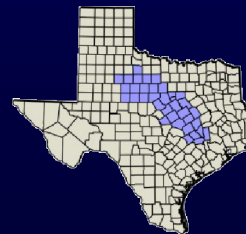


# ***Agenda Item 6.4***

## ***Alternative Safe Yield Analyses***

**June 17, 2009**



**HDR**

**BRAZOS G**  
WATER PLANNING GROUP

# ***Overview of Presentation***

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- ✓ **Introduction**
- ✓ **Alternative yield concepts**
- ✓ **Methodology**
- ✓ **Findings**
- ✓ **Discussion?**

# ***Uncertainty Due to Climatic Variability***

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## ✓ Known truths:

- The earth's climate varies
- Climatic variation impacts drought/wet cycles
- How the climate will vary in the future is unknown
- Climatic variation will impact future water supplies

## ✓ Statement of problem:

- How can water supply planning account for this uncertainty to ensure reliable future supplies?

# Reservoir Yield Analyses

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- ✓ Yield: Annual volume of water that be withdrawn from a reservoir reliably
  - Based on hydrologic analysis
  - Conventional approach is based on “drought of record” analysis
    - ✓ 1950’s drought
    - ✓ Recent upper basin drought (1998 – 2007)
- ✓ **Firm yield**: reservoir just goes dry during worst part of historical drought
- ✓ **Safe yield**: reservoir retains a buffer volume during worst part of historical drought

# ***Brazos G Water Supply Assumptions***

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- ✓ Firm yield – reservoirs below Possum Kingdom Reservoir
- ✓ 1-year safe yield – reservoirs upstream of Possum Kingdom
- ✓ 6-month safe yield – Lake Palo Pinto
- ✓ Alternative safe yields – under consideration
  - 2-year safe yield
  - 3-year safe yield

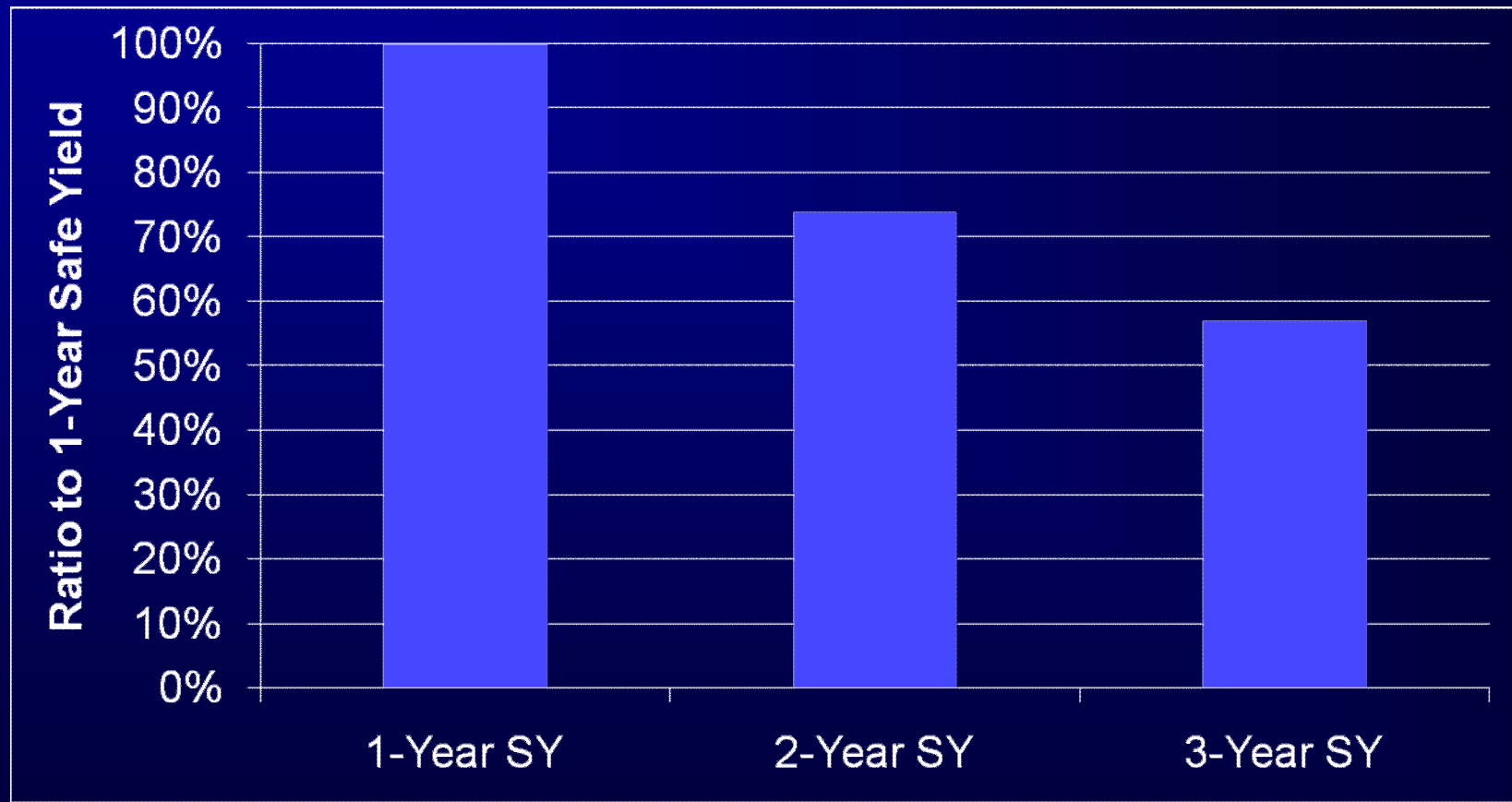
# **Methodology**

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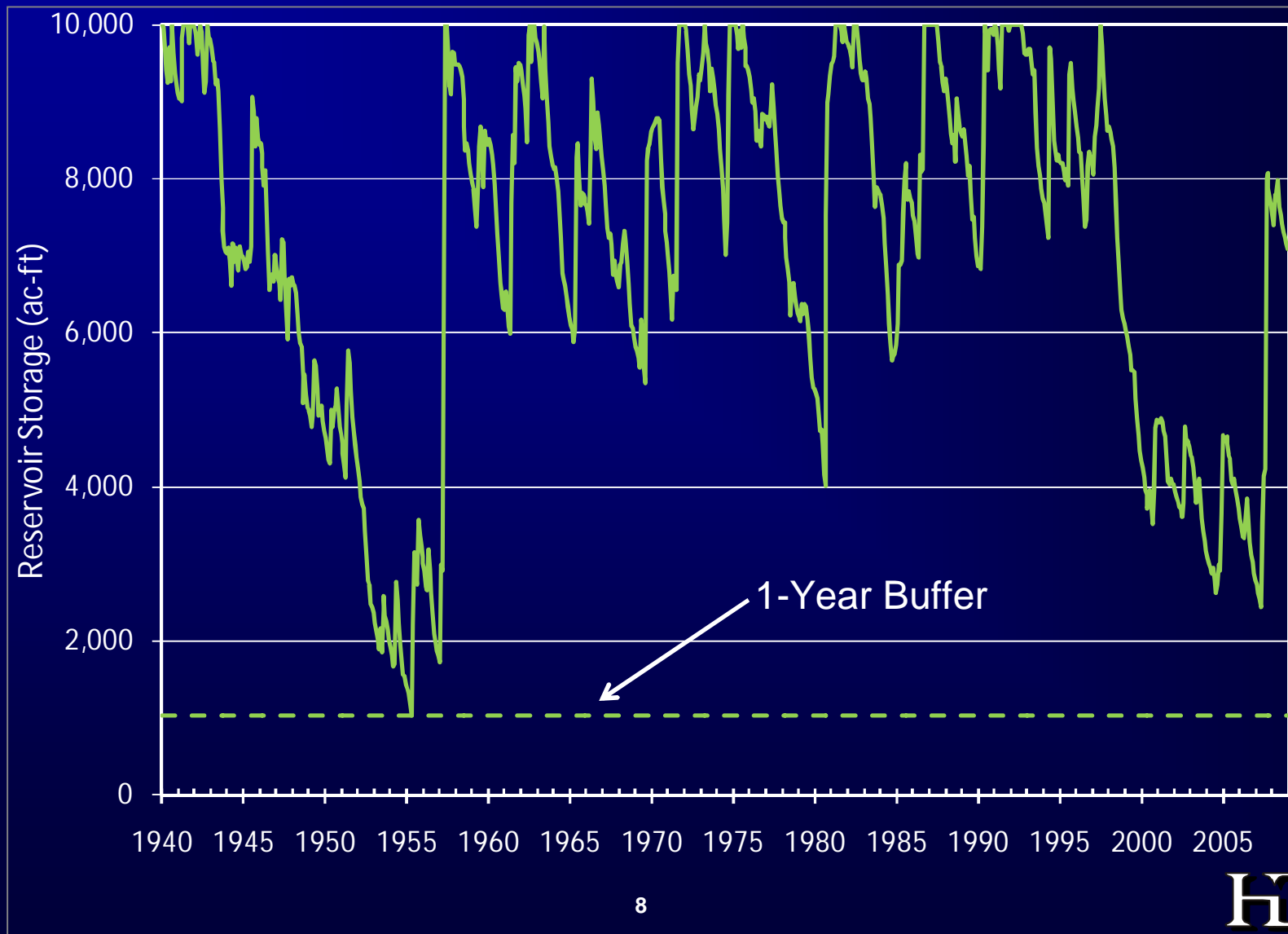
- ✓ **Determine 1-year, 2-year and 3-year safe yields for sample of Brazos G reservoirs**
  - **Based on historical hydrology and drought**
- ✓ **Operate reservoirs under assumed worse droughts**
  - **10% more severe**
  - **20% more severe**
  - **30% more severe**
- ✓ **Would supply be maintained during assumed worse drought?**

# Safe Yield Alternatives

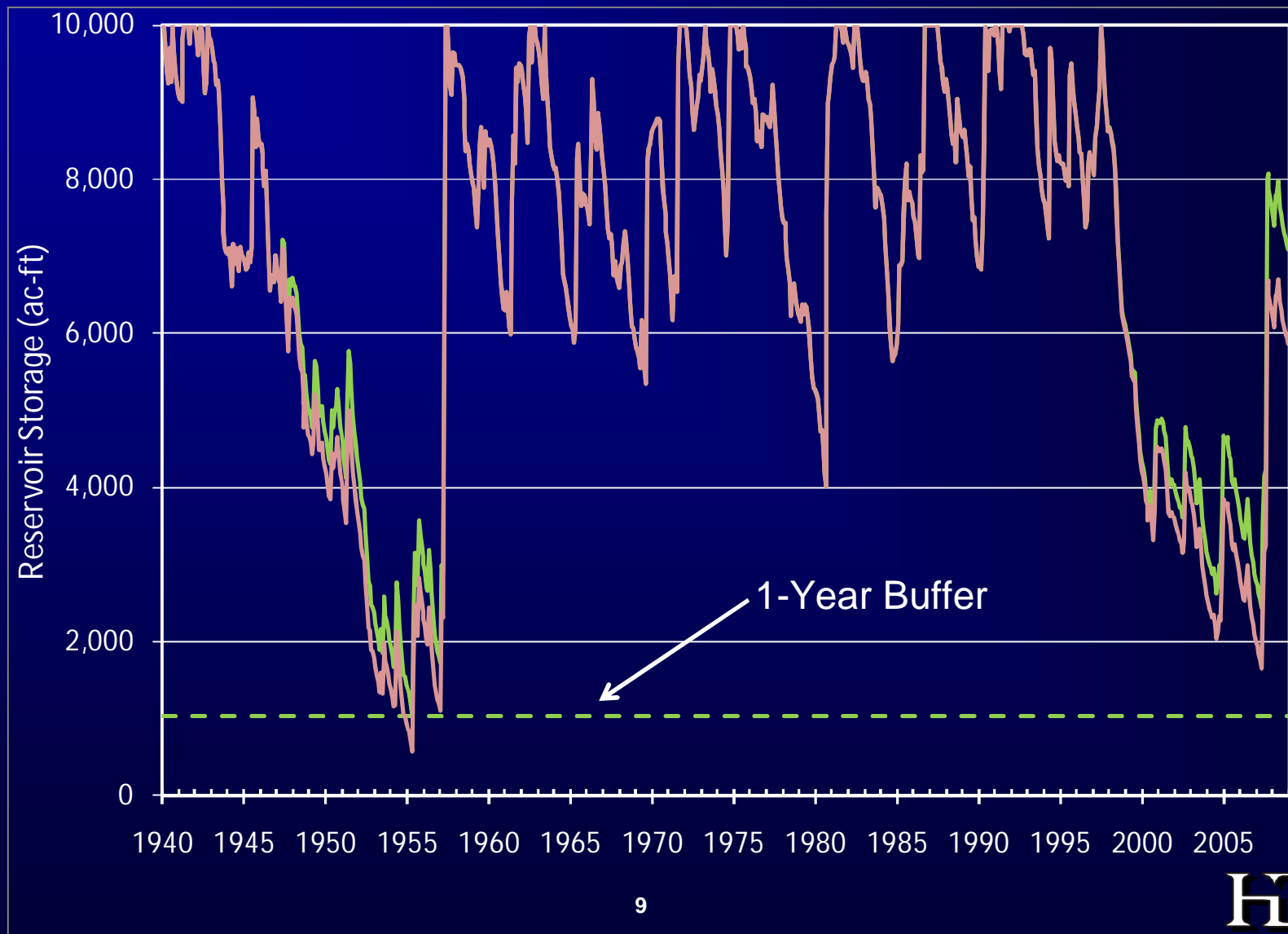
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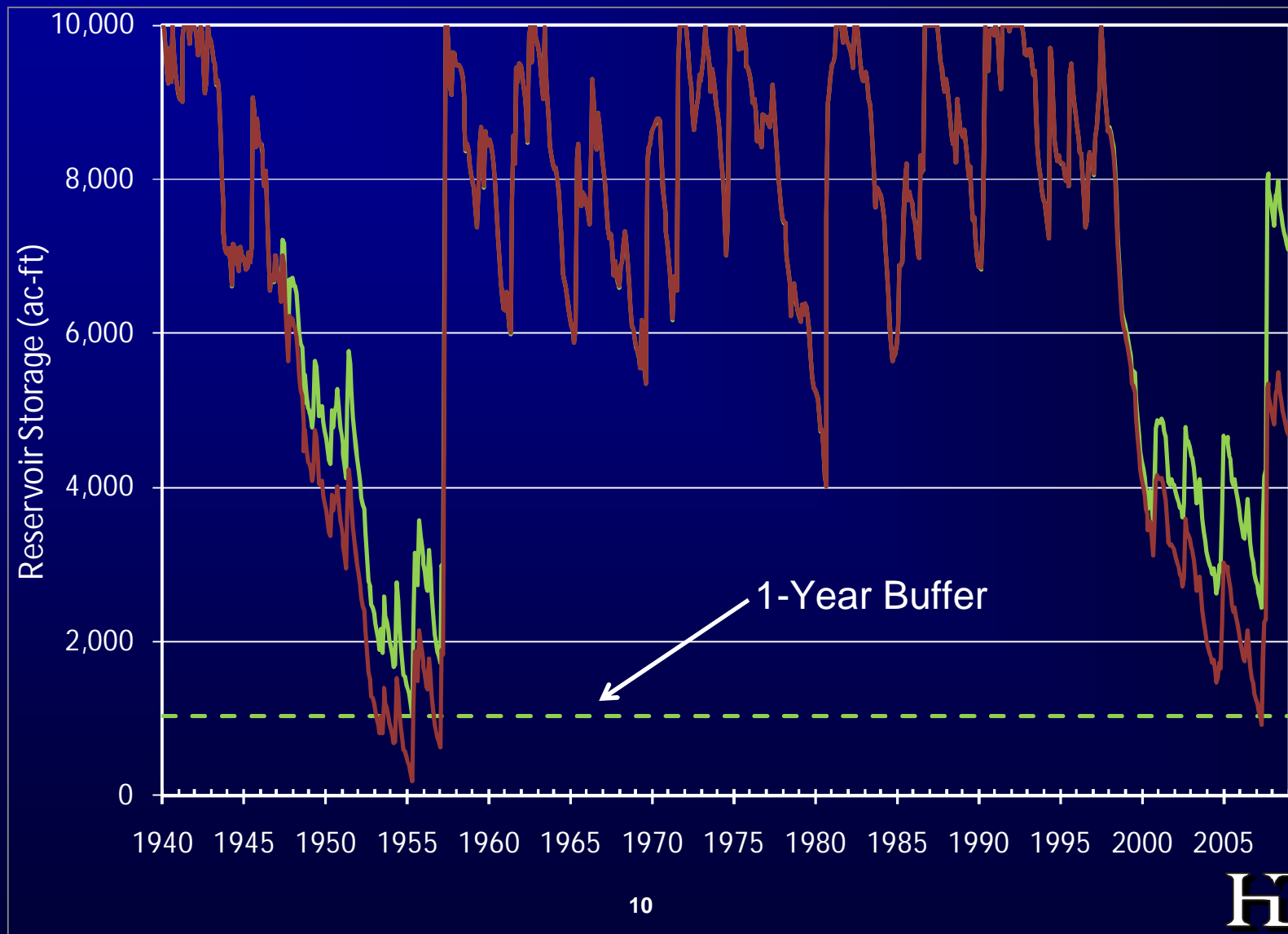
# Lake Sweetwater: 1-Year Safe Yield



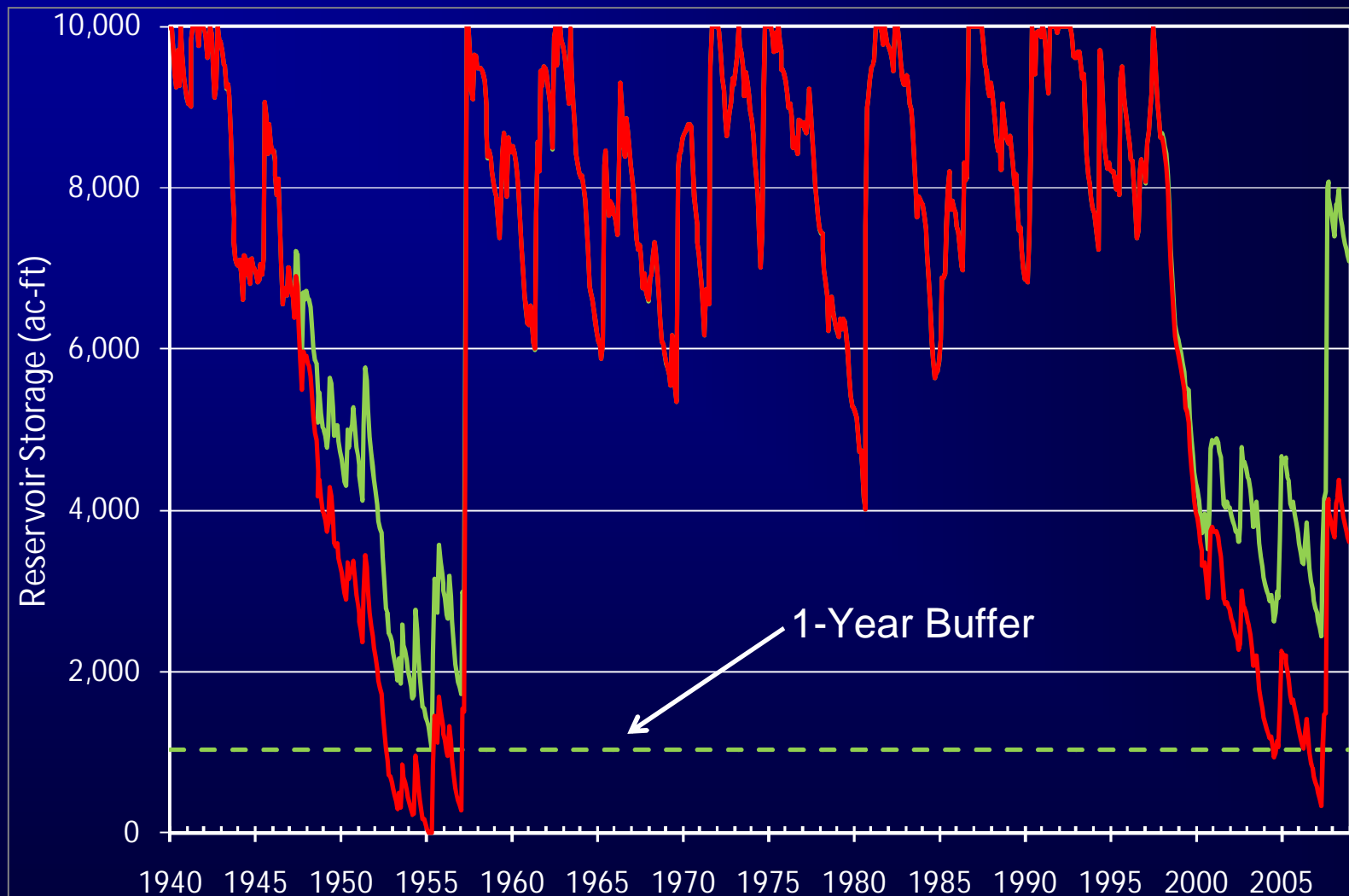
# Lake Sweetwater: 1-Year, 10% Drought



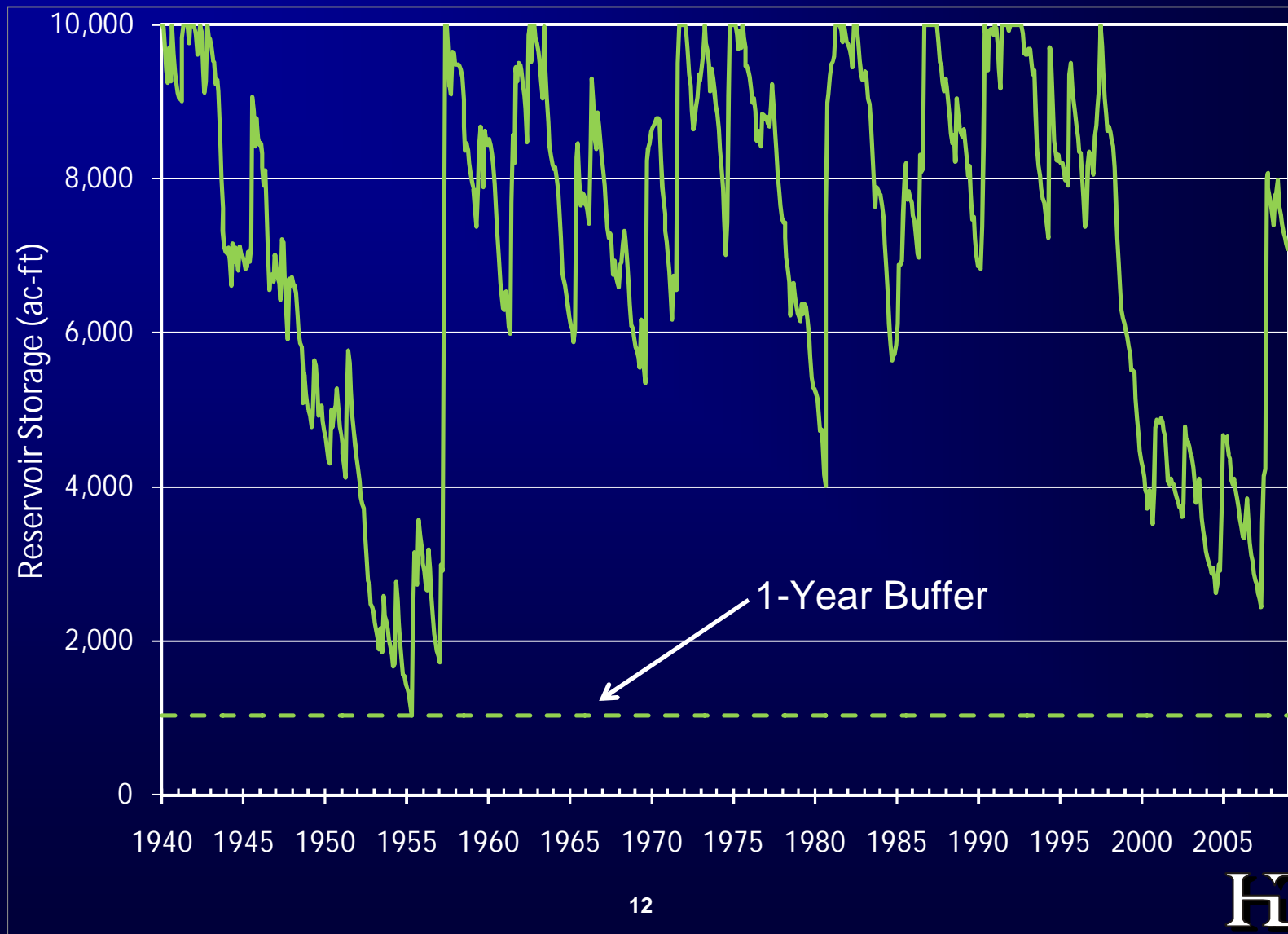
# Lake Sweetwater: 1-Year, 20% Drought



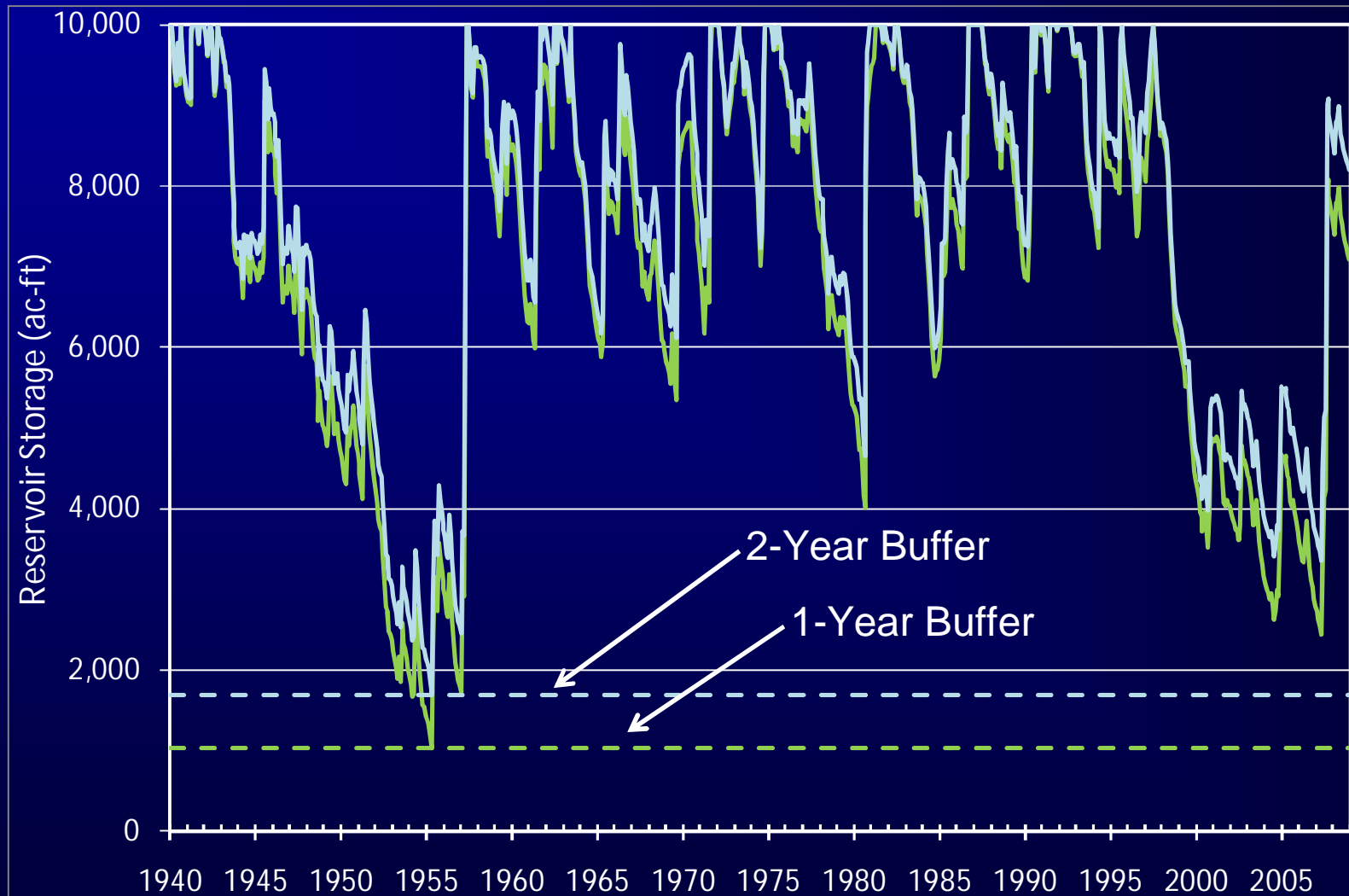
# Lake Sweetwater: 1-Year, 30% Drought



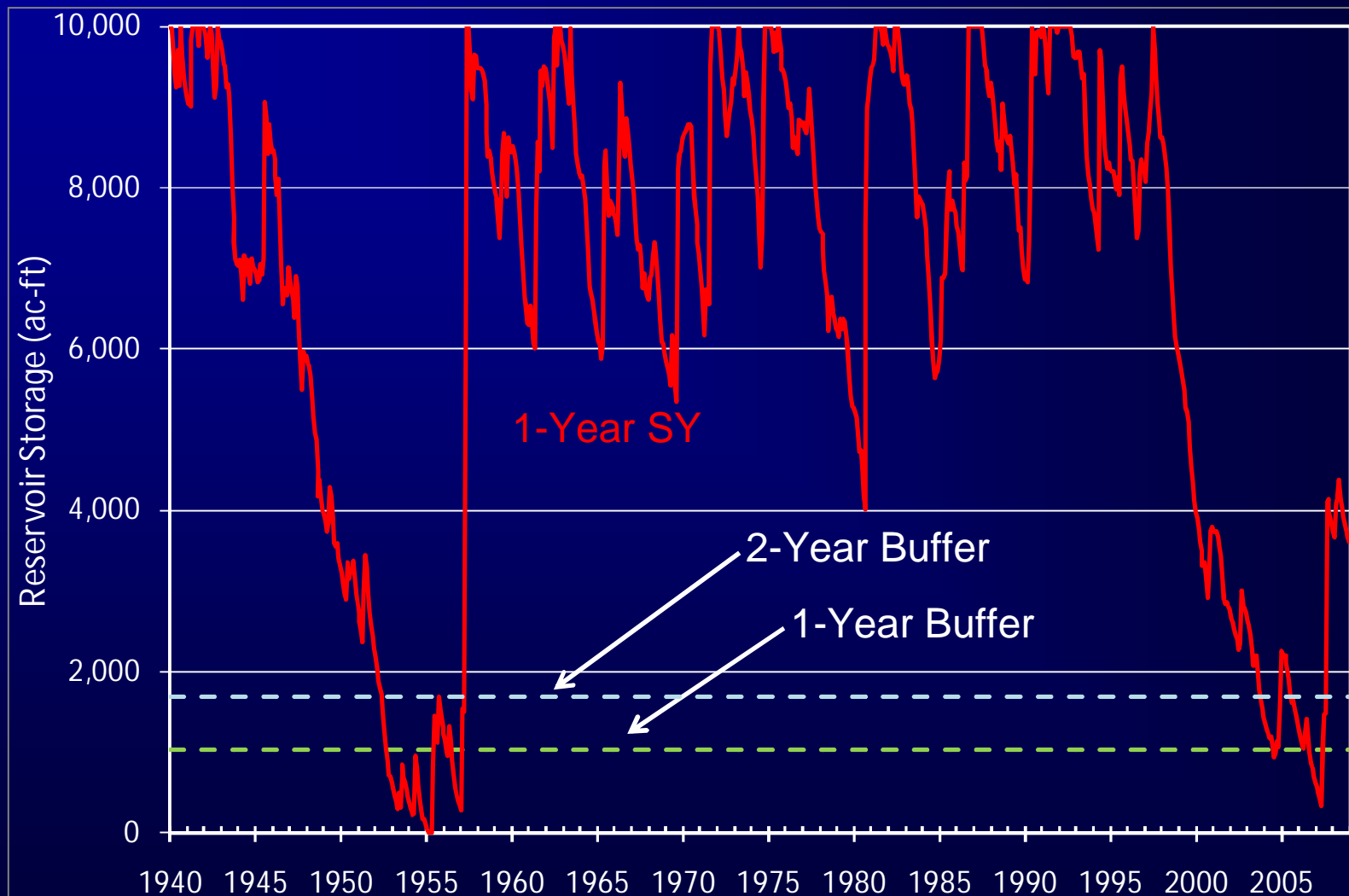
# Lake Sweetwater: 1-Year Safe Yield



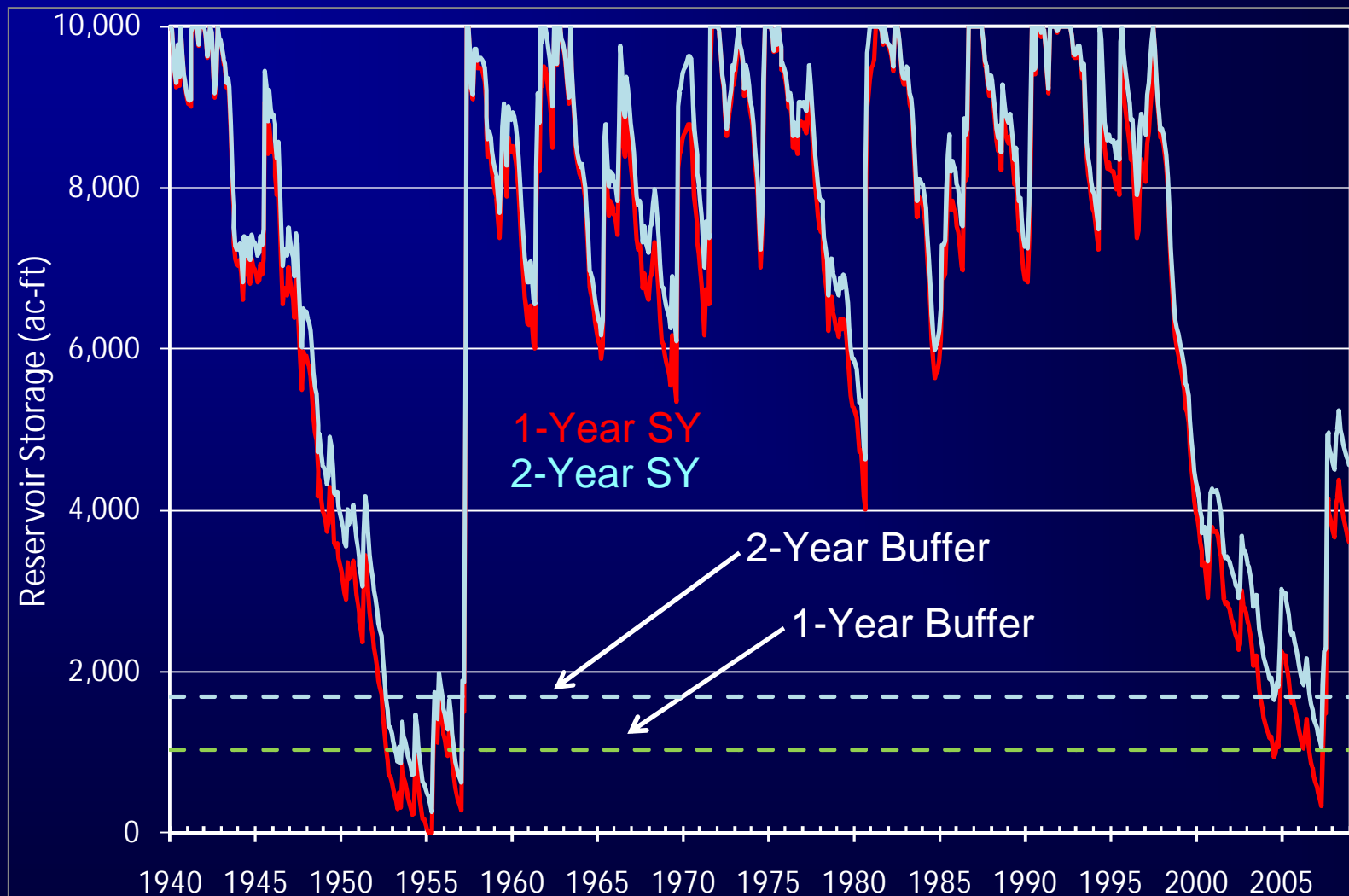
# Lake Sweetwater: 2-Year Safe Yield



# Lake Sweetwater: 30% Drought



# Lake Sweetwater: 30% Drought



# ***Effectiveness of Alternative Safe Yields***

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**Number of Reservoirs with Protected Supply Under Various Drought Scenarios (20 Total)**

	Drought Severity		
	<u>10%</u>	<u>20%</u>	<u>30%</u>
1-Year SY	16	12	6
2-Year SY	19	13	11
3-Year SY	19	17	15

# ***Summary and Recommendation***

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- ✓ **Alternative safe yields can be an effective tool for dealing with future droughts that may be more severe than recent history**
- ✓ **Use of alternative safe yields would reduce assumed available reservoir supplies**
  - **2-year – 74% of 1-year safe yield**
  - **3-year – 57% of 1-year safe yield**
- ✓ **Effectiveness is specific to reservoir and watershed**
- ✓ **Reducing assumed supplies would necessitate additional water management strategies**
- ✓ **Recommendation: Consider adopting alternative safe yield supply when requested by local WUG or WWP**