Water Supply Reallocation
Dependable Yield Mitigation Storage

by
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Dependable Yield Mitigation Storage or DYMS

- What is DYMS?
- When is DYMS required?
- Why is DYMS required?
- How is DYMS calculated?

What is DYMS and When is it required?

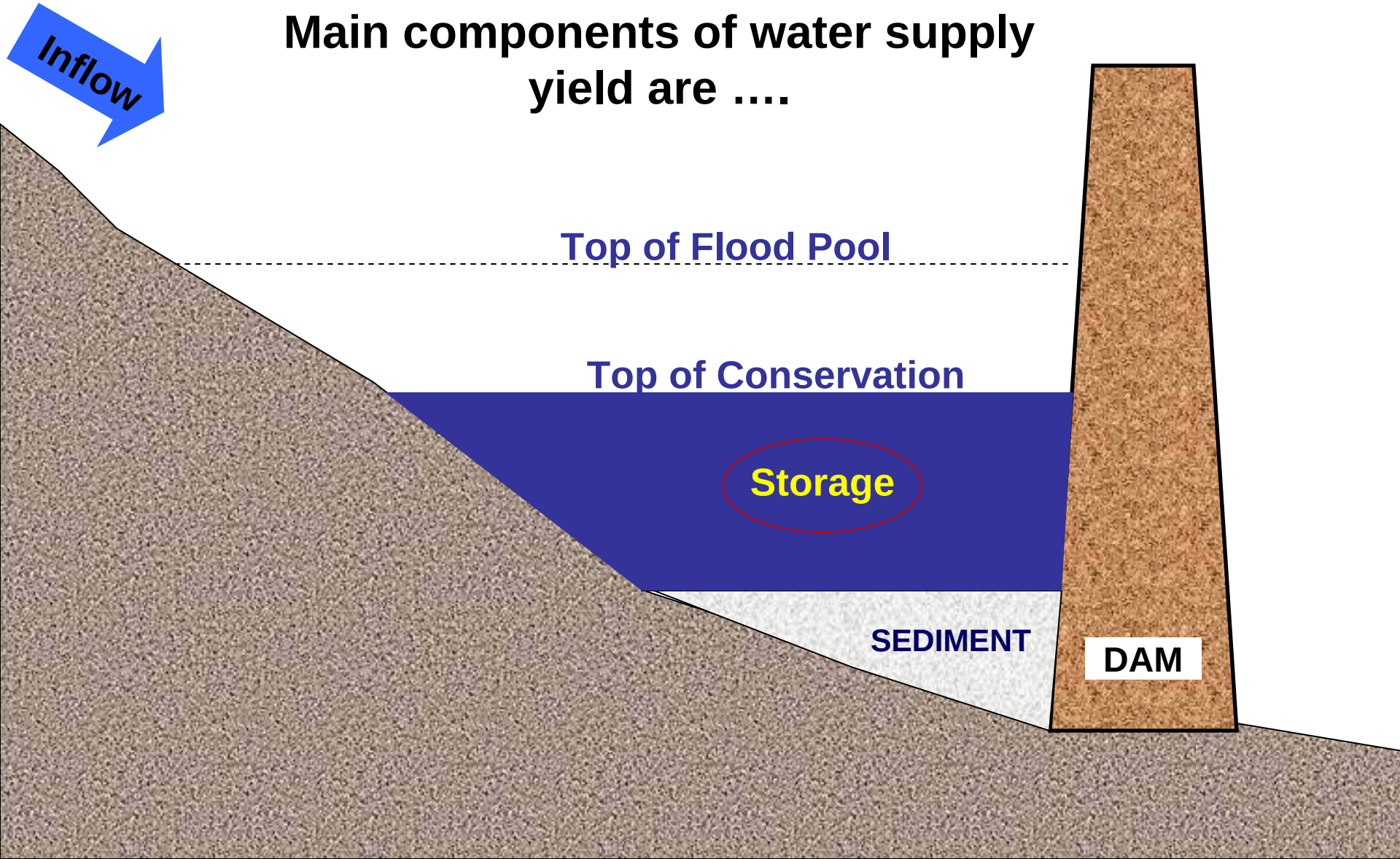
DYMS is mitigation storage required for current water supply users when reallocating from the flood pool, or expanding the conservation pool.

DYMS guidance found in ER 1105-2-100, Section VIII

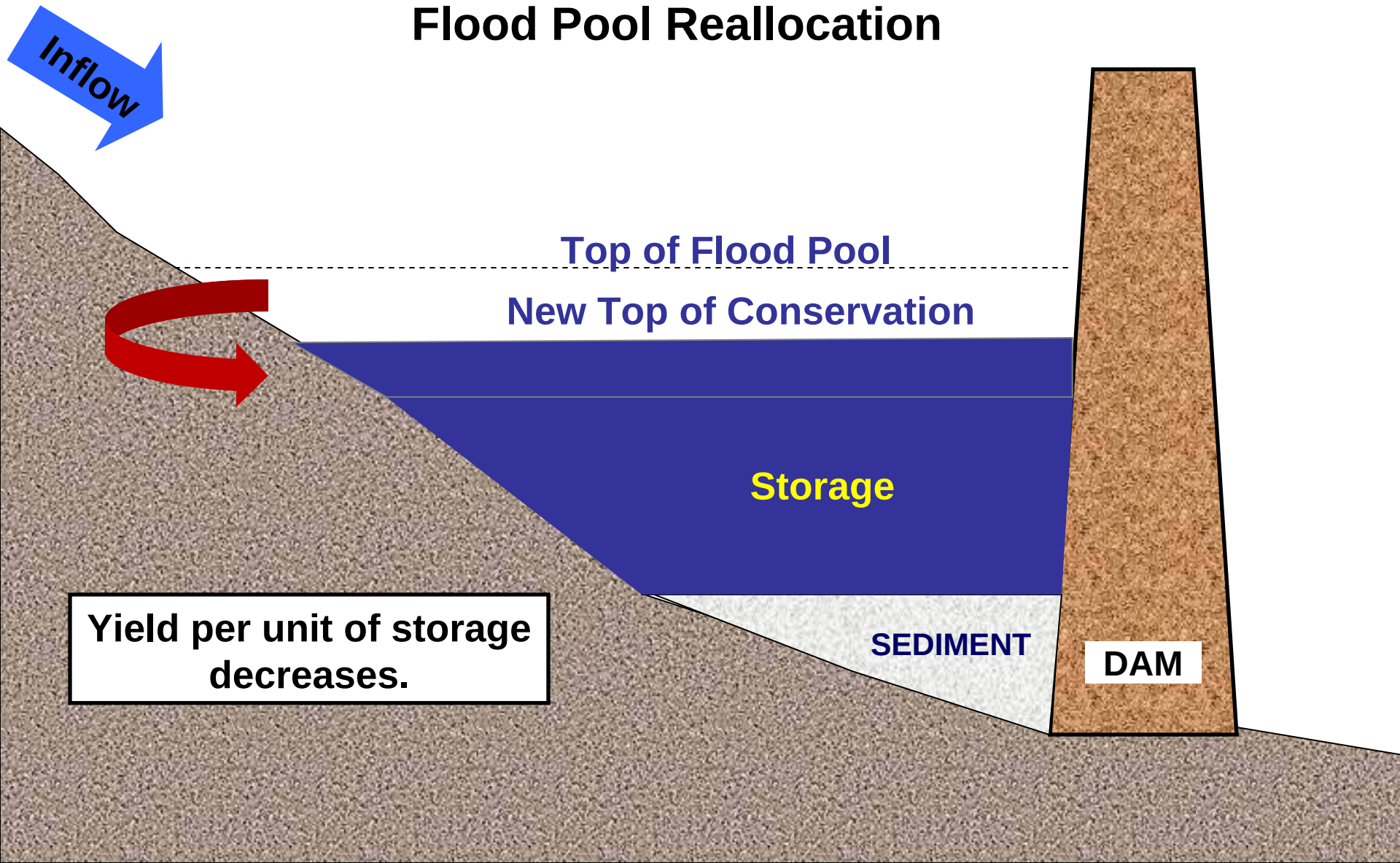
What is DYMS? ***Mitigation Storage***
When is DYMS required? ***When reallocating from Flood Pool***

Why is DYMS required?

Main components of water supply yield are ….



Flood Pool Reallocation



Yield per unit of storage decreases.

Why is DYMS Required?

- Yield is function of **storage** and **inflow**.
- With flood pool reallocation, storage increases but inflow stays the same.
- Causes the yield per unit storage to decrease.
- Current water supply users now get less yield – so users need to be made “whole”.

What is DYMS? *Mitigation Storage*

When is DYMS required? *When reallocating from Flood Pool or expanding the conservation pool*

Why is DYMS required? *Less yield/unit storage – need to make current users whole*

How is DYMS calculated?

Example
Flood Pool Reallocation

How is DYMS calculated?

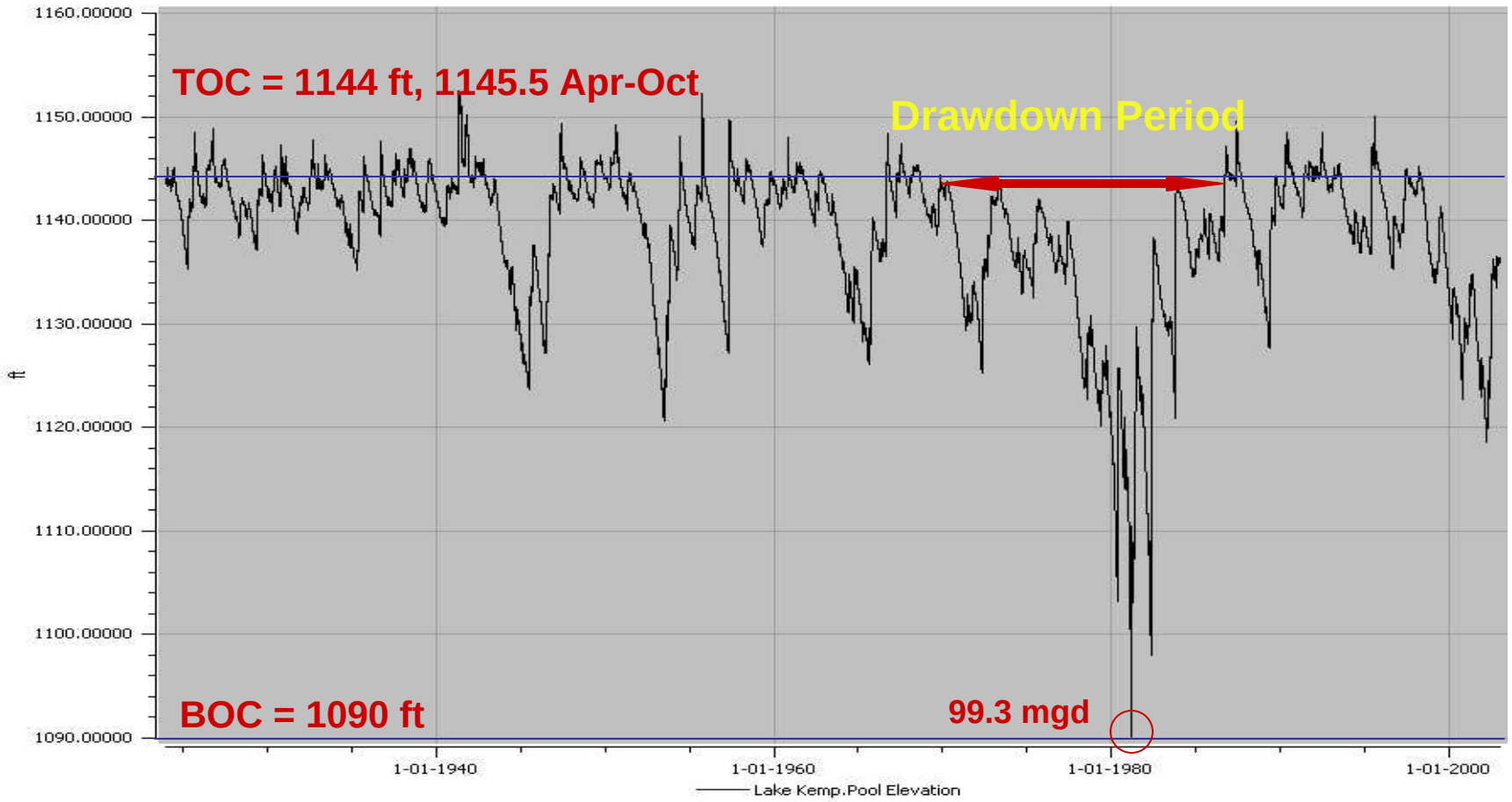
Water Supply Yield

Critical Period Dependable Yield or Safe Yield

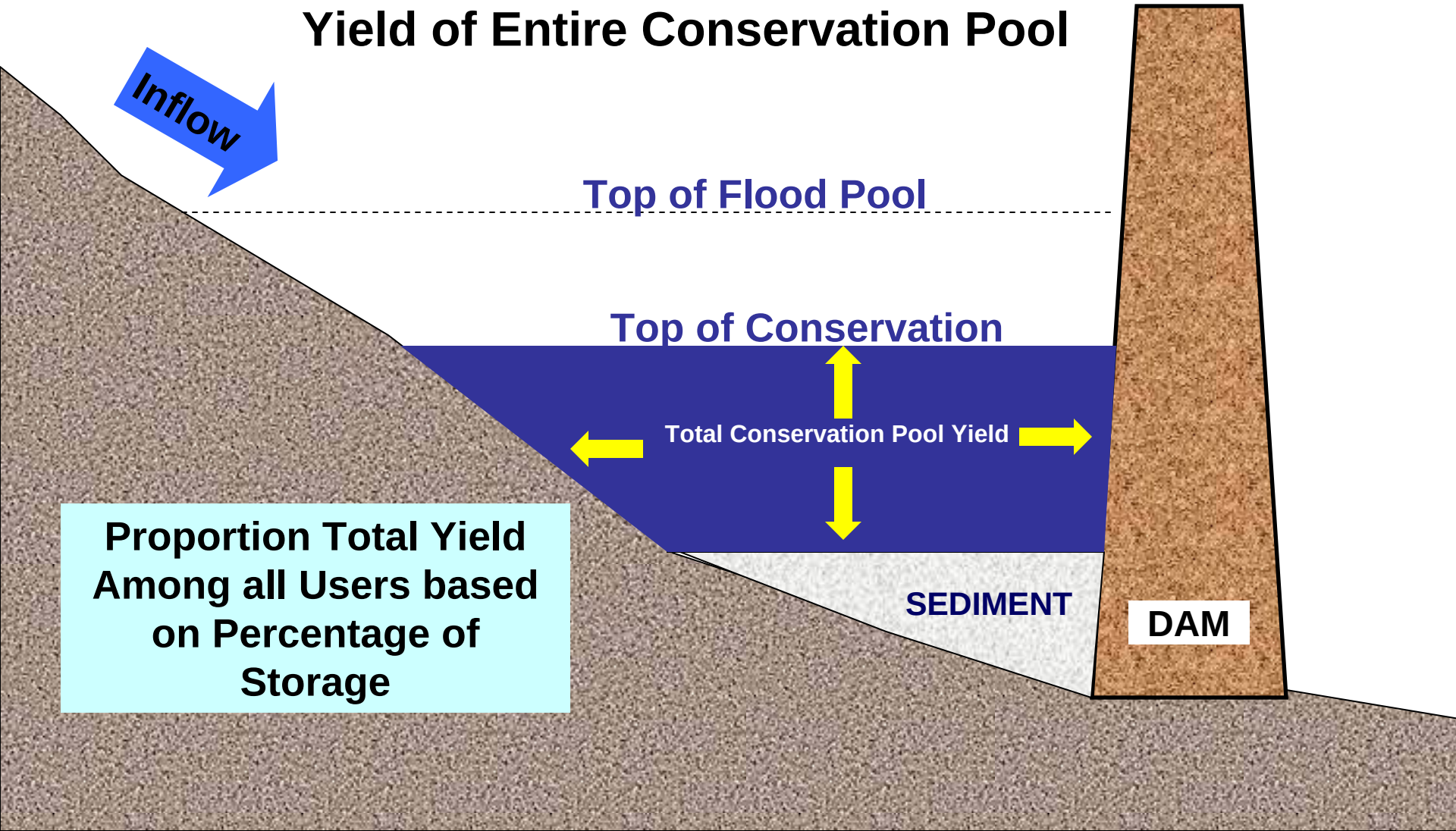
The amount of water that can be dependably withdrawn from a reservoir, causing the pool to draw down to the bottom of conservation only once during the period of record.

Tulsa District Models: Arkansas River - 69 year period of record
Red River - 71 year period of record
Wichita River – 79 year period of record
North Canadian – 56 year period of record

Lake Kemp on Wichita River
Period of Record Elevations



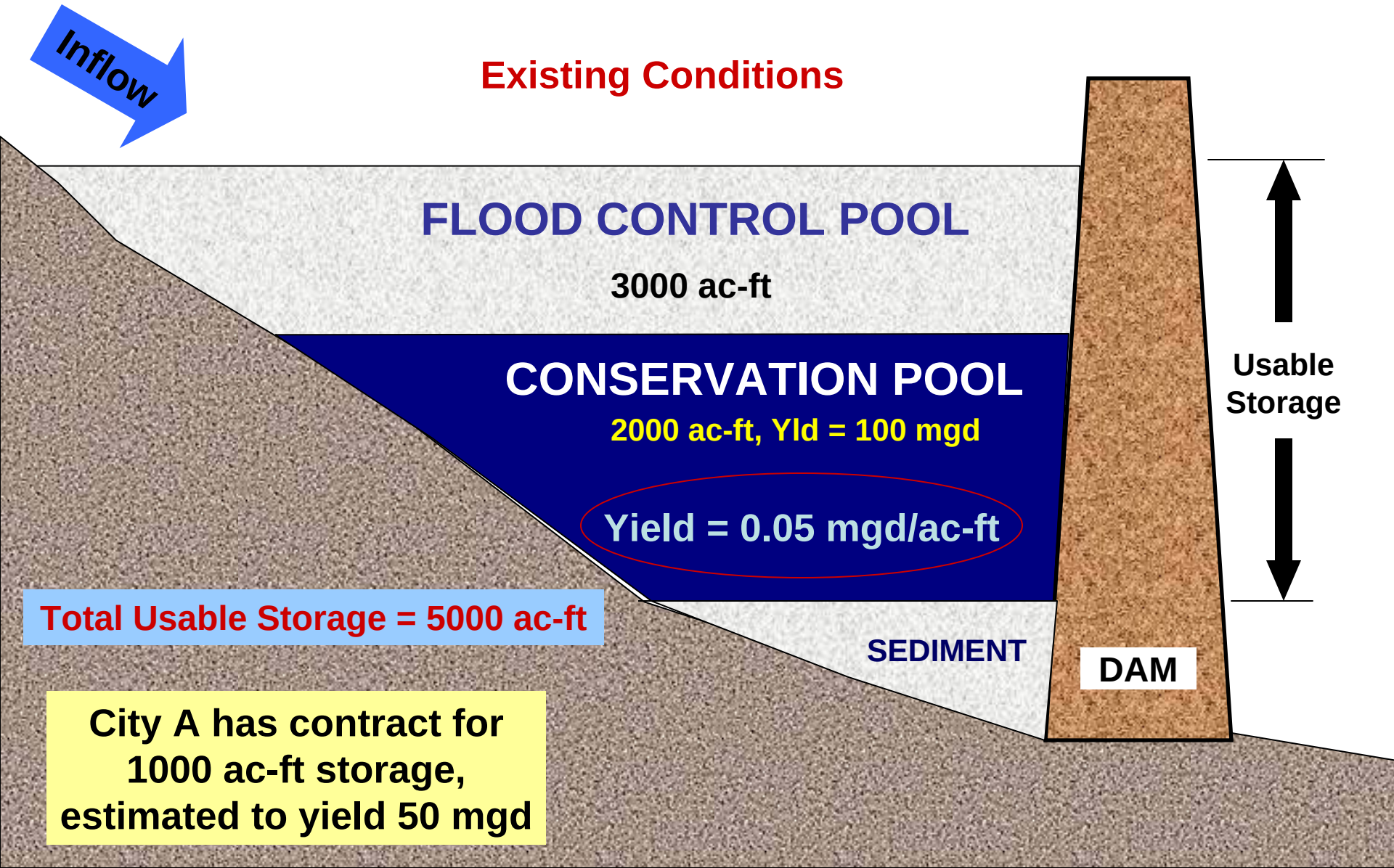
Find Critical Period Dependable Yield of Entire Conservation Pool



Proportion Total Yield Among all Users based on Percentage of Storage

Basic Yield Equation

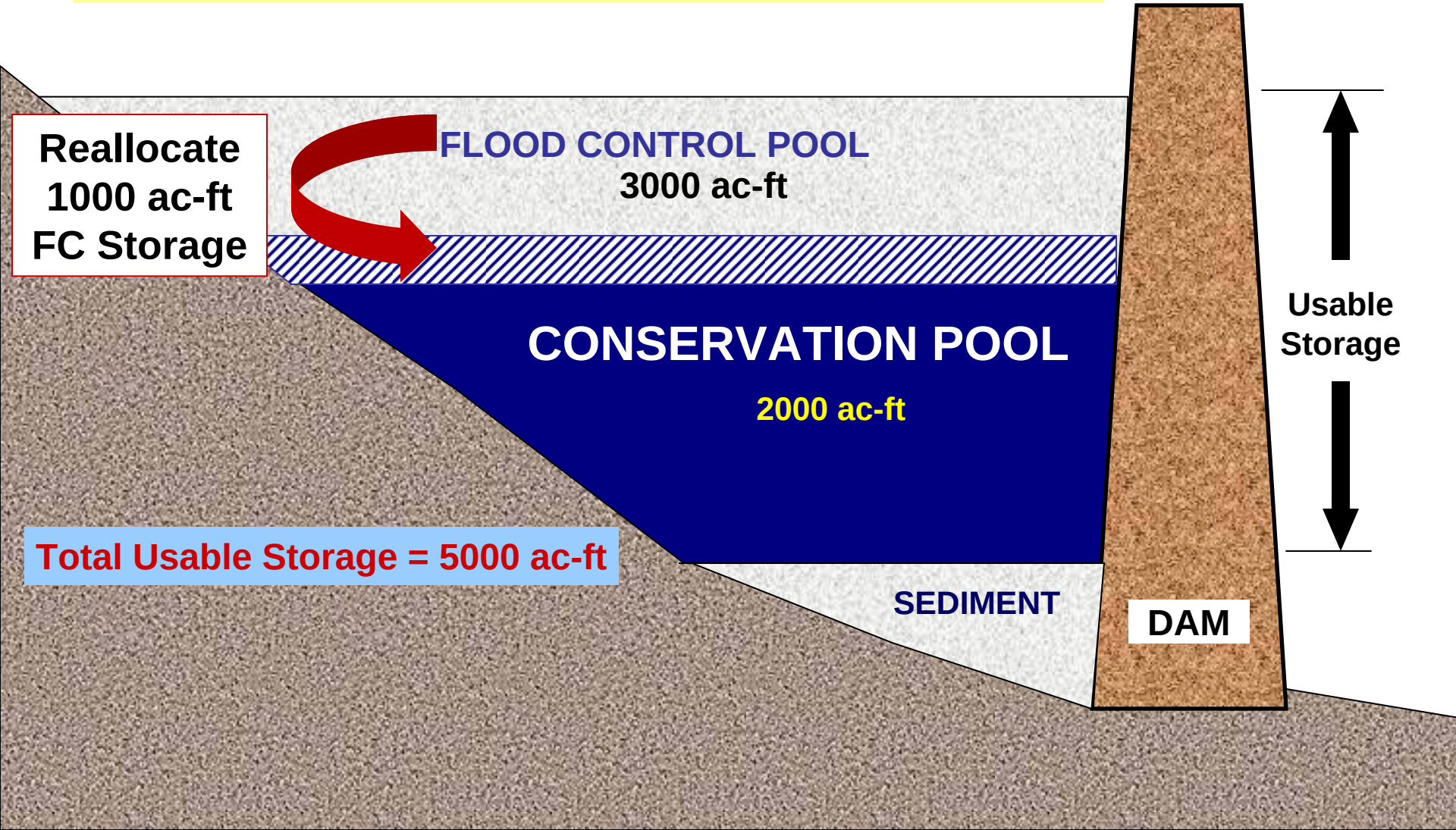
$$\text{Critical Period Dependable Yield of Water Supply Storage} = \frac{\text{Total Allocated Water Supply Storage}}{\text{Total “Usable” Conservation Storage}} * \text{True Yield Conservation Pool}$$


Inflow
Existing Conditions
FLOOD CONTROL POOL
3000 ac-ft
CONSERVATION POOL
2000 ac-ft, Yld = 100 mgd
Yield = 0.05 mgd/ac-ft
SEDIMENT
DAM
Usable Storage
Total Usable Storage = 5000 ac-ft
City A has contract for 1000 ac-ft storage, estimated to yield 50 mgd

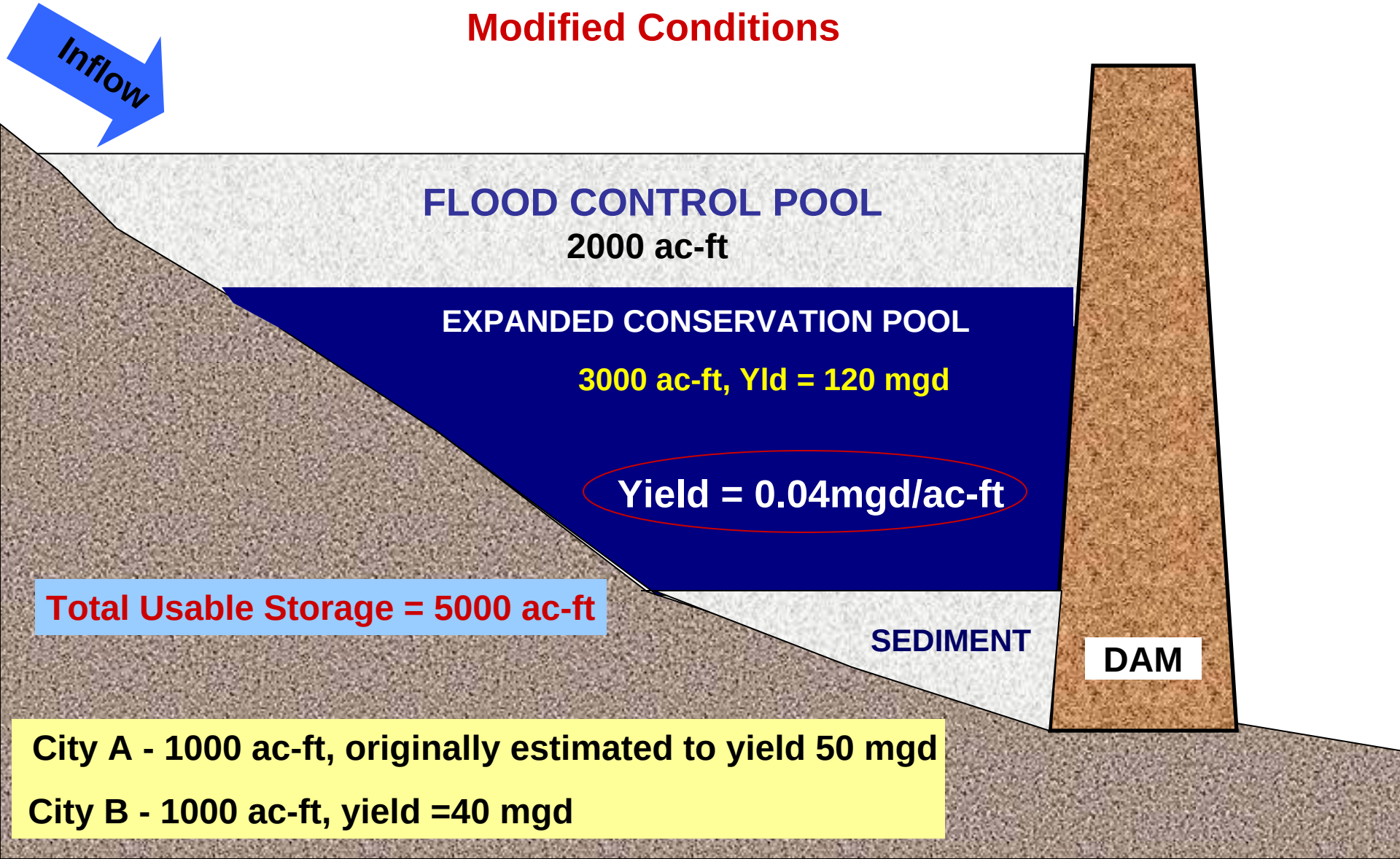
Existing Conditions

	Elevation (ft)	Usable Storage for 20?? Conditions (ac-ft)	Yield (mgd)	Percent of	
				Usable Total Storage (%)	Usable Conservation Storage (%)
Flood Control	600-630	3000		60.000	
Conservation	570-600	2000	100	40.000	100.000
Water Supply		1000	50	20.000	50.000
City A		1000	50	20.000	50.000
Other – Such as WQ		1000	50	20.000	50.000
Total Usable Storage		5000		100.000	

City B – needs 40 mgd, so initiates request for 1000 ac-ft



Modified Conditions



Total Usable Storage = 5000 ac-ft

City A - 1000 ac-ft, originally estimated to yield 50 mgd

City B - 1000 ac-ft, yield =40 mgd

Modified Conditions

(City B required 40 mgd = 40 mgd / 0.04 mgd/ac-ft = 1000 ac-ft)

Flood Pool Reallocation without DYMS - Yield decreases for current WS user

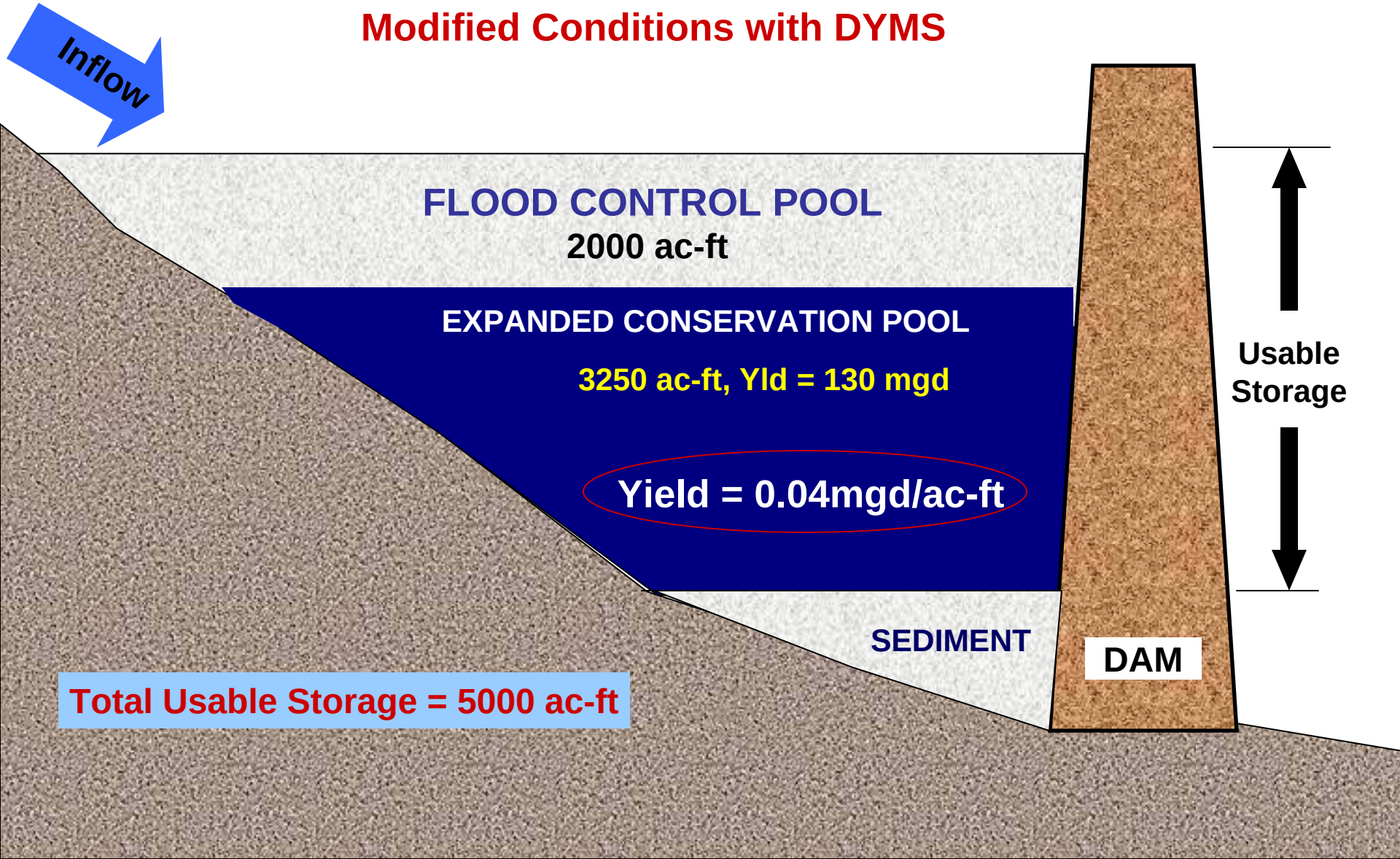
	Elevation (ft)	Usable Storage for 20?? Conditions (ac-ft)	Yield (mgd)	Percent of	
				Usable Total Storage (%)	Usable Conservation Storage (%)
Flood Control	610-630	2000		40.000	
Conservation	570-610	3000	120	60.000	100.000
Water Supply		2000	80	40.000	66.666
City A		1000	40	20.000	33.333
City B		1000	40	20.000	33.333
Other – such as WQ		1000	40	20.000	33.333
Total Usable Storage		5000		100.000	

Modified Conditions

Flood Pool Reallocation with DYMS –Yield maintained for current WS user (50 mgd / 0.04mgd/ac-ft = 1,250 ac-ft) – DYMS = 250 ac-ft

	Elevation (ft)	Usable Storage for 20?? Conditions (ac-ft)	Yield (mgd)	Percent of	
				Usable Total Storage (%)	Usable Conservation Storage (%)
Flood Control	615-630	1750		35.000	
Conservation	570-615	3250	130	65.000	100.000
Water Supply		2250	90	45.000	69.231
City A		1250	50	25.000	38.462
City B		1000	40	20.000	30.769
Other – such as WQ		1000	40	20.000	30.769
Total Usable Storage		5000		100.000	

Modified Conditions with DYMS



Total Usable Storage = 5000 ac-ft

Note:

- All costs associated with DYMS are paid for by the new water supply user.
- City B must pay for 1000 ac-ft + 250 ac-ft = 1,250 ac-ft
- City A has no additional costs, but contract is updated with additional storage.

Also Note:

- Hydropower experiences similar adverse impacts as water supply users.
- Not Corps Policy to provide DYMS to hydropower.
- Losses satisfied by financial credits. Credit provided to hydropower account from water supply proceeds, based on revenues foregone. Capacity losses may be offset by operational changes.

Questions?