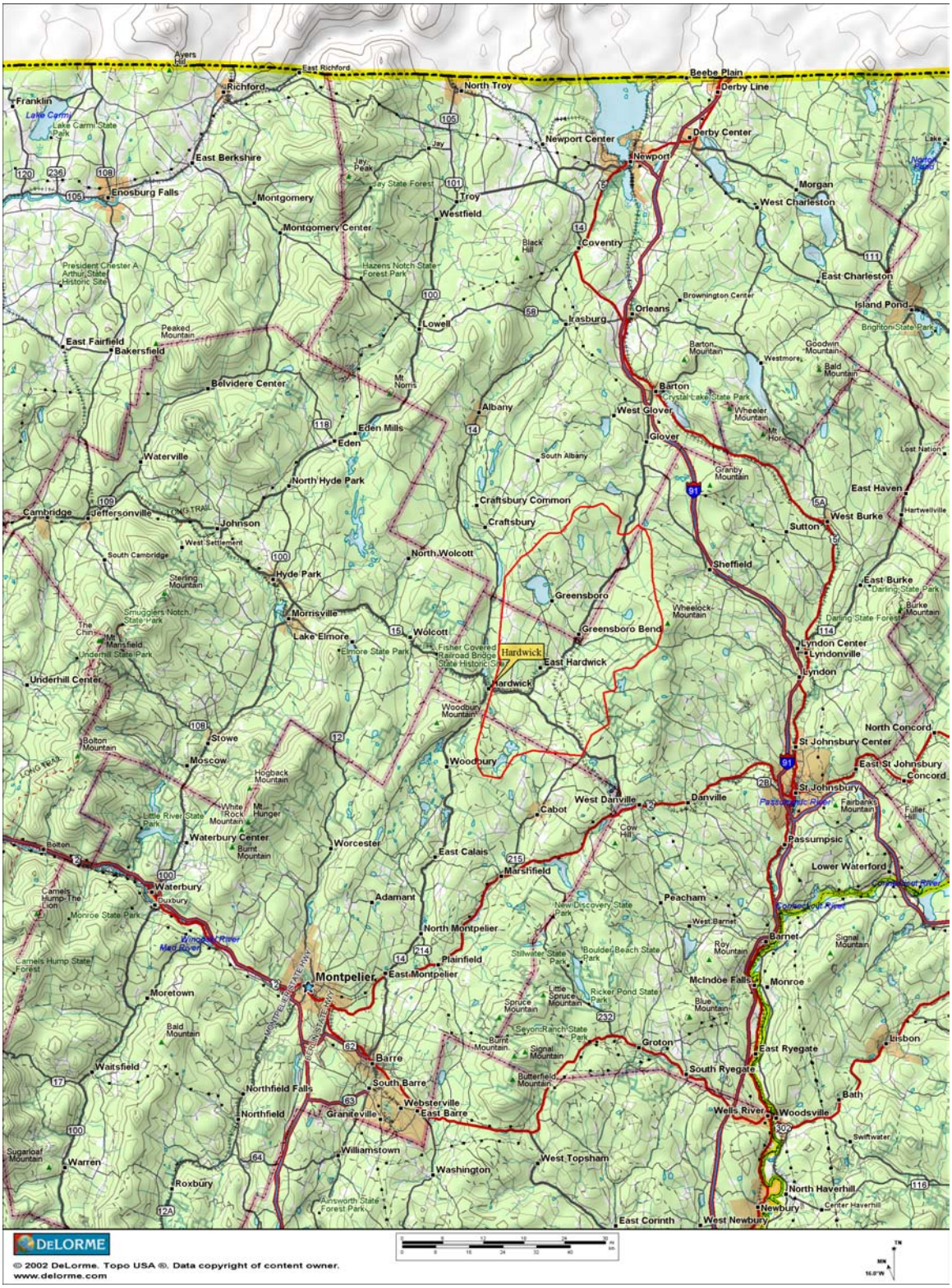
Hardwick Vermont Site Visit /Field observations and 2003-2004 Winter History

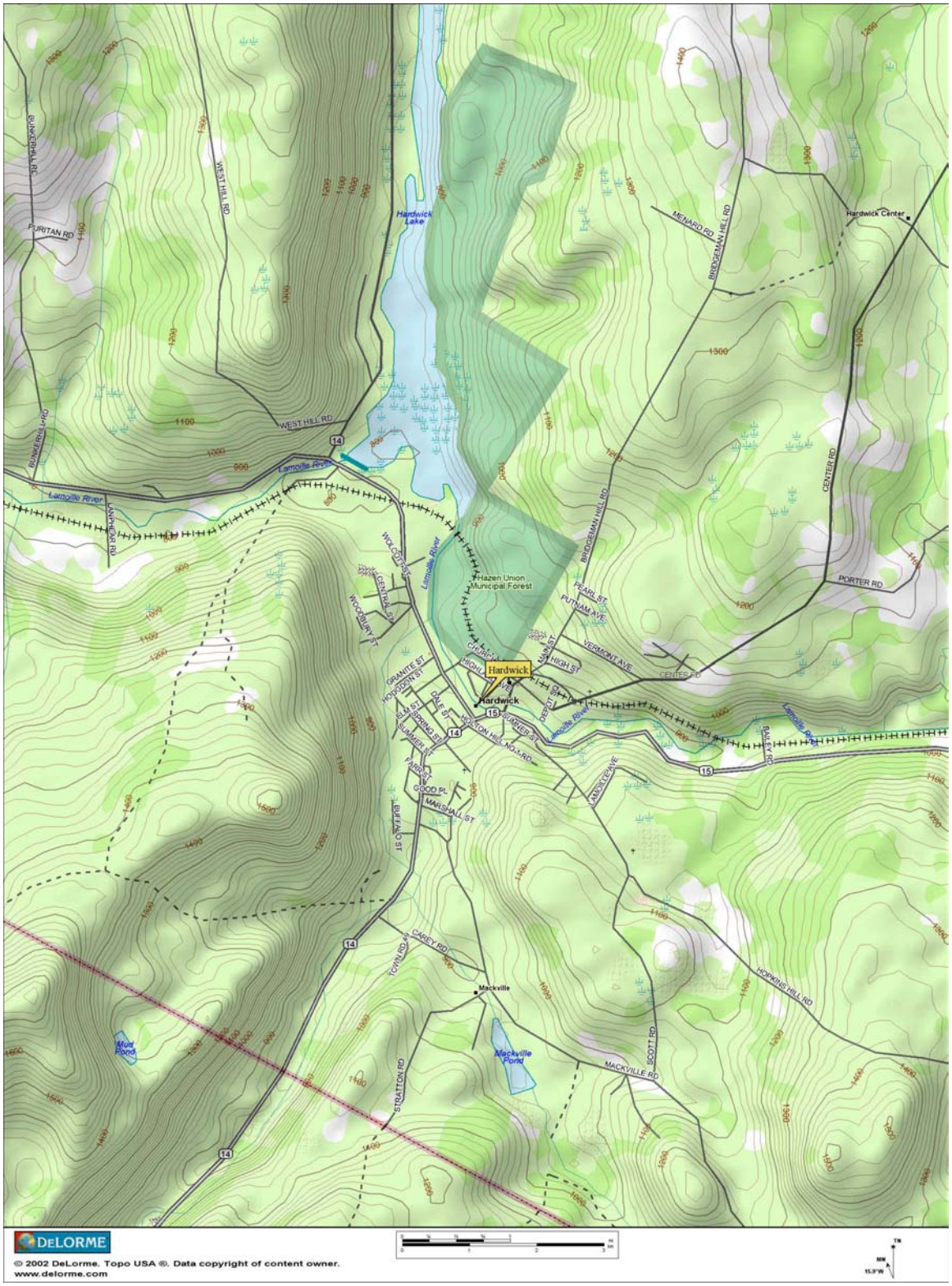
1. On February 3,2004 Jessie Stanley and I drove to Hardwick Vermont to reinstall the control box that provides remote control of the data collection rate and activates and deactivates flood lights at the Hardwick Vermont field site. Also seasonal ice thickness measurements were made and observations of ice conditions upstream and downstream of the ICS. This ice season has had two ice runs so far this winter, the first occurring on December 12th **Fig 4-5** followed by a second release and documented by the Hardwick Web camera on January 15th 2004 following a severe cold snap **Fig 11.** This second event resulted in the creation of an ice jam upstream of the Cottage Street Bridge **Fig 15**.Just downstream of this location heavy frazil ice accumulations required the town to use mechanical removal techniques to improve river flow. **Fig16** (Memo for record Tuthill 17 December 2003.)
2. Ice thickness measurements were made in the pool upstream **Fig 17-18** of the structure and photo's show the condition of the ice and the remnants of the release on January 15th and the additional accumulation of ice between the 3rd and 4th structural element on the left bank side of the river. **Fig 17and 19.**
3. The instrumentation shelter located at the ICS site is used to monitor water levels at 11 locations along the Lamoille River upstream and downstream of the ICS along with air and water temperatures and a web camera **Fig 12**. The control box installation was completed and tested, lights and time lapse video deck was set up and also tested at the shelter. The tape deck was set for 12hour time laps setting to allowing maximum coverage during daylight hours. Readings of the water level data indicate that we currently have only two of our 11 sensors available due to the extreme cold and low flow conditions leading up to the current site visit. A warming trend may thaw sensors and bring them back on line. A new power supply was added to the instrumentation package this year to remove a suspected source of power fluctuations to the data collection system.

Table of figures:



Hardwick Vermont Watershed (Fig 1)

USGS Air Photo Hardwick Vermont ICS (Fig 2)



Hardwick Vermont Contour Map (Fig 3)

Hardwick Vermont ICS Hardwick Vermont ICS November 30,2003 (Fig 4)

Debris accumulation at Hardwick Vermont ICS November 30,2003 (Fig 5)

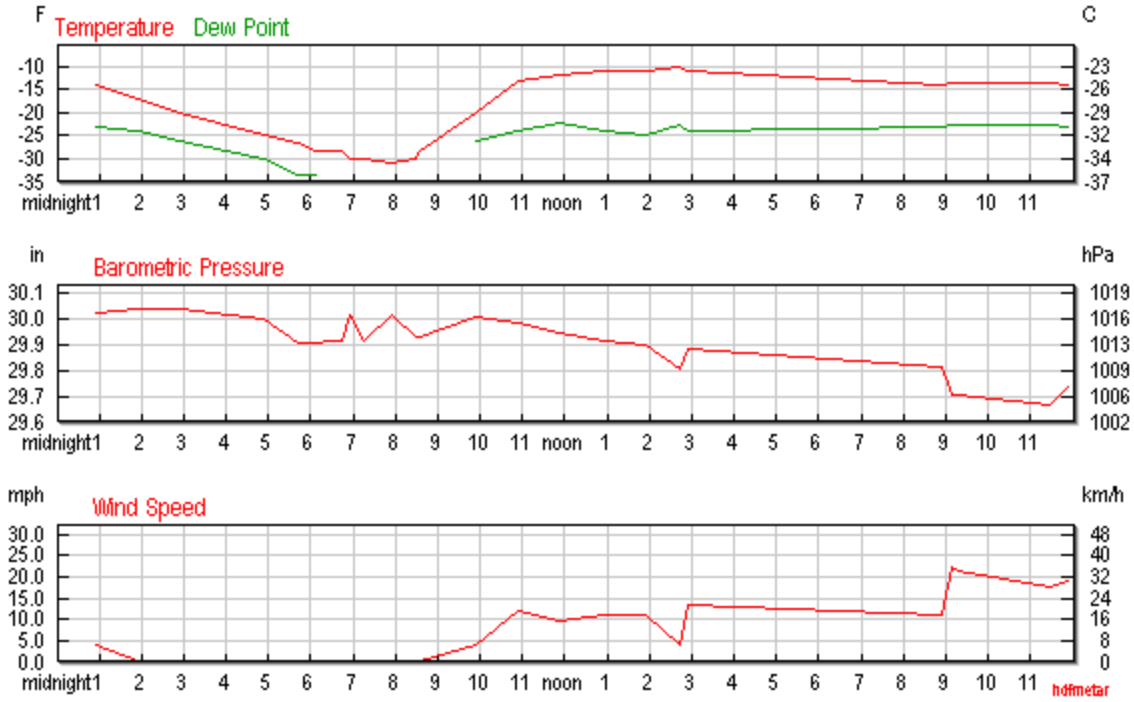
Looking upstream Ice run on or before 12/12/03 (Fig 6)

Remnants of Ice run on or before 12/12/03 Web cam photo from right bank (Fig 7)

January 13,2004 Lamoille River Looking upstream at ICS partial ice cover Hardwick Web Camera (Fig 8)

January 14,2004 Complete Freeze Up upstream of ICS Hardwick Web Camera (Fig 9)

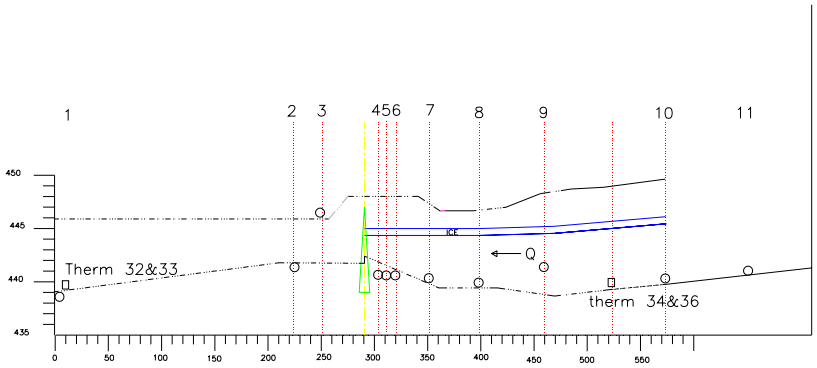
ICS Following Ice Run overnight Hardwick Web Camera (Fig10)



History for Morrisville, Vermont

on Thursday, January 15, 2004

Temperature records from a nearby town of Morrisville indicate the extreme cold snap prior to the ice release at the Hardwick ICS on 15 January 2004. (Fig 11)



Transducer locations 9/10/2003

# New Tran	2003-2004 Distance (ft)	Invert elevation	Transducer Type	Year	Old # loc	Feature
1	0		Submerged	2002	1	
2	222	New	Submerged	2003	14	New location (rt bank)
3	250	846.12	Air	2003	6	F.P
ICS	290		ICS	2002	ICS	ICS
4	302		Submerged	2002	12	
5	310		Submerged	2002	13	
6	319		Submerged	2002	11	
7	351		Submerged	2002	10	
8	398		Submerged	2002	9	
9	460		Submerged	2002	2	
10	573		Submerged	2002	7	
11	1304	New	Submerged	2003	4	New sub Railroad
12	2162	Na	Submerged	2002	3	Removed

Note

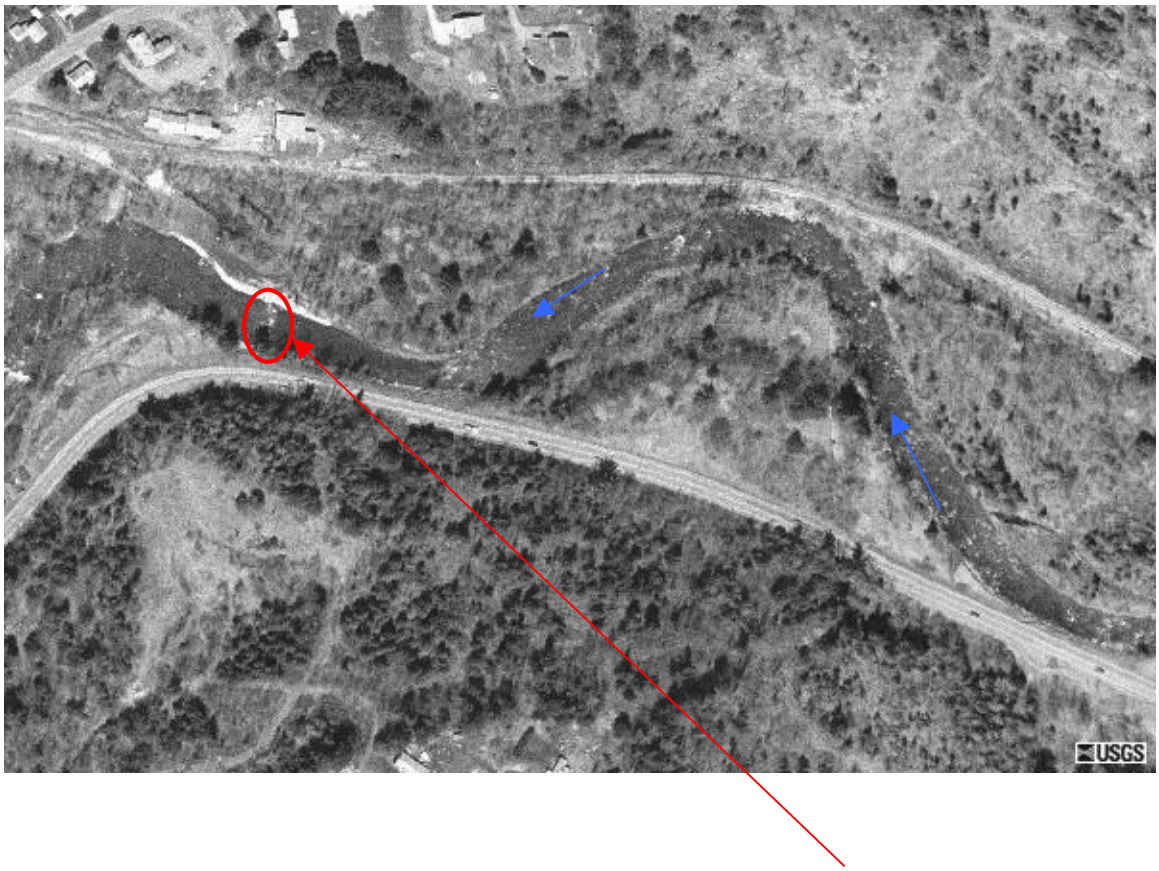
Old Tran location #5 not used

Thermistors #34 and#36 moved to old location #8 (525ft) measuring bed temperature

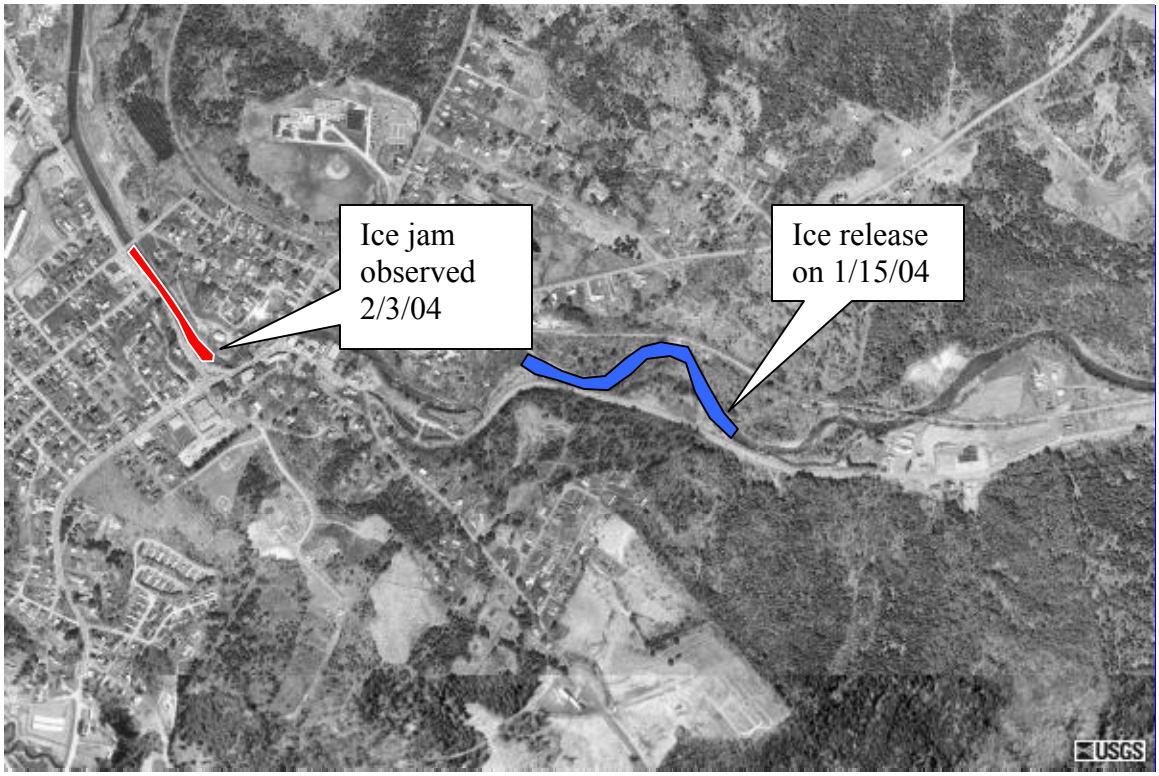
Thermistors #32 and 33 at Tran location #1measuring bed temperature

Transducer at location 12 removed 9/11/03

Sensor layout on Lamoille River Hardwick Vermont (Fig 12)



Air photo of Hardwick Vermont from USGS 30 April 1999 at ICS location (Fig 13)



Ice jam location on February 3,2004 from January 15th ice release (Fig 14)

Ice jam location on February 3,2004 looking upstream of cottage street bridge (Fig 15)

Looking downstream of Cottage Street Bridge at the refrozen channel on February 3,2004 after ice removal (Fig 16)

Pool area upstream of ICS on February 3,2004 with a one foot ice cover and evidence of the January 15,2004 ice run along the banks (Fig 17)

Hole #	Dist from rt. bk. (Ft)	Total depth (Ft)	Ice thick. (Ft)	Frazil
1	13	1.6	0.8	None
2	30	2.4	1.05	None

Ice thickness measurements in the pool upstream of the ICS (Fig 18)

ICS with new one-foot thick ice cover formation on February 3,2004 (Fig 19)