

# A Framework for Water Demand in the Yakima River Basin

YRBWEP III Work Group

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# Basis of the Framework

“Title XII (the current YRBWEP authorization) also provided for the completion of two reports, with recommendations which shall provide **a basis for the third phase of the YRBWEP.** These reports are: 1) A report addressing the adequacy of the water supply available for sustaining the agricultural economy of the Yakima River basin, and 2) The Biologically Based Target Flow Report which has been completed by SOAC .”

Bureau of Reclamation, Interim Comprehensive Basin Operating Plan for the Yakima Project, 2002

# How does the adequacy of water supply effect the Agricultural Economy of the Basin?

**Table 4.46 Gross on farm income (incremental to the No Action Alternative) by IMPLAN sector for each year of the 25-year period of record (1981–2005) that the proration level falls below 70 percent Black Rock Alternative**

| <b>Year</b> | <b>Grains</b> | <b>Other</b> | <b>Fruits</b> | <b>Vegetables</b> |
|-------------|---------------|--------------|---------------|-------------------|
| 1987        | \$556,579     | \$17,232,110 | \$16,043,770  | \$1,129,626       |
| 1992        | \$428,138     | \$13,255,040 | \$12,347,810  | \$868,943         |
| 1993        | \$685,021     | \$21,206,100 | \$19,804,730  | \$1,393,283       |
| 1994        | \$1,840,993   | \$55,196,340 | \$88,008,910  | \$4,932,981       |
| 2001        | \$1,113,159   | \$34,101,480 | \$43,542,390  | \$2,964,663       |
| 2005        | \$1,070,345   | \$32,796,050 | \$41,392,080  | \$2,821,306       |

# What is the Agricultural Economy?

| Year | Total Loss On-Farm Income | Loss X 3.5 Economic Multiplier |
|------|---------------------------|--------------------------------|
| 1987 | \$34,964,072.00           | \$122,374,252.00               |
| 1992 | \$26,901,923.00           | \$94,156,730.50                |
| 1993 | \$43,091,127.00           | \$150,818,944.50               |
| 1994 | \$149,981,218.00          | \$524,934,263.00               |
| 2001 | \$81,723,693.00           | \$286,032,925.50               |
| 2005 | \$78,081,786.00           | \$273,286,251.00               |

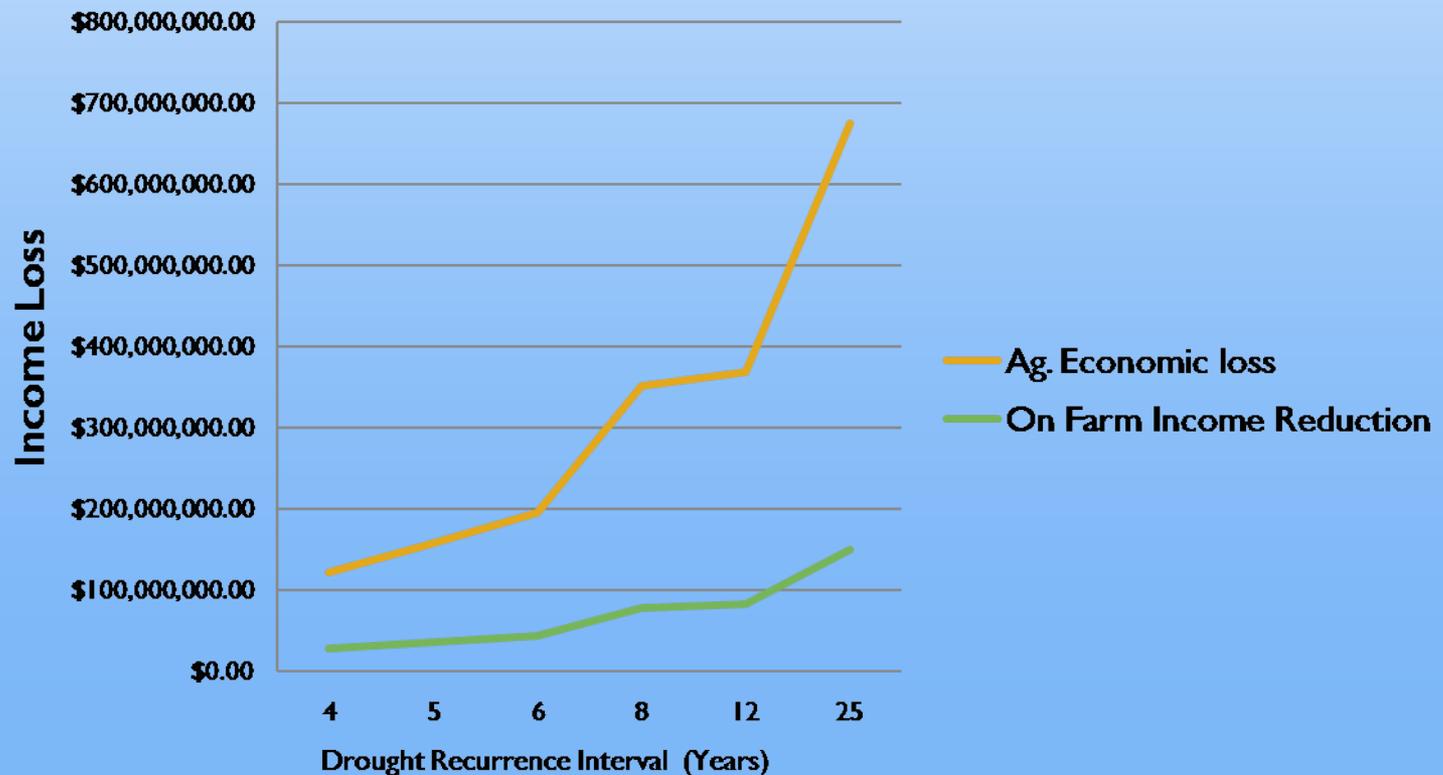
# What is the frequency and severity of Drought?

Historically, pro-rationing has occurred in 14% of the years since 1945, with 1 year of pro-ration of senior districts in 1979. But the last 25 years show:

| Year | Pro-Ration Level | Probability |
|------|------------------|-------------|
| 1994 | 28               | 0.04        |
| 2005 | 38               | 0.08        |
| 2001 | 40               | 0.12        |
| 1993 | 56               | 0.16        |
| 1992 | 64               | 0.2         |
| 1987 | 65               | 0.24        |
| 1988 | 73               | 0.28        |
| 1986 | 92               | 0.32        |
| 1981 | 95               | 0.36        |
| 2003 | 97               | 0.4         |
| 1989 | 98               | 0.44        |
| 1982 | 100              | 0.48        |

# What is the risk to Ag. Economy of water supply shortage?

**Economic Risk Curve for Water Supply**



# What is the unmet demand for water in a recent drought year?

| District                        | Firm Rights   | Pro-ratable Rights | "Normal" Drought year (2005, 38%) | Additional "minimal" water supply demand | Available for in "normal" drought year | Proportion of full entitlement |
|---------------------------------|---------------|--------------------|-----------------------------------|--|--|--------------------------------|
| KRD                             |               | 336,000            | 127,680                           | 85,000                                   | 212,680                                | 63%                            |
| RID                             |               | 375,000            | 142,500                           | 35,000                                   | 177,500                                | 47%                            |
| WIP                             | 306,000       | 350,000            | 133,000                           | 50,000                                   | 183,000                                | 75%                            |
| Sunnyside                       | 316,000       | 143,000            | 54,340                            | 0  | 54,340                                 | 81%                            |
| Tieton                          | 76,000        | 38,000             | 14,440                            | 0  | 14,440                                 | 79%                            |
| Other                           | 519,000       | 42,000             | 15,960                            | 3000                                     | 538,000                                | 93%                            |
| <b>KID</b>                      | <b>18,000</b> | <b>91,275</b>      | 75,150                            | 0  | 75,150                                 | <b>85%</b>                     |
| Total                           | 1,235,000     | 1,375,275          | 563,070                           | 170,000                                  | 720,110                                |                                |
| Fish Pulse                      |               |                    | 0                                 | 42,000                                   | 42,000                                 |                                |
| Parker                          |               |                    | 83,000                            | 180,000                                  | 180,000                                |                                |
| Total Irr and Fish Unmet Demand |               |                    |                                   | <b>395,000</b>                           |  |                                |

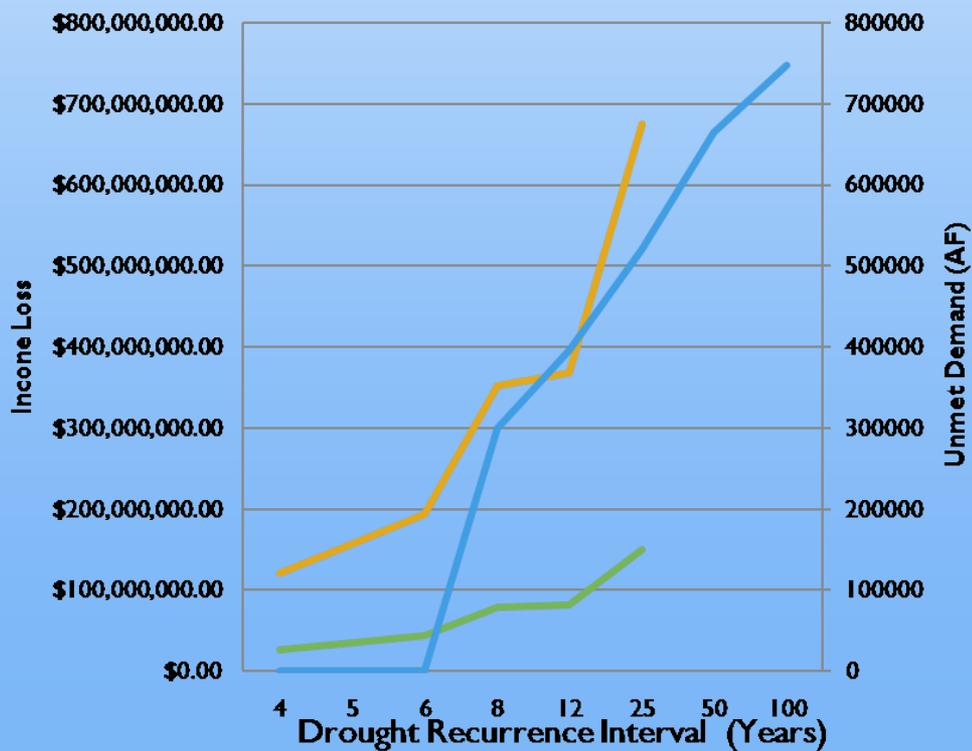
# Unmet Water Demand at Various Water Supply levels

## Pro-Rationing Level

| District                                   | 50% (around 1993) | 38% (2005)     | 28% (1994)     | 10%            | 0%             |
|--|-------------------|----------------|----------------|----------------|----------------|
| KRD  | 44,680            | 85,000         | 118,600        | 179,080        | 212,680        |
| RID  | 35,000            | 35,000         | 35,000         | 35,000         | 35,000         |
| WIP  | 8,000             | 50,000         | 85,000         | 148,000        | 183,000        |
| Sunnyside                                  | 0                 | 0              | 0              |                |                |
| Yak-Tieton                                 | 0                 | 0              | 0              |                |                |
| Other                                      | 0                 | 3,000          | 7,200          | 14,760         | 18,960         |
| <b>KID</b>                                 | 29,513            | 0              | <b>52,331</b>  | <b>66,023</b>  | <b>75,150</b>  |
| Total                                      | 117,193           | 173,000        | 298,131        | 442,863        | 524,790        |
| Fish Pulse                                 | 30,000            | 42,000         | 42,000         | 42,000         | 42,000         |
| Parker                                     | 153,000           | 180,000        | 180,000        | 180,000        | 180,000        |
| Total Irr and Fish Unmet Water Demand (AF) | <b>300,193</b>    | <b>395,000</b> | <b>520,131</b> | <b>664,863</b> | <b>746,790</b> |

# Combined Economic and Water Demand

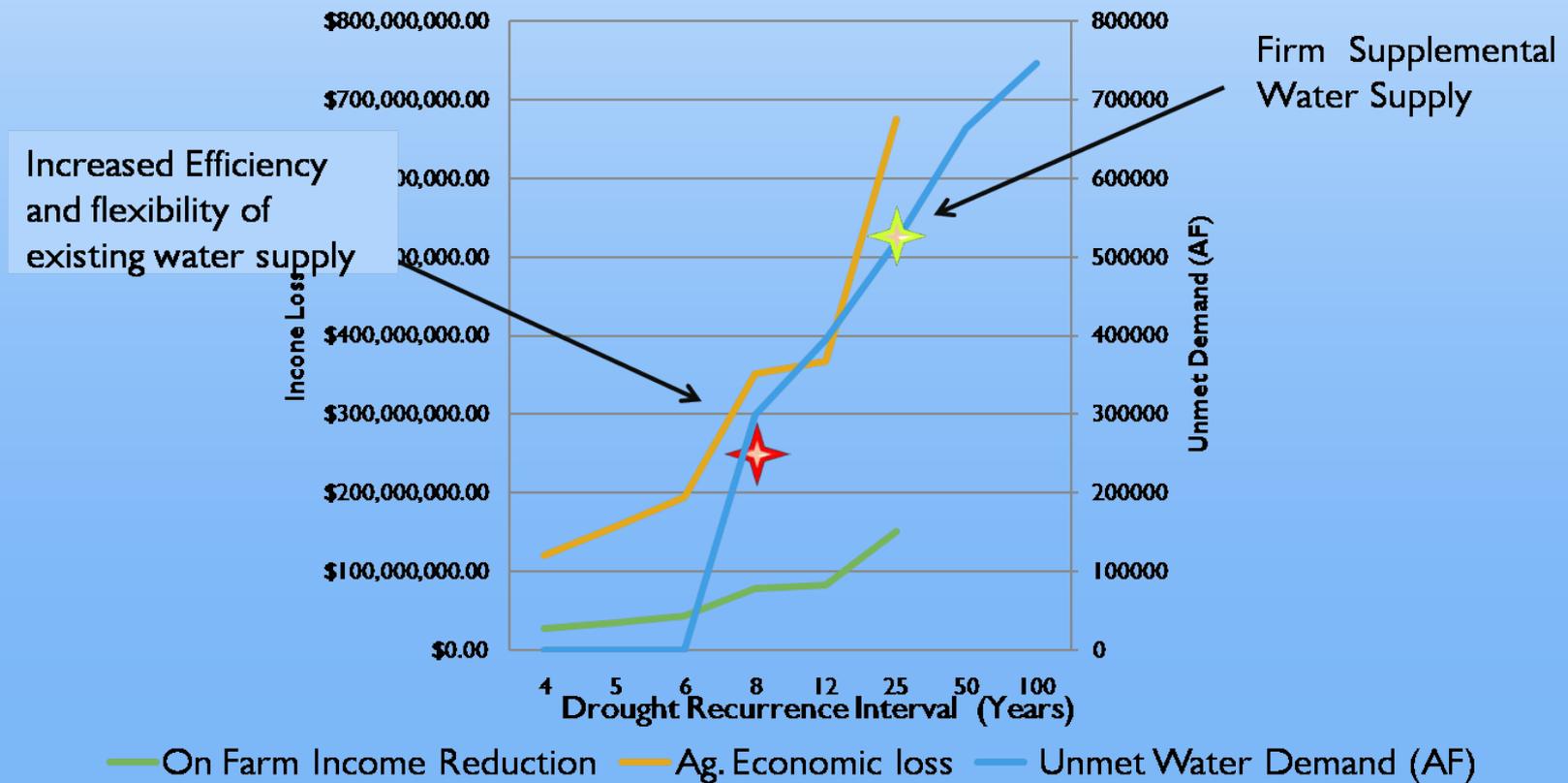
## Economic Risk Curve and Unmet Water Demand



— On Farm Income Reduction — Ag. Economic loss — Unmet Water Demand (AF)

# Water Supply Goals

## Economic Risk Curve and Unmet Water Demand



# Elements of Different Water Supply Goals

300 KAF of improvements to efficiency and flexibility of existing water supply.

## Information Needs-

- ❑ In-stream flows at Parker gage dominate the water supply needs, do we really see habitat benefits at higher flows? What about flows at Prosser and Kiona?
- ❑ Increased efficiency of water use can impact KID during droughts, can KID generate an similar “minimal” water demand for drought?

## Elements -

- ❑ In-stream flows at Parker gage – Conservation, Diversion Reduction (i.e. Satus Project), Changes to existing facilities, Transfers
- ❑ Ag. and Fish Water Supply – Conservation, Use/Manage Surficial Aquifer, Re-reg reservoirs (Wymer and Naches Arm), Transfers, **Carry Over Storage in new or existing Reservoirs**

# Elements of Different Water Supply Goals

520 KAF of Firm Supplemental water supply.

## Information Needs-

- ❑ Minimal need for the WIP?
- ❑ Minimal needs for M&I Pro-ratable or Junior Water Rights?
- ❑ Minimal needs for Roza if supplied by other means than Large Bumping?
- ❑ Flow targets and means to meet them at Parker, Prosser, Kiona

## Elements -

- ❑ Inter-Basin Transfer
- ❑ New Dedicated Multi-Year Carry Over Storage – Wymer, Small Bumping, other Naches Arm Storage
- ❑ Ag. and Fish Water Supply – Use/Manage Surficial Aquifer, Re-reg reservoirs (Wymer and Naches Arm), Transfers, Carry Over Storage in existing Reservoirs,
- ❑ Drought Relief Wells – Already have approximately 100 KAF of firm supply for the near term.