

Introduction to Flow Scenarios

Ecological Flows Science Advisory Board
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Instream Flow Status (pp 84-86 of IFC book)

- No Protection
 - No legal ability to keep from drying up the stream
 - Rare in N.C., but there are examples
- Threshold Protection (i.e., minimum flow)
 - May be a single value (e.g., 7Q₁₀) or have seasonal value (e.g., 20/30/40 percent of MAF)

Instream Flow Status (pp 84-86 of IFC book)

- Partial Ecologically-Based Protection
 - Addresses 1-4 riverine components
 - Most likely hydrology, biology and water quality
 - May address intra-annual variability, but not inter-annual
- Comprehensive Ecologically-Based Protection
 - Addresses all 5 riverine components (hydrology, biology, water quality, connectivity, geomorphology)
 - Maintains intra-annual and inter-annual variability
- Full Protection (hands off)

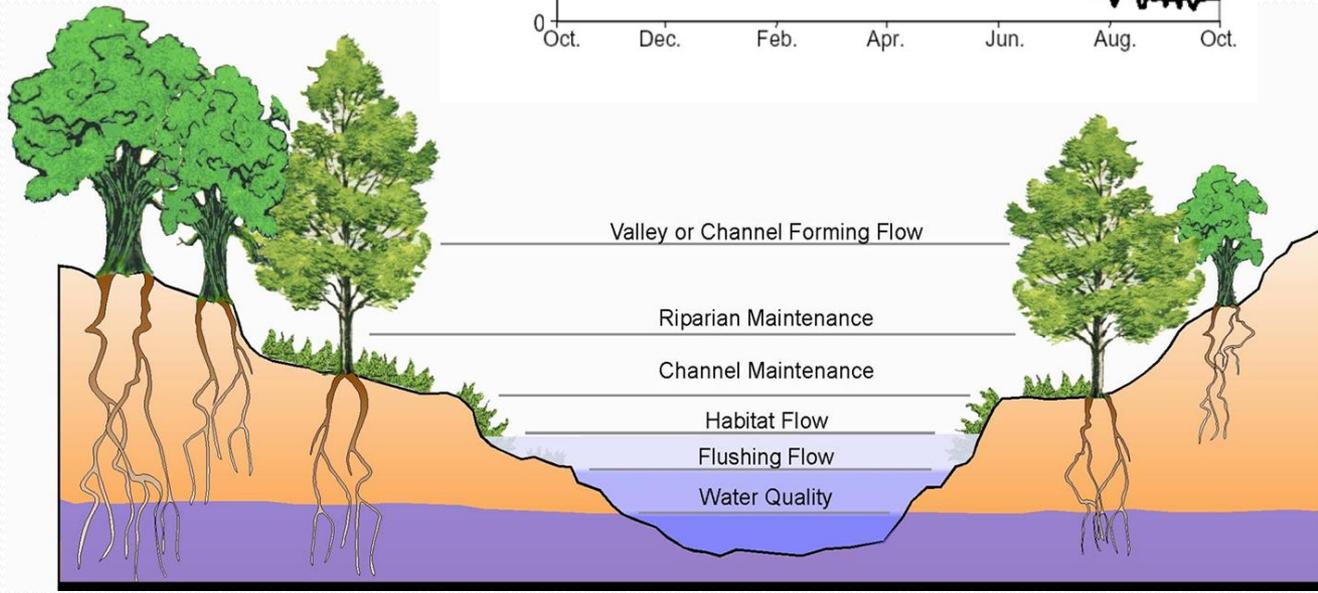
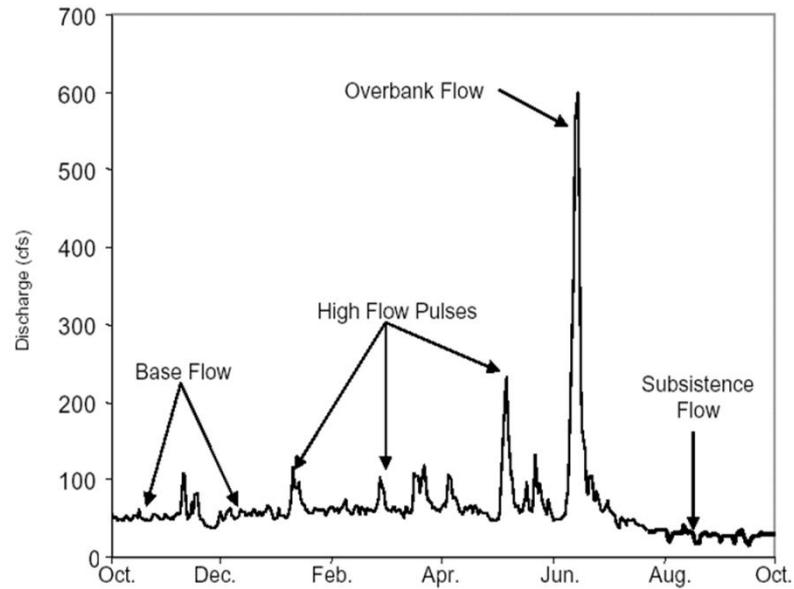
General Approaches (Richter et al. 2011)

- Minimum Flow Threshold
- Statistically-based Standard
 - Typically partial protection, but could be comprehensive
- Percent of Flow Standard

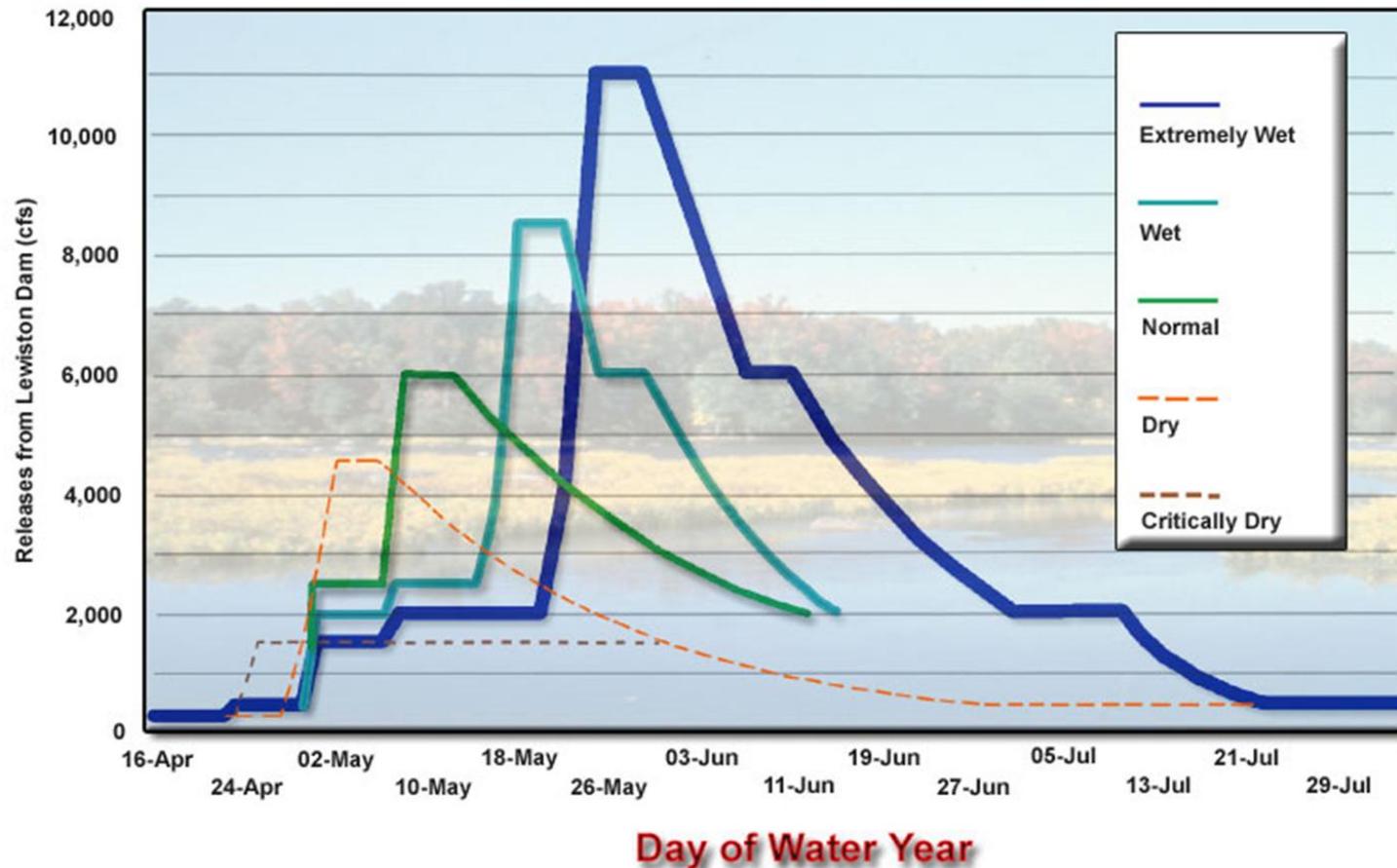
Statistically-Based Standard

- Flow components include:
 - Critical low, low, high flow pulses, small floods, high floods
 - Wet, normal, dry years
- For each, includes magnitude, duration, frequency, season
- Tied to ecologically significant events
 - Spawning
 - Floodplain rejuvenation
 - Fry/juvenile growth
 - Migration
 - Sediment movement
 - Channel maintenance

Flow Components



Example – Trinity River



Example – Cheoah River

Monthly Base Flow (cfs) Releases from Santeetlah Dam into the Cheoah River Bypassed Reach.

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Tier A	50	100	100	100	90	60	60	50	50	50	50	60
Tier B	50	90	90	90	80	60	50	40	40	40	40	50

Tier A = Normal/Wet Conditions

Tier B = Dry Conditions

Example – Cheoah River

Table 2. High Flow Events – 5-year Repeating Schedule.

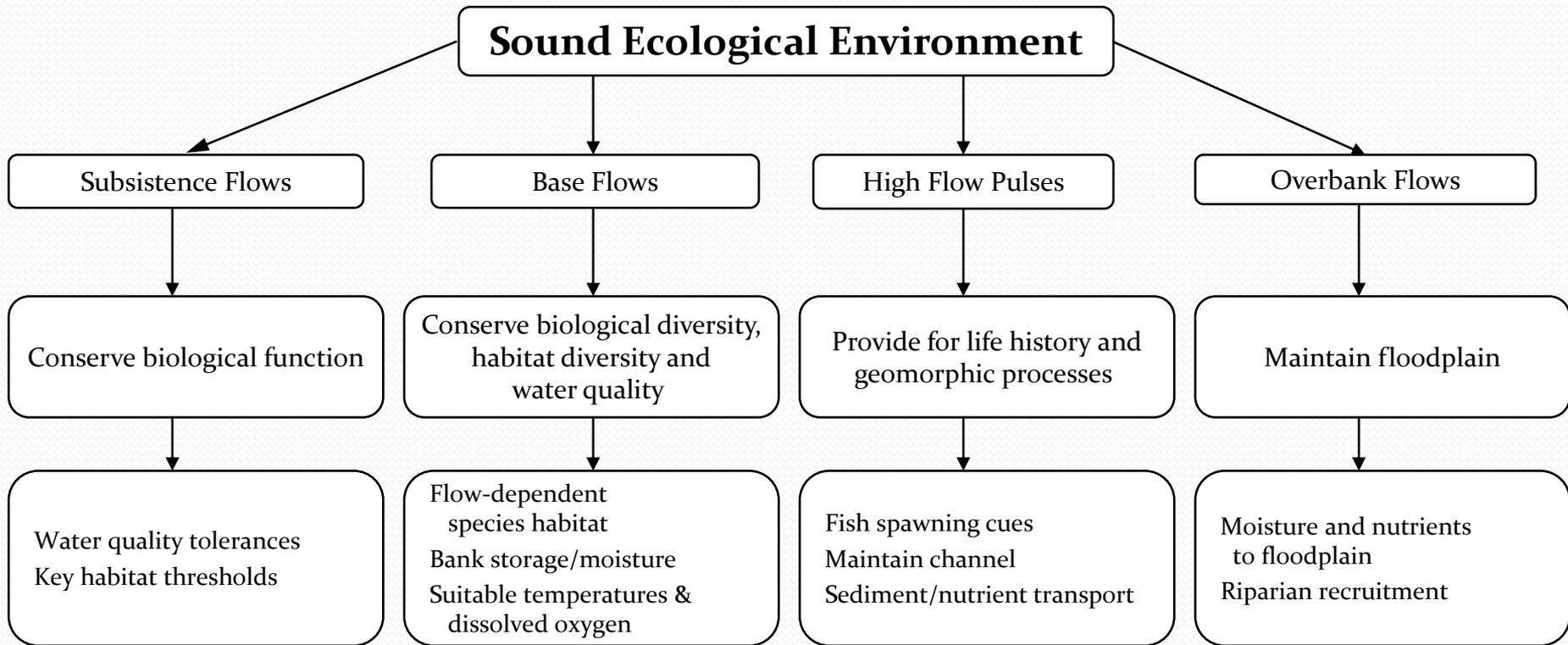
High Flows	Year 1		Year 2		Year 3		Year 4		Year 5		Magnitude (cfs) ³		
	Events	Total Days Per Month	Day 1	Day 2	Day 3								
January													
February	1	2	1	2	1	2	1	2	1	2	1000	Var ¹	
March	1	3	1	3	1	3	1	3	1	3	1000	600 ²	300
April	2	5	3	6	2	5	2	5	3	6	1000	850	300
May	2	4	2	4	3	6	3	6	3	6	1000	850	
June	1	2	1	2					1	2	1000	850	
July					1	2					1000	850	
August							1	1			1000		
September	1	1			1	1					1000		
October	1	1	1	1			1	1			1000		
November	1	1	1	1	1	1	1	1	1	1	1000		
December													
Total Per Year:	10	19	10	19	10	20	10	19	10	20			

¹ 600 cfs from hour 15 to hour 19, 400 cfs from hour 20 to hour 34; 200 cfs from hour 35 to hour 47; 100 cfs for hour 48

² 600 cfs from hour 16 to hour 36; 300 cfs from hour 37 to hour 48

³ 12:00 a.m. (midnight) shall be the starting point for determining the appropriate time for initiating and changing flow releases

Flow Regime Tied to Ecology



Percent of Flow Standard

- Remove $X\%$ of water flowing by for a given time step
- X generally 6 – 20% (Richter et al. 2011)
- Alberta just releasing a standard of 15%
- Time step can be daily, weekly, etc.
- X can differ by season

Flow Scenario Examples

