

Where Are We and Where Are We Going?

Habitat, Water Quality, and PHABSIM in the North Fork Shenandoah River

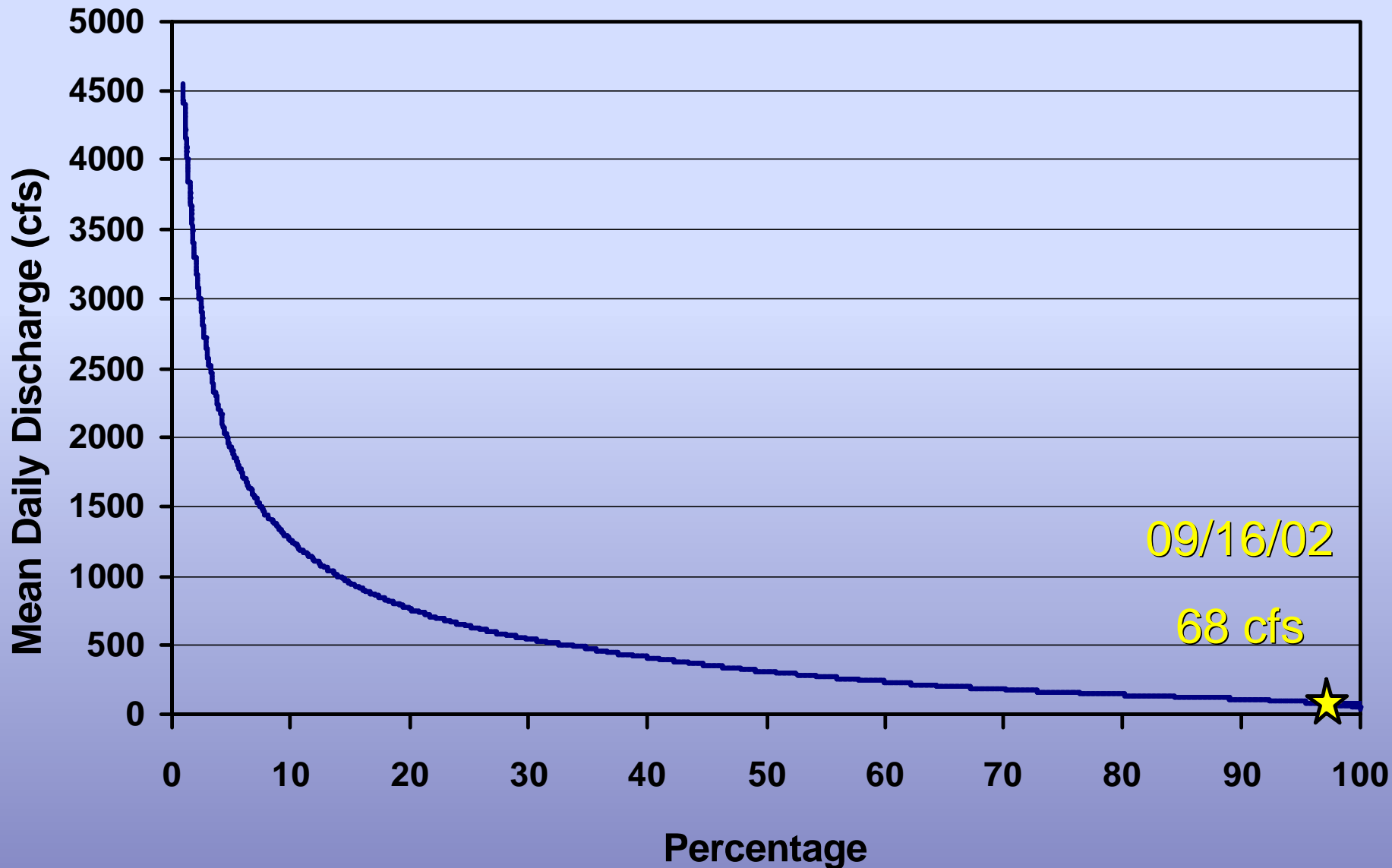
PRELIMINARY ANALYSES

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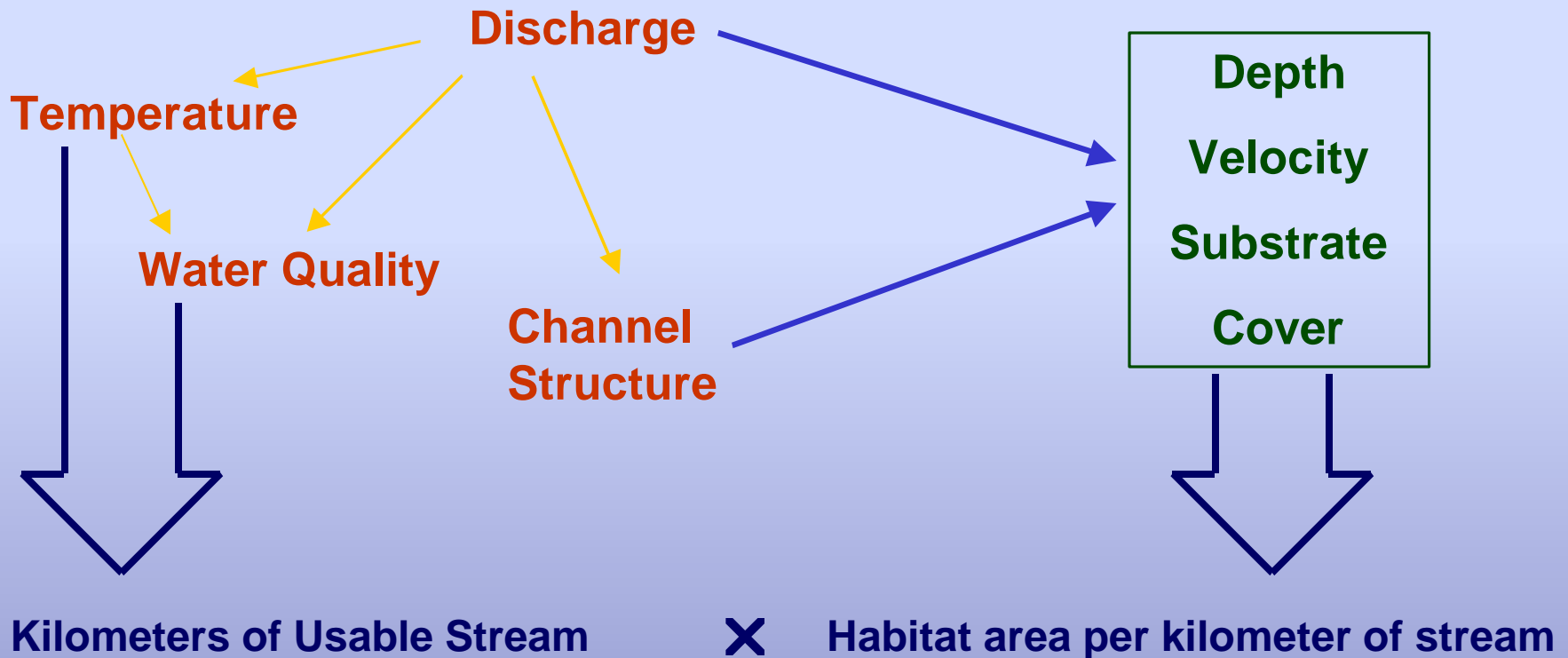
North Fork Shenandoah, Strasburg Gauge, Flow Exceedance Curve (1925 – 2000)



PHABSIM

Macrohabitat

Microhabitat



= TOTAL HABITAT

Habitat Data Status

- **Habitat Data Collection Complete**
 - Validation data North Fork
 - Transferability data South Fork
- **Data Analysis**
 - Finalizing habitat suitability criteria
 - Begin transferability testing

North Fork Shenandoah 2002 Data

- **Total of 24 species collected**
- **2 new species**
 - **Potomac sculpin & blacknose dace**
- **6 species not found**
 - **greenside darter, tessellated darter, rosyside dace, bluegill & common carp**
 - **white sucker**

South Fork Shenandoah 2002 Data

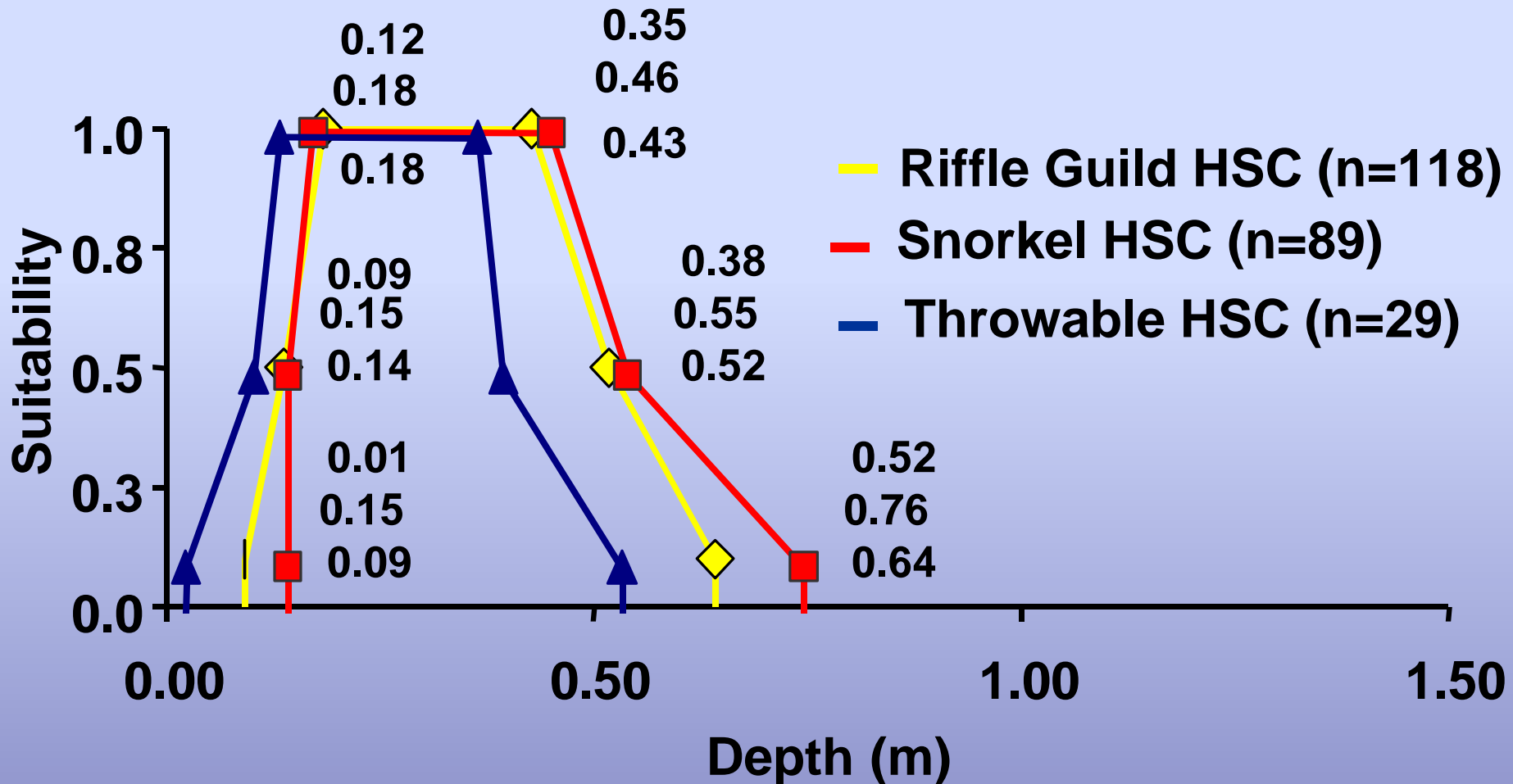
- **Total of 31 species collected**
- **3 new species**
 - cutlips minnow
 - pumpkinseed sunfish & american eel
- **2 species not found**
 - greenside darter & rosyside dace

Sampling Techniques

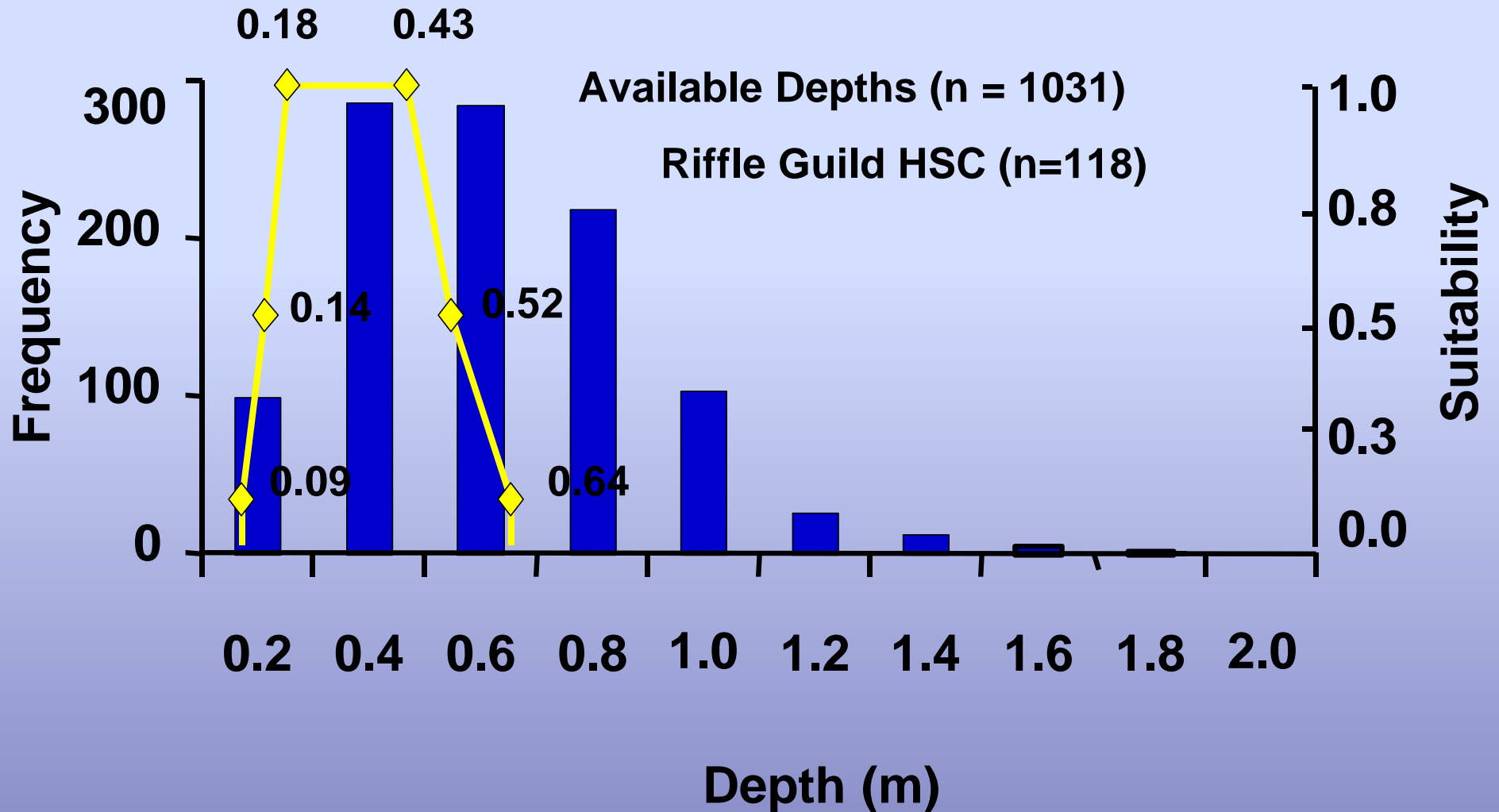
- **Two sampling techniques**
 - **Snorkeling**
 - **Throwable anode electrofishing**



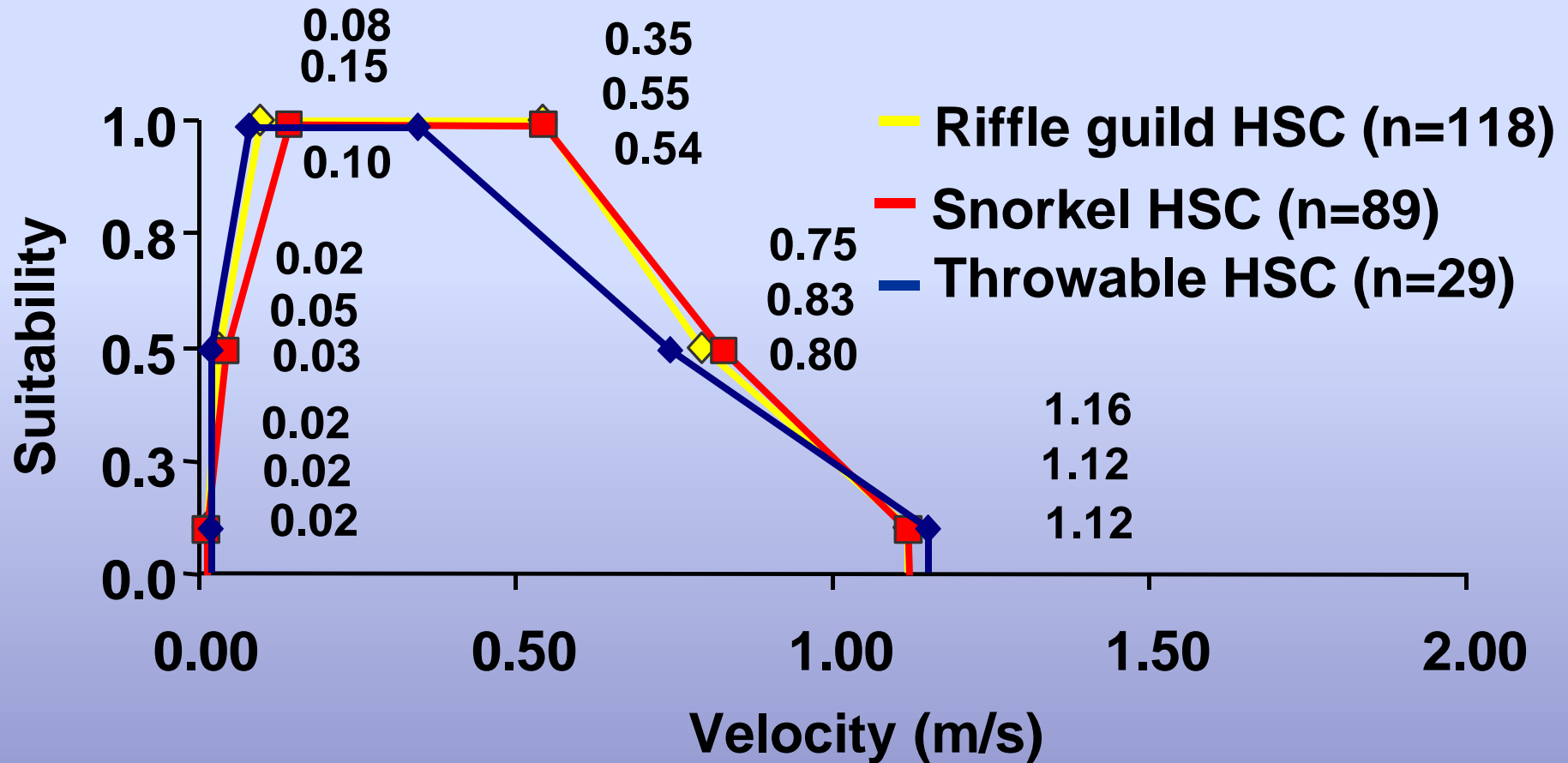
Riffle Depth Habitat Criteria



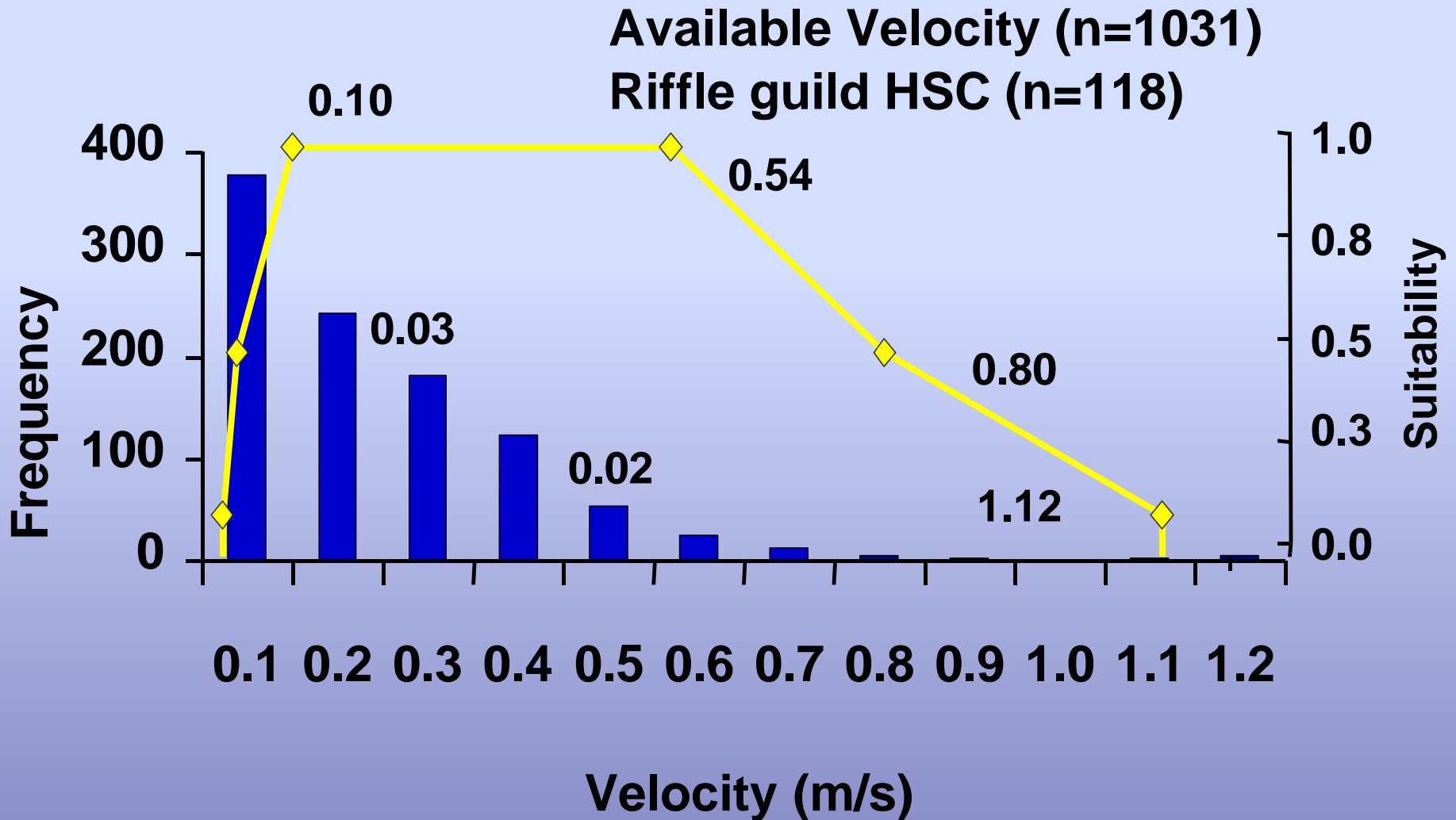
Riffle Depth vs. Available



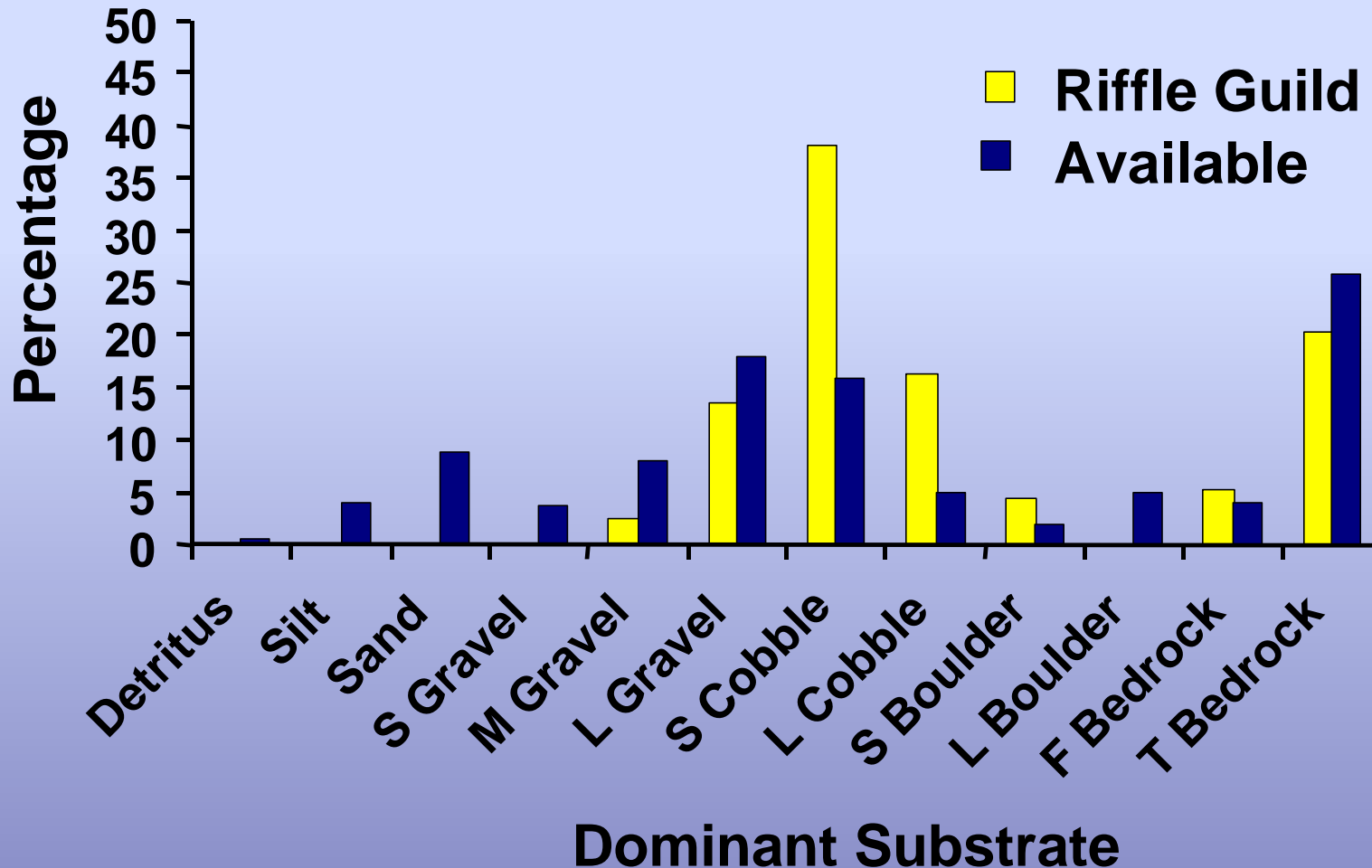
Riffle Velocity Habitat Criteria



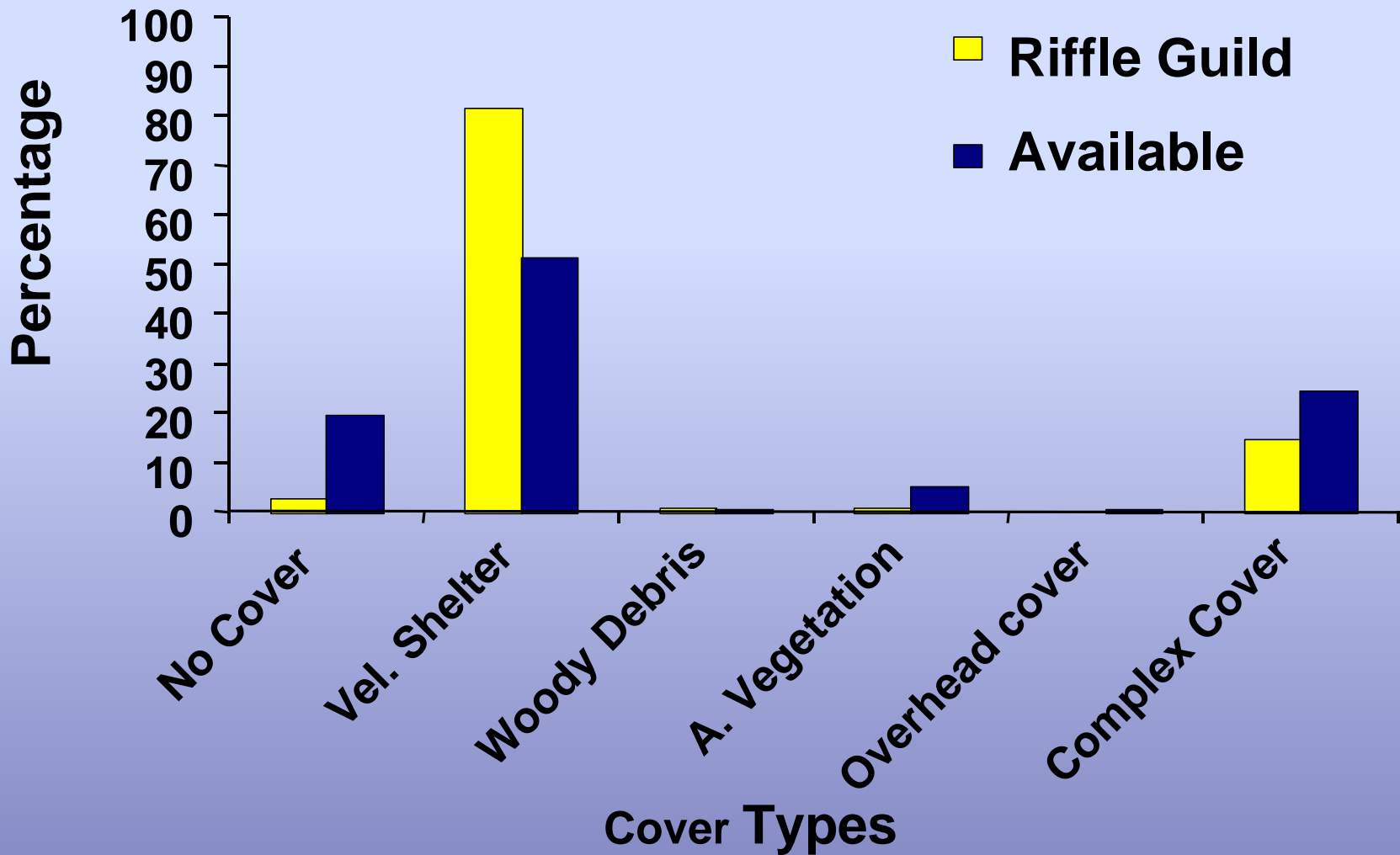
Riffle Velocity vs. Available



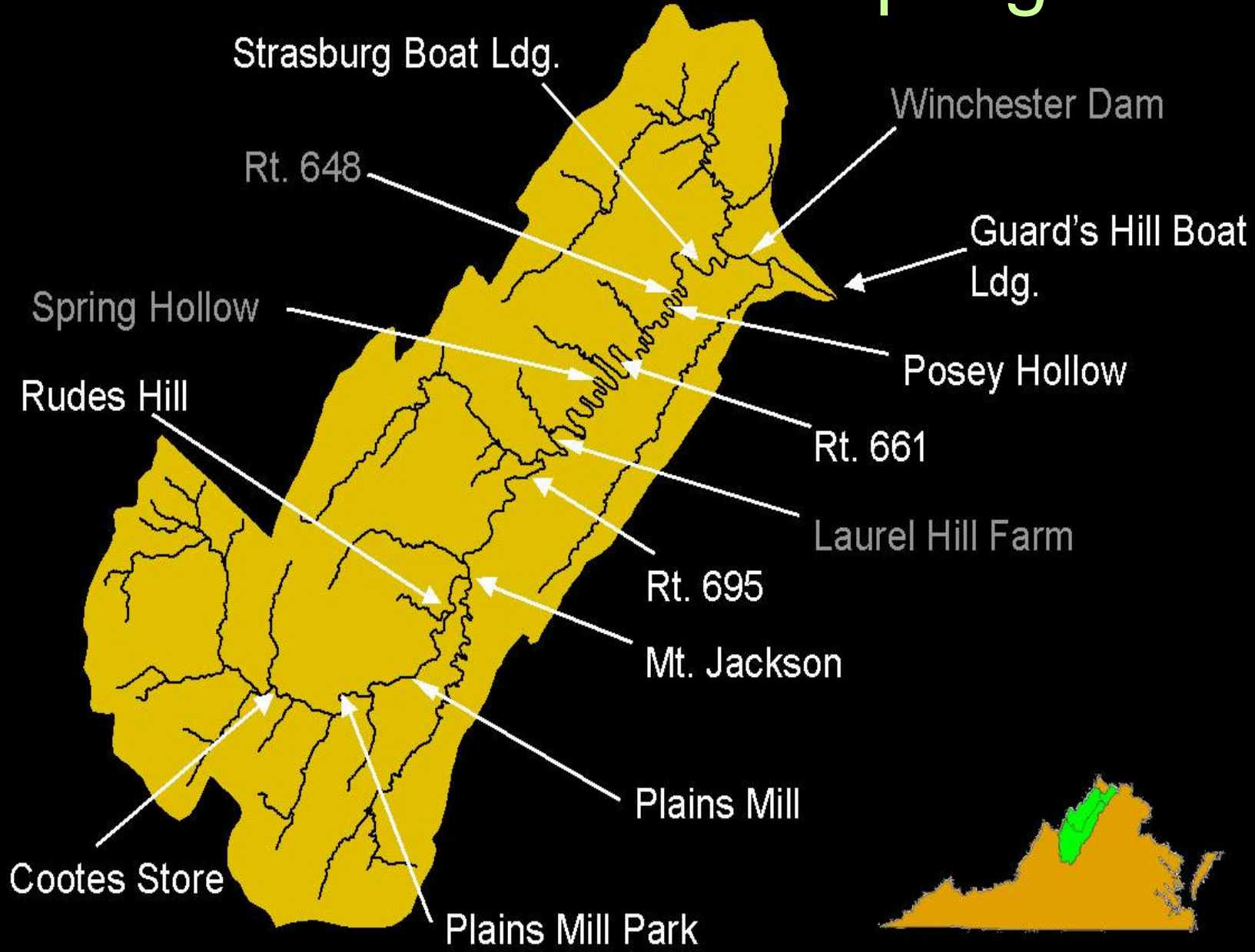
Riffle Substrate vs. Available



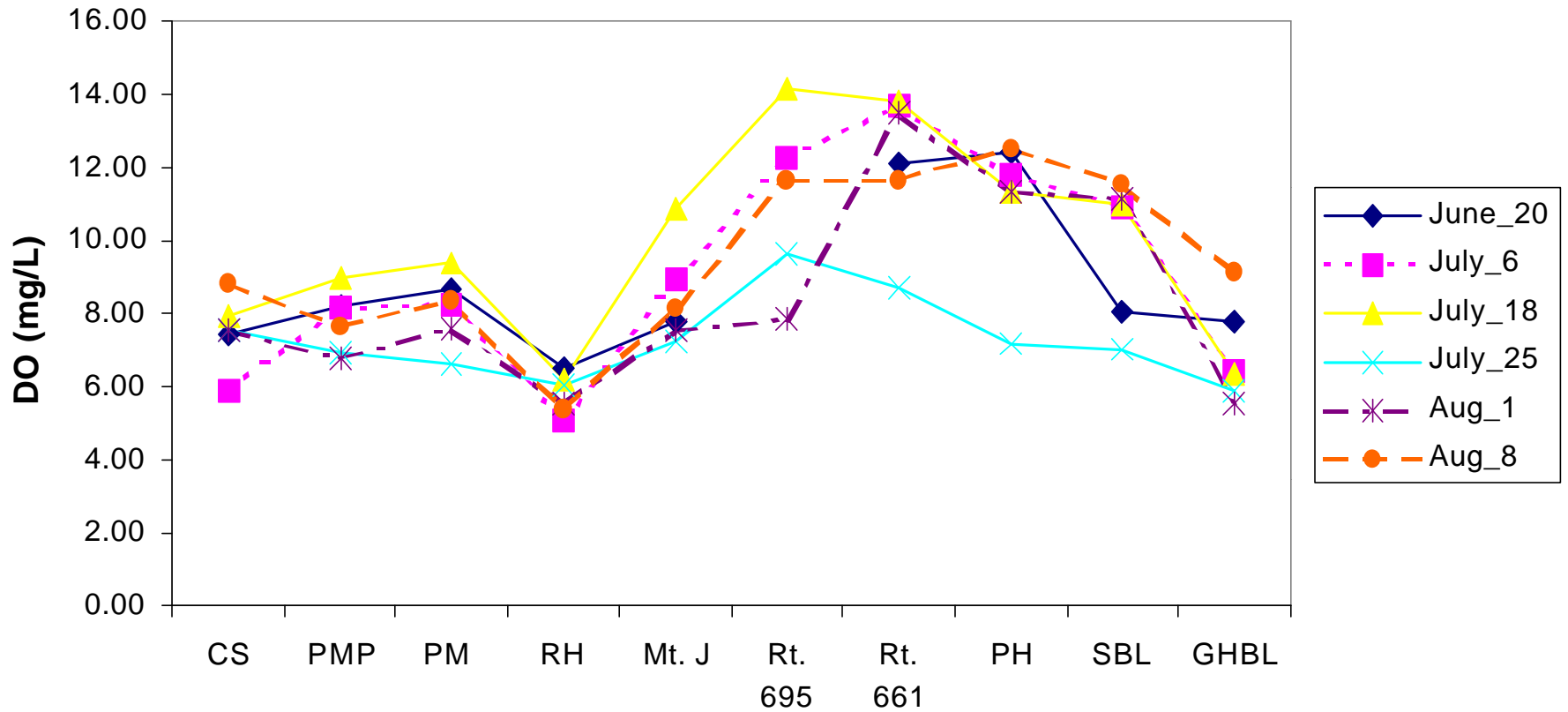
Riffle Cover vs. Available



North Fork Shenandoah Sampling Sites



Dissolved Oxygen - Summer 2002

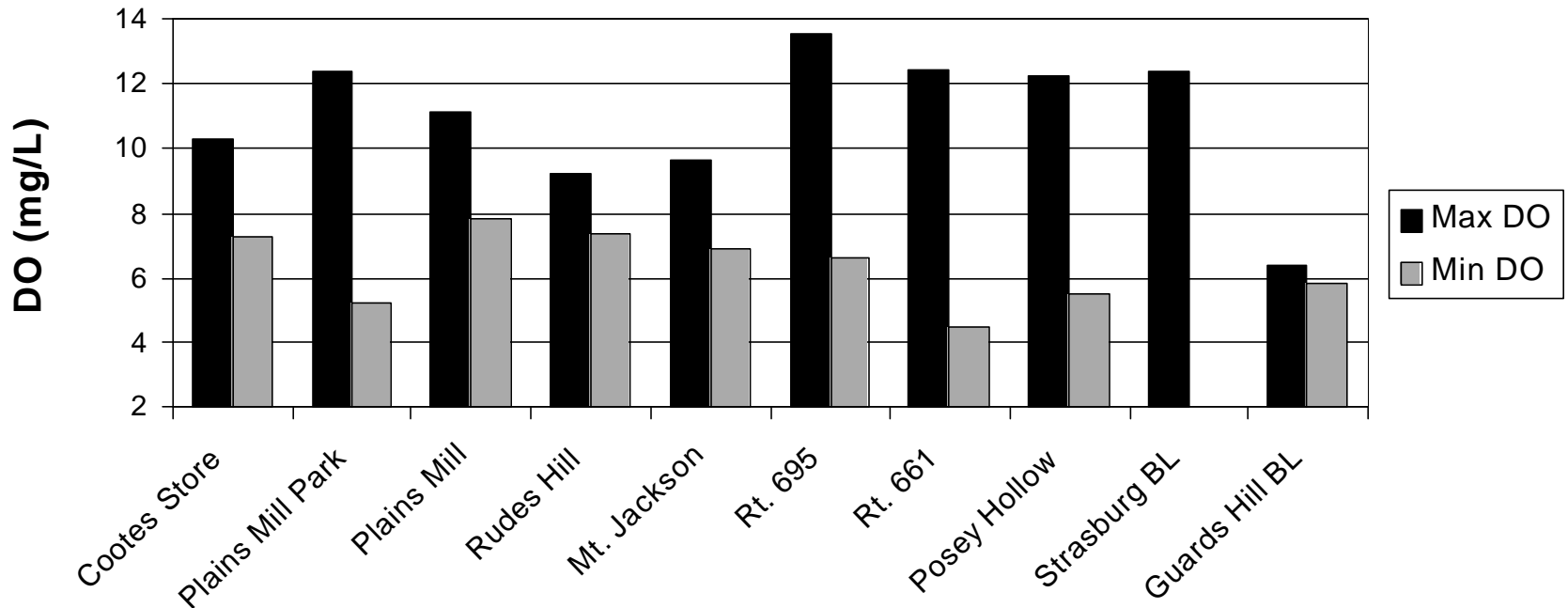


Early morning values may be low due to time sample was taken.

Values are above the DEQ water quality minimum DO standard (4 mg/l).

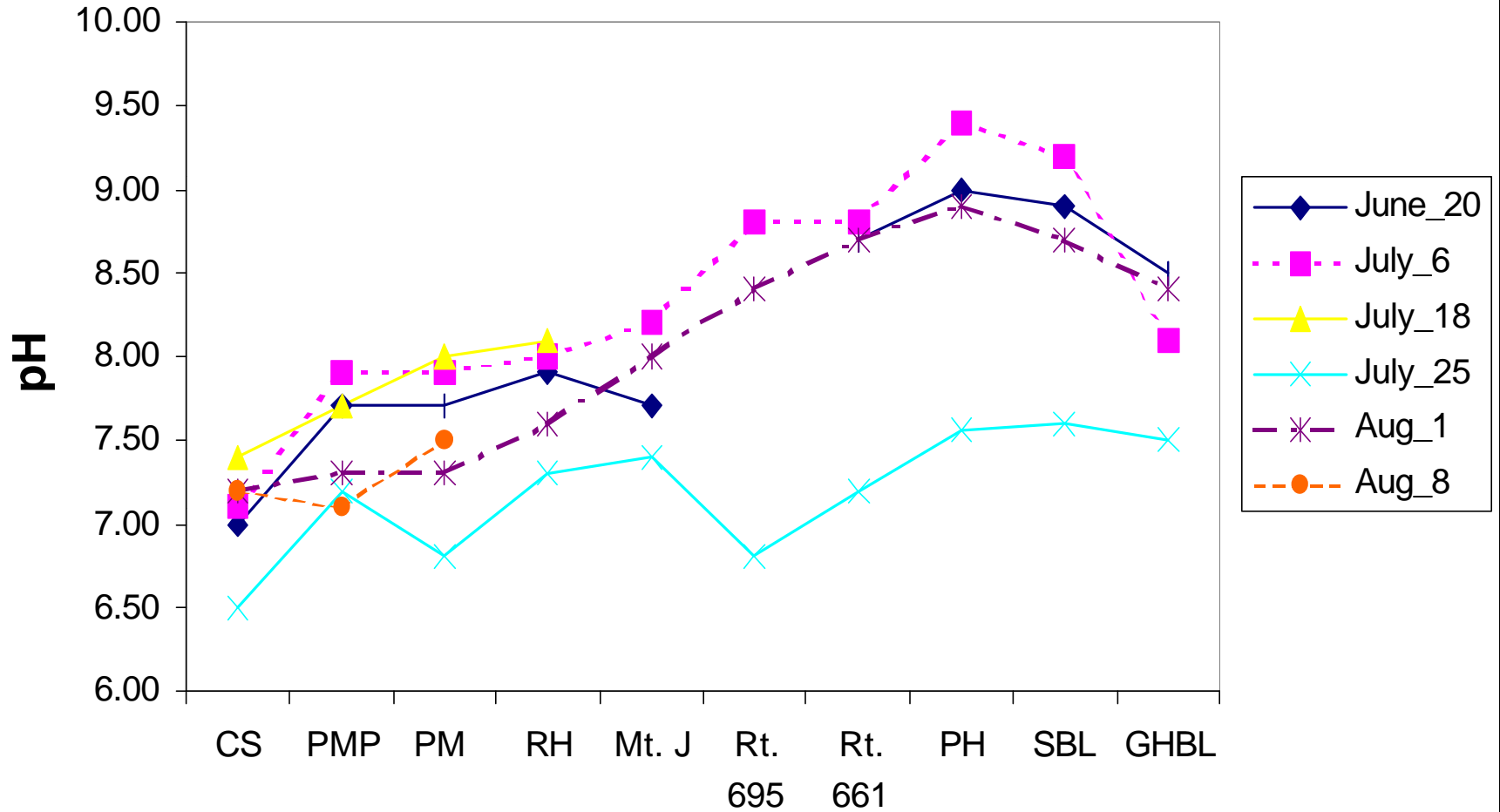
July 25 was rainy and overcast; low overall values possibly due to agricultural and industrial runoff.

Minimum & Maximum Dissolved Oxygen (DO)



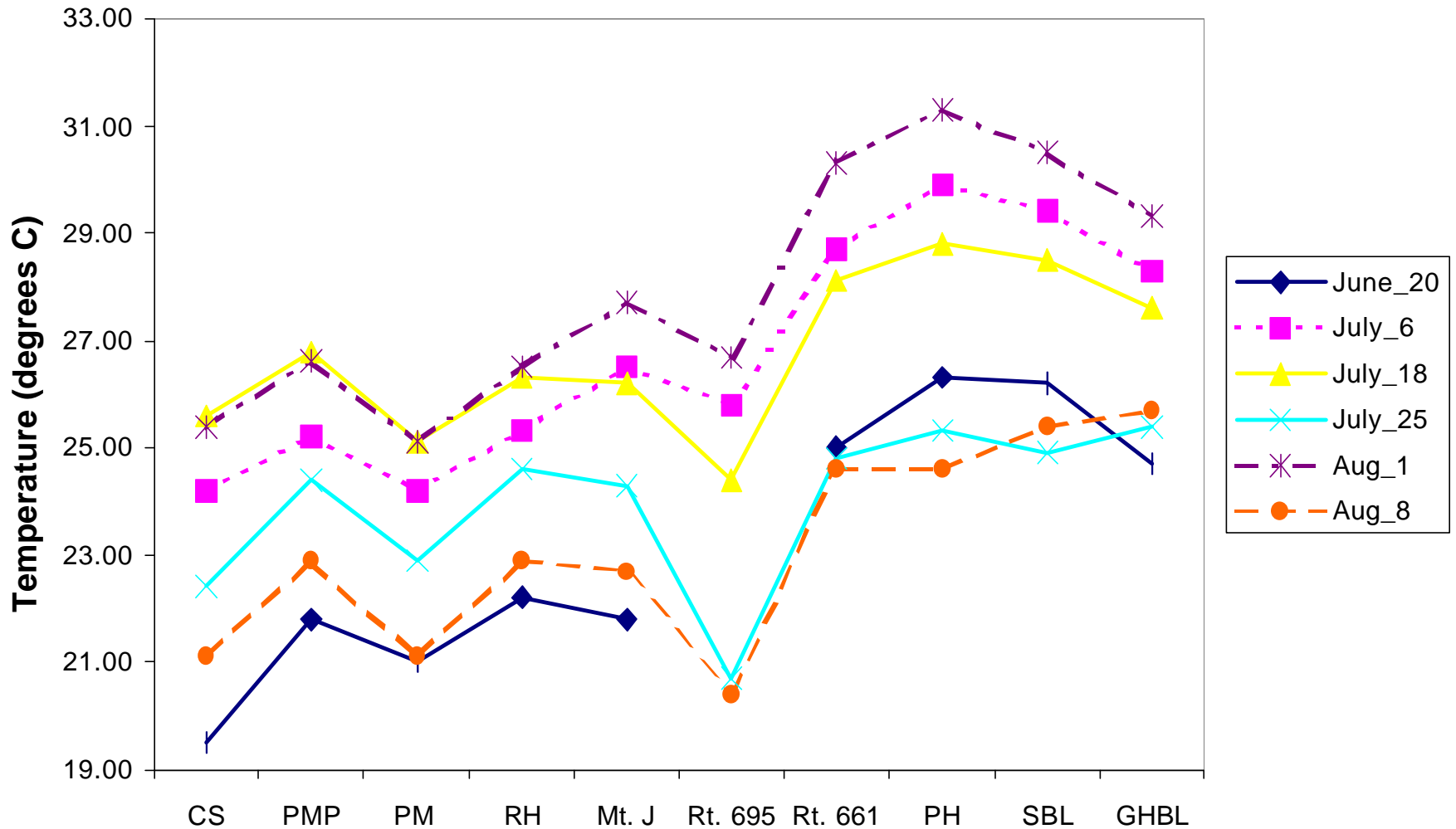
- Where DO is supersaturated in the pre-dawn hours (4 – 6 a.m.), we see much lower levels in the afternoon (3 – 5 p.m.).

pH - Summer 2002



July 6 value is outside the DEQ water quality range (6.0 – 9.0) at PH & SBL

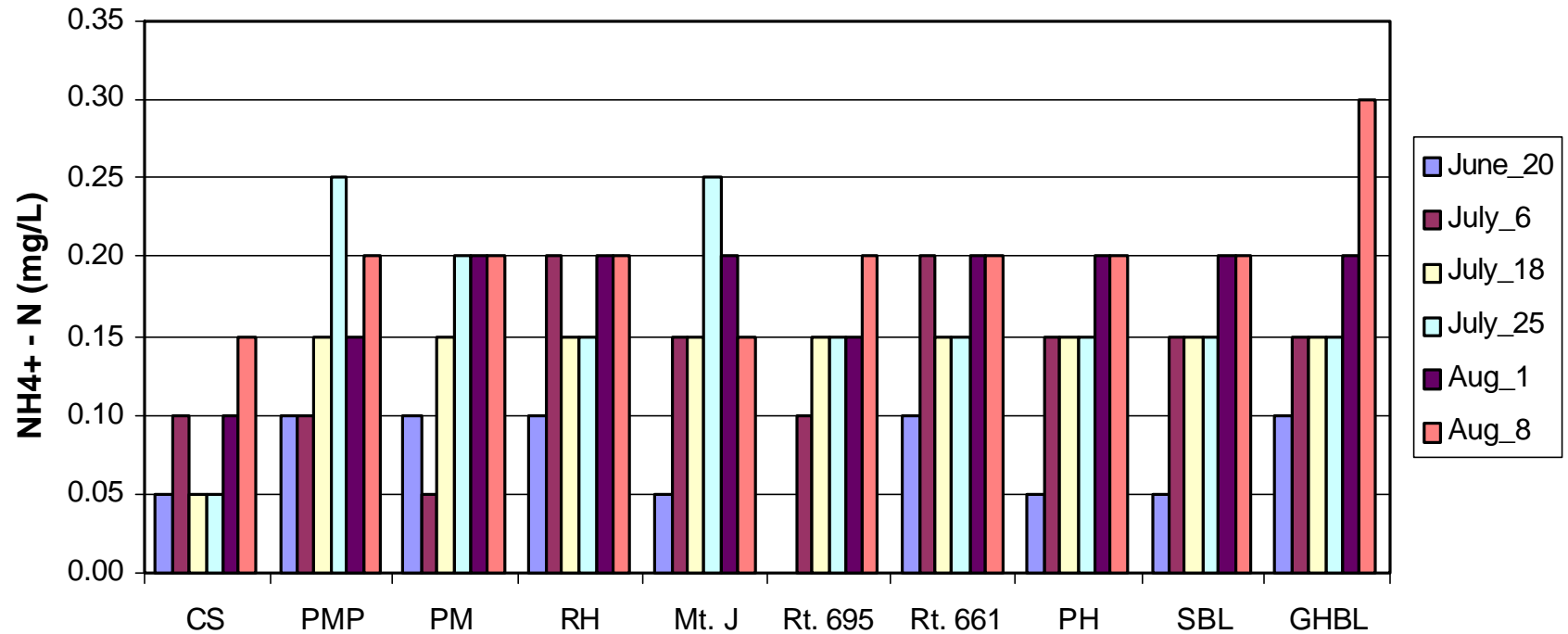
Temperature



Dips in temperature are related to cold springs entering the river.

Aug 1 temperature above 31°C, the DEQ water quality limit for non-trout streams

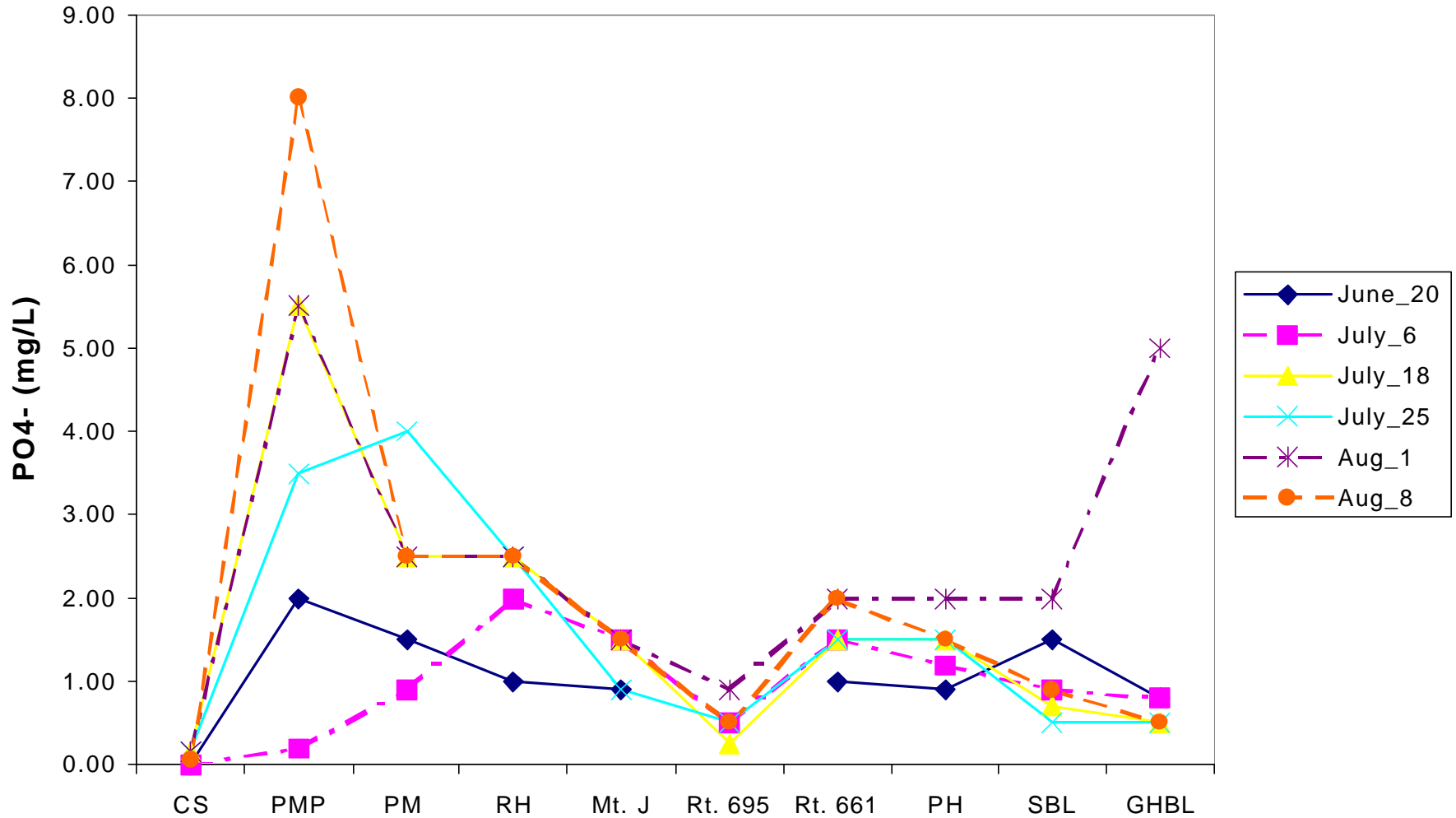
Ammonia - Nitrogen - Summer 2002



Increasing total ammonia levels across sampling time.

July 25 – peaks at PMP and Mt. J sites possibly due to non-point source pollution

Phosphate - Summer 2002



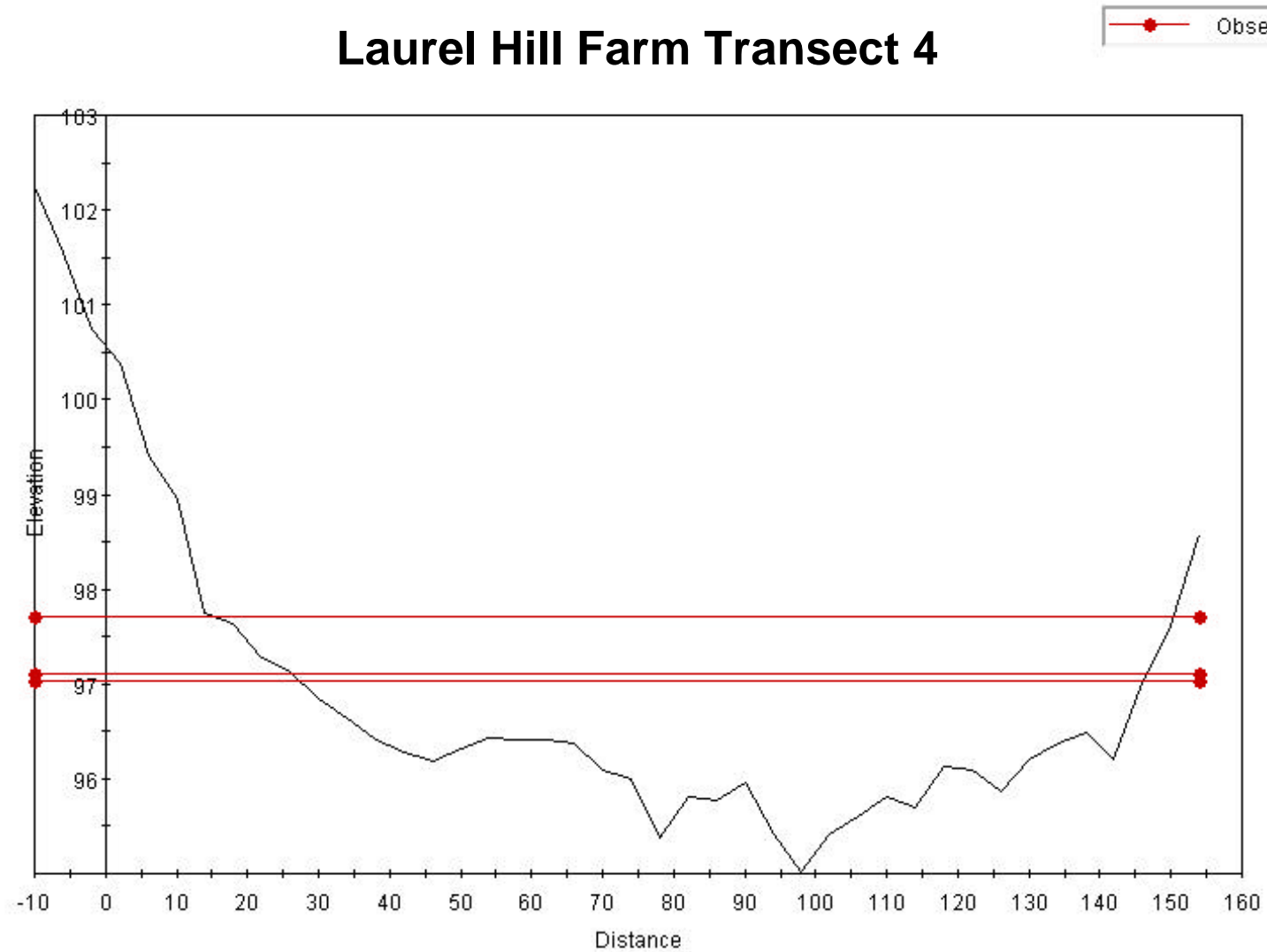
Based on EPA water quality criteria, phosphate should not exceed 0.1 mg/L to control algal growth.





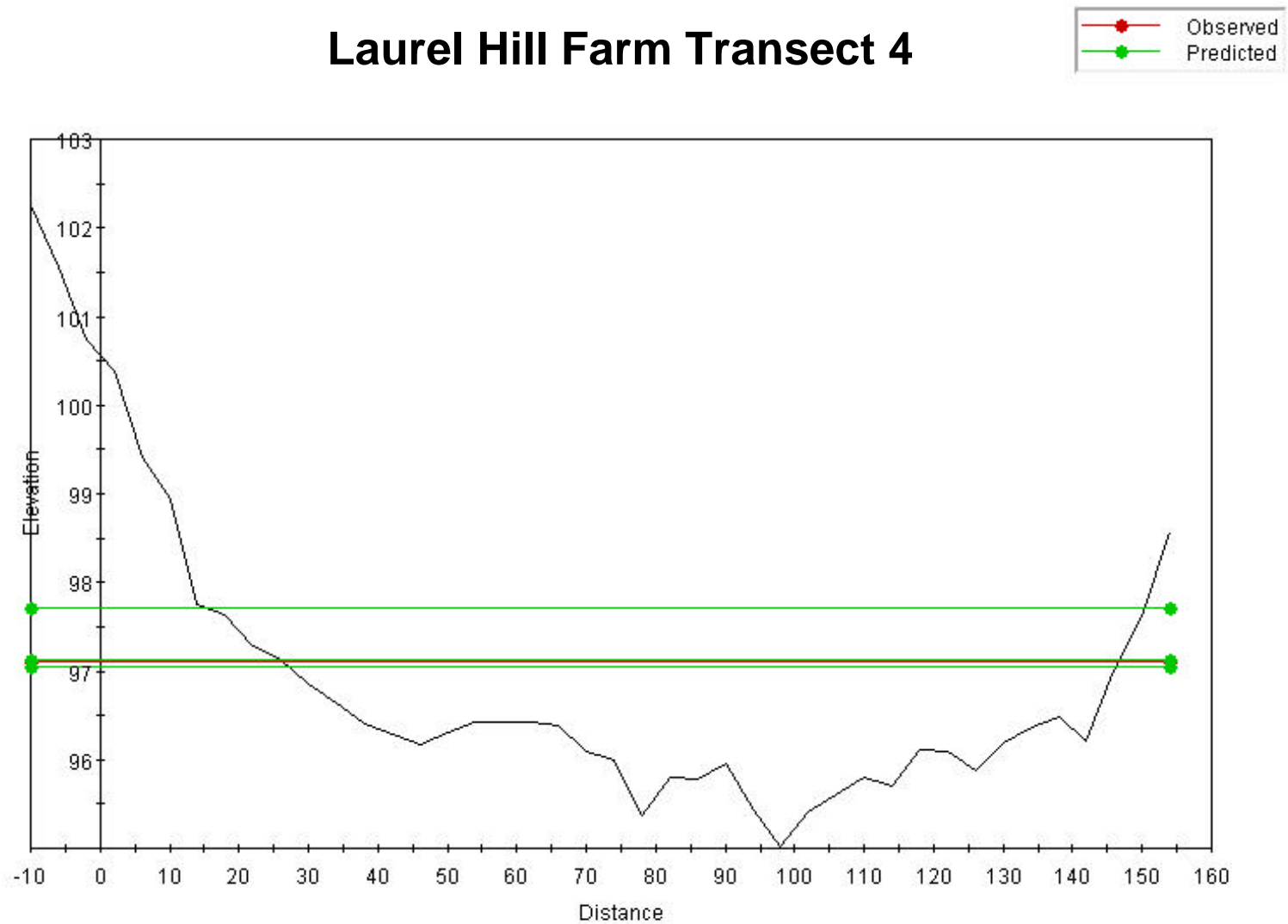
WSL Modeling: Observed vs. Predicted Flows

Laurel Hill Farm Transect 4



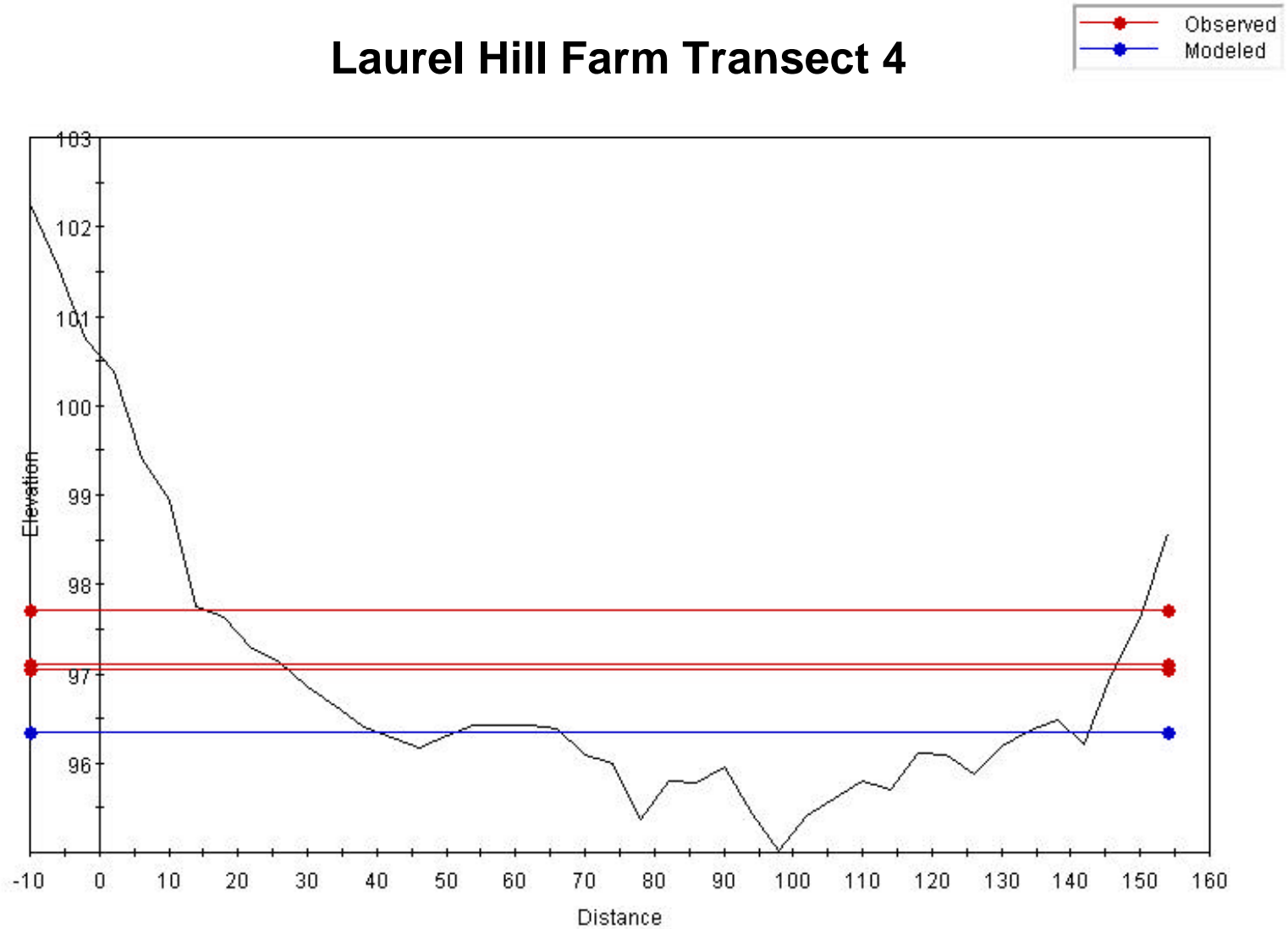
WSL Modeling: Observed vs. Predicted Flows

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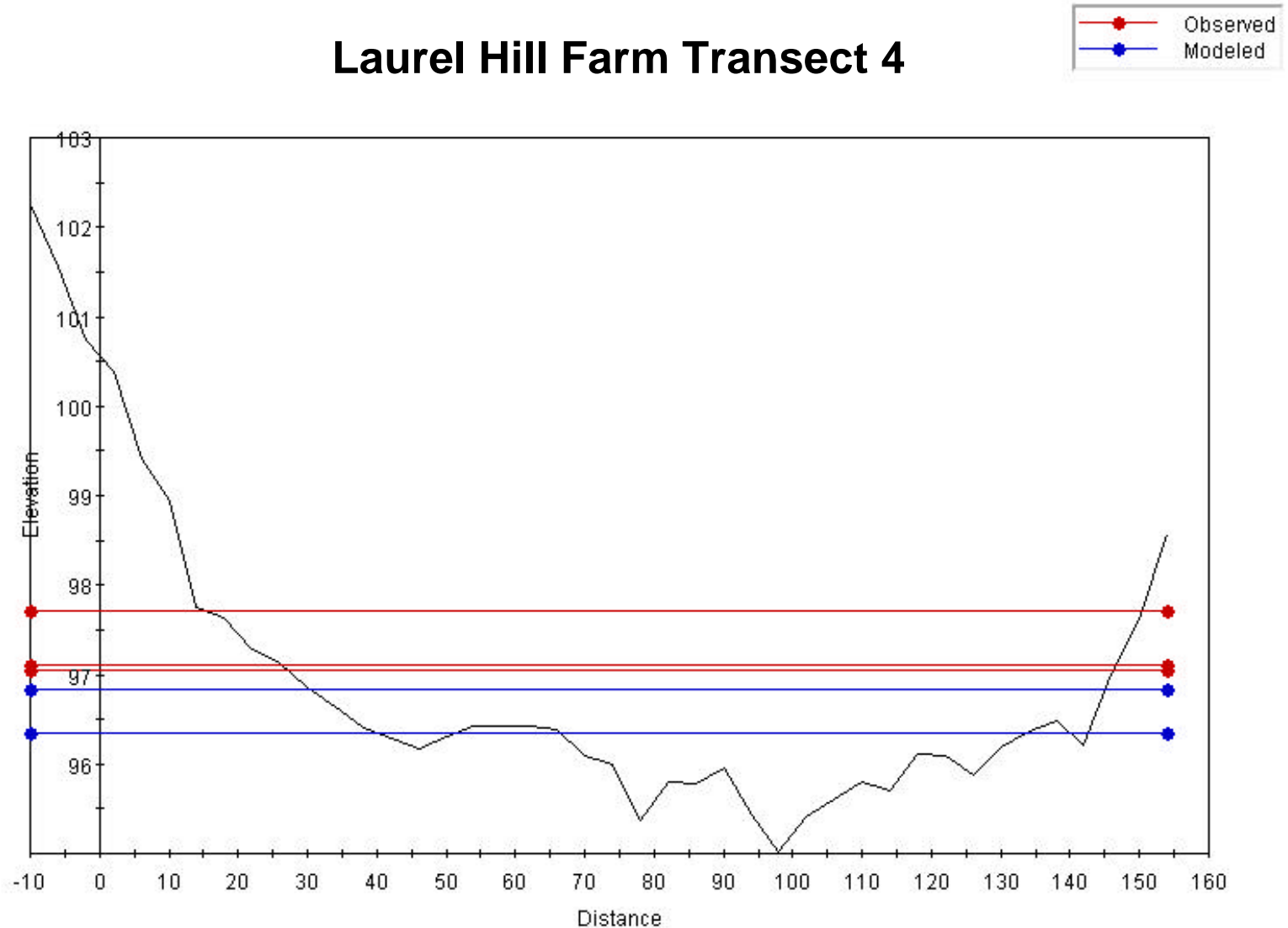
WSL Modeling: Observed vs. Modeled Flows

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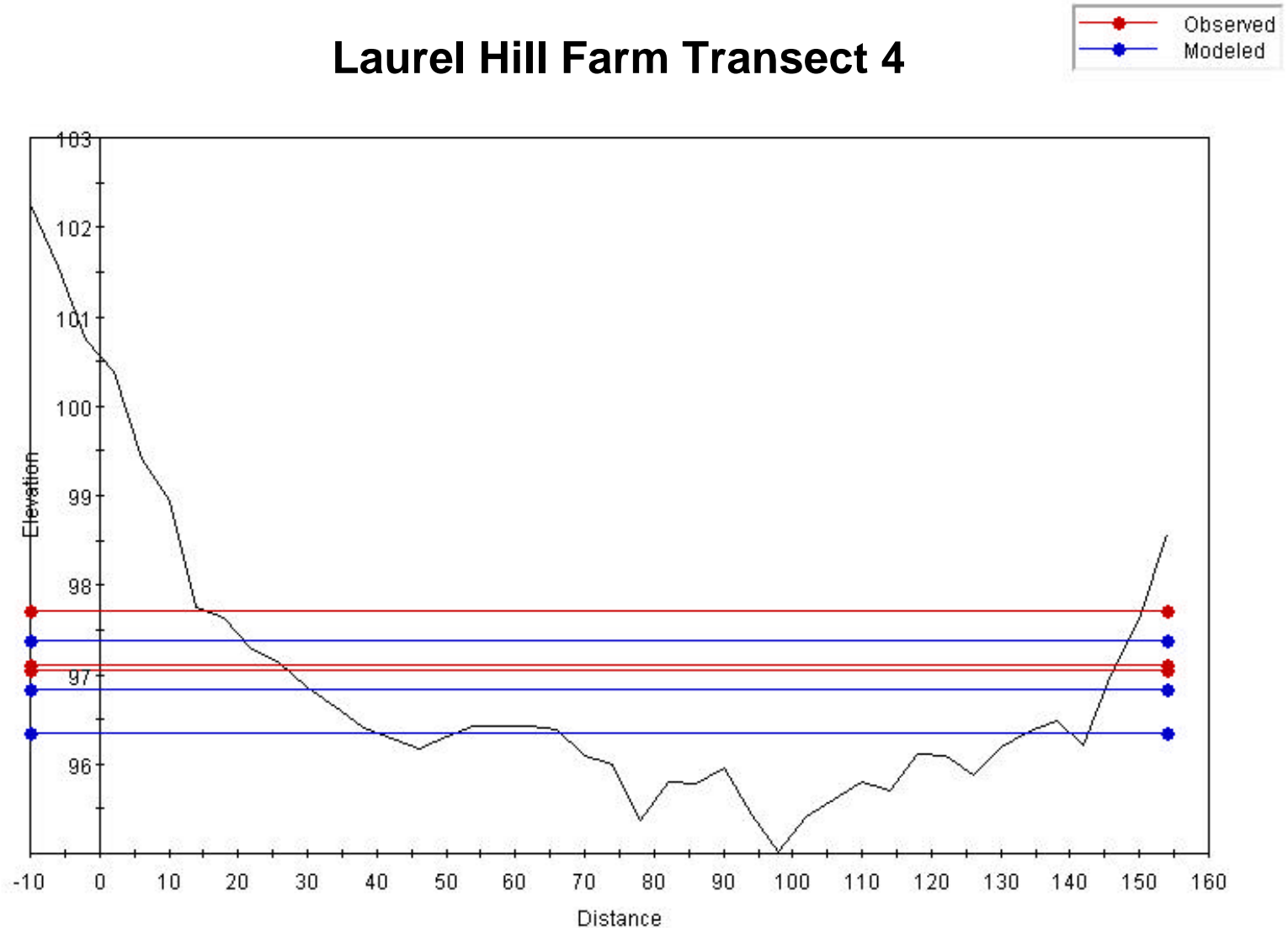
WSL Modeling: Observed vs. Modeled Flows

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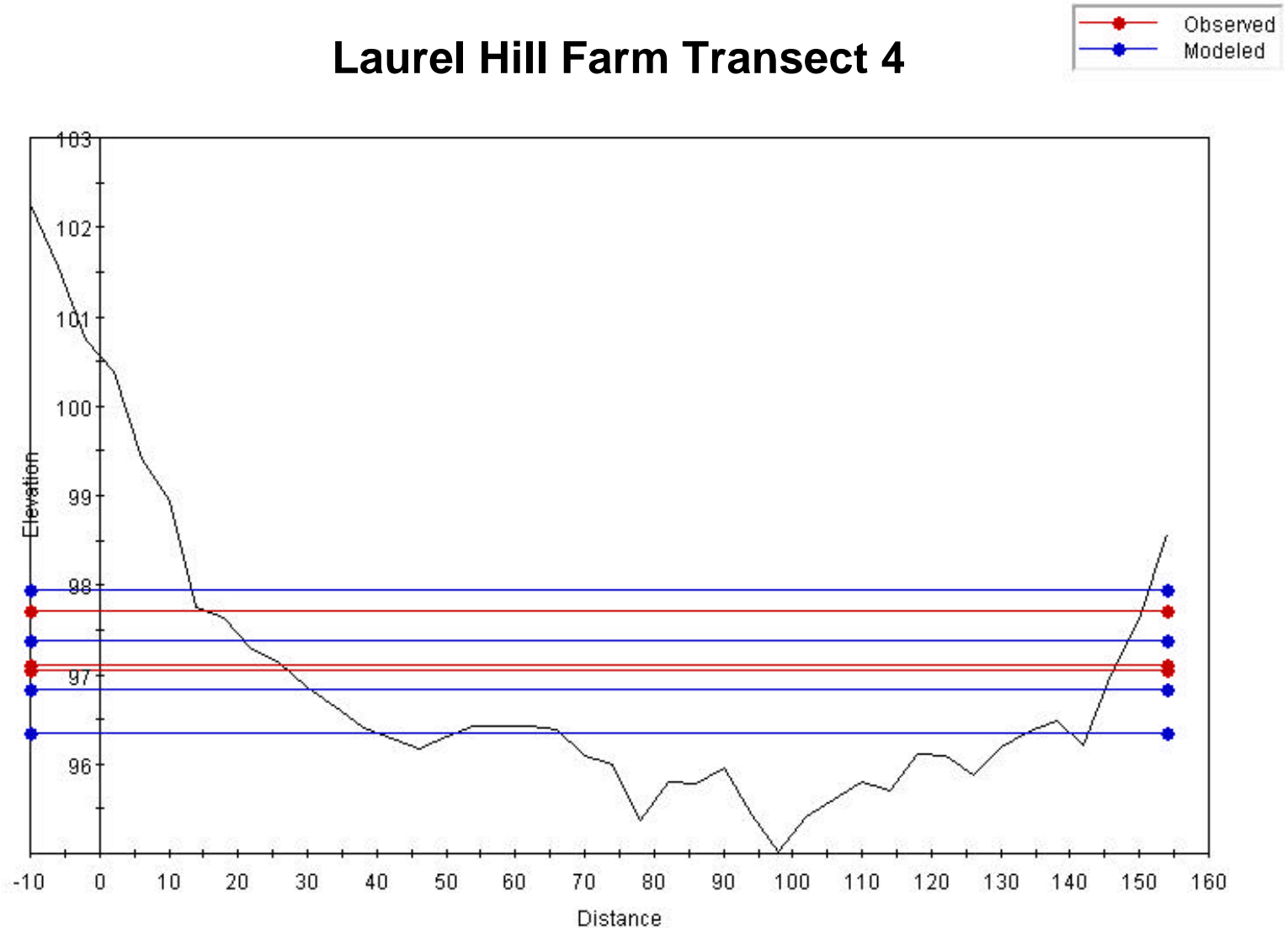
WSL Modeling: Observed vs. Modeled Flows

Laurel Hill Farm Transect 4

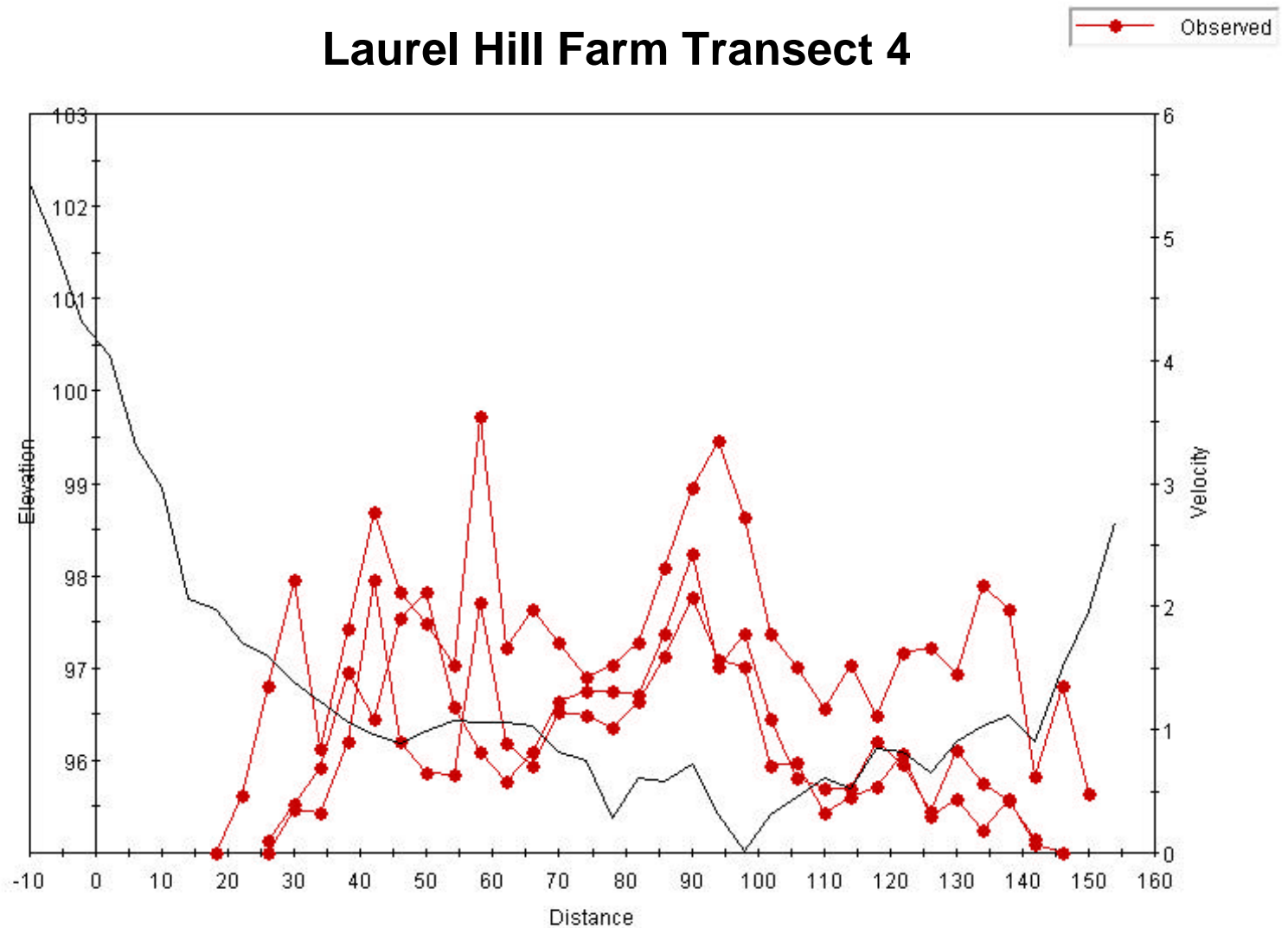


WSL Modeling: Observed vs. Modeled Flows

Laurel Hill Farm Transect 4

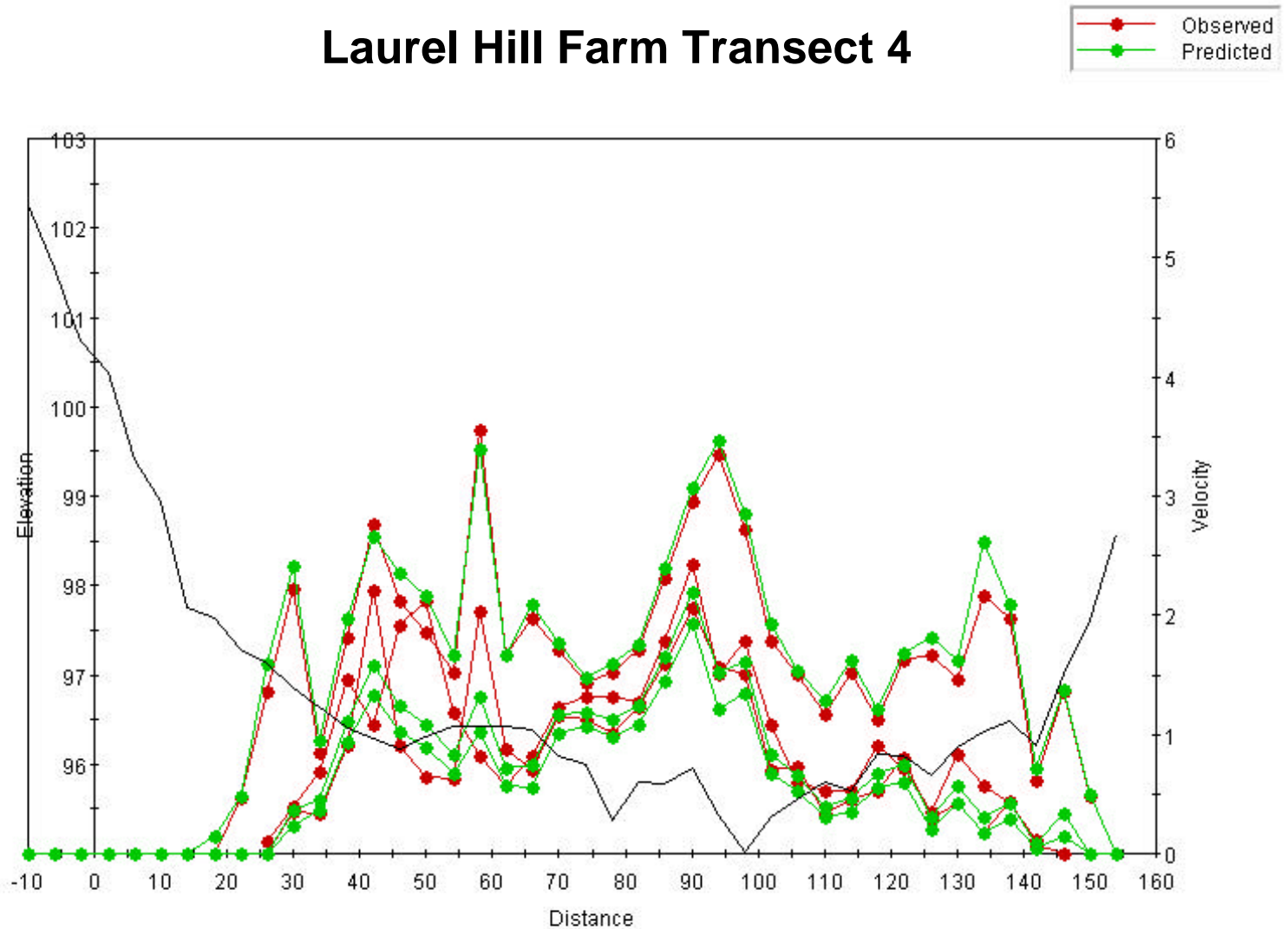


Velocity Modeling: Observed vs. Predicted



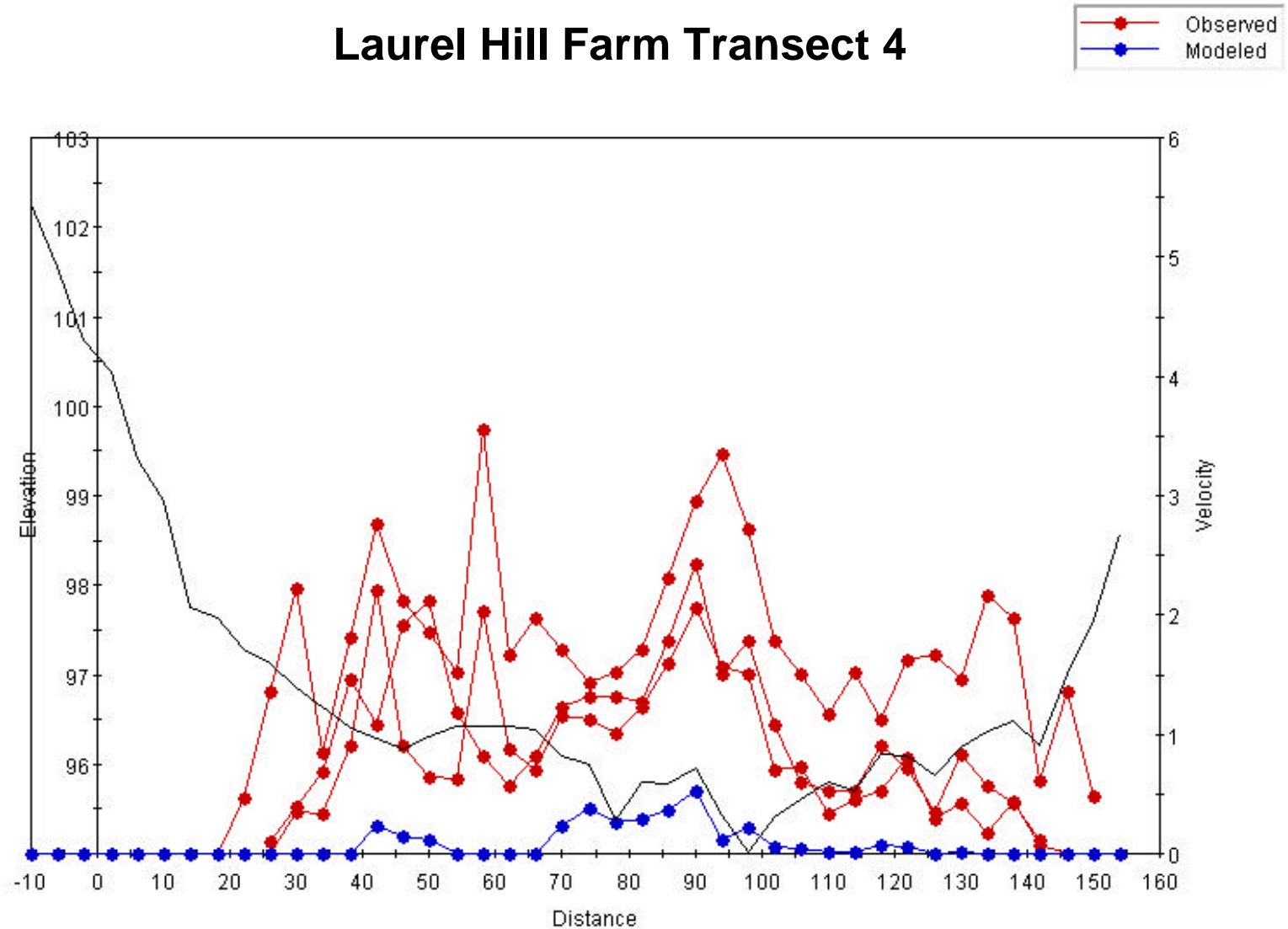
Velocity Modeling: Observed vs. Predicted

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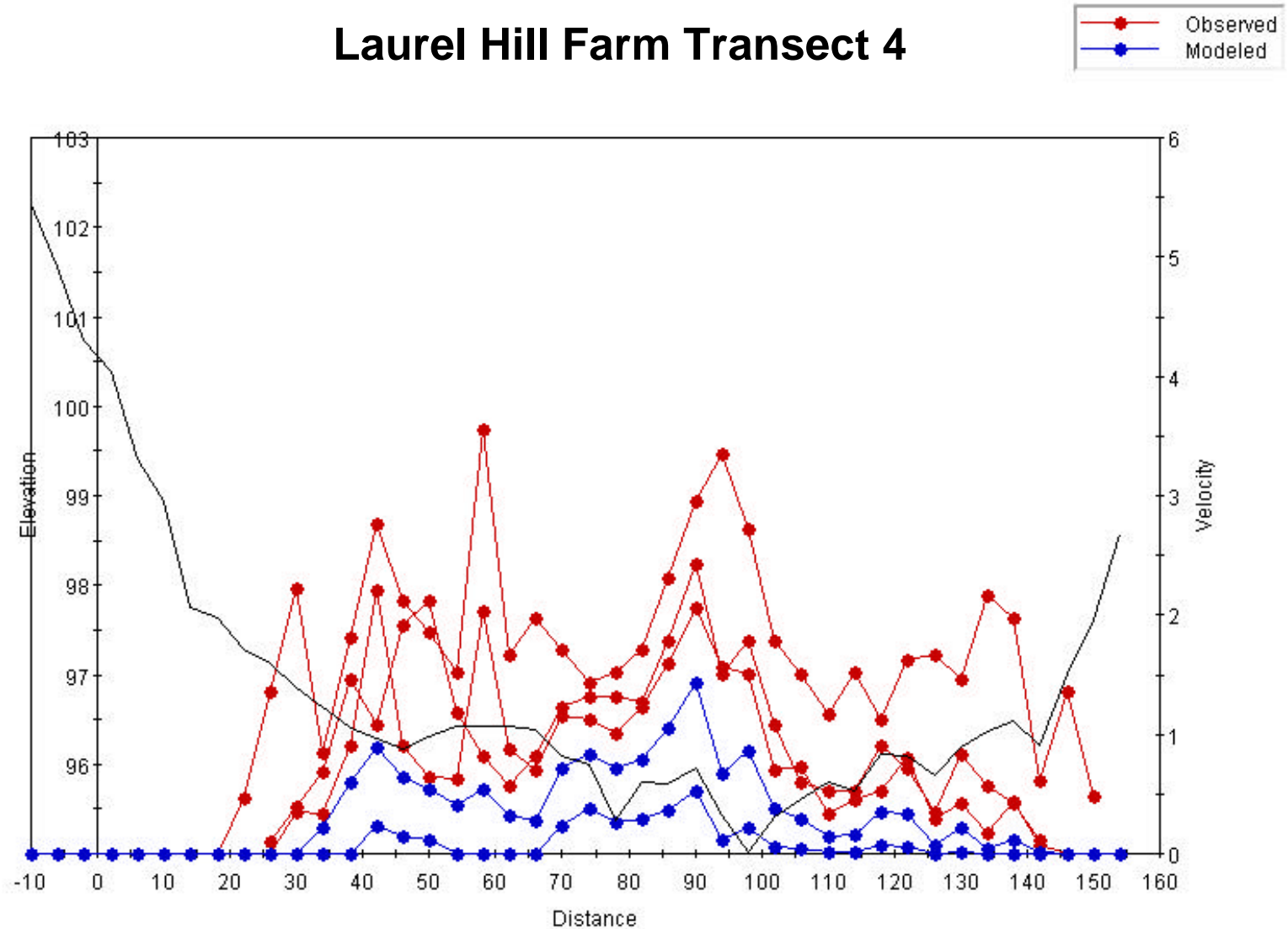
Velocity Modeling: Observed vs. Modeled

Laurel Hill Farm Transect 4



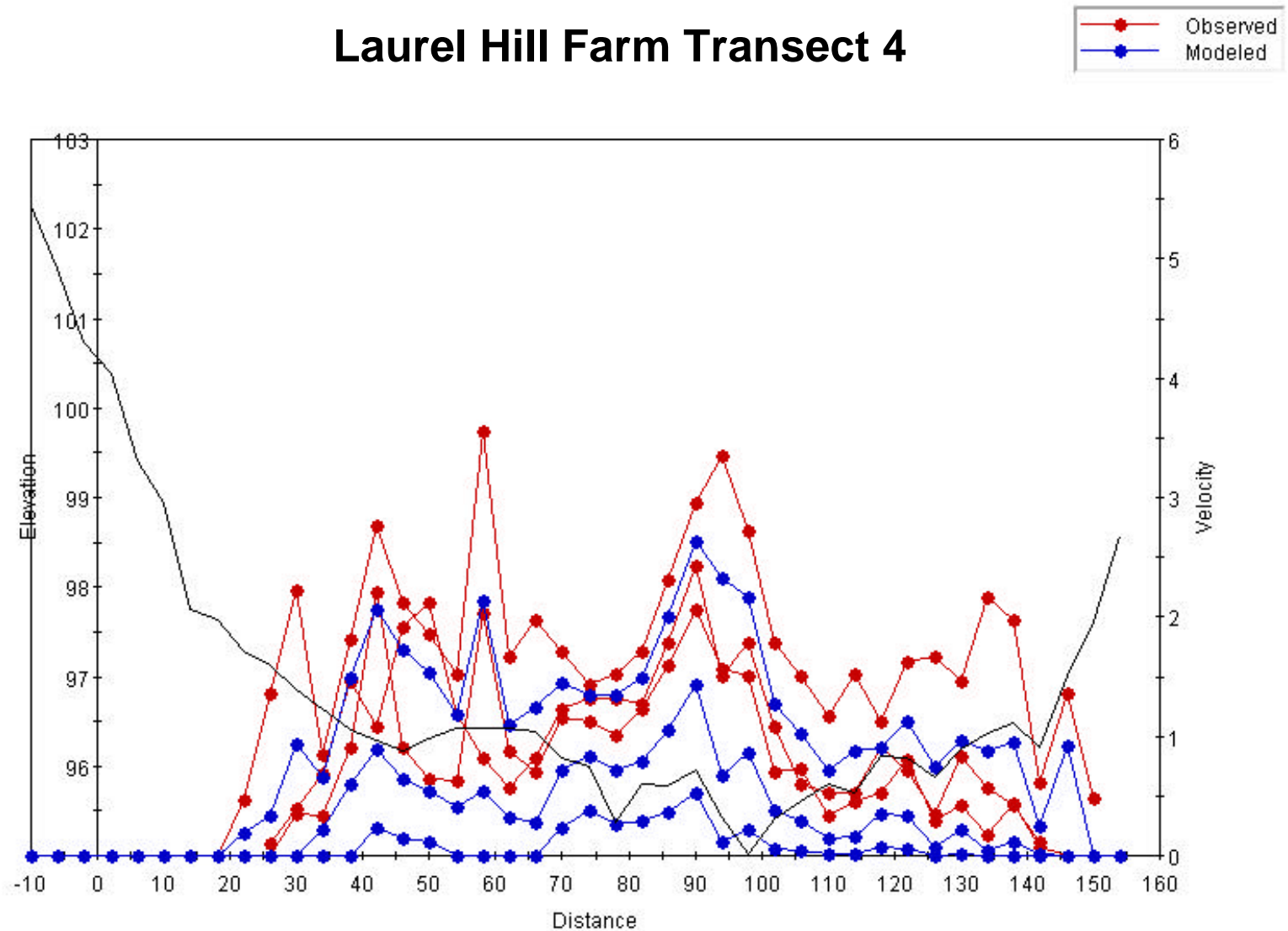
Velocity Modeling: Observed vs. Modeled

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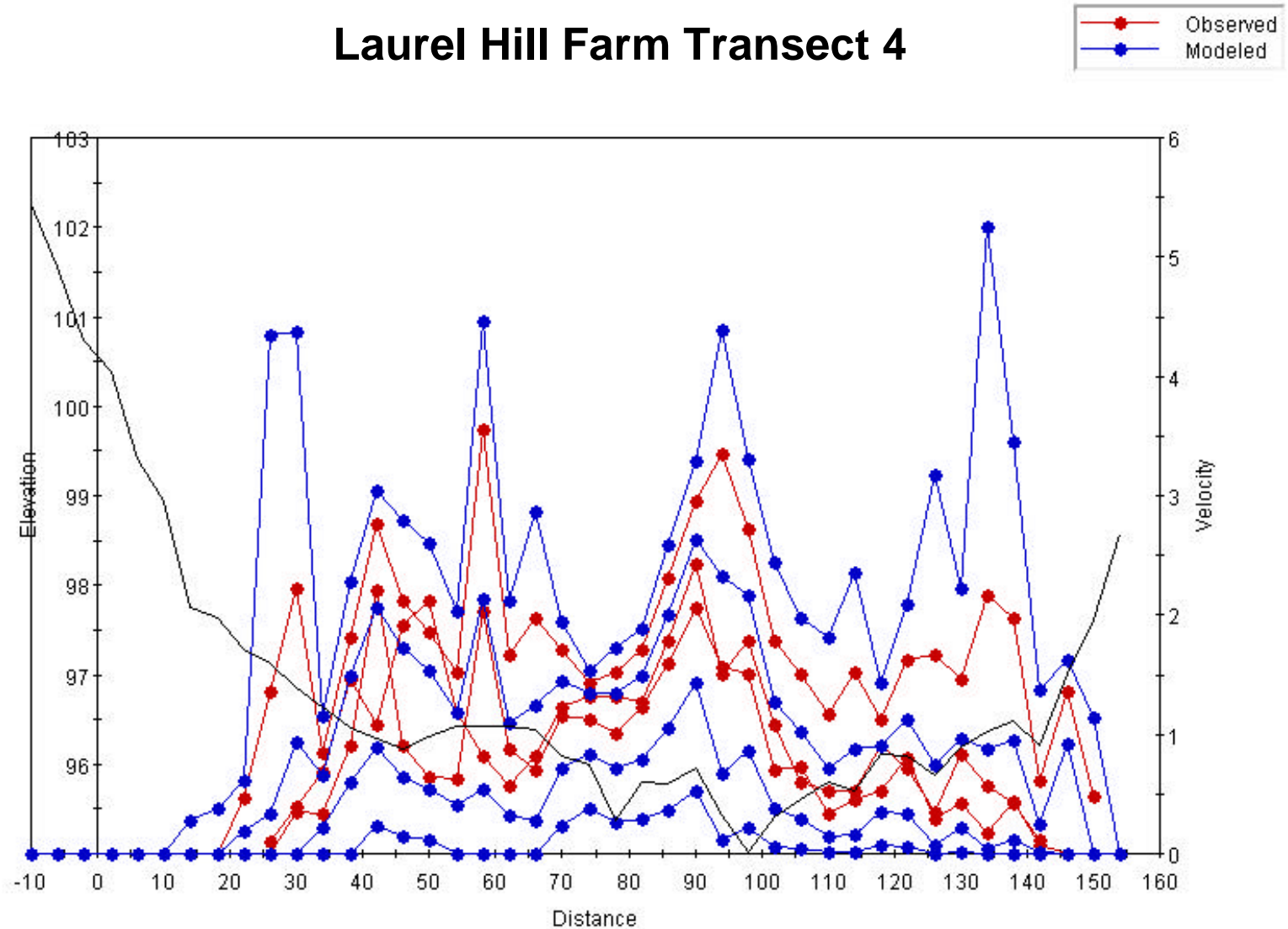
Velocity Modeling: Observed vs. Modeled

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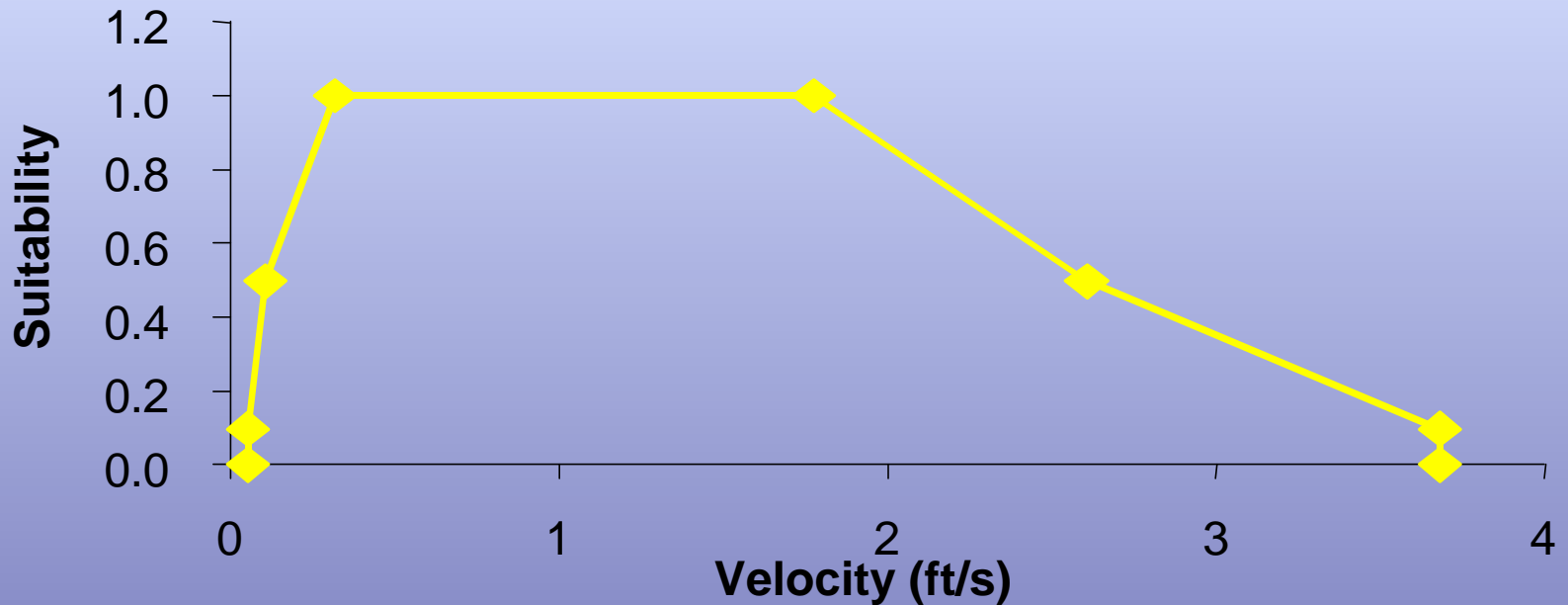
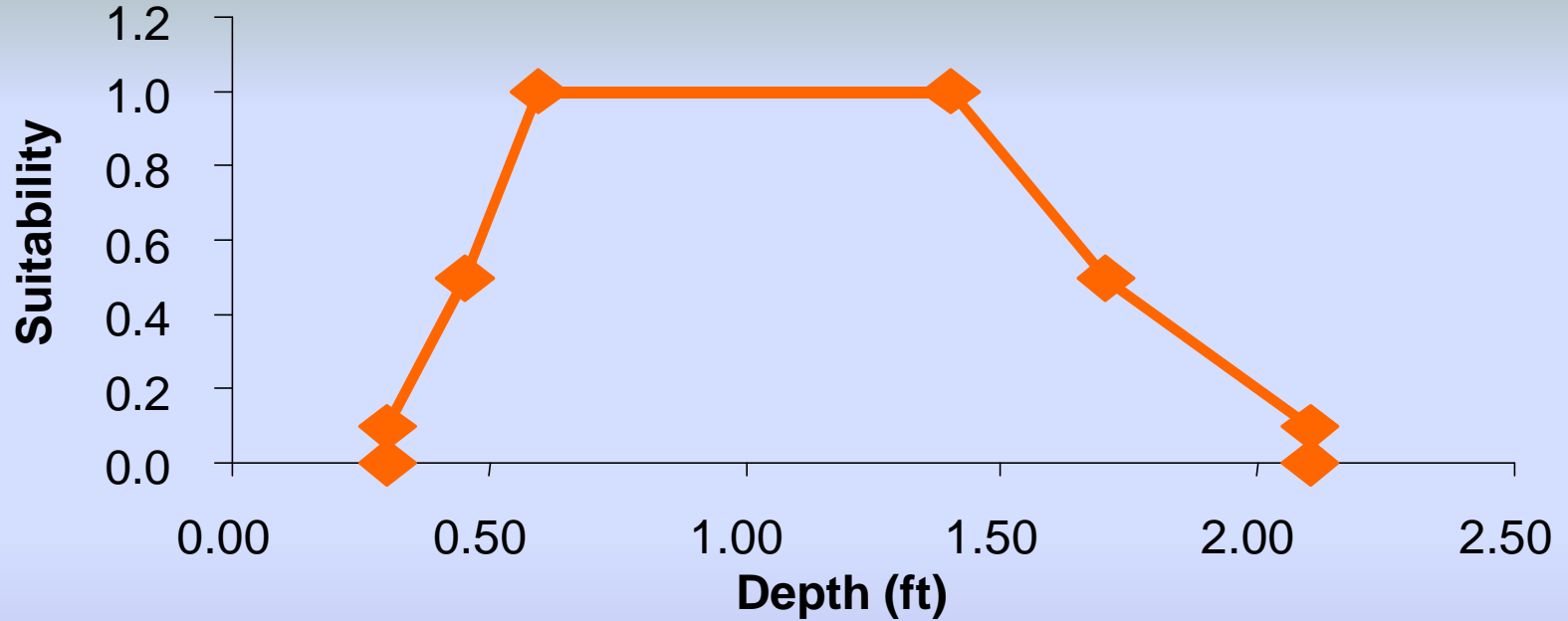


Velocity Modeling: Observed vs. Modeled

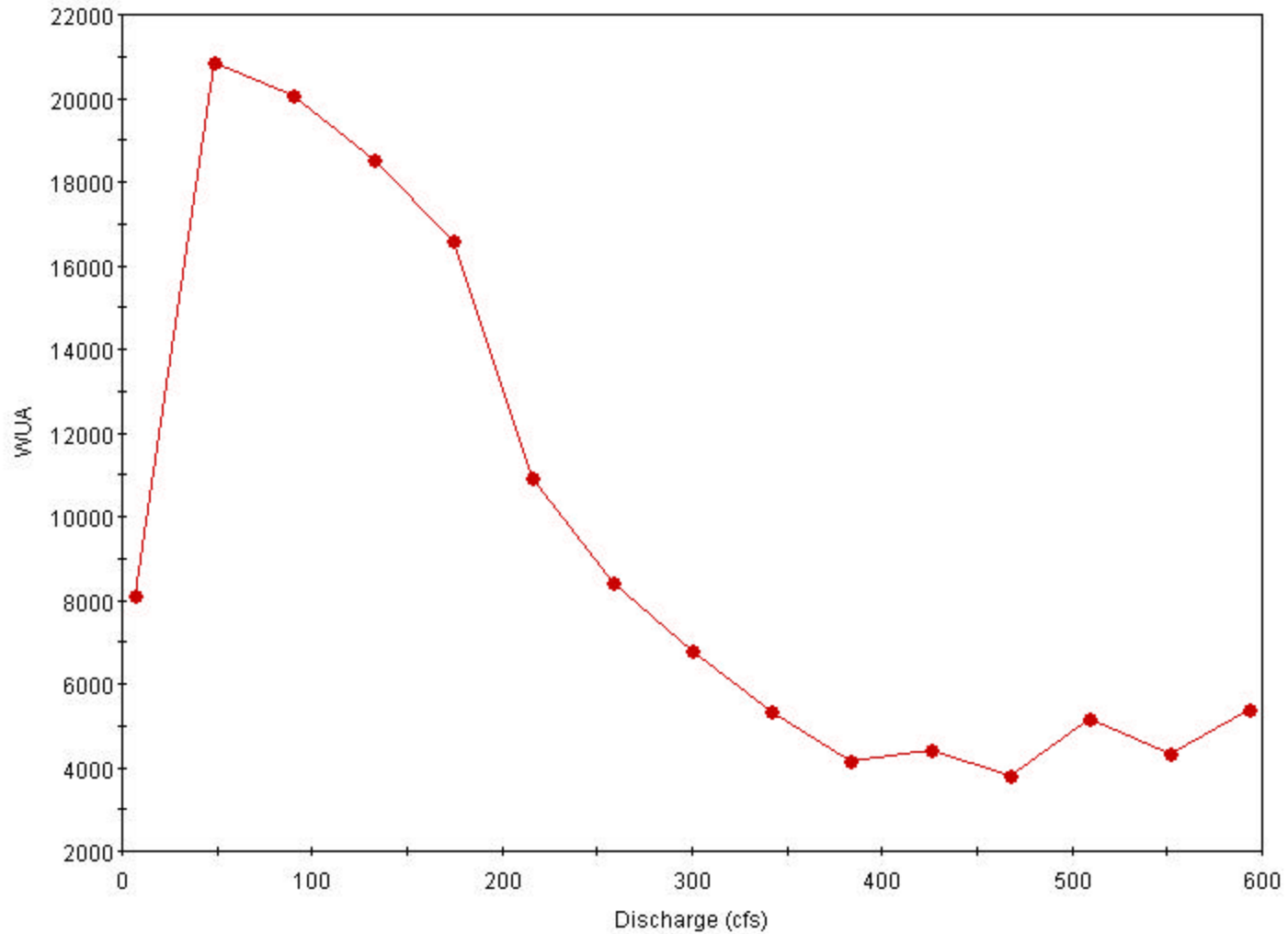
Laurel Hill Farm Transect 4



Riffle Guild D & V Suitability Indexes



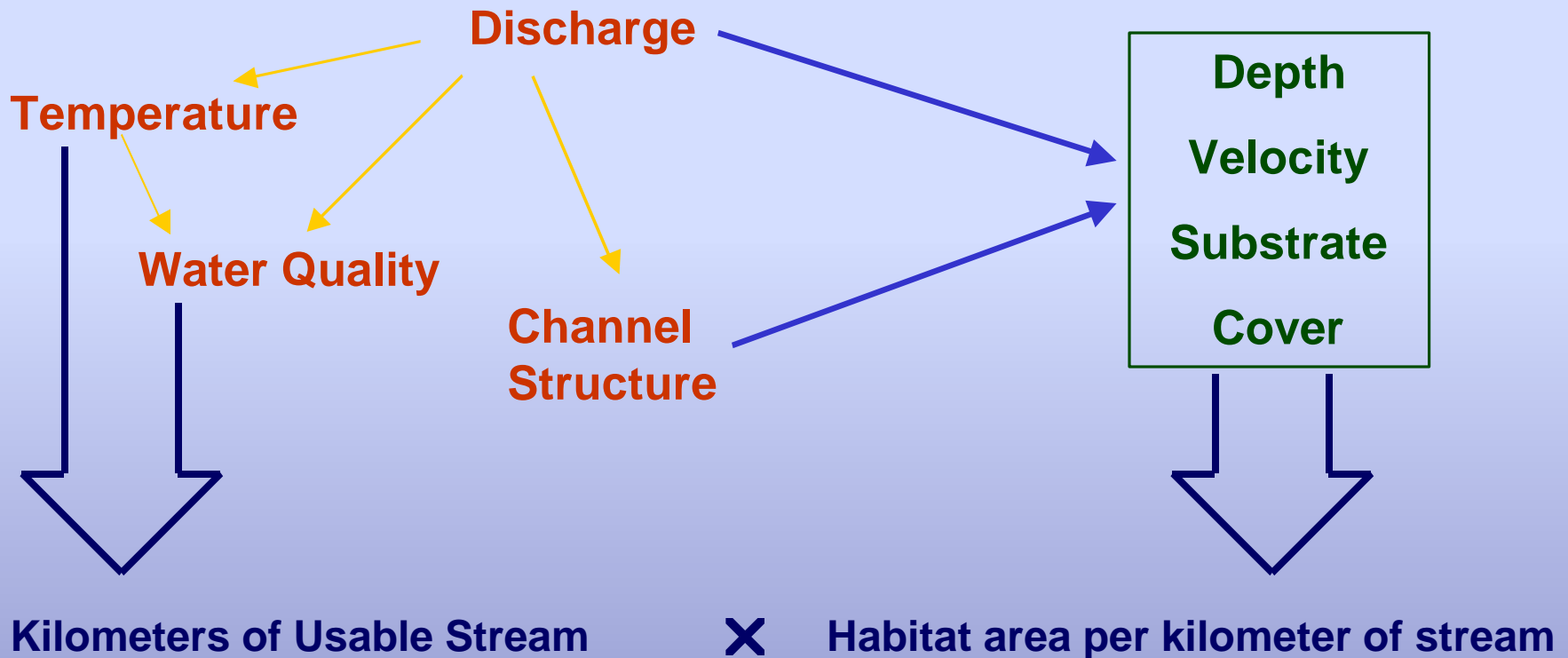
Laurel Hill Farm: Reach WUA



PHABSIM

Macrohabitat

Microhabitat



= TOTAL HABITAT