

USGS Diversion Estimate Methodology for Non-metered Irrigation

Estimating Irrigation Withdrawals:

Total irrigation withdrawals are estimated by the USGS based on crop acreage, yearly consumptive water requirement for major crops, irrigation system efficiency and conveyance losses. Irrigated acreage will be delineated using aerial photography to estimate field boundaries and then field verified to determine crops grown during the year. Consumptive water requirement rates for crops are determined by using the modified Blaney-Criddle method. Irrigation efficiency and conveyance losses are a critical measure for irrigation performance in terms of the total water required to irrigate a field and is estimated when fields are visited and field verified in each growing season.

$$W = (A \times C) / L$$

where:

W is irrigation withdrawals, in acre-feet, for a particular crop

A is irrigated acreage of the selected crop, in acres

C is the consumptive water requirement for the selected crop in feet

L is considered to be all the potential water loss occurred while irrigating (i.e. conveyance loss, irrigation system efficiency, irrigation system age and condition among others) in decimal fraction. (See attached table)

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Example of field irrigation application efficiencies and attainable efficiencies.

[Data from USDA, 2003]

| Irrigation Method | Field Efficiency (%) | | |
|-----------------------------------|----------------------|-------|---------|
| | Attainable | Range | Average |
| Surface | | | |
| Graded furrow | 75 | 50-80 | 65 |
| with tail water reuse | 85 | 60-90 | 75 |
| Level furrow | 85 | 65-95 | 80 |
| Graded border | 80 | 50-80 | 65 |
| Level basins | 90 | 80-95 | 85 |
| Sprinkler | | | |
| Periodic move | 80 | 60-85 | 75 |
| Side roll | 80 | 60-85 | 75 |
| Moving big gun | 75 | 55-75 | 65 |
| Center pivot | | | |
| Impact heads with end gun | 85 | 75-90 | 80 |
| Spray heads without end gun | 95 | 75-95 | 90 |
| LEPA ¹ without end gun | 98 | 80-98 | 95 |
| Lateral move | | | |
| Spray heads with hose feed | 95 | 75-95 | 90 |
| Spray heads with canal feed | 90 | 70-95 | 85 |
| Micro-irrigation | | | |
| Trickle | 95 | 70-95 | 85 |
| Subsurface drip | 95 | 75-95 | 90 |
| Micro-spray | 95 | 70-95 | 85 |
| Water table control | | | |
| Surface ditch | 80 | 50-80 | 65 |
| Subsurface drain lines | 85 | 60-80 | 75 |

¹LEPA is low energy precision application