
Stream Flow :
The Next Two Decades
2. 10. 2002


09/14/2005

STREAM FLOW REGULATION TIMELINE

PA -229
Minimum Stream Flow Act Enacted.
1971

Minimum Stream Flow Regulations
Adopted 1979

Diversion Act 1982

Program Review 2003

1970 1975 1980 1985 1990 1995 2000 2005 2010

Waterbury v. Washington 2002

Fenton River Desiccated
2005

PA 05-142 Enacted
Mandating Minimum Stream
Flow Regulations 2005

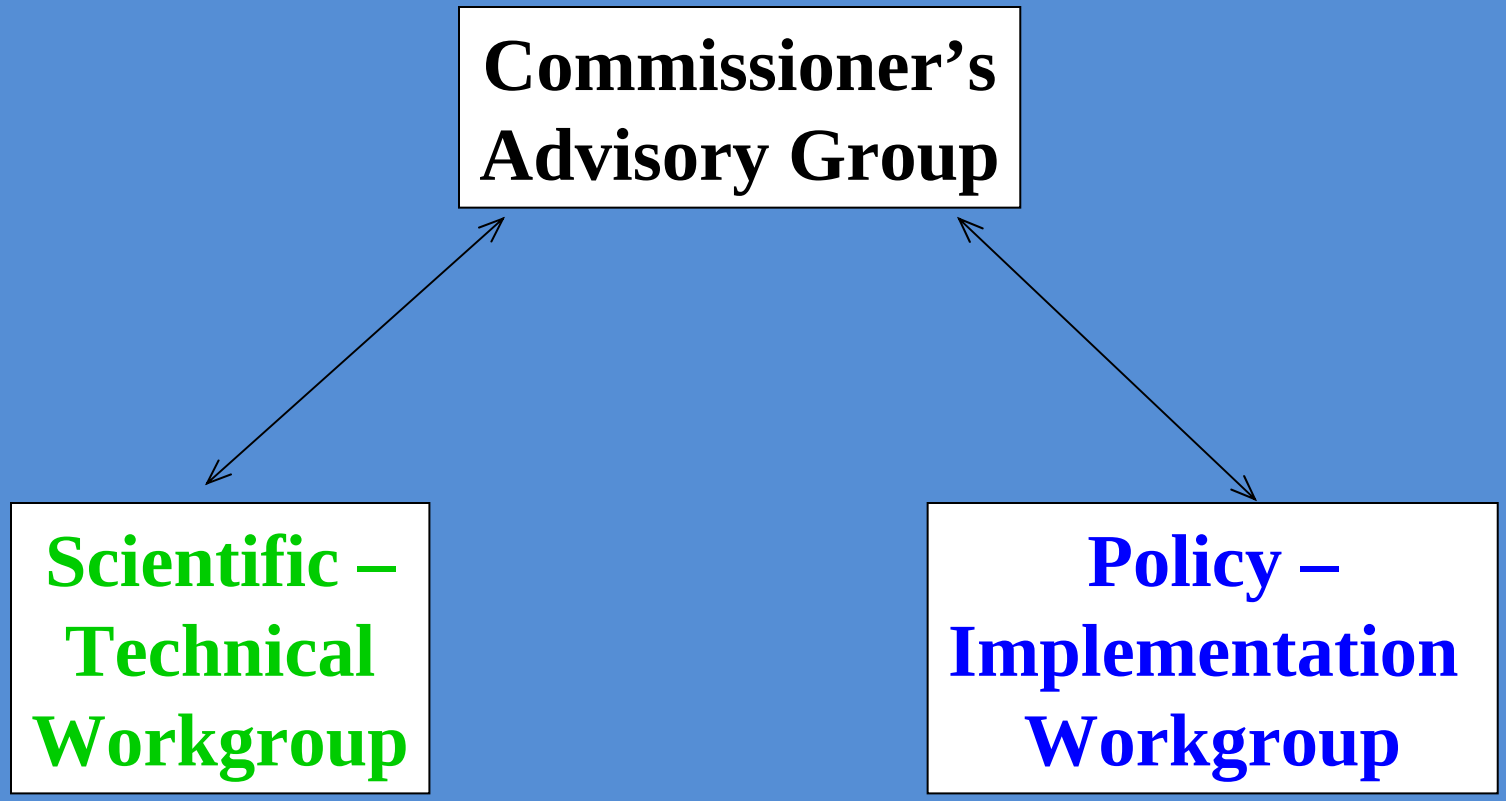
Advisory Groups Formed
2005

Draft Regulation 2009

Public Act 05-142

An Act Concerning the Minimum Water Flow Regulations

- Commissioner to Adopt Flow Regulations:
  - Apply to all rivers and streams
  - Be based on best available science
  - Preserve and protect natural aquatic life and wildlife
  - Promote and protect public recreation
  - Be based, to the maximum extent practicable, on natural variations of flows and water levels – while providing for the needs and requirements of public health, flood control, industry, public utilities, water supply, public safety, agriculture, and other lawful uses
  - By December 31, 2006



Established December of 2005

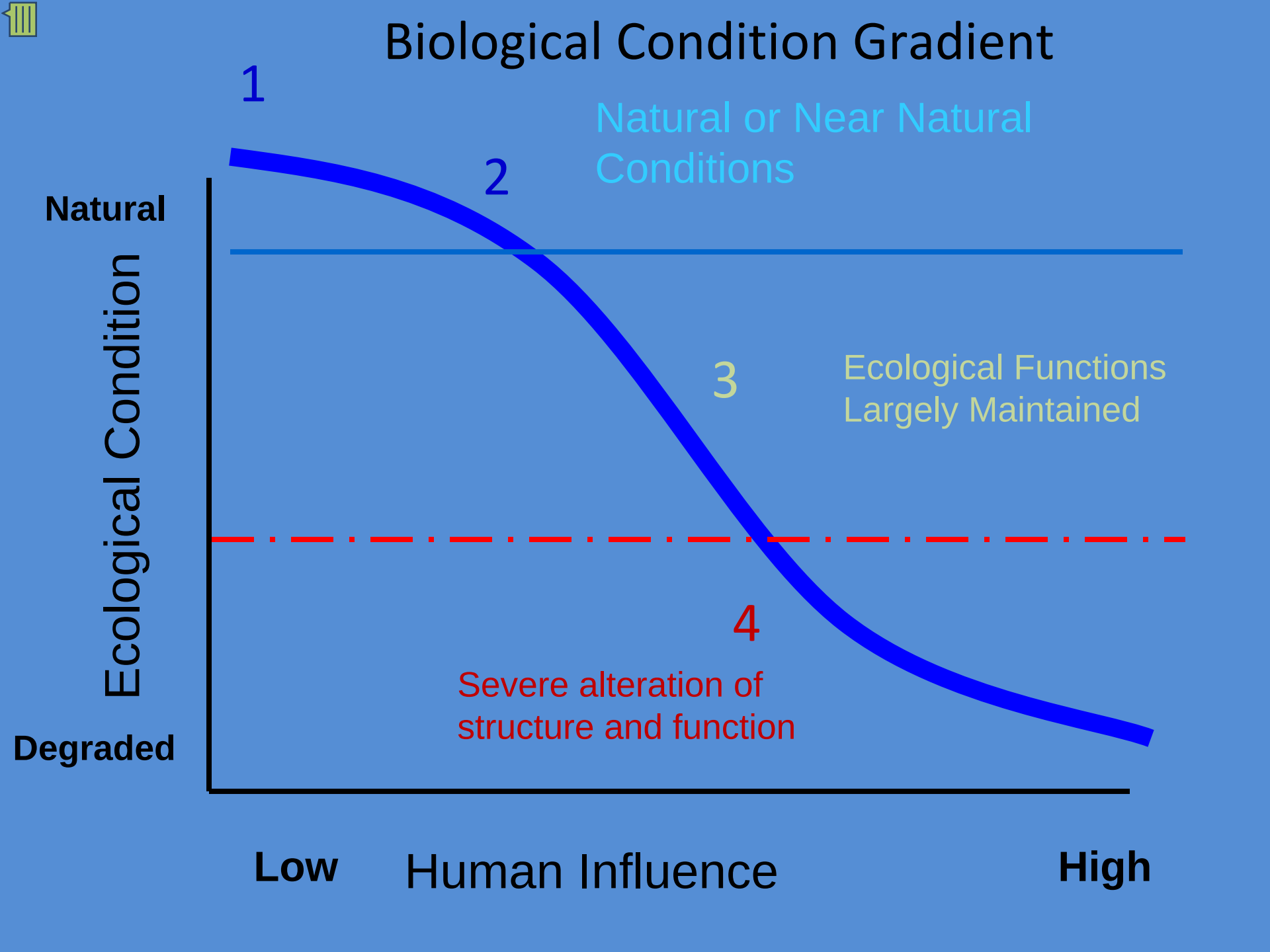
What has DEP Been Doing Since Last Advisory Committee Meeting?

- Considering feedback from CWWA
- Exploring various alternatives, modeling impacts
- Refining scope of regulation
- Developing procedure for assessing impact of groundwater diversion on stream flow
- Redrafting regulation into regulation-ease
- Continuing to meet with Technical and Scientific Advisory Committee members for feedback on specific technical issues
- Drafting "Stream Flow : The Next Two Decades"

Structure of Proposed Regulation

- Classification
- Operation Rules dependent on Classification
- Phased in Compliance over 16 years

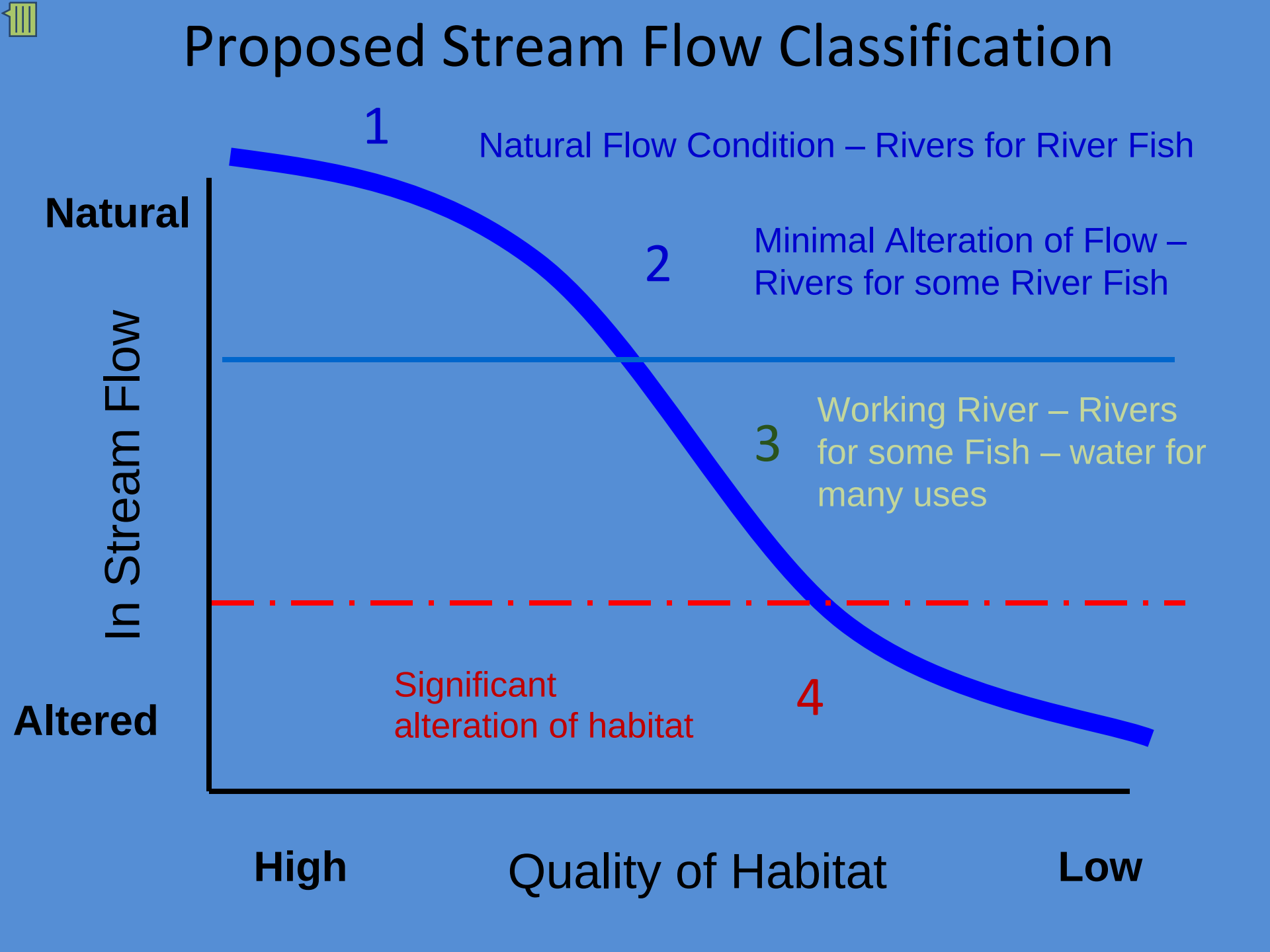
Biological Condition Gradient



What That Tells Us

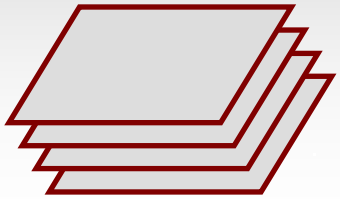
- Not all streams and rivers in the state are the same
- Not possible to take everything back to pristine
- Different places on the curve call for different management strategies –
- Challenge is to define what where

Proposed Stream Flow Classification



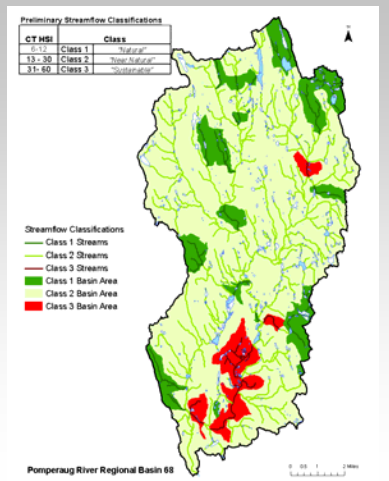
The Commissioner Shall Adopt Stream Flow Classifications

Consider Factors Indicative of the Degree of Human Alteration of Natural Stream Flow



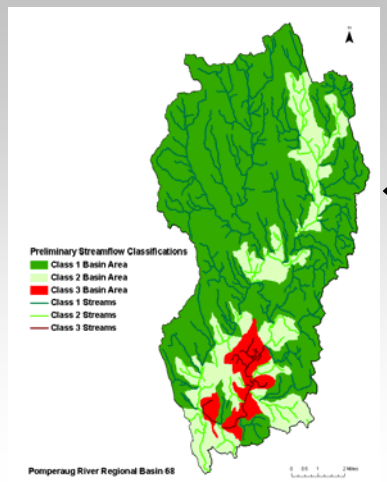
Diversions
Dams
Impervious Cover
Return Flow
Unique Factors

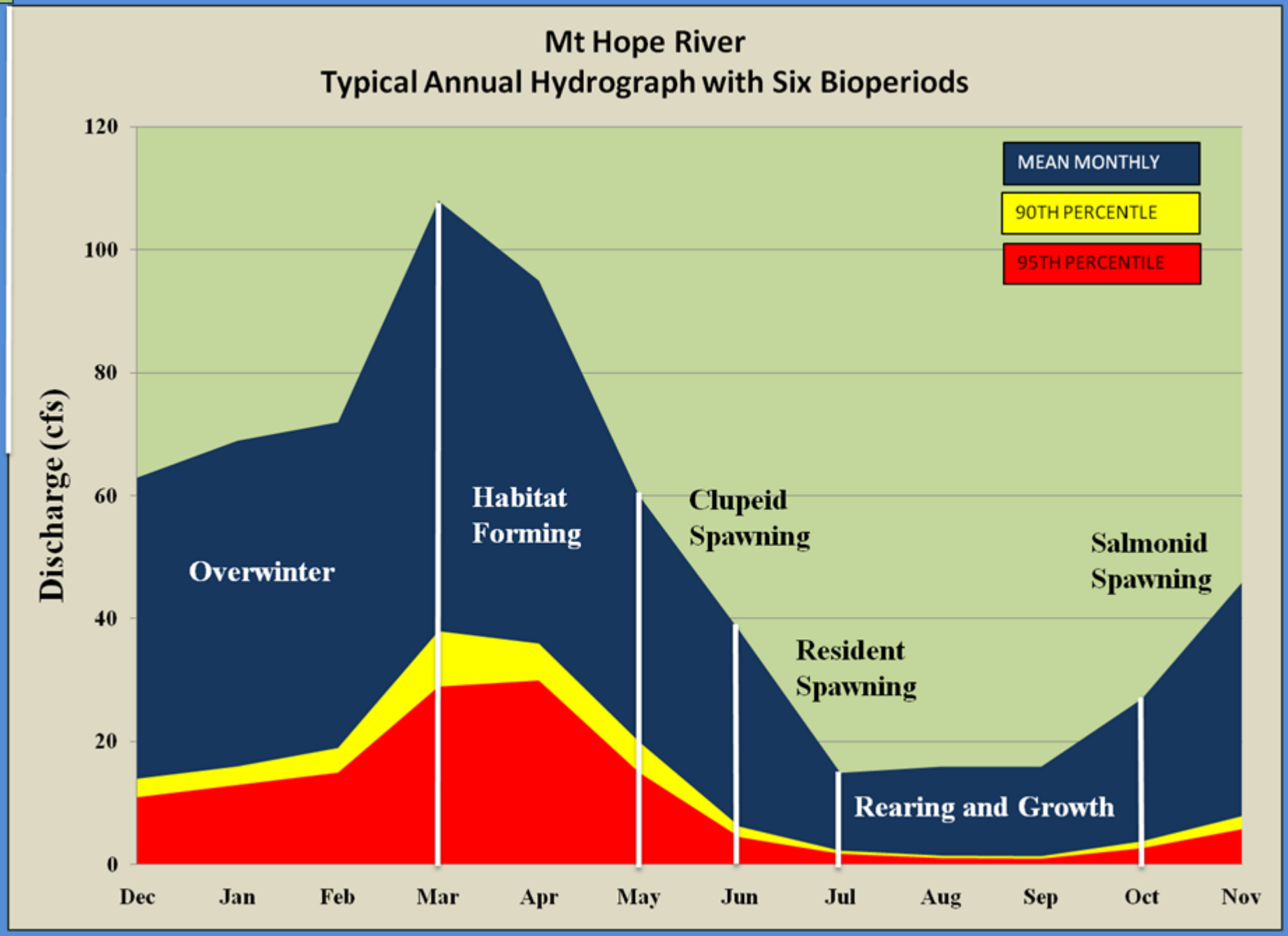
Develop Draft Stream Flow Classes



Propose Stream Flow Classifications, Public Notice, and Solicit Comment

Adopt Stream Flow Classifications




Mt Hope River
Typical Annual Hydrograph with Six Bioperiods
MEAN MONTHLY
90TH PERCENTLE
95TH PERCENTILE
Discharge (cfs)
120
100
80
60
40
20
0
Dec
Jan
Feb
Mar
Apr
May
Jun
Jul
Aug
Sep
Oct
Nov
Overwinter
Habitat Forming
Clupeid Spawning
Resident Spawning
Rearing and Growth
Salmonid Spawning

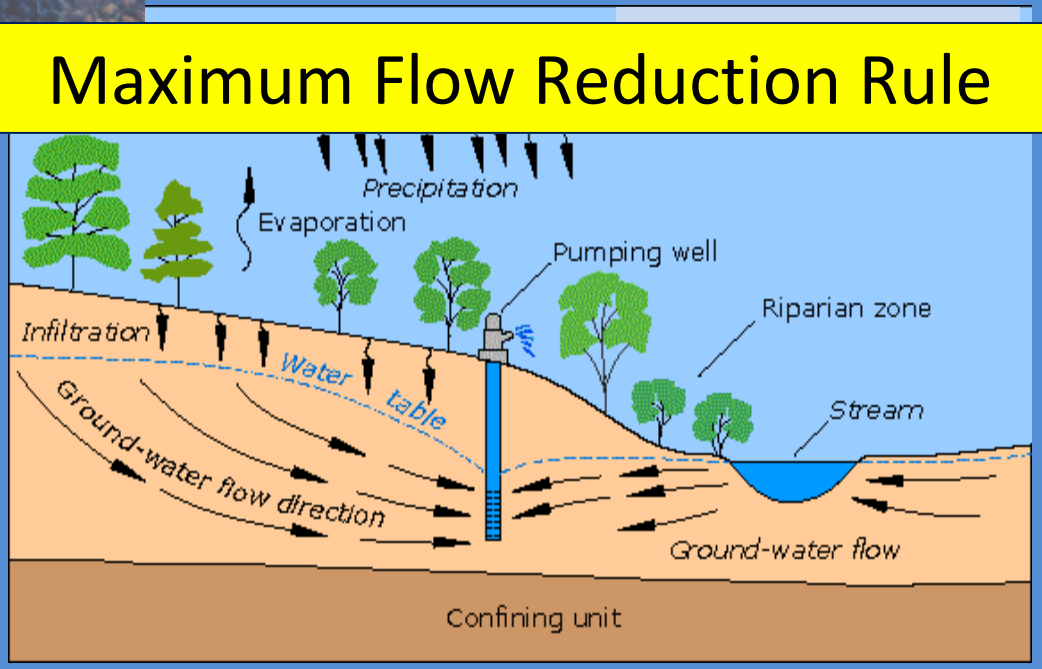
Minimum Flow Release Rule

Source - NOAA

Two major ways we influence flow in rivers and streams – dams and withdrawals

Each requires a different approaches – with one underlying premise – accept a certain degree of variation from natural flow – class dependent

Maximum Flow Reduction Rule



Source - USGS

Upon Adoption of Regulation

- If a release is required under the existing stream flow regulations – it must be continued until new release requirement becomes effective.
- All diversion permits or other agreements concerning water withdrawals remain in effect.
- What Not Regulated
  - Tidal rivers
  - Dams operated in run of river mode
  - Small and intermittent withdrawals

Proposed Timing of Regulation

- Year “0” — Adoption of Regulation
- Years 1-5 — Classification, Data Collection and Analysis
- Years 6-11 — Dams Intermediate Release
  Other Diversions individual compliance
- Years 11-16 — Dams Full Release
  Other Diversions collective compliance
- Water Management Plan/Agreement – any time

Dams 5 Years After Segment Classification

- Begin daily recording of release
- Submit data to DEP upon request/notification
- Class 2 – release 75% of natural inflow
- Class 3 – releases per Low Level Release Rule

LOW LEVEL RELEASE RULE		
Bioperiod	**Effective Date**	**Minimum Required Release**
Overwinter	Dec 1 - Feb 28	Bioperiod Q95
Habitat Forming	Mar 1 - Apr 30	Bioperiod Q95
Cluepeid Spawning	May 1 - May 30	Bioperiod Q95
Resident Spawning	Jun 1 - Jun 30	Bioperiod Q90
Rearing and Growth	Jul 1 - Oct 31	Bioperiod Q80
Salmonid Spawning	Nov 1 - Nov 30	Bioperiod Q90

- Class 4 – greater of 0.1 cfsm or existing stream flow

Dams Ten Years After Classification of Segment

- Dams
  - Class 2 – release 75% of natural inflow
  - Class 3 – Release per Multi-Level Release rule

MULTI-LEVEL RELEASE RULE

Bioperiod	Effective Date	Minimum Required Release	
		Anteceedent 14d Period Dry	Anteceedent 14d Period Wet
Overwinter	Dec 1 - Feb 28	Bioperiod Q95	Bioperiod Q75
Habitat Forming	Mar 1 - Apr 30	Bioperiod Q95	Bioperiod Q75
Cluepeid Spawning	May 1 - May 30	Bioperiod Q95	Bioperiod Q75
Resident Spawning	Jun 1 - Jun 30	Bioperiod Q90	Bioperiod Q75
Rearing and Growth	Jul 1 - Oct 31	Bioperiod Q80	Bioperiod Q50
Salmonid Spawning	Nov 1 - Nov 30	Bioperiod Q90	Bioperiod Q75

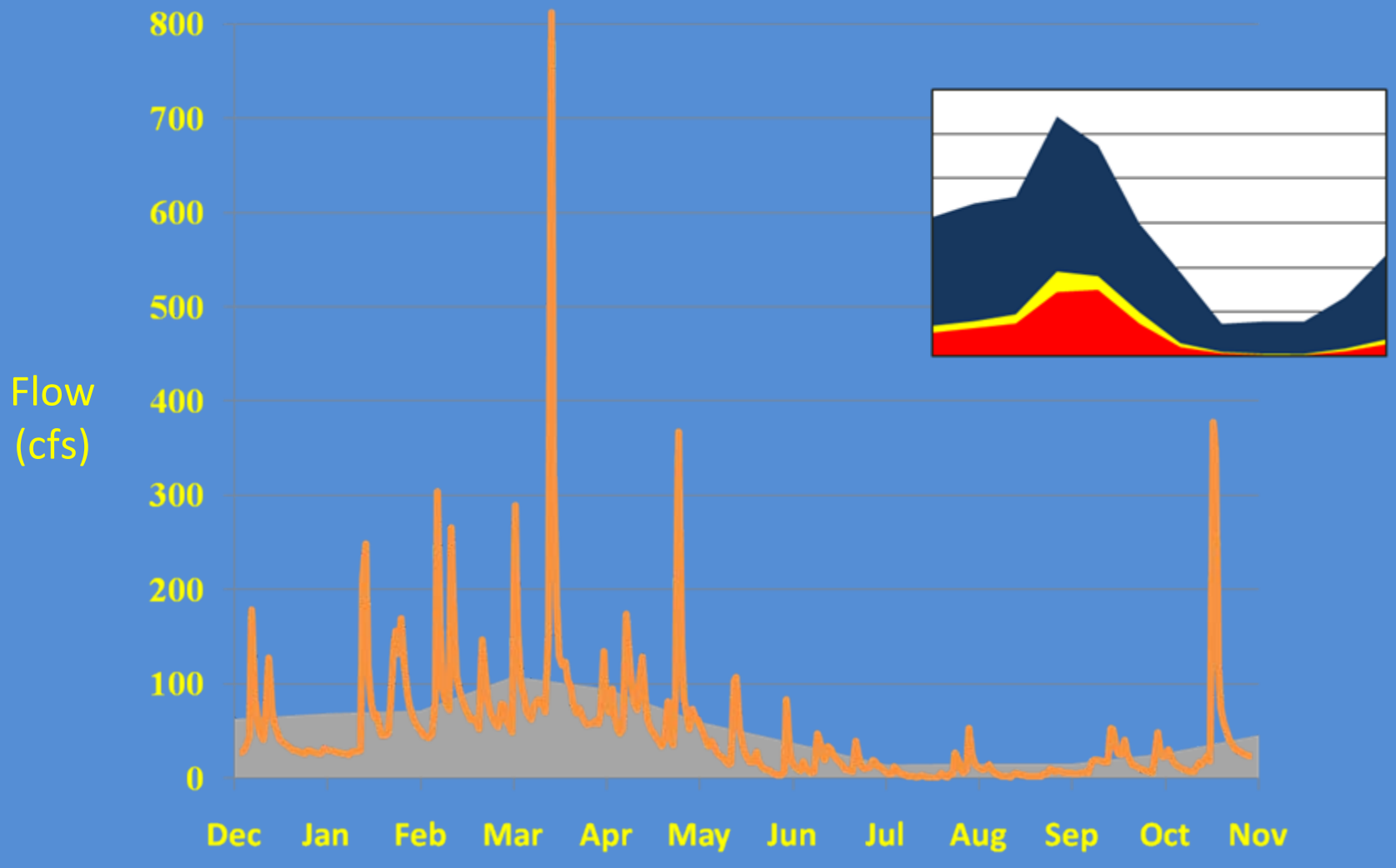
Class 4 – greater of .1 cfsm or existing stream flow

Flow Release Drought Triggers

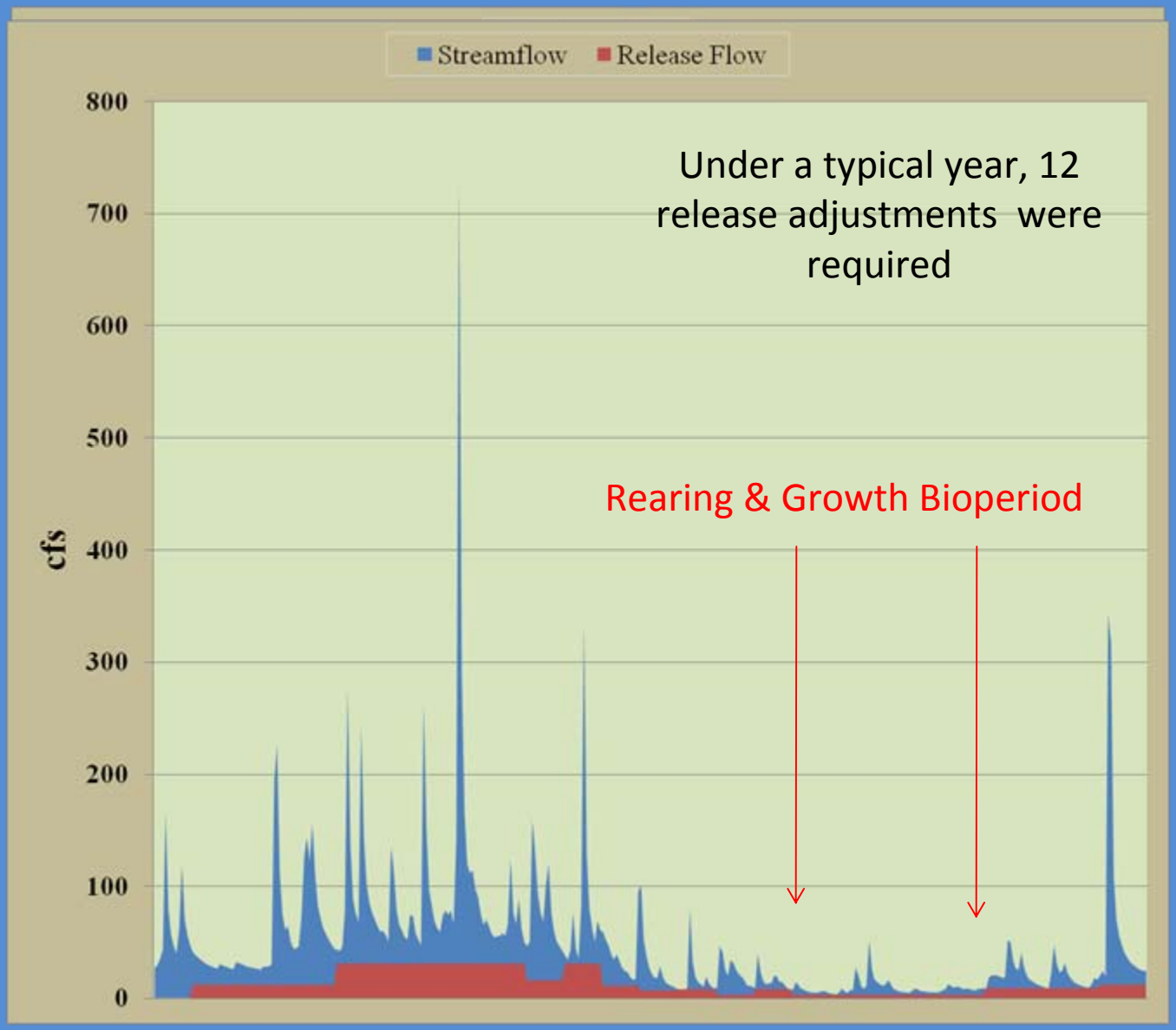
- Effective when new release requirements start
- Based on individual water supply plan trigger

Water Supply Plan Trigger	Reduction in Required Release	
	Rearing and Growth Bioperiod	All Other Bioperiods
Advisory	None	50%
Watch	50%	50%
Warning	75%	75%
Emergency	none	none

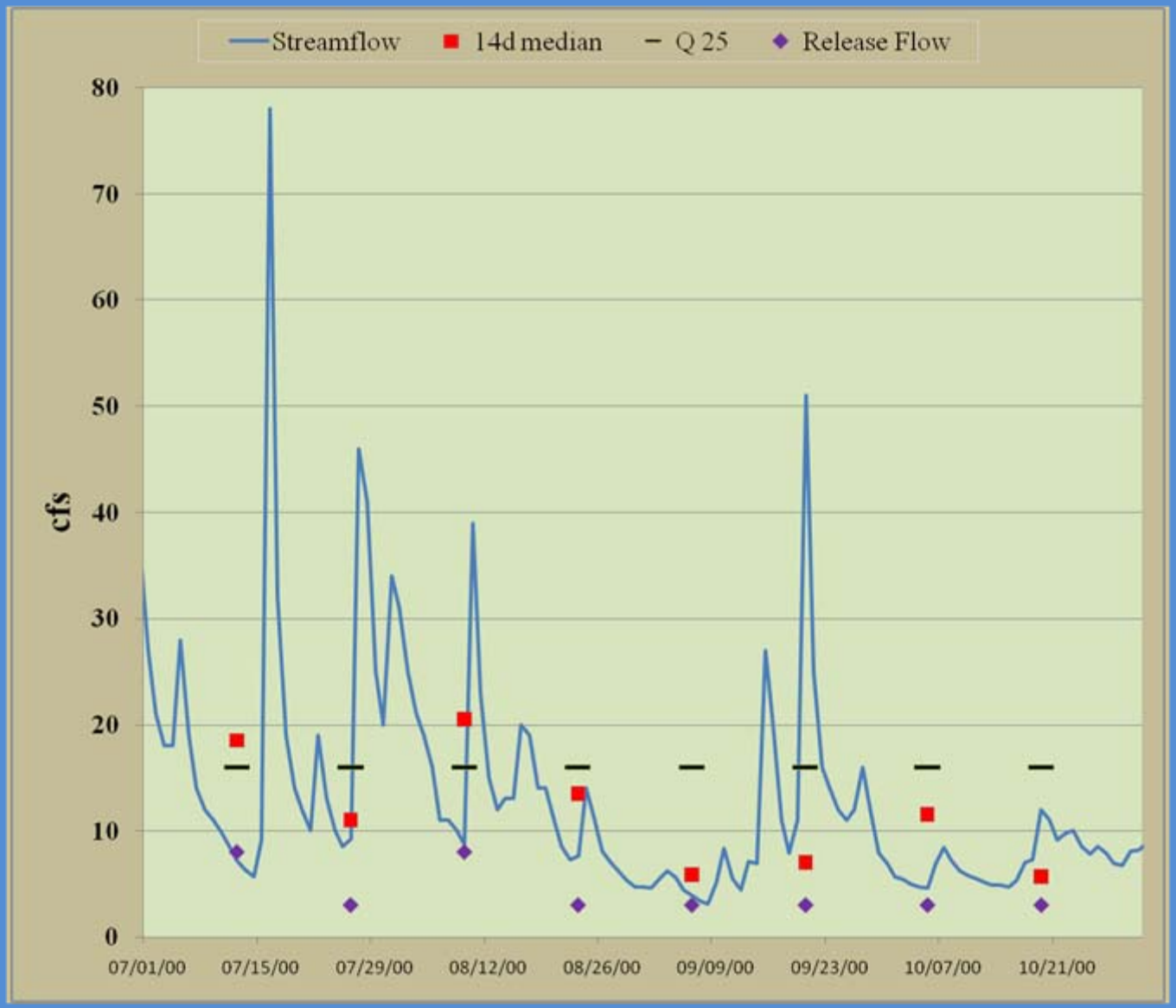
Typical Annual Hydrograph



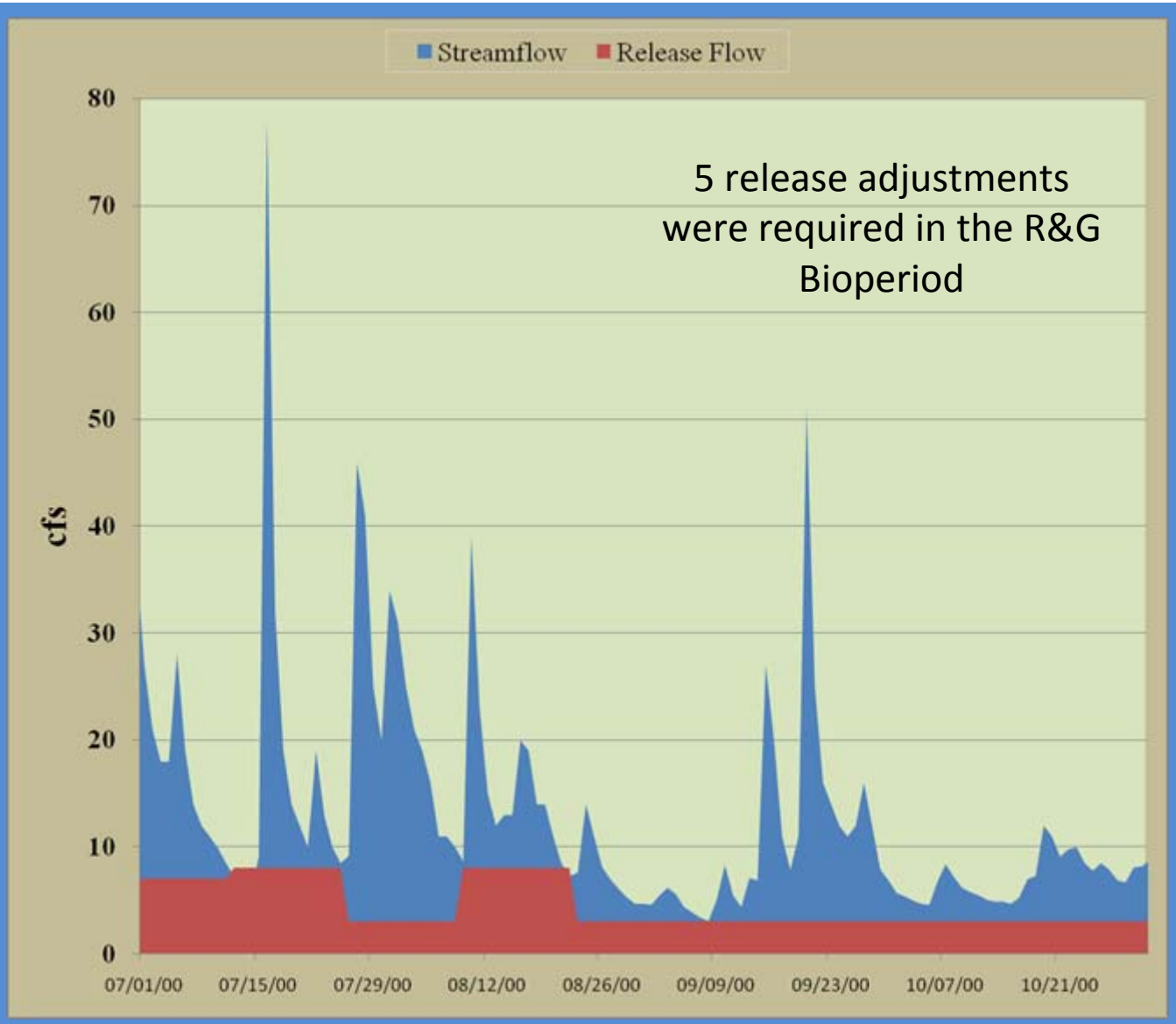
Multi-Level Release Rule



Rearing & Growth Bioperiod



Rearing & Growth Bioperiod



Summary of Flow Release Rule

- 26 times a year, operators will be required to evaluate whether to make a “dry” flow or “wet” flow release
- Many times, there will be no change in previous flow release

MULTI-LEVEL RELEASE RULE

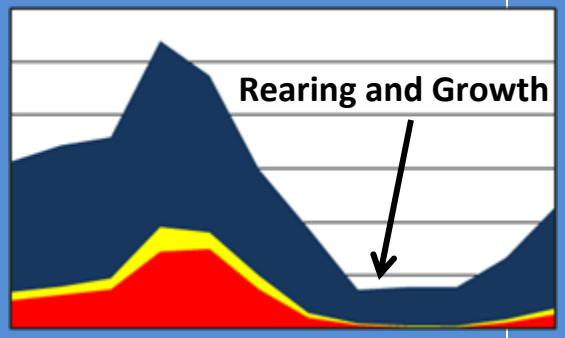
Bioperiod	Effective Date	Minimum Required Release	
		Anteceedent 14d Period Dry	Anteceedent 14d Period Wet
Overwinter	Dec 1 - Feb 28	Bioperiod Q95	Bioperiod Q75
Habitat Forming	Mar 1 - Apr 30	Bioperiod Q95	Bioperiod Q75
Cluepeid Spawning	May 1 - May 30	Bioperiod Q95	Bioperiod Q75
Resident Spawning	Jun 1 - Jun 30	Bioperiod Q90	Bioperiod Q75
Rearing and Growth	Jul 1 - Oct 31	Bioperiod Q80	Bioperiod Q50
Salmonid Spawning	Nov 1 - Nov 30	Bioperiod Q90	Bioperiod Q75

Flow Release Rule

	0-5 years	5-10 years	10+ years
Class 1	Run of River operation only	Run of River operation only	Run of River operation only
Class 2	Existing Practice	75% of Natural Inflow	75% of Natural Inflow
Class 3	Existing Practice	Low-Level Release Rule Plus Drought Triggers	Multi-Level Release Rule plus Drought Triggers
Class 4	Existing Practice	Existing Practice or 0.1 cfsm or alternative acceptable to Commissioner	Existing Practice or 0.1 cfsm or alternative acceptable to Commissioner

Other Diversions Five Years After Classification of Segment

- Begin daily recording of withdrawals
- Model impact of well pumping on stream depletion
- Submit data to DEP upon request / notification
- Look at diversion impact **individually**
- Operate diversion such that
  - Class 1 – max alteration is .05 x Q99
  - Class 2 – max alteration is .25 x Q99 x F
  - Class 3 – max alteration is .50 x Q99 x F
  - Class 4 – existing practice



F = ratio Q99 for the bioperiod to Q99 for Rearing and Growth bioperiod allowing for greater amounts of water to be removed for human use during bioperiods when flow is typically higher than during Rearing and Growth bioperiod.

Other Diversions Ten Years After Classification of Segment

- Look at diversions in basin **cumulatively**
- Operated diversion such that
  - Class 1 – max alteration is .05 x Q99
  - Class 2 – max alteration is .25 x Q99 x F
  - Class 3 – max alteration is .50 x Q99 x F
  - Class 4 – existing practice

F = ratio Q99 for the bioperiod to Q99 for rearing and growth bioperiod

MAXIMUM FLOW REDUCTION RULE

	0-5 years	5-10 years	10+ years
Class 1	Existing Practice	0.05 X Q99 individual basis	0.05 X Q99 cumulative basis
Class 2	Existing Practice	0.25 x Q99 x F individual basis	0.25 X Q99 X F cumulative basis
Class 3	Existing Practice	0.50 x Q99 x F individual basis	0.50 X Q99 X F cumulative basis
Class4	Existing Practice	Existing Practice	Existing Practice

Regulated Community Action During Five Years Up to Intermediate Release

- Diverters plan, design and build infrastructure to
  - physically make both dry and wet releases
  - measure releases and withdrawals
  - Train staff and install monitoring equipment
  - Develop operational rules to balance sources of supply and maximize yield
  - Implement measures to enhance demand management (conservation) during drought periods

Regulated Community Action During Ten Years Leading Up to Full Release

- Diverters
  - Evaluate what is necessary to compensate for decline in safe yield as a result of full release
  - Steps could include
    - Minimizing leakage/water loss
    - Maximizing effectiveness of demand management
    - Building interconnections to move water
    - Matching water to use – i.e. save potable for drinking
    - Restarting existing supplies
    - Bringing new supplies online
    - Building new treatment as necessary
    - Developing a basin plan

Summary of Major Changes in Response to Feedback

- Refinement of what is regulated
  - Exempted
    - Diversions that do not require permit
    - Diversions from or releases to tidally influenced water
    - Reservoirs that release at least 0.1 cfsm that
      - Drain less than 3 square miles
      - Are less than 1 mile upstream of another reservoir
  - No additional release requirements for
    - Dams operated in instantaneous run of river operation
  - No additional requirements for diversions operated in accordance with a permit

Summary of Major Changes in Response to Feedback

- Eliminate Provisional Class 3
- Phase in Compliance over 16 years
- Drought Triggers for Flow Releases
  - Effective when new release requirements start
  - Based on individual water supply plans

What DEP Will be Doing Next

- Propose Regulation and get Adopted
- Public Outreach - Water Quantity
- Adopt Classification (0-5) – Major Basin at a time
- Develop Data Management to be ready at Year 5
- Assess if any improvements necessary to state owned dams

Next Steps

- Move forward with public notice of regulation in early 2009


09/14/2005