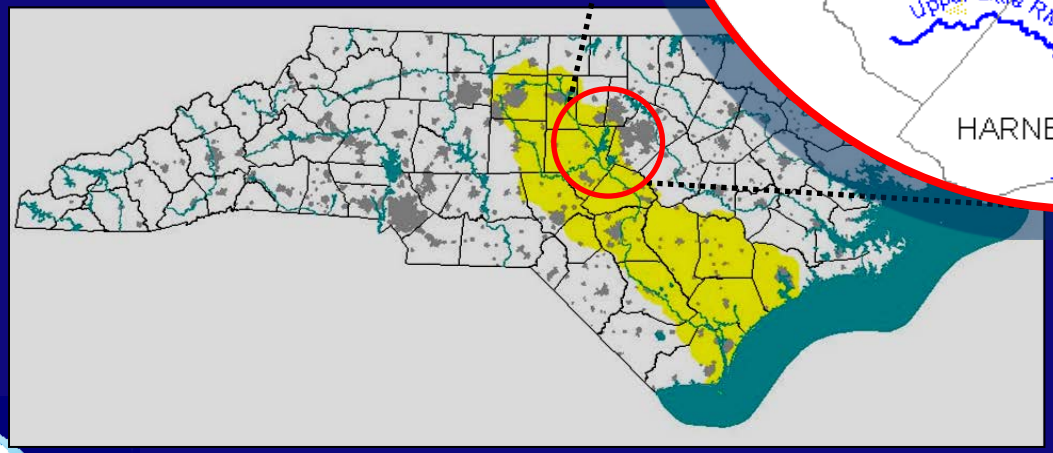
Jordan Lake Water Supply Allocation

Don Rayno
Division of Water Resources

North Carolina
Department of Environment and Natural Resources

Jordan Lake Overview



Division of Water Resources

History of Jordan Lake Impoundment

1945 – Disastrous flooding in Cape Fear River Basin

1945 – Congress -> USACE study water resource needs

1963 – Authorized “New Hope Reservoir”

1967 – Construction begins

1971 – USACE Environmental Impact Study

1979 – Federal Court allows impoundment of lake

1981-1982 – Impoundment

Purposes / Uses

- Built and operated by the Army Corps of Engineers for:
  - Flood Control
  - Water Quality
  - Water Supply
  - Recreation
  - Fish and Wildlife Conservation
- State of North Carolina partnered with the Federal Government to include water supply storage
- EMC responsible for allocating water supply storage to units of local government that request it GS 143-354(a)(11)

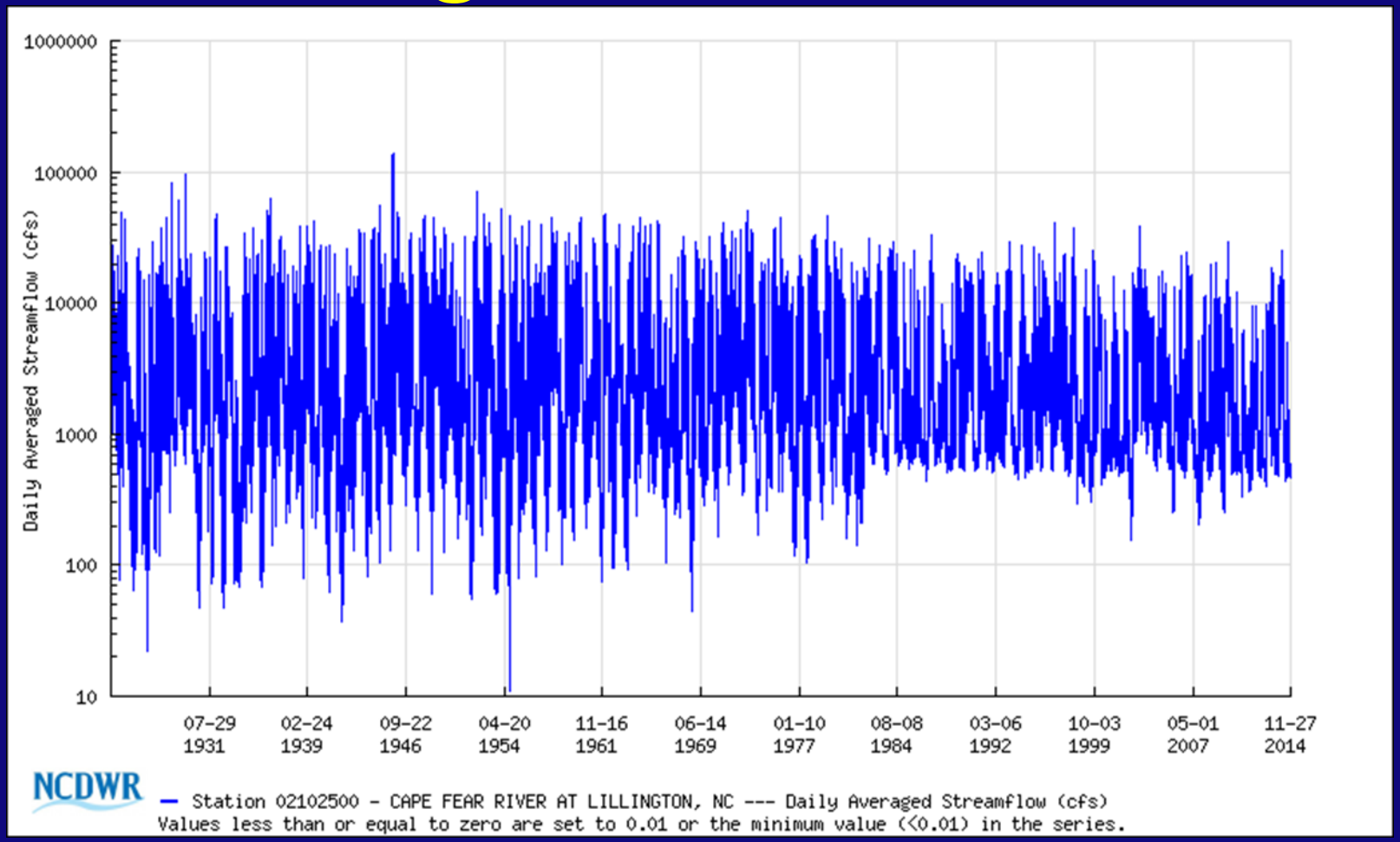
Looking south toward Lillington, Sept. 18, 1945

(From Harnett County Public Library)

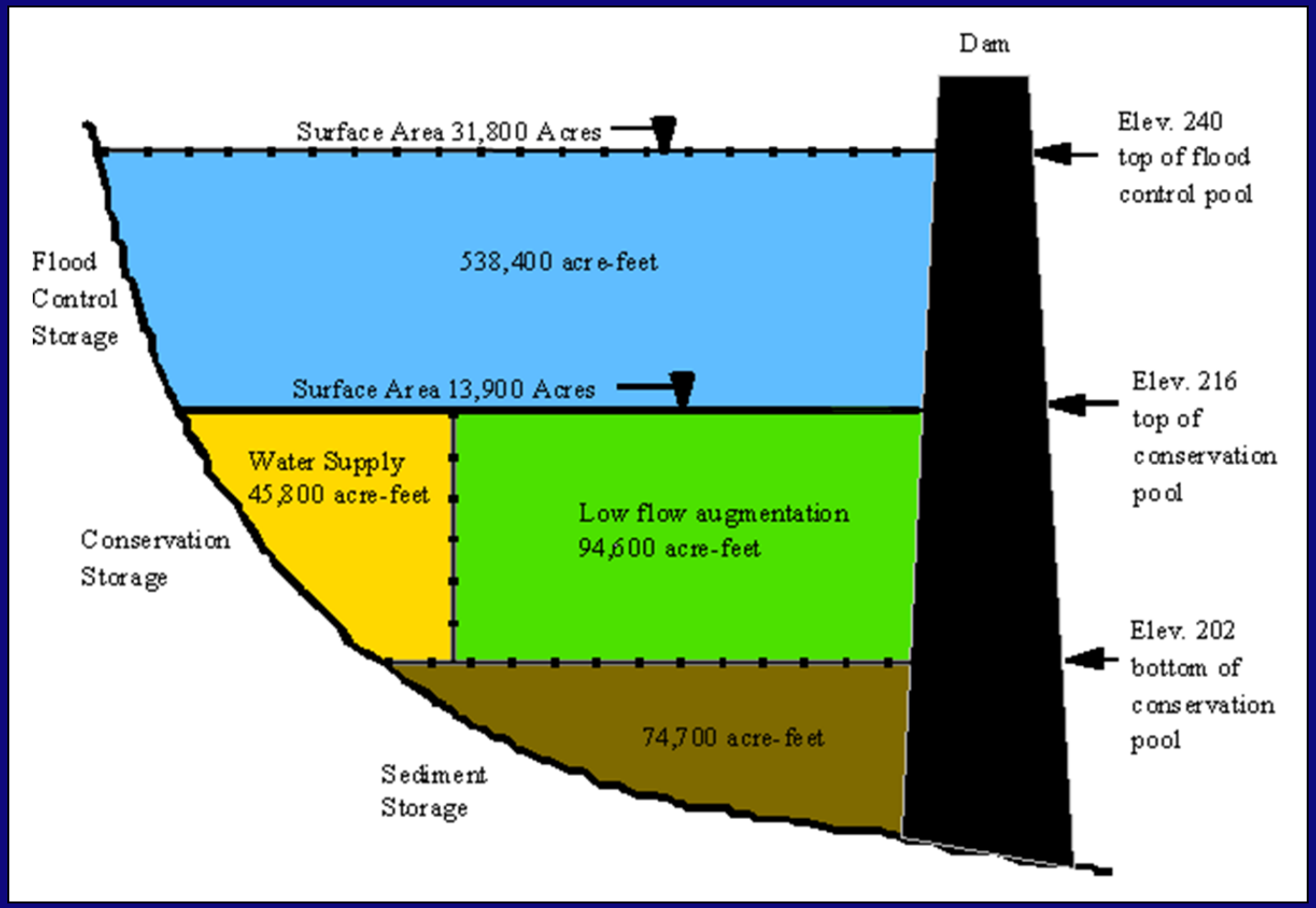
1945 Fayetteville flood stage = 35’ msl
on Sept. 21st , 1945 reached 68.9 ‘ msl
(Photo: Fayetteville Observer from the Bill Belch Collection)

DWR
Division of Water Resources

Lillington Flow Record



Reservoir Storage Allocation



Jordan Lake Allocation Process

Application Requirements

- Population and Demand to 2060
  - Include methodology and assumptions
- Presently available sources and yield
- Map of current and future service areas
- Alternative sources
- Potential yield, quality, costs
- Demand management practices
- Plans to utilize Jordan Lake
- Financial commitment statement
- Additional necessary information
  - 15A NCAC 2G .0500

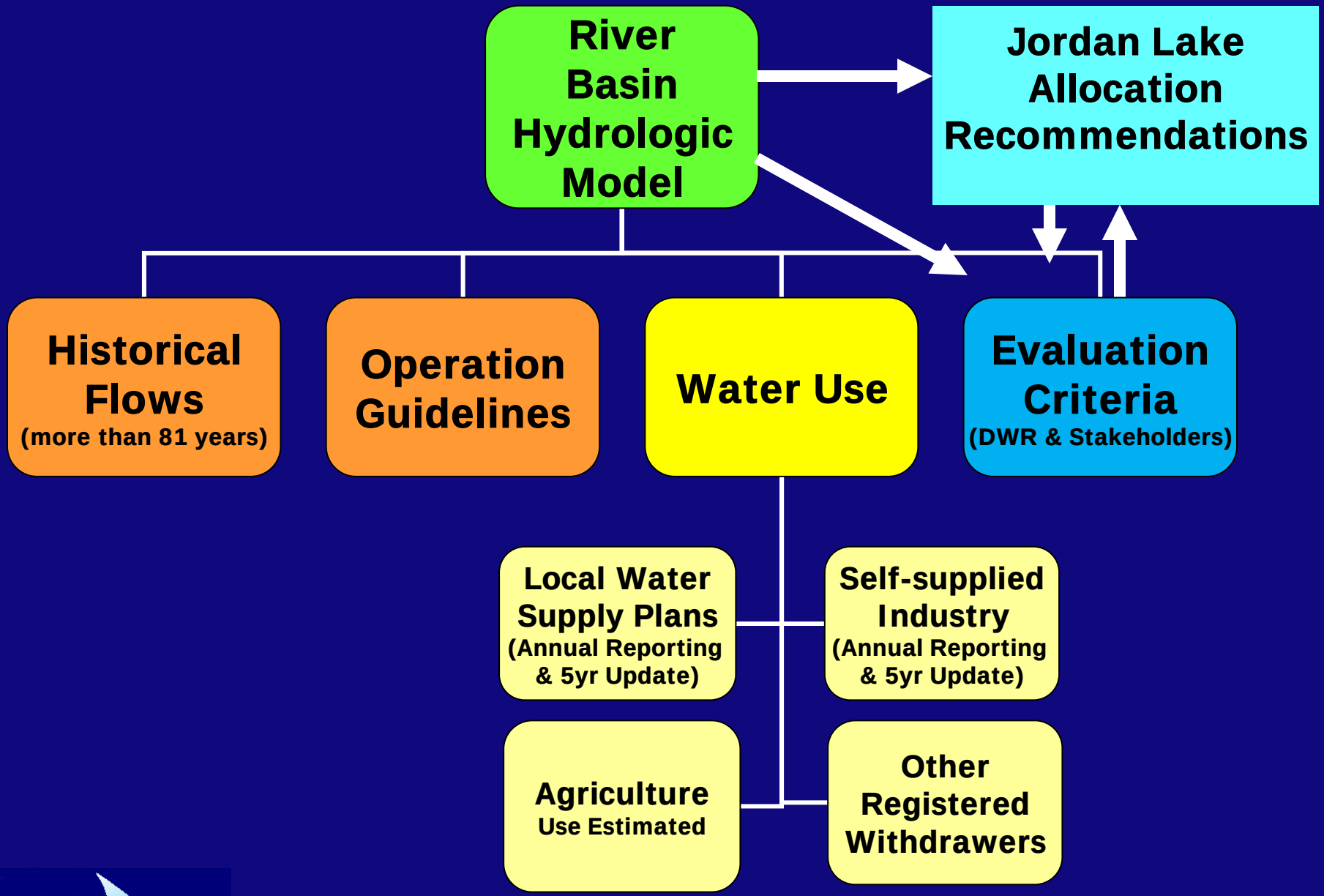
DWR
Division of Water Resources

Allocation Decisions

Long Range Water Resources Evaluation
Neuse River and Cape Fear River Basins

- Describe hydrologic **conditions** and water uses in a basin
- Describe water sharing arrangements among communities
- Interpret output of the hydrologic model
- Quantify impacts of water withdrawals
- Identify areas that will face supply challenges
- Identify magnitude and duration of water supply shortages

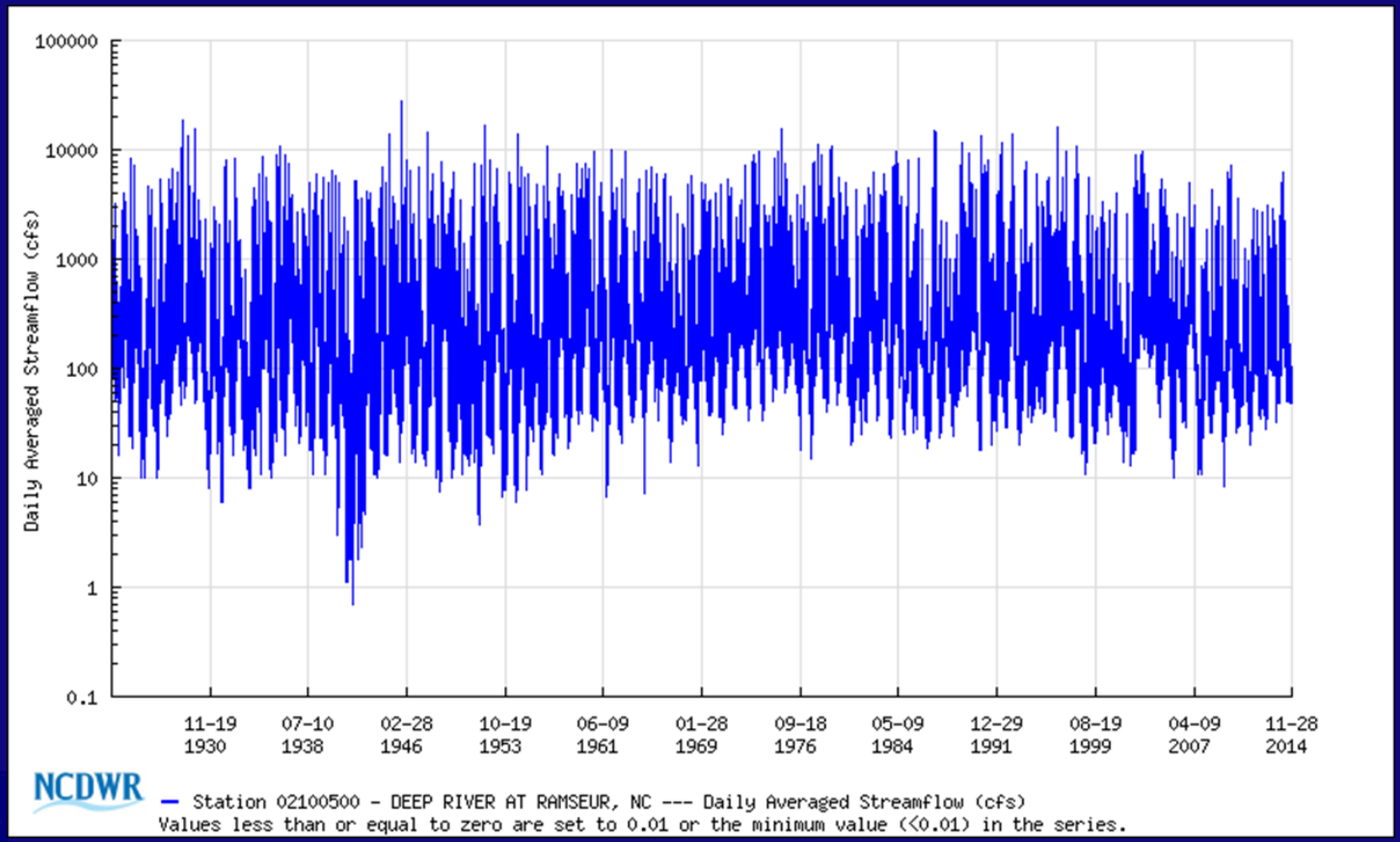
DWR
Division of Water Resources



DWR
Division of Water Resources

Historical Flows

Demands in a model scenario are evaluated for each day in the 81 year flow record



Operations Guidelines

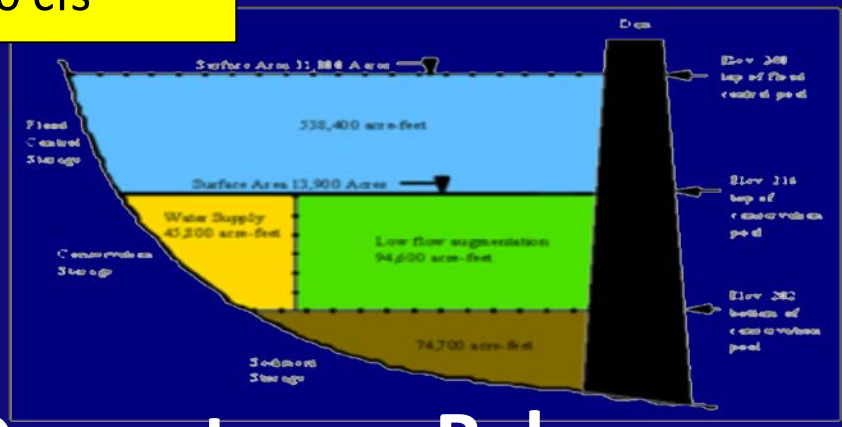
Examples

- **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 Division of Water Resources

Operation Guidelines

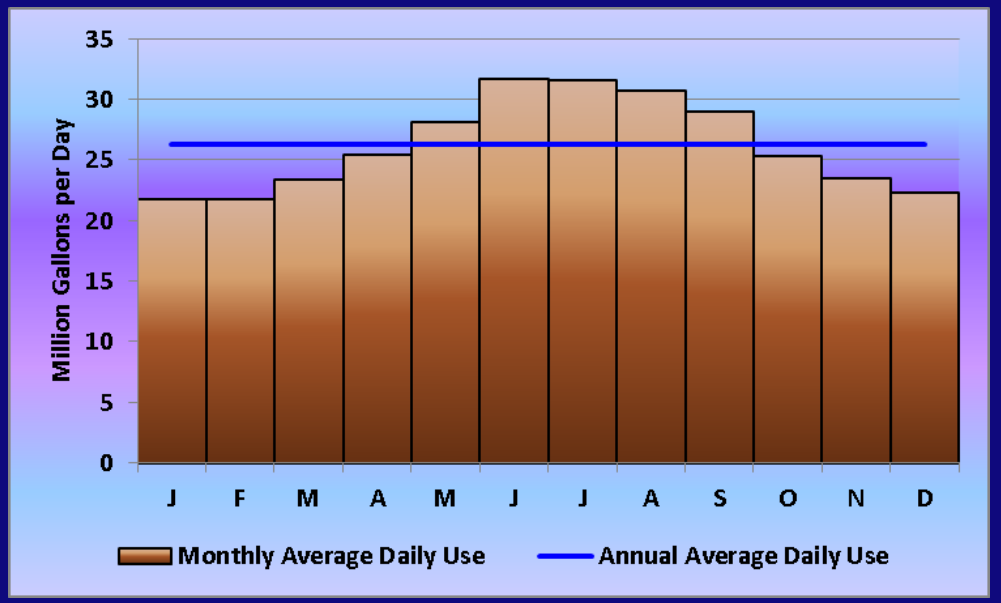
Flow-Aug. Pool	Minimum Release	Release water to meet Lillington target flow of:
>100 %	40 cfs	600 cfs
80-100 %	40 cfs	600 cfs
60-80 %	40 cfs	450-600 cfs
40-60 %	40 cfs	300-450 cfs
20-40 %	200 cfs	
0-20 %	100 cfs	



Jordan Lake Downstream Releases

Water Use

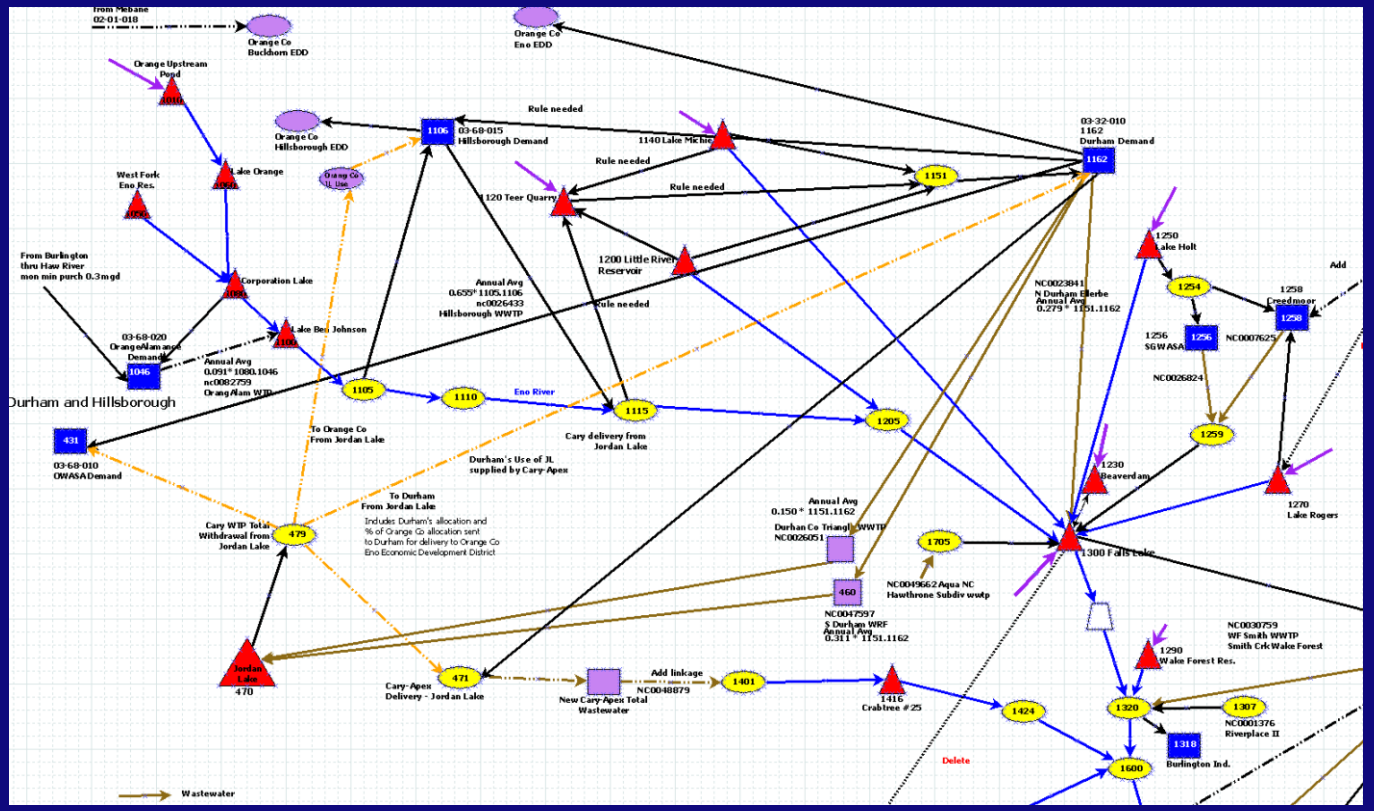
Model Node	System	2010 Scenario	2045 Scenario	2060 Scenario
31	Reidsville	3.53	5.26	5.76
123	Greensboro	35.24	53.87	65.66
223	High Point	12.64	17.66	20.05
261	Randleman	0.40	1.20	1.32
301	Ramseur	0.49	0.69	0.75
321	Graham-Mebane	3.50	6.30	7.56
327	Siler City	2.38	1.91	2.12
341	Burlington	15.03	20.16	20.73
401	Pittsboro	0.60	10.29	11.58
431	Orange WASA	7.86	11.32	12.91
471	Cary Apex Combined	18.40	39.10	41.40
473	Chatham County North	2.16	11.21	15.58
483	Performance Fibers/Allied Signal	0.20	0.20	0.20
491	Sanford	6.23	17.37	24.31
551	Harnett County RWS	10.14	34.87	43.07
601	Pilgrims Pride	0.97	0.88	0.88
654	Angier	0.42	1.19	1.64
663	Dunn	3.41	3.07	3.33
701	Carthage	0.30	0.54	1.27
719	Spring Lake	0.91	1.42	1.65
721	Old North Utility Services, Inc.	4.80	4.88	5.06
733	Fayetteville PWC	26.23	65.41	77.56
781	DuPont water supply	11.17	11.17	11.17
785	LCFWSA_Bladen Bluffs	0.00	2.25	2.25
823/825	CFPUA/LCFWSA-Kings Bluff	30.21	40.91	50.16
903	Jamestown	0.45	0.73	0.76
904	Archdale	0.70	1.24	1.26
923	Holly Springs	1.98	7.24	8.78
1046	Orange-Alamance	0.18	0.23	0.24
1106	Hillsborough	1.16	3.20	3.70
1162	Durham	25.27	39.43	43.80
1256	South Granville WASA	2.99	4.35	4.96
1258	Creedmoor	0.32	0.80	0.88
1306	Raleigh	52.00	97.50	115.00
1506	Wilson	8.96	13.08	14.86
1646	Johnston County	8.56	16.13	21.73
1666	Smithfield	2.96	5.88	9.45
1706	Fuquay-Varina	1.87	7.54	9.48
1756	Benson	0.78	1.08	1.31
1766	Duke Energy_Lee Steam Station	8.91	8.08	8.08
1786	Goldsboro	4.78	14.25	17.64
1806	Neuse Regional WASA	7.82	12.80	13.95
1906	Weyerheauser Demand	14.47	14.47	14.47



Division of Water Resources

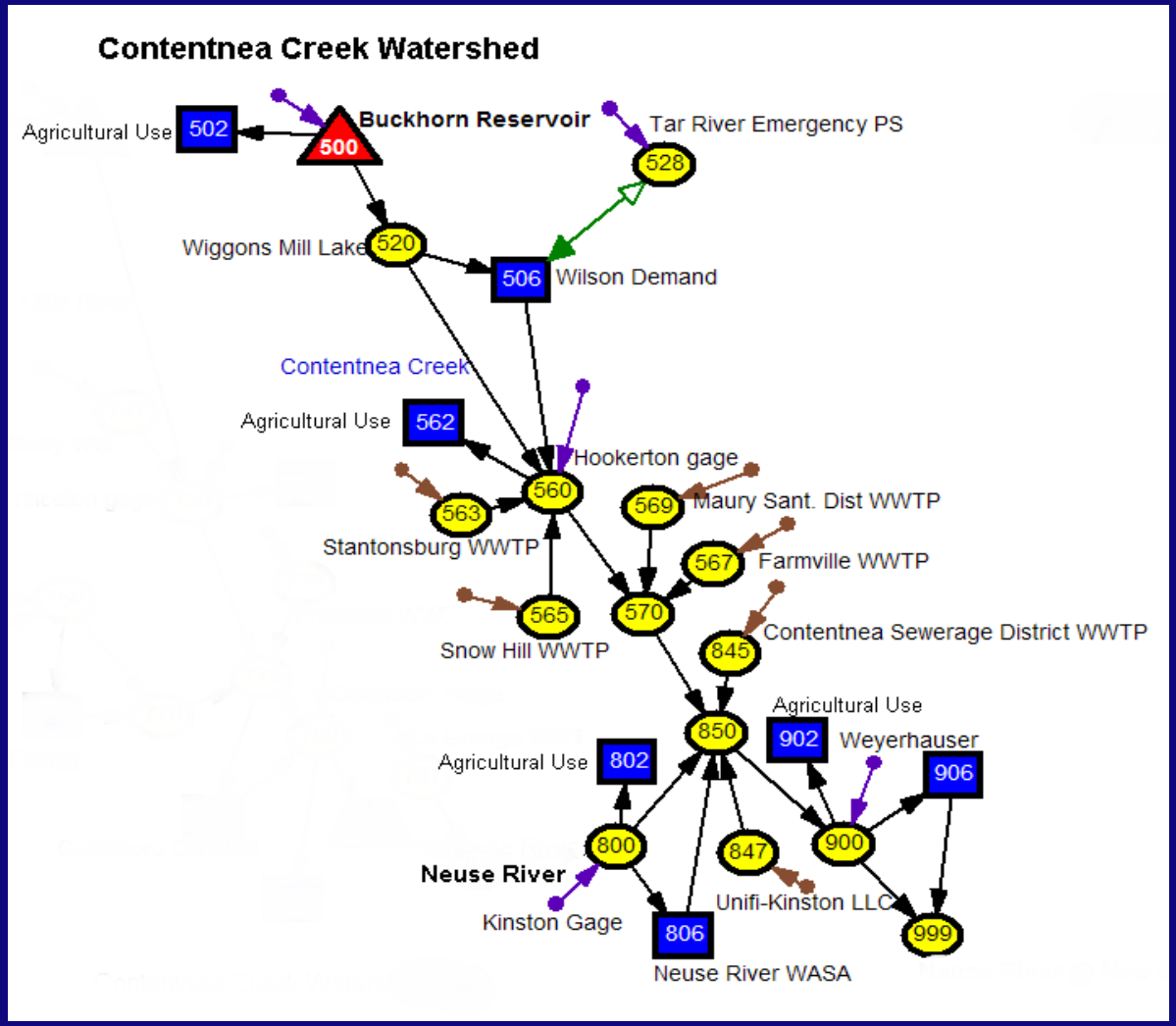
Water and Treatment Sharing

Water Use



Hydrologic Model

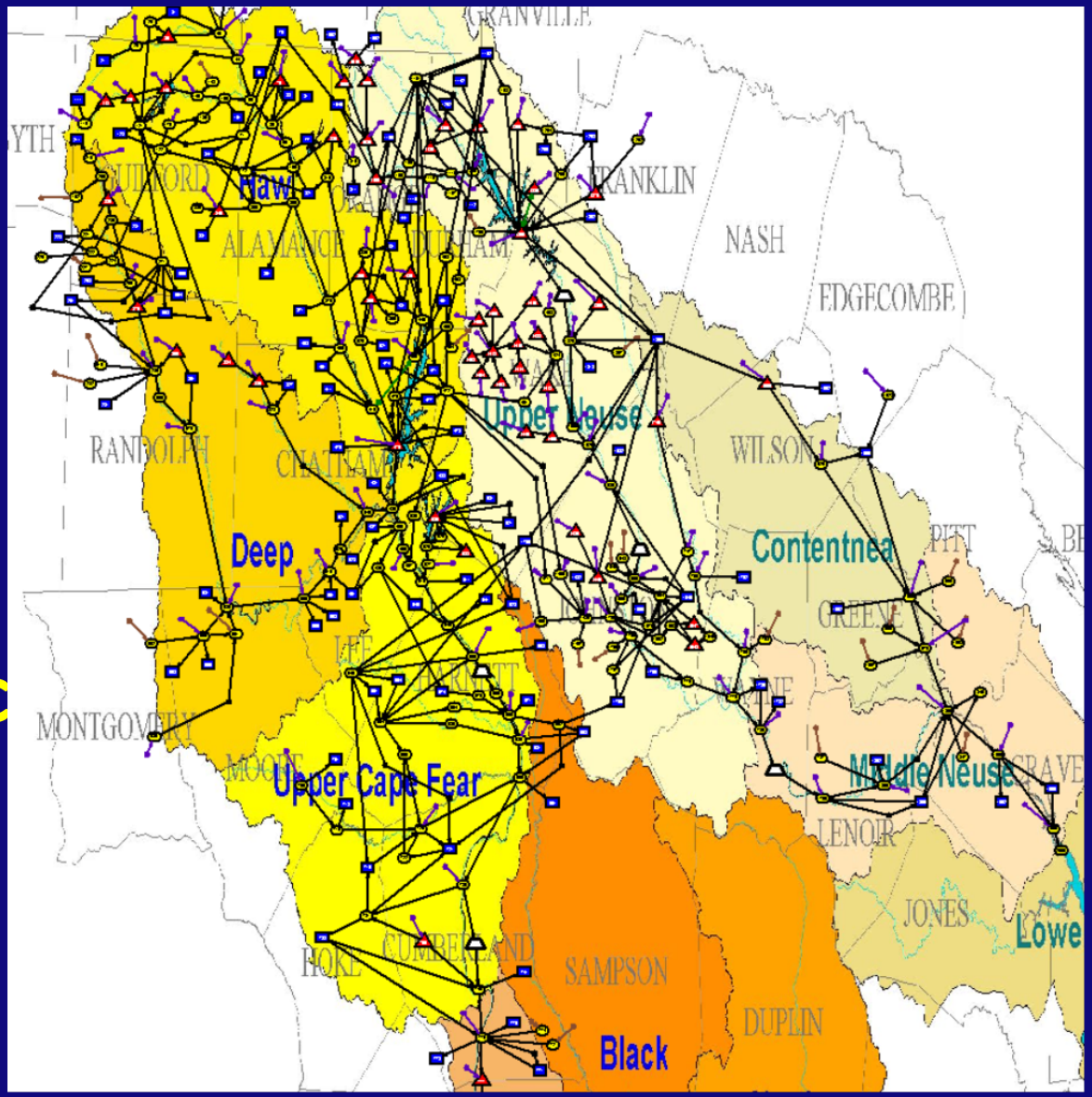
Mathematical simulation of the relationships of inflows, storage, withdrawals and return flows as water moves downstream



Division of Water Resources

Hydrologic Model

Cape Fear-Neuse River Basin Hydrologic Model Schematic

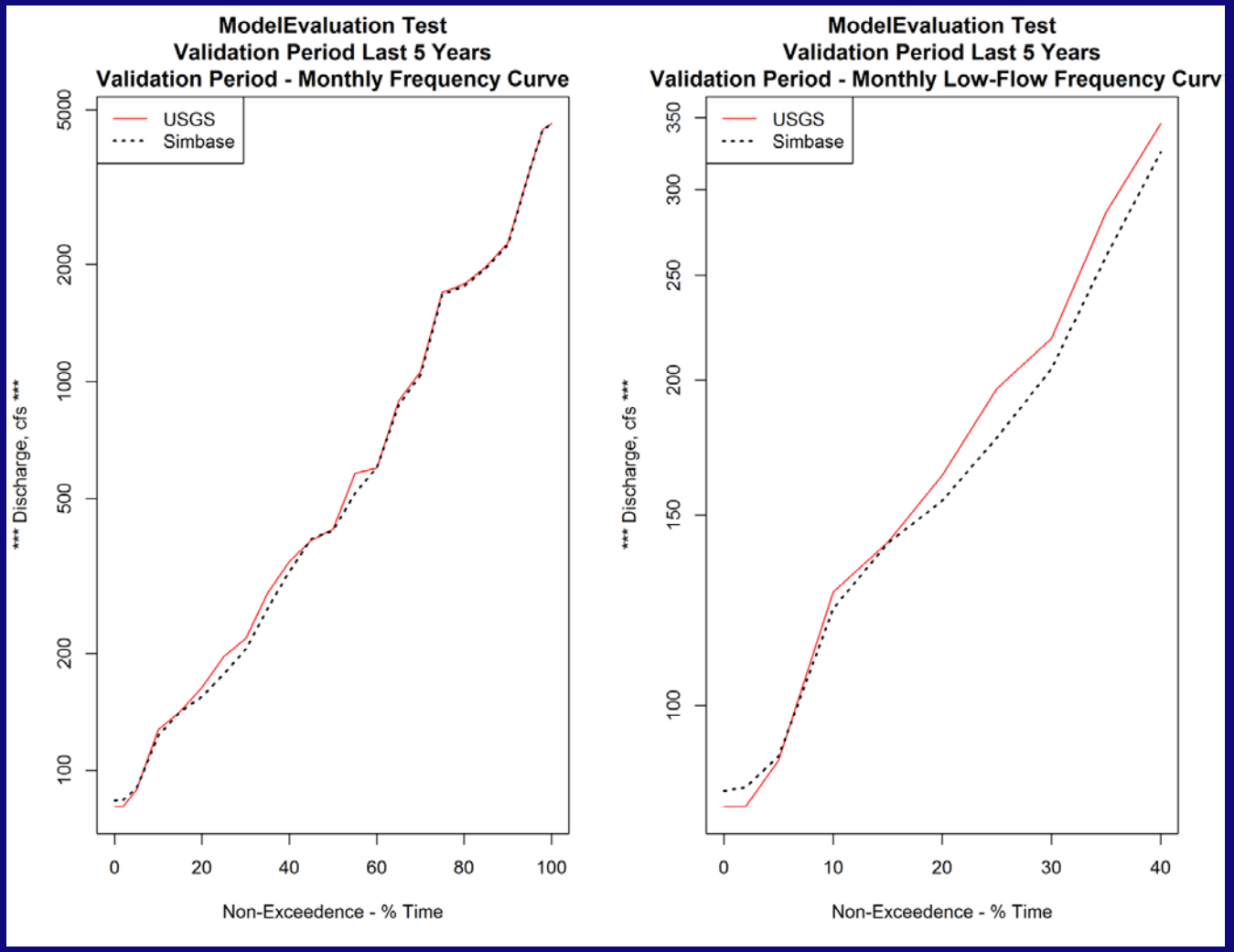


DWR
Division of Water Resources

Major Assumptions and Limitations

- Future withdrawals will come from current intake locations
- Future wastewater discharges will be the same percent of withdrawals and occur 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
- **Does NOT include Ecological Flows**

How well does the model simulate reality?



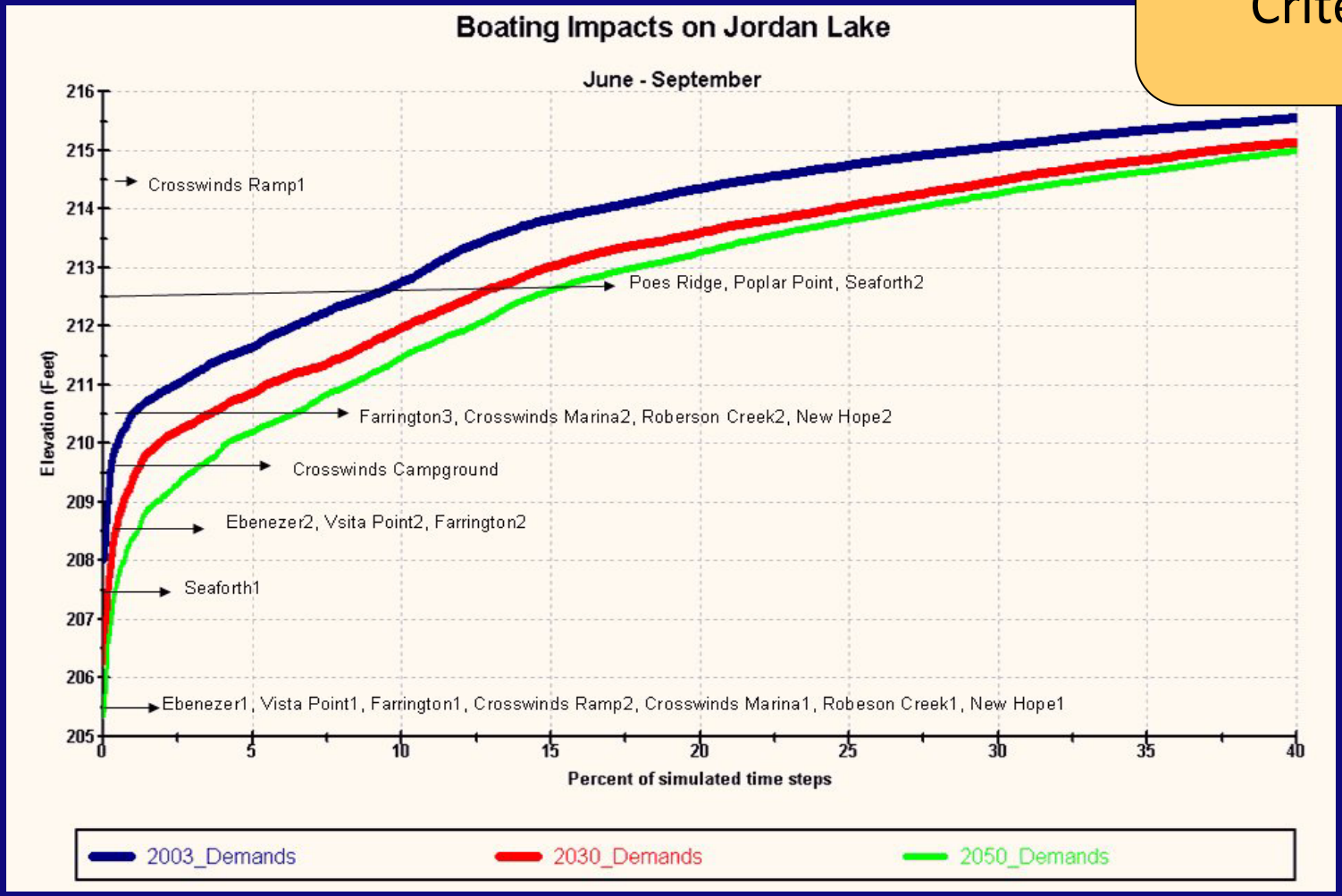
Deep River @ Moncure (2006-11)

How often?
What's the chance?

Evaluation Criteria

JLA3 Evaluation Water Levels in Summer

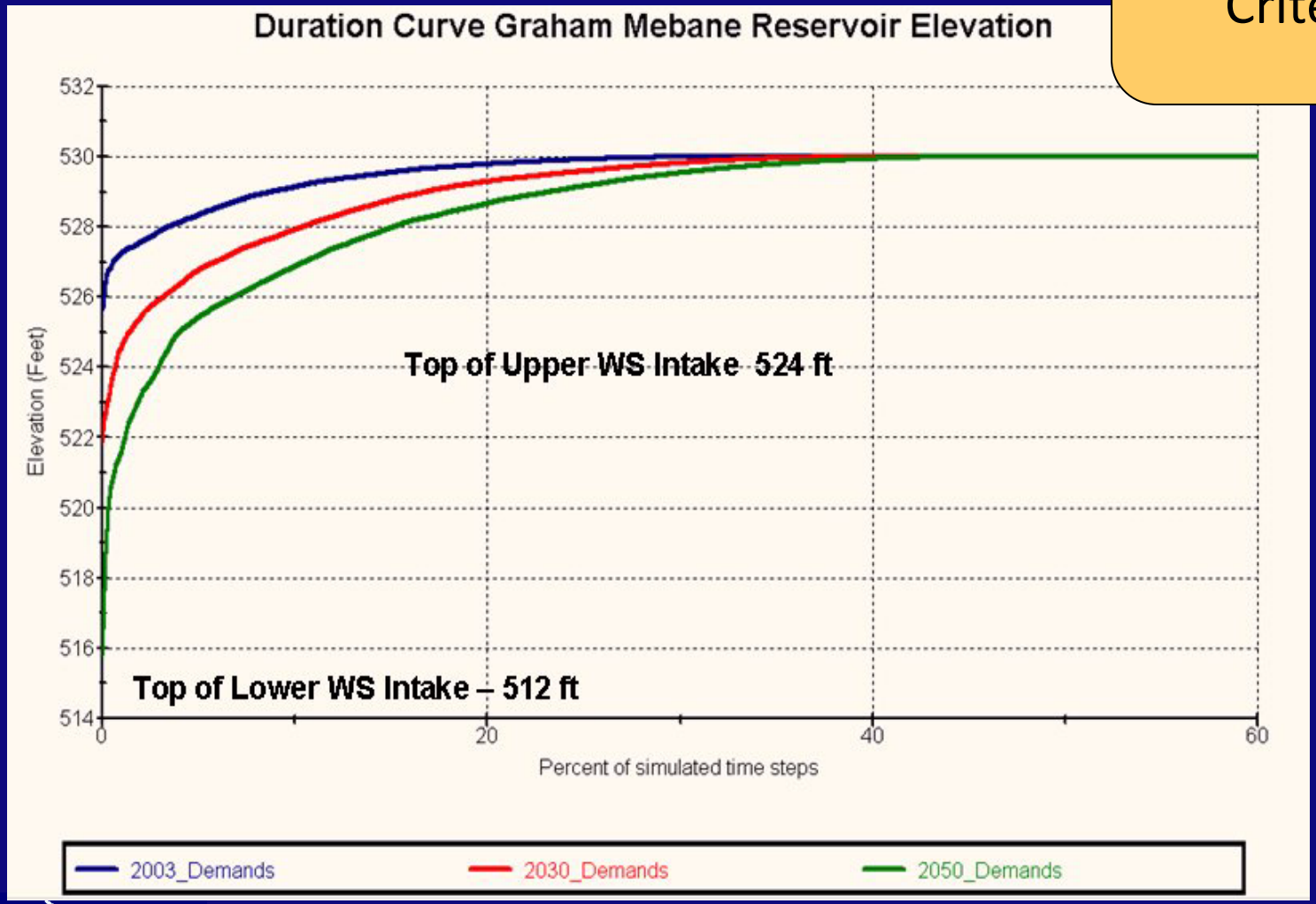
Evaluation Criteria



Division of Water Resources

JLA3 Evaluation Water Intake Limitations

Evaluation Criteria



- **Recommendations based on:**
  - **Information in application**
  - **Modeling results**
  - **Consideration of public comments**
  - **Timing of water supply needs**
  - **Necessity of IBT certificate**

Division of Water Resources - 733-4064

www.ncwater.org

Division of Water Resources

JLA4 Schedule

- 11/14/2014 – Final Applications Submitted
  - DWR reviews applications and develops CFRB Water Supply Plan
- 1/7/2015 – Update to WAC of EMC
- 3/11/2015 – WSP and Draft Recommendations to WAC of EMC
- Public Review and 30-day comment period
- 9/9/2015 – Response to comments, WSP and Recommendations to WAC of EMC
- 11/19/2015 – EMC decision on allocations