RECHARGE APPLICATIONS IN IDAHO

PNWS - AWWA – Pre Conference Seminar, May 12, 2010

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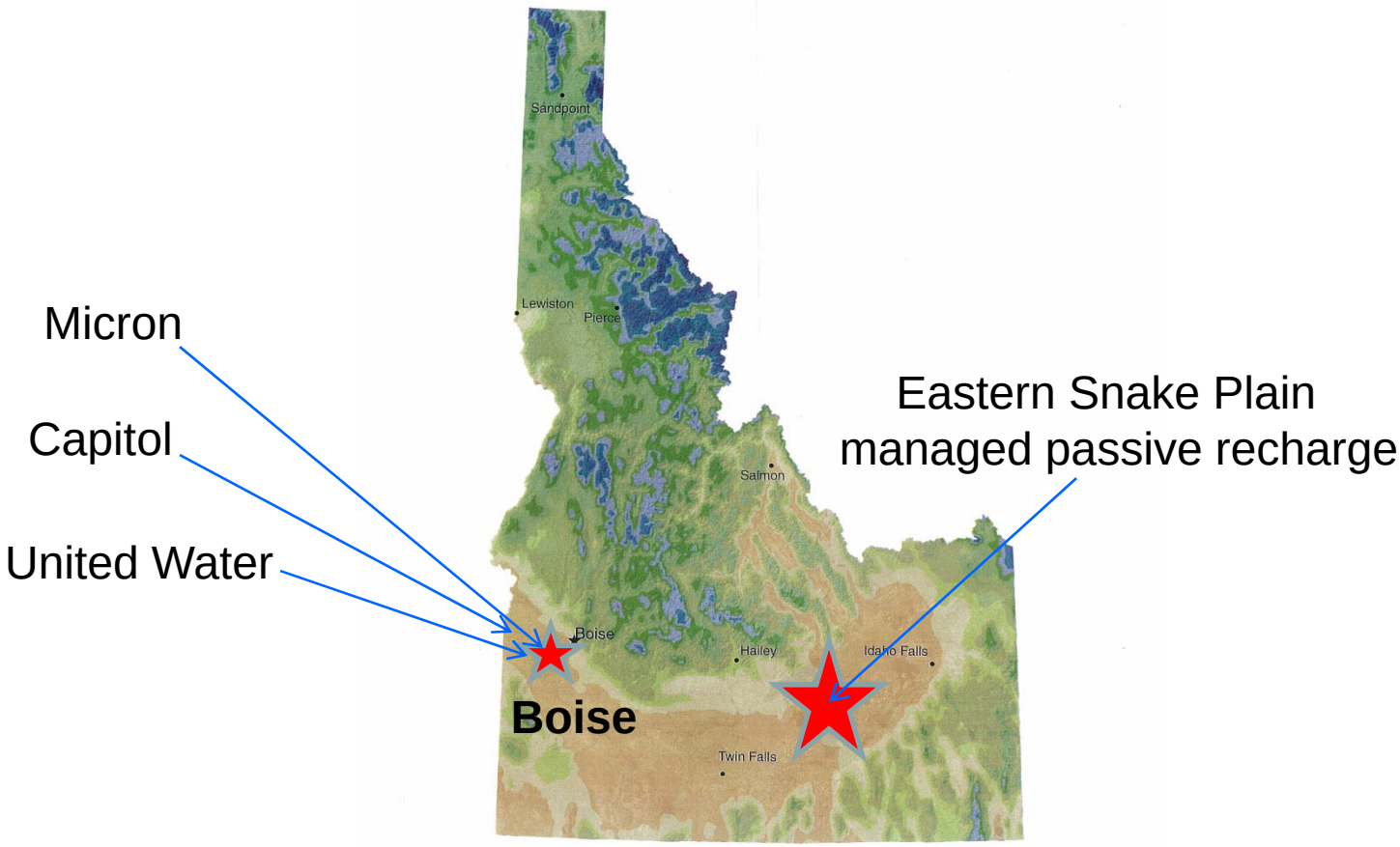

IDAHO RECHARGE SITES / AREAS

Micron Technology, Inc.

- purpose – used to mitigate groundwater withdrawals and for cost benefits

- water source - treated Boise River water

- injection into confined aquifer, UIC permit issued by IDWR

- treatment - ultra-filtration to drinking water standards
  - avg. TDS in 2009, 23 mg/L

- injection well - 16-in. diam., 1,215-ft. TD
  multiple screened zones from 630 to 1,203 fbls
  swl approx. 490-ft. bls
  Baski control valve
  200 hp submersible pump for periodic development

- recovery wells – several recovery wells within 0.5 mile

- operations: 1,160 a-f injected in 2009
  7,201 a-f total 2001- 2009
  1,504 a-f remaining in storage (injected- recovered-10% annual loss)

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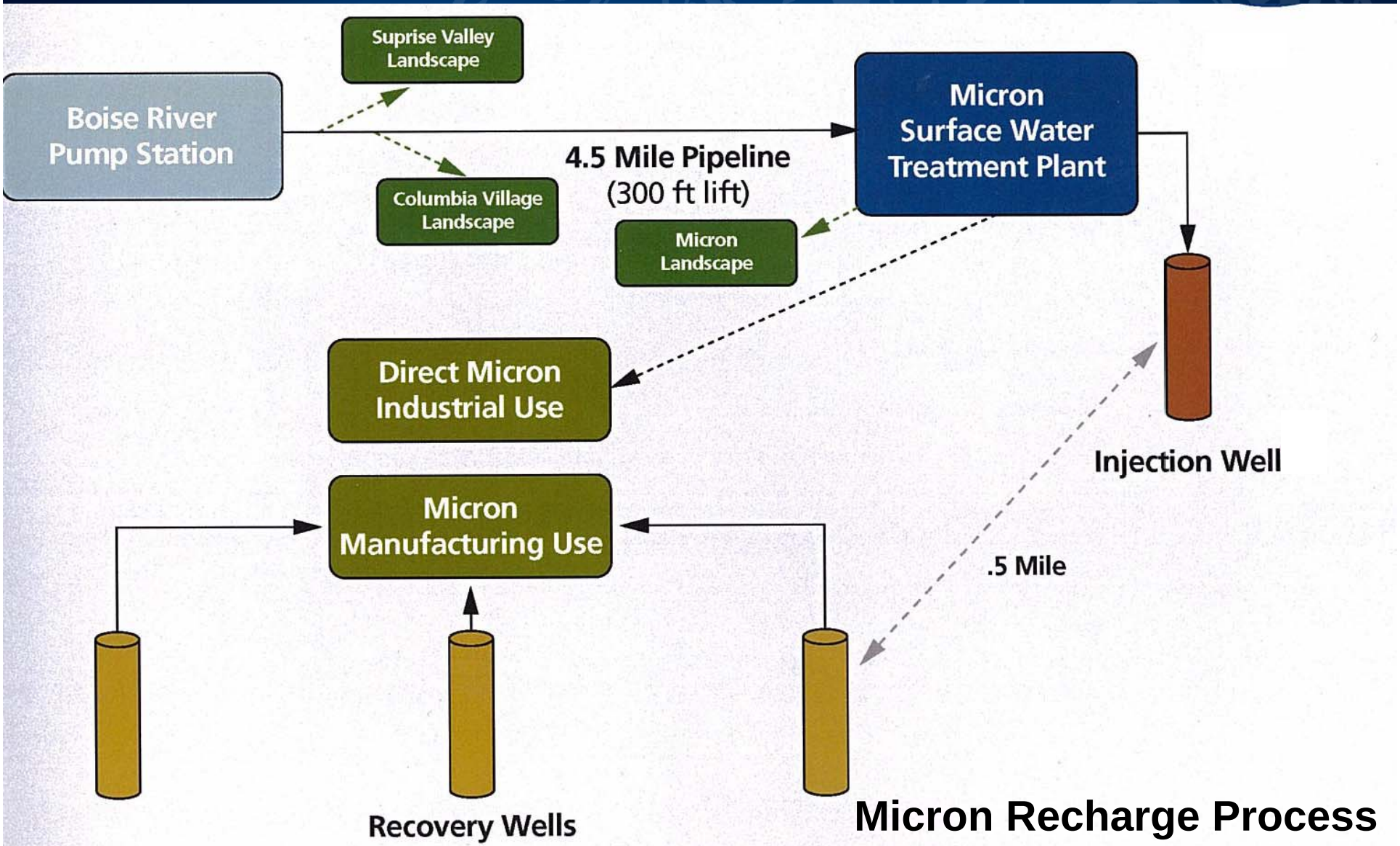


Micron Recharge Process

United Water

- serves most of Boise with ~ 81,000 connections
- six active injection wells
- purpose - mitigate locally high manganese concentrations
  - allows efficient use of all wells
- injection into confined-semi confined aquifers, permits issued by IDWR
- average injection rate ~200 gpm, average recovery rate ~700 gpm
- average drilled depth ~500 ft.
- source water – Boise River/ground water mix from system
- injection occurs between November and May each year
- ~40 – 60 MG/yr injected, ~90% recovered

Capitol Water Corp.

- small local water company (2,700 connections) – 7 wells including 1 ASR well (500 ft TD)
- purpose – mitigate local high iron concentrations
- source water – ground water from system
- injection into confined aquifer, UIC permit issued by IDWR
- injection rate ~ 300 gpm, recovery rate ~ 350 gpm, avg. ~43.2 mg/yr
- injection occurs between November and April
- 2004 – 2010 through April, ~929 a-f injected, 668 a-f recovered

Eastern Snake Plain Managed Recharge

- low cost, passive process
- allows use of recharge rights before (after) senior irrigation rights are used
- extends the time water is in canals
- sponsored by the Idaho Water Resource Board
- cash incentive paid to encourage canal companies to participate

Sources of Recharge Water

- Snake & Big/Little Wood Rivers – generally good quality, low TDS, turbidity

- Idaho Water Resource Board recharge rights
  - -1980 priority, 1,200 cfs diversion from the Snake River
  - -1980 priority, 800 cfs diversion from the Big/Little Wood Rivers

Recharge Timing

- Before, after and on shoulders of irrigation season (generally 15 April – 15 October)
- Losses that occur during irrigation, “incidental losses”, are considered normal operating losses and are not counted as recharge (even though recharge is occurring)

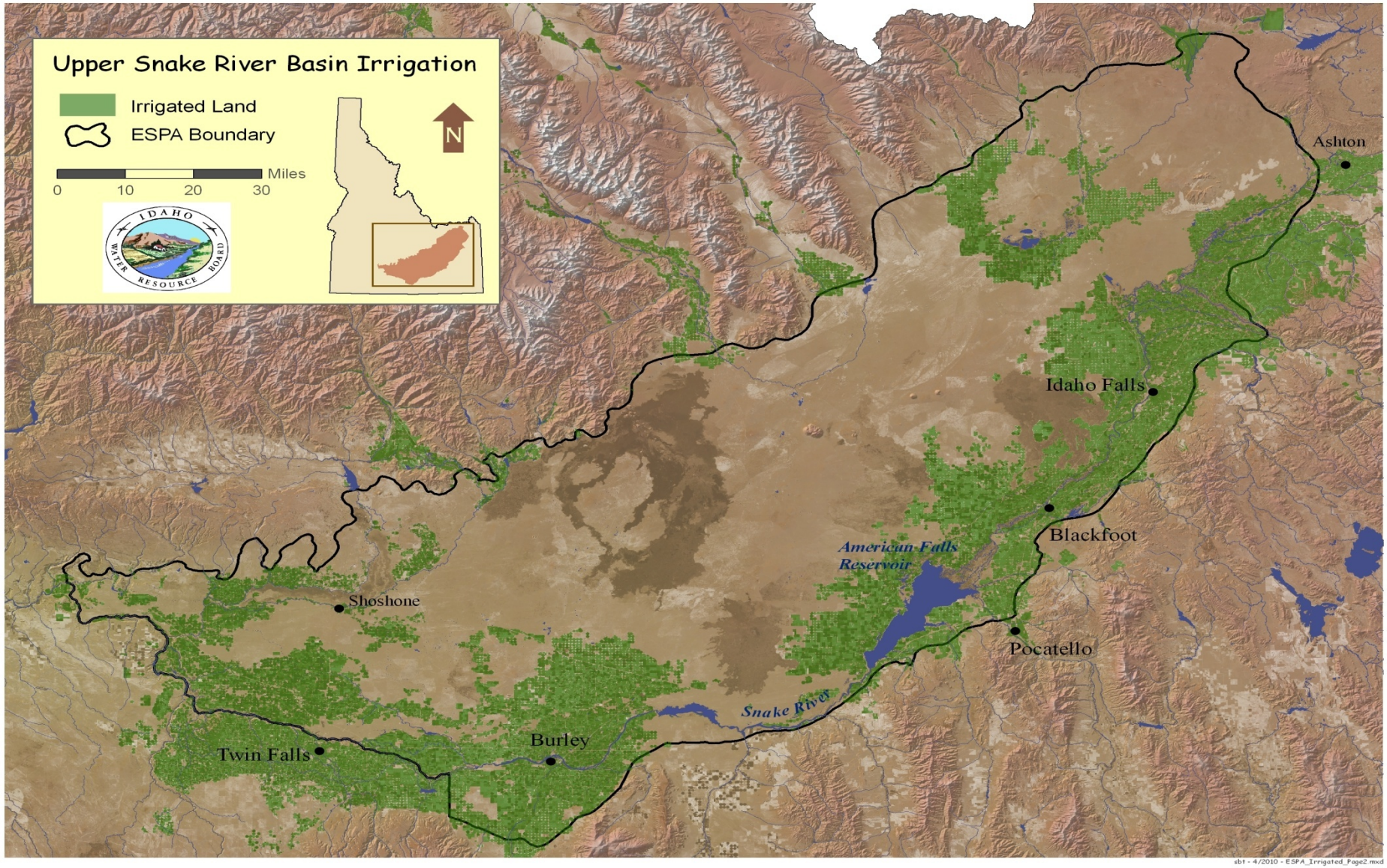
Eastern Snake Plain Aquifer

- unconfined, fractured basalt
- area approximately 11,000 square miles (~ 200 miles long by ~60 miles wide)
- total storage in the upper 500 ft. estimated at 200-300 maf, roughly equivalent to Lake Erie (116 mi^3 , 392 maf)
- flow contacts are rubbly and have high porosities & hydraulic conductivities
- columnar jointing & other fracture systems provide vertical conductivity
- well yields above 3,000 gallons per minute are common: high transmissivities: between 6.9×10^5 to 1.1×10^6 ft^2/day
- hydraulic gradient is southwest
- primary discharge area is “Thousand Springs”

Eastern Snake Plain Canals and Leakage

- ~ 2 million acres irrigated: ~ half surface and half ground water
- region accounts for ~21 % of all goods and services in Idaho
- ~ $10 billion annually
- constructed between 1900 and 1935
- most canals are unlined and leak ~ 30 %
- one canal diverting 1 Maf/season looses ~ 300 kaf (~1,700 af/day)
- annual average (1980-2002) leakage (incidental recharge) ~ 3.4 maf

So what good are these !##*#!! canals if they leak so much ??


Upper Snake River Basin Irrigation
Irrigated Land
ESPA Boundary
Miles
0
10
20
30
N
Ashton
Idaho Falls
Blackfoot
American Falls Reservoir
Pocatello
Shoshone
Snake River
Burley
Twin Falls
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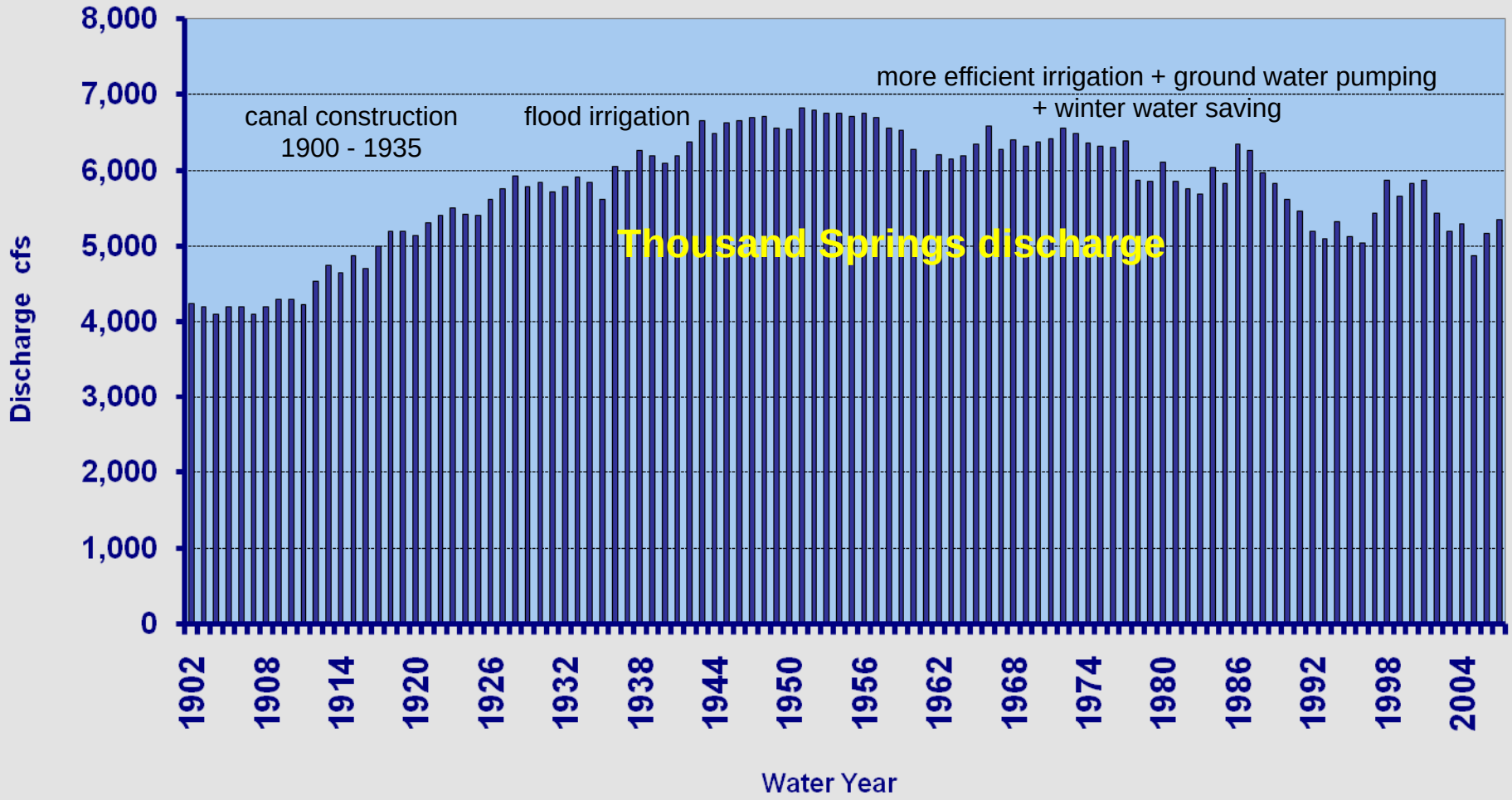

1902 discharge ~ 4,200 cfs, 3 Maf/yr
1950 peak discharge ~ 6,800 cfs, 4.9 Maf/yr
2007 discharge ~ 5,350 cfs, 3.9 Maf/yr

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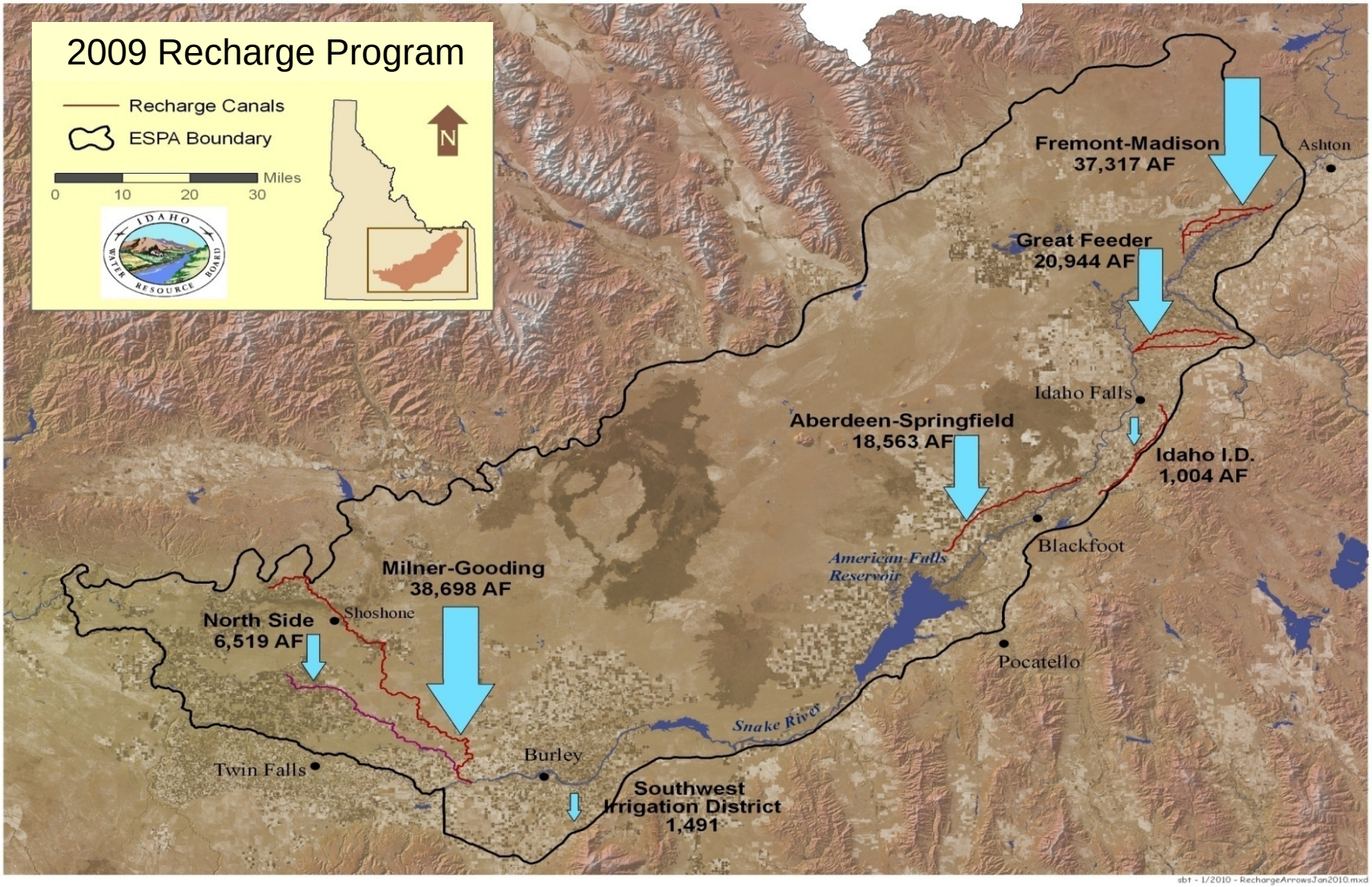

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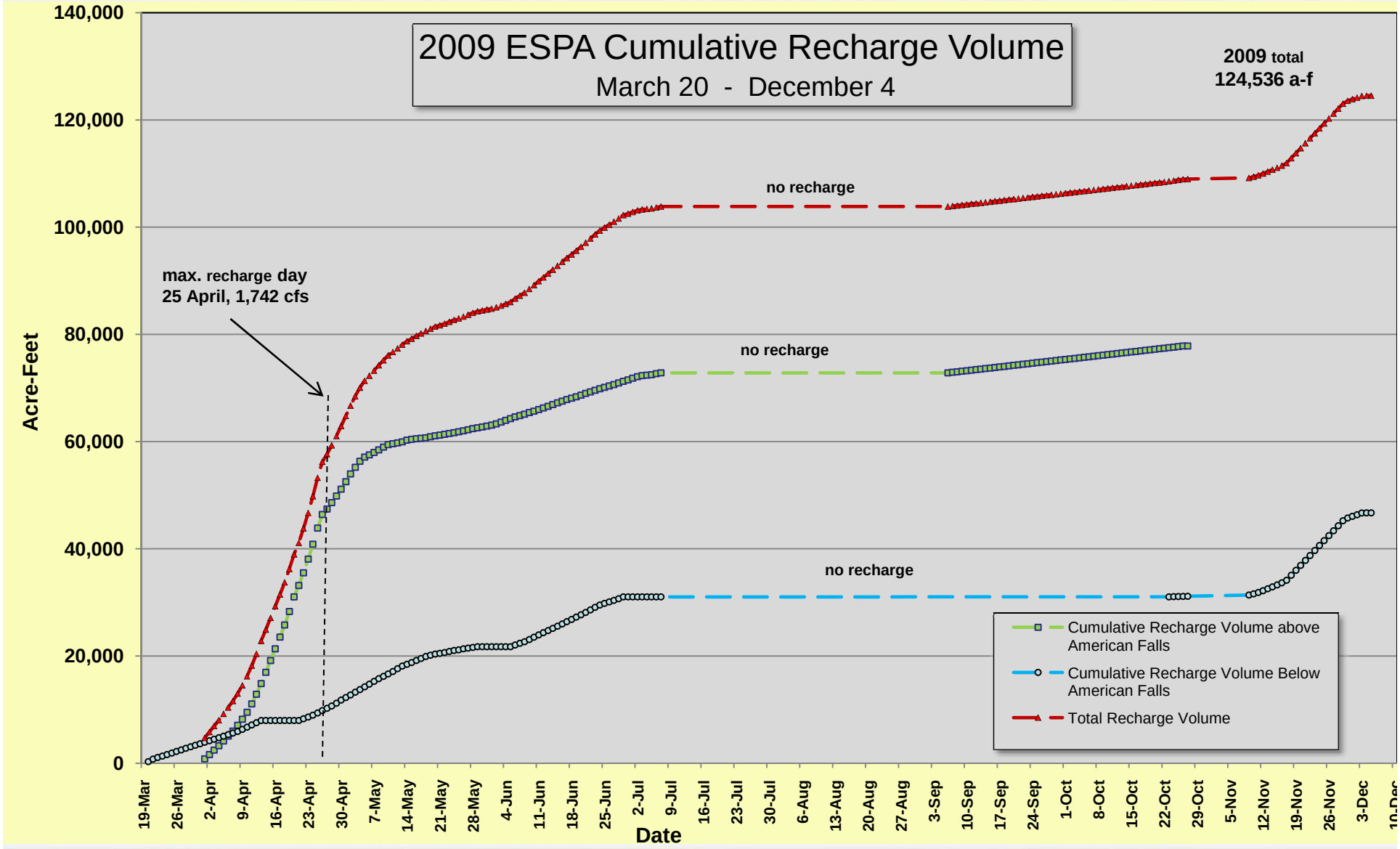

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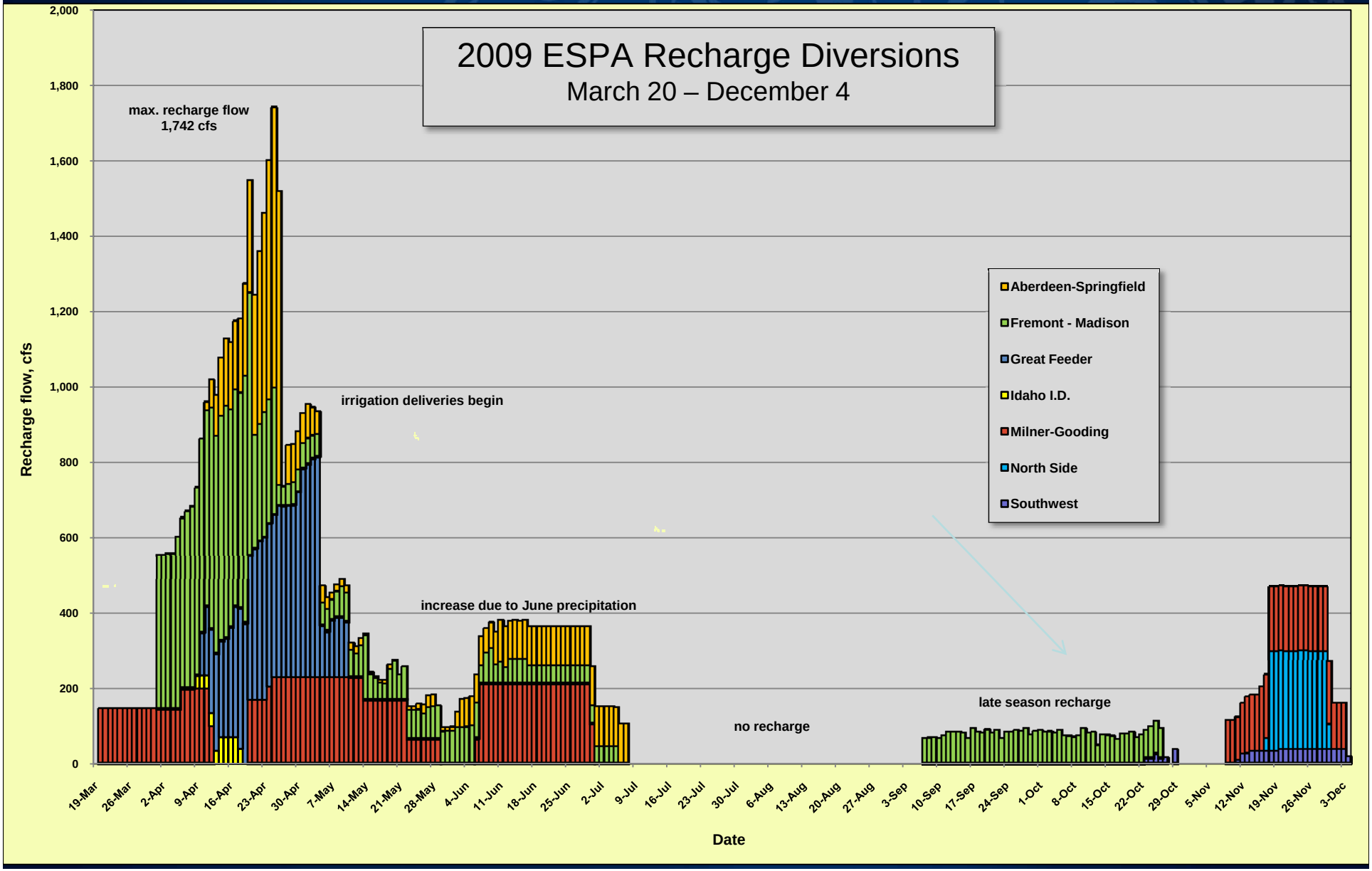

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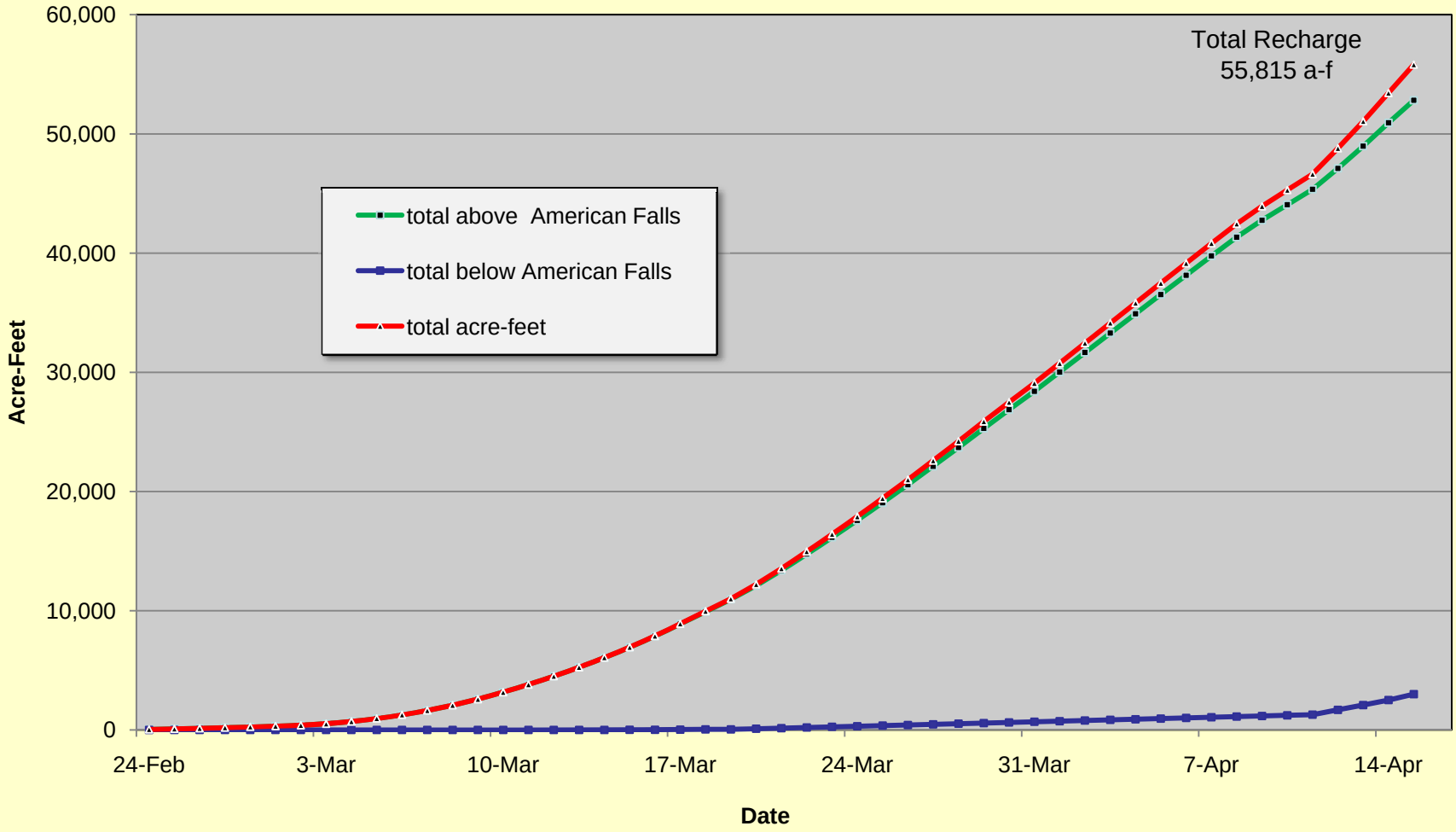
2010 Cumulative Recharge Volume
Early Season, February 24 - April 15



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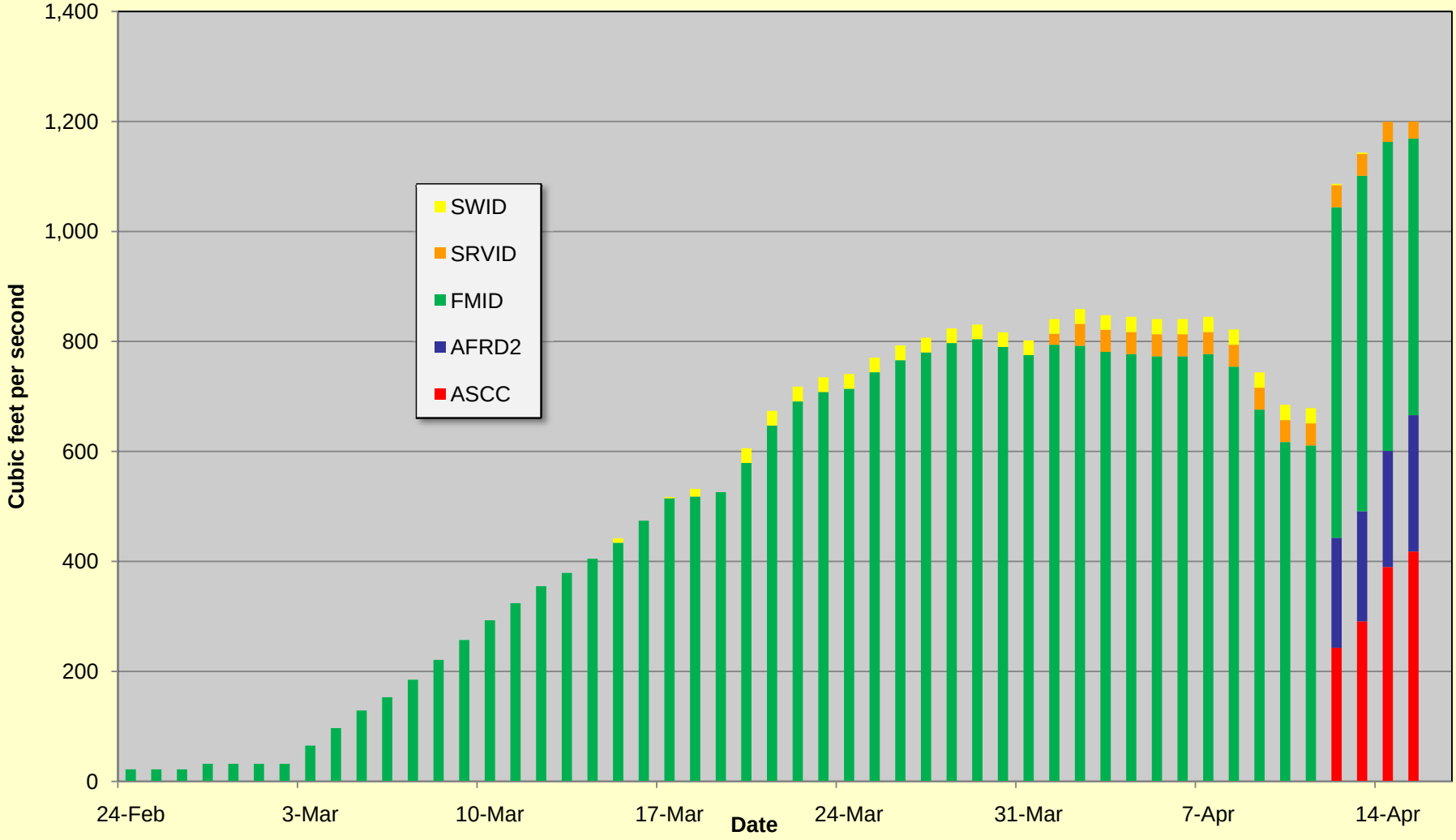
2010 ESPA Recharge Diversions
Early Season February 24 - April 15



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Recharge north of Shoshone, Idaho from Milner-Gooding Canal
April 28, 2009. Flow is approximately 230 c.f.s.

Permitting & Water Quality Monitoring

- recharge from canal losses is a consequence of canal operations as such no permit or water quality monitoring is required
- recharge at designated off-canal recharge sites requires IDEQ approval and water quality monitoring
- recharge by injection requires a UIC permit issued by IDWR

ESPA Model

- collaboration between IDWR, USGS, USBOR, U of Idaho, Idaho National Lab, USF&W, Idaho Power Co., consultants, and managed by IDWR
- over 1,000 head observation points (monitoring wells)
- over 2,500 computed reach gains/losses in 11 Snake River reaches
- among other outputs, models benefits of recharge by steady state and transient responses from recharge

Recharge and Water Resource Management

…….. helps improve management of Idaho's water resources through

- water quality mitigation
- water supply mitigation
- in the ESPA, a major component of the Comprehensive Aquifer Management Plan
  - water budget change of 600 kaf annually by 2030
  - by stabilizing and improving spring flows, ground water levels and river flows
- a potential component of future CAMP programs in the Boise, Spokane-Rathdrum Prairie and Moscow-Pullman areas to address both supply and timing issues
- ASR in Idaho
  - no legal framework to accommodate ownership and recovery of recharged water
    - ESPA is a dynamic, unconfined aquifer with many users
    - recharged water is considered a public resource