# New Hampshire
# Instream Flow Program

Many y

Many, r olicy

Too ma cy


Twenty-five years of Instream Flow policy

# 2500 years of Instream Flow Policy

# How much is too little?

# What to do about it?

# 483:9-c Establishment of Protected Instream Flows

I. The commissioner, in consultation with the advisory committee, shall adopt rules under RSA 541-A specifying the **standards, criteria, and procedures** by which a **protected instream flow** shall be **established** and **enforced** for each designated river or segment. Each protected instream flow shall be established and enforced to maintain water for **instream public uses** …

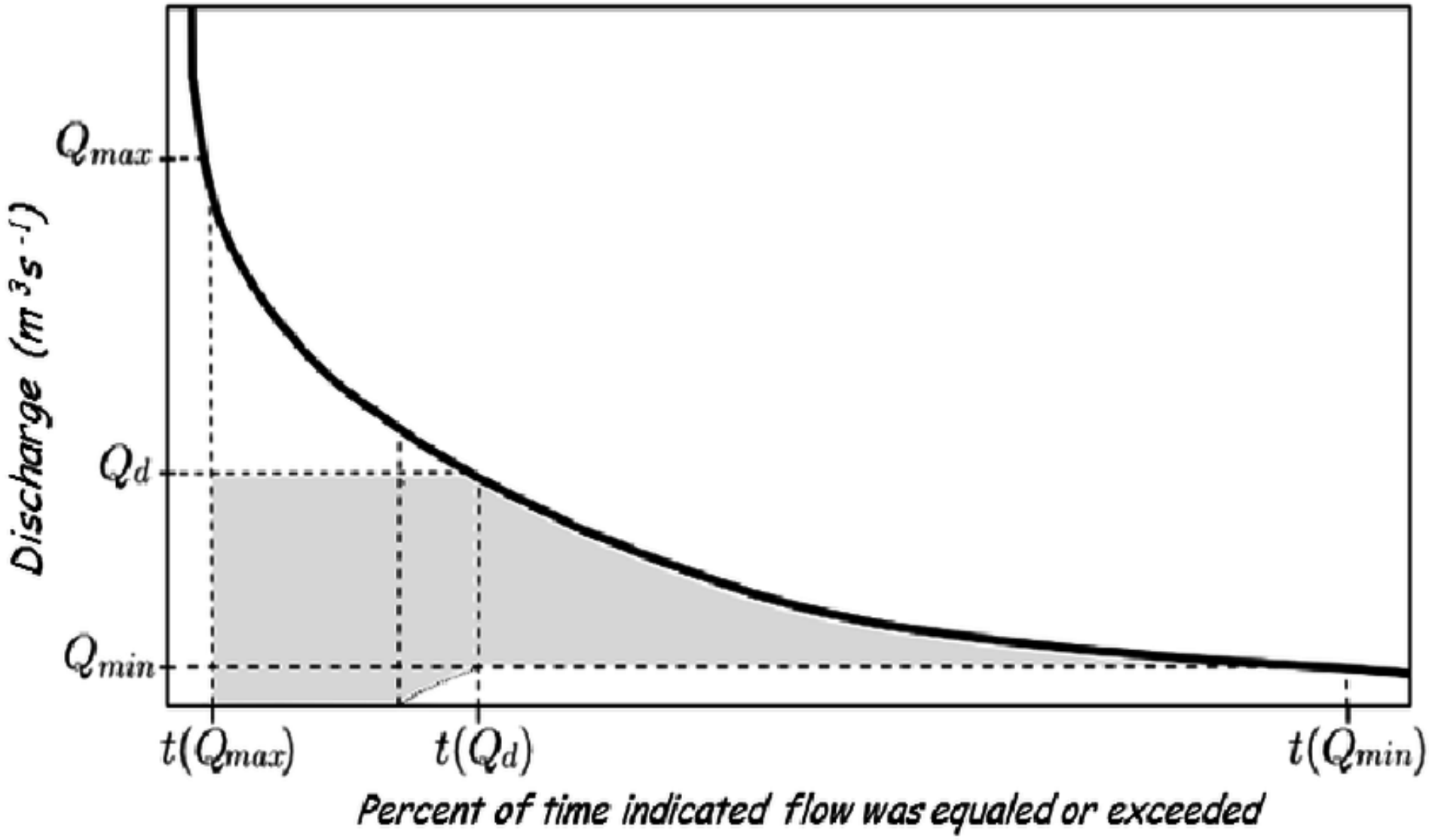
# NH Instream Flow Program

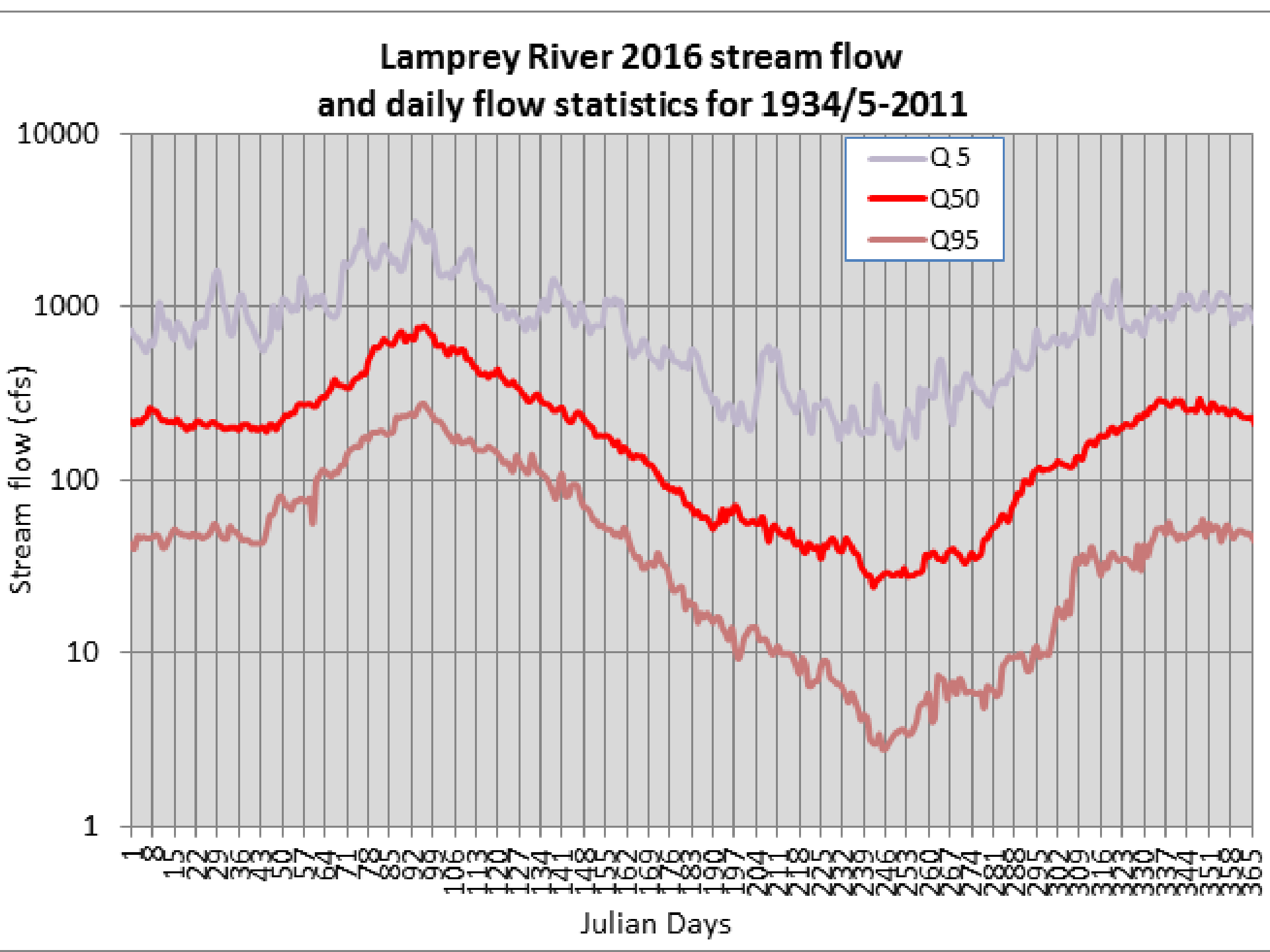
- 1988 Rivers Mgt. and Protect. Act
- 1990 RSA 483 takes effect
- 1990 – 2000 – Decade of standard setting
- 2001 – Instream Flow Pilot Program
  - Souhegan & Lamprey
- 2015 – Complete pilot
- 2016-17 – Rule-making

# Instream Flow Rules

- Work on Flow Rules began in 1990
- Draft rules in 1994, 1995, 1996 & 1999
- Extensive public outreach (50 + presentations)
- Standard-setting approach


rolfebautista.blogspot.com/2011/10/908-not-enough-water.html


$Q_{max}$
$Q_d$
$Q_{min}$
Discharge ($m^3 s^{-1}$)
$t(Q_{max})$
$t(Q_d)$
$t(Q_{min})$
Percent of time indicated flow was equaled or exceeded


Lamprey River 2016 stream flow
and daily flow statistics for 1934/5-2011
10000
1000
100
10
1
Stream flow (cfs)
Q 5
Q50
Q95
Julian Days

# 2000 proposal

Phase 1: Seasonal Q60

- Aggregate consumptive use limit 4% of Q60
- Withdrawals shared among Basin AWUs

Phase 2: Seasonal Q80

- Aggregate consumptive use limit 2% of Q80
- Withdrawals shared among Basin AWUs

Phase 3: Seasonal Q90

- AWUs must cease consumptive use

**Consumptive Use = Withdrawal – Return**

**AWU = Affected Water User**

# Problems

- Too generic -- Not river specific
- DES required to enforce daily flows - complicated.
- Both too strict and not strict enough
- Cost – Storage! -- $25M - $49M

# 2001 proposed rules

| Phase | Limit | Flow in river |
|---|---|---|
| 1 | 5% of 7Q10 | < 0.5 cfsm |
| 2 | 0.02 cfsm | 0.5 – 1 cfsm |
| 3 | 0.04 cfsm | 1 – 4 cfsm |
| 4 | 0.16 cfsm | > 4 cfsm |

**Limit = Average aggregate monthly water use in the designated river cannot exceed this amount;**

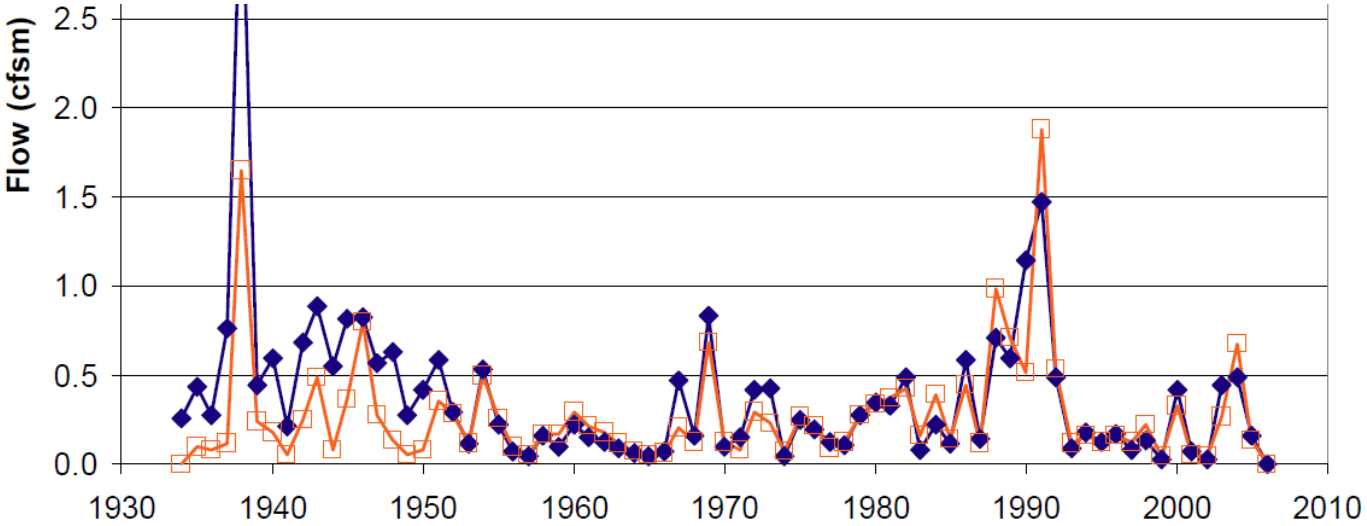
**Cfsm = cubic feet per second per square mile of drainage**

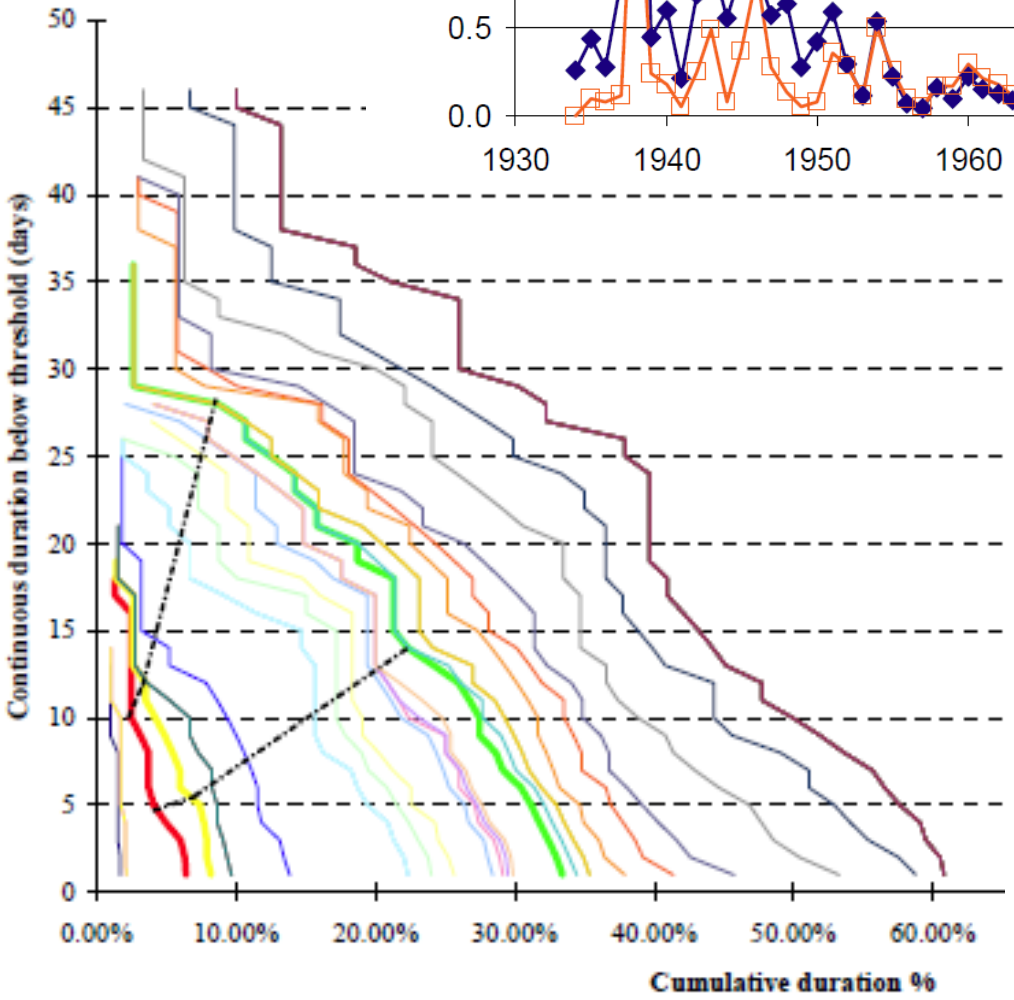
# River Dynamics

# Natural Flow Paradigm

- Focus on instream public uses
- Life cycle needs like spawning accommodated
- Protected flows defined within the historical flow pattern
- Droughts happen on a natural cycle
- Magnitude, duration, frequency, and variability

- Magnitude – how low?
- Duration – how long?
- Frequency – how often?
- Variability – still looks natural?


Flow (cfsm)
2.5
2.0
1.5
1.0
0.5
0.0
1930
1940
1950
1960
1970
1980
1990
2000
2010


Continuous duration below threshold (days)
50
45
40
35
30
25
20
15
10
5
0
0.00%
10.00%
20.00%
30.00%
40.00%
50.00%
60.00%
Cumulative duration %

# Science!

# Protected Instream Flows

| Lamprey River Time of Year | Critical flow (cfs) | Allowable duration (days) |
|---|---|---|
| Dec 9 – Feb 28 | 110 | 10 |
| Mar 1 – May 4 | 238 | 10 |
| May 5 – Jun 19 | 62 | 5 |
| Jun 20 – Jul 4 | 18 | 5 |
| Jul 5 – Oct 6 | 18 | 15 |
| Oct 7 – Dec 8 | 40 | 11 |

# Management of Low Flows

## Applies to water users

- Conserve water
- Use alternate sources

## Applies to dam owners (lakes)

- Release 2-day pulses of water from storage to restore the flow pattern

# Water Use Plans

**River Specific**

**User specific**

Damn

That's the dam →

That's the flow →

# Benefits of instream flow protection

*Protects fish and other aquatic life*

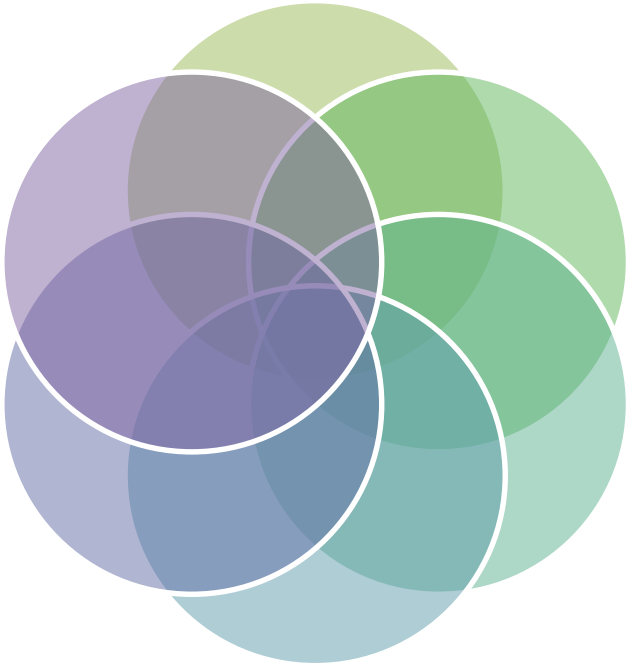
*Provides water for people*

*Levels the playing field for all users*

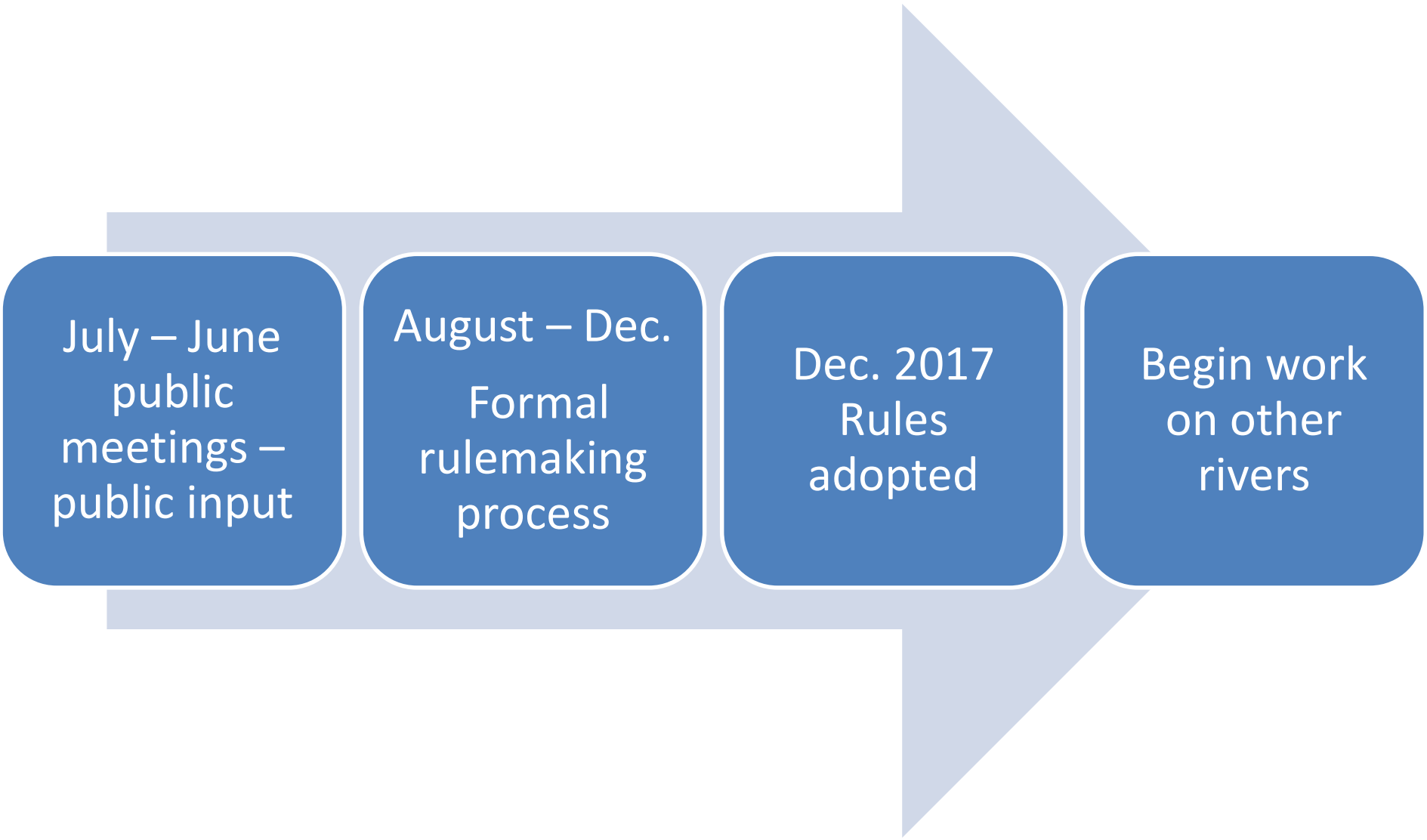
*Integrates management of lakes and rivers*

*Incorporates public outreach*

*Scientific and river-specific*



# Schedule for 2016 – 2017 Rulemaking Env-Wq 1900



# Implementation Experience

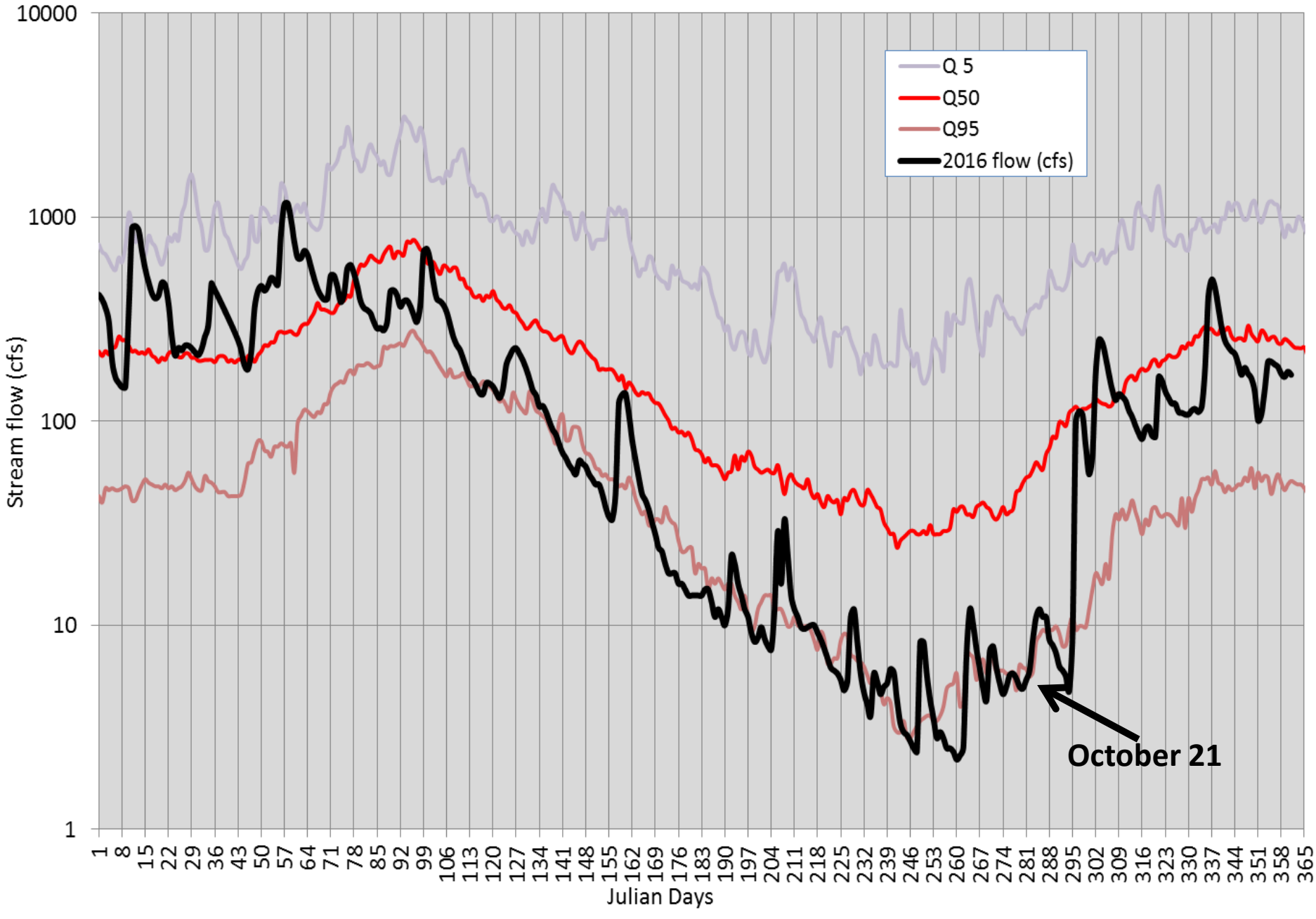
- Drought of 2016
- Lesson learned
- Next Steps


Summer 2016


July


August

# Lamprey River 2016 conditions

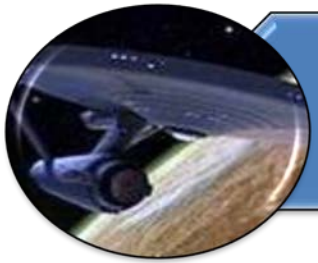


# Drowns Dam

# Drowns Dam during a relief pulse

# Major findings -- 25 years and still learning!


Protected flows are realistic and reflect the real world.



We're boldly going where no state has gone before.

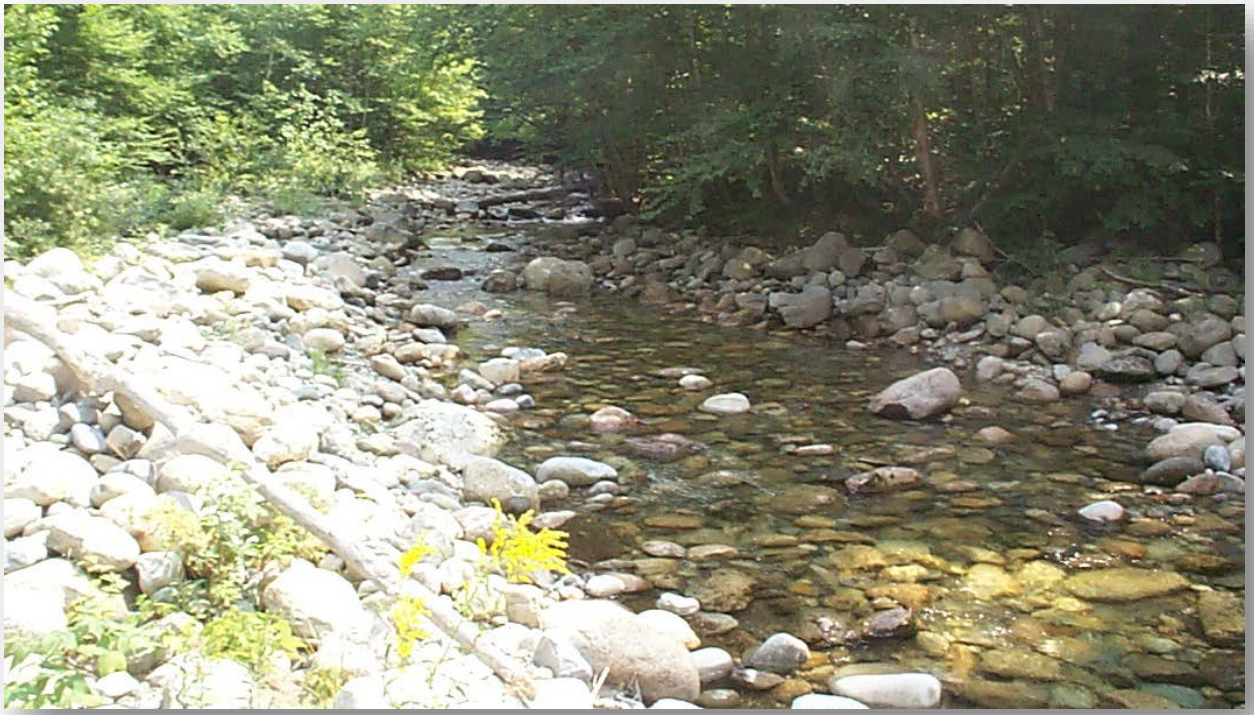

Spin off benefits examples:

- Reduced fall drawdown may help phosphorus /invasives
- Eliminate "rule of thumb" approaches
- Level playing field for new users
- Downstream run of river power generation

Public participation is key – traditional forms of public input are not sufficient.

# Next Steps

- Rules
- Hydrology in ungaged watersheds
- Target Fish Communities
- Selection of next rivers for assessment



# Careful what you wish for!


**Lamprey River 2006**