the TMDL Because it Does Not Address the Flow Listing for the Lower Yakima River

We thus object to the approval of this TMDL because it did not take into account a flow regime for the Yakima River. Our objections to the failure to address the flow listing in this TMDL rest on:

1. The obvious and critical needs presented by the facts above to stop the continued hemorrhage of water from the river and to reallocate water to instream flows through enforcement against illegal diverters and the implementation of far more efficient water use technology in the basin;

2. The impossibility of solving the listed pollution problems of the lower Yakima River to which this TMDL is currently addressed without at the same time setting a flow regime so that the pollutant assimilative capacity is known and fixed, and not a moving and ever-shrinking target; and

3. The fact that the solution for reducing TSS loads, and hence other pollutant loads to the river, is the same for flow, *viz.*, much more efficient and environmentally sound application of water to irrigated crop land. The failure to include flow in this TMDL is destined to result in greater consumptive use of water in the basin and *more* damage to the River's instream flow resources if new water rights are not stemmed, and water that no longer needs to be diverted from the river because of improved irrigation practices to reduce TSS loading is not dedicated to the Washington Trust Water Rights Program for instream flows.

It makes no sense to spend hundreds of millions of taxpayer dollars to increase flows in the Yakima River to recovery the anadromous fishery unless these is a mechanism in place to stop the grant of more water rights, to assess and set an instream flow regime for the basin, to shut down illegal diversions, and to vastly improve the efficiency of agricultural and other water use in the basin.

As fully acknowledged in the TMDL Evaluation Report that is the subject of these comments, there is an integral relationship between flow and pollutant loading to the river (e.g., "the river under high flow conditions in April to June may have enough dilution to assimilate the reduced tributary loads from Granger Drain"),[16] but if neither Ecology or EPA incorporates flow into the instant TMDL, there will be no way ever to calculate the extent of TSS or other pollutant load that can be delivered to the river from point and non-point sources, and hence no way for users ever finally to comply with load limits.

One example serves to illustrate the problem. The Snyderville Basin sewer district outside of Salt Lake City discharges into East Canyon Creek, Utah. The district's discharge permit is among the most stringent in the state. But as Utah continues to allocate more and more water out of East Canyon Creek upstream of the sewer district, the creek's water quality is worsening as a direct result of decreased flows. Because of the worsening water quality, the state's water quality department intends to require the sewer district to switch from biological to chemical treatment at a cost of $10 million dollars. And water allocation from the Creek continues without consideration of its impacts on water quality *or the economic consequences to the Snyderville Basin sewer district.*

The same is true here. The basin must be closed to more water withdrawals (including exempt wells), and a stable flow regime set for the Yakima Basin (based on the life cycle needs of salmonids as required state water quality standards). If this is not done immediately, not only will water quality standards continue to be violated because of low flows (and will be ever worsening), but it will be impossible for irrigation districts and farmers ever to rest assured that their efforts in improving irrigation practices will

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[16] *A Suspended Sediment and DDT Total Maximum Daily Load Evaluation Report for the Yakima River* (July 1997) 70 (DOE Publication No. 97-321). See also, e.g., pp. 62, 66.

correct the TSS and other pollutant problems in the Yakima River. Indeed, they will in all probability be subject to ever more stringent controls in the future.

Finally, and this is probably the single most important point, if that amount of water that no longer must be diverted from the river to deliver consumptive crop needs is not dedicated to instream flows, and thus is still available to be used to irrigate, the result will be increased agricultural consumption of water in the Yakima basin. Thus, as irrigation districts and farmers make improvements in water deliveries and application, the corresponding efficiencies must be translated into reduced diversions, with the difference being permanently dedicated to instream flows through the Washington Trust Water Rights Program. To miss that opportunity with the implementation of this TMDL is to miss it forever. Those water "savings" must be calculated as irrigation improvements are made, and accounted for in the Trust Water Rights Program, or the savings will be lost.

In conclusion, we object to a TMDL process that addresses only numeric pollutant violations. A plan to implement water conservation measures while not addressing the flow listing in its TMDL makes no sense. Instead of protecting the saved water instream to address the flow listings, the result will be an *increase* in the consumptive use of water. First, the more efficient application of water results in increased water uptake by plants. Second, if not protected for restoring flows, the "saved" water will be used to increase irrigated acreage, *both* results clearly *aggravating* instead of mitigating the instream flow deficit *and* water quality problems. Thus, the failure to include flow in this TMDL is likely further to jeopardize the continued existence of salmonids proposed for listing under the Endangered Species Act, i.e., bull trout and steelhead.

E. General Recommendations for a Flow TMDL

A TMDL to restore instream flows would (1) set seasonal instream flow regimes that fully support the designated uses for which the stream is listed (e.g., salmonid spawning, rearing, migration and harvest); (2) stem new withdrawals or diversions having further flow impacts on the listed reaches until a flow regime supporting designated uses is attained, and more water is available for allocation; (3) implement universal water use metering and reporting; (4) promote the best available conveyance and on-farm application technologies, as well as the best technology for other water uses, through education and low interest loans, grants, and other sources of public funding; and (5) protect the saved water for attainment of the seasonal instream flow regime.

Such a framework can be used to satisfy both flow impaired listings under the Clean Water Act, as well as to satisfy the consultation provisions of Section 7 of the Endangered Species Act, 16 U.S.C. §1536.

Below we discuss the general framework for a flow TMDL that could easily be adopted to the Yakima and other flow-listed stream reaches in the state of Washington.

An appropriate interim flow regime could, given the wealth of data already available on lower Yakima mainstem flow requirements, quickly be established for this reach of the river. See, e.g., the submission of American Rivers to the Department of Ecology in support of the lower Yakima flow listings for 1996, and the Draft Report on Biologically-Basin Flows for the Yakima River Basin, Report to the Secretary of the Interior (SOAC, February 20, 1998).

The remaining flow TMDL framework elements we discuss below are suggested ways to implement the interim flow regime. Protocols for monitoring the interim regime and arriving at a more permanent flow regime for the river are in the SOAC report. See also, e.g., *Instream Flows to Assist the Recovery of Endangered Fishes of the Upper Colorado River Basin* (National Biological Survey, Report 24, July 1994); Castleberry, Cech, Erman, Hankin, Healey, Kondolf, Mangel, Hohr, Moyle, Nielsen, Speed and Williams, *Uncertainty and Instream Flow Standards*, Fisheries, Vol. 21, No. 8, 20-21 (August 1996).

F. Specific Recommendations for the Flow Component of the Lower Yakima TMDL and Its Implementation

1. The TMDL is a Seasonal Flow Regime

A flow TMDL must begin by defining a flow regime for flow-impaired rivers that will assure support of salmonid life cycle needs. Defining an instream flow regime is analogous to establishing a Total Maximum Daily Load (*i.e.*, maximum pollutant load that a water body can assimilate while still meeting water quality standards) for water bodies not meeting water quality standards because of pollution discharges. In other words, for the flow restoration plan, the states will define the flows needed to support uses designated in water quality standards (e.g., salmonid migration, rearing, spawning, and harvest) and then proceed to restore instream flows to that level.

A phased approach to restoring flows is appropriate.[17] First, an interim flow regime will be defined based on existing information. The second phase would include additional studies conducted in cooperation with state fishery agencies and tribes to refine the initial flow regime to assure that the anadromous fish use designation is met.

In Washington, water quality regulations require full support of salmonid migration, rearing, spawning, and harvest in Class AA rivers. Other states designate coldwater biota as the use. EPA describes this regulatory concept of "full support" of cold water biota (including salmon) as water that is able to "support thriving, sustainable populations of species which would normally occur in coldwater absent water

[17] In cases where there is uncertainty, EPA recommends a phased approach which includes implementation of controls based on best professional judgment, monitoring, and a schedule for revisiting the goals of the "TMDL" and the adequacy of controls. U.S. EPA, *Guidance for Water Quality-based Decisions: The TMDL Process*, 15 (April 1991).

column/habitat degradation. . . . Full confirmation would include attainment of applicable numeric criteria and the presence of a biological community representative of what one might expect for that given ecosystem." Thus, instream flows must be at least sufficient to protect and restore salmonid habitat to meet all lifecycle needs and to restore ecosystem functions of the river needed to support aquatic life.

2. Implementation Measures

A. Antidegradation

The states are required under the antidegradation provision of their water quality standards to prevent any further deterioration of water quality.[18] Where a state has determined that existing diversions and withdrawals impair beneficial uses, as many have on their 303(d) lists, permitting any additional withdrawals or diversions would violate the antidegradation provision.

In Washington, the prohibition against depletion of flow-impaired waters is also found in the state's water code. It provides that water may not be appropriated unless the state finds "that there is water available for appropriation . . . and will not impair existing rights or be detrimental to the public welfare."[19] This provision prohibits appropriation from flow-impaired streams because (1) the state's finding on its 303(d) list that water quality standards are not met due to depletion of instream flows demonstrates that there is not water available for additional diversion; and (2) allowing further depletion of stream flows would be contrary to the public interest by exacerbating water quality violations.

In addition, the Water Resources Act's policy requires "that a flow sufficient to support game fish and food fish populations be maintained at all times in the streams of this state."[20] This provision applies equally to groundwater withdrawals and surface water diversions.[21] Consequently, under this policy no additional groundwater or surface water rights may be issued from flow impaired water bodies.

ACTION ITEMS:

(1) All applications for surface diversions from and ground water withdrawals in hydraulic continuity with flow-impaired reaches will be denied, unless and until there is clear evidence that flows have been restored to a level that meets water quality criteria and fully supports instream uses, plus a margin of safety.

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[18] WAC 173-201A.070 ("Existing beneficial uses shall be maintained and protected and no further degradation which would interfere with or become injurious to existing beneficial uses shall be allowed.")
[19] RCW 90.03.290
[20] RCW 75.20.050.
[21] RCW 90.44.060.

(2) States may, however, consider applications for change in place and type of use of existing water rights. For instance, a change application from surface water diversion for agricultural use to ground water domestic uses may be permitted provided that such a transfer does not deplete instream flows or impair water quality.

(3) States should will consider basin closure as a more efficient means to guard against further depletion of instream flows than the current practice of case-by-case denials of permit applications.

B. Metering and reporting:

Water use metering and reporting water use to the water quality authority should be required in all flow-impaired basins. In Washington, it is required under the State's water resources laws and is a critical first step in remedying 303(d) flow-impairment. Metering and reporting will promote voluntary compliance with water rights by assisting growers in measuring and controlling their water use. In addition, it will provide the states with information essential to assuring that water uses comply with water rights and in assembling accurate and complete data about water use for flow restoration efforts.

Washington law authorizes the Department of Ecology to require metering of *all* surface water diversions and ground water withdrawals.[22] And, Ecology *must require* metering of diversions from all waters in which salmonid stocks are rated as depressed or critical as determined by the Washington Department of Fish and Wildlife or where the water being diverted exceeds one cubic foot per second.[23]

ACTION ITEMS:

Develop plan for implementing water use metering and reporting for surface water, groundwater, and exempt wells.

Option 1:

Install measuring devices on all water uses within a specified timeline not to exceed six months, starting first with larger water uses. Define the specifications for water measurement devices for various uses. Appoint a stream patrolperson or water master to assure installation of measurement devices and to record water use. Identify funding sources to be used for installation and maintenance of measuring devices. Funding for the stream patrol person could come from states, other agencies, county government, water users, or any combination of these sources.

Option 2:

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[22] RCW 90.03.360 (surface water metering authorized and required in some circumstances); RCW 90.44.020 (surface water statute, RCW 90.03, applies equally to ground water regulation).
[23] RCW 90.03.360.

Same as option 1, but instead of appointing stream patrolperson, require each water user to take daily water use measurements and report these measurements to the state water quality authority.

Option 3:

Require installation of telemetered devices such that water use measurements would be transmitted to directly to state water quality authority which would maintain and monitor these data.

C. Restore instream flows

1. Assure all water use is legal

The states will evaluate water use information to assure that water uses comply with water rights. Whenever a state finds illegal water use, it will bring immediate enforcement action.

2. Implement water conservation

The prohibition of wasteful water use is a fundamental tenet of the prior appropriation doctrine. This principle has been adopted into Washington's water resources laws. Washington is permitted to appropriate water only for beneficial uses.[24] Beneficial use is limited to reasonable use without waste.[25] And the State has recognized that wasteful use of water is prohibited by law.[26] Thus, Washington has the authority to limit water use to that which is efficient.

In addition, Washington's water quality standards rules require that activities that generate nonpoint sources of pollution shall be conducted so as to comply with water quality standards which includes water withdrawals and diversions.[27] As nonpoint sources, water withdrawals and diversions must employ best management practices to achieve attainment of water quality standards. Best management practices are considered a subset of the "AKART" requirement that all known, available, and reasonable methods of prevention, control, and treatment be employed to remedy water quality standards

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[24] RCW 90.03.010 (Water rights may be acquired "only by appropriation for a beneficial use"); 90.03.290 (Ecology may appropriate only upon finding "that there is water available for appropriation for a beneficial use.")

[25] *See, Ecology v. Grimes*, 121 Wn.2d 459, 471 (1993).

[26] *See, e.g.*, RCW 90.03.005 (Based on the tenet of water law which precludes wasteful practices in the exercise of rights to the use of water, the department of ecology shall reduce the practices the maximum extent practicable . . . ."); RCW 90.44.110 and 90.44.120 (prohibiting the wasteful use of groundwater); RCW 90.54.020(6) and RCW 90.54.180 (Ecology shall encourage public and private entities to implement water conservation.)

[27] WAC 173-201A-160(3).

violations. It follows that in addressing designated use impairment caused by water use, best management practices would dictate that all known, available and reasonable methods of water delivery and application be employed to conserve water and minimize water use.

ACTION ITEMS:

(1) Develop water conservation actions and timeline for implementation.

The states will develop and implement a water conservation plan that will define specific measures (facilities and management practices) to improve the efficiency of water transportation and delivery and that will reduce water use consumption and define a timeline for implementing these measures. The states may draw from the expertise of the growers and other agencies and organizations including the Bureau of Reclamation, the Natural Resources Conservation Service, and the Cooperative Extension Services.

Though more efficient conveyance and on-farm application may not reduce consumptive water use, such efficiency measures may increase flows at critical times and in important places. For each proposed measure, the states will define the estimated cost and the projected volume and extent (river miles) of the increase in stream flows. The plan will consider increased stream flows that could be achieved in the following categories:

-- Water Transportation and Delivery: The state water quality authority will investigate opportunities to improve stream flows in the river through installing the most efficient water delivery and irrigation system (e.g., piped as opposed to open ditches, replacing flood irrigation with sprinkler or drip irrigation, switching to ground water pumping instead of surface diversions.)

-- Irrigation Management Practices: The state water quality authority will investigate practices that assure that the quantity and timing of water application is need-based as determined by soil moisture levels and water requirements of crops. Measures may include system to provide timely information about soil moisture levels, precipitation, evapotranspiration rates for area and crop requirements. The timing/scheduling of water application should be based on this information to minimize water use.

-- Reduced consumptive water use: The state water quality authority will explore opportunities to reduce consumptive water use (e.g., dry year fallowing, switching to crops well suited to the area's meteorological regime, acquisition of water rights).

(2) Use public and private funding sources

The states will identify and secure public funding to the greatest extent possible to aid in implementing conservation measures for the benefit of instream flows. These sources include:

-- Bureau of Reclamation. The Bureau has various funding programs through the Small Reclamation Projects Act of 1956 which provides loans and grants for rehabilitation of on-farm irrigation systems and for fish and wildlife enhancement.

-- U.S. Department of Agriculture. The Department of Agriculture's Natural Resources Conservation Service has various programs that provide funding and financing for conservation planning and implementation including the Conservation Operations Program, the Resource Conservation and Development Program, and the Cooperative River Basin Studies Program, the Watershed Protection and Flood Protection Act, the Agricultural Conservation Program, and the Water Bank Program.[28]

-- Cooperative Extension Service. The Cooperative Extension Service, which is comprised of the Extension Service, state governments, and land-grant universities, assists farmers and others to develop and apply the latest irrigation practices and technology.

In Washington, additional state sources include:

-- Referendum 38 funds (RCW 43.99E and WAC 173-170). Referendum 38 authorizes available funding to public bodies operating agricultural water supply facilities to assist in improving their efficiency of water use.

-- Centennial Clean Water Fund (RCW 70.146 and WAC 173.95). Funding may be used to help local communities meet water quality, health and safety requirements. Grants are available for planning, research, monitoring, and education involving nonpoint, ground water and fresh water projects.

Private funding sources may include nonprofit organizations that specialize in acquiring land and/or water for the protection of natural resources and ecosystems such as the Trust for Public Lands, the Oregon Water Trust, the Nature Conservancy, and the soon-to-be-established Washington Water Trust. To the extent that public funding sources or private non-governmental organization contributions are not sufficient to implement required measures, the growers and other water users will need to share a portion of the cost.

(3) Dedicate saved water to instream flows.

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[28] For a more detailed description of the programs, see *Wash. Dept. of Ecology, Irrigation and Water Use Efficiency Demonstration Project*, Appendix B, July 1992.

All of the net water savings achieved under the water quality flow restoration framework water will be dedicated to instream use through state law. In Washington, this can be accomplished through the trust water rights program in accordance with RCW 90.38.

The trust water rights program guidelines establish criteria for determining what proportion of saved water should be dedicated to instream flows. A flow restoration TMDL should follow the same principles. Namely, instream flow improvements achieved through reductions in consumptive water use will be protected instream from the point of diversion to the mouth of the river in question. In addition, instream flow gains achieved through increased efficiency should be protected in the affected reach (from the point of diversion to the point where the flows would have returned to the river through surface or subsurface flows.) *See, e.g., WA Trust Water Rights Guidelines* for discussion of technically how this may be accomplished.

3. Acquire water

Where funds are available, opportunities to acquire water from willing sellers should be pursued to the greatest extent possible. Public and private funding sources should be identified. Potential sources will include those listed above under water conservation.

Water acquired by state or federal agencies will be permanently dedicated to instream rights. Water acquired that would have otherwise been consumptively used should be protected instream from the point of diversion to the mouth of the river. The portion of the acquired water right that would have otherwise returned to the river through return flows (surface and subsurface), should be protected in the affected reach (from the point of diversion to the point where the flows return to the River). *See, e.g., WA Trust Water Rights Guidelines.*

4. Condition existing water rights

To the extent that flows cannot be restored by implementing the strategies discussed above, the states must impose conditions on existing rights that limit water use so that flows are restored to levels sufficient to support designated uses. Such an adjustment would be the flow analogy to rewriting NPDES permits to meet the load allocation defined in the Total Maximum Daily Load.

State authority to take this action derives from the Clean Water Act. The United States Supreme Court has held that the states' authority to protect water quality is not limited by existing water rights. It explained that states are not limited in the "controls that may be imposed on users who have obtained, pursuant to state law, a water allocation."[29] The Court noted that Congress in enacting the Clean Water Act explained

[29] *Jefferson County PUD No. 1 v. Washington Department of Ecology*, 114 S.Ct. 1900, 1915 (1994)

"[t]he requirements [of the Act] may incidentally affect individual water rights."[30] As the Court clearly stated, the state may limit the use of existing rights holders if necessary to meet water quality standards.

The states' authority to take administrative action to limit water use to protect the fishery is also found in the public trust doctrine. The doctrine provides a basis for state action in protecting the trust resources of navigation, fisheries, water quality, and recreation, and it is not limited by a prior appropriators' right to water.[31] In other words, under the public trust doctrine the state may reallocate water to protect instream flows for the fishery or other public trust resources.

ACTION ITEM:

(1) Quantify instream flow shortfall, that is, the difference between instream flows that can be restored through acquisition of water, water conservation and other measures and the flows required to fully support designated uses as defined above.

(2) Allocate this shortfall equitably among existing water users under a schedule phased in over time.

3. Assuring Implementation

Each measure in the water quality flow restoration plan should be specific, assigned to accountable parties, and backed up by a mechanism to aid enforcement, such as an order, consent decree, or conditioned funding.[32] The states will define a time frame for implementation of controls and attainment of water quality standards; upon a failure to implement measures or meet water quality goals, enforcement action will follow.

The states' implementation and enforcement authority is derived from the Clean Water Act and the state water pollution control statute. Under the Clean Water Act Section 505, the both citizens and the state may enforce water quality standards limitations. *U.S. Dept. of Energy v. Ohio*, 112 S.Ct 1627 (State considered "citizen" CWA § 505 and as such may enforce provisions of the CWA). In addition, states such as Washington have abundant authority under their water pollution control act, RCW 90.48, to set water quality standards,[33] prohibit pollution of state waters,[34] to bring an

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[30] *Id.*
[31] Ralph W. Johnson, *Water Pollution and the Public Trust Doctrine*, 19 Environmental Law 485 (1989).
[32] *EPA Guidance for Water Quality-Based Decision: The TMDL Process*, April 1991, EPA 440/4-91-001 at 22.
[33] 90.48.260
[34] 90.48.080

enforcement action to carry out the statute's provisions,[35] and to enforce the water quality program through penalties, emergency powers, and criminal sanctions.[36]

The implementation measures required in the flow restoration plan are also enforceable by EPA. "Whenever the [EPA] Administrator finds that any person is in violation of section 1311, 1312, 1316, 1317, 1318, 1328, 1345, he [or she] shall issue an order requiring such person to comply with such section or requirement."[37] Section 1313 (CWA § 303) which sets forth water quality standards and the requirement to set TMDLs is included by reference whenever 1311 (CWA § 301) is listed.[38]

And given the intersection between the Clean Water Act and the Endangered Species Act for this TMDL, and the conference and/or consultation requirements of the latter federal statute, a flow component to this TMDL is not only a practical, but also a legal necessity.

4. Public Participation

Every TMDL includes public notice and consultation at important decision points. The public participation plan should reflect a sincere effort to bring growers and other water users, agencies, and other interested parties together to develop the most innovative, expedient, and equitable solutions to achieve fully water quality standards in flow-limited basin. Through collaboration, the flow restoration plan has the potential to restore fish habitat in rivers throughout the Northwest. And, with consultation with the National Marine Fisheries Service incorporated into the TMDL process in ESA basins, the flow restoration plan may satisfy at least the water component of any ESA recovery plan. For the lower Yakima, DOE and NMFS already have the product of a number of flow recommendations made by stakeholders' groups, referenced above (including IFIMs on which the listing was based by Parametrix and by the U.S. Fish & Wildlife Service); See also *A 20/20 Vision For a Viable Future of the Water Resource of the Yakima River Basin* (Draft of October 1997)(Yakima River Watershed Council)(recommending a 700 cfs minimum flow for the lower river).

5. Monitoring Plan

Any monitoring plan must (1) assess implementation of control measures, (2) require measurement and reporting of water use, (3) measure instream flows in the river channel, and (4) assess the adequacy of flows to restore stream health to a level that provides full support for salmonid uses by developing parameters to measure response and health of the river, define timeline to evaluate these parameters and to revise flow goal and measures accordingly.

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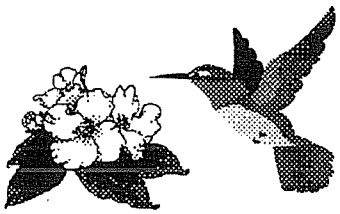
[35] 90.48.037
[36] 90.48.260
[37] 33 U.S.C. §1319(3).
[38] *See Jefferson County PUD No. 1 v. Dept. of Ecology*, 114 S.Ct 1900 (1994) at 1909.

G. Conclusion

We appreciate having the opportunity to comment on this proposed TMDL, and request that you incorporate a flow component in it before seeking approval from EPA.

Sincerely,

Katherine P. Ransel



The Yakima Valley Audubon Society is people dedicated to the enjoyment and preservation of the natural world. Through birding, education and conservation activities in our community, we raise awareness and promote the cause of global environmental protection.

April 9, 1998

Chris Coffin
Lower Yakima River TMDL Coordinator
Washington Department of Ecology Central Regional Office
15 West Yakima Avenue, Suite 200
Yakima, WA 98902

RE: Proposed TMDL for the Lower Yakima River

Dear Mr. Coffin,

Yakima Valley Audubon Society (YVAS) is one of 26 Washington Chapters of the National Audubon Society whose membership equals 550,000. YVAS, representing over 400 Yakima watershed families dedicated to the enjoyment and preservation of the natural work, appreciates the opportunity to submit some brief comments on Washington Department of Ecology's (Ecology) final draft of A Suspended Sediment and DDT Total Maximum Daily Load Evaluation Report for the Yakima River.

While the TMDL's for suspended sediment and DDT are quite warranted in the lower Yakima River, and we endorse Ecology's TMDL strategies for eradicating these pollutants from the Yakima River, we also believe a TMDL for flow is necessary. In addition to suspended sediment, DDT and other parameters, the Yakima River is also listed on the 1998 proposed 303(d) list as an impaired water body due to flow impairments. Flow must be addressed in the Lower Yakima River in order to achieve an ecologically balance river system in the lower Yakima River, and provide the opportunity for native salmonid stock recovery. Not only is surface water flow of importance to provide adequate and quality water for migrating salmonids, but flow from the hyporheic zone also provides critically important cool water temperatures so important in the high desert country of the Columbia plateau during summer migration periods. There is vast information available about lower Yakima River flows during irrigation season and the correlation low flows have on the poor water quality of the Yakima River.

Currently, as you know, there are many federal and state government programs proposed to help increase flows for anadromous fish restoration by purchasing water rights at a proposed million dollar cost. Ironically, Ecology still accepts applications for water rights permits. So, while on one side some increased flow might be

YAKIMA VALLEY AUDUBON SOCIETY
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obtained through instream flow purchasing "rights" programs, on the other, there is nothing being done to stop diverting or extracting (wells) additional flow by granting more water right permits. The result of this cycle will only mean the Yakima River will remain on the 303(d) list as an impaired water body even after all efforts to improve suspended sediment, DDT, and other parameters have been implemented and addressed.

The TMDL Federal Advisory Committee (FACA) for EPA has recently been discussing outstanding issues, including instream flows in TMDL development, for recommendations to EPA's TMDL's program. We encourage Ecology to note that this advisory committee, in their March 2, 1998 draft committee report, submitted the following: " . . . water quality standards nonattainment resulting from flow modification is within the scope of the Clean Water Act, important to water quality standards attainment, and therefore very relevant to the TMDL program." The committee goes on to say: "Water rights are generally governed by State law and it is beyond the Committee's charge...to review these laws or to suggest changes in water rights laws or procedures. However, the Committee felt that where impairments are due to flow alterations, either alone or in combination with other sources of impairment, they must be addressed by the TMDL program. "

While I am neither a hydrologist, water rights expert or scientist, basic logic tells me that a flow TMDL is actually the first logical step to take in working towards attainment of Clean Water Act requirements for the Yakima River. We know a flow TMDL needs to be set for the Yakima River that meets salmonid life-cycle needs and request Ecology take on this task and incorporate our request into what they submit to EPA for approval.

Thank you for providing Yakima Valley Audubon Society the opportunity to provide comments on Ecology's proposed TMDL.

Sincerely,

Brenda McMurray

Brenda McMurray
President
Yakima Valley Audubon Society

Section 7 - Responsiveness Summary

Section 7 - Responsiveness Summary

LOWER YAKIMA RIVER SUSPENDED SEDIMENT TMDL

Responsiveness Summary

Comments from the Roza-Sunnyside Joint Board of Control:

#1. Page 77, 5 year (2002), first bullet - We suggest the following alternate wording: "Yakima River main stem will comply with the turbidity target of not more than a 5 NTU increase for the 90th percentile between the confluence of the Yakima and Naches Rivers (RM 116.3) and the Kiona gage at Benton City (RM 30)." This addition is consistent with your discussion of the turbidity criterion on pages 65 and 66 of the draft report. We also note your discussion is with reference to the "irrigation season". Is it intended a different criterion applies for the non-irrigation season?

Response: Agree to change wording. Also, it is true, Ecology does not intend to apply the TMDL targets and criteria outside of the irrigation season when it submits the TMDL to the USEPA.

#2. Page 78, 5 year (2002), second bullet - The Board has no specific recommendation to replace the percentile value, now set at 90. However, we suggest that when we analyze the data for 2002, we may wish to amend this value and/or this method of setting a target, such as "the discharge weighted mean for ____ percentile of the time shall not exceed 25 NTU".

Response: We can add a statement to the amended first bullet of the five year schedule: "Use of the 90th percentile frequency in the turbidity compliance target for the main stem will be evaluated."

#3. Page 78, 5 year (2002), third bullet - The Board suggest adding to the current wording to read as follows: "The efficacy of using TSS load targets for tributaries and drains where the 25 NTU target is not representative of total load reductions will be evaluated, such as is likely to occur where there are significant reductions in flow due to changing irrigation methods." It is the goal of the Board to minimize runoff from each farm by encouraging the use of drip and sprinkler irrigation methods and to consider reuse of return flow. The use of reregulating reservoirs along the main canals will also reduce the use of these drainage ways to return operational spill to the Yakima River. These efforts will likely result in much reduced flows from drains into the Yakima River. These efforts have two very significant benefits to the TMDL targets and aquatic organisms in the basin.

a) Less water is diverted for irrigation, and

b) With less return flow the load of TSS and DDT will be significantly reduced. As we understand the Clean Water Act and the TMDL process, if the loads of TSS or DDT were met and the turbidity levels were exceeded, this would be preferred to meeting the turbidity target but exceeding the TSS or DDT load target.

Response: We should keep this a general statement in the technical report, and not get tied to specific management approaches. The management approaches can be discussed in the implementation strategy.

#4. Page 78, 10 years (2007), first bullet - The Board wonders why this target is desirable if concentrations are being met where the water enters the Yakima River main stem.

a) The enforcement of the 25 NTU at all points within a sub-basin removes certain options of encouraging water reuse available to the Board and its member districts. It would seem that if the system can meet its goal, the boards should be allowed as much management flexibility as possible.

Response: Ecology, USEPA and the Yakama Nation decided that the TMDL evaluation would not "second guess" fish habitat issues in the Yakima basin in terms of which "drains" or "creeks" qualified as habitat, or how far up a stream network habitat should be protected. The Yakima Enhancement Project, endangered species determinations, and other fish habitat protection legislation and agreements should guide local entities and Ecology where aquatic habitat and agricultural uses interface.

#5. Page 78, 10 years (2007), second bullet - The Board agrees that the 7 mg/L TSS target needs to be evaluated. This is especially true because background TSS measured values exceeded the proposed targets for the Kiona gage when 1995 conditions were 9 and 14 NTU at background and Kiona respectively (18 and 30 mg/L TSS).

Response: Comment noted.

#6. The monitoring section of the report, pages 79 and 80, is well done. What is missing is a specific, recommended program and implementation timeline. If other agencies collecting water-quality data are expected to work with Ecology in meeting the stated TMDL targets, they need to have, at a minimum, the turbidity and TSS values associated with background and the Kiona gage now. Having these data would allow Ecology and agencies assessing their data to determine if incremental steps are likely to result in meeting the stated targets. Alternatively, if data is not collected until 2002 and assessed in 2003, it will be 2004 (half way to 2007) before we find out how we are doing.

Response: Under Ecology's 5-year Water Quality Management Approach, monitoring by Ecology would be most intense in the two years prior to the target compliance date (e.g., 2000 and 2001 for the year 2002 targets). Ecology's Central Regional Office (CRO) has been requesting monitoring support in the lower Yakima River basin from Ecology's Environmental Investigations and Laboratory Services (EILS) Program since the 1995 water year. In addition, the CRO has been involved in coordinating monitoring with other agencies in the lower Yakima, and they have been involving EILS in the process as well. It is anticipated that as Ecology

moves further into the implementation and monitoring phases of this TMDL, coordination of activities between the involved entities will increase. This will include the sharing of data in as close to "real time" as possible. The logistics of the gathering and dissemination of data have been and continue to be discussed among agencies and stakeholders within the Yakima Basin.

#1. (Page 3) The title of your report suggests the entire Yakima River system is addressed. The text is limited to the river basin below the confluence of the Yakima and Naches Rivers. The report title should be revised to conform with Ecology's intent with respect to basin planning (see further comments below regarding Ecology – EPA Memorandum of Agreement).

Response: The title should be changed to: "...for the Lower Yakima River"

#2. The relationships of the recommended target TMDLs to the states' overall water quality management program for the lower Yakima River Basin should be described in sufficient detail to enable implementing agencies to understand the "big picture". It is recognized that the Yakima TMDL studies preceded the October 29, 1997 Memorandum of Agreement between Ecology and EPA regarding implementation of Section 303(d)'of the Federal Clean Water Act. However, this Agreement, which is now operative, sets forth a uniform, statewide planning process to be followed in developing water quality management plans. In general terms this process appears to be:

- *A watershed approach to water quality management is to be followed; the state is divided into 23 Water Quality Management Areas (WQMA); the Upper and Lower Yakima WQMAs represent two of the 23 geographical areas.*
- *Point and nonpoint source problems and needs are to be addressed by WQMA on a cyclical, sequential basis; developing and implementing TMDLs is only one aspect of a WQMA program.*
- *A five step/five year program which includes the following activities is to be conducted in each WQMA: Year 1 – Scoping; Year 2 and 3 – Data Collection and Analysis; Year 4 – Develop WQMA Plan of Action, and Year 5 – Implementation.*
- *The Agreement schedule indicates the products of Year 4 and Year 5 activities are to be submitted to EPA for approval in Year 5. Provision is made that TMDLs may be completed on a basis other than a 5-Year watershed cycle.*
- *The final WQMA Plan of Action must include (1) a TMDL strategy, (2) a waste discharge permit strategy, and (3) a nonpoint source strategy.*
- *In Year 6, Ecology is to initiate a repeat of the 5-Year cycle.*

The draft lower Yakima River TMDL report was issued July 1997 and prior to the Ecology – EPA Agreement. Discussion beginning on page 77 (TMDL Priorities and Schedule) summarizes 5, 10, 15 and 20-year targets/goals. The final TMDL report should clarify whether a WQMA plan is being prepared for the lower Yakima River basin in response to the Ecology – EPA Agreement and, if so, the timing for development of the Plan of Action, EPA approval and the implementation schedule for TMDL activities. The

Board has adopted policies and initiated activities on the assumption the TMDL targets will be adopted as Ecology – EPA water quality criteria within the current year (1998).

Response: Your assumption is correct. The Lower Yakima River TMDL process was well under way before the MOA with USEPA was negotiated. Project funding and resources had already been allocated and directed towards the preparation of this submittal. In order to maintain continuity in the process and a consistency of efforts already begun in this high priority basin, a decision was made to proceed with this TMDL on its original time line.

Planning for a phased start up tying TMDL activity to the five year WQMA cycle, Endangered Species Act salmon recovery planning and other local watershed planning efforts is ongoing. As of this writing, while the EPA/Ecology MOA is agreed upon by the involved parties, funding for the outlined TMDL activities has not been approved by the WA State Legislature, leaving the implementation and fate of the agreement in limbo.

USEPA Region X Comments:

#1. It was noted in the study that the turbidity standard in the lower Yakima River had to be met at all points in the river, not just at Kiona. However, project modeling showed that under certain simulations, the 25 NTU at the mouth of the tributaries would not achieve the 5 NTU over background. Would you please clarify what may be an inconsistency in the study?

Response: The model simulations (Figure 24) of the river's failure to meet the turbidity target are examples of 10^{th} percentile extreme conditions that may be encountered. The target is to be met for the 90^{th} percentile background TSS concentration. All parameters were set at or above the 90^{th} percentile target values (e.g. 1995 background TSS, discharges from the major drains, and assumptions about sedimentation rates). The point of the exercise was to show that both high flow and low flow extreme conditions could occur, and additional measures of protection will be helpful to ensure compliance with the targets (e.g. Yakama Nation participation, Moxee Drain compliance, ungaged and unknown source identification).

#2. The TSS modeling (pg. 70) uses the 90^{th} percentile TSS concentrations for the two drains that were below the 56 mg/L target. The fourth sentence in the second paragraph on page 71 states that these drains will be expected to remain below the target. This is consistent with both the modeling and the State's anti-degradation policy. However, the

sentence is buried in the document and this expectation is not clearly displayed elsewhere. To clearly define the levels that cannot be exceeded, we recommend that the numerical targets for these drains be clearly specified in the final TMDL submittal.

Response: We will change Table 14 to reflect the TSS limits as being less than 56 mg/L for Wide Hollow Creek, Ahtanum Creek, and DID #7.

#3. A "margin of safety" (MOS) is a required element of any TMDL. Ecology implicitly applied MOSs at various points in the study, but does not clearly define which MOSs were used and when they were applied. EPA requests that Ecology add a paragraph to the study or the accompanying TMDL fact sheet that defines how all of the MOSs were applied.

Response: A lower Yakima TMDL assessment complied with the margin of safety requirement in the following ways:

- The State of Washington turbidity criterion was applied to the entire lower Yakima irrigation project rather than drain by drain.
- The proposed targets of 56 mg/L TSS and 25 NTU are more protective than USEPA guidance of 100 mg/L TSS, and are based on harm to local sensitive species of concern.
- The SMPTOX3 model simulations of contaminant loading (both of TSS and DDT) assume the 90th percentile flow and concentration which are conservative assumptions since no relationship was found between flow and concentration (for either TSS or DDT). Upstream concentrations of DDT and TSS in the DDT model calibration were based on data collected 20 miles upstream at the Yakima River above Ahtanum Creek. Two large diversion structures occur within those 20 miles that could reduce DDT and TSS concentrations.

#4. FIRST PARAGRAPH. In the second paragraph on page 3 of the Introduction, Ecology indicates that "Implementation of the TMDL will remove turbidity, DDT, DDE and DDD from the list of contaminants impairing water quality in the lower Yakima River and several of its tributaries." (Note: total DDT= t-DDT = DDT + DDE + DDD). Table 2 on page 10 identifies the specific 1996 303(d) list of contaminants for each water body in the lower Yakima Basin. With the exception of t-DDT for the Yakima River, EPA agrees that the TMDL will address TSS/turbidity and t-DDT for aquatic life as defined in Table 2. Because the modeled simulations show that the chronic aquatic toxicity criterion might not be attained in the Yakima River at the proposed reduced TSS concentration loadings from the tributaries and return drains (see page 74), EPA's position is that the Yakima River remain listed for t-DDT for aquatic life. If future monitoring and subsequent model simulations show that control measures will result in meeting the t-DDT criterion for aquatic life in the mainstem Yakima River, it need not be listed for this parameter and beneficial uses.

Response: This model simulation may need further explanation. The SMPTOX3 model simulation shown in Figure 26 on page 74 indicates a loading of

4+ ng/L t-DDT in the mainstem Yakima at "East Toppenish Drain". This simulation was used to demonstrate that reducing DDT loading to meet the 1 ng/L chronic toxic aquatic criteria in the tributaries of the lower Yakima listed in the diagram would not cause an increase of DDT in the mainstem. It is fairly obvious in the simulation by the line representing "7 mg/L TSS Targets on All Tribs." that DDT concentrations would not increase as compliant tributary loads entered the river. If mainstem background were set at 1 ng/L DDT or less in Figure 26, the simulation would show that the river would meet the criterion under the TMDL target. This simulation was not intended to be indicative of background levels of DDT entering the lower Yakima TMDL project area, as perhaps may be incorrectly inferred from the diagram. The mainstem DDT loading of 4+ ng/L indicated at East Toppenish Drain is not representative of the background concentrations in the mainstem above the TMDL project area.

The mainstem monitoring site and sampling event from which the concentration of 4+ ng/L was derived is located on the Yakima River, below the confluence of Moxee Drain and Wide Hollow Creek, both sources of DDT delivery to the Yakima River. This sampling event, conducted by Joseph Rinella and Stuart McKenzie of the USGS in June of 1989, was used in the simulation because it is part of the most complete data set available for the SMPTOX3 model calibration. In personal conversations with Joseph Rinella and Stuart McKenzie (July and August, 1998) and as included in the USGS Open-File Report 92-644, "SURFACE-WATER-QUALITY ASSESSMENT OF THE YAKIMA RIVER BASIN, WASHINGTON: PESTICIDE AND OTHER TRACE-ORGANIC-COMPOUND DATA FOR WATER, SEDIMENT, SOIL, AND AQUATIC BIOTA, 1987-91" (included in this submittal document), it was indicated that during the monitoring period of late June 1989, Moxee Drain was showing high levels of DDT and typically high loads of suspended sediment. As demonstrated in the Evaluation Report and supported by Rinella and McKenzie, the occurrence of DDT in the waters of the Yakima has a strong correlation with agricultural sediments held in suspension in the water column. It is the opinion of Rinella and McKenzie that the exceedance of chronic toxic aquatic criteria (1 ng/L) in the mainstem for DDT at this site was probably the result of suspended sediment and the associated DDT coming primarily from Moxee Drain.

This is further supported by monitoring data from the mainstem Yakima and the Naches River above the project area during the same period of late June 1989. As also indicated in the USGS Open–File Report 92-644, monitoring sites upstream from the project area, i.e., the Yakima River at Cle Elum, the Yakima River at Umtanum Creek and the Naches River near north Yakima, did not show evidence of exceeding chronic toxic aquatic criteria for DDT.

Moxee Drain and Wide Hollow Creek are within the TMDL project area and are being addressed in the TMDL implementation plan. Projects are already underway to significantly reduce irrigation runoff and erosion in the Moxee drainage. It is fully expected that as the sediment contribution from Moxee Drain is reduced so will DDT levels in the mainstem be reduced.

Two reaches upstream of the TMDL project area on the mainstem Yakima River are listed on the 1996 303(d) list for DDT concentrations in fish tissue. The presence of the pesticide has been documented in the water column, however, as mentioned earlier, water column and suspended sediment loading has not been shown to exceed chronic toxic aquatic criteria. Ecology is continuing to work on the issue of background DDT concentrations with the scheduling of a TMDL effort in the upper Yakima River basin, specifically addressing sediment and DDT. An assessment is scheduled to begin in July of 1998. Similar to the lower Yakima project, implementation of on-farm improvements and coordination with the local agricultural community has already begun in the upper Yakima Basin. Work performed in the upper basin should help alleviate transport downstream if it is occurring.

#4, SECOND PARAGRAPH. It is EPA's position that the Yakima River segments and applicable tributaries remain on the State's 303(d) list for t-DDT for human health protection. Although this TMDL is the first step in addressing t-DDT for all beneficial uses, too many uncertainties exist a this point in time for the assessment to conclude that the t-DDT criterion can be achieved.

Response: We concur with EPA. We are submitting this TMDL to address chronic aquatic toxicity criterion for DDT and metabolites, not human health criteria. However, Ecology believes that the implementation strategy and schedule in this TMDL will allow us to free the lower Yakima River from all but background sources of DDT within the next fifteen years. Only after DDT from irrigated agriculture is significantly controlled can the complexity of tissue burdens and human health assessments of DDT be reasonably addressed. Ecology is advocating a legacy pollutant approach with scheduled monitoring and assessments. Steady and reasonable progress implementing the TMDL will lead to attainment of human health protection within 20 years.

#5. EPA recommends that Ecology summarize in its TMDL fact sheet its reasons for using TSS as a surrogate measure for turbidity and t-DDT. Ecology should also provide a statement explaining the following: (1) how the diminutive contributions from point sources; (i.e., the waste load allocations) will be maintained at the current discharge concentrations, (2) that the load allocations for the nonpoint sources are applied to all pollutant-contributing agriculture sources within each tributary, and (3) that load allocations are set to achieve the turbidity targets at the mouth of each tributary.

Response: Ecology is using turbidity criteria as a surrogate to control TSS. Ecology (following initial work by USGS in the basin) also demonstrated a strong link between TSS and DDT in intensively irrigated areas of the lower Yakima basin. TSS is the focus of the TMDL because it better describes suspended sediment from eroded soils, the real pollutant Ecology is trying to control.

(1) The water balance and TSS balance demonstrated that point sources were not an issue. This is a nonpoint source TMDL; no waste load allocations will be necessary.
(2) Load allocations will be made to sub-basins, not individual agricultural sources.
(3) The load allocation compliance points are clearly stated in the report on pages 77 and 78.

#6. Based on the October 29, 1997, MOA between the Ecology and EPA regarding "The Implementation of 303(d) of the Federal Clean Water Act" a "Summary Implementation Plan" must be included as part of the TMDL submittal package. EPA recommends that the summary implementation and subsequent implementation efforts focus on those tributaries/return drains contributing the greatest pollutant loading; (i.e., @ Granger and Moxee drains). EPA also suggests that the summary implementation plan include data sources which indicate that the pollution reduction targets will be achieved using conventional soil and water conservation practices for irrigated agriculture. See page 67.

Response: Comment noted. See the Summary Implementation Plan.

#7. Throughout the study, it appears that Ecology uses the terms TSS, total suspended sediments, suspended sediments and total suspended solids interchangeably. Please clarify if this were Ecology's intention. If not, please define the differences in the terms.

Response: Yes, for the purposes of this report, the terms are synonymous.

Response to the comments of Marco Yolo:

The concerns you bring up in your comments will be addressed by the implementation of this TMDL. Recommended "best management practices" will include fencing livestock from waterways, maintaining buffer zones along waterways and minimizing the impact of stock watering on riparian areas.

Response to the comments of American Rivers:

The lower Yakima River is listed on the 303(d) for inadequate instream flow. Pesticides, turbidity and suspended sediment in the lower Yakima River, also of major concern, are the specific targets of this TMDL. The primary sources of these pollutants and their effect on the beneficial uses in the waterbodies of the lower Yakima Basin are well documented and relatively easy to demonstrate. These are pollutants that can be controlled through proper irrigation water management without the integration of a specific flow regime. Cooperative efforts of Conservation Districts, NRCS, irrigation districts, grower groups and individual irrigators are already implementing many of the practices necessary to control these pollutants. Also, sediment load allocations for the lower Yakima River, as described in the "Evaluation Report", are the result of monitoring and data analysis conducted over what was considered a low water and an average water year. This study took into consideration a wide variability in flow regime.

Water conservation, measurement of water diversions and deliveries, illegal diversion of water, biologically based flow regimes and confirmation or denial of water right claims are all issues being addressed in one or more venues other than this TMDL project. Further, it is projected that impaired flow along with temperature issues in the Yakima Basin will be given high priority and addressed as an important component in responding to Endangered Species Act listings in this area. Ecology believes that addressing impairment due to low flow is not a necessary component in this TMDL.

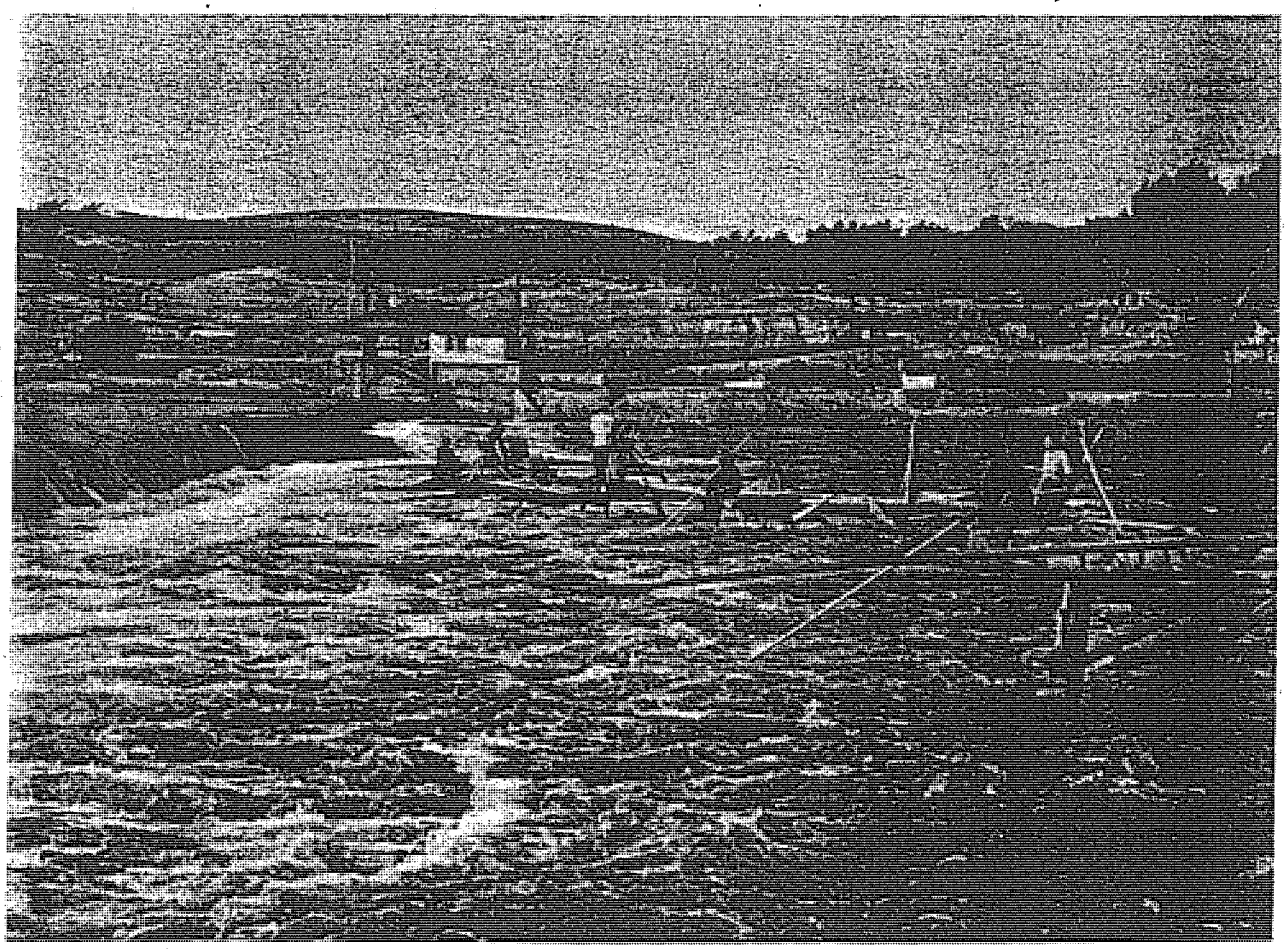
Response to the comments of The Yakima Valley Audubon Society:

The response to your comments is much the same as our preceding response to the American Rivers comments. Ecology agrees that flow issues in the lower Yakima River need to be addressed, however, we do not believe that the success of implementing this proposed Suspended Sediment TMDL necessitates the integration of a TMDL on flow.

Appendix 1

Appendix 1

MOXEE WATERSHED
WATERSHED PLAN AND
ENVIRONMENTAL ASSESSMENT
FOR MOXEE WATERSHED YAKIMA COUNTY, WASHINGTON



SEPTEMBER 1994

PREPARED BY: NORTH YAKIMA CONSERVATION DISTRICT
AND SOIL CONSERVATION SERVICE, USDA

FACT SHEET

Project Information

PROJECT NAME Moxee Watershed Plan and Environmental Assessment

Total $ $ 5,132,500

Location of Project Yakima County, Washington
5th Congressional District

Authorization Public Law 83-566, 68 Stat. 666 as amended (16 U.S.C.1001 et. seq.)1954

Background

The goal of the Moxee Watershed Project is to increase the percentage of Fall Chinook Salmon egg-to-fry survival from 27 percent to 57 percent for the 21.2 mile Parker Reach of the Yakima River. The project goal will be achieved by reducing sediment discharge from the Moxee Drain by 4,100 tons per year. This is a 70 percent reduction in sediment discharge to the Yakima River. This reduction in sediment delivery will be achieved by converting 4,550 acres of furrow irrigated cropland, primarily hops, to trickle irrigation systems. Irrigation water management, as well as nutrient and pesticide management, will also be achieved for these converted acres. On-farm irrigation efficiencies will be improved by 40 percent on acres converted from furrow to trickle.

Economic and financial data

Costs

Project Purposes	Total Traditional cost share		Annual O&M
	Non-Fed	Federal	Non-Fed
Watershed Protection	35	65	
Total Costs	$1,750,000	$3,382,500	$5,000

Benefits

Average annual benefits on-site	Number of direct beneficiaries on-site	off-site
$1,227,500	44	21.2 miles of habitat

Benefit-to-Cost Ratio

2.5:1 @ 8% (authorized rate)
2.5:1 @ 8% (current rate)

Budget Data

Funding Schedule	1st	2nd	3rd	4th	5th	6th	7th
Federal Funds	$1,738,750	$893,750	$532,750	$92,250	$82,500	$21,250	$21,500
Non-Federal Funds	$995,800	$464,200	$108,500	$87,500	$81,000	$6,500	$6,500

Period of Analysis and Project Life

25 years

Environmental Problems

The project will double the egg-to-fry survival of Fall Chinook Salmon in the 21.2 mile Parker Reach of the Yakima River.

Six acres of the 836 acres of wetlands will be lost with project implementation.

The loss will be mitigated by the sponsors providing $17,500 to the State of Washington Fish and Wildlife Department, habitat restoration and land acquisition program.

On-farm irrigation efficiency will increase 40 percent on acres converted to trickle irrigation systems.

Other Significant or Controversial Issues

The Yakama Indian Nation strongly supports the project. The Parker Reach is a historical fishing site.

Evidence of Unusual Congressional or Local Interest

Representative Inslee has indicated support for the project. Local producers are ready to sign 28 contracts covering 1,879 acres. These contracts would commit 1.2 million dollars of PL83-566 funds immediately.

Moxee Watershed Plan / Environmental Assessment

September, 1994

Yakima County, Washington

Sponsors and Responsible Agencies:

North Yakima Conservation District

Soil Conservation Service, USDA

Cooperating Entities:

Environmental Protection Agency (EPA)

Washington State Department of Ecology (DOE)

Washington State Conservation Commission (CC)

Agricultural Stabilization and Conservation Service, USDA (ASCS)

Yakama Indian Nation (YIN)

Washington State Department of Fish and Wildlife

United States Geological Survey (USGS)

U.S. Dept. of the Interior, Bureau of Reclamation (BOR)

Bonneville Power Administration (BPA)

Yakima County Commissioners

Washington State University, Cooperative Extension Service

Yakima Valley Conference of Governments

Washington Hop Growers

Washington Hop Commission

Moxee Irrigation District (MID)

Roza Irrigation District (RID)

Moxee Watershed Agricultural Producers

Contact person: North Yakima Conservation District
Michael Tobin 1606 Perry, Suite F
Yakima, WA 98902

PROJECT GOAL

The goal of the Moxee Watershed Project is to increase the percentage of Fall Chinook Salmon egg-to-fry survival from 27 percent to 57 percent for the 21.2 mile Parker Reach of the Yakima River.

PROJECT ABSTRACT

The project goal will be achieved by reducing sediment discharge from the Moxee Drain by 4,100 tons per year. This is a 70 percent reduction in sediment discharge to the Yakima River. Currently, the equivalent of 10 dump truck loads of sediment is being deposited onto the spawning gravel of the Parker Reach each day during the irrigation season. With project, the equivalent number of loads will be reduced to 3 per day. This reduction in sediment delivery will be achieved by converting 4,550 acres of furrow irrigated cropland, primarily hops, to trickle irrigation systems. Irrigation water management, as well as nutrient and pesticide management, will also be achieved for these converted acreage.

The project will improve salmon reproduction in 21.2 miles of the Yakima River by doubling the Fall Chinook egg-to-fry survival. Erosion, sediment, and tailwater will be eliminated from the 4,550 acres which will be converted to trickle irrigation systems. Water quality in the Parker Reach of the Yakima River will be improved by reducing the amount of nutrients and pesticides carried by sediment. The health and welfare of the homeless, migrant laborers, and Native Americans camping along the river utilizing the water and resident fish will be improved. On farm irrigation efficiencies will be improved by 40 percent on acres converted from furrow to trickle irrigation systems. On farm inputs and operating cost will be reduced with project implementation. Total project cost is $5,132,500. Total PL83-566 cost is $3,382,500.

STATEMENT OF NON DISCRIMINATION

WATERSHED AGREEMENT
between the
NORTH YAKIMA CONSERVATION DISTRICT
(referred to herein as sponsors)
State of Washington
and the

Soil Conservation Service
United States Department of Agriculture
(Referred to herein as SCS)

Whereas, application has heretofore been made to the Secretary of Agriculture by the sponsors for assistance in preparing a plan for works of improvement for the Moxee Watershed, State of Washington, under the authority of the Watershed Protection and Flood Prevention Act (16 U.S.C. 1001-1008); and

Whereas, the responsibility for administration of the Watershed Protection and Flood Prevention Act, as amended, has been assigned by the Secretary of Agriculture to SCS; and

Whereas, there has been developed through the cooperative efforts of the sponsors and SCS a plan for works of improvement for the Moxee Watershed, State of Washington, hereinafter referred to as the Watershed Plan/Environmental Assessment, which plan is annexed to and made a part of this agreement;

Now therefore, in view of the foregoing considerations, the Secretary of Agriculture, through SCS, and the sponsors hereby agree on this plan and that the works of improvement for this project will be installed, operated, and maintained in accordance with the terms, conditions, and stipulations provided for in this watershed plan and including the following:

1. Cost-sharing rate for the establishment of enduring land treatment practices is 65 percent of the average cost of installing the enduring practices in the selected plan for the unit. The estimated total financial assistance cost for enduring practices is $4,567,500.

2. The SCS will assist the sponsors in providing technical assistance to land owners or operators to plan and install land treatment practices shown in the plan. Percentages of technical assistance costs to be borne by the sponsors and SCS are as follows:

Works of improvement	Sponsors (percent)	SCS (percent)	Estimated technical assistance cost ($)
Land treatment practices	40	60	325,000

3. The sponsors will obtain applications from owners of not less than 40 percent of the land in the furrow irrigated area, indicating that they will carry out the planned land treatment measures. These applications will be obtained before the first long term contract is executed.

4. The sponsor will obtain agreements with landowners or operators to operate and maintain the land treatment practices for the protection and improvement of the watershed.

5. The sponsors and SCS will each bear the cost of project administration that each incurs, estimated to be $10,000 and $230,000, respectively.

6. The costs shown in this plan are preliminary estimates. Final costs to be borne by the parties hereto, will be the average costs incurred in the installation of works of improvement or an approved variation.

7. This agreement is not a fund-obligating document. Financial and other assistance to be furnished by SCS in carrying out the plan is contingent upon the fulfillment of applicable laws and regulations and the availability of appropriations for this purpose.

8. A separate agreement will be entered into between SCS and sponsors before either party initiates work involving funds of the other party. Such agreements will set forth in detail the financial and working arrangements and other conditions that are applicable to the specific works of improvement.

9. This plan may be amended or revised only by the mutual agreement of the parties hereto, except that SCS may deauthorize or terminate funding at any time it determines that the sponsor has failed to comply with the conditions of this agreement. In this case, SCS shall promptly notify the sponsor in writing of the determination and the reasons for the de-authorization of project funding , together with the effective date. Payments made to the sponsors or recoveries by SCS shall be in accord with the legal rights and liabilities of the parties when project funding has been deauthorized. An amendment to incorporate changes affecting a specific measure may be made by mutual agreement between SCS and the sponsor having specific responsibilities for the measure involved.

10. No member of or delegate to Congress, or resident commissioner, shall be admitted to any share or part of this plan, or to any benefit that may arise therefrom; but this provision shall not be construed to extend to this agreement if made with a corporation for its general benefit.

11. The program conducted will be in compliance with the nondiscrimination provisions as contained in the Titles VI. and VII. of the Civil Rights Act of 1964, as amended, the Civil Rights Restoration Act of 1987 (Public Law 100-259) and other nondiscrimination statutes, namely, Section 504 of the Rehabilitation Act of 1973, Title IX of the Education

Amendments of 1972, the Age Discrimination Act of 1975, and in accordance with regulations of the Secretary of Agriculture (7CFR-15, Subparts A&B) which provide that no person in the United States shall, on the grounds of race, color, national origin, age, sex, religion, marital status, or handicap be excluded from participation in, be denied the benefits of, or be otherwise subjected to discrimination under any program or activity receiving Federal financial assistance from the Department of Agriculture or any agency thereof.

12. **Certification Regarding Drug-Free Workplace Requirements (7CFR 3017.Subpart F.)**

By signing this watershed agreement, the sponsors are providing the certification set out below. If it is later determined that the sponsors knowingly rendered a false certification, or otherwise violated the requirements of the Drug-Free Workplace Act, the SCS, in addition to any other remedies available to the Federal Government, may take action authorized under the Drug-Free Workplace Act.

Controlled substance-means a controlled substance in Schedules I through V of the Controlled Substances Act (21 U.S.C. 812) and as further defined by regulation (21 CFR 1308.11 through 1308.15);

Conviction-means a finding of (including a plea of nolo contender) or imposition of sentence, or both, by any judicial body charge with the responsibility to determine violations of the Federal or State criminal drug statues;

Criminal drug statute-means a Federal or non-Federal criminal statute involving the manufacturing, distribution, dispensing, use, or possession of any controlled substance;
Employee-means the employee of a grantee directly engaged in the performance of work under a grant, including: (i) all direct charge employees; (ii) all indirect charge employees unless their impacts or involvement is insignificant to the performance of the grant; and, (iii) temporary personnel and consultants who are directly engaged in the performance of work under the grant and who are on the grantee's payroll. This definition does not include workers not on the payroll of the grantee (e.g., volunteers, even if used to meet a matching requirement; consultants or independent contractors not on the grantees payroll; or employees of subrecipients or subcontractors in covered workplaces).

Certification:

(A) The sponsors certify that they will or will continue to provide a drug-free workplace by:
- (1) Publishing a statement notifying employees that the unlawful manufacture, distribution, dispensing, possession, or use of a controlled substance is prohibited in the grantee's workplace and specifying the actions that will be taken against employees for violation of such prohibition;
- (2) Establishing an ongoing drug-free awareness program to inform employees about:
  - (a) The danger of drug abuse in the workplace;
  - (b) The grantee's policy of maintaining a drug free workplace;
  - (c) Any available drug counseling, rehabilitation, and employee assistance programs; and
  - (d) The penalties that may be imposed upon employees for drug abuse violation occurring in the workplace.

(3) Making it a requirement that each employee to be engaged in the performance of the grant be given a copy of the statement required by paragraph (1);

(4) Notifying the employee in the statement required by paragraph (1) that, as a condition of employment under the grant, the employee will--

(a) Abide by the terms of the statement; and

(b) Notify the employer in writing of his or her conviction for a violation of a criminal drug statute occurring in the workplace no later than five calendar days after such conviction;

(5) Notifying the SCS in writing, within ten calendar days after receiving notice under paragraph (4)(b) from an employee or otherwise receiving actual notice of such conviction. Employers of convicted employees must provide notice, including position title, to every grant officer or other designee on whose grant activity the convicted employee was working, unless the Federal agency has designated a central point for the receipt of such notices. Notice shall include the identification number(s) of each affected grant;

(6) Taking one of the following actions, within 30 calendar days of receiving notice under paragraph (4)(b), with respect to any employee who is so convicted--

(a) Taking appropriate personnel action against such an employee, up to and including termination, consistent with the requirements of the Rehabilitation Act 1973, as amended; or

(b) Requiring such employee to participate satisfactorily in a drug abuse assistance or rehabilitation program approved for such purposes by a Federal, State, or local health, law enforcement, or other appropriate agency.

(7) Making a good faith effort to continue to maintain a drug-free workplace through implementation of paragraphs (1),(2),(3),(4),(5), and (6).

B. The sponsors may provide a list of the site(s) for the performance of work done in connection with a specific project or other agreement.

C. Agencies shall keep the original of all disclosure reports in the official files of the agency.

13. **Certification Regarding Lobbying (7 CFR 3018) (applicable if this agreement exceeds $100,000).**

(1) The sponsors certify to the best of their knowledge and belief that:

(a) No Federal appropriated funds have been paid or will be paid, by or on behalf of the sponsors, to any persons for influencing or attempting to influence an officer or employee of an agency, Member of Congress, an officer or employee of Congress, or an employee of a Member of Congress in connection with the awarding of any Federal contract, the making of any Federal grant, the making of any Federal loan, the entering into of any cooperative agreement, and the extension, continuation, renewal, amendment or modification of any Federal contract, grant, loan, or cooperative agreement.

(b) If any funds other than Federal appropriated funds have been paid or will be paid to any person for influencing or attempting to influence an officer or employee of any agency, a Member of Congress, an officer or employee of Congress, or an employee of a Member of Congress in connection with this Federal contract, grant, loan, or cooperative agreement, the undersigned shall complete and submit Standard Form - LLL, "Disclosure Form to Report Lobbying," in accordance with its instructions.

(c) The sponsors shall require that the language of this certification be included in the award documents for all subawards at all tiers (including subcontracts, subgrants, and contracts under grants, loans, and cooperative agreements) and that all subrecipients shall certify and disclose accordingly.

(2) This certification is a material representation of fact upon which reliance was placed when this transaction was made or entered into. Submission of this certification is a prerequisite for making or entering into this transaction imposed by Section 1352, Title 31, U.S. Code. Any person who fails to file the required certification shall be subject to a civil penalty of not less than $10,000 and not more than $100,000 for each such failure.

14. **Certification Regarding Debarment. Suspension and Other Responsibility Matters - Primary Covered Transaction (7 CFR 3017).**

(1) The sponsors certify to the best of their knowledge and belief, that they and their principals:

(a) Are not presently debarred, suspended, proposed for debarment, declared ineligible, or voluntarily excluded from covered transactions by any Federal department or agency.

(b) Have not within a three year period preceding this proposal been convicted of or had a civil judgment rendered against them for commission of fraud or a criminal offense in connection with obtaining, attempting to obtain, or performing a public (Federal, State, or local) transaction or contract under a public transaction; violation of Federal or State antitrust statutes or commission of embezzlement, theft, forgery, bribery, falsification or destruction of records, making false statements, or receiving stolen property;

(c) Are not presently indicted for or otherwise criminally or civilly charged by a governmental entity (Federal, State, or local) with commission of any of the offenses enumerated in paragraph (1)(b) of this certification; and

(d) Have not within a three-year period preceding this application/proposal had one or more public transactions (Federal, State, or local) terminated for cause or default.

(2) Where the primary sponsors are unable to certify to any of the statements in this certification, such prospective participant shall attach an explanation to this agreement.

NORTH YAKIMA CONSERVATION DISTRICT:

by _____

R.E. CORNELIUS,SR. - Board Chair

15180 Rutherford Road, Yakima, WA 98903 10/14/94

Address Zip Code Date

The signing of this plan was authorized by a resolution of the Board of Supervisors of North Yakima Conservation District and adopted at a meeting held

on Sept. 20 1994.

1606 Perry Street, Yakima, WA 98902 _____

Address Zip Code Date

_____ 10-14-94

Secretary Date

SOIL CONSERVATION SERVICE
UNITED STATES DEPARTMENT OF AGRICULTURE

Approved by: _____
LYNN A. BROWN
State Conservationist

Date: 10/17/94

WATERSHED PLAN / ENVIRONMENTAL ASSESSMENT
FOR MOXEE WATERSHED
YAKIMA COUNTY, WASHINGTON

SUMMARY

Project Name: Moxee Watershed

County: Yakima **State:** Washington

Sponsor: North Yakima Conservation District

Description of recommended plan:

Implement on farm trickle irrigation systems, nutrient management, pesticide management, and irrigation water management on 4,550 acres of furrow irrigated cropland. Implementing this action will reduce sediment to the Yakima River by 70 percent which will increase the egg-to-fry survival of Fall Chinook Salmon from 27 percent to 57 percent in the Parker Reach of the Yakima River..

Resource Information:

Size of Watershed	97,680 acres
Irrigated Cropland	19,880 acres
Wetlands	836 acres
Dry Cropland	2,700 acres
Rangeland	75,100 acres

Land ownership:
Private-74.7 percent State/Local-3 percent Federal-22.3 percent

Number of farms: 791 **Average farm size:** 51 acres
Note: data obtained from ASCS records, they include only farms on record.

Prime and unique farmland	15,000 acres
Number of minority farmers	1
Number of limited resource farmer	5
Estimated number of contracts	44

Project Beneficiary Profile:

The off-site benefit area, Parker Reach of the Yakima River, is historically one of the significant Chinook Salmon spawning areas of the Yakima River. This reach of the river is the eastern boundary of the Yakama Indian Nation reservation. Tribal members continue to fish this reach. The riparian vegetation is in excellent condition for the most part. The riparian areas with tall black cottonwoods provide a popular location for homeless and migrant workers to reside.

The watershed is adjacent to the city of Yakima , population 57,660. The area is primarily farmland with clusters of rural residential communities. The average farm size for the county is 380 acres. Yakima Counties per capita income is $14,494, (the 32nd lowest level in the state with the state average being $18,775). Moxee City, population 825, is the largest community within the watershed's boundaries.

Sixteen percent (16 percent) of the population in the watershed is Hispanic. The majority of this population is farm laborers, not landowners; They rely on the farms within the watershed for their employment. Other minority groups make-up less than 3 percent of the population. Hops and orchards are the primary economic crops in the watershed having an average value of over $3,000 per acre.

Wetlands:
836 acres

Flood Plains:
4,954 acres

Highly erodible cropland:
9,750 acres

Threatened or Endangered species:
Bald Eagle

Cultural Resources:
Inventory available at SCS Yakima Field Office.

Cost
The total project cost is $5,132,500

Other Impacts:
Increase on-farm irrigation efficiencies 40 percent and reduced on-farm inputs and production cost.

Environmental values changed or lost:

Wooded flood plain - none

Wetlands - Potential loss of 6 acres.

Cultural Resources - none

Wildlife habitat - no negative effect.

Fish Habitat - Reducing sediment discharge from the Moxee Drain will decrease the sediment in the spawning gravel doubling the Fall Chinook Salmon egg-to-fry survival rate. The sediment reduction will also assist in lowering stream temperatures.

Prime farmland - Project will provide adequate protection on 4,550 acres.

Major Conclusions:
Good quality spawning habitat is a limiting factor for Fall Chinook Salmon in the Yakima River system. As the percentage of sediment in the spawning gravel increases fry survival decreases. The Moxee Drain has been identified as the contributor to the sediment problem in the Parker Reach of the Yakima River system. The Moxee Drain delivers 5,200 tons of sediment each year. The majority of the sediment impacting the spawning area originates in the furrow irrigated lands of the Moxee watershed. Ninety five percent of the total season sediment loading occurs during the irrigation season. The furrow irrigated acres producing hops are the major sediment contributor. Converting 4,550 acres of furrow irrigated cropland, primarily hops, to trickle systems with irrigation, pest, and nutrient management will reduce sediment delivery 4,100 tons per year. This will reduce the fine sediment in spawning gravel from 30 percent to 15 percent which will double Fall Chinook Salmon egg-to-fry survival in the Parker Reach of the Yakima River.

Areas of Controversy:

The project has broad public support. Over 40 percent of the problem area has been offered for land treatment contracts by the persons controlling the land. In response to plan development, the Yakama Indian Nation has initiated sediment studies in Parker Reach. This will provide baseline data and monitor the effectiveness of project implementation.

INTRODUCTION

The Moxee Watershed is proposed to improve the egg-to-fry survival of Fall Chinook Salmon in the Parker reach of the Yakima River. The NYCD requested assistance from the Soil Conservation Service in order to implement their five year Hydrologic Unit Area Plan. A PL83-566 Plan has been developed.
The identified problem is impaired spawning due to sedimentation. The furrow irrigated land primarily hops, has been identified as the sediment source. Several alternatives were evaluated. Trickle irrigation systems provided the basis for the National Economic Development plan. The supporting documentation includes numerous studies from U.S.G.S. and Washington State Department of Ecology. The Washington State Department of Fish and Wildlife and the Yakama Indian Nation biologist have been involved in the plan development. Broad public input has been solicited throughout the process.

PROJECT SETTING

The Moxee Watershed project is located within the Moxee Hydrologic Unit #17030003-120. The watershed is outlined on the project map located in Appendix D. The north boundary of the watershed is the Yakima Ridge. Rattlesnake Ridge is the southern boundary. The eastern border is in the Blackrock area. Water drains westerly to the Yakima River which makes up the western boundary. The Moxee Drain and Birchfield Drain provide the drainage for the watershed. The Parker Reach of the Yakima River is identified on the project map. Appendix D.

The watersheds climate lends itself well to intense irrigated agriculture. The average summer temperature is 68 degrees. The average maximum temperature is 82 degrees. Average annual precipitation is 7 to 8 inches of which 30 percent falls during the growing season. Wind in the area is from the west-northwest with an average high wind speed of 8 miles per hour in the spring. Daytime humidity ranges about 40 percent and 75 percent of days are sunny during the summer. All of these factors provide the project area with a minimum 163 day growing season.

The Moxee Watershed has been filled with material that was deposited by normal stream activity and glacial outwash. These areas include low terraces and flood plains. Representative soils that formed in recent alluvium are those in the Esquatzel, Weirman, Ashue, Wenas, Toppenish, and Umapine series. Extensive areas are mantled by loess underlain by lake sediment that was deposited during glacial flooding in the late Pleistocene. This sediment occurs at elevations of as much as 1,000 feet. Warden soils are formed in loess overlying lake sediment.

Major soil series in the project area are Esquatzel, Umapine, Warden, and Willis Silt Loams ranging from 0 percent to 15 percent on irrigated lands with associated rangelands greater than 15 percent slope. The project area can be classified as a rural farming community with single family residences. There is no major industry in the watershed that is not related to agricultural production or harvest. There are two small communities in the watershed. They are Terrace Heights and the City of Moxee.

Land holders within the watershed include the United States Army (18,240 acres), Bureau of Land Management (3,500 acres), Washington Department of Natural Resources (2,880 acres), and private land ownership (73,060 acres).The principal land uses and future land uses are specialized agriculture and "bedroom communities" to Yakima. The "bedroom communities" are expected to grow at a steady rate and occupy marginal agricultural lands. The specialized crops of hops, vineyards, and orchards occupy a large amount of prime farmland and are expected to remain. Other crops of importance include hay and wheat production. There is a significant rangeland acreage.

The Parker Reach between Moxee Drain outlet and Zillah is a broad braided section of the Yakima River with excellent riparian habitat in most areas. Tall black cottonwood trees provide shade for the river and a large number of migrant workers and homeless families which camp along the river. The reach is a traditional fishing area for members of the Yakama Nation. The cover photo is a 1950's era picture of Native Americans fishing below the Sunnyside Dam.

WATERSHED PROBLEMS AND OPPORTUNITIES

The Moxee Drain, one of the contributing agricultural drains to the Yakima River, is recognized by the USGS, National Water Quality Assessment team as a major source of sediments and associated contaminants in the Yakima Basin. Approximately 43 tons of sediments per day are discharged into the Yakima River during the irrigation season.

The Parker Reach of the Yakima River is classified as Class A (excellent) surface water according to state water quality standards. The general characterization of the water quality of this class is that it shall meet or exceed the requirements for all or substantially all uses identified in WA 173-201-045 (2) (b). One of these characteristic uses is for salmonid migration, rearing, spawning, and harvesting. In fact, the Yakima River does not meet the Class A standards and has been identified as an impaired waterbody in Ecology's Nonpoint Source Pollution Assessment and Management Plan.

Two of the primary problems encountered by fish populations are sedimentation and high temperature. Excessive sediment loading is known to be one of the primary limiting factors for production in the Parker Reach. When sediment loading in spawning gravel exceeds 20 to 30 percent a significant increase in the mortality of incubating eggs occurs due to suffocation and /or encasement. Most of the Parker Reach is known to contain sediment levels well in excess of the recommended threshold for even marginal salmon production. Successful spawning occurs in a few relatively high gradient riffles with sediment levels at the lower end of the scale.

Sediments also directly or indirectly reduce salmon production by : 1) causing gill abrasions which result in fungal infections among juvenile fish, 2) reducing primary productivity by limiting light penetration, 3) impacting juvenile salmonid food supply by reducing aquatic invertebrate species, 4) binding to pesticides, heavy metals, and other deleterious substances, which are then transported more readily to the Yakima River from agricultural drains, and 5) causing significant increases in stream temperatures due to greater absorbance and retention of solar radiation. Total suspended sediment (TSS) concentration is positively correlated to elevated water temperature. The threshold water temperature for juvenile salmonids is 68 degrees F. Low flow, high water temperature, and high TSS combine to produce adverse smolt survival conditions.

The Yakima River currently supports valuable populations of Spring and Fall Chinook Salmon. Wild spawning Spring Chinook Salmon are now extinct in the Parker Reach. Although lower Yakima River Fall Chinook received a "healthy" status rating from the Washington State Department of Fish and Wildlife, there is no surplus production to provide harvest (stock is just maintaining itself). Seventy-eight percent of the lower Yakima Fall Chinook Salmon spawn in the Parker Reach. At a minimum improvements in factors affecting fish production is needed to prevent a decline to "depressed" status. Significant improvement in limiting factors will be required to produce Fall Chinook Salmon runs capable of supporting harvest.

Figure I identifies the impact of sediment on the percentage of egg-to-fry survival of Fall Chinook Salmon. Significant increases in survival occur as the percentage of sediment is decreased down to the 10 percent sediment level. The Washington Department of Fish and Wildlife as well as tribal fishery specialist estimate sediment to be in the range of 30 percent. At this level, studies have given a range of percent emergence from around 10 percent up to 40 percent. The source of these sands is the Moxee watershed.

The Moxee Watershed has been identified by North Yakima Conservation District (NYCD), Soil Conservation Service (SCS) and acknowledged by Washington State Department of Ecology (DOE) and United States Geological Survey (USGS) as a significant contributor of pollutants to the Yakima River. The Yakima River Basin Water Quality Plan developed by the Yakima Valley Conference of Governments and approved by Washington State, Department of Ecology also identifies this watershed as a problem area. NYCD and SCS have identified the problem source area in the Moxee Valley as being the furrow irrigated croplands and the inadequate return flow management facilities. Ninety-five percent of the sediment loading occurs during the irrigation season.

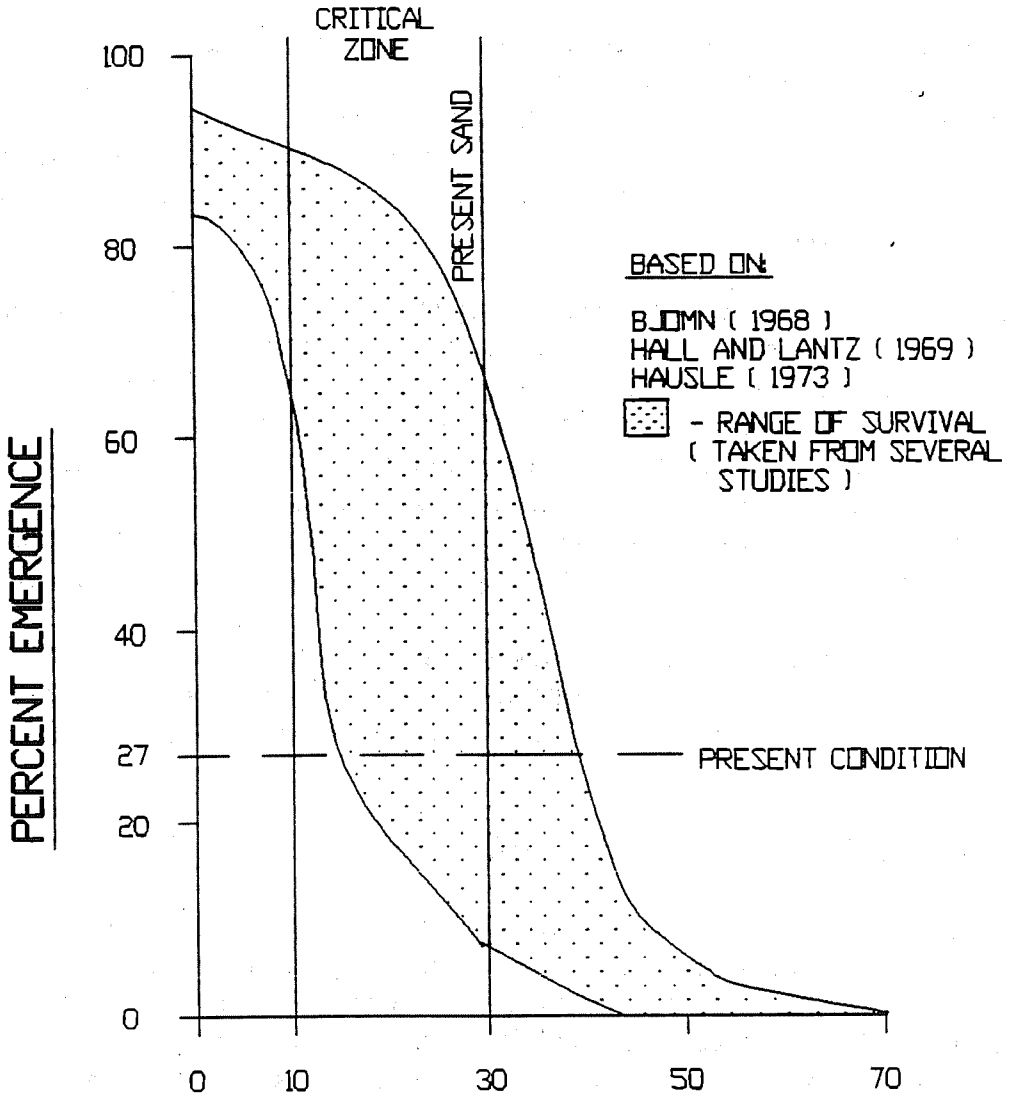
The watershed sends 5,200 tons of sediment to the Yakima River each year. Also, 368,000 pounds of nitrogen, 14,000 pounds of phosphorous, and 70,000 pounds of potassium are lost with the sediments. These materials are part of the 19,700 acre feet of irrigation return flow discharged each year into the Moxee Drain.

SCOPE OF ENVIRONMENTAL ASSESSMENT

This section addresses resources concerns identified in the project planning process. These concerns have come from initial natural resource concerns of NYCD. Additional concerns have been developed from multi-entity involvement of resource related agencies such as SCS, USGS, and Washington Department of Fish and Wildlife as well as concerns of watershed producers and the general public through public meetings. Table A, identifies those concerns, degree of concern and degree of significance to decision making.

FALL CHINOOK
EGG-TO-FRY SURVIVAL

FIGURE I



PERCENT SAND

(GENERALLY LESS THAN 0.83 MM)

FIGURE I- COMPOSITE INVERSE RELATIONSHIP BETWEEN PERCENTAGE OF FINE SANDS IN GRAVELS AND EGG-TO-FRY SURVIVAL OF SALMONID EGGS DEPOSITED IN REDDS. (FROM CEDARHOLM AND SALO 1979)

TABLE A
Identified Concerns

CONCERNS	DEGREE OF CONCERN	DEGREE OF SIGNIFICANCE TO DECISION MAKING	REMARKS
Water Resources			
surface water quality	high	high	High nutrient and sediment loading
surface water quantity	med	med	Moxee Drain flows year round
ground water quality	medium	low	Nutrients Lost through deep percolation
ground water quantity	medium	low	Very few irrigation wells
sedimentation	high	high	Impacts spawning egg-to-fry survival
flood plains	medium	low	No change expected
wetlands	low	low	
riparian areas	medium	medium	Excellent along Parker Reach
fish habitat	high	high	Spawning affected by sediment
wildlife habitat	medium	medium	Cover limiting factor
threatened and endangered species	medium	medium	Bald Eagles pass through watershed
cultural resources	medium	medium	Possible unknown sites
economics	medium	medium	Watershed Is Ag Based
visual quality	low	low	
air quality	low	low	
social effects	medium	medium	Homeless, immigrants and Native Americans use Parker Reach
natural areas	low	low	
wild and scenic rivers	N.A.	N.A.	Not present in this project

September 30, 1994

1/ High - Must be considered in the analysis of alternatives
Medium - May be affected by some alternative solutions
Low - Consider, but not too significant
None - Need not be considered in the analysis

FORMULATION AND COMPARISON OF ALTERNATIVES:

Formulation process

Four alternative methods of achieving the goal of reducing the quantity of sediment in the spawning gravel of Parker Reach were evaluated.

(1) A large sediment pond near the mouth of the Moxee Drain.
(2) On farm sediment ponds with tailwater recovery.
(3) Furrow mulch systems.
(4) Converting furrow to trickle system.

The large sediment basin proved to be impractical because of space requirements. Smaller structures could not be properly maintained.

On-farm sediment ponds with tailwater recovery systems filled with sediment in one irrigation in some situations. They proved to be impractical.

Furrow mulch systems were quite effective as a sediment reducing mechanism. Currently 20 percent of the furrow irrigated ground is mulched. Expansion is limited because of labor requirements needed to properly stage straw.

Water quality, sedimentation, fish habitat, economics, and water conservation were considered with each alternative.

Grower input, public meetings, and demonstrations were also used to identify public concerns and determine what alternatives should be considered.

The sponsors, with assistance from the public, Washington State Department of Fish and Wildlife and Tribal Fishery representatives worked together to establish the 57 percent egg-to-fry survival goal (figure 2). Due to the wide variation in survival response to the percent sand in gravel, it was determined a 70 percent reduction in sediment would insure achieving the project goal.

FALL CHINOOK
EGG-TO-FRY SURVIVAL

FIGURE II

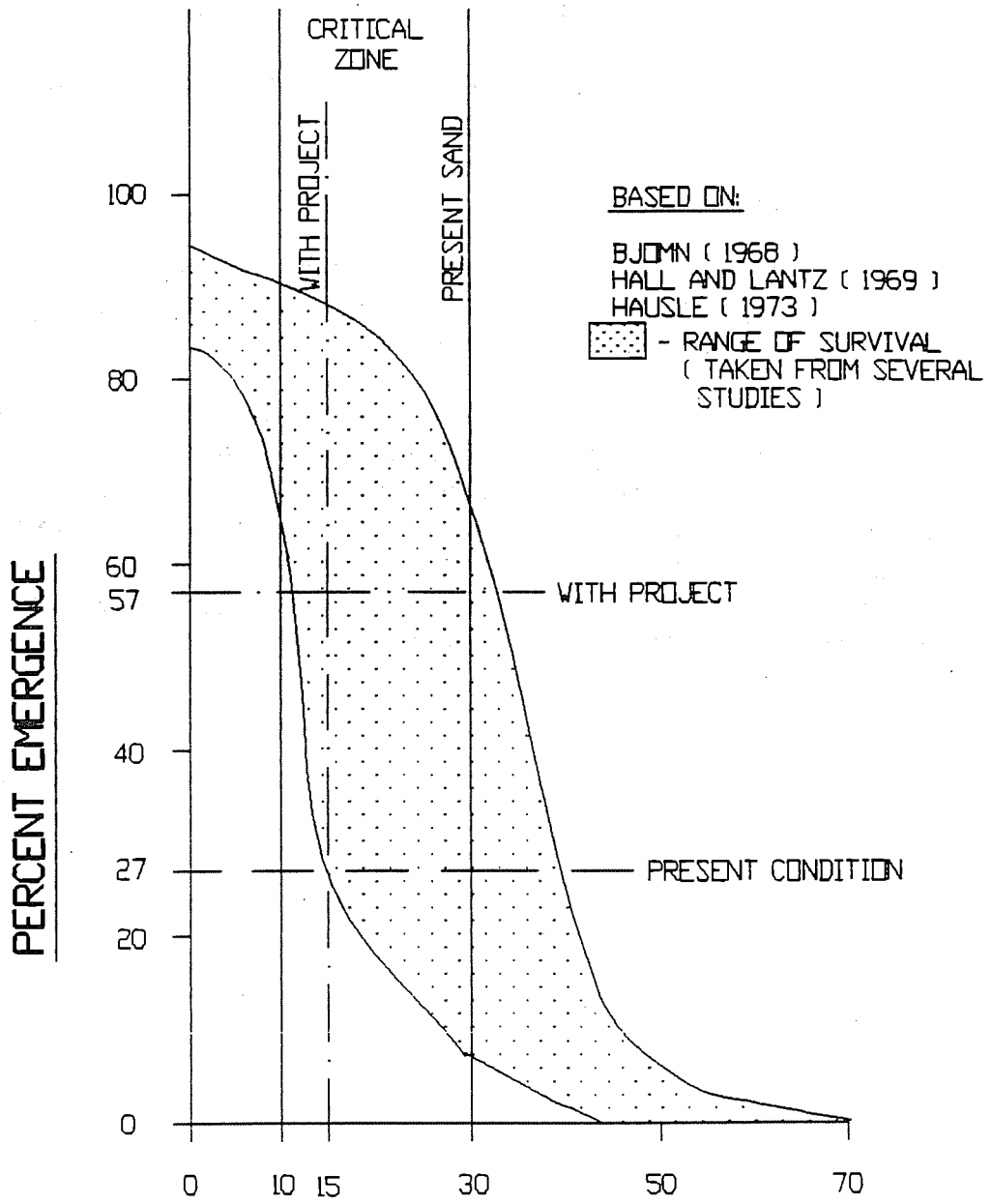


FIGURE II- COMPOSITE INVERSE RELATIONSHIP BETWEEN PERCENTAGE OF FINE SANDS IN GRAVELS AND EGG-TO-FRY SURVIVAL OF SALMONID EGGS DEPOSITED IN REDDS. (FROM CEDARHOLM AND SALO 1979)

Description of alternative

In the future without project alternative, competition for a limited supply of water will continue. Five thousand two hundred tons of sediment will be delivered to the Yakima River. Spawning areas of the Parker Reach will be impacted by sand. High runoff events in some winters on the Yakima River will effectively "wash" the gravel removing the sands. However, before the migration of the Fall Chinook Salmon, sediments from Moxee Drain will deteriorate the quality of the spawning area.

The capitol requirement of trickle irrigation system will restrict implementation without project action.

Effects of alternative

Conversion from furrow to trickle satisfies environmental concerns, provides a mechanism for water conservation for the producers, and meets the project goal of improving the survival of Fall Chinook Salmon egg-to-fry at the 4,550 acre producer participation rate.

Recent producer acceptance of the trickle systems has simplified the alternative development process. A limited number of trickle systems were installed in the Yakima Valley during the past 15 years. However, various problems restricted wide application of these systems. The technology introduced in the past three years has changed producers perception of these systems. Trickle systems are now viewed as the system of the future. The systems not only use less water, eliminate off-site water quality and ground water concerns, but also improve the ease of management. In addition, production costs are reduced, labor hours are reduced significantly, and managerial flexibility is enhanced.

SUMMARY AND COMPARISON OF CANDIDATE PLAN

EFFECTS MEASURES	WITHOUT PROJECT	ALTERNATIVE (NED)
--------		Trickle Systems On 4,550 ACRES with IWM, and pesticide management
PROJECT INVESTMENT	$0	$5,132,500
NATIONAL ECONOMIC DEVELOPMENT ACCOUNT		
Beneficial annual		$1,277,500
Adverse annual		$ 486,000
Net beneficial		$ 791,500
On-site savings in water		Not quantified
Maintaining productivity for the evaluation period		"
Maintaining productivity for future generations		"
Off-site sediment damage reduction		"
Increase fish and wildlife values		"
Off-site savings in water		"
ENVIRONMENTAL QUALITY ACCOUNT		
Sediment to Parker Reach Yakima	5,200 tons	1,100 tons
Runoff of farm applied nutrients		
Nitrogen	368,000 lbs.	80,000 lbs.
Phosphorus	14,000 lbs.	3,000 lbs.
Potassium	70,000 lbs.	15,000 lbs.
Return flows	19,700 acre-ft.	4,300 acre-ft.
Surface water quality		Converting to trickle systems will decrease sediment 4,100 tons.
Surface water quantity		Irrigation return flows will be reduced from 19,700 to 4,300 acre ft.
Ground water quality		Trickle systems will significantly reduce deep percolation.
Ground water quantity		No significance effect.
Sedimentation		Sediment to spawning areas will be reduced from 5,200 tons per year to 1,100 tons per year.
Flood plains		No adverse effect.
Riparian areas		No adverse effect.
Fish habitat		Sediment reduction in spawning gravel will double egg-to-fry survival.
Wetlands		Potential loss of 6 acres
Wildlife habitat		Reduced cultivation will improve on-farm upland habitat.
Threatened and endangered species		Increased survival of Fall Chinook Salmon.

OTHER SOCIAL EFFECTS

Impact on disadvantaged persons	Improved water quality. Assist migrants and homeless and camping along Parker Reach.
Impact on rural development	Reduce impact of short water years.
Nuisance/safety effects	Quality of resident fish will be improved.
Health effects	Quality of resident fish will be improved.
Social well-being	Quality of resident fish will be improved.

REGIONAL ECONOMIC DEVELOPMENT ACCOUNT

Regional annual beneficial effect	$1,277,500
Regional annual adverse effect	$ 169,000
Rest of U.S.	$ 317,000

Note: Interest Rate 8 percent period of analysis 25 years - Price Base 1994

Risk and uncertainty

There is limited data as to the expected response of the egg-to-fry survival to reductions in sediment. The conservation district has already received verbal commitments for 60 percent of the furrow irrigated acres. Based on experience in the county, the remaining participation will be easily achieved. Water right issues may effect disposition of water made available by increased efficiency. There is reduced risk from pesticides attached to sediment.

Rationale for plan selection

Converting furrow irrigated lands to trickle systems will provide a means for producers of reducing water requirements. These systems require less water, there is no tailwater, or sediment. The producers can utilize the systems for both fertilization and pest control applications in precise amounts. The number of tillage operations is greatly reduced and managerial flexibility is increased. The alternative meets the project goal. It is environmentally sound and is widely accepted by producers. The potential loss of 6 acres of wetland is being mitigated. The 40 percent increase in irrigation efficiency is the deciding force for most producers because of water shortages in recent years. Severe economic losses occur proportionately with water shortages. Converting to trickle will result in on farm water savings benefit of $260 per acre. Savings in nutrient application cost will be $21 per acre. These benefits are equivalent to a 10% increase in production.

A total of 836 acres of wetlands occur within the proposed project area. Approximately 692 acres of these wetlands are located along the flood plain of the Yakima river. These wetlands are associated with water tables from the river and are not expected to be influenced by the projects conversion of furrow irrigated cropland to drip irrigated cropland. The croplands planned for conversion to trickle irrigation all occur on a natural bench above the flood plain of the Yakima River where a majority of the wetlands occur.

The National Wetland Inventory Maps (NWI) identify approximately 144 acres of wetlands that occur above the flood plain and on the bench where project implementation is expected to take place. Of these 144 acres, approximately 116 acres are identified on the (NWI) as either excavated, drains, irrigation ditches, diked, or impounded, artificial wetlands. Field investigations in the project area tie most of the remaining 28 acres of wetlands to pump back system, irrigation ditch overflow systems, drainage ditch systems, or ponds formed from leakage from main canals.

The four main types of artificial wetlands in the project area are:

* Irrigation water delivery canals
* Ponds from canal leakage or pumping systems.
* Deeply incised irrigation drain ditches.
* Shallow irrigation drain ditches.

On-farm, tailwater wetlands do not normally occur in or around the furrow irrigated hops fields. Tailwater is normally ditched or piped back to drain ditches.

Artificial wetlands associated with irrigation canals and water delivery systems are not expected to be impacted by implementation of the project. The canals are charges with water between early April and early October and dry other times of the year. These water conveyance systems are required to run at or near capacity in order to function (supply water to delivery points) properly. This is not expected to change significantly with project implementation. Ponds and seeps formed from leakage from fully charges canals are not expected to be altered by the project. Ponds used for irrigation or pump back systems are not expected to change with project implementation.

An inventory of the artificial wetlands associated with the drainage ditches in the project area identify two main types of irrigation drain ditches.

The first type are at the bottom of deeply incised, V-shaped, (excavated) ditches. Depth of these ditches ranges from 10 to 25 feet deep. Based on length measured from the NWI maps and width observations in the field these types of wetlands comprise 4.54 acres. These acres do no include the main Moxee or Birchfield drains which are also deeply incised ditches. Conversion of hop fields from furrow to drip is not expected to greatly alter the size of these artificial wetlands nor reduce their value significantly. Water that occurs in these drainage ditches comes from canal overflows, leakage from surrounding canals and runoff from on-farm irrigation systems. When tailwater is eliminated as hop fields are converted from furrow to trickle irrigation, the wetlands associated with

these deeply incised drainage ditches will not be significantly altered. Depth to water in these ditches will be affected but not enough to significantly affect wetland plant composition and or functions.

The second type of drains are ditches that are not deeply incised. Depth of these ditches is usually less than 5 feet deep. These type of wetlands comprise approximately 8.97 acres in the project area. Water in this type of ditch also comes from canal leakage, ditch overflows, and on-farm irrigation runoff. Considering the shallow depth of these drains it is expected that implementation of the project will affect these wetlands. On-farm water savings from rill to trickle conversions in hops field in the project area will reduce flow in drains by approximately 60%. The project plans to implement Best Management Practices on 65% of the rill irrigated lands. The maximum estimated acres of wetlands that can be expected to have a significant reduction in wetland values, be reduced in size or function, or be eliminated altogether due to project implementation is (8.97 X 65%) = 5.83 acres. (6 acres).

The overall positive benefits of reduced sediment on Fall Chinook Salmon habitat and spawning areas in the Yakima River is the primary objective of the project. Reducing the sediment into the Yakima River system also reduces additions of farm chemicals entering the river. This includes currently used agricultural chemicals and older banned chemicals like DDT and its derivatives. Wetlands along the Yakima River will also benefit from the reduction of sediment and chemicals entering the drainage systems within the project area.

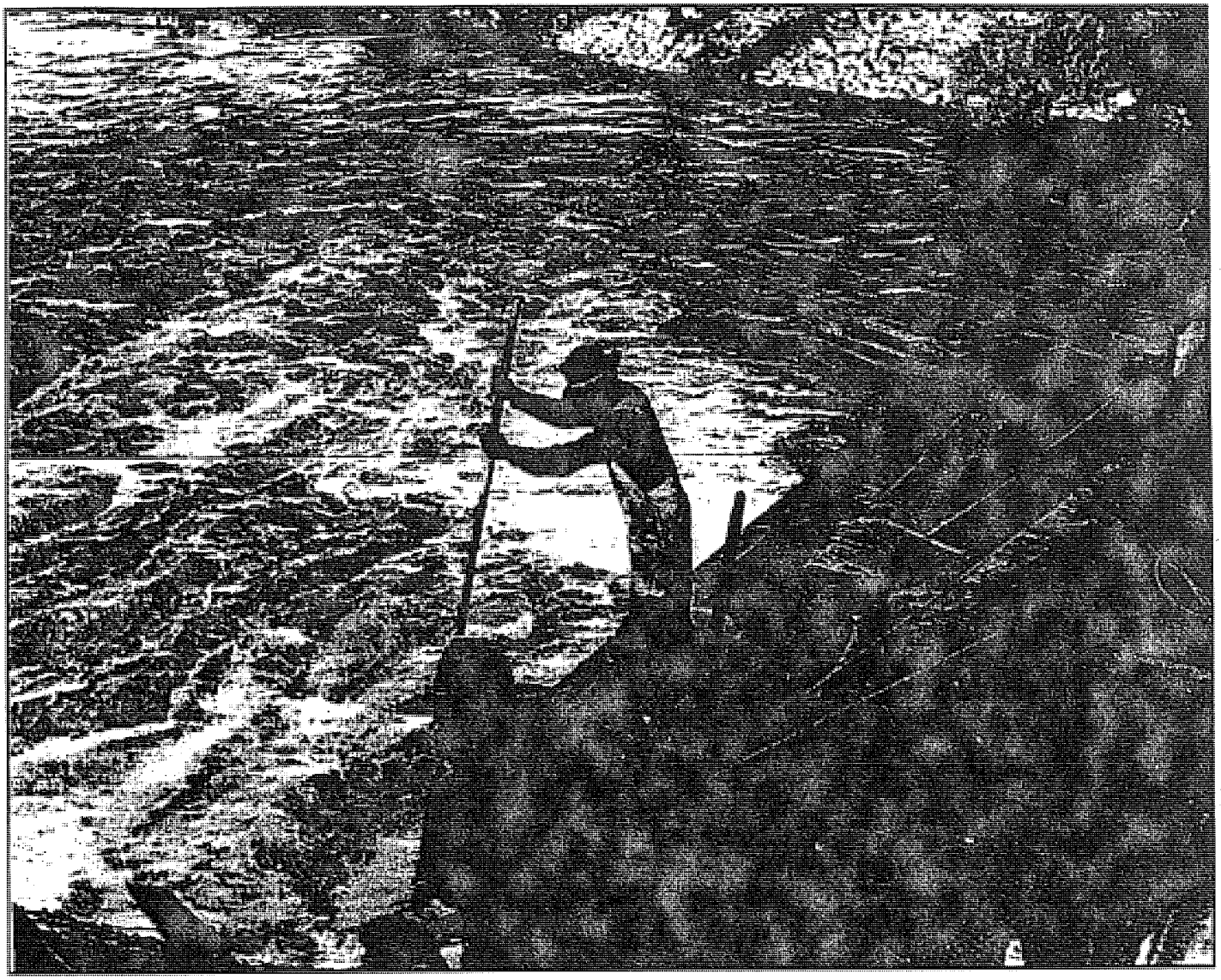
The cumulative and immediate project benefits to off-site aquatic, and wetland habitats is estimated to outweigh the minimum loss of habitat within the project area. The six acre wetland loss is being mitigated.

CONSULTATION AND PUBLIC PARTICIPATION

The list of participating agencies and individuals is included in the reference list. A public meeting was held August 3, 1994. No adverse comments to the project were made. There is broad public support. NYCD has been implementing an information, education program in the watershed for several years. Interagency comments and responses are included in Appendix A.

There were two main areas of concern. The first issue is potential off-site water savings. The draft plan discussed off-site water savings effects and benefits. Since the project does not have any guarantee to assure those benefits references to off-site water savings have been deleted.

The second issue was wetlands. The draft plan did not specifically identify wetland effects. A wetland section has been added to the recommended plan. There will be a six acre loss of wetlands. (less than 1%). A mitigation plan consisting of providing $17,500 to the Washington State Fish and Wildlife's habitat restoration and land acquisition account was developed by NYCD, SCS and the U.S. Fish and Wildlife Service. NYCD has assumed responsibility for providing these funds.



Native Americans Fishing
at
Sunnyside Dam in Parker Reach
Circa 1953

(Photo courtesy - Jack Whitnall Collection)

Purpose and Summary

The primary purpose of the Moxee Watershed Project is to increase the percentage of Fall Chinook Salmon egg-to-fry survival from 27 percent to 57 percent for the 21.2 mile Parker Reach of the Yakima River.

Measures to be installed

Trickle irrigation systems will be installed on acreage that is currently furrow irrigated. Other practices may be used on small areas where trickle systems are not feasible. Accelerated technical assistance for conservation planning and application on cropland private lands will be furnished by SCS and NYCD. SCS and NYCD will be responsible for certification of proper measure installation, providing funds for cost-sharing, and administering the project (except for obtaining necessary landrights, permits and licenses).

NYCD will encourage development and installation of conservation farm plans on all land within the watershed. They will provide leadership through an aggressive education and sales program to encourage application of land treatment measures necessary for the success of this plan. NYCD has responsibility for locally coordinating accelerated installation of cropland treatment under PL83-566 with concurrent activities under Agricultural Stabilization and Conservation Service (ASCS) Special Project Funding authorities. NYCD will approve all conservation plans, determine eligibility for cost-sharing, and assist landowners and operators with operation and maintenance plans.

Mitigation features

There is a potential of losing six acres of artificial wetlands with project implementation. The sponsors will mitigate this potential loss by providing the Washington State Department of Fish and Wildlife $17,500 for Habitat Restoration and land acquisition. This mitigation action was developed jointly with SCS, NYCD and the U.S. Fish and Wildlife Service.

Permits and compliance

Installation of the works of improvement will be in full compliance with all laws and policies of the federal, state, and local government. No federal permits are required; however, individual landowners and or operators will secure local, county, or state permits as required for installation of project measures. In addition, compliance with the Water Resource Council's designated environmental statues is shown in Appendix C.

Costs:

The estimated total installation cost is $5,132,500 which includes financial assistance for establishing land treatment measures, technical assistance for accelerating conservation planning and application, and project administration. The total assistance for establishing conservation land treatment measures on cropland is $4,567,500 The cost-share rate is approximately 65 percent for PL83-566 and 35 percent for other than PL83-566 funds. The total estimated other than PL83-566 costs are estimated at $1,732,560.

The total estimated PL83-566 cost of accelerating technical assistance for planning and applying land treatment measures on cropland is $325,000. Technical assistance costs for conservation planning and application include the direct cost of soil conservationists, engineers, or other technicians for information, conservation planning, surveys, investigations, and design and preparation of plans and specifications.

Project administration includes all administrative costs associated with the installation of planned measures, including the costs of LTC administration, review of conservation plans, and supervision of measure application. The SCS and the sponsors will each bear project administration costs which they incur. These costs are estimated as follows:

PL83-566	SCS	$230,000
other than PL83-566	NYCD	$ 10,000
	Total	$240,000

All costs in this plan are planning estimates. Final costs to be borne by each party will be based upon the average cost or actual cost not to exceed the average cost associated with installation and/or management of each land treatment measure. Installation of accelerated land treatment measures will be pursued in a systematic manner beginning the first year and carrying through the project installation period. During the first two years of project installation, most land treatment activity will be confined to information, promotion, and development of conservation plans. All cost shared measures will have been installed at the end of 5 years with 2 years contracted management practices following.. Table B shows the anticipated expenditure of funds by fiscal year.

TABLE B - Installation Schedule

PL83-566 MOXEE WATERSHED, WA.

Year	PL83-566 Installation Cost	Technical Assistance	Project Admin.	Total PL83-566	Other Installation and Project Admin.	Other Technical Assistance	TOTAL Other
1995	$1,575,000	$48,750	$115,000	$1,738,750	$963,300	$32,500	$995,800
1996	$787,500	$48,750	$57,500	$893,750	$431,700	$32,500	$464,200
1997	$472,500	$48,750	$11,500	$532,750	$76,000	$32,500	$108,500
1998	$61,250	$19,500	$11,500	$92,250	$74,500	$13,000	$87,500
1999	$61,250	$9,750	$11,500	$82,500	$74,500	$6,500	$81,000
2000	$0	$9,750	$11,500	$21,250	$0	$6,500	$6,500
2001	$0	$9,750	$11,500	$21,500	$0	$6,500	$6,500
TOTAL	$2,957,500	$195,000	$230,000	$3,382,500	$1,620,000	$130,000	$1,750,000

Responsibilities for installation:

Installation of land treatment measures is the responsibility of individual landowners and/or operators.

Installation and financing

Project measures will be installed by individual owners and operators under contracts beginning in 1994, between the individual owners or operators and the Soil Conservation Service. Technical and financial assistance, in addition to that already available in the watershed, will be provided under Public Law 83-566. Financial cost-sharing assistance for project measures will be provided (1) on the basis of cost effectiveness, (2) at a rate amended, (3) policy statements of the Secretary of Agriculture and the Chief of the Soil Conservation Service, and (4) in accordance with sound fiscal management of financial assistance under the Public Law 83-566. The Washington Department of Fish and Wildlife will utilize the $17,500 wetland mitigation funds.

Contracting

All cropland treatment measures receiving PL83-566 cost-sharing assistance for installation will be installed in accordance with provisions of a conservation contract between SCS and individual landowners and/or operators for measures installed on land which these individuals own or control. The 44 contracts will be for a period of not less than 3 years nor more than 7 years in length. The contracts will continue for at least two years following the installation of the final cost-share item. Land treatment measures will be included in each conservation contract on the basis of their cost effectiveness. Non cost-shared measures will be required as a condition for cost-share assistance where such measures are necessary for the planned project. Non cost-shared practices may be applied concurrently with cost-shared practices.

Cost-share payments will be made by SCS after an eligible unit of the conservation measure has been completed and certified. The participant must file a claim for payments.

All contracting or arrangements for installation of measures are the responsibility of individual landowners and/or operators. All works of improvement will be installed in accordance with the applicable local, State, and Federal regulations with specific reference to standards and specifications of the SCS. All land disturbed by construction activities will be shaped and vegetated. Plant selection will be made during the installation phase in consideration of season, soil type, adjacent vegetation, and sponsor preferences.

Landrights

Landowners and/or operators have responsibility for obtaining any permits, landrights, licenses, or water rights needed to perform planned work.

Other agencies

The ASCS will continue to provide funding for eligible measures through the Agricultural Conservation Program (ACP) contingent upon appropriation of funds for this purpose. The Yakama Tribe is doing both habitat and population evaluations in the Parker Reach which is complimentary to the NYCD sediment monitoring program in the Moxee Drain. Other State and Federal agencies are continuing on-going water quality studies. The Washington State Department of Fish and Wildlife will utilize the habitat restoration and land acquisition funds for the project's wetland mitigation.

Cultural resources

A cultural resources survey of the watershed indicated that there are no cultural resources of national register significance. In the event that archaeological and historical properties are discovered during the installation of measures, the procedures in SCS's General Manual, Title 420, Part 402 (October 1983) as amended, will be utilized.

Financing

Project installation costs allocated to PL83-566 funds will be paid from funds appropriated under authority of PL83-566, 83rd congress, 68 Stat. 666, as amended. NYCD, organized under Washington State Law, is empowered to enter into agreements and contracts, to sue and to be sued, and to carry out soil and water conservation programs. NYCD and landowners and operators have participated in cost-sharing decisions. They have given assurance that their portion of the estimated costs for installing land treatment measures, land rights, and project administration will be borne by individual landowners or operators with such assistance as may be available from state or county funds, or from ASCS through applicable provisions of the Rural Development Act of 1972.

Conditions for providing assistance

This plan does not constitute a financial document for obligation of PL83-566 or other funds. Financial or other assistance furnished by SCS in carrying out the plan is contingent upon appropriation of funds for this purpose. Any practices not considered to be an annual practice such as terraces, grassed waterways, etc., and which were previously installed with cost-sharing under Federal programs, will not qualify for accelerated financial assistance under the project unless they have exceeded the normal useful life with proper maintenance. In addition, any specific land treatment activity described in this plan, will not receive PL83-566 cost-share assistance in any year that comparable cost-share assistance is available under existing programs in the watershed.

Operation and maintenance

The operation, maintenance, and replacement of measures will be the responsibility of the landowner. An operation and maintenance (O&M) agreement will be executed prior to signing a project agreement in accordance with the O&M plan which will be prepared during project design. The average annual cost for operation and maintenance is $5,000.

Inspection and reviews

Active contracts are to be reviewed annually on the land and with the cooperators to assess current conditions and progress in carrying out the plan/schedule of operations. The final review of a contract must be made with the cooperator at least 90 days before the contract expires. Reviews are to be made by an SCS employee.

Even though SCS employees may visit a farm or ranch under contract one or more times during a year, the annual review should be the occasion for careful evaluation of the cooperator's needs and problems and the status of his contract and operations. Following are some of the areas which should be checked and findings recorded.

(1) Maintenance of practices previously applied.
(2) Application of practices scheduled in the current year.
(3) Need for changes in time schedule or practices.
(4) Adequacy of applied conservation practices in relation to erosion control achieved.
(5) Determine whether land under contract is still under the cooperator's control.

TABLE 1- Estimated Installation Cost

MOXEE WATERSHED, WA.
(Dollars) 1/

			Estimated cost (dollars)1/		
Installation Cost Item	Unit	Number Total	Public Law 83-566 Funds Total	Other Funds Total	Total
Land treatment-Accelerated Evaluation Unit					
Irrigation system, Trickle 3/,4/,5/	acre	4,550	2,957,500	1,610,000	4,567,500
Technical Assistance			195,000	130,000	325,000
Subtotal-Accelerated			3,152,500	1,740,000	4,875,000
Project Administration			230,000	10,000	240,000
TOTAL PROJECT			3,382,500	1,750,000	5,132,500

September 1994

1/ Project price base April 1994
2 / Federal agency responsible for assisting in installation of works of improvement
3/ Irrigation nutrient, and pesticide management required with trickle systems, cost included in on-farm operation cost.
4/ Other practices may be substituted on some minor acreage
5/ Includes $0 of Public Law 83-566 funds and $17,500 of other funds for wetland mitigation measures.

TABLE 4 - Estimated Average Annual NED Cost

MOXEE WATERSHED, WA.
(Dollars) 1/

Evaluation Unit	Project Outlays		TOTAL
	Amortization of Installation Costs	Operation maintenance, and replacement cost	
Land Treatment Accelerated	481,000	5,000	486,000
GRAND TOTAL	481,000	5,000	486,000

September 1994

1/ Price Base 1994, amortized over 25 years at a discount rate of 8 percent.

2/ Cost for technical assistance to install associated measures and financially assisted accelerated land treatment in this evaluation unit are included.

TABLE 5a - Estimated Average Annual Watershed Protection Damage Reduction Benefits

MOXEE WATERSHED, WA
(Dollars) 1/

Item	Damage Reduction benefit average annual - agriculture - related
On-site reduced cost Land voiding and depreciation 3/ Water conservation 2/ Maintaining productivity 3/ Other reduced cost operation cost	 1,180,000 97,500
Sub-Total	1,277,500
Off-site/Public Water Conservation Maintaining productivity for future generations 3/ Fish and wildlife 3/ Water conservation 3/	
GRAND TOTAL	**1,277,500**

September 1994

1/ Price base 1994.

2/ 40 percent increase in on-farm efficiency. In water short years increased efficiency will allow more normal production. Water should be available for downstream use in years with average or above water supply.

3/ Benefits exist but they have not been monetarily evaluated

TABLE 6 - Comparison of NED Benefits and Cost

MOXEE WATERSHED, WASHINGTON
(Dollars) 1/

Evaluation Unit	Agriculture-related Damage Reduction	Average Annual Benefits 2/	Average Annual Costs 3/	Benefit Cost ratio
Land Treatment-acres	1,227,500	1,227,500	486,000	2.5:1
TOTAL	1,227,500	1,227,500	486,000	2.5:1

September 1994

1/ Price base 1994.
2/ From Table 5a
3/ From Table 4

LIST OF PREPARERS
PL83-566 MOXEE WATERSHED

Name	Present Title (time in job)	Education (degree)	Experience Other Titles (Licenses)
Ken King	Manager-6	YVCCA WSU	SCS-ENG TECH-16 SCS-208 W/Q PROJECT PLANNER-1 CSM W/Q PROJECT LEADER-3 SCS-IWM PROJECT I SCS-COLORADO RIVER SALINITY CONTROL PROJECT A2-3
Michael Tobin	Resource Con-6	YVCCA WSU-BS	DELIVERY/PRODUCTION PROMOTION AG.MECH. AG. EQUIPMENT-3
Jackie Whitnall-Craven	Secretary	YVCCA	SECRETARY / 6 SELAH IRRI. DIST SECRETARY - BOISE CASCADE /1
Ray Wondercheck	D.C. YAKIMA F.O.	UN-BS	SCS-D.C.-NEBRASKA-2 AGRON.D.C.-ARIZONA-6
Larry Edmonds	Ag. Econ.	OSU-BS	SCS-23
Larry Cooke	Environmental Spec.-2	BS-NAT. RES.MGT.	D.C.-14 SOIL CON.-2 CERT.SOIL CON.PEST TECH-2 CONES I

The Watershed plan and environmental assessment has been reviewed and concurred in by state staff specialists having responsiblity for engineering, soils, agronomy, range conservation, biology, forestry, geology, and water quality.

The West National Technical Center (WNTC) has reviewed and concurred on the technical aspects of the plan and environmental assessment.

REFERENCES

The Moxee Watershed Plan has been developed utilizing information contained in the following reports.

Final report for the "Moxee/Naches Water Quality Project" prepared by NYCD.

Final report for the "Moxee BMP Implementation and Demonstration Project" prepared by NYCD.

Ref-38 "Comprehensive Water Conservation Plan" prepared by Moxee Irrigation District.

"Yakima River Basin Management Plan" prepared by Yakima Valley Council of Governments.

"Nonpoint Source Pollution Assessment and Management Plan-1989" prepared by Washington Department of Ecology.

Field Inventories by SCS.

Maps and cooperator list by ASCS.

NAWQA reports and datum (national water quality assessment) by USGS.

During the development of this information the following individuals have assisted the NYCD board of supervisors in developing this information.

Max Linden, Department of Ecology, NPS Pollution Supervisor Central Region Office.

Kahle Jennings, Department of Ecology, 319
Coordinator, Olympia.

Rich Van Horn, Hop Growers of Washington, President
Ann George, Hop Growers of Washington, Manager
Brian Miller, ASCS, Executive Director.
Richard Halverson, ASCS County Committee.
Mary Ann Bonny, ASCS
Jean Allen, ASCS
Onni Perala, Bureau of Reclamation, Boise
Don Schram, Bureau of Reclamation, Yakima Project Office.
Thomas Ley, WSU Cooperative Extension, Prosser
Marc Desmarais, Fowler Ditch Company, President/farmer
Lee Gamache, Moxee Irrigation District, President/farmer
Montgomery Irrigation

The following producers have provided input into the development of the plan:

Roy Farms	Jeff Gamache Farms	Harris Farms
Desserault Ranch	Van Horn Farms	Desmarais Ranch
East Valley Farms	Sundquist Orchards	Albert Mulford
Larry Hattrup	Wes Den Beste	Steve Den Beste
Fred Den Beste	Lyle Brulotte	Firewater Ranch
Morrier Ranch	Charron Farms	GLD Farms
Fred Lenseinge	Cascade Hop Ranch	Loftus Ranches

INDEX

APPENDIX A: CONSULTATION WITH OTHER AGENCIES

1. State of Washington, Department of Ecology

2. U.S. Department of Interior, Fish and Wildlife Service

3. Washington State University, Cooperative Extension.

STATE OF WASHINGTON
DEPARTMENT OF ECOLOGY
3601 W. Washington • Yakima, Washington 98903-1164 • (509) 575-2800

received 10/3

September 30, 1994

Lynn A. Brown
Soil Conservation Service
Rock Pointe Tower II, Ste 450
W. 316 Boone Ave
Spokane WA 99201-2348

SUBJECT: Comments on Moxee Watershed Draft Plan and Assessment Report Dated August 12, 1994

The following comments are offered for your consideration:

1. The operation and maintenance agreements should contain wording to the effect that water saved through conservation cannot be used to add new areas of irrigation. The saved water is to remain in the conveyance system, storage, or the river system. If possible, the plan should include a way to measure the areas irrigated before and after drip system installation.

2. If possible, the plan should include a means to measure improvements in water use efficiency. This project presents a unique opportunity to contribute to the body of research concerning buried drip irrigation systems.

Thank you for the opportunity to comment.

Sincerely,

Timothy D. Reierson

Tim Reierson
Water Resources Program

940937ska

NYCD and SCS Response to Department of Ecology:

Concern 1:

The Moxee Watershed Plan has been formulated to improve habitat of Parker Reach of the Yakima River for Fall Chinook Salmon. Reducing sediment and the associated nutrients and pesticides seventy percent will allow the egg-to-fry survival rate of these salmon to double. The project will reduce sediment to the Yakima River 4,000 tons each year. References to off-site water savings have been removed.

Farms in the Moxee Watershed have experienced critical irrigation water shortages in recent years. The increase in irrigation efficiency will assist producers to meet the water requirements of existing crops. Project benefits have been claimed for this improved efficiency. PL83-566 funds will not be used to bring new acreage into production. All land treatment contracts require the producers obtain all necessary permits be acquired. The plans also require the produce meet all state and federal laws and regulations.

The disposition of water in irrigation district canals is a matter of concern between the irrigation districts and the State. The Moxee Watershed conservation contracts require on-farm irrigation water management, nutrient management, and pesticide management. Additional requirements for the disposition of water not delivered to the farm is beyond program and contract limitations. References to off-site water savings have been deleted from the plan.

Concern 2:

We will relay your interest in water use efficiency to Bob Stevens, WSU. WSU is in a better position to respond to this research issue than SCS of NYCD.

United States Department of the Interior

FISH AND WILDLIFE SERVICE
Ecological Services
3704 Griffin Lane SE, Suite 102
Olympia, Washington 98501-2192
(206) 753-9440 FAX: (206) 753-9008

September 27, 1994

Lynn A. Brown, State Conservationist
Soil Conservation Service
Rock Pointe Tower II, Suite 450
W. 316 Boone Ave.
Spokane, WA 99201-2348

Dear Mr. Brown:

This is in response to your August 15, 1994, letter regarding the draft Moxee Watershed Plan and Environmental Assessment (Plan). The emphasis of the draft Plan is to convert 5,250 acres of furrow irrigated hops and vineyards to buried trickle irrigation systems. The stated goals of the draft Plan are to conserve irrigation water, improve water quality of irrigation return flows to the Yakima River, protect ground water quality, and enhance Yakima River stream flows. The U.S. Fish and Wildlife Service (Service) provides the following comments and recommendations for your consideration.

The Service supports the draft Plan and concurs with the potential water quality benefits which would accrue from implementing the proposed measures. However, we believe there are two issues that need to be addressed more fully in the final Plan. These issues include the impacts of the proposed plan on existing wetland resources and the fate of any water conserved due to improved irrigation efficiency.

As noted on page 26 of the draft Plan, the majority of the 838.85 acres of wetlands in the watershed are located downstream of the furrow irrigated area. The National Wetland Inventory maps included in the draft Plan identify many wetlands in and near drainageways. With full implementation of the draft Plan, irrigation tailwater moving through the drainageways would be reduced from the current 18,860 acre-feet to 2,500 acre-feet (page 30 of draft Plan). The large reduction in return flows would have some adverse impacts on wetlands located in, or associated with, the drainageways downstream of the proposed project. We assume many of these drainageways and associated wetlands would receive no tailwater once the buried trickle irrigation systems are installed. This may eliminate some of these wetlands. Reducing the hydrology to other

wetlands could reduce their size, change their plant composition, and/or change their functions.

The potential for negative effects to wetlands from the tailwater reduction is mentioned on page 30 of the Plan. However, other references to wetlands in the Plan either indicate there would be no negative impacts or there would be positive effects due to reduced sedimentation. While the Service agrees that reducing erosion and pollutant runoff would have potential beneficial effects on wetlands, negative impacts could also accrue with plan implementation.

As you are probably aware, wetlands are an important component of the landscape. They serve several functions including water quality improvement, groundwater recharge, recreation, and wildlife habitat. Many efforts are being made to protect, restore, and maintain these important areas. Also, various laws, initiatives, and policies, designed to protect wetlands, such as Executive Order 11990 and Section 404 of the Clean Water Act, are now in place. Therefore, wetland losses due to the proposed plan implementation should be avoided and minimized, where practicable, and any unavoidable losses should be fully compensated by replacement wetlands. This would ensure that these important areas continue to provide valuable functions and can assist the proposed Watershed Plan in achieving its goals of improving the water quality of the Yakima River and the groundwater.

The final Plan should identify the type, location, and size of wetlands which would no longer receive tailwater flow following implementation of the Plan. It should identify the same information for wetlands which would receive reduced flows following Plan implementation. The final Plan should also address how impacts to wetlands could be avoided and minimized, and how any remaining losses would be compensated. This should include a mitigation plan which details the location of mitigation sites, specific information on how wetlands would be created or restored, a monitoring plan, success criteria, and a contingency plan should the success criteria not be met.

The draft Plan states that the water conservation achieved as a result of the proposed project would enhance flows in the Yakima River (pages 24 and 25 of the draft Plan). While the proposed project would result in land on the affected area being irrigated with a small fraction of the volume of water currently used, it is unclear what regulatory mechanism or incentive would be used to ensure that the conserved water is left in the river to enhance flows. For example, it is not clear whether the water rights of those participating in the plan would be reduced as a result of the water conservation or whether any conserved water would be available for appropriation by junior water right holders. If water rights are not reduced or the conserved water is withdrawn by others, then no benefits to the river may occur. The final Plan should address this issue because it may negate the potential to enhance flows in the Yakima River, as claimed in the draft Plan.

We appreciate the opportunity to provide these comments for the draft Moxee Watershed Plan and Environmental Assessment. If you have any questions regarding these comments, please contact Don Haley or Dave Kaumheimer at our Moses Lake office (509-765-6125).

Sincerely,

Nancy J. Gloman

for David C. Frederick
State Supervisor

dh/jmc
c: FWS, Portland (Jay Watson)
WDFW, Yakima (Ted Clausing)
EPA, Seattle (Dick Clark)
North Yakima Conservation District, Yakima (Mike Tobin)
Yakama Indian Nation, Toppenish (Jerry Meninick)

NYCD and SCS response to United States Department of the Interior, Fish and Wildlife Service:

Wetland concern

A description of wetland effects has been added to the Rationale for Plan selection section. Potentially, six acres of artificial wetlands located in small tailwater channels could be lost as the tailwaters are eliminated from the converted fields. The Washington State Department of Fish and Wildlife's habitat restoration and land acquisition program will receive about $17,500 from NYCD to mitigate the habitat. This mitigation plan was agreed to by SCS, NYCD and U.S. Fish and Wildlife Service.

Water Conservation Concern:

References to off-site water savings have been removed.

Frank

COOPERATIVE EXTENSION

Washington State University

WSU Prosser

Rt. 2, Box 2953-A
Prosser, WA 99350-9687
509-786-2226 / FAX 509-786-4635

October 3, 1994

Mr. Lynn A. Brown
State Conservationist
Soil Conservation Service
Rock Pointe Tower II, Suite 450
W.316 Boone Avenue
Spokane, WA 99201-2348

Dear Lynn:

On behalf of Washington State University I would like to thank you for the opportunity to provide input into the proposed project "Moxee Watershed Draft Watershed Plan and Environmental Assessment" prepared by the North Yakima Conservation District and Soil Conservation Service. Although I have had several conversations with your field staff in both Yakima and Spokane, I would like to provide a few written comments.

I strongly support the conversion of furrow irrigated hops to buried drip systems. This conversion has the potential to significantly improve water use efficiency and prevent surface water quality degradation. Buried drip also has the potential to reduce groundwater contamination with nutrients such as nitrate.

As I have indicated to you staff, I also support the implementation of management tools that will help assure maximum benefit from the proposed buried drip systems. Although we have only a small data base to help develop guidelines, research on the management of buried drip systems is ongoing. I would suggest that soil samples be used to develop a baseline for nutrient management. There are still several questions to be answered with regards to the optimum sampling procedure for buried drip. I believe that we will develop a method in the near future. Petiole sampling should be implemented to allow the producer to monitor the nitrogen supply to the crop. Individual producers will need to develop their own data base under their management conditions.

I would strongly recommendation that an educational program be considered as part of this watershed plan. Buried drip irrigation systems must be managed properly if the water savings and

groundwater protect benefits are to be realized. Those of us at WSU-Prosser working with buried drip systems would be willing to help put together this type of educational effort. I believe that it is important for producers to have a good working knowledge of how the system is designed to work and how miss management can lead to problems. I would be glad to help either SCS or NYCD put this training together.

Once again, I strongly support this effort and am pleased to work with your staff to increase the return on investment. If I can be of any additional assistance please let me know.

Sincerely,

Robert G. Stevens
Extension Soil Scientist

cc.
Rob McDaniel
Frank Easter
Renu D. Arjal
Jeff Graham

NYCD and SCS response to WSU concerns:

WSU's recommendation has been added to the land treatment contract specifications.

We agree with the importance of an education program. NYCD's current HUA information, education program will be used for program implementation. WSU's involvement will be gladly received.

APPENDIX C - COMPLIANCE OF THE RECOMMENDED PLAN WITH WRC-DESIGNATED ENVIRONMENTAL STATUTES

Moxee Watershed, Washington

FEDERAL POLICY	COMPLIANCE
1. Archaeological and Historical Preservation Act, 16 USC 469, et seq.	full comp.
2. Clean Air Act, as amended, 42 USC 1857h-7, et seq.	N/A
3. Clean Water Act(Federal Water Pollution Control Act), 33 USC 1251, et seq.	full comp.
4. Coastal Zone management Act, 16 USC 1451, et seq.	N/A
5. Endangered Species Act, 16 USC 1531, et seq.	full comp.
6. Estuary Protection Act, 16 USC 1221, et seq.	N/A
7. Federal Water Project Recreation Act, 16 USC 460-1(12), et seq.	N/A
8. Fish & Wildlife Coordination Act, 16 USC 661, et seq.	full comp.
9. Land & Water Conservation Fund Act, 16 USC 4601-4601-11, et seq.	N/A
10. Marine Protection, Research & Sanctuary Act, 33 USC 1401, et seq.	N/A
11. National Environmental Policy Act, 42 USC 4321, et seq.	full comp.
12. National Historic Preservation Act, 16 USC 470a, et seq.	full comp.
13. Rivers & Harbors Act, 33 USC 403, et seq.	N/A
14. Watershed Protection & Flood Prevention Act, 16 USC 1001, et seq.	full comp.
15. Wild & Scenic Rivers Act 16 USC 1271, et seq.	full comp
16. Farmland Protection Policy Act, 7 USC 4201, et seq.	full comp.

a. Full Compliance- Having met all requirements of the Statute for current stage of planning (either pre-authorization or post authorization).

b. Not Applicable- No requirements for the Statute compliance for the current stage of planning.

APPENDIX C
INVESTIGATION AND ANALYSIS - ENDANGERED SPECIES

LISTED AND PROPOSED ENDANGERED AND THREATENED SPECIES AND CANDIDATE SPECIES WHICH MAY OCCUR WITHIN THE VICINITY OF THE PROPOSED MOXEE WATERSHED RESOURCE INVENTORY PROJECT NEAR YAKIMA, IN YAKIMA COUNTY, WASHINGTON
(T12N I; T13N I)
FWS Reference: 1-3-94-SP-482
LISTED
Bald eagle (Haliaeetus leucocephalus) - wintering bald eagles may occur in the vicinity of the project from about October 31 through March 31.
Major concerns that should be addressed in the biological assessment of project impacts to bald eagles are:

1. Level of use of the project area by bald eagles.
2. Effect of the project on bald eagles primary food stocks and foraging areas in all areas influenced by the project.
3. Impacts from project construction and implementation (e.g., increased noise levels, increased human activity and/or access, loss or degradation of habitat) which may result in disturbance to eagles and/or their avoidance of the project.

PROPOSED
none
CANDIDATE
The following candidate species may occur in the vicinity of the project:
Bull trout (Salvelinus confluentus)
Ferruginous hawk (Buteo regalis)
Loggerhead shrike (Lanius ludovicianus)
Western sage grouse (Centrocercus urophasianus phaios)

FEDERAL AGENCIES' RESPONSIBILITIES UNDER SECTIONS 7(a) AND 7(c) OF THE ENDANGERED SPECIES ACT OF 1973, AS AMENDED

SECTION 7(a) - CONSULTATION/CONFERENCE

Requires:

1. Federal agencies to utilize their authorities to carry out programs to conserve endangered and threatened species:

APPENDIX C - INVESTIGATION AND ANALYSIS - OTHER STUDIES

The majority of the formulation of the watershed plan occurred during the Moxee Drain BMP Implementation Demonstration Project completed September 1993. The table of contents of the completion report is included.

This study was followed by the Moxee Drain Irrigated Agriculture BMP Implementation Project 1994-1998 which is underway now. This Plan included treating 4,550 acres of furrow irrigated ground. PL83-566 has been used as the vehicle to implement this on-farm treatment section of the Project.

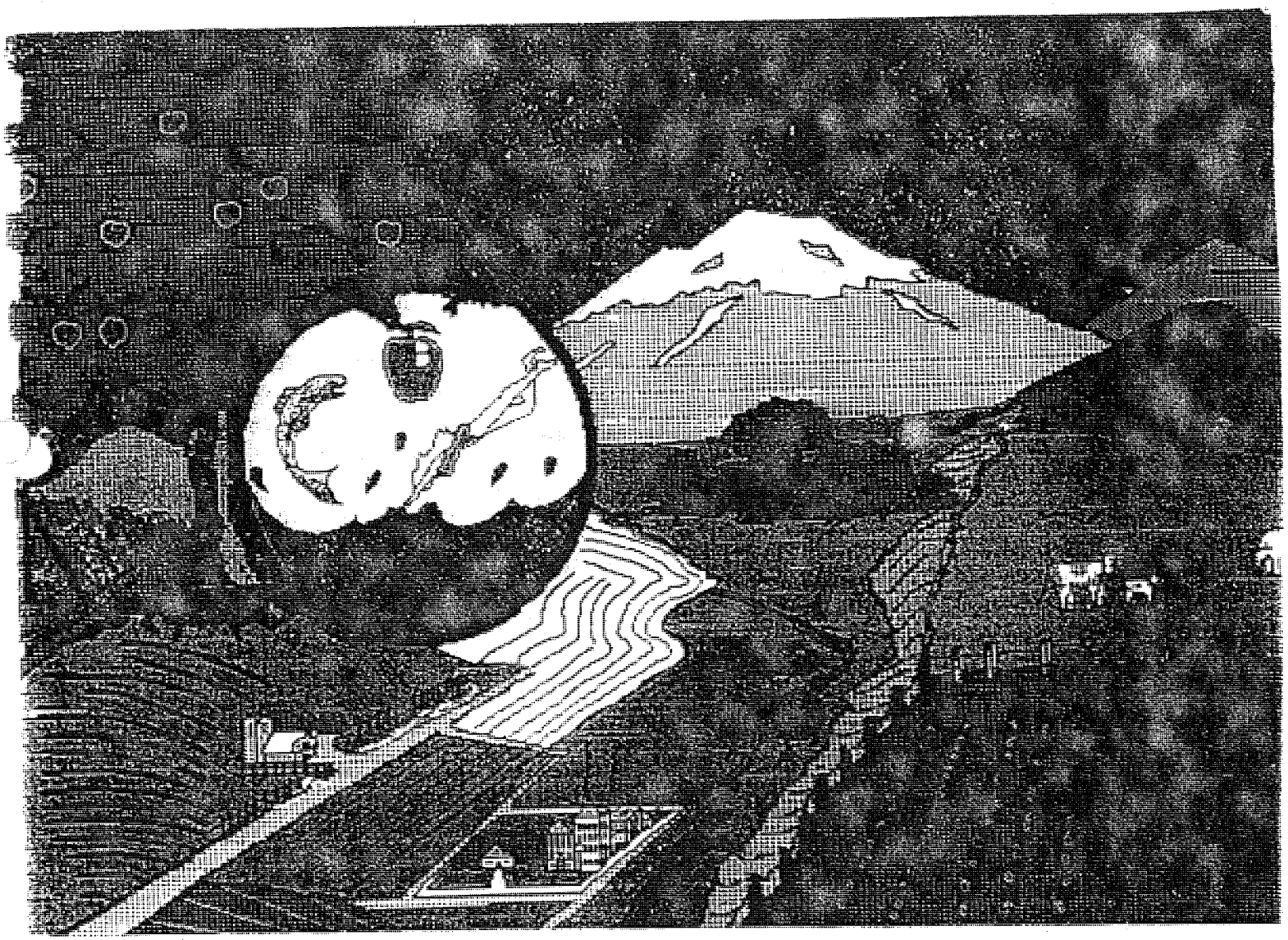
The Moxee/Naches Water Quality Project 1989-1991 Table of Contents is also included.

MOXEE DRAIN IRRIGATED AGRICULTURE

BMP IMPLEMENTATION PROJECT

1994 - 1998

Revised: August 1993



Sponsored By:

North Yakima Conservation District

MOXEE DRAIN IRRIGATED AGRICULTURE
BMP IMPLEMENTATION PROJECT
Work Plan
Revision August, 1993

DESCRIPTION

The Moxee Drain carries the primary return flow of surface water to the Yakima River from the entire Moxee Hydrologic Unit. The Moxee Drain has been identified in the Washington Department of Ecology publication "Nonpoint Source Pollution Assessment and Management Program", dated October 1989. The Yakima River, in this area, has been identified as a "Threatened Waterbody."

The Moxee Hydrologic Unit has been identified by NYCD, SCS and acknowledged by Ecology and USGS as a significant contributor of pollutants to the Yakima River. The Moxee area is also identified in the same context in the Yakima River Basin Management Plan currently being developed by the Yakima County Council of Governments. (May be an approved plan by the time this application is reviewed).

The North Yakima Conservation District (NYCD) and Soil Conservation Service (SCS) have identified the primary problem area, in the Moxee Valley, as being the furrow irrigated cropland and the inadequate return flows management facilities.

NYCD, in three previous Moxee projects, has documented the problem areas identified above. In the first project 1988-1989, funded by a Conservation Commission Water Quality Grant, a partial inventory of water quality problems was developed and a program of building a rapport with Moxee water users was carried out. In the second Project 19891991 innovation of a cultural practice (furrow mulching), completely new to the area, was demonstrated by NYCD. The Project was very successful in many ways and is documented in the Project completion report. The third project was designated by NYCD Supervisors to demonstrate the almost completed "Moxee BMP Implementation and Demonstration Project"(319). This project area was selected to model, on a small scale, the pros and cons of a Hydrologic Unit Treatment Demonstration Project. An interim report and subsequent water monitoring of this Project indicates a very large degree of success in regard to water quality improvement, in local producer's participation and in NYCD's capabilities to sponsor and administer these natural resource related activities.

In recent years a great deal of study and analysis has been done on the Moxee basin by DOE, USGS, NYCD, BOR and WSU Extension. NYCD has agreed to sponsor and administer a multi-entity involvement Project to implement BMP's utilizing the following concepts; hydrologic unit treatment; conservation districts capabilities; voluntary incentive cost-share programs; intensive technical assistance to land users; cooperative activities between many natural resource oriented entities.

Results, both pro and con, from this Implementation Project would be directly applicable to other problem areas of the Yakima River Basin such as Wilson Creek, Sulfur Creek, Granger Drain etc., all of which have been identified as water quality problem areas. The results of Hydrologic Unit Planning would be applicable, at least in context, to most any other small watersheds of the United States, particularly where irrigation is involved.

DETAILED TASK DESCRIPTIONS

TASK 1: WATER QUALITY/WATER CONSERVATION PLANNING (ON-FARM)

Irrigated Land

NYCD will provide supervision, coordination, employee training and farm plan approval throughout the proposed Project. All SCS standards and specifications will be adhered to in all planning activities.

All Farm Plans will be reviewed by the DOE/NYCD liaison person as was done in the recent 319 Demonstration Project.

Two types of Farm Plans will be developed, Long Term Agreements and Annual Plans, as defined by SCS and ASCS. Group Plans (Pooling Agreements) may be developed when and where this approach is appropriate.

All Farm Plans will emphasize water quality improvement Best Management Practices (BMP's), however all BMP's relating to protecting the resource base will be incorporated into the Farm Plans. Consideration will also be given to ground water effects. Ground water problems will be pursued when encountered.

Farm Plans will identify problems, alternative solutions, selected BMP's and funding sources for implementation and schedule of implementation.

It will be the goal of NYCD to revise and/or develop Farm Plans for 1,500 acres of irrigated farm land each year, beginning in fiscal year 1994.

Existing SCS Farm Plans will be updated, modified or redeveloped as appropriate. As the Farm Plans are developed they will be incorporated into the SCS, Yakima Field Office Farm Plan files.

Non-Irrigated Land

Dryland acreage in the Project Hydrologic Unit is approximately 78,250 acres. NYCD, with SCS assistance, will develop, modify or update Farm Plans on dryland as appropriate and in accordance with the current Farm Bill criteria. For Project purposes, these plans will be readdressed or developed with water quality and erosion control BMP's emphasis.

At least sixty percent of the dryland will be addressed in these Farm Plans (Range Plans) which is approximately 56,662 acres.

DRYLAND OWNERSHIP	Acres
U.S. ARMY (YTC)	18,240
BLM	3,500
DNR	2,880
PRIVATE	50,930

Other Lands

Two Farm Plan folders will be developed for Yakima County. One will address County Jurisdictions of the Health Department and one will address public work's jurisdictions. These two plans will identify water quality related problem areas and recommend the appropriate BMP Implementation.

If Project planning activities encounter water quality related problems in the metropolitan areas of Moxee City and Terrace Heights, a Farm Plan folder similar to the County folder will be developed for each of them.

Washington State Department of Transportation is currently planning for highway improvements and modifications within the Project area. NYCD will coordinate all applicable Project activities with the Highway Department and make appropriate recommendations when and where water quality concerns may be applicable.

TASK 2: WATER QUALITY/WATER CONSERVATION BMP IMPLEMENTATION (ON-FARM)

The Moxee Hydrologic Units (H.U.) consists of approximately 97,930 acres located in the East Central portion of Yakima County. The entire H.U. drains into the Yakima River at the Southerly end of Union Gap.

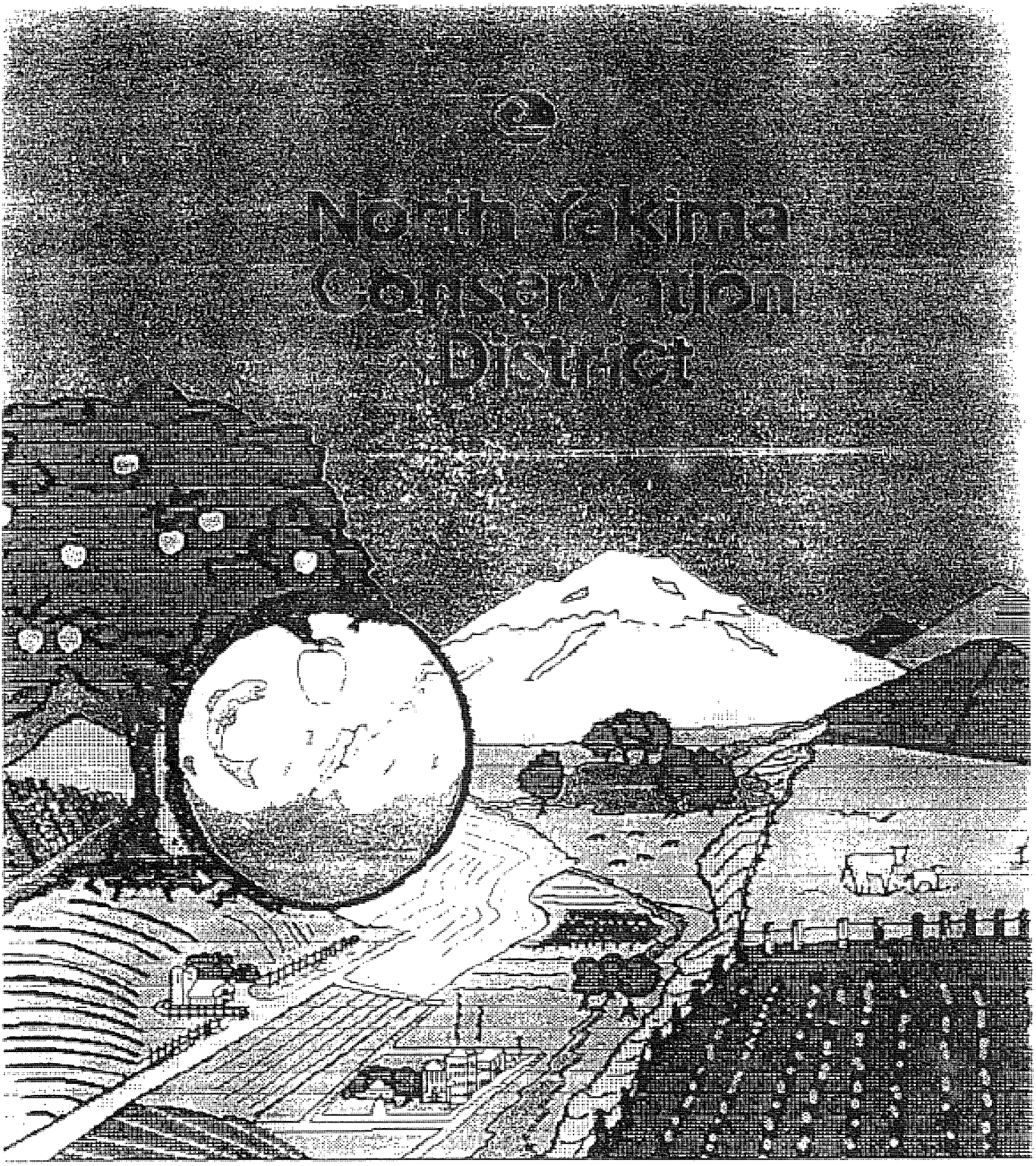
The total acreage consists of:

Irrigation District Land ----------	14,980 acres
Deep Well Irrigated Land ------	4,700 acres
Dry Cropland ----------	2,700 acres
Dry Rangeland ----------	75,550 acres

It is the goal of the Project to implement BMP's on 65% of all H.U. land with emphasis being placed in the following order:

		BMP Implementation Goal
1.	Furrow irrigated Land (approx 7,000 acres)	4,550 acres
2.	Tailwater management systems (approx. 70 farm units)	45 each
3.	Other irrigated land (7,980 acres)	5,187 acres
4.	Dry cropland (2,700 acres)	1,755 acres
5.	Rangeland (75,550)	49,108 acres

Two Cost-Share, Voluntary Incentive Programs, will be utilized to stimulate farmer participation and BMP implementation. ASCS will initiate a "Special Project" designation for the H.U. and planning emphasis will be directed towards Long Term Agreements, utilizing the current ACP handbook of Yakima County Practices and cost-share rates.



MOXEE DRAIN BMP IMPLEMENTATION DEMONSTRATION PROJECT

COMPLETION REPORT

September 1993

1.0 Executive Summary

North Yakima Conservation District's "Moxee Drain BMP Implementation Demonstration Project" was designed to demonstrate that intensive Best Management Practice (BMP) applications would improve water quality. Working together, NYCD and the Washington State Department of Ecology were able to carry out this project. Funding for project activities was granted from the Environmental Protection Agency to implement Ecology's Clean Water Act Section 319 nonpoint pollution program.

Project design consisted of six components: Farm planning, BMP Implementation, Water Quality Monitoring, Cost-Share Program, Information and Education Program and Project Administration. These components were designed to all work together by complementing one another or to stand alone as individual activities.

Ecology's role in the project was to administer the program to NYCD, and through Ecology's Environmental Investigation Laboratory Service, assist in design and implementation of the Water Quality Monitoring Component. NYCD's role was to be responsible for the project and assure it's effective and efficient implementation and administration.

NYCD's selection of the project area was based on irrigation and cropping patterns; diversity of soil and slope; and hydraulic characteristics. This sub-basin best represented current agricultural and land uses as well as the Water Quality Problems and Impaired Uses of the Moxee Hydrological Unit.

Project highlights include 87% of irrigated land treated, 91% of individually identified BMP's implemented, and 89% producer participation. Farmer acceptance of Best Management Practices was excellent and expanded to other areas. Monitoring showed that implemented BMP's improved water quality, however, many external factors effected these results.

As a result of this project North Yakima Conservation District Board of Supervisors has taken the direction of expanding the project's concepts to the entire Moxee Hydrological Unit (#17030003-120). It is presumed that the results gained in this demonstration project can be duplicated through a multi-year, multi-agency effort toward significant improvement of water quality of the Moxee Hydrologic Unit.

Moxee Drain BMP Implementation Demonstration Project

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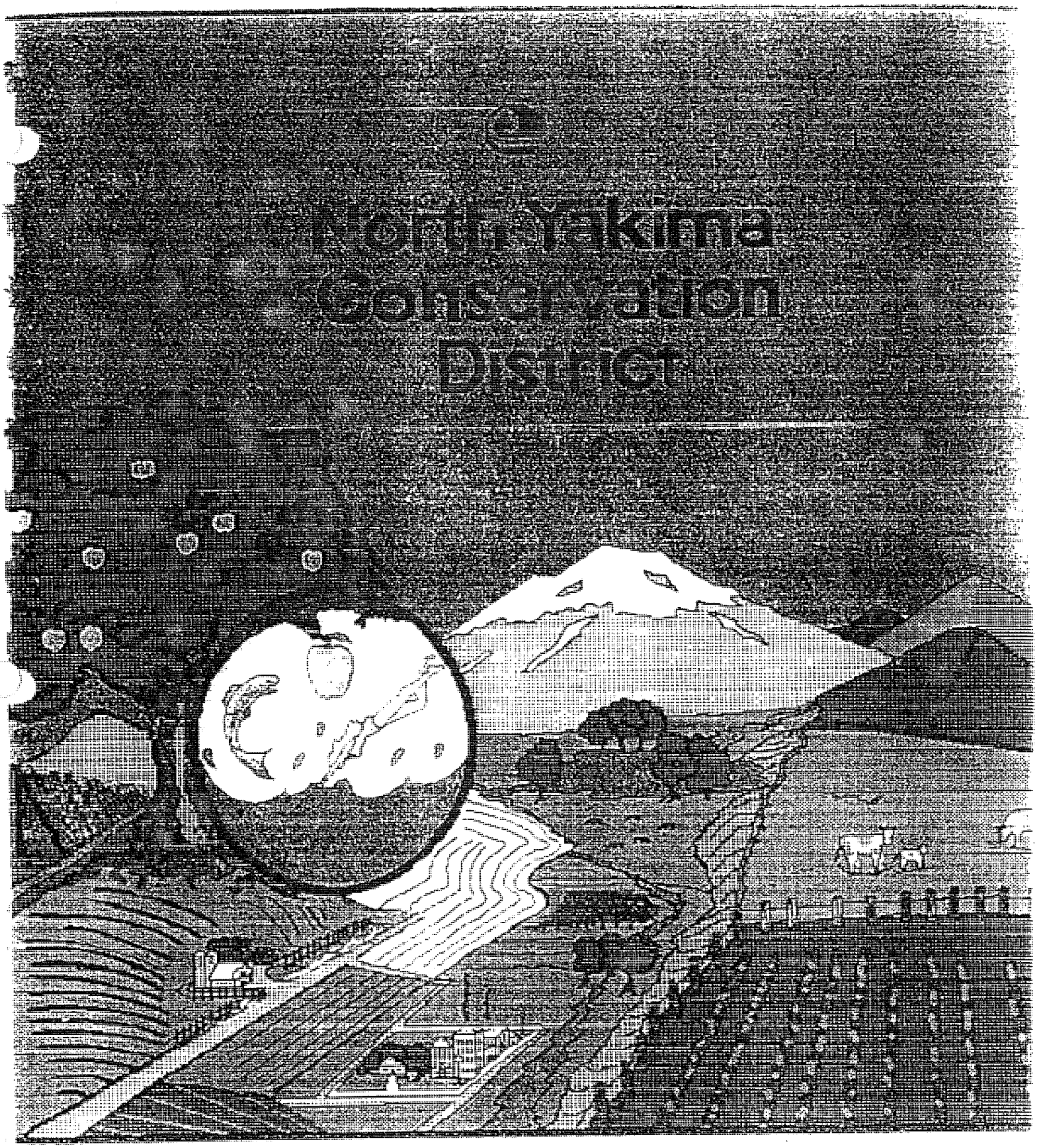

FINAL REPORT

MOXEE/NACHES WATER QUALITY PROJECT

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CHAPTER 1

INTRODUCTION

BACKGROUND

Yakima County is in the South Central area of Washington State. It consists of privately owned land and land owned and managed by the USDA Forest Service, Bureau of Land Management, the Washington Department of Game, the Washington Department of Natural Resources, the Yakima Indian Nation and the Yakima Training Center.

Yakima County encompasses over 2.7 million acres. About 458,000 acres is irrigated cropland, 64,000 acres is non-irrigated cropland, and 1.5 million acres is rangeland, and grazeable woodland. The remainder is managed by various government agencies for public benefit. Irrigated farming is the main economic enterprise in the area. Major crops include apples, cherries, hops, asparagus, corn, as well as grass and legumes grown for hay.

Nearly all of Yakima County drains into the Yakima River with the Naches River being a major tributary. The far northeastern and southeastern portions of the County drain into the Columbia River. Irrigation water is the life blood of the local economy due to the dependence on it by irrigated farming. The supply of irrigation water comes primarily from the streams that receive snowmelt from the Cascade Mountains. These streams have more than ample flow early in the growing season, but the flow decreases during mid season. To supplement the flow of streams in summer and fall, a number of reservoirs have been constructed to impound water supplies. Even with these reservoirs, there is frequently a shortage of water in the tributaries of the Yakima River. Inefficient irrigation systems and the tendency to over irrigate aggravate the problems of water shortage, water quality, erosion, alkali and salt accumulation. In addition, growing industrial and metropolitan pressures on available water, contributes to water quality and quantity problems. Continued development of agricultural, industry and population growth will require additional storage capacity and implementation of water saving measures (Ref #1).

It has been shown that good irrigation water management can reduce soil erosion by 50 percent. It is also evident that inefficient use of water and degradation of water quality are directly related. Irrigated agriculture water quality issues are very complex, requiring innovative techniques to bring about meaningful water quality improvements (Ref #2). The "Water Quality Protection Needs Evaluation" (Ecology, 1987) identified improvement and rehabilitation of inefficient, leaking irrigation canals, formation of public irrigation districts from private entities (so they can qualify for direct state financial assistance), as well as implementation of Best Management Practices (BMP) as the primary means of water pollution control for irrigated agriculture.

In the past, farmers have focused on improving on-farm irrigation systems, rather than on improving the efficiency of water supply and

delivery systems. One exception to this statement is the furrow irrigated fields in the Moxee Valley. Economics have worked against improving irrigation delivery systems. Maintenance of existing systems and construction costs of new systems have soared beyond the feasibility of many small irrigation companies. Presently, adequate rehabilitation financial assistance is needed. Accordingly, these are the circumstances that form the basis for this project.

PROJECT SUMMARY

The Moxee/Naches Water Quality project encompasses irrigated orchards and cropland on the south sides of the Naches River and irrigated hop fields and vineyards in the Moxee Valley. Although the two regions differ in crops produced and have unique characteristics, both areas are experiencing problems with excessive erosion and irrigation runoff rates. As a consequence, water quality was being degraded by farming activities in these areas. In July, 1989 the Washington Department of Ecology (Ecology) offered a Centennial Clean Water Fund Grant to the North Yakima Conservation District (NYCD) to fund a water quality project to decrease irrigation runoff into the Naches and Yakima Rivers, and to demonstrate Best Management practices (BMP's) in hop fields.

After irrigation companies in the South Naches River region were successfully organized into an irrigation district, funding was obtained for a preliminary engineering plan for a closed pipe irrigation water delivery system. Using a single river diversion for this system will consolidate seven gravel bar diversions currently being used in the Naches River. This proposal will also consolidate seven fish screens into one proposed screen facility, currently being planned by Bonneville Power Administration and the Bureau of Reclamation. In addition, this activity will eliminate the open irrigation canals currently draining into the Naches River.

Activities in the Moxee Valley hop fields centered on implementation of furrow mulching and surge irrigation systems demonstrations as BMP's for reduction of soil erosion. Ambient water quality monitoring of irrigation runoff water indicates a reduction in soil and particle matter movement from the demonstration areas. Additionally, updated farm plans for operators in the Moxee area were developed, and a continuous education and information effort was undertaken by the NYCD in both the Moxee and Naches project areas.

APPENDIX C - ECONOMICS

VALUE OF WATER ANALYSIS:

Each acre foot of water will produce 1.375 tons of hay. This is based on the agronomic evaluation done for a 1993 tailwater recovery analysis.

WASHINGTON ALL HAY PRICE	1993	$96.00
Prices from Washington Ag.	1992	$82.50
Statistics annual reports	1991	$81.00
	1990	$91.00
	1989	$89.50
The five year average price per ton of hay:		**$88.00**
Variable cost per ton of hay.		$32.28
Return per ton over variable cost		$55.72
Return per acre foot of water		$76.62

Hay is the lowest value crop grown in the watershed. In the long run when water shortages occur available water would be diverted from hay to other crops. Therefore, the marginal value of water, should be equal to the value of production lost minus the variable cost of producing that crop.

The value of nutrients is analyzed by using the replacement cost of the nutrients at current prices. No application charge is added s it is assumed the operators anticipate potential losses and apply nutrients accordingly.

1992 Nutrient Cost Yakima Valley	COST/LB.
Nitrogen	$ 0.30
Phosphorus	$ 0.34
Potassium	$ 0.14

Reduced sediment damages are accounted for by improved water quality.

PROJECT ANALYSIS

Convert 4,550 acres of furrow irrigation land to trickle irrigation systems. Include irrigation water management, nutrient management, and pesticide management compared to future without project action.

Positive (+)		Negative (-)	
Annual benefits	$1,277,500	Annual cost	$486,000
Net benefits	$791,500	Project cost	$5,132,500
Mitigation benefits			
Reduced return flows	15,400 acre ft.	Loss of 6 acres wetland	
Double Fall Chinook Salmon egg-to-fry survival in 21.2 miles of Parker Reach of the Yakima River.		Mitigation cost	
Improved wildlife upland habitat by reducing tillage			

ON-FARM PER ACRE ANALYSIS

Trickle Irrigation System with irrigation water management, nutrient management, and pesticide management compared to furrow irrigation system.

Positive (+)	Negative (-)
Cost-share $650	Installation cost $1,000
Increased irrigation efficiency 40 %	Possible yield reduction first year up to 20 percent
Reduced sediment delivery to Parker Reach. 9 tons per year	
Reduced fertilizer purchase - 77 lbs/acre - $21.00/acre	
Water savings $260/acre - Reduced labor	
Reduce tillage operations - 8 per year	
Increase flexibility of spraying.	
Improved upland wildlife habitat do to improved cover.	

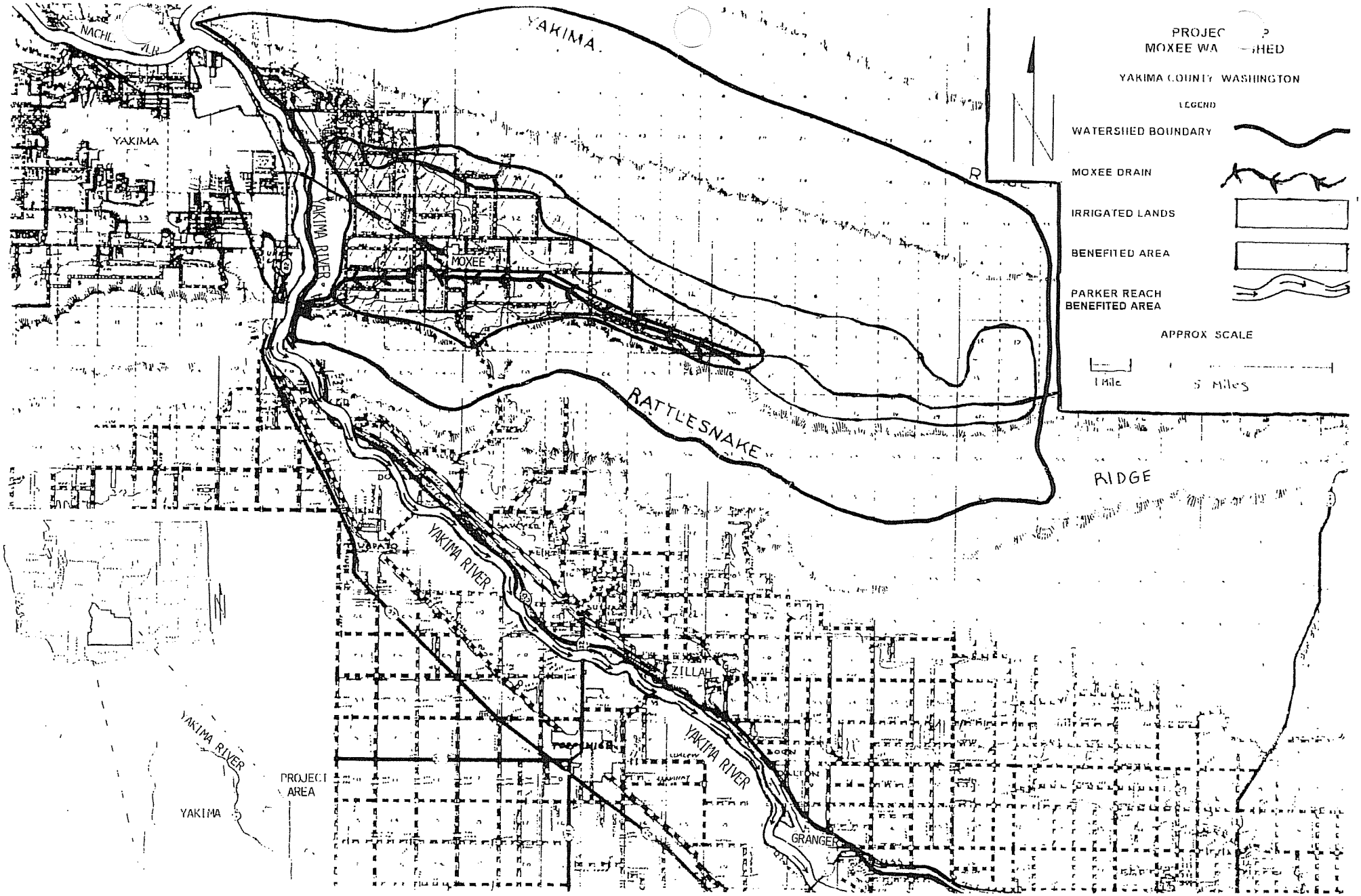
APPENDIX C - PROJECT FORMULATION

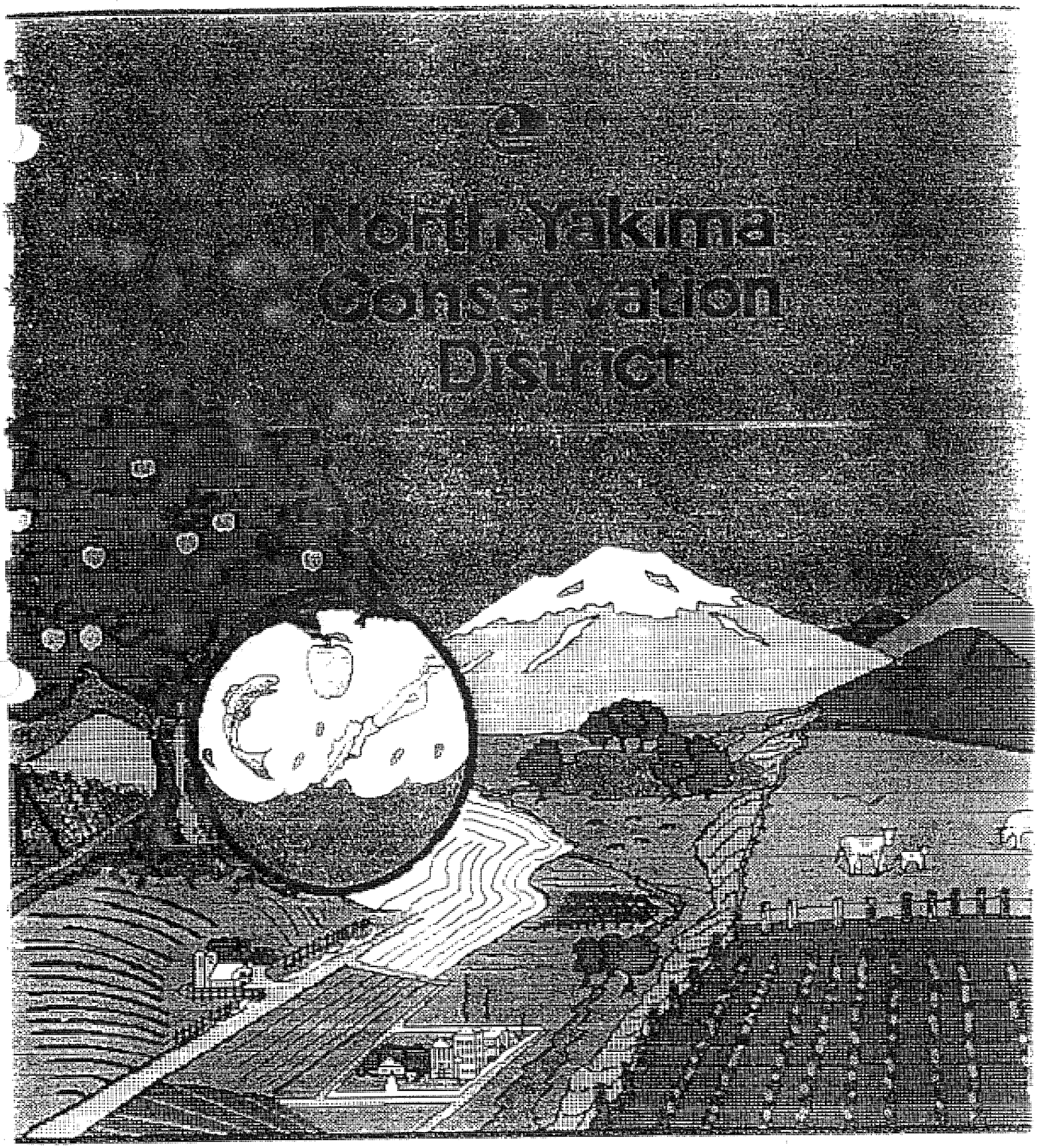
John Easterbrook of the Washington State Department of Fish and Wildlife and Bob Tuck representing the Yakama Nation assisted with evaluating the effects of sediment reduction. Streamside Management: Forestry and Fishery Interactions edited by Salo and Candy, University of Washington, 1987 was used as the documentation. An unpublished study by Tom Spofford, adjusted by Joe Sahlfeld was used to determine sediment, nutrients and water savings.

The wetland evaluation was completed by Mike Tobin and Rick Pudney using NWI surveys with field verification.

The HEP model was used for wildlife habitat evaluations.

Cost data and flat rate schedule data was based on data furnished by dealers and completed by Mike Tobin and Larry Edmonds. The public participation notebook is located in the Yakima Field Office.


PROJECT MAP
MOXEE WATERSHED
YAKIMA COUNTY WASHINGTON
LEGEND
WATERSHED BOUNDARY
MOXEE DRAIN
IRRIGATED LANDS
BENEFITED AREA
PARKER REACH BENEFITED AREA
APPROX SCALE
1 Mile
5 Miles
YAKIMA
YAKIMA RIVER
MOXEE
RATTLESNAKE RIDGE
YAKIMA RIVER
ZILLAH
YAKIMA RIVER
YAKIMA RIVER
PROJECT AREA
YAKIMA
GRANGER



FINAL REPORT

MOXEE/NACHES WATER QUALITY PROJECT

Appendix 2

Appendix 2

Moxee Monitoring Data Report 1994

PRELIMINARY
SUBJECT TO REVISION

Moxee and Birchfield Drains

Prepared By

North Yakima Conservation District

MOXEE MONITORING DATA REPORT 1995

Moxee and Birchfield Drains

Prepared By:
North Yakima Conservation District

Draft Copy

MOXEE MONITORING DATA REPORT 1996

Moxee and Birchfield Drains

Prepared By:
North Yakima Conservation District

DRAFT

MOXEE MONITORING DATA REPORT 1997

MOXEE AND BIRCHFIELD DRAINS

Prepared By:
North Yakima Conservation District