River Basin
Water Resources Planning

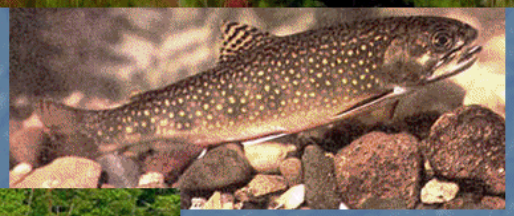
Don Rayno
Division of Water Resources

North Carolina Department
of
Environment and Natural Resources

Water Resources Plans support







- Sustainable management
- Reliable, quantitative methods for planning
- Objective management and regulatory decision making





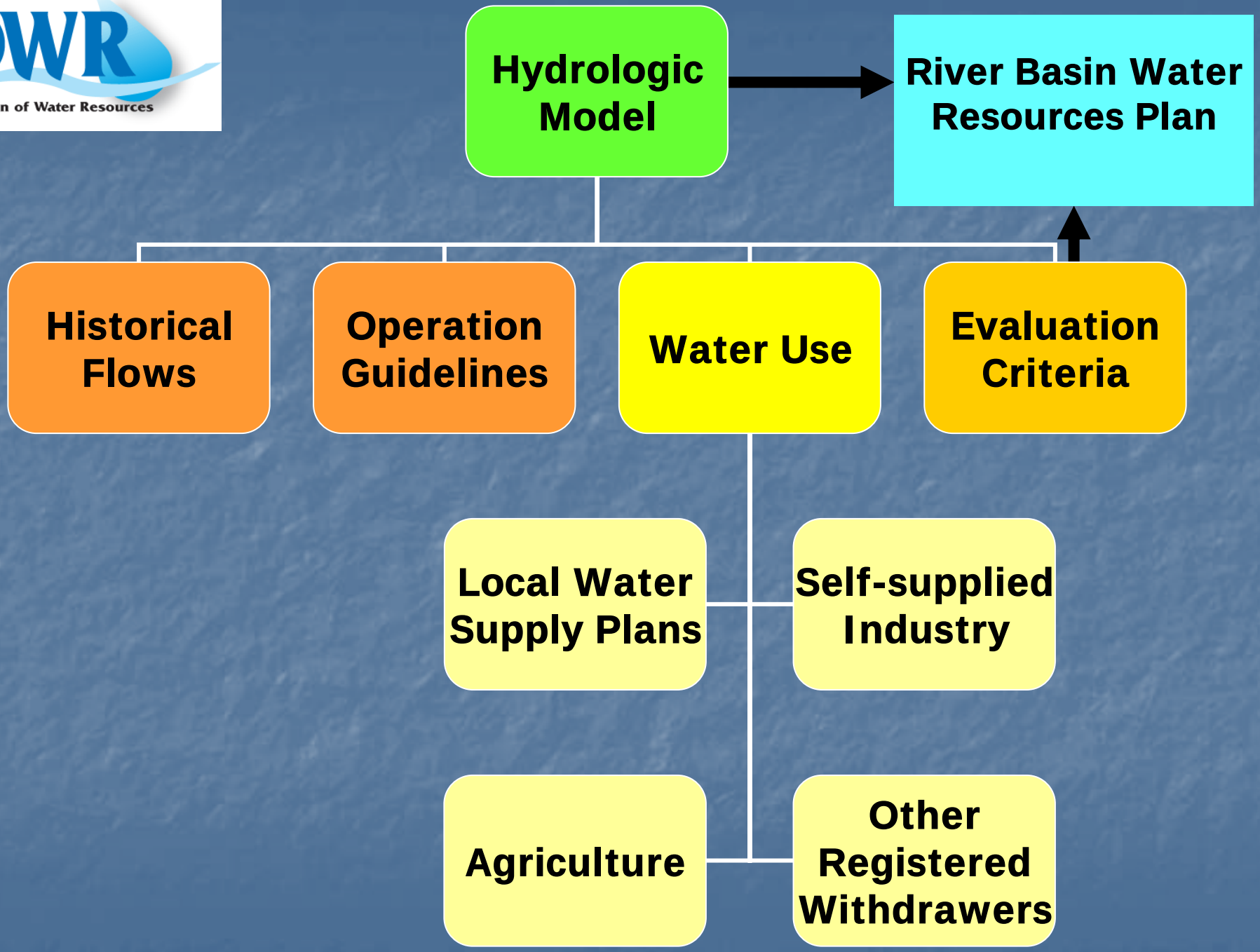


Critical Questions

How much water is available in the river system?

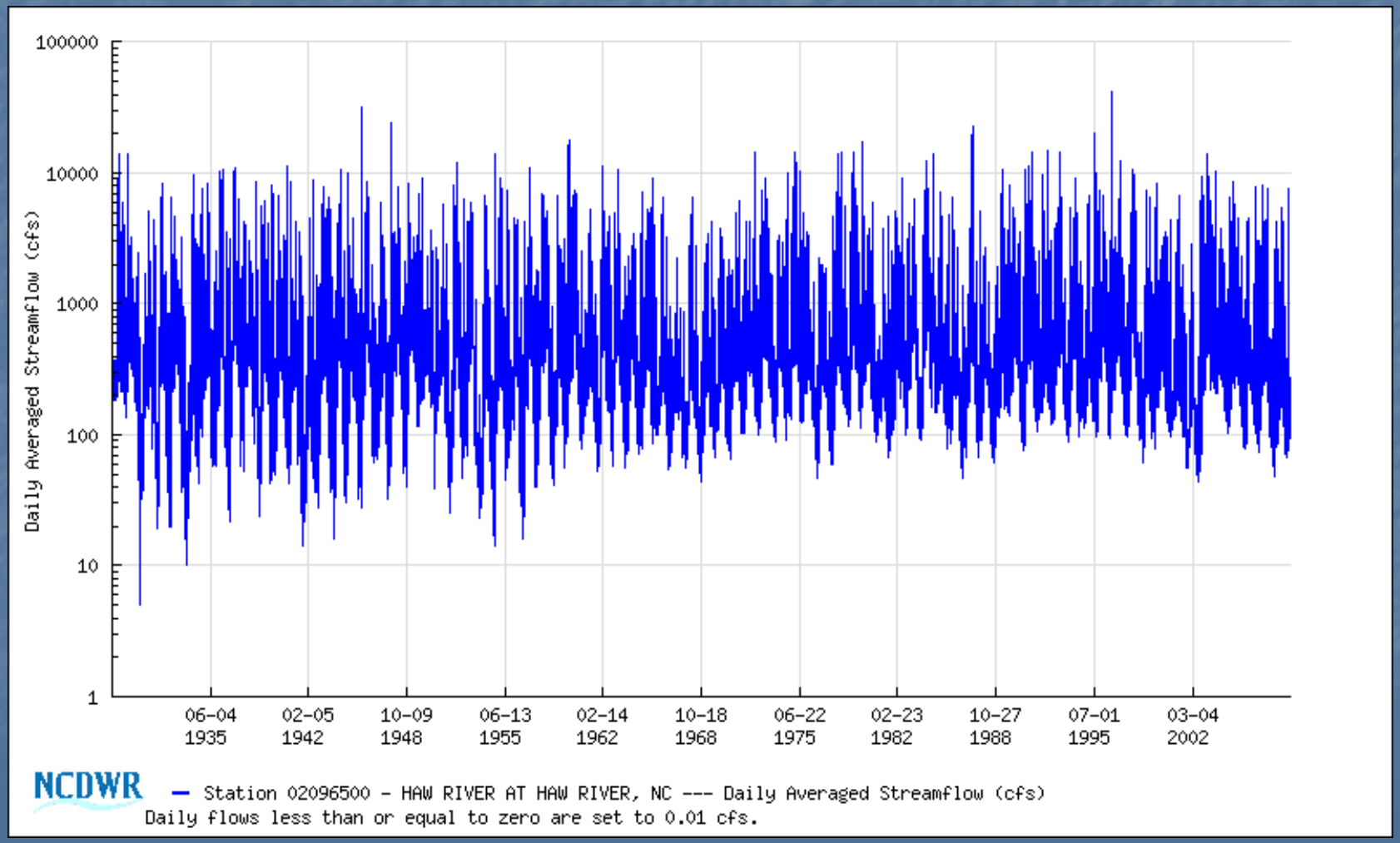
How much and when is water needed for the various services we expect the river to provide?

Water Use Data
+
Hydrologic Model


Hydrologic Model
River Basin Water Resources Plan
Historical Flows
Operation Guidelines
Water Use
Evaluation Criteria
Local Water Supply Plans
Self-supplied Industry
Agriculture
Other Registered Withdrawers

Historical Flows

More than 70 years Annual Flow Patterns



DWR
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Operations Guidelines

Examples

- Quantity and timing of specific flows
  - Aquatic habitats
  - Water quality protection
  - ✓ Intake coverage
  - Recreation

- Reservoir water level limits and timing
  - Structural limits
  - Aquatic habitat protection
  - ✓ Intake coverage
  - Boat ramp access
  - Authorized purposes and storage allocations

DWR
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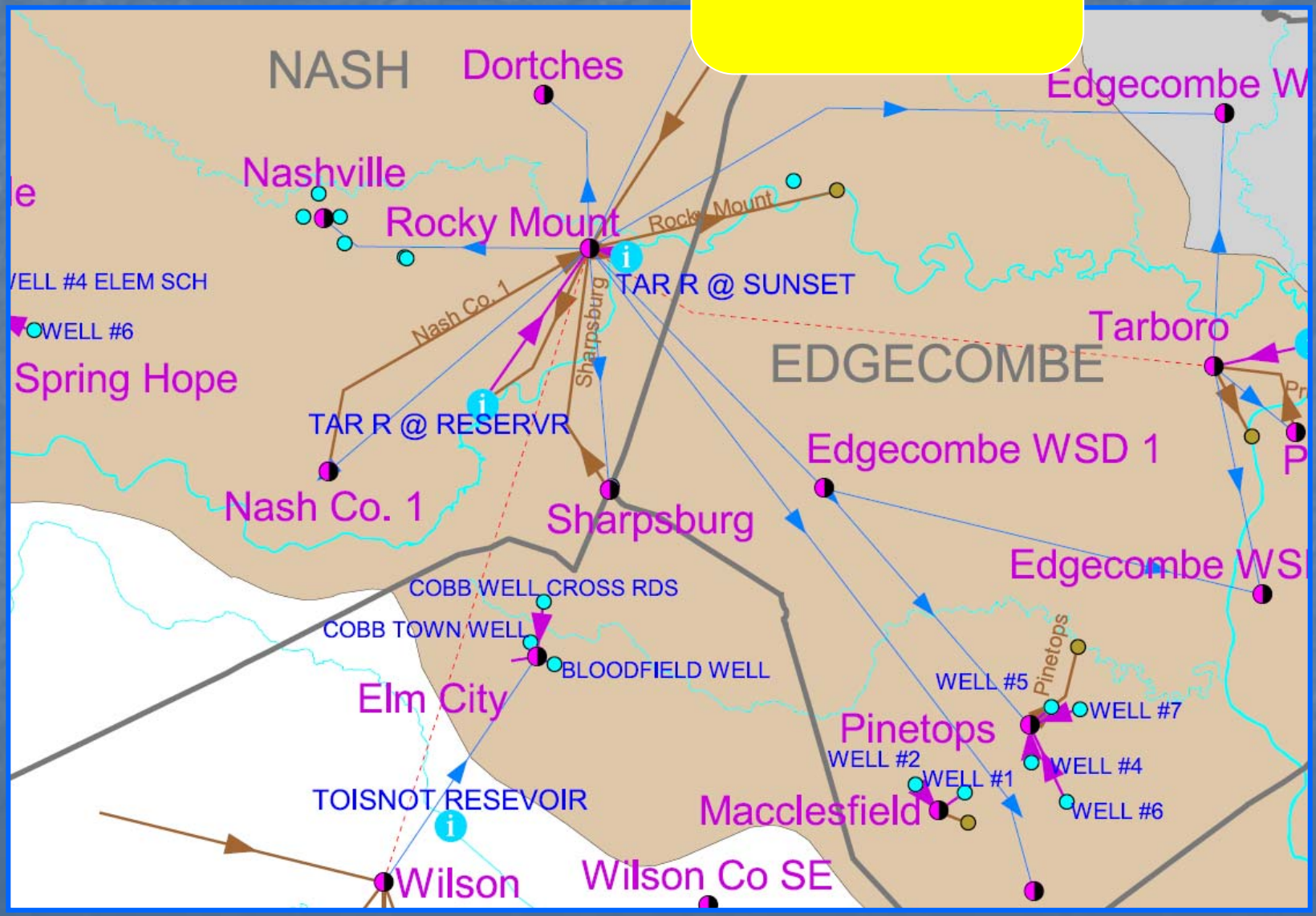
Water Use

- **Water Withdrawal Registrations**
  - Agriculture > 1,000,000 gallons per day
  - Non-agriculture > 100,000 gallons per day
- **Local Water Supply Plans**
  - Local Government Water Systems
  - Other Large Community Water Systems
- **Annual Use Reporting due by April 1**

Water and Treatment Sharing

Water Use



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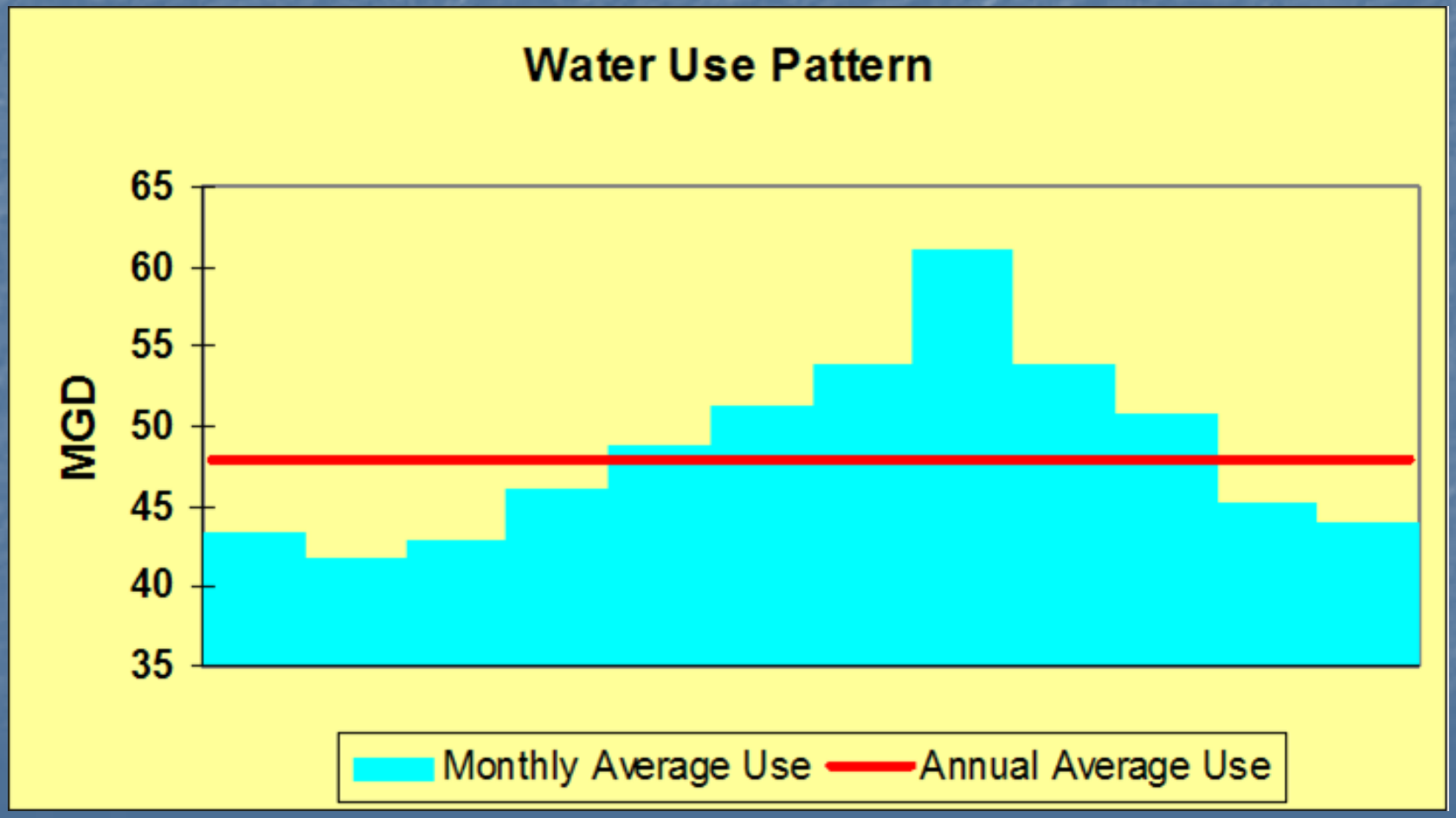
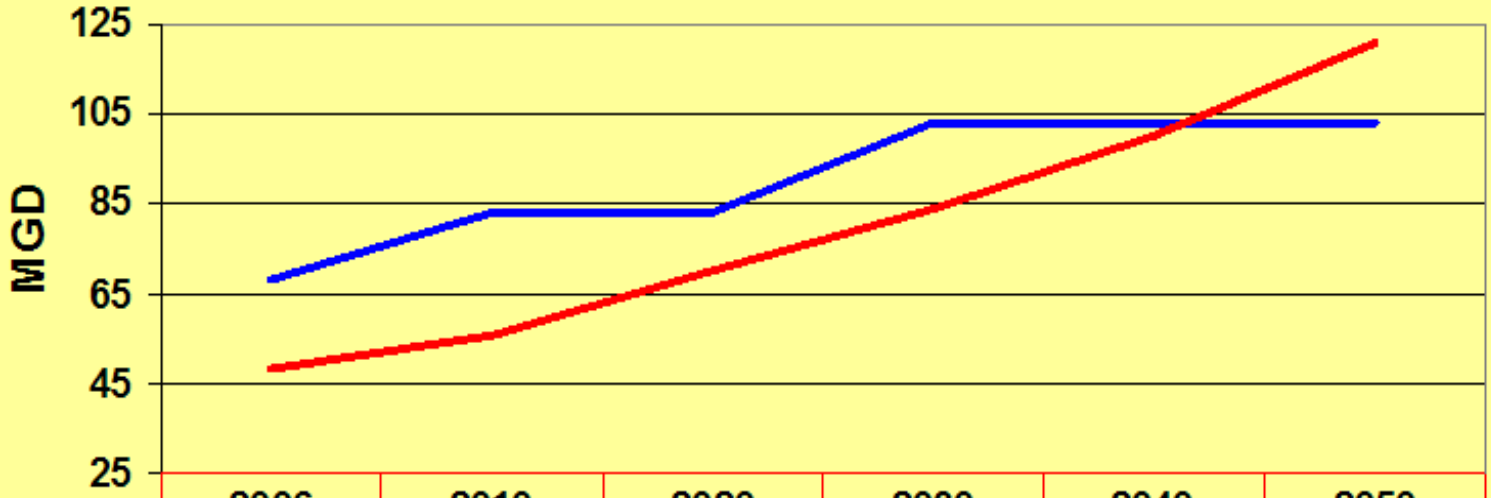
Seasonal Use Pattern

Water Use



Water Use

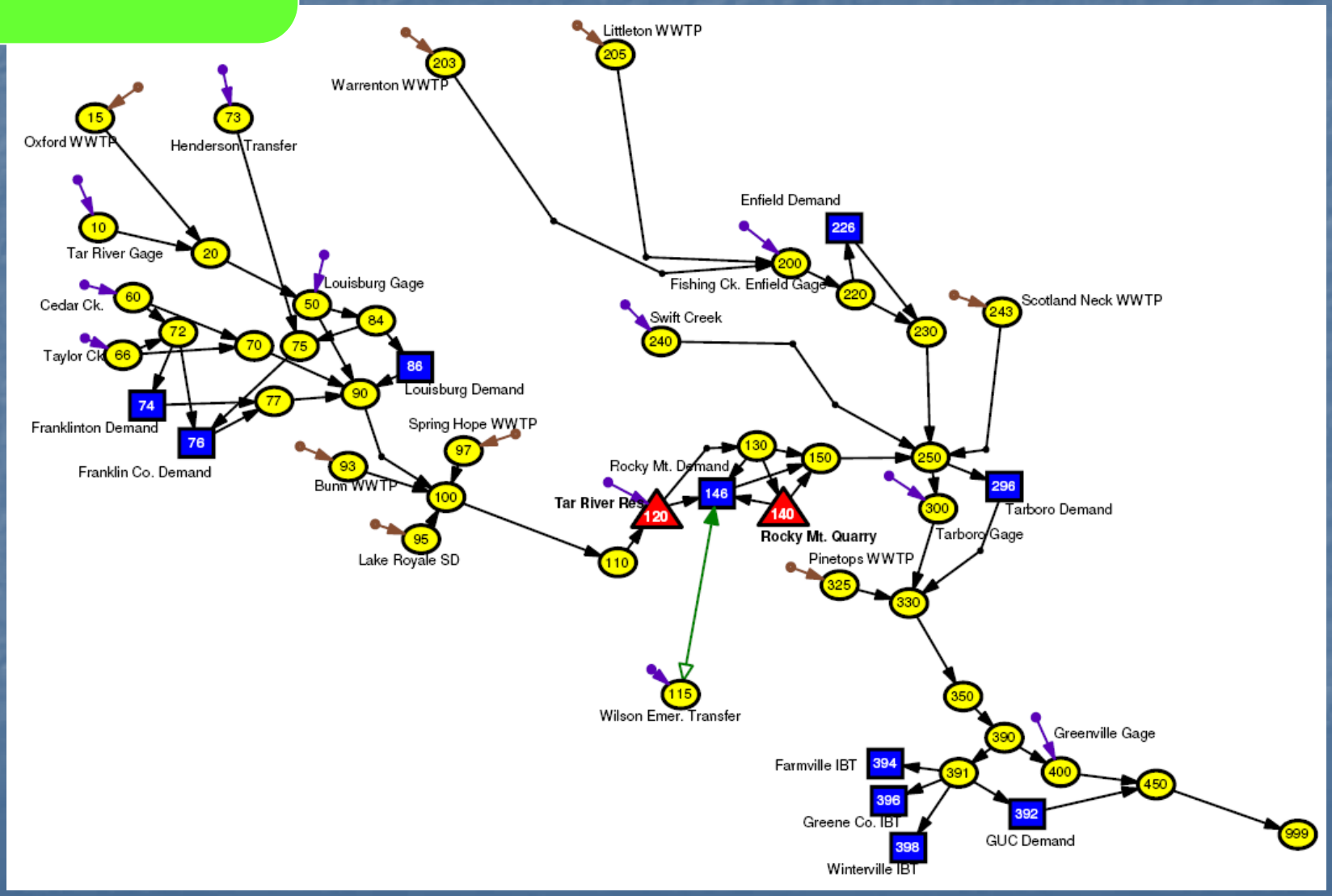
Projected Demands



	2006	2010	2020	2030	2040	2050
Supply	68	83	83	103	103	103
Demands	48	56	70	84	101	121

Hydrologic Model

Tar River Model DRAFT Schematic



Major Assumptions

- Future withdrawals will come from current intake locations
- Future wastewater discharges will be same percent of withdrawals at the same locations
- Sellers will continue to meet buyers' needs
- Future flows will be within the range of flows in the historical record
- Local utilities are the best judges of future system growth
- Currently NO Provisions of ecological flows

Evaluation Criteria

How often?
What's the chance?

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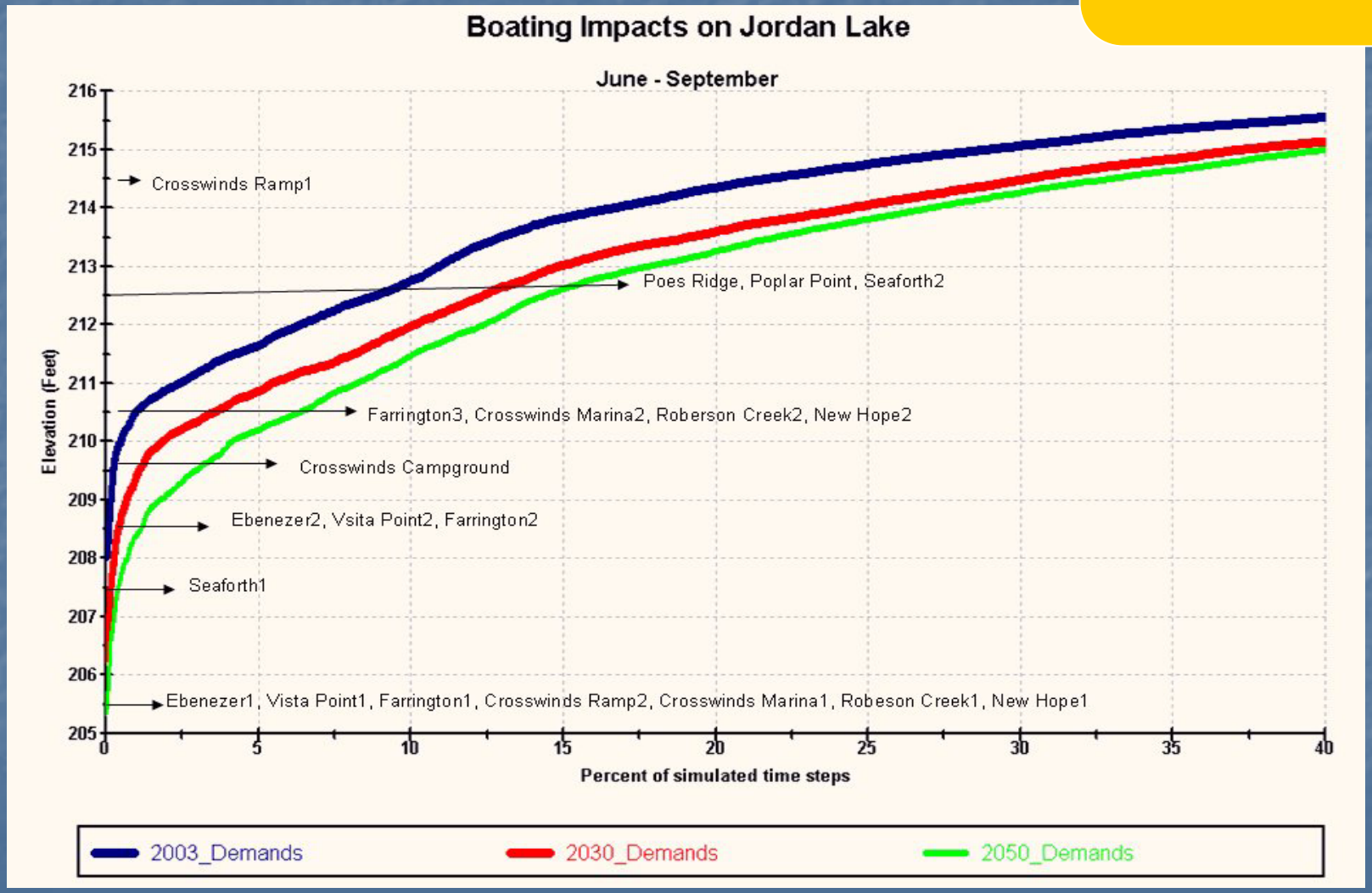
Interpretation

Evaluated Modeling Results

- **What is the answer to each of the evaluation questions?**
- **Are there areas where there may be problems meeting expected demands?**
- **When can we expect to have shortages and how can we adapt when there is a shortage?**

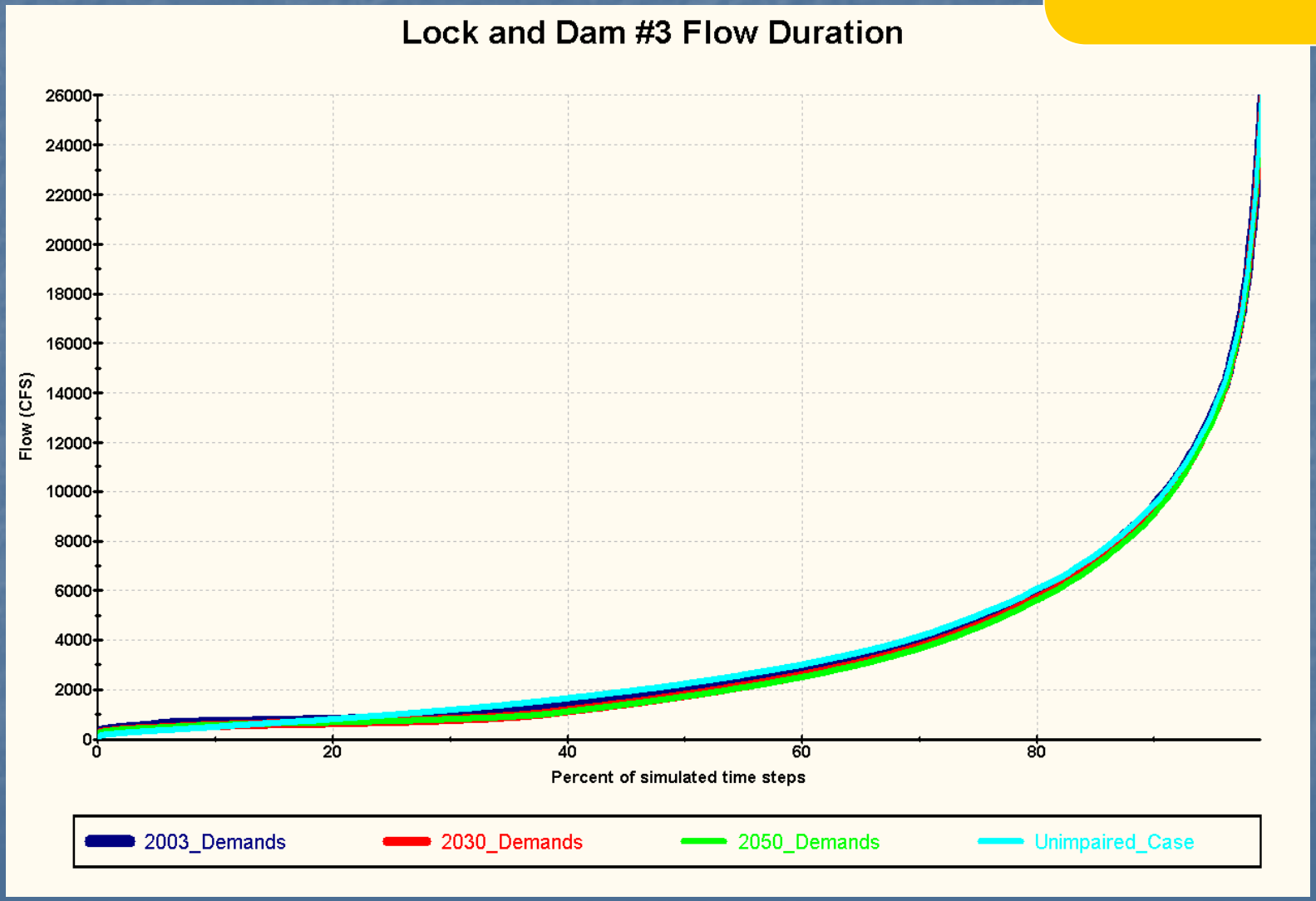
Reservoir Water Levels

Evaluation Criteria



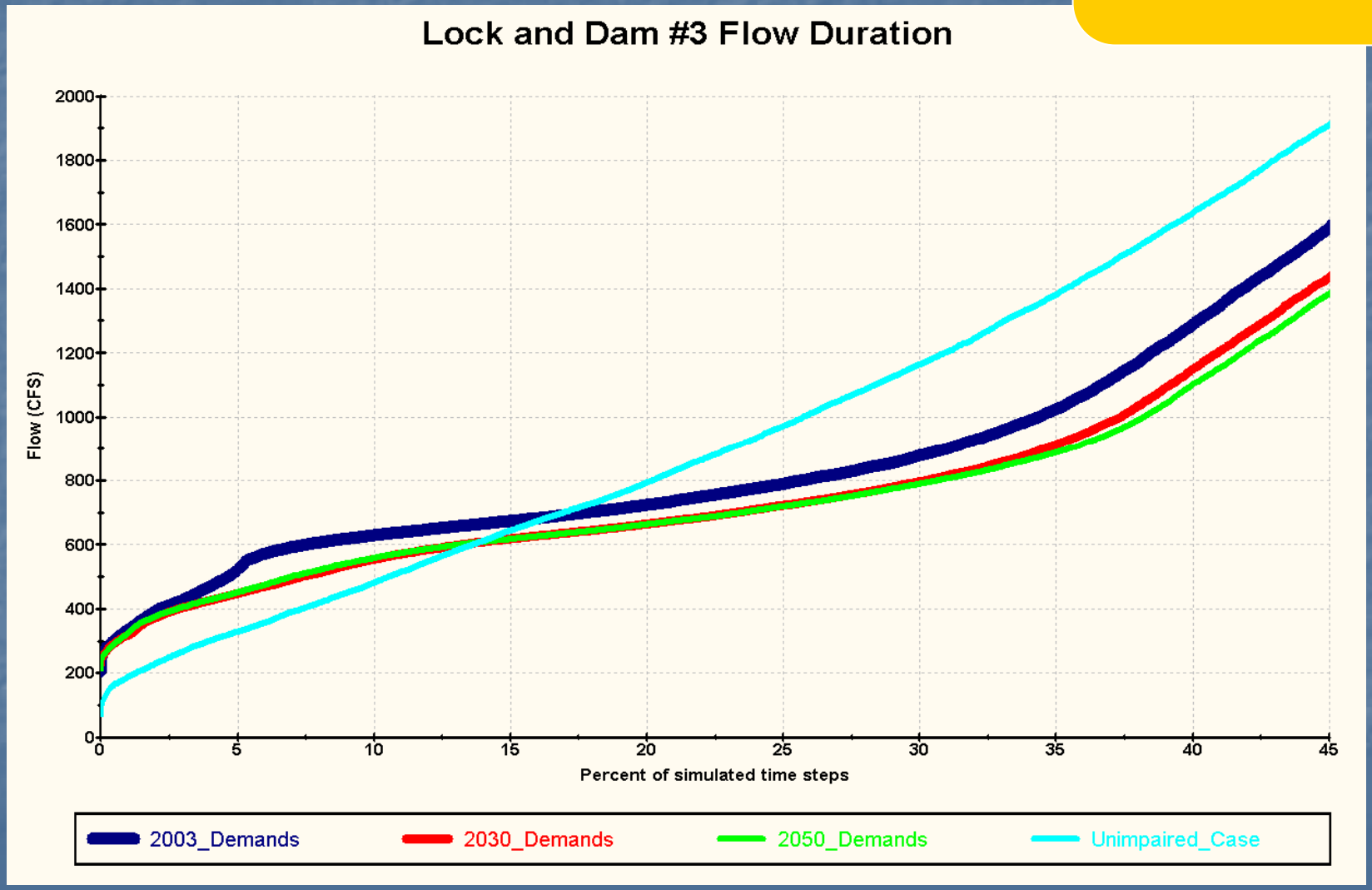
Stream Flows

Evaluation Criteria



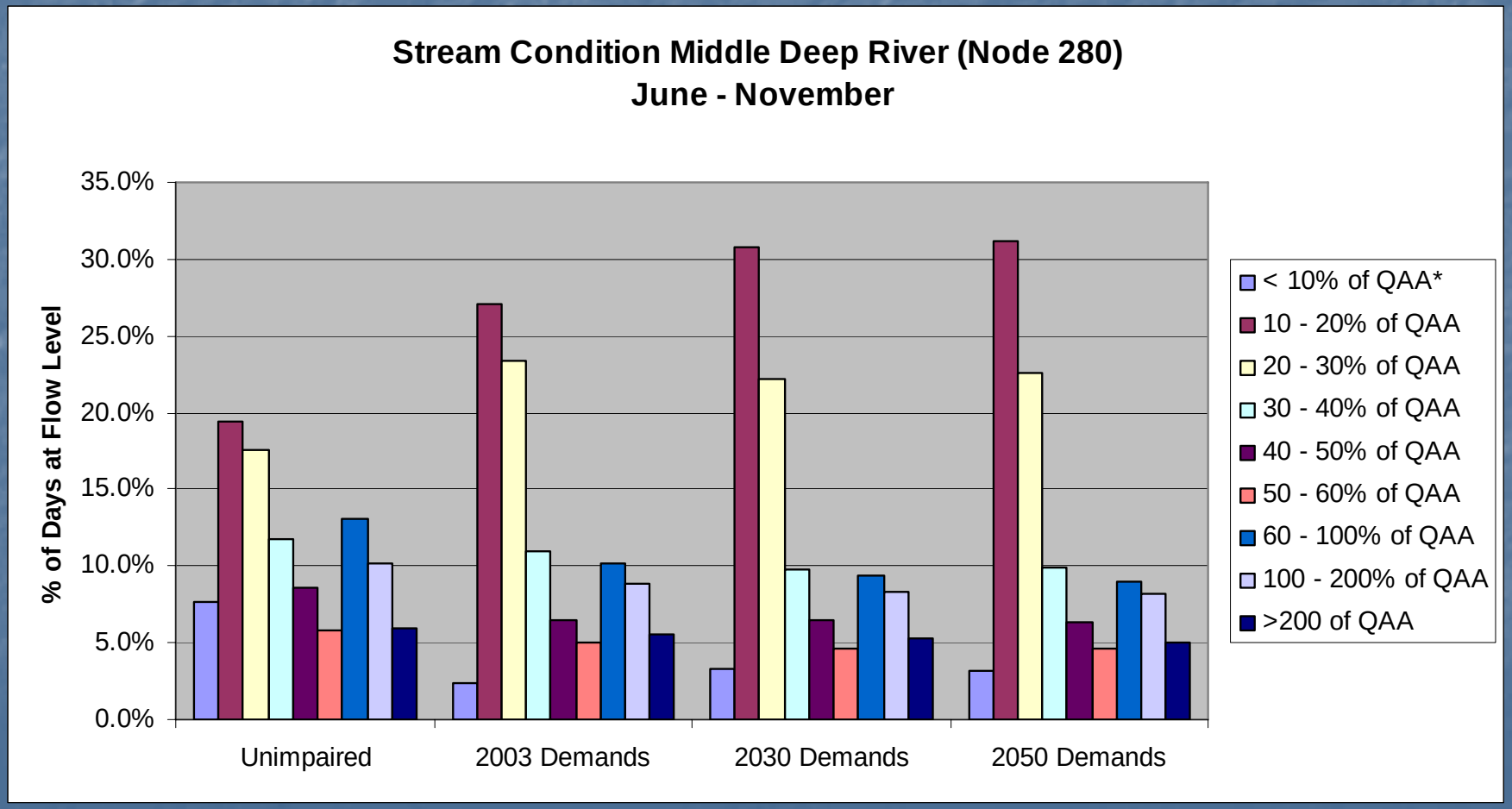
Stream Flows

Evaluation Criteria



Evaluation Criteria

Flow Regime Changes



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Evaluation Criteria

Water Supply Deficits

Table 4-3: Water Supply Demand & Deficits Predicted by the Neuse River Basin Hydrologic Model, 2050 Scenario

Model Scenario / Water Systems	2050 Average Demand (mgd)	2050 Average Deficit (mgd)	Longest Deficit Period (Days)	Years Demand Not Fully Met Out of 78
Orange-Alamance	0.21	0.14	30	2
Hillsborough	2.76	1.84	30	2
Piedmont Minerals	0.25	0.16	30	2
Raleigh	129.23	86.18	124	36
Durham	40.92	29.13	60	5
SGWASA	10.01	8.7	79	14

Longest Deficit (Days) = The greatest number of consecutive days over the entire 78 year record that the full water supply demand may not be met.
Years Demand Not Met = The number of years out of a total of 78 annual flow patterns that the full water supply demand may not be met.
Systems in Red are those for which a deficit is predicted in any scenario seven or more years out of the 78 year record.

Needed Information for Plan Update

- Annual Water Use Data LWSP & WWR
- Update LWSP
  - ✓Projections to 2060
  - ✓Projections of wastewater discharges
  - ✓Anticipated source changes (GW --> SW?)
  - ✓Anticipated additional water sources
- USE “NOTE” FIELDS to submit additional information

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Projections

* denotes required fields

Population Projections	2006	2010	2020	2030	2040	2050
* Year-Round	288	0	0	0	0	0
Seasonal		0	0	0	0	0

Water Use Projections (MGD)	2006	2010	2020	2030	2040	2050
* Residential	0.016	0	0	0	0	0
* Commercial	0.002	0	0	0	0	0
* Industrial	0.000	0	0	0	0	0
* Institutional	0.003	0	0	0	0	0
* System Process	0.003	0	0	0	0	0
Unaccounted-for Estimate	Calculate	0.000	0.000	0.000	0.000	0.000
* Unaccounted-for Fill	0.003	0	0	0	0	0

Note:

Add 2060 data here

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What ifs:

- Would a reasonable reduction in demands avoid the identified problems?
- Could an alternative source meet expected demands?
- What happens if future droughts are longer or more severe?
- What happens if we can not discharge the same percent of wastewater?

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