NH Instream Flow Program - Policy and Application

April 29, 2005

Wayne Ives
Instream Flow Specialist
NH Department of Environmental Services

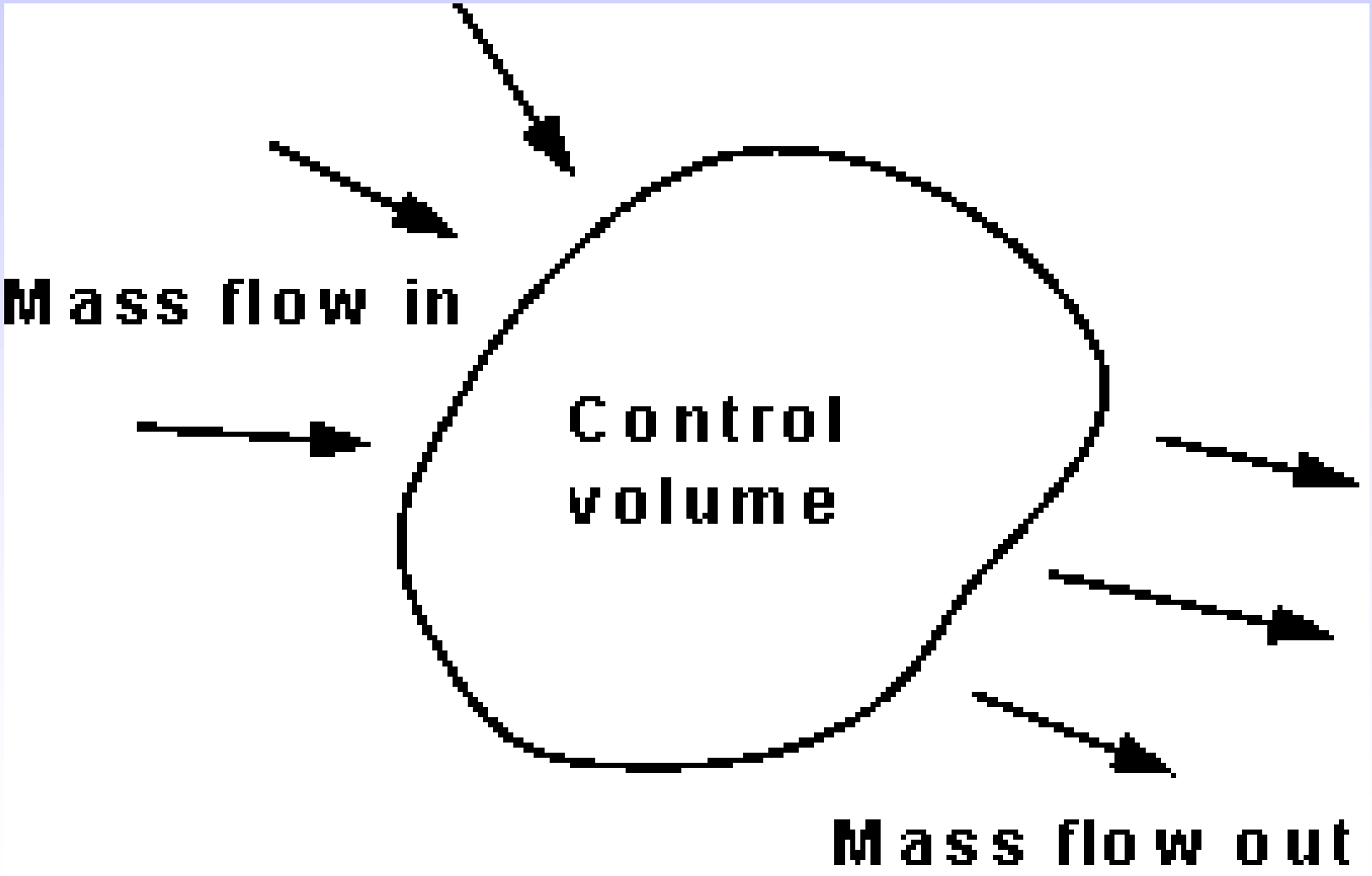
NH Water Resources Regulation

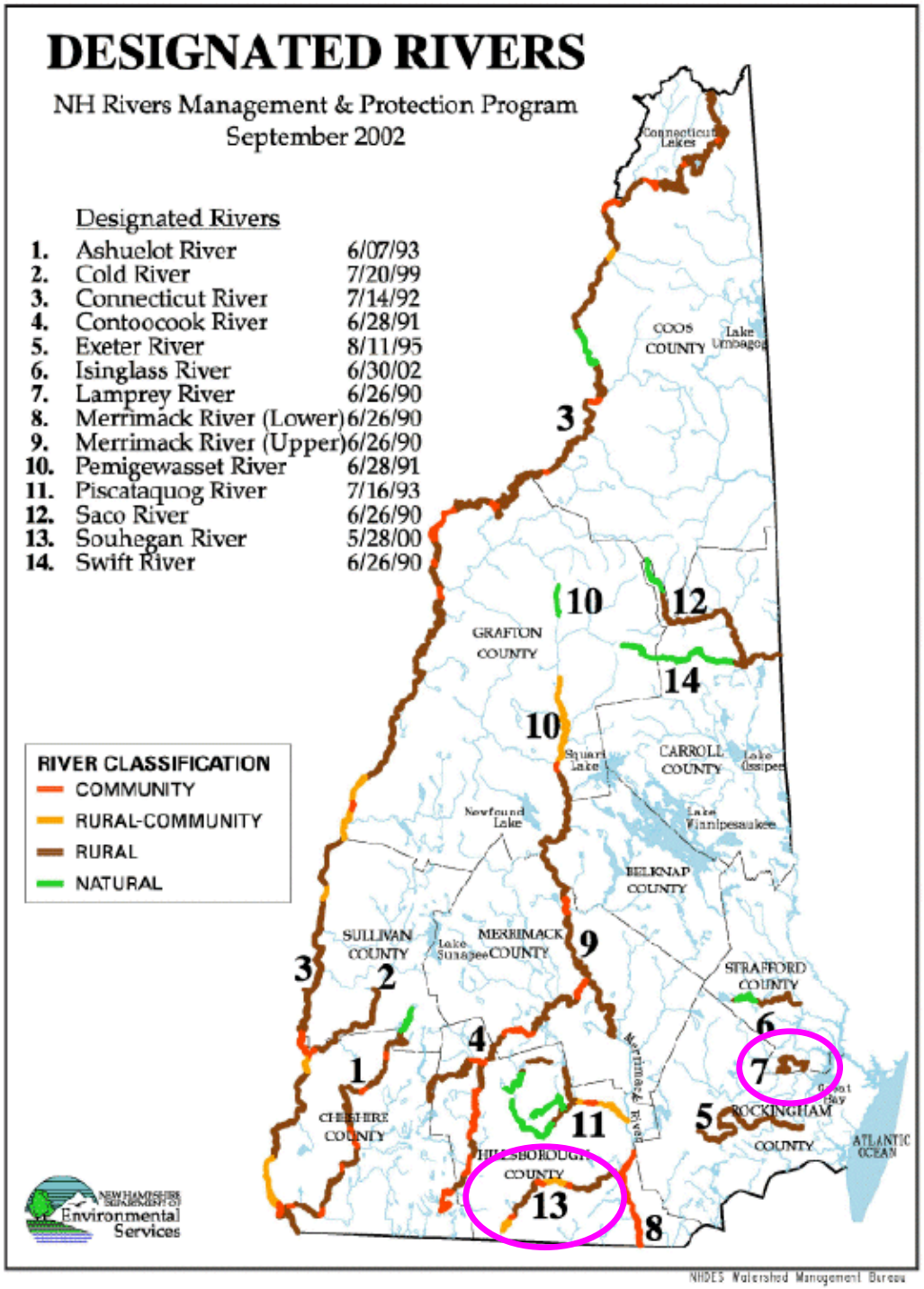
- **Groundwater**
  - Major and Minor GW Withdrawal Rules
- **Surface Water**
  - Surface Water Quality Regulations - narrative statements of intent only for quantity
  - CWA 401 water quality certifications - apply anywhere a federal permit is needed
  - RSA 483 - applies only to DR impacts
  - Instream Flow Rules – pilot; apply only to the Souhegan and Lamprey
  - **Water Conservation Rules** (being developed)

Concepts for Instream Flow

- Public Trust Doctrine – state is responsible for protecting the public's interests
- Riparian Rights – water can be used, but not to detriment of other users
- Flow is a component of water quality
- Natural flows support natural ecosystem (magnitude, duration, frequency, timing, and rate of change)

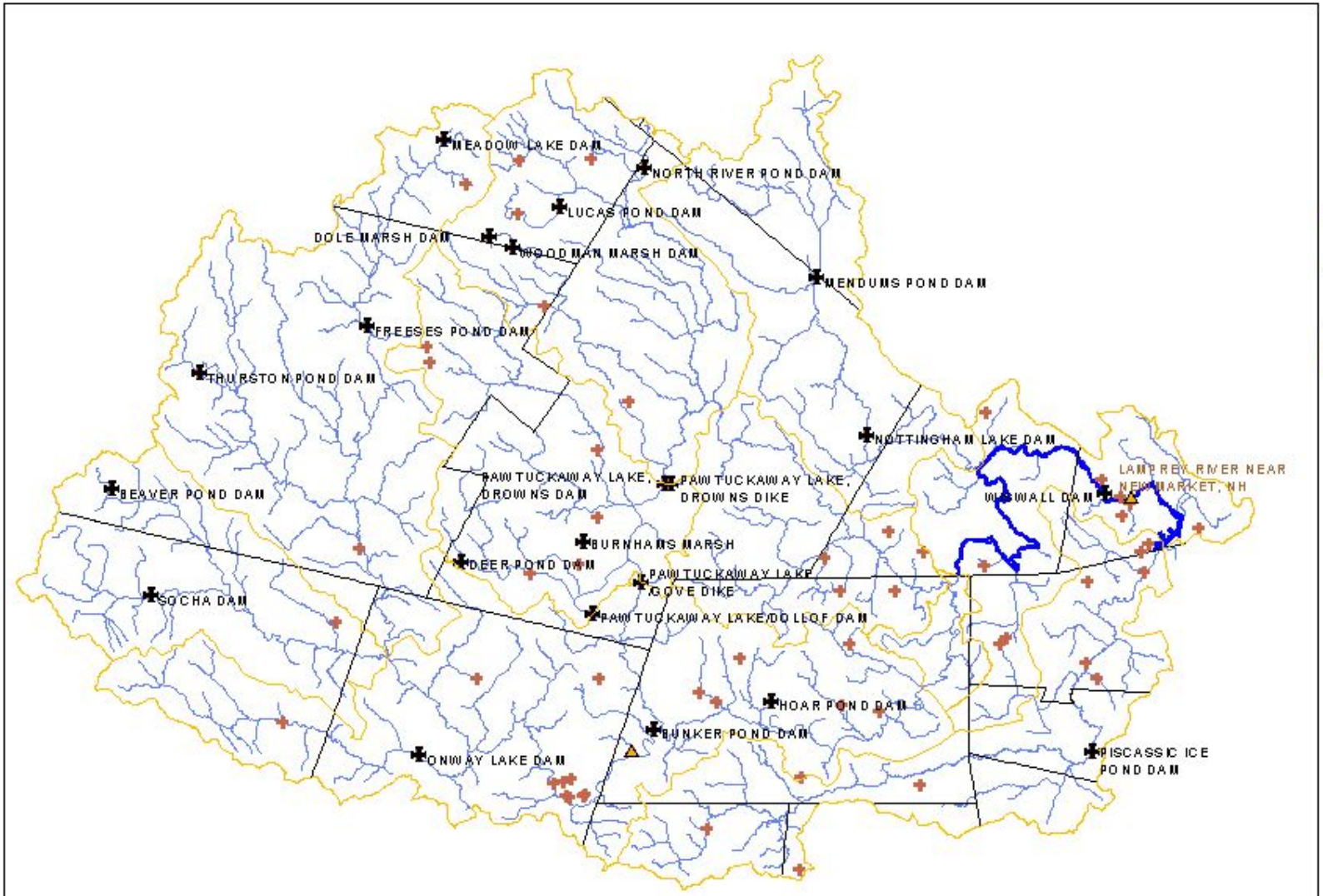
Water entering = Water leaving +/- change of water in storage





NH Rivers Management and Protection Program (RSA 483) and the ISF Pilot that applies to Lamprey (7) and Souhegan (13)

Lamprey WMPA - All Active Dams



The coverages presented are under constant revision as new sites or facilities are added. They may not contain all of the potential or existing sites or facilities. NHDES is not responsible for the use or interpretation of this information. Not intended for legal purposes.

Map produced April 23, 2004

Legend

- Affected Dams
- Unaffected Active Dams
- Stream Gages
- Designated Reach
- Hydrology
- Town boundary
- Lamprey WMPA

N

0 1 2 3 Miles

Instream Flow Pilot Program Rules

- (Re)authorized by Laws of 2002, Chapter 278
- Public process (advisory committees and public hearings)
- Includes economic assessments of proposed plans as part of approvals
- Rules apply to ADOs and AWUs:
  - dams with impoundments >10 acres
  - **registered** surface water withdrawals
  - **registered groundwater withdrawals** within 500 feet of a Designated River tributary

NH's **Registration** and Reporting (Env-Wr 700)

- Water use >140,000 gallons per week
- Registered users report monthly water use
- Reports submitted on a quarterly/annual cycle
- Reports describe withdrawals, transfers, and returns by source and destination

Groundwater withdrawals can induce recharge from streams

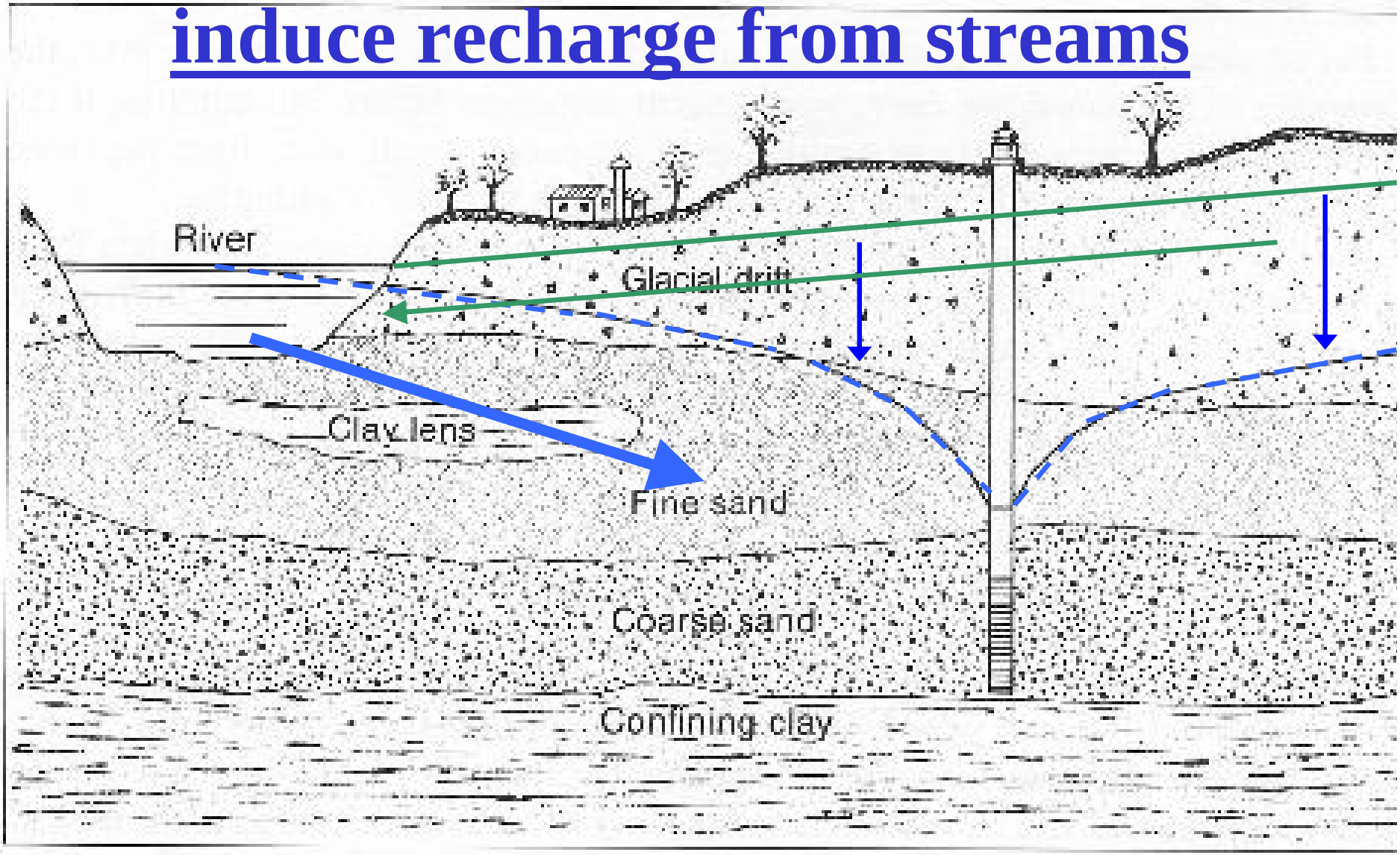


Figure 9.17. Cone of depression expanding beneath a riverbed creates a hydraulic gradient between the aquifer and river. This can result in induced recharge to the aquifer from the river.

NH Instream Flow Components

- Protected Instream Flow Study
  - Identify protected entities (flow-dependent)
  - Define protected flow levels for them
- Water Management Plan
  - Each AWU and ADO has a plan
    - Conservation Plan
    - Water Use Plan
    - Dam Management Plan

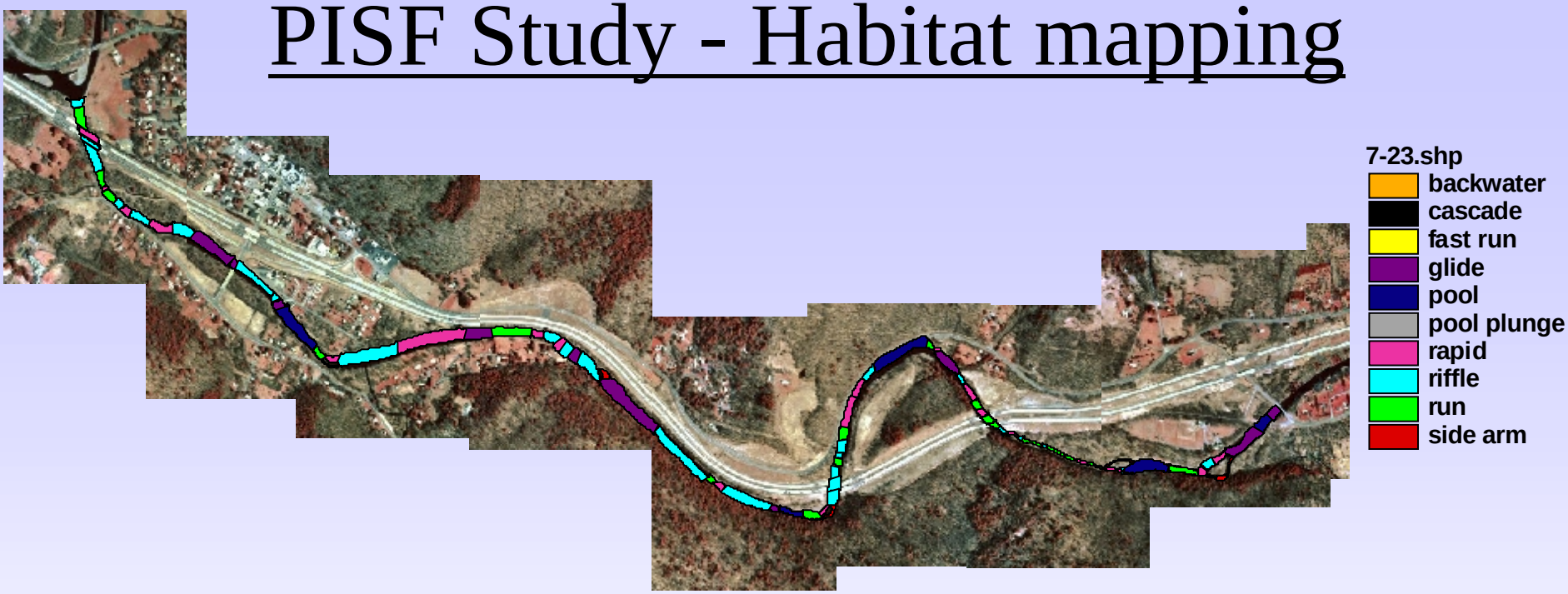
ISFR Pilot Program Consultant Tasks

- Task 1. Draft List of Protected Entities
- Task 2. Assessment of Well Withdrawal Impacts on Surface Water
- Task 3. On-Stream Survey for Protected Entities
- Task 4. Report Describing Protected Entities and Proposed PISF Methods
- Task 5. PISF Assessments and Proposed PISF Report
- Task 6. PISF Public Hearing
- Task 7. PISF Report for the Lamprey River
- Task 8. Assessment of Water Use with the Established PISF
- Task 9. Development of WMP Sub-Plans
- Task 10. Proposed WMP
- Task 11. WMP Public Hearing
- Task 12. WMP for Lamprey River

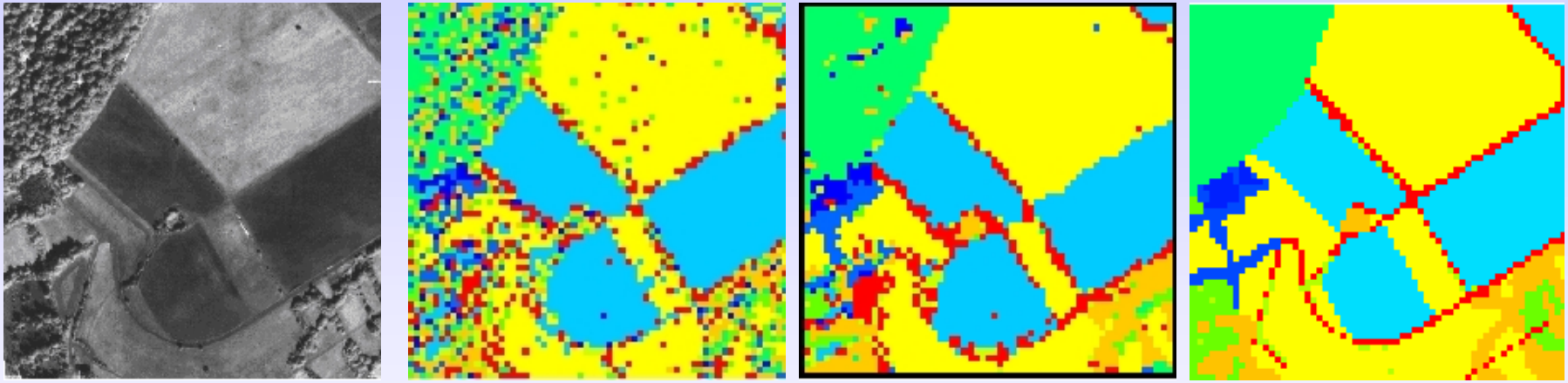
Protected Entities

- Recreation
- Fisheries
- Open space
- Natural resources
- Storage
- Wildlife
- Rare species or habitat
- Vegetation
- Cultural resources
- Aquatic and fish life
- Hydrologic resource
- Fish & wildlife habitat
- Geologic resource
- Water quality
- Pollution abatement
- Aesthetic beauty
- HE energy production
- Agriculture
- Public water supply
- CWA Designated Uses

PISF Study - Habitat mapping

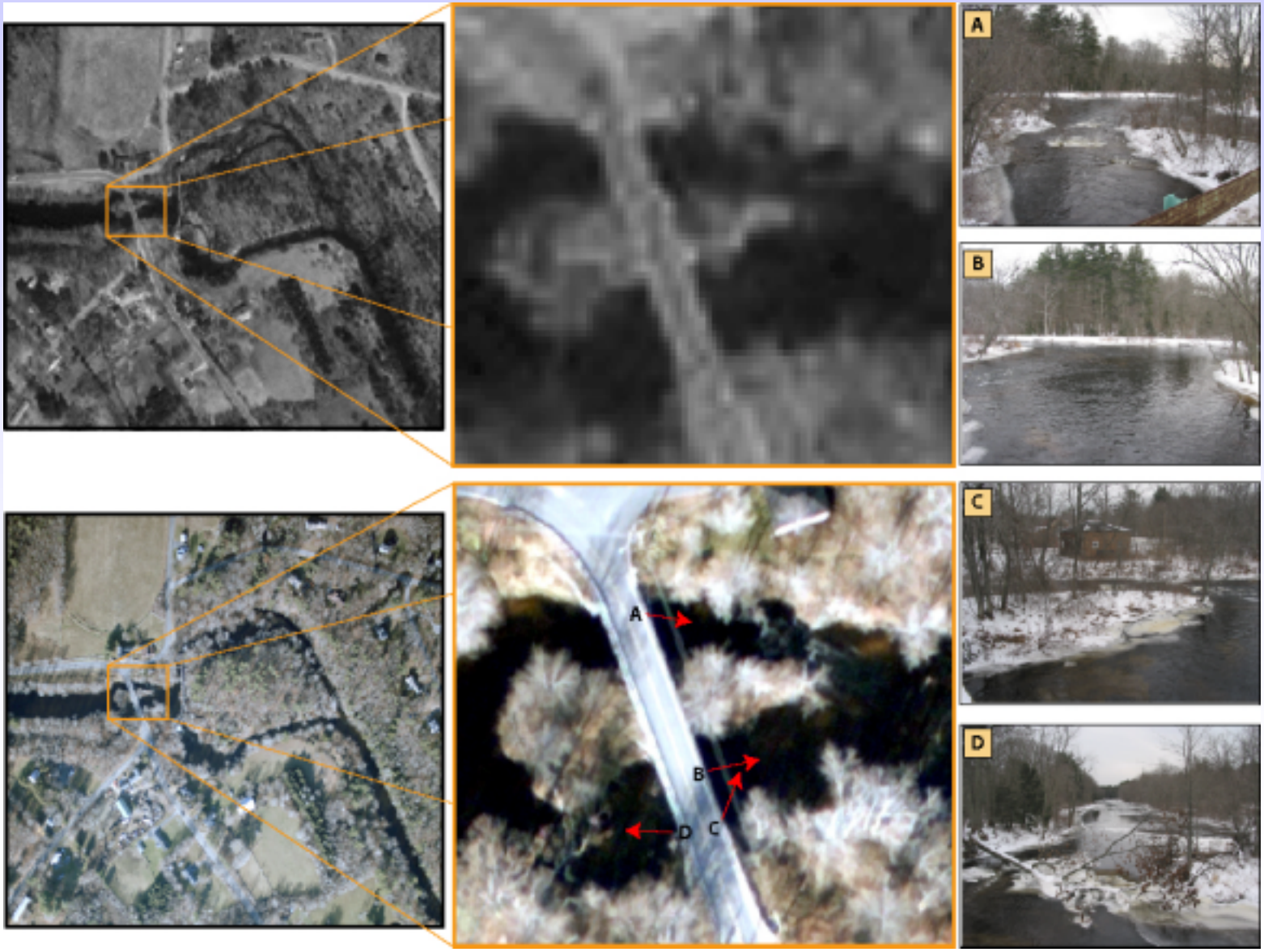


Lamprey includes multi-flow habitat assessments using remote sensing . . .

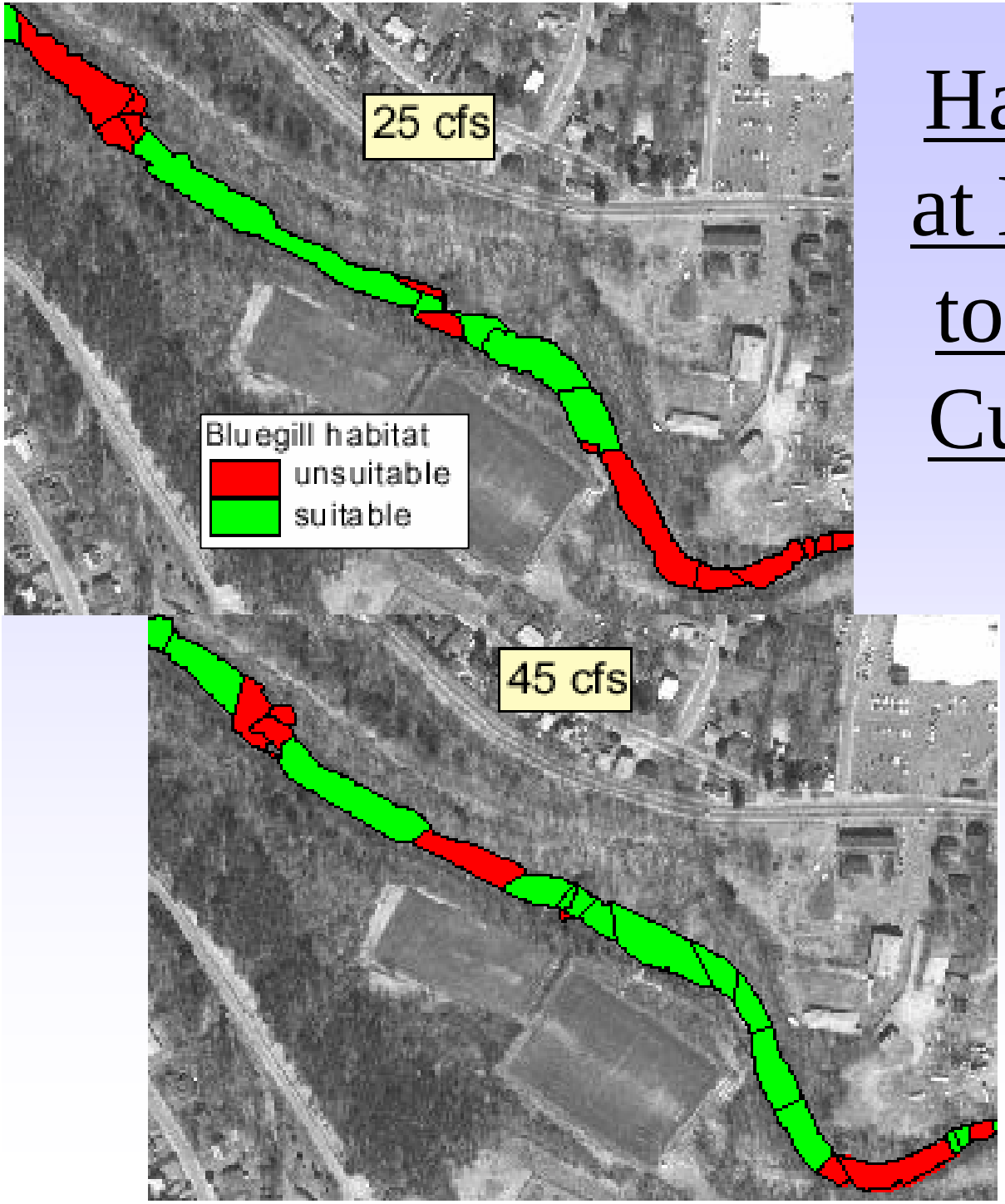


- 1. Black and white aerial imagery
- 2. An initial segmentation
- 3. Iterations of the algorithm
- 4. A “perfect” hand-generated segmentation.

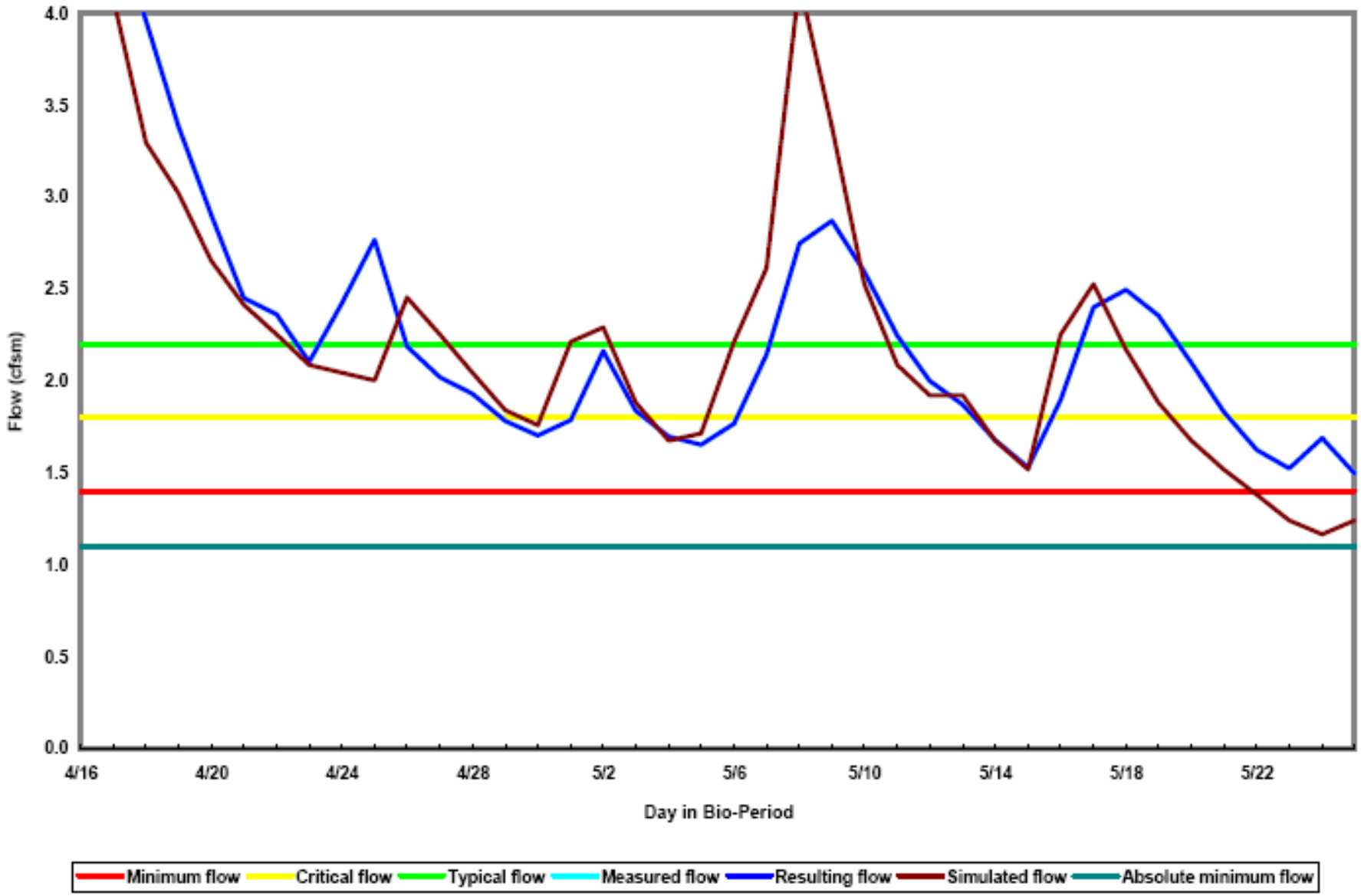
. . . based on high-resolution aerial photography



Habitat Mapping at Multiple Flows to Create Rating Curve of Habitat to Flow

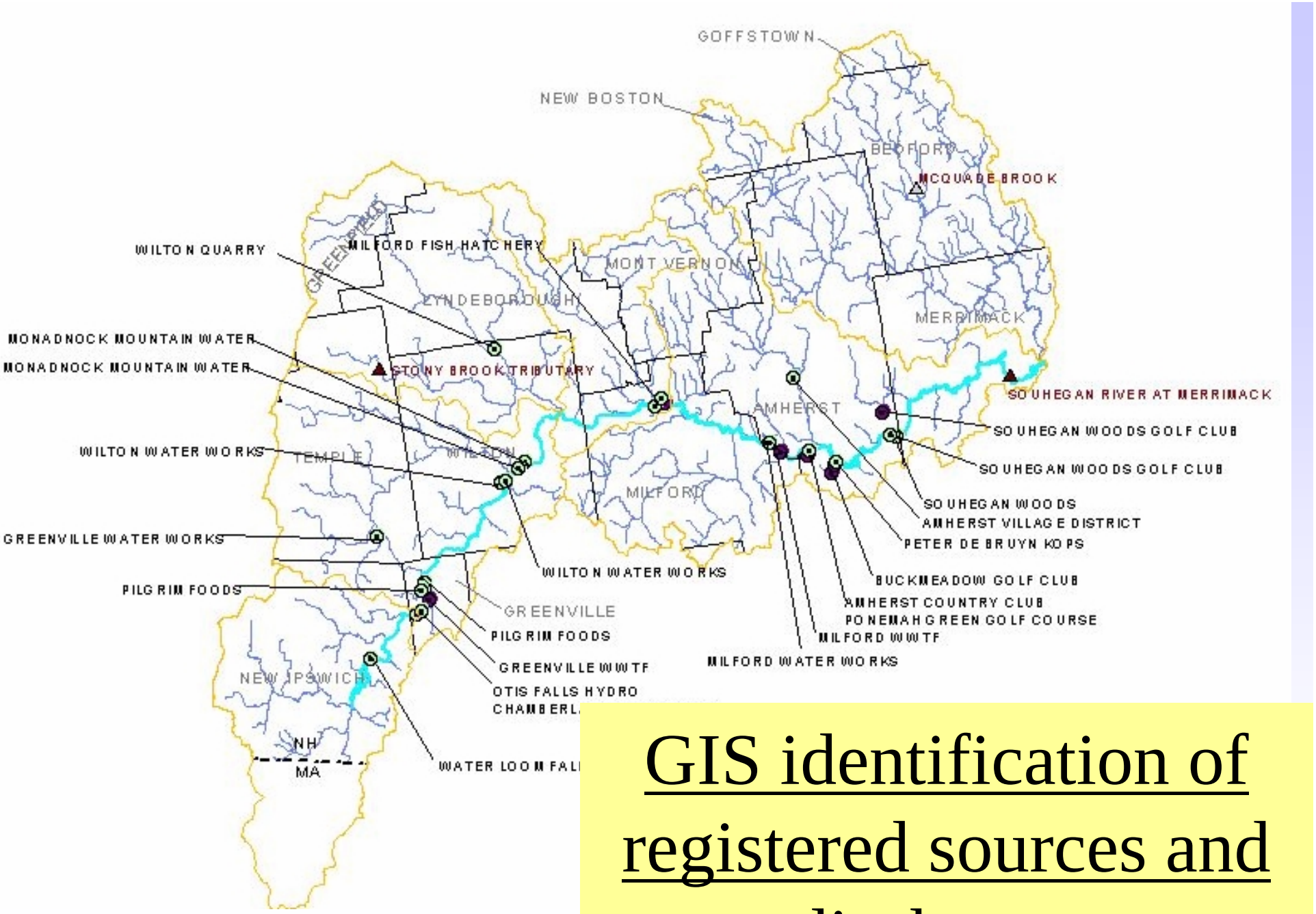


Protected flows with action plans



PISF compared to water use

- Evaluation of watershed-wide water use and protected flows
- Component of approval process for PISF
- Input to WMP process
- Also, an annual assessment conducted state-wide using established PISFs (or General Standard)



GIS identification of registered sources and discharges

Water Use From Registration and Reporting

2003 Souhegan Water Use in CFS

SD_ID	DA on DR (SQ MILE)	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
END OF DES. RIVER	21.1												
20228-S01	22.7	21.73	24.06	21.73	22.46	21.73	22.46	21.73	21.73	22.46	21.7	22.5	21.7
20228-D01	22.7	-21.73	-24.06	-21.73	-22.46	-21.73	-22.46	-21.73	-21.73	-22.46	-21.7	-22.5	-21.7
20229-S01	29.5	24.96	27.63	24.96	25.79	24.96	25.79	24.96	24.96	25.79	25.0	25.8	25.0
20229-D01	29.5	-24.96	-27.63	-24.96	-25.79	-24.96	-25.79	-24.96	-24.96	-25.79	-25.0	-25.8	-25.0
20230-S01	29.6	31.07	34.40	31.07	32.11	31.07	32.11	31.07	31.07	32.11	31.1	32.1	31.1
20230-D01	29.6	-31.07	-34.40	-31.07	-32.11	-31.07	-32.11	-31.07	-31.07	-32.11	-31.1	-32.1	-31.1
20086-D01	31.0	-0.21	-0.33	-0.38	-0.40	-0.33	-0.33	-0.22	-0.23	-0.21	-0.2	-0.3	-0.3
20681-S04	31.5	0	0	0	0	0	0	0	0	0	0	0	0
20681-S03	31.6	0	0	0	0	0	0	0	0	0	0	0	0
20681-S02	31.6	0.01	0.01	0.02	0.02	0.02	0.02	0.03	0.02	0.03	0.02	0.03	0.02
20047-S03	38.8	0.17	0.17	0.18	0.18	0.18	0.21	0.21	0.20	0.19	0.22	0.17	0.16
20065-S02	46.8	0.13	0.12	0.13	0.13	0.13	0.17	0.15	0.16	0.13	0.12	0.12	0.13
20065-S01	46.8	0.13	0.13	0.13	0.11	0.15	0.15	0.23	0.15	0.14	0.13	0.12	0.16
20621-S02	63.7	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05
20621-S01	64.1	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05
20281-S01	99.5	0.00	0.00	0.00	0.04	0.05	0.06	0.13	0.09	0.11	0.04	0.04	0.00
20218-S01	104.2	2.56	2.56	2.56	2.56	2.56	2.56	2.56	2.56	2.56	2.56	2.56	2.56
20218-S02	117.4	1.23	1.23	1.23	1.17	1.17	0.62	1.23	1.23	1.23	1.11	1.11	1.11
20218-D01	117.4	-3.79	-3.79	-3.79	-3.73	-3.73	-3.19	-3.79	-3.79	-3.79	-3.68	-3.68	-3.68
20100-S01	139.0	1.47	1.45	1.39	1.45	1.53	1.60	1.59	1.66	1.56	1.38	1.33	1.34
20092-D01	140.0	-2.00	-1.96	-3.22	-3.21	-2.66	-2.36	-1.62	-1.72	-1.58	-1.69	-1.96	-1.95
20624-S01	141.7	0.00	0.00	0.00	0.00	0.01	0.03	0.09	0.05	0.02	0.00	0.00	0.00
20190-S01	141.7	0.00	0.00	0.00	0.00	0.05	0.16	0.47	0.29	0.10	0.03	0.00	0.00
20000-S01	155.2	0.05	0.03	0.05	0.13	0.15	0.20	0.22	0.11	0.10	0.07	0.05	0.06
20383-S01	156.2	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
20659-S01	160.6	0.03	0.03	0.03	0.04	0.03	0.08	0.12	0.10	0.09	0.02	0.01	0.01
20523-S01	160.6	0.00	0.00	0.00	0.00	0.09	0.09	0.35	0.20	0.12	0.03	0.00	0.00
START OF DES. RIVER	219.7												

Stream flow data rendered as a General Standard value (in CFSM)

USGS 01094000 SOUHEGAN RIVER AT MERRIMACK, NH

DA(mi^2)	171
7Q10 (cfs)	13

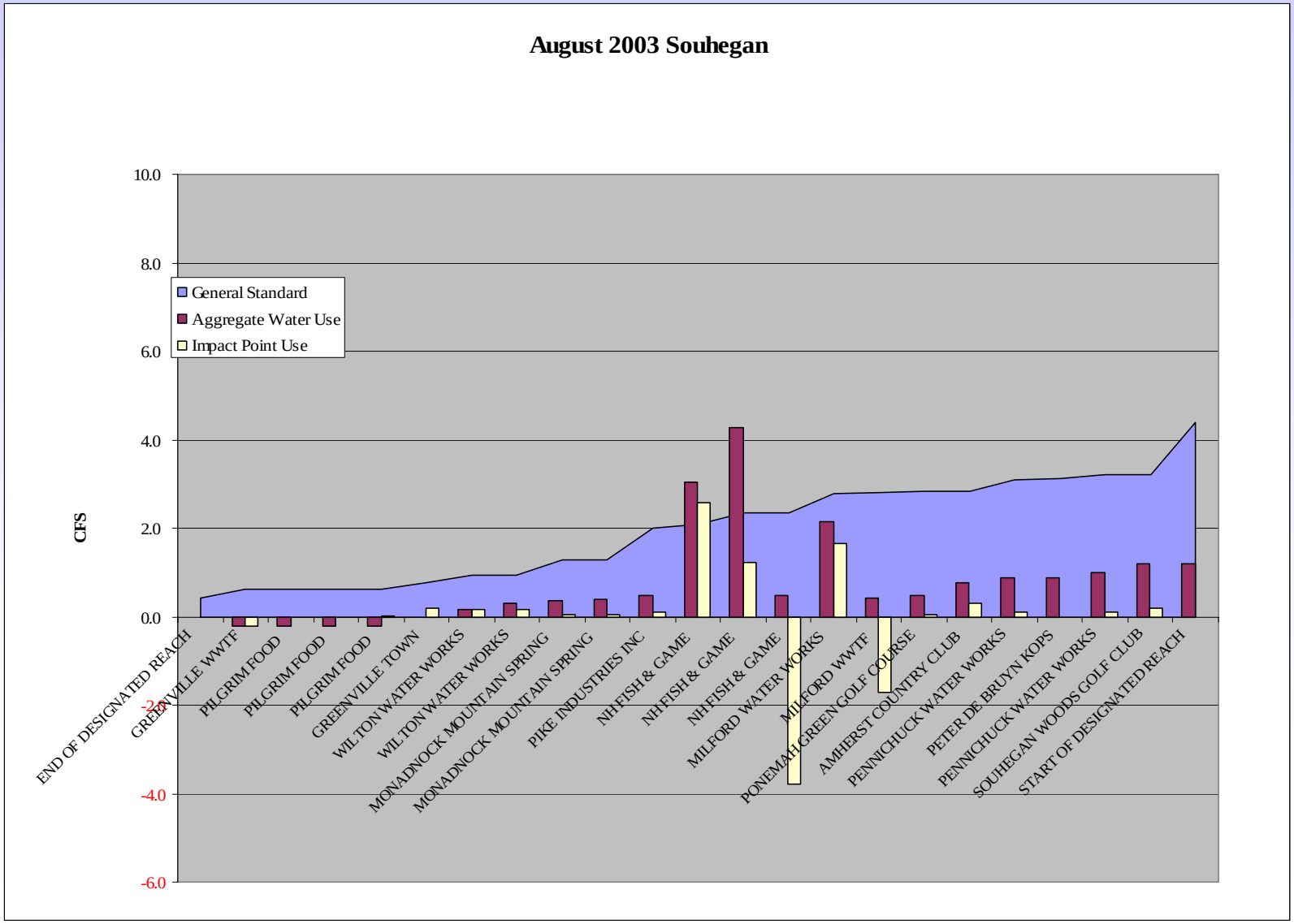
	Mean of daily streamflows (2003) in cfs	Mean of monthly streamflows (POR=69 years) in cfs	Median of monthly means (cfs)	Calculated Monthly mean CFSM	General Standard in cfsm
Jan-03	268	268	241	1.57	0.04
Feb-03	271	271	225	1.59	0.04
Mar-03	891	624	549.5	5.21	0.16
Apr-03	817	769	734	4.78	0.16
May-03	537	379	375	3.14	0.04
Jun-03	342	213	149.5	2.00	0.04
Jul-03	52	101	66.95	0.30	0.0038
Aug-03	123	77.5	46.8	0.72	0.02
Sep-03	71	88.2	46.1	0.41	0.0038
Oct-03	209	107	60.7	1.22	0.04
Nov-03	330	223	157.5	1.93	0.04
Dec-03	657	282	243.5	3.84	0.04

2003 daily data availability
81.9%

Using POR average streamflow for this month

Using interpolated values or POR average daily

Comparison of water use to protected instream flow



What we've learned

- Natural populations are supported by natural flows
- Components to describe natural flow include magnitude, duration, frequency, timing, and rate of change
- Flow is a major component of habitat, but not the only component (riparian buffers, in-channel habitat)

Basic requirements for effective water management

- Funding
  - NH legislature & NOAA grant = $ 0.9M
- Reliable Data
  - Water Use Registration and Reporting
  - Stream gaging (groundwater monitoring)
- A Scientific Method – UNH consulting team
- Public Participation and Acceptance

wives@des.state.nh.us

http://www.des.state.nh.us/rivers/instream/

Edit View Favorites Tools Help

Back Search Favorites Media

ess http://www.des.state.nh.us/rivers/instream/ Go Links

ursday, Apr. 14, 2005

Home

out DES
S Programs
blic Information
es/Regulatory
siness Center
eStop Data

hat's New?

Z Topics List

Contact DES

Site Search

New Hampshire Department of Environmental Services

Rivers Management and Protection Program

Instream Flow Protection Pilot Program

Welcome to our web pages for information on the progress of instream flow protection pilot projects on the Souhegan and Lamprey Rivers.

- Souhegan River
- Lamprey River
- NOAA Grant Funding
- 2002 Instream Flow Legislation
- Env-Ws 1900 Instream Flow Rules
- Background Information
- Fact sheet on surface water withdrawals for hydroseeding, swimming pools, construction, etc.
- Send Us Your Comments

DRAFT: 2003 Annual Report of Water Use versus Stream Flow on Designated Rivers

Instream Flow protection under RSA 483

Instream public uses are defined as including the flow-dependent components of navigation, recreation, fishing, conservation, maintenance and enhancement of aquatic life, fish and wildlife habitat, protection of water quality and public health, pollution abatement, aesthetic beauty, public water supply, and hydropower production.