Saving Fish & Farmers:

A Model for Responding to Environmental Concerns and Endangered Species Criteria by Applying Irrigation Principles and Water Conservation Practices

The Walla Walla Valley is located in the southeast corner of the state of Washington and the northeast corner of the state of Oregon. Agriculture constitutes the primary sustaining source of revenue for the valley, although a moderate industrial presence has developed over the past few decades. The valley is bounded on the north, south and east sides by the Blue Mountains, which contain the headwaters of the Walla Walla and Touchet Rivers. These two river systems comprise the major drainage corridor of the Walla Walla Valley. The stream morphology of the area is unique because the Blue Mountain Range is a relatively young and resistant formation. This condition produces a rapid change in elevation from peak to valley, creating very fast moving, clean, clear creeks and streams in the upper reaches. As the Walla Walla and Touchet rivers move abruptly into the valley, the relief becomes far less pronounced, and in places nearly flat. The river systems transition through a broad, mature floodplain to the north and west before merging and dropping into the Columbia River Basin and the arid deserts of south central Washington.

Historic stream flows in the Walla Walla and Touchet rivers normally fluctuate from flood stage in the spring to static flows in the late summer. A progressive dewatering of the main drainages of the valley for agriculture and other purposes was one of two primary drivers for development of the conservation programs which will be presented here. The second primary driver was the fact that these rivers contain fish species listed as "Threatened" and "Endangered" under Subpart B of the federal Endangered Species Act (ESA). Because traditional irrigation methods often clash with today's stream conservation requirements and an increasing demand for water by growing populations has placed accelerated emphasis upon efficient use, farmers are often caught between ESA mandates and the cost of improving their irrigation systems.

Two programs that were developed in the state of Washington and which have proven successful in addressing this situation are: (1) the Washington Department of Fish and Wildlife's *Cooperative Compliance Review Program* (CCRP); and (2) the Washington State Department of Ecology's *Irrigation Efficiency Program*. The CCRP is better known as the *Fish Screen Program*, or simply the *Screening Program*. Both of these programs began with doubt and skepticism, but through perseverance, communication and commitment by all of the parties involved, the results achieved have been astounding.

Cooperative Compliance Review Program

The underlying concept of the screening program is very simple. First, irrigators may voluntarily identify their equipment or practices as being in noncompliance with state and federal juvenile fish screening criteria – the specifications that determine how

an irrigator may withdraw water from an affected water source which precludes the possibility of removing fish in the process. In return for voluntary identification, irrigators may be eligible for amnesty from potential federal or state enforcement actions. Second, eligible irrigators may receive an 85% cost-share benefit toward the installation costs of new, compliant fish screens. Critical to the practical implementation of such a program is a progressive philosophy and a willingness on the part of responsible government agencies to challenge institutionalized discovery and enforcement policies. The notion that a governmental agency would amend its discovery and enforcement policies, even temporarily and for reasonable expectation of exceptional public benefit, is unusually progressive.

The Screening Program was the brainchild of a Washington Department of Fish and Wildlife (WDFW) agent who had worked in valley communities for over 30 years. He recognized that the commonly held regulatory philosophy of *command and control,* or *"find and fine*", was ineffective in terms of cost-benefit. The so-called *sledgehammer* approach to enforcement throughout the state had arguably met with minimal compliance success and had generally resulted in the deterioration of relationships between the regulated community and agency personnel. He felt that, if presented with an alternative method for resolution of specific noncompliance issues that involved a less confrontational and more proactive manner, local irrigators would embrace the effort and the outcome would be much more amenable to everyone. As a member of the local community, he felt personally compelled to pursue a new approach - one of "cooperative" compliance with his agency. After a year of research and discussion, senior WDFW management agreed and *"Cooperative Compliance"* was given the blessing of the agency's director, albeit, in the event that the program did not produce a timely and effective compliance solution, WDFW would then be compelled to return to an expedited and basin-wide inspection and enforcement position.

In October of 2000, and following WDFW's lead, the National Marine Fisheries Service (NMFS), now known as NOAA Fisheries, also agreed in concept and resolved to defer enforcement of certain of their laws with regard to the Endangered Species Act (ESA) for a limited amount of time. The temporary moratorium on enforcement of the ESA 4(d) rules by NOAA Fisheries was also conditionally approved upon achieving effective and timely progress under the new program.

Even with state and federal agencies in accord, the Cooperative Compliance Program lacked the necessary funding and a programmatic/administrative structure in order to proceed. Noting that valley irrigators and the Walla Walla County Conservation District (WWCCD) were concurrently engaged in other projects associated with salmon recovery, and that the irrigation community was closely acquainted with the methods and personnel of the District, WDFW felt that the Cooperative Compliance Program would be given the best opportunity for success if the WWCCD were to play a lead role.

The WDFW subsequently approached the Walla Walla County Conservation District (WWCCD) to ascertain whether the District could seek funding for the program and also act as the lead implementing agency. Under this scenario, technical oversight,

funding and program administration would rest with the WWCCD, while the WDFW would be responsible for recruiting valley irrigators to sign up for the program, and to handle the permitting tasks required to facilitate installation of the new screens and equipment. From a programmatic perspective, this type of collaborative arrangement was considered advantageous in that it would remove WDFW personnel and the agency's attendant enforcement obligation from direct involvement in actual field operations and also provides an administrative buffer between state oversight and local implementation.

The Conservation District thereafter agreed to take on the program for the WDFW and in October of 2000 a $700,000 funding package for technical assistance and implementation of the first stages of the program was secured. This funding was made possible by contributions from the Bonneville Power Administration, a federal utility operating the major hydroelectric projects on the Columbia River, and the Salmon Recovery Funding Board (SuRF Board), an entity established to pool and administer fish protection monies from multiple agencies and organizations in the northwest. With initial funding in place, the CCRP staff began to identify potential program participants and formalize the method in which these participants would be brought under the program. Additionally, the identification of a technical entity capable of performing both field assessment and irrigation engineering design would be required. The latter task was of critical importance in that new fish protection screens, piping, power and control equipment would often require custom design or redesign relative to each irrigation application. Hydraulic and mechanical compatibility among existing site irrigation components, design compliance with ESA species protection criteria and cost maintenance would clearly depend upon finding a service provider that could accomplish both assessment and design at a reasonable cost.

Within months WDFW personnel managed to contact and identify over 400 irrigators interested in program assistance in order to achieve compliance with state and federal pumping criteria. Although Conservation District personnel had anticipated a high level of interest, the state and federal agency administrators were amazed with these results. Despite the level of interest, however, there was still some distrust within the irrigation community. Because the ESA establishes a high and widely known potential monetary penalty associated with the death of threatened or endangered species ($25,000 per "take"), fear and skepticism regarding how long NOAA Fisheries would refrain from enforcement action, even given the new program's protection, was nonetheless an undercurrent. In any case, the Fish Screen Program has now been in existence for nearly four years. During this time, and to the admirable credit of both the WDFW and NOAA Fisheries, neither agency has seen fit, within the legal parameters of its charter, to pursue enforcement action against a program participant. With a beginning level of participation assured, the focus eagerly shifted to filling the technical assistance role.

As a matter of assumption, there had existed a general consensus among the agencies that local consultants, engineers, contractors and distributors would be interested in providing a bulk package of technical assistance services. Unfortunately, this assumption was proven false when Conservation District leaders held an initial meeting with 16 local firms to discuss the technical assistance and implementation aspects of the

program. Although the engineering groups had shown moderate interest in the design phase work, site assessment and installation tasks were not viewed attractively. A portion of the contracting firms were interested only in the implementation phase and the distributors were singularly interested in providing materials. No one wished to take on a comprehensive role from site assessment through installation. Nevertheless, the Conservation District felt strongly that the site assessment and design work, and to a lesser extent, implementation, should be performed by the same entity based upon the fact that each site would likely be unique and would require a customized design and implementation plan. In short, the Conservation District wanted a full service consultant.

In March of 2001, this obstacle was eliminated when the local WDFW agent and the Executive Director of the Conservation District approached the Walla Walla Community College Irrigation Technology Program (now the Water Management Program) in order to determine whether there was an interest in providing the requisite technical assistance. We (WWCC) were very interested in providing assistance in our field of expertise. Assisting the local community is one of the services a good community college provides and the WWCC administration agreed heartily that the Water Management Program should be involved. Subsequently, and 18 months after the first discussions within WDFW, the programmatic structure of the effort was completed and ready for implementation.

At this juncture two tasks would need to be performed in order for the program's implementation phase to begin. First, a formal assessment of the hundreds of irrigation sites whose owners had signed up for the program had to be completed. Second, a provider of ESA compliant fish screens, or a manufacturer willing to design and provide screens that met the ESA criteria in sizes that accommodated the diversion flows for each site, needed to be identified. Unfortunately another roadblock with potentially fatal consequences then emerged - Water Rights.

The agency responsible for administering and enforcing all water rights issues in the state of Washington is the state Department of Ecology (DOE). In harmony with the other agencies, the DOE was persuaded to defer action on program-related enforcement issues provided all illegal stream diversions identified were eliminated and all water rights involved were verified as legal. In any case, the Conservation District would be required to ensure that all involved water rights were legal in order to support expense of federal and state money to screen these diversions. Because the Conservation District and DOE now required rights verification, this compromised the path to progress and had to precede any design and installation phase work. The verification of water rights proved to be one of the biggest hurdles to final implementation of the Cooperative Compliance Program, largely because the records of water rights for the Walla Walla Valley were archived in the DOE's Spokane, Washington office. The records existed only as paper copies and were filed in apple crates in the basement of the building. It became apparent early on that this process was going to take time.

While waiting for water rights verifications from the DOE, WWCC hired two irrigation technology students for the purpose of contacting each program applicant and,

under the guidance of college program instructors, performing an engineering assessment of each site's existing pumping configuration. Categories of relative retrofit difficulty were established in three phases. Phase-1 sites were those sites which could be designed and completed quite easily – generally involving very small diversions, small streams and small acreages. Phase-1 water system usages were to range in size from 1.72 gpm up to 150 gpm. Phase-2 systems constituted those which were likely to require additional information and would require substantial design time. Phase-3 systems were those for which no readily apparent solution could be determined at that time. Once the phase classifications and assessments were in place for review, all parties involved decided that a concerted effort should be placed on the Phase-1 designs and installations in order that WDFW and NOAA Fisheries could realize some immediate results. In concert, DOE concentrated their water right verification efforts on the Phase-1 sites, aided by the WDFW biologist initially tasked with processing the necessary permitting. This realignment of resources streamlined the process but the situation may best serve as a valuable lesson that water rights verifications should be addressed as early in the process as possible to avoid program implementation delays.

A second action, which was pursued at the same time as water rights verification, was the identification of a source of compliant fish screens. As noted earlier, stream flows in the Walla Walla Valley are highly variable and as a matter of necessity, screen designs would need to address the low suction-shallow submersion pumping requirements of small creeks and streams as well as the high flow-deep diversion configurations of larger irrigation projects. This too proved harder to address than originally envisioned. In brief, it was found that no screens were being manufactured at that time which met both the state and federal screening criteria and which would function effectively in shallow waters. All commercial screens were sized for large diversions of 250 gpm and up or were of the active design. Active design screens possess cleaning bars which either spin themselves around the screen or spin the screen around a stationary bar. Because active screens contain moving parts and had proven problematic for irrigators to maintain, program participants wanted nothing to do with this style of filtration. Only after much additional research and assistance from the agencies was a single manufacturer of a passive style screen meeting federal screening criteria identified. Unfortunately, the only screens offered by this manufacturer were 250 gpm and 500 gpm units that required a minimum of 20 inches of water and were over 5 and 10 feet in length respectively.

When asked if something smaller could be designed to match small diversions in the 10-16 gpm range and up, the manufacturer responded by utilizing a CAD program to scale the two existing screen versions by 50% and 75%. NOAA fisheries subsequently agreed that, provided the screens were downsized as a percentage, the engineered effectiveness of the screens would not change and therefore, the compliance certification of the larger screens was granted for the smaller screens. Ultimately, our program designers could choose from a range of NOAA-accepted passive screens in sizes of 15, 30, 65 and 130 gpm. Because the WDFW screening criteria had been adopted verbatim from the federal regulations, the new screens met all Washington state criteria as well. While testing of a prototype screen in July of 2001 exposed some minor manufacturing

problems, the first eight compliant fish screens were in place and operational by the end of that summer. Despite the implementation team's perception that this process had been sluggish, agency leadership was taken aback that so much had been overcome in such a short period of time.

Throughout the rest of 2001 and through December of 2002, 370 targeted pumping sites were assessed with 153 of these sites being classified as Phase-1 screens. Of these, 65 designs had been installed. Cooperative Compliance was beginning to catch on and receiving rave reviews from the farming community. Nevertheless, there remained skepticism on the part of some people in the agencies and the environmental community that the program would not fully achieve its goals of total compliance in the absence of enforcement.

In October 2002 the Columbia Conservation District (CCD), Walla Walla's county neighbor to the north, received a grant to begin their own screening program to be modeled after that operating in the Walla Walla Valley. WWCC assessed 60 sites for the CCD from October 2002 to December 2002 with most of these sites being classified as either Phase-2 or Phase-3 in complexity. In total, over 430 sites had been assessed and 160 had been designed, leaving 270 with no immediate solutions.

It became evident, during this initial assessment phase that the number of sites without an immediate solution was going to be of concern. The primary reason for this problem was that within the federal screening criteria, one specification required that passive fish screens could only be used on diversions of less than 1 cfs. Diversions greater than 1 cfs were required to utilize an active-style screen. As noted previously, active screens are drum-style screens. Drum-style screens, under NOAA criteria, were required to be placed within large, deep stream holes. Since streams in the Walla Walla Valley rarely contain large, deep holes, the Conservation District and WWCC made a proposal to the WDFW and NOAA Fisheries in April of 2002 to pilot test a passive-style screen in a worse case scenario. WDFW and NOAA subsequently agreed to the test provided weekly site visits were performed. An existing pump site was identified on the lower Walla Walla River just west of Touchet, Washington and on July 12, 2002 WWCC staff and students installed the pilot screen. A piezometer was built and installed on the screen so that differential pressure between the surface of the screen and the interior of the screen could be monitored. This was done to check plugging of the screen. Also monitored was the depth of water over the screen, the temperature of the water, total river flow, total gallons pumped and general water quality conditions. When the test concluded on November 7, 2002, the data unequivocally demonstrated that a passive screen could perform to the required criteria in worse case scenarios.

Armed with this new data, the previously classified Phase-2 and Phase-3 sites were reevaluated. As a result, nearly all of the 430 sites then assessed in Walla Walla and Columbia Counties possessed a passive screen solution. These solutions, however, were immaterial in the absence of a federal criteria modification which would allow for passive screen diversions up to 3 cfs. In the early spring of 2003, the WDFW took the lead by granting passive screen acceptance up to 3 cfs, thereby allowing the Cooperative

Compliance Program to progress in the design and installation of passive screen solutions for diversions greater than 1cfs of flow. One year later, NOAA Fisheries would recommend the same rule change to the federal screening criteria.

During the remainder of 2003, WWCC and the screen manufacturer continued to develop new screen configurations. The notion of connecting smaller screens together to form one screen assembly (termed "manifolding"), capable of pumping larger quantities of water, was tested. This design proved effective; although, the number of screen elements comprising the full assembly was limited to 4, given velocity restrictions in the manifold. With these assemblies, screening was now available which could divert water flows of greater than 1 cfs while installed in less than 1 foot of water. This breakthrough now provided a multitude of screen design solutions to fit each individual site. It became simply a matter of matching the site to the solution.

From the time WDFW first compiled the program participation lists to the present, new applicants have continued to step forward. Currently, there are approximately 500 people on the program's self-identification and assistance lists. Of these, over 450 screening solutions have been designed, and 300 or more have been contracted and/or installed; all without the shadow of enforcement or litigation issues. The final push to complete the project and achieve 100% compliance is now underway. This program concept has since been replicated by the North Yakima Conservation District in the state of Washington and the North Fork of the John Day River Watershed Council in north-central Oregon. Without a doubt, Washington's Cooperative Compliance Program represents a solid model of what can be accomplished if agencies and the regulated community are willing to take mutual responsibility and a single trusting step toward shared goals.

Irrigation Efficiency Program

The Irrigation Efficiency Program was developed by the Washington State Conservation Commission and is funded by the Washington State Department of Ecology. The program allows an existing water user to upgrade an irrigation system to a new, more efficient system with a cost share of as much as 85%, in return for leasing the conserved water back to in-stream flows. To qualify for this program, an irrigator must present proof of the quantity of beneficial water usage being diverted, and be able to demonstrate a quantity of water savings likely to occur within such usage if the applicant were to be provided with a more efficient irrigation system. The calculated savings in water is then placed in trust by the Washington State Department of Ecology. This action provides a legal protection for the conserved portion of the water on behalf of the holder of the water right from potential confiscation as unused or non-beneficial usage of the water under state water law. Such conserved water, of course, remains in the associated stream or aquifer, although the program participant retains a value of the conserved water through the leasing instrument. While this program has shown tremendous potential, progress has been slowed because of issues related to interpretation of Washington state water law- particularly, those related to water rights. In order to provide some perspective, the potential savings identified in an initial assessment within the Walla

Walla and Tucannon river basins alone was as much as 30 cfs and 20 cfs respectively. In most cases the user must be irrigating a large area in a very inefficient manner in order to realize a quantity of savings which justifies the costs associated with converting to a more efficient system. In essence, experience with the program in its current form has demonstrated that irrigators with large acreages and associated large water rights may qualify for this program, while small users (under 1cfs) generally will not qualify. At this time new ideas are being formulated which would allow small pumping operations to qualify for eligibility under a program such as this.

Once an irrigator has been identified as a potential qualifier, the emphasis is placed upon increasing on-farm irrigation efficiency. This is accomplished by utilizing commonly accepted irrigation principles and practices, new equipment, technology and most importantly, educating the user in correct implementation of these new tools.

To illustrate how the program works, approximately 300 acres of hand-line irrigated alfalfa, winter wheat, peas/beans and pasture was converted to new, low pressure, center pivot irrigation in the Tucannon River drainage in southeast Washington. The standard irrigation efficiency numbers allowed by the Natural Resources Conservation Service (NRCS) are 65% for a well-maintained hand-line/wheel line and up to 85% for a low-pressure drop tube center pivot. Of the foregoing crops, the largest consumptive use (C_U) requirement was given for pasture grass. Using the C_U for pasture grass in the Tucannon River basin and associated soils, an irrigation management plan was prepared utilizing the increase in efficiency which saved in excess of 6 cfs. The landowner received new high efficiency pumps, new fish screens (under the Screening Program), and new mainlines, thus increasing the overall water and energy efficiency of the operation. The 6 cfs "returned" to the river does not represent a yearly total, but an instantaneous flow that corresponds to roughly 10% of the instantaneous flow of the Tucannon River during the months of August and September. This quantity of water conserved was leased by the state and placed in trust. The trust was written for a period of 20 years, at which time the saved water will revert back to the landowner's entitlement. The trust serves two purposes: First, to protect the water, as far as the state is concerned, as it moves downstream; and, second, to provide a beneficial use (in this case "in-stream") which serves to protect the individual's water right. One of the state's statutory requirements with regard to water rights mandates that water diverted or pumped pursuant to a water right must be put to beneficial use or the right to unused and/or non-beneficially utilized water may be terminated after a five-year period. This has been termed locally as the *"use it or lose it"* clause. The state trust essentially eliminates this clause from applicability to participating landowners.

An additional example of the Efficiencies Program is the conversion of approximately 300 flood-irrigated pasture acres to low pressure center pivot irrigation. This conversion took place in the lower Walla Walla basin on the Walla Walla River. The same principles were implemented on this project, using NRCS numbers for flood irrigation efficiency at 50% and low pressure center pivot at 85%. This resulted in savings of over 4 cfs. In 2002 the lowest flow reading taken by the USGS gauging

station on the lower Walla Walla River was 2 cfs in late August. With one efficiency project we would have doubled the flow of the river for that time period.

At this time two more projects are under contract on the Tucannon River. These projects involved conversion of hand lines to center pivots and have resulted in another savings of approximately 3 cfs, making the total saved on the Tucannon roughly 9 cfs. Another project in the Walla Walla basin resulted in a savings of another 1 cfs. One additional project in the Walla Walla basin is in the final stages of completion and is expected to go to contract before the end of this year. This project adds another 1 cfs of saved water making the total saved water for the Walla Walla River roughly 6 cfs. The foregoing numbers represent the water saved from a legal water rights standpoint and do not consider the actual true savings from use above the documented water right. If the actual true savings amounts were added into the totals, the savings in both basins is substantially greater. The reason the actual saved water cannot be represented is because the use in excess of the actual water right cannot be placed in trust by the state.

Many critics of the program consider the cost extravagant; saying that if the state would simply enforce the existing laws regarding water rights, the conserved water would remain in-stream, thus they are of the opinion that they are paying for something they already own. A second point opponents bring forth is that merely purchasing the water rights back from the users through the water acquisitions program would offer a simpler alternative. While the first statement has some truth to it, not considered is the "good will" developed between an agency whose track record of dealing with the public is poor at best, and the landowners/operators. The argument also fails to recognize the high cost and social consequences of litigation. History is replete with evidence of such litigation in situations where satisfactory progress has not been made. The second statement does not consider the economic and social ramifications of removing viable, productive agricultural acres. If the costs associated with the program are divided by the number of acres and then amortized through the life of the lease, the true costs are $47.80 per acre-foot/year or $9,337 per ft^3/sec/year of in-stream flow.

The results of this program are crystal clear. The state of Washington is able to increase stream flows, which contain threatened and/or endangered species, thus increasing water quality. This in turn decreases juvenile fish mortality rates. The state is thereby able to demonstrate progress toward compliance with the ESA provisions-keeping federal regulators at bay, while pleasing the environmental community by increasing in-stream flows. The state may provide funding for up to 85% of the new irrigation equipment, and in return for this investment, efficiency improvements are realized, agricultural land is kept in production and our farmers remain competitive in the world markets. Utilizing standard irrigation principles and practices, technology and education, we are able to increase the efficiency of agricultural production, while decreasing water use, and conserving stream flows…saving fish and farmers!