

# ESTIMATES OF GROUND-WATER RECHARGE TO THE YAKIMA RIVER BASIN AQUIFER SYSTEM, WASHINGTON, FOR PREDEVELOPMENT AND CURRENT LAND USE AND LAND COVER CONDITIONS



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# OVERVIEW

- **WHAT** — GROUND-WATER RECHARGE
- **WHERE** — YAKIMA RIVER BASIN, WASHINGTON
- **WHY** — GROUND-WATER AVAILABILITY
- **HOW** — APPLICATION OF TWO HYDROLOGIC MODELS
- **RESULTS** — MAPS AND GRAPHS

# WHAT

## GROUND-WATER RECHARGE:

DRAINAGE FROM: THE ACTIVE  
ROOT-ZONE OR THE SOIL COLUMN  
FOR BARREN SOILS

- SPATIAL DISTRIBUTION OF RECHARGE
- TEMPORAL VARIATIONS IN RECHARGE

FOR:

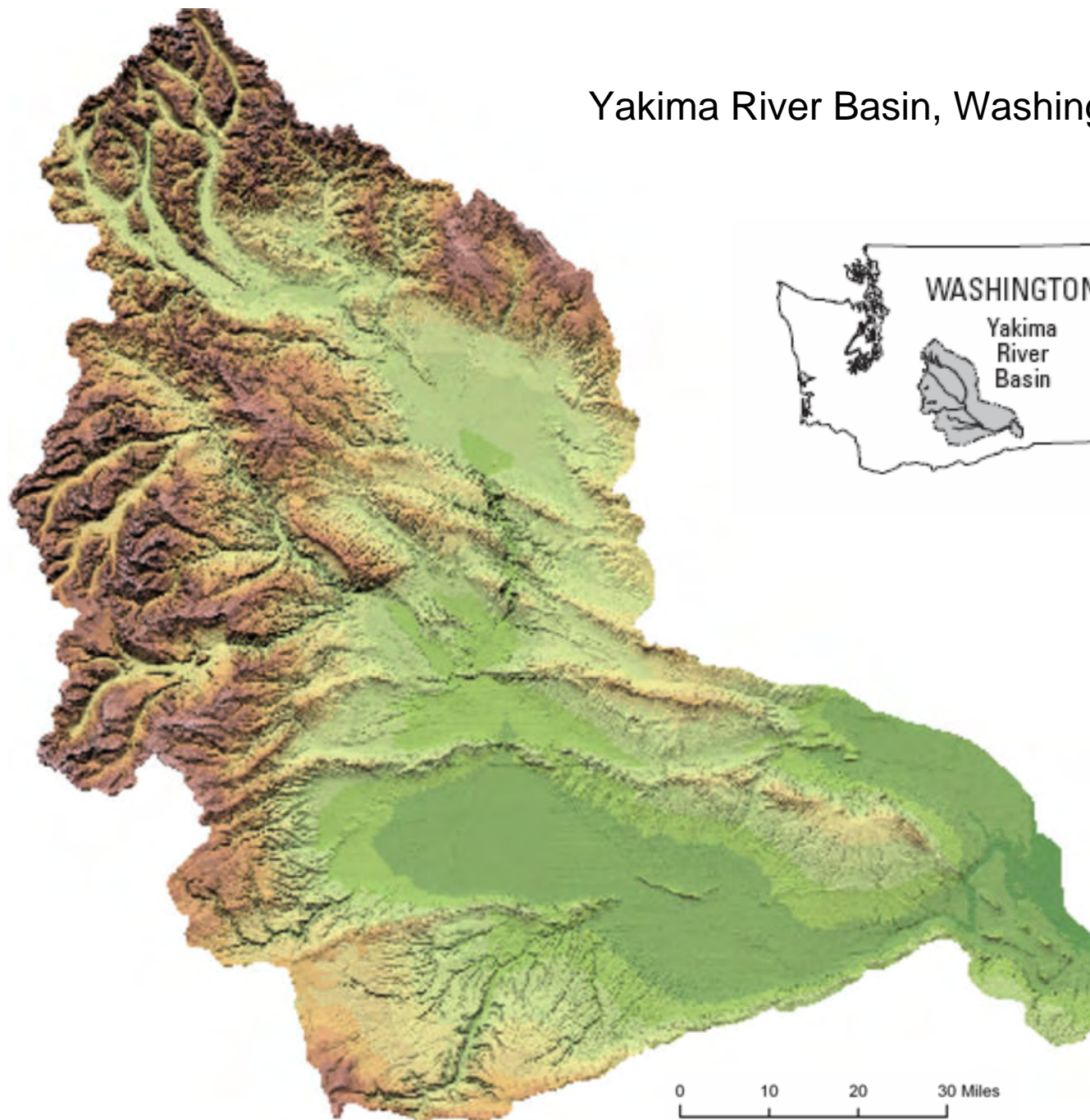
PREDEVELOPMENT AND CURRENT  
LAND-USE AND LAND-COVER CONDITIONS

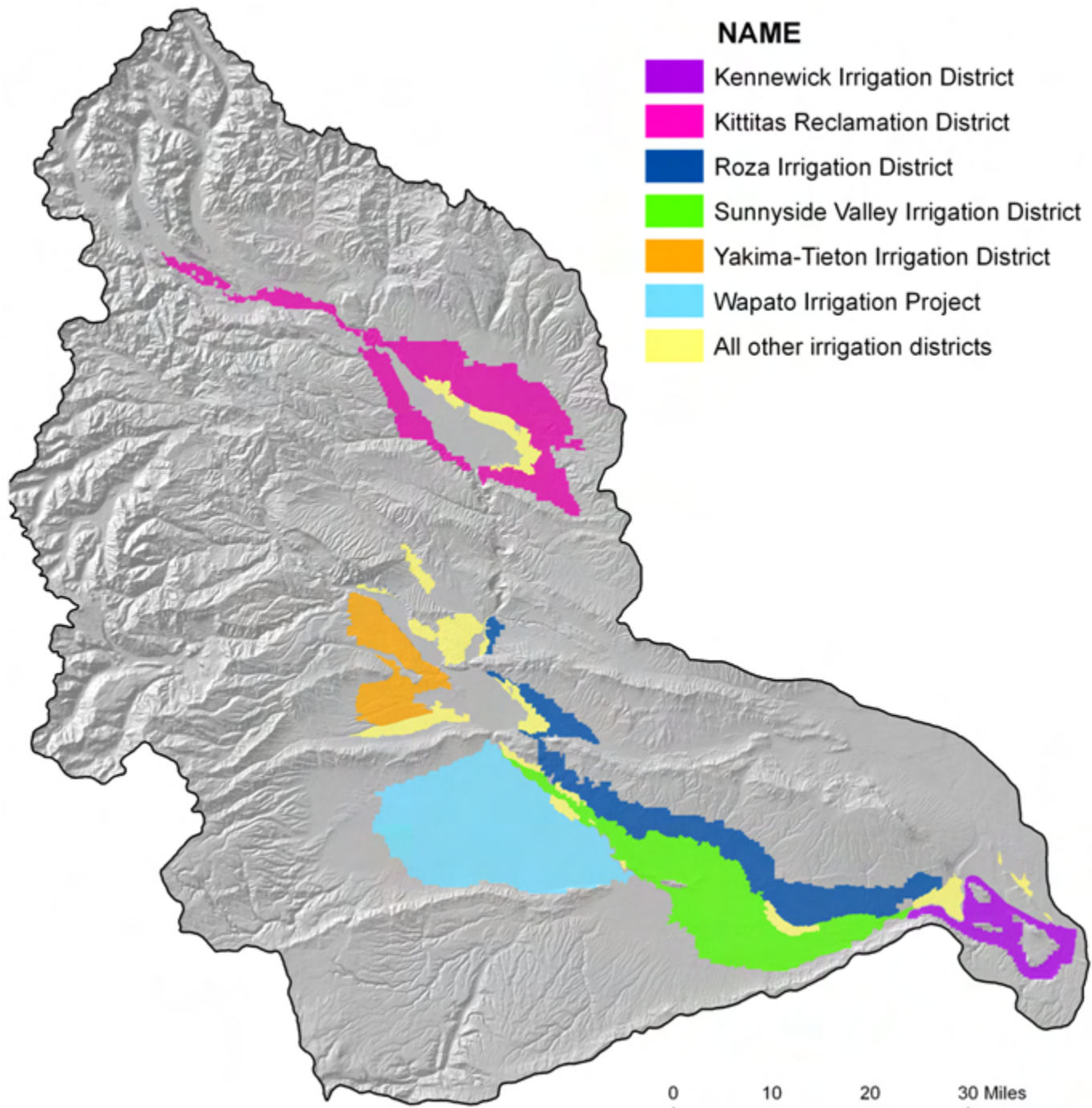
DAILY ESTIMATES FOR WATER YEARS  
1950-1998/2003

# WHERE



# Yakima River Basin, Washington







# WHY

# Ground-water availability and its relation to surface-water resources

Hydrogeologic Framework

Ground-Water Pumpage

**Ground-Water Recharge**

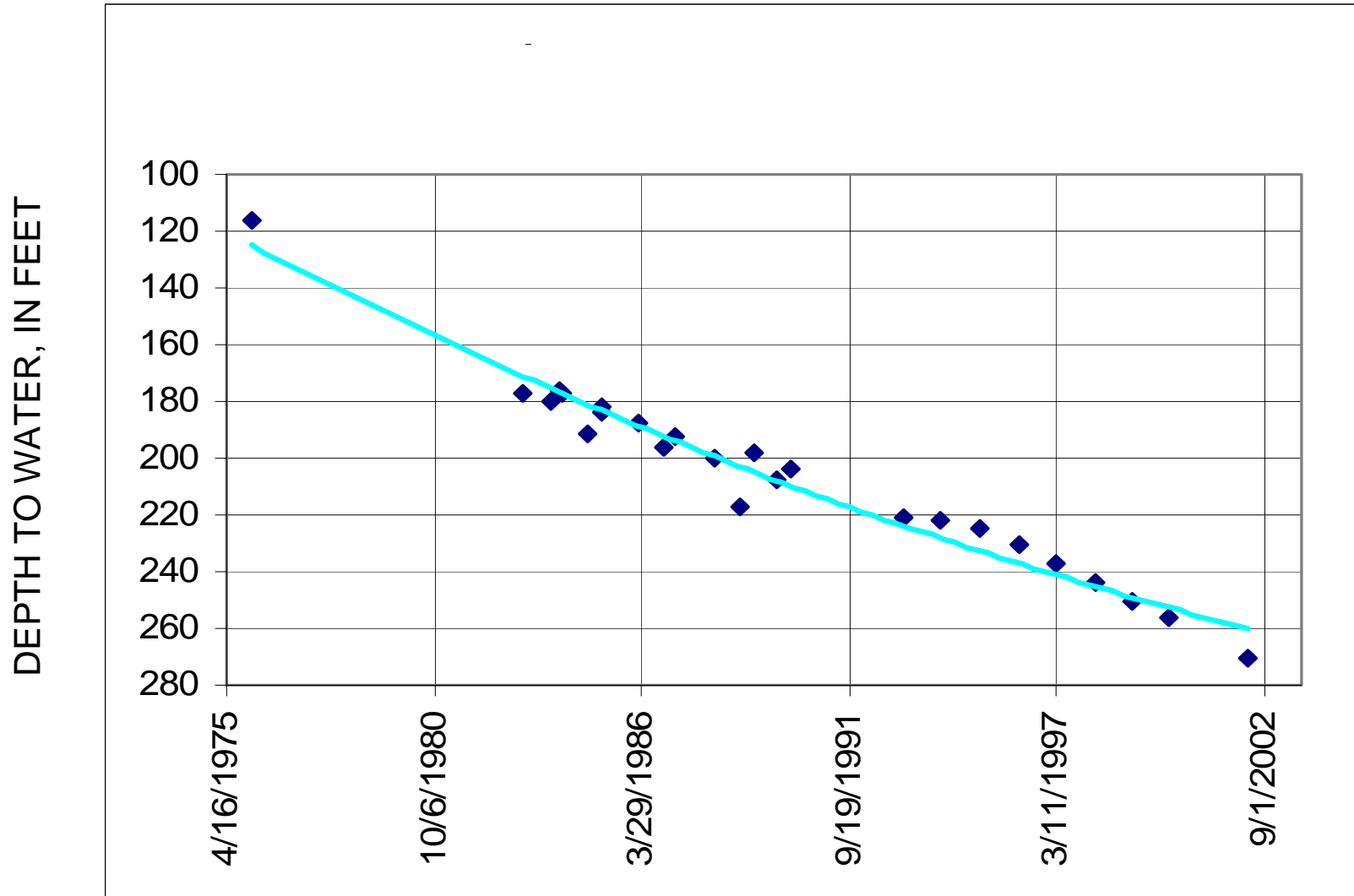


Integrate Elements Using  
Ground-Water Flow Models

GW/SW Interchanges

Ground-Water Levels

1,280 feet deep, about 5.7 feet per year decline



# HOW

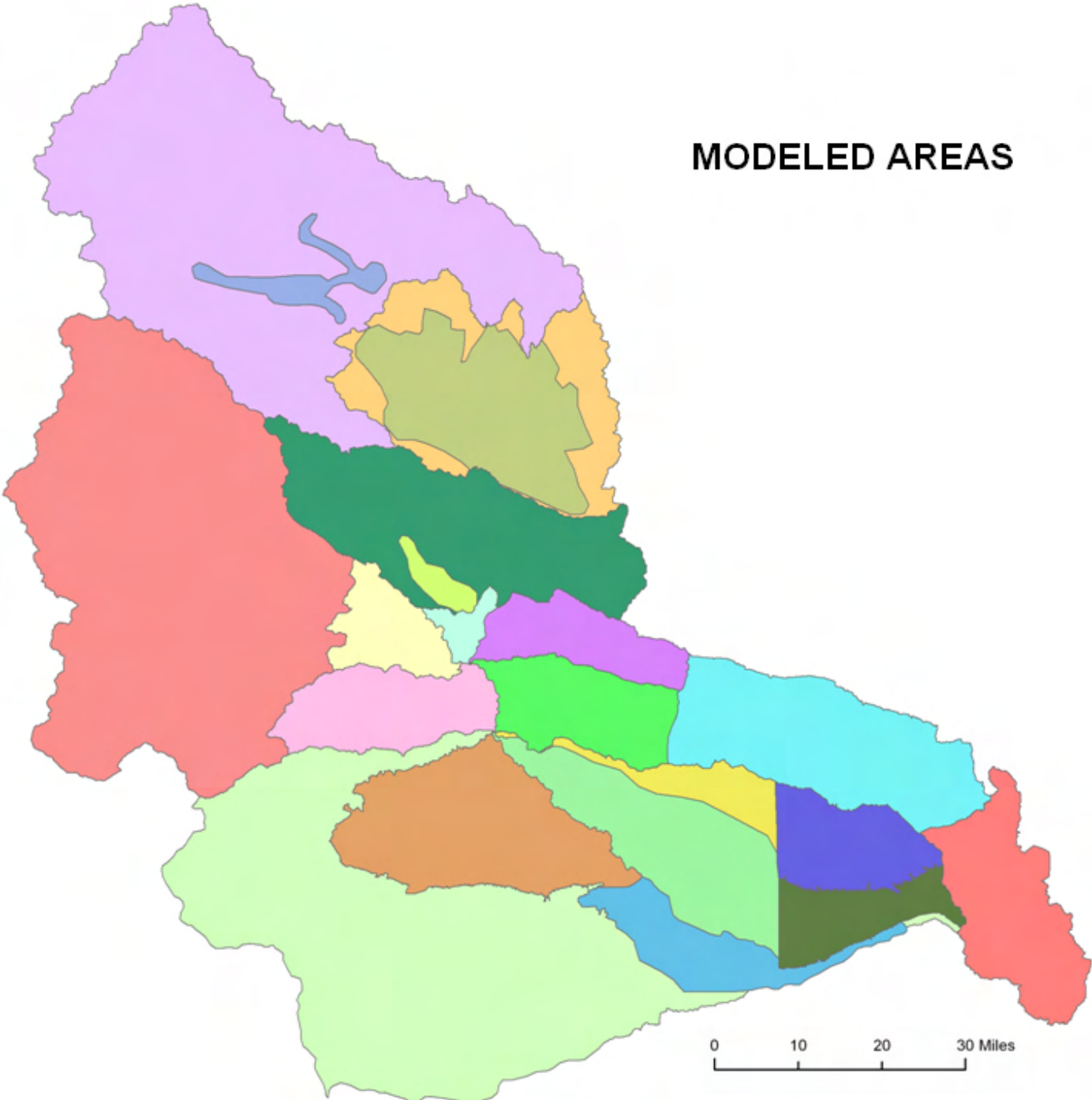
- Application of two hydrologic models:

Precipitation-Runoff Modeling System  
(PRMS)

Deep Percolation Model  
(DPM)

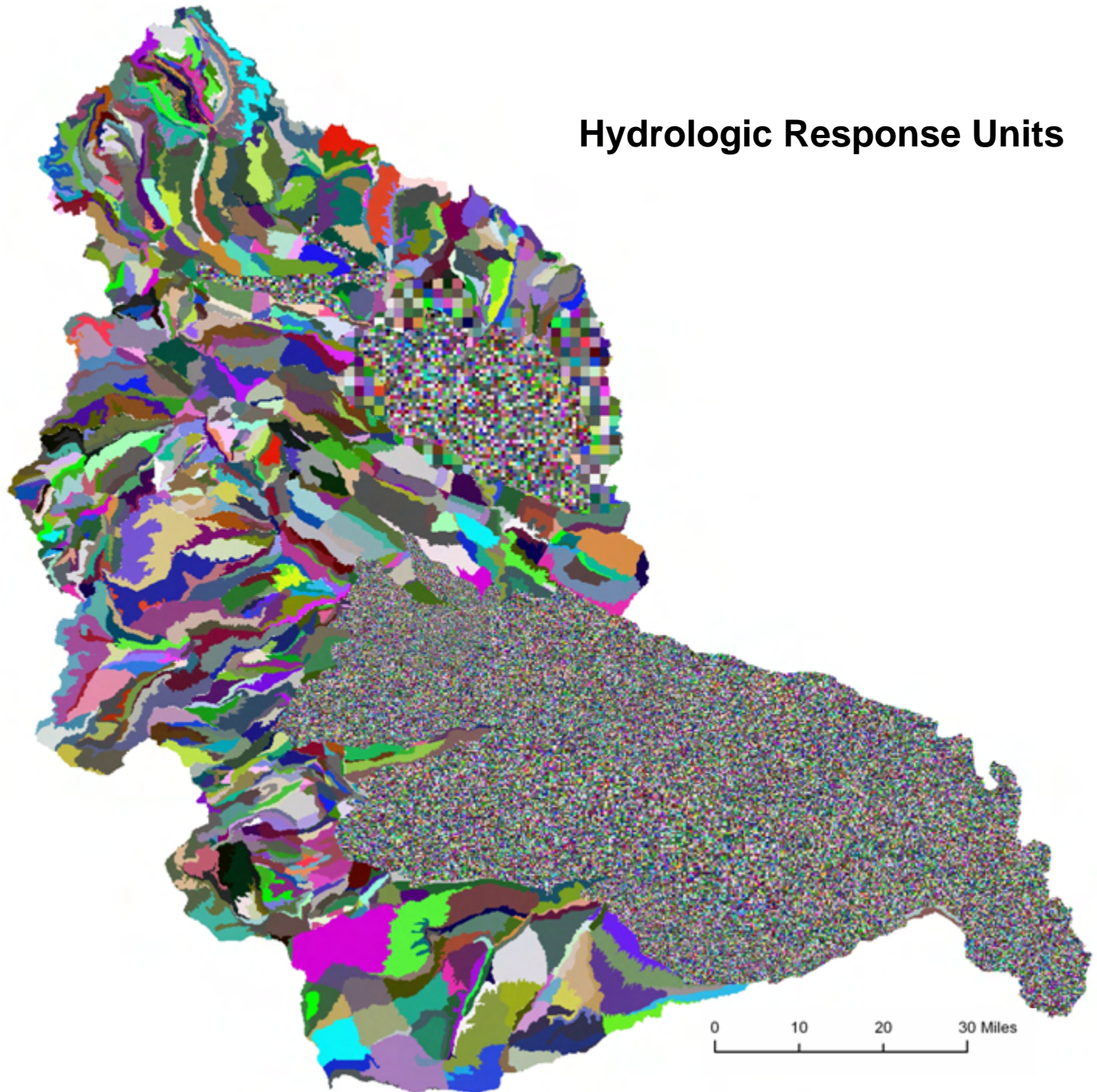
Both in the USGS Modular Modeling System

# MODELED AREAS



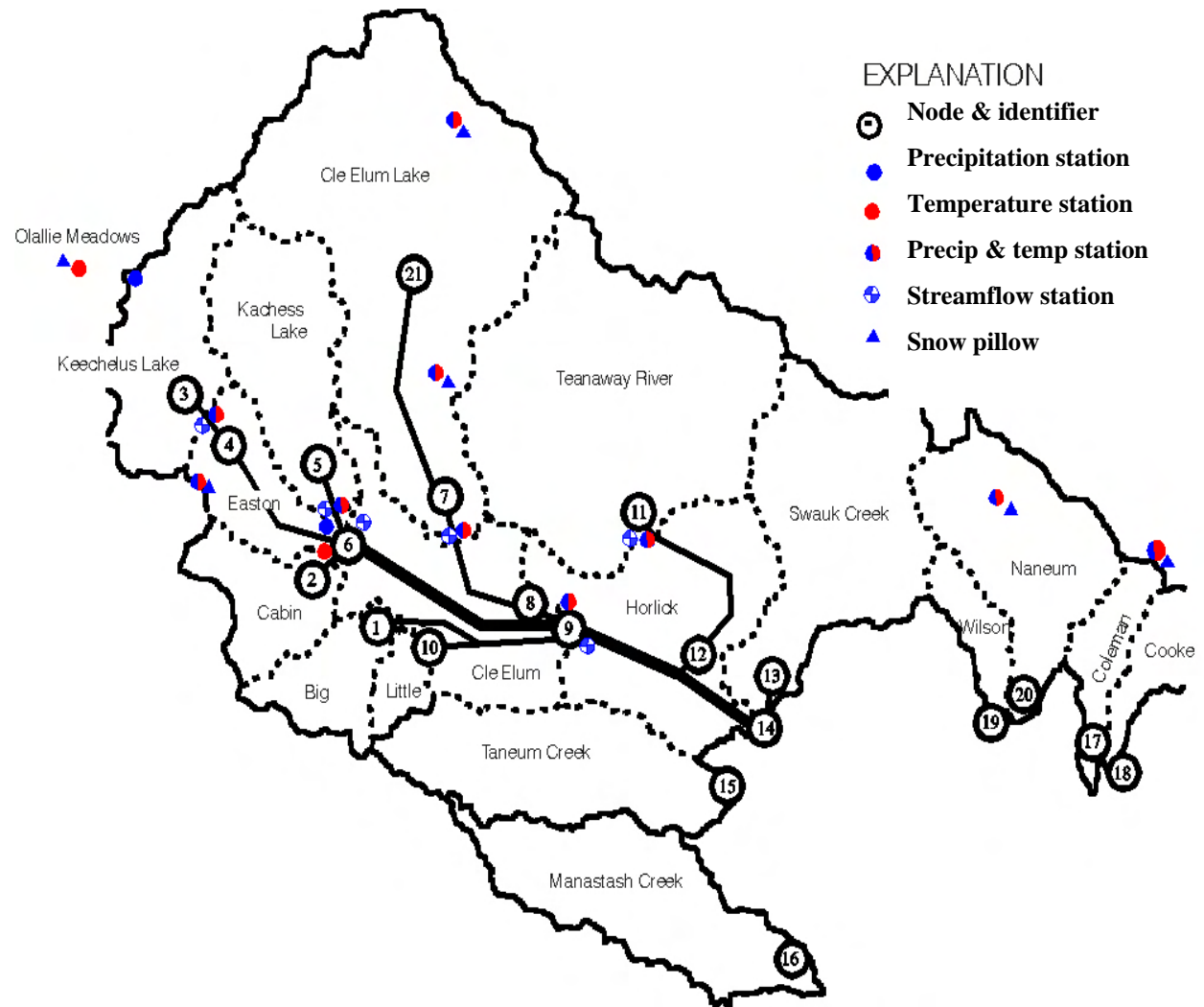


# Hydrologic Response Units



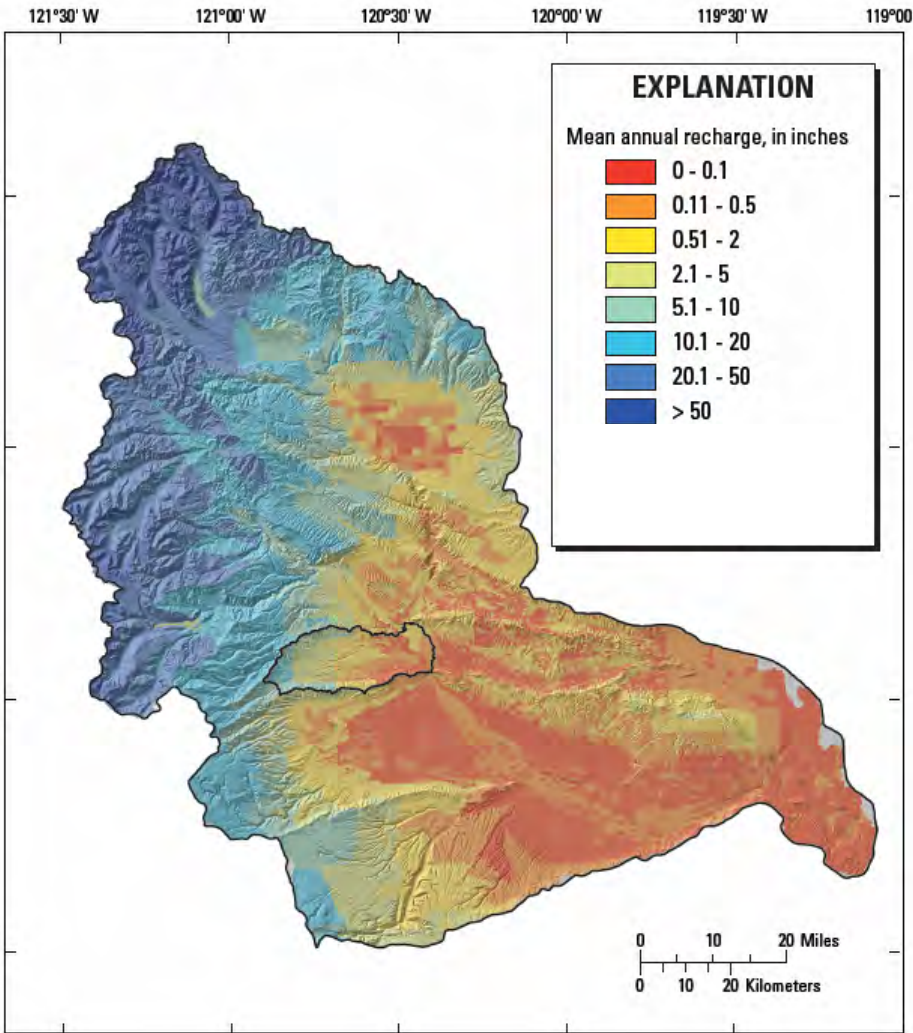
# Upper Yakima Modeling Unit

- 404 HRUs
- 17 subbasins
- 21 nodes
- 14 precipitation inputs
- 13 temperature inputs

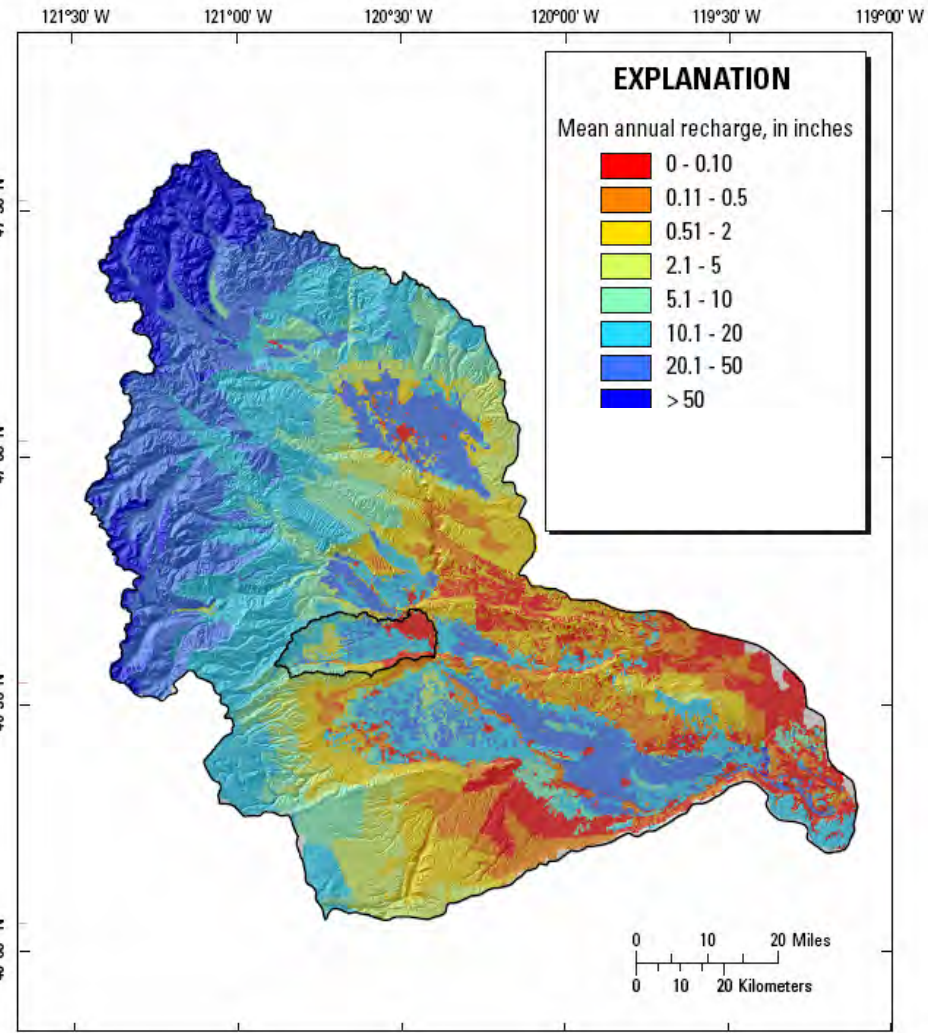


# RESULTS

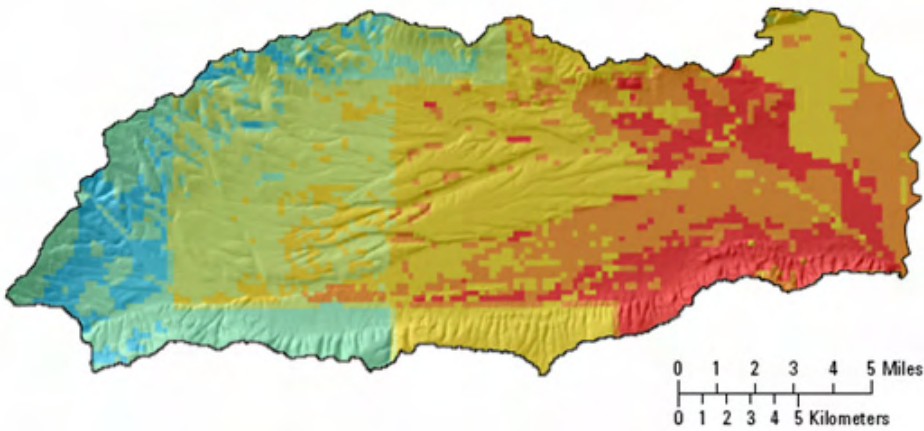
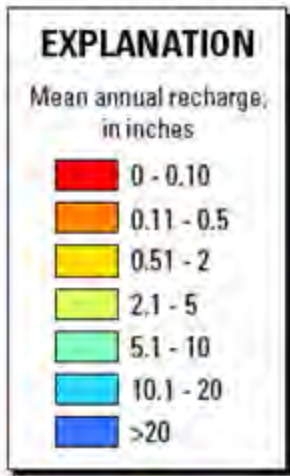




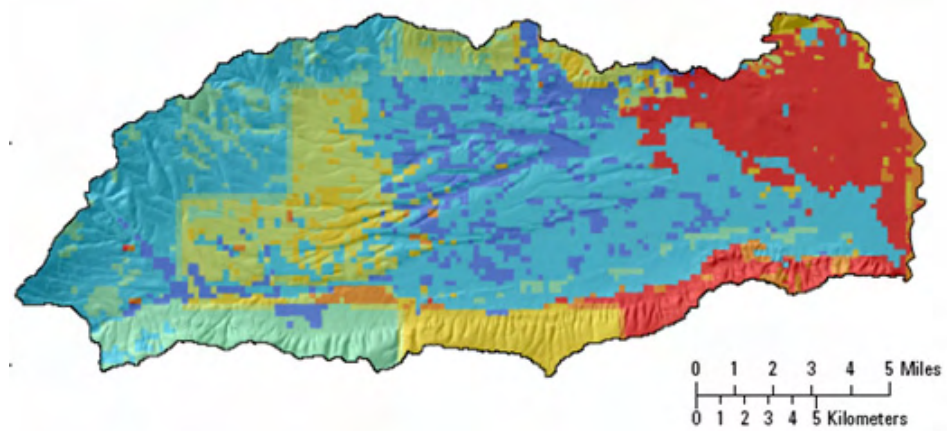
PREDEVELOPMENT CONDITIONS



CURRENT CONDITIONS



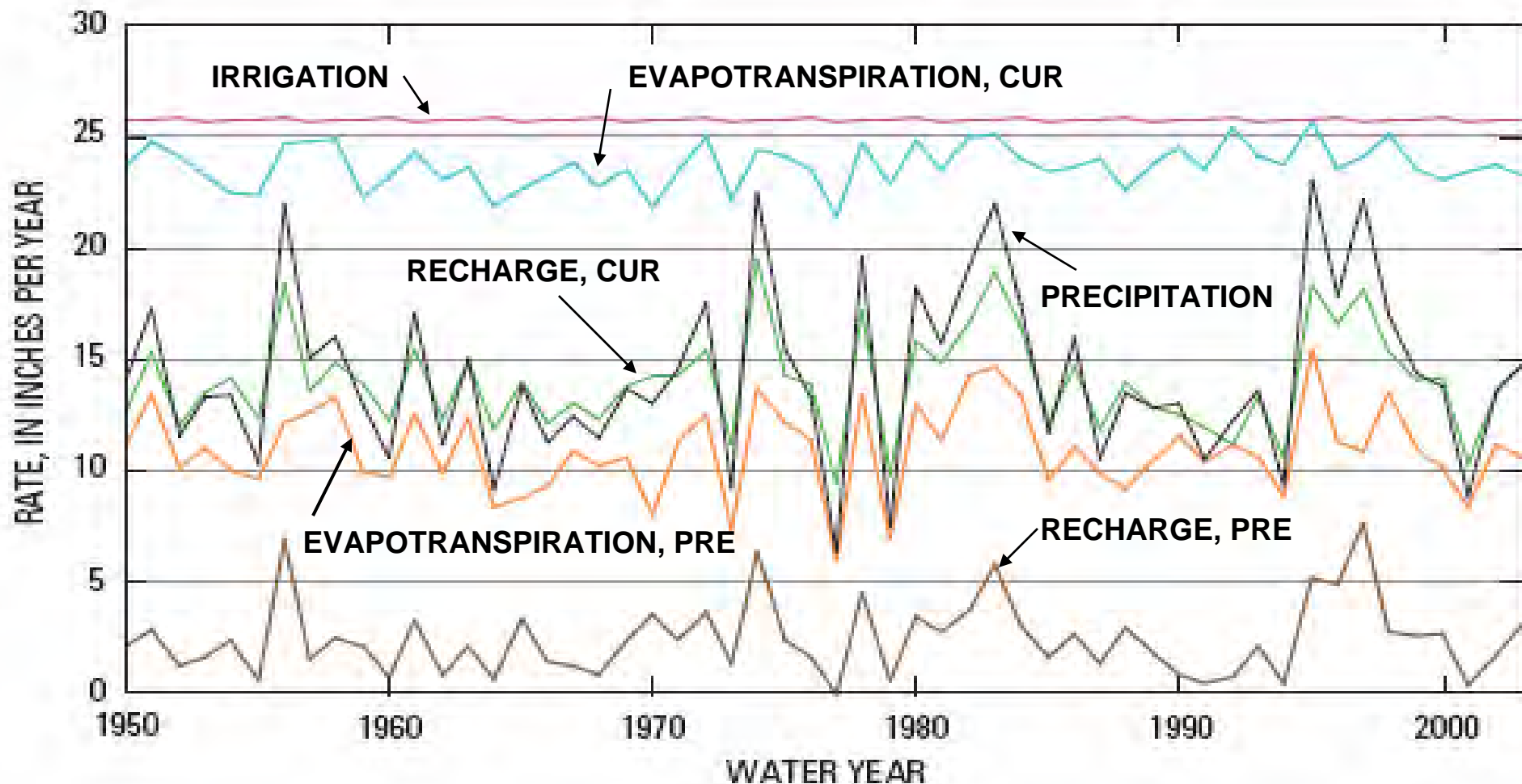
**PREDEVELOPMENT CONDITIONS**

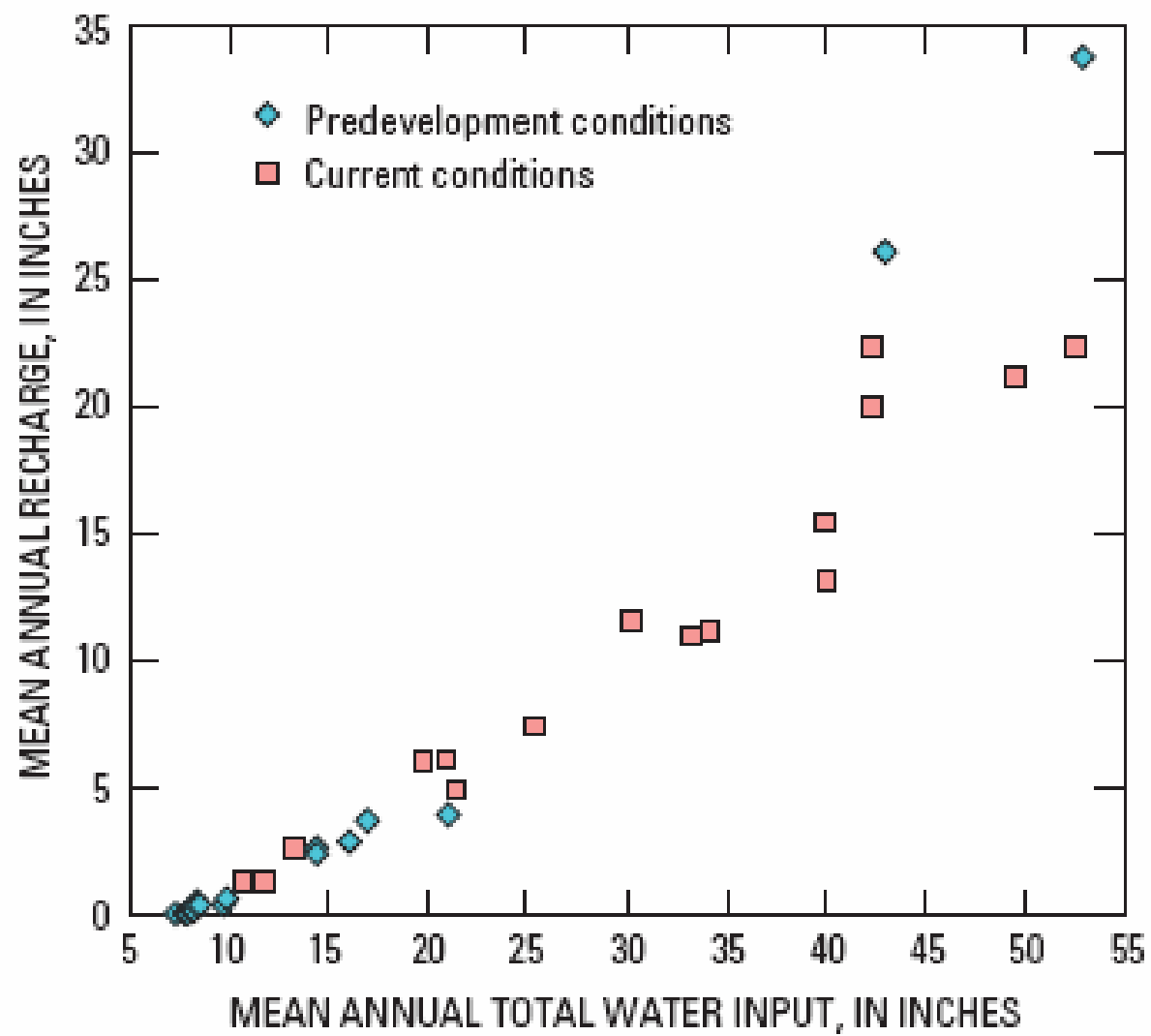


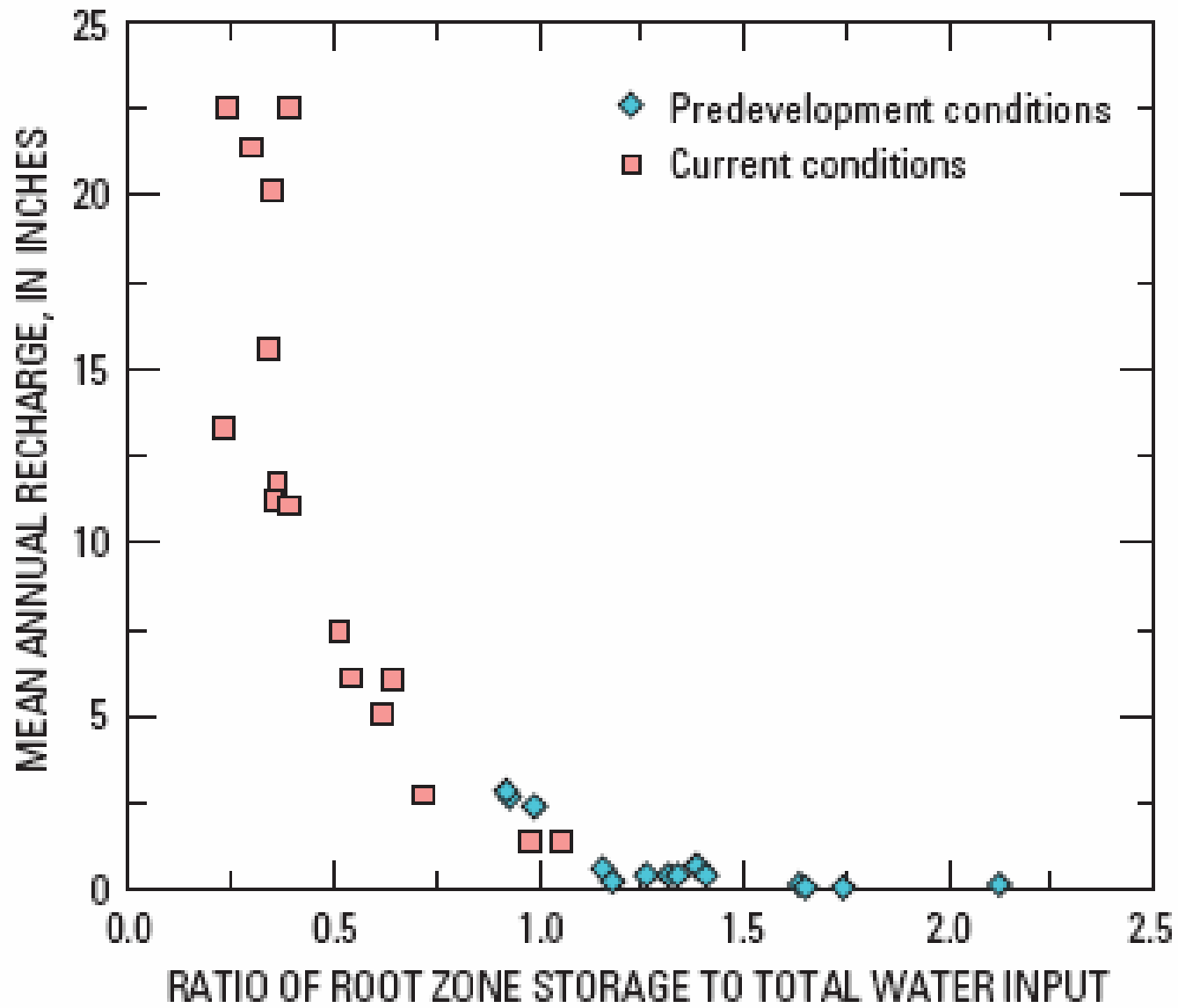
**CURRENT CONDITIONS**



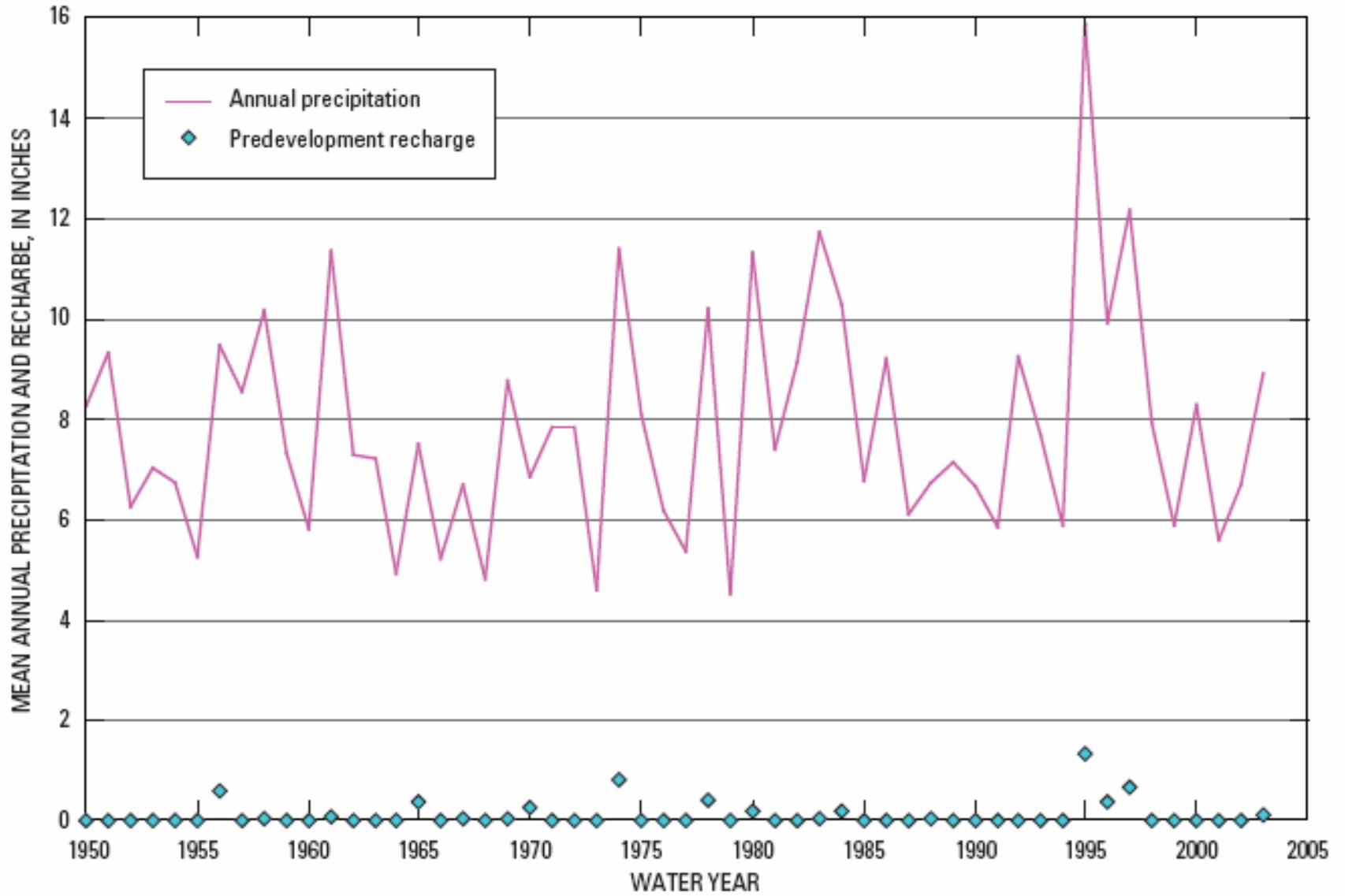
# ANNUAL WATER BUDGET FOR A SEMIARID MODELED AREA







# PREDEVELOPMENT RECHARGE FOR AN ARID AREA



# COMPARISON WITH OTHER WATER BUDGET ITEMS

## RECHARGE

PREDEVELOPMENT	5,500 ft <sup>3</sup> /s
CURRENT	7,300 ft <sup>3</sup> /s

## PRECIPITATION

12,000 ft<sup>3</sup>/s

## STREAMFLOW

UNREGULATED	5,600 ft <sup>3</sup> /s
REGULATED	3,600 ft <sup>3</sup> /s

## EVAPOTRANSPIRATION

UNREGULATED	6,400 ft <sup>3</sup> /s
REGULATED	8,400 ft <sup>3</sup> /s

## PUMPAGE (2000)

430 ft<sup>3</sup>/s