

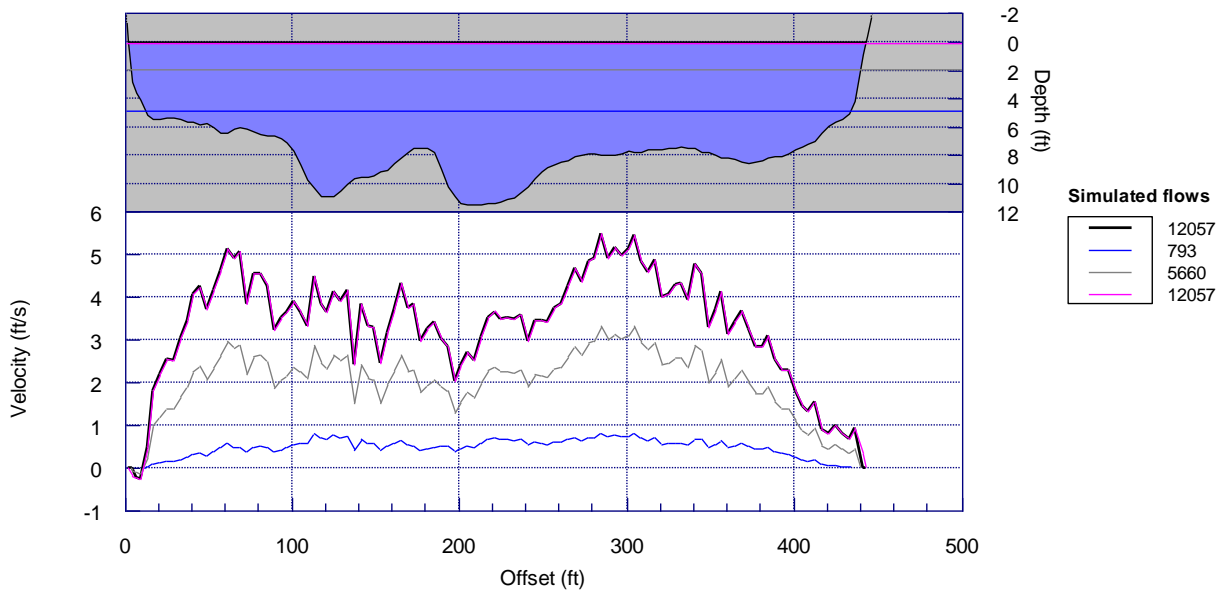
Appendix C

Cross Section Profiles - WSE, Measured Velocities and Simulated Velocities at Calibration Flows

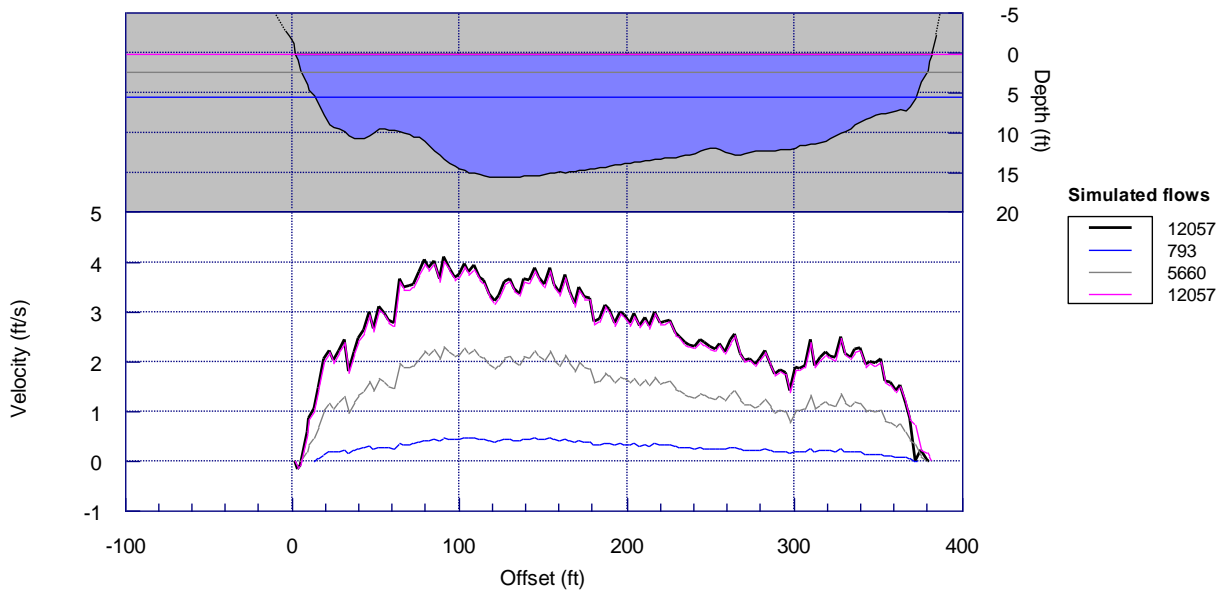
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Wilder Reach 1

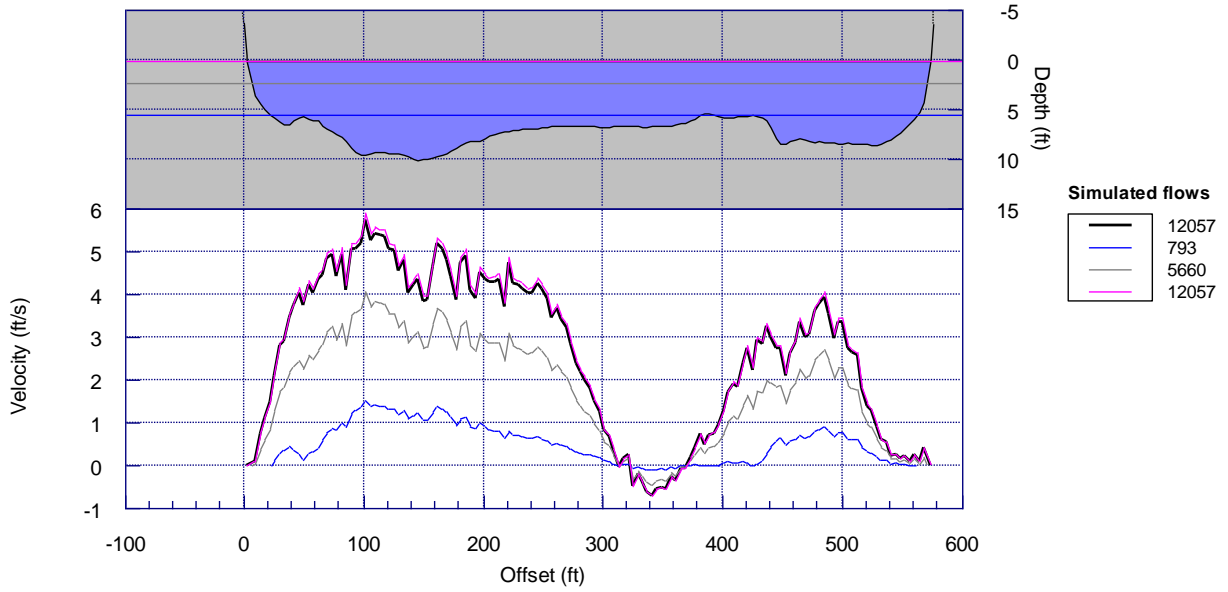
Cross-section: WR1-10 Glide: Manning Ns applied IFG4 method



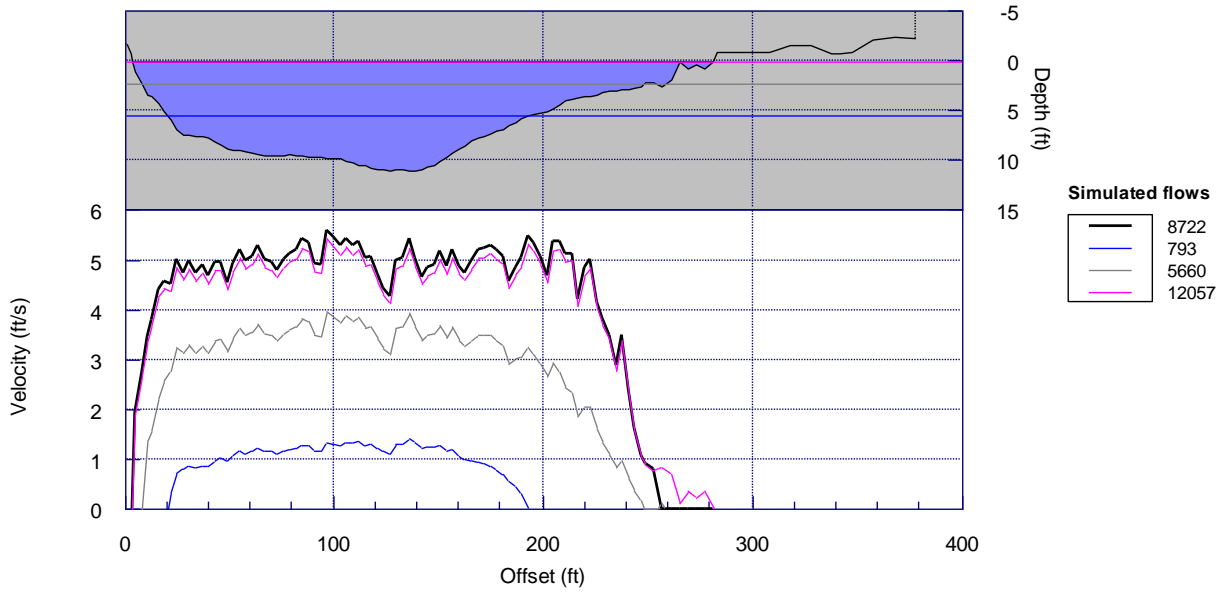
Cross-section: WR1-9 Pool: Manning Ns applied IFG4 method



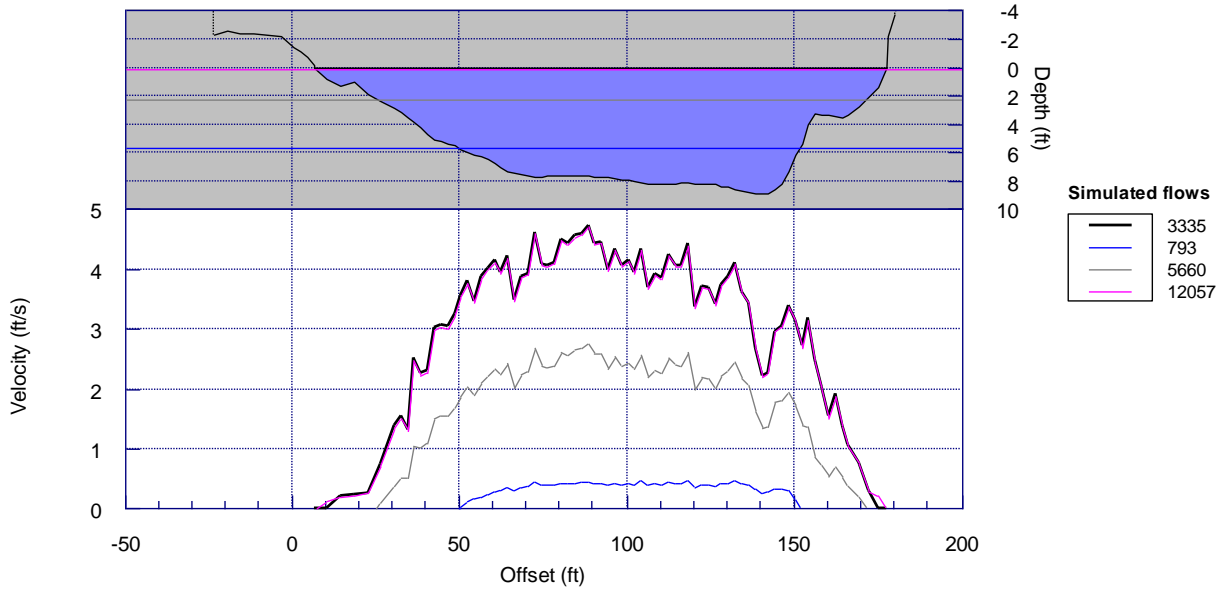
Cross-section: WR1-8 Run: Manning Ns applied IFG4 method



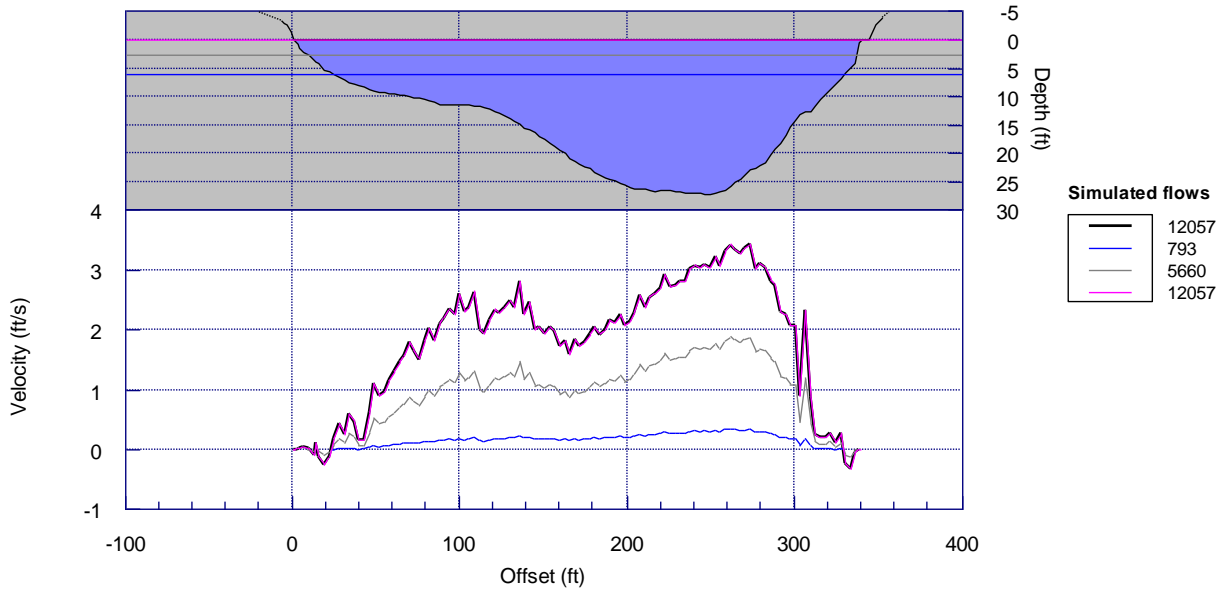
Cross-section: WR1-7 RC Run: Manning Ns applied IFG4 method



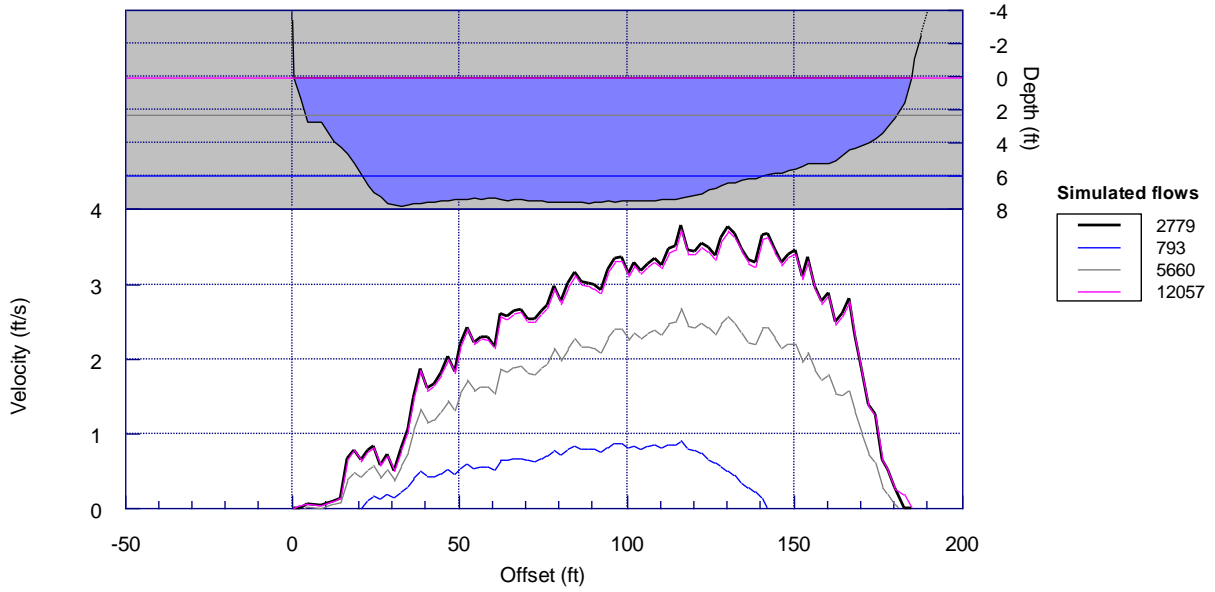
Cross-section: WR1-7 LC Run: Manning Ns applied IFG4 method



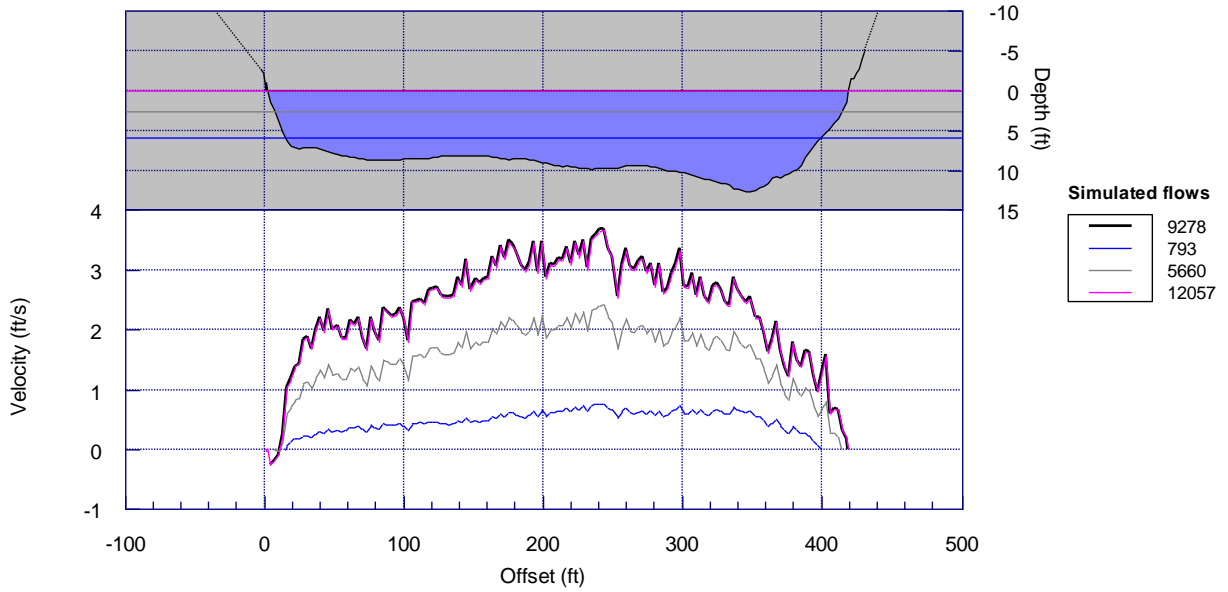
Cross-section: WR1-6 Pool: Manning Ns applied IFG4 method



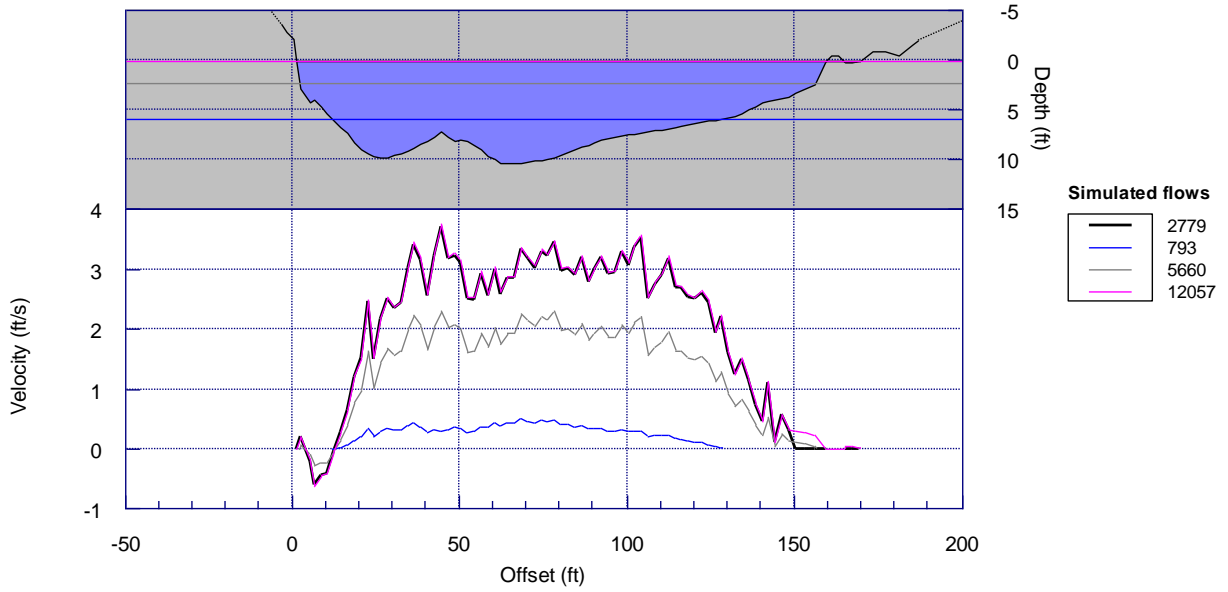
Cross-section: WR1-5 RC Run: Manning Ns applied IFG4 method



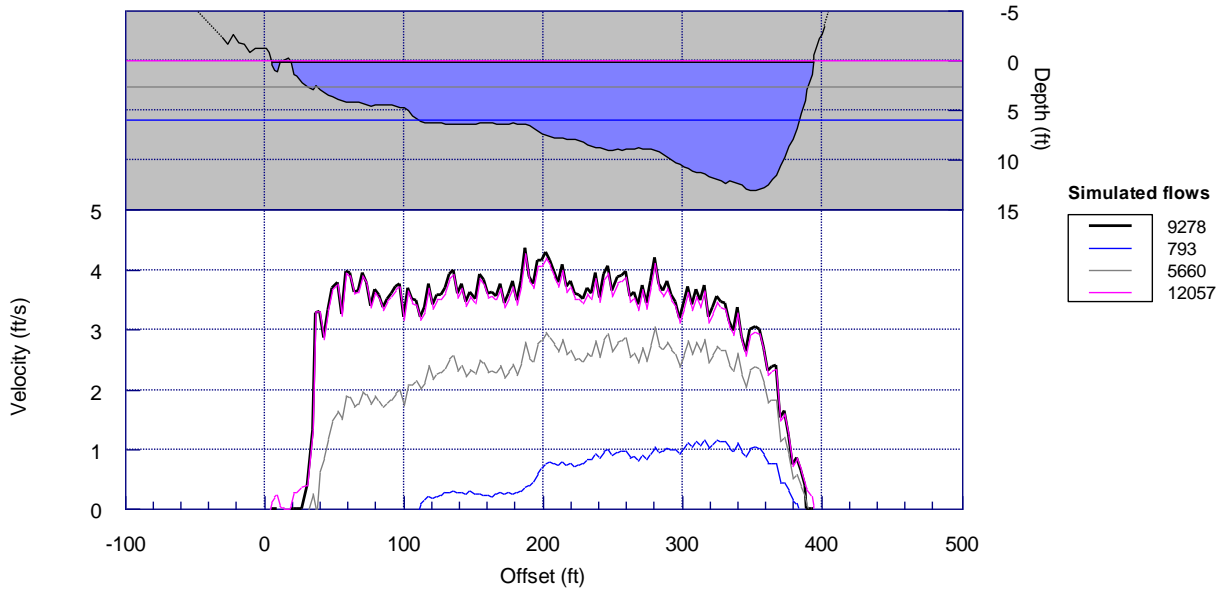
Cross-section: WR1-5 LC Glide: Manning Ns applied IFG4 method



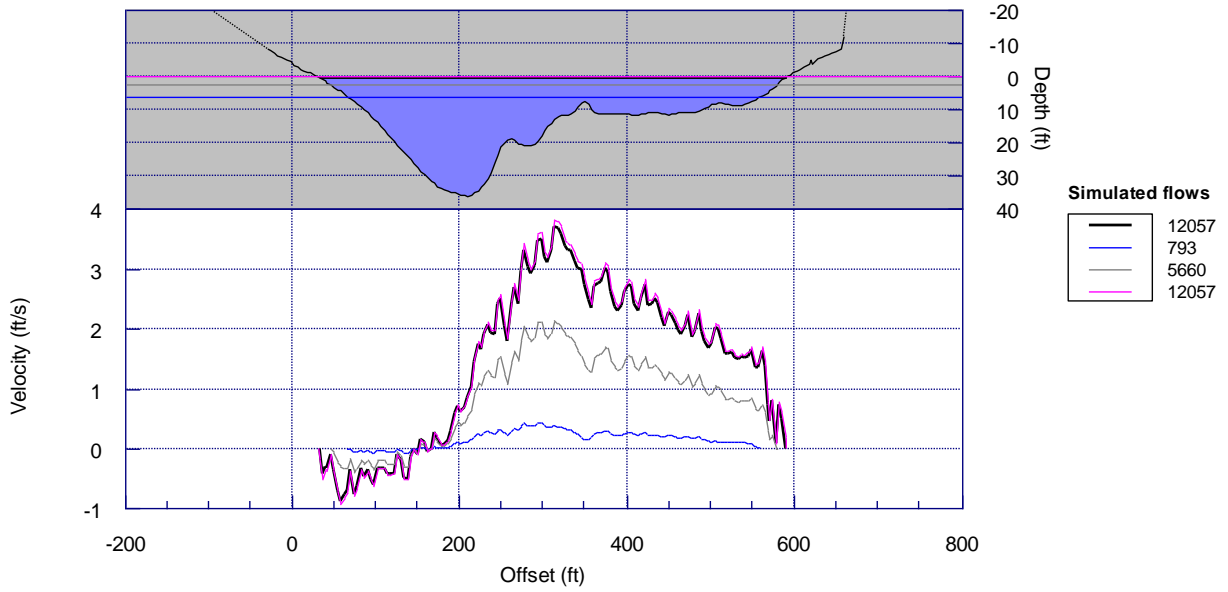
Cross-section: WR1-4 RC Run: Manning Ns applied IFG4 method



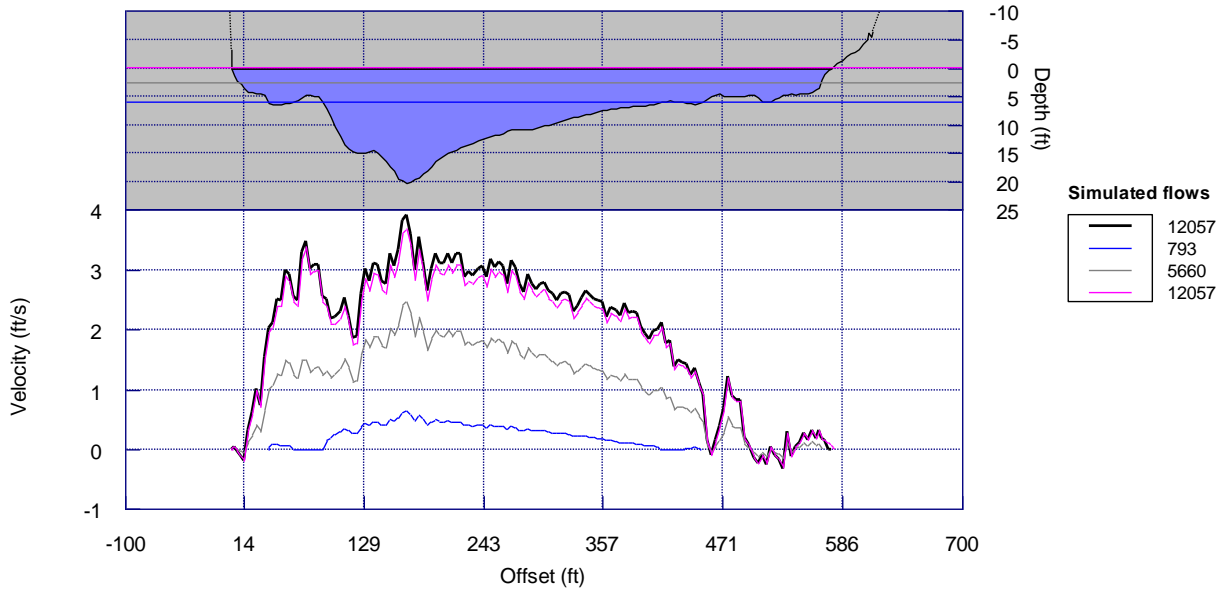
Cross-section: WR1-4 LC Run: Manning Ns applied IFG4 method



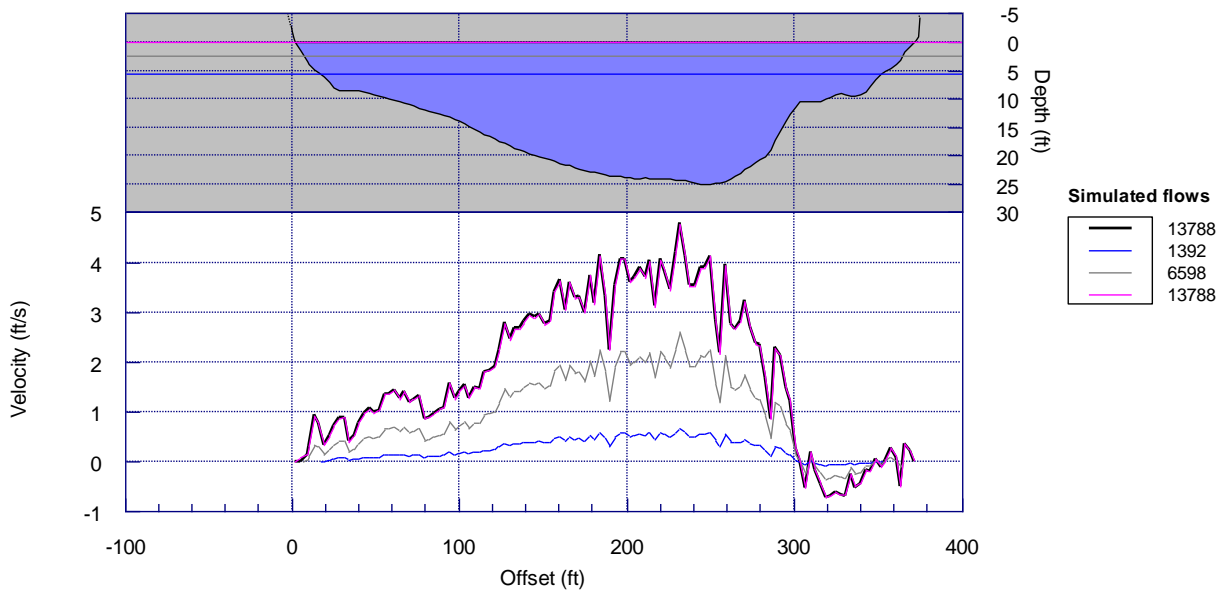
Cross-section: WR1-3 Pool: Manning Ns applied IFG4 method



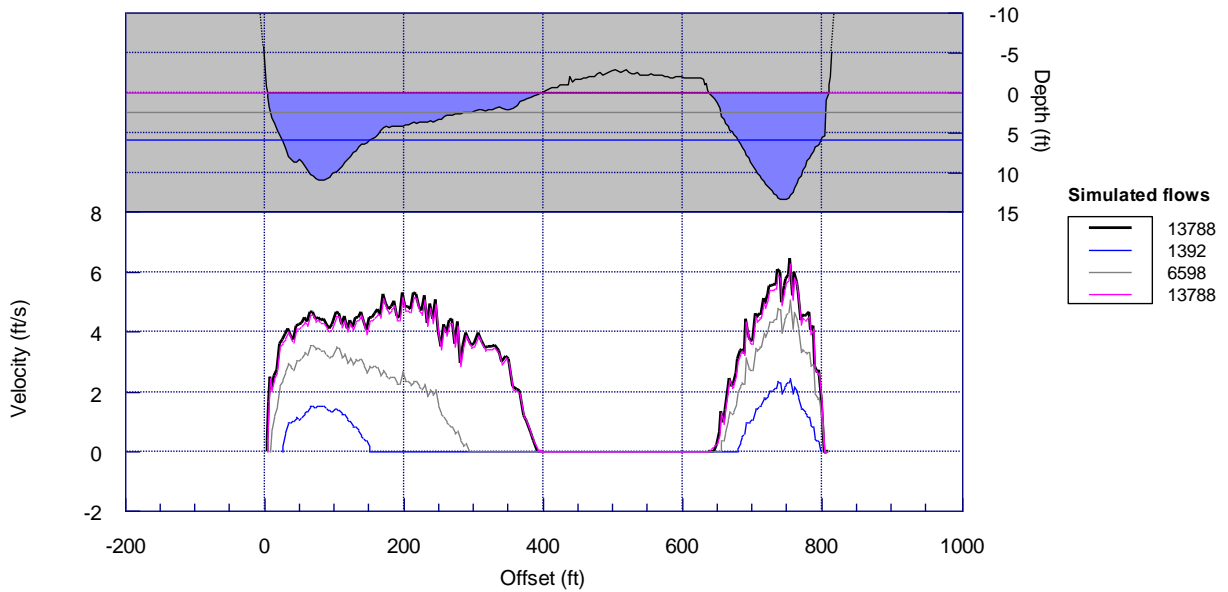
Cross-section: WR1-1 Pool: Manning Ns applied IFG4 method



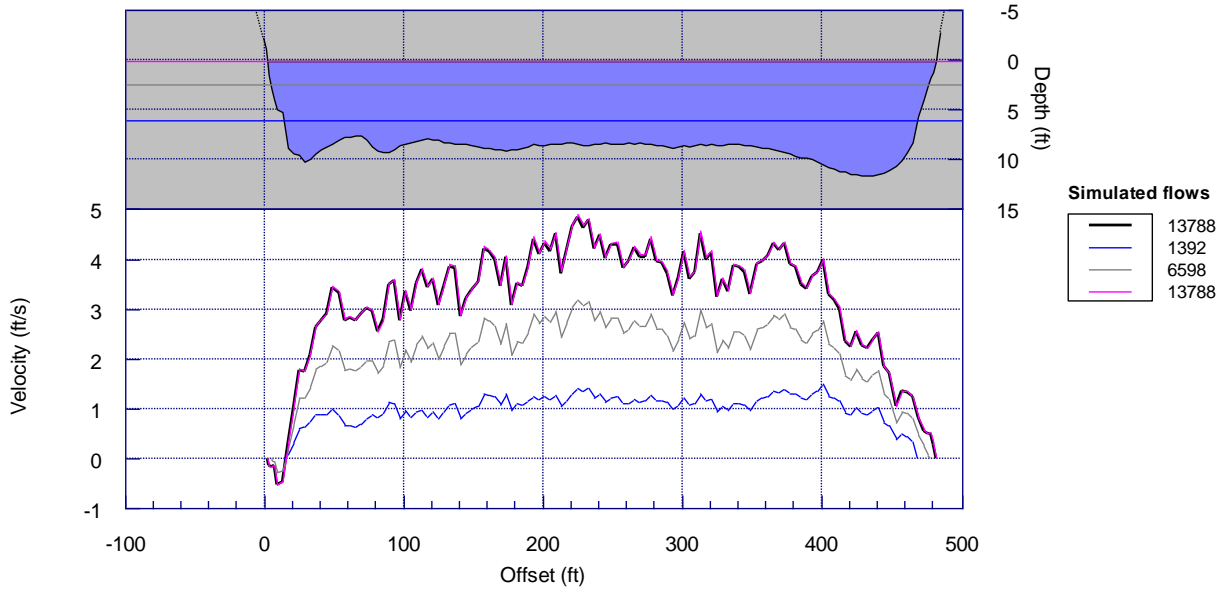
Cross-section: WR2-14 Pool: Manning Ns applied IFG4 method



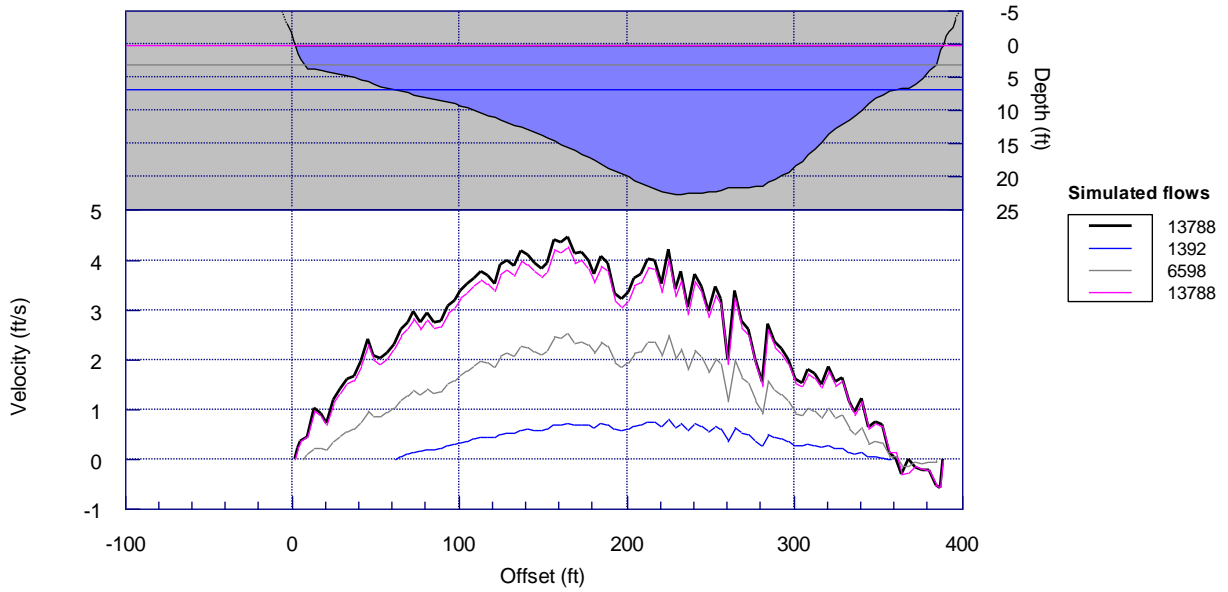
Cross-section: WR2-13 Run: Manning Ns applied IFG4 method



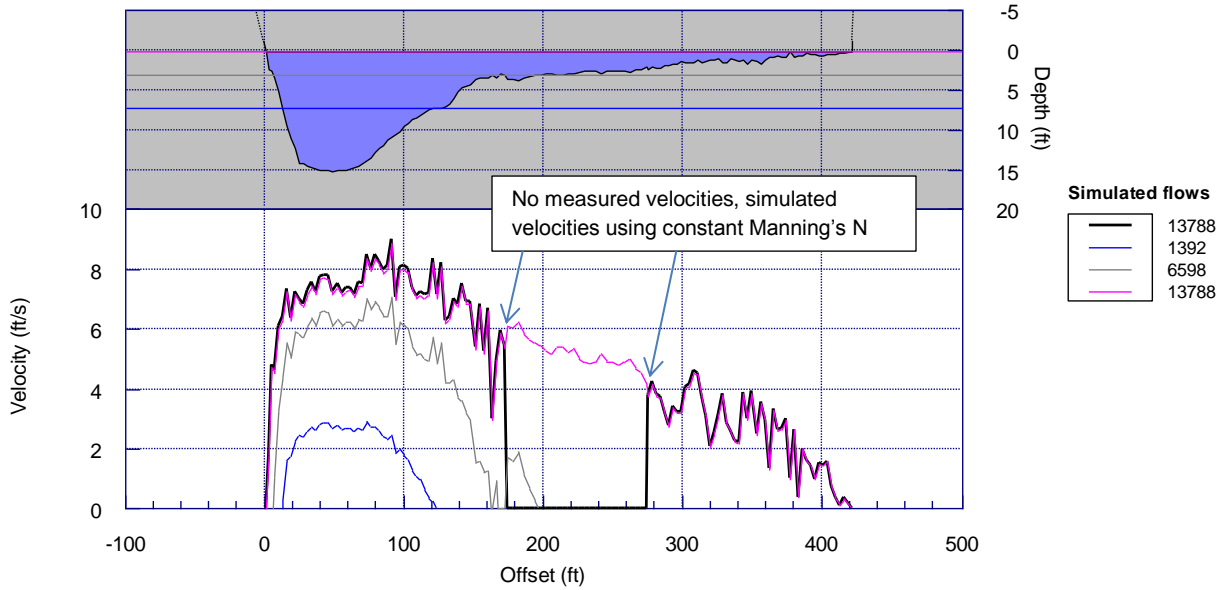
Cross-section: WR2-12 Glide: Manning Ns applied IFG4 method



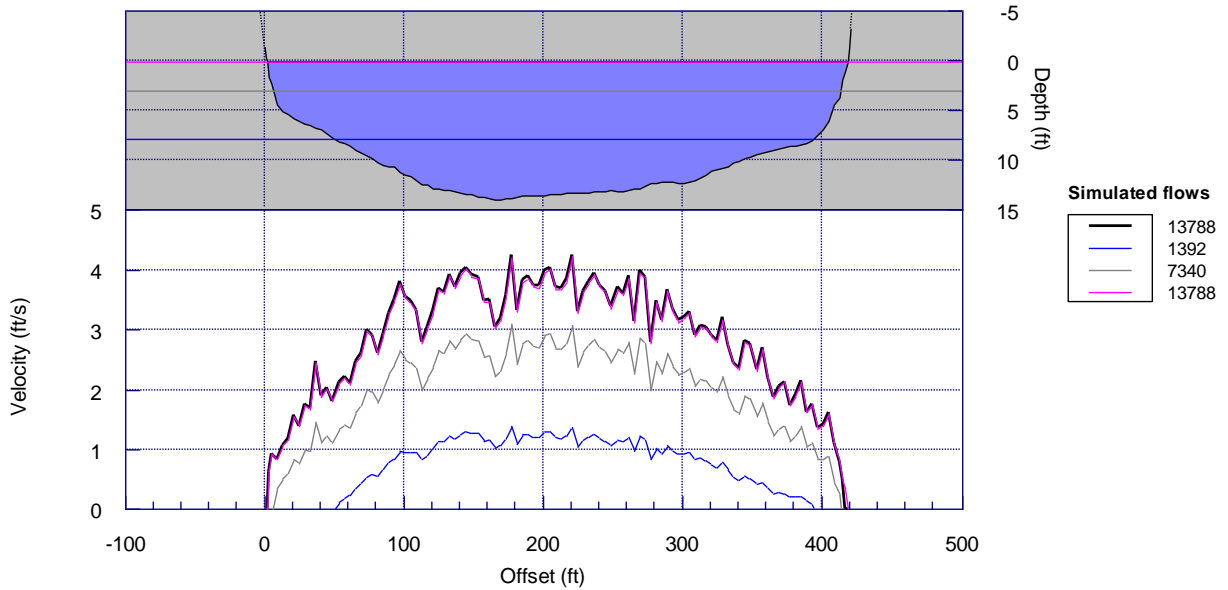
Cross-section: WR2-11 Pool: Manning Ns applied IFG4 method



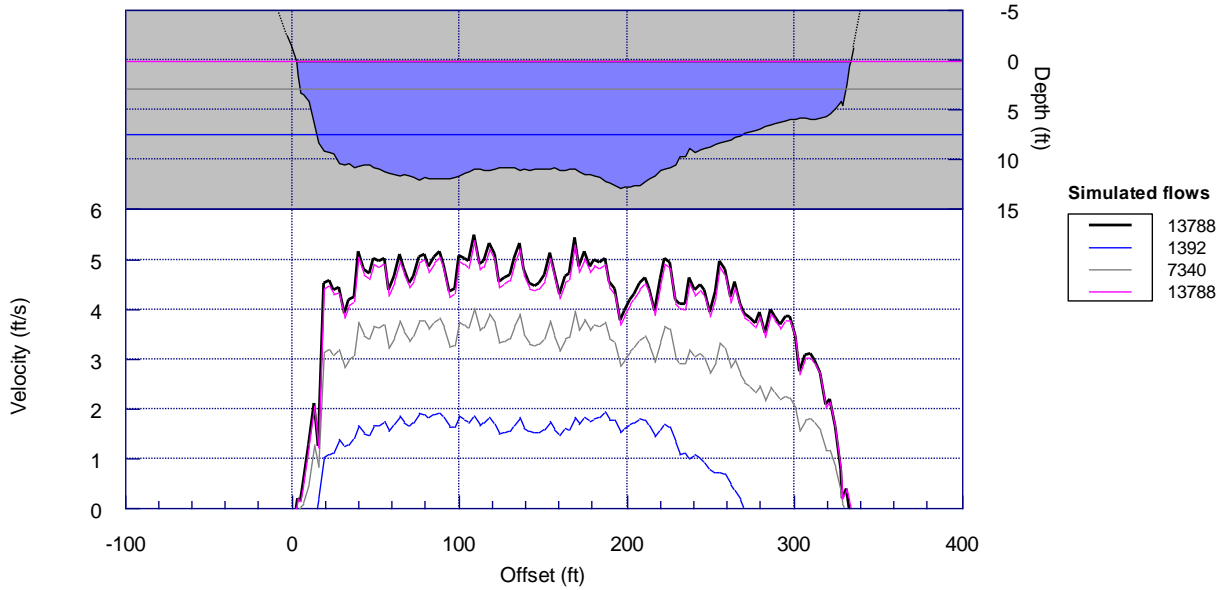
Cross-section: WR2-10 Run: Manning Ns applied IFG4 method



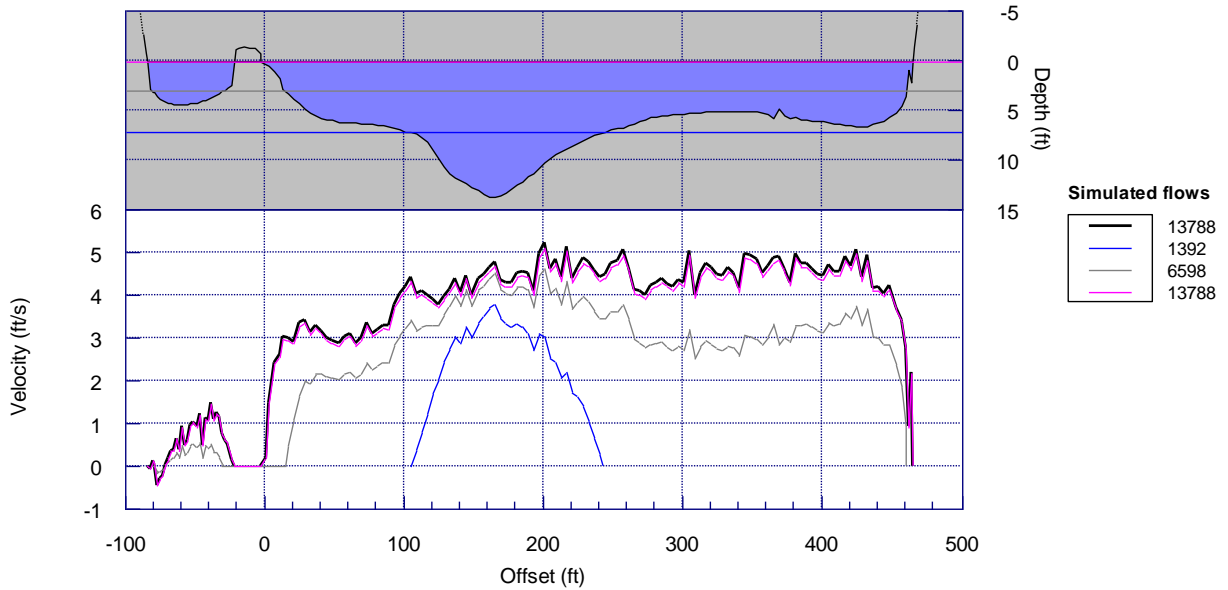
Cross-section: WR2-9 Pool: Manning Ns applied IFG4 method



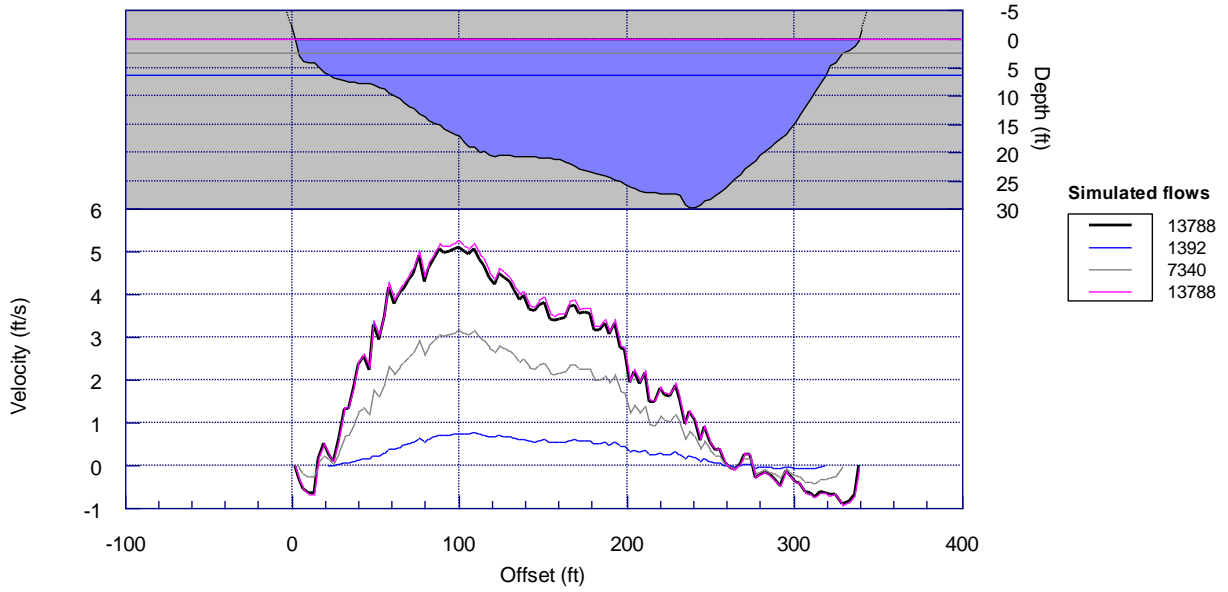
Cross-section: WR2-8 Run: Manning Ns applied IFG4 method



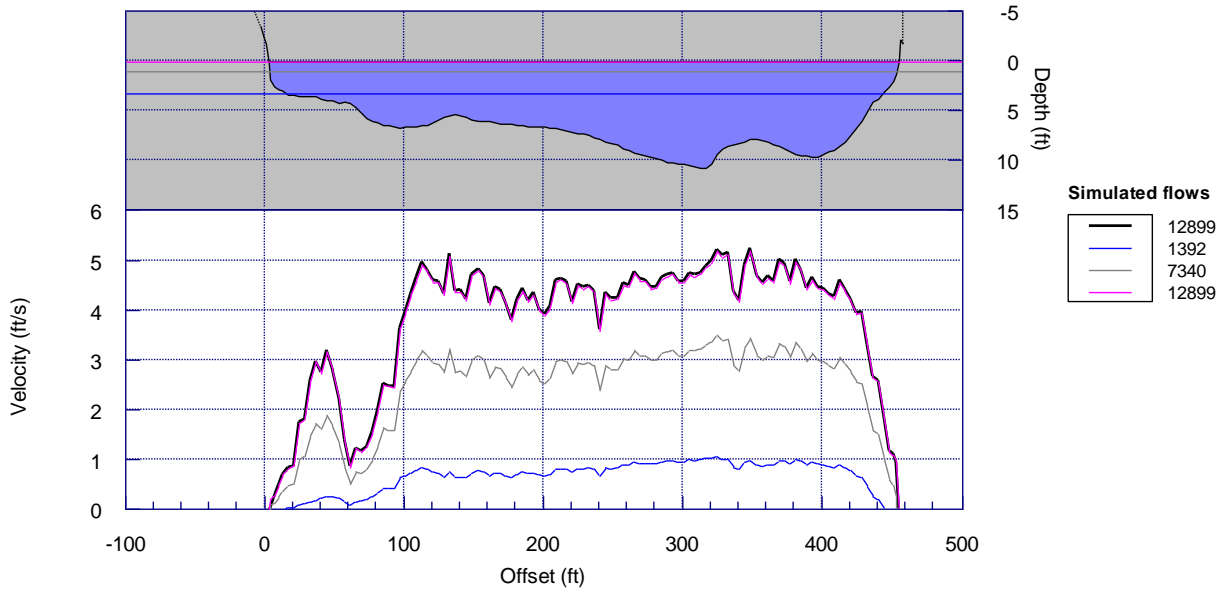
Cross-section: WR2-7b Run: Manning Ns applied IFG4 method



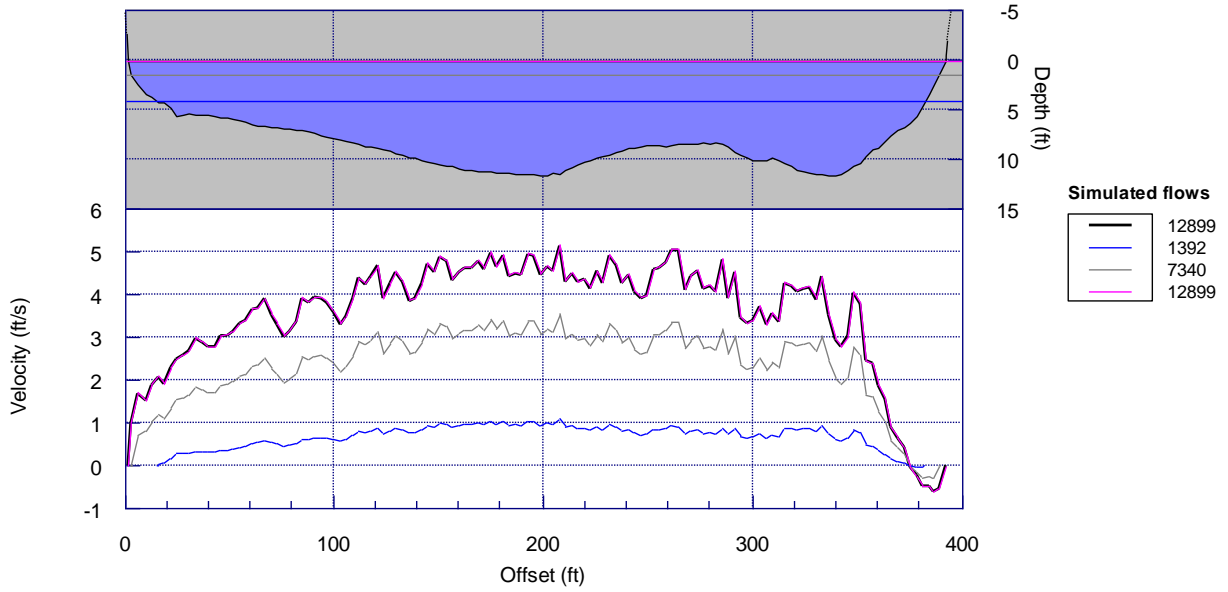
Cross-section: WR2-7 Pool: Manning Ns applied IFG4 method



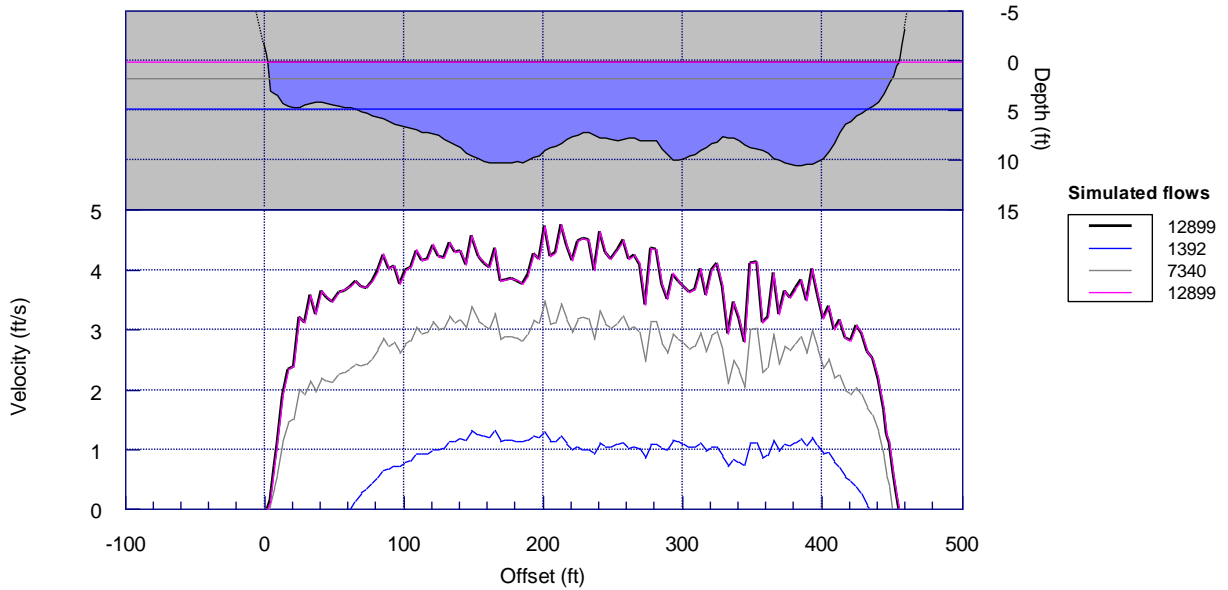
Cross-section: WR2-6 Glide: Manning Ns applied IFG4 method



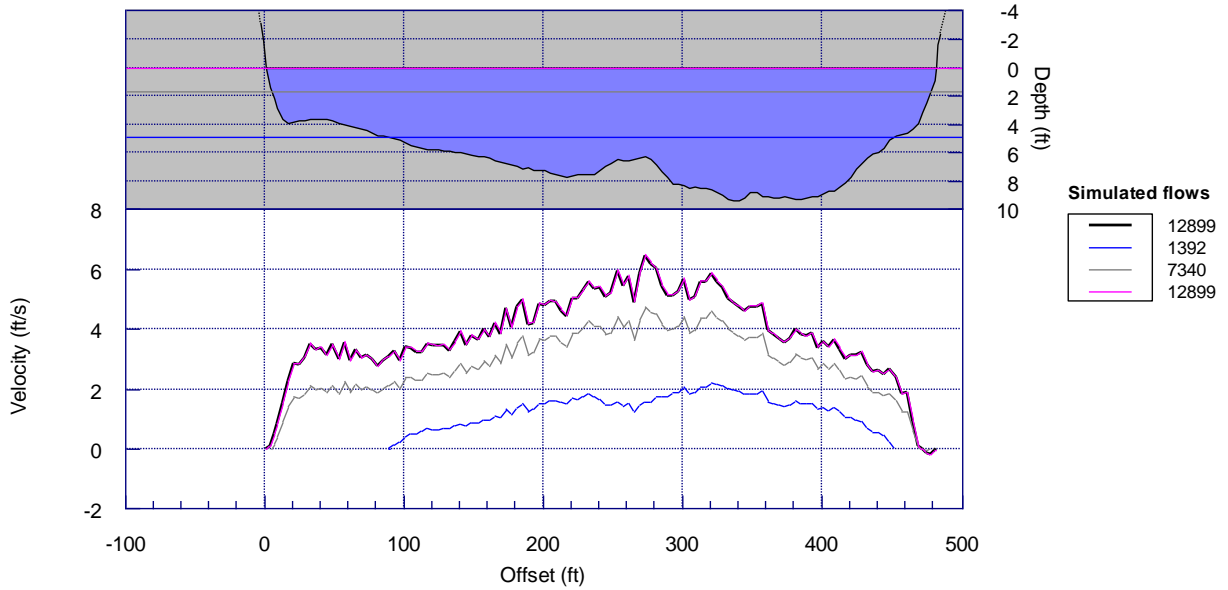
Cross-section: WR2-5 Pool: Manning Ns applied IFG4 method



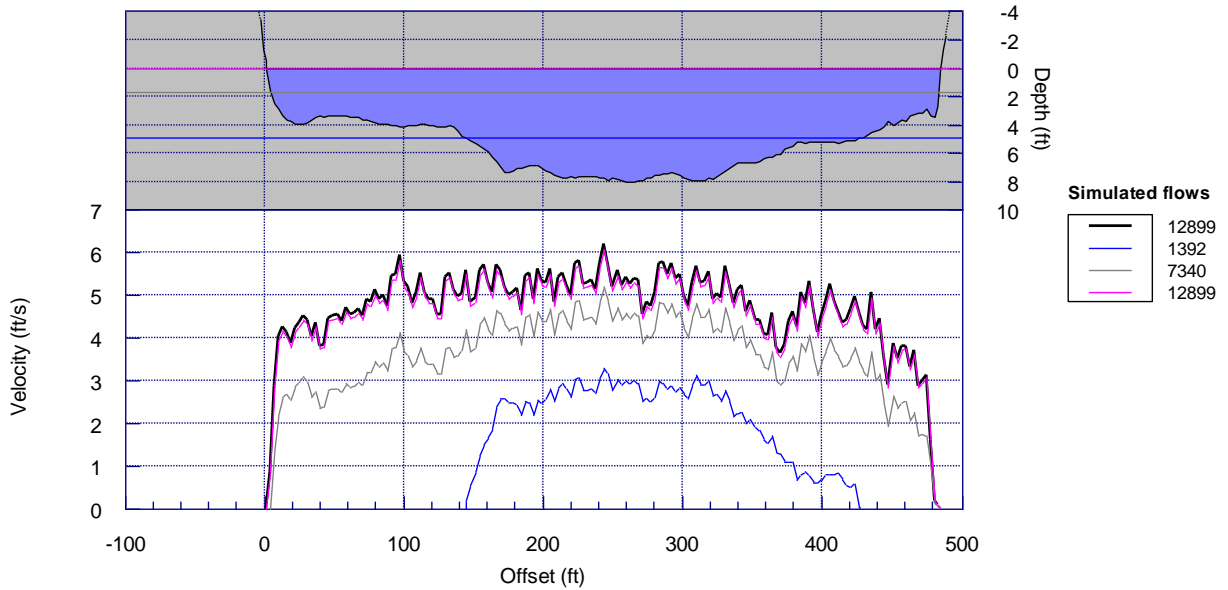
Cross-section: WR2-4 Glide: Manning Ns applied IFG4 method



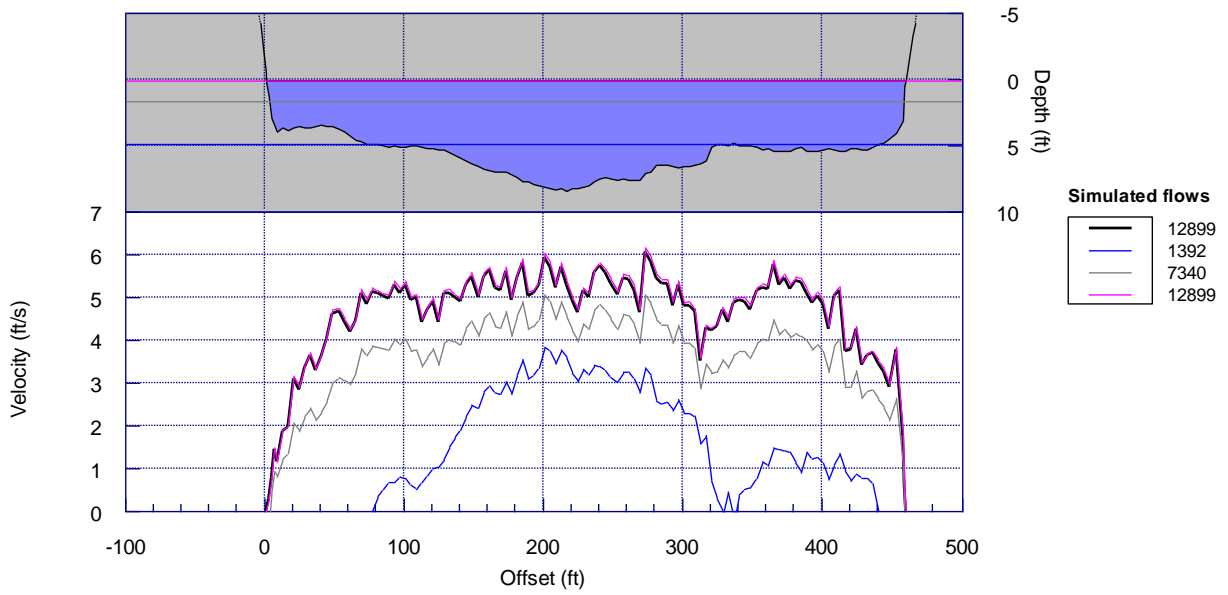
Cross-section: WR2-3 Run: Manning Ns applied IFG4 method



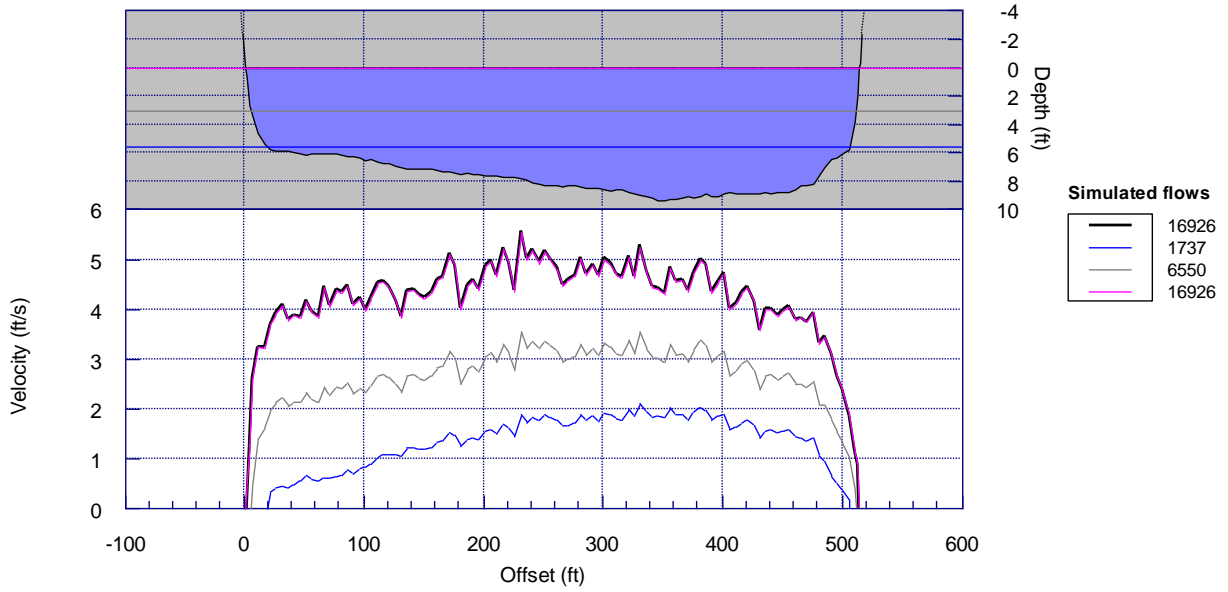
Cross-section: WR2-2 Riffle: Manning Ns applied IFG4 method



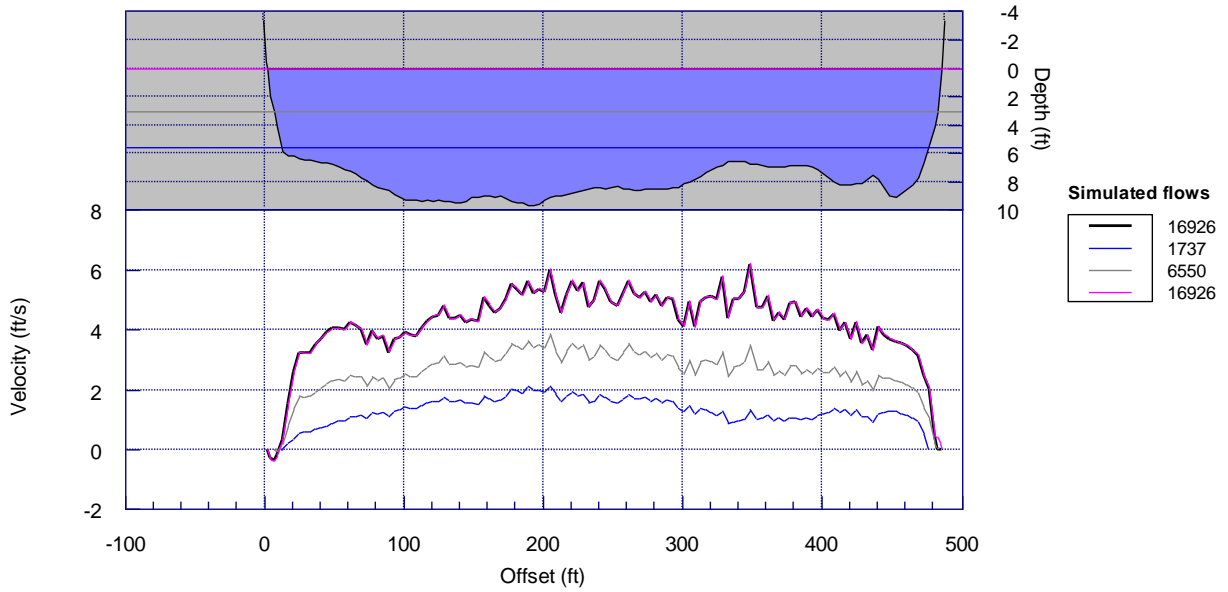
Cross-section: WR2-1 Run: Manning Ns applied IFG4 method



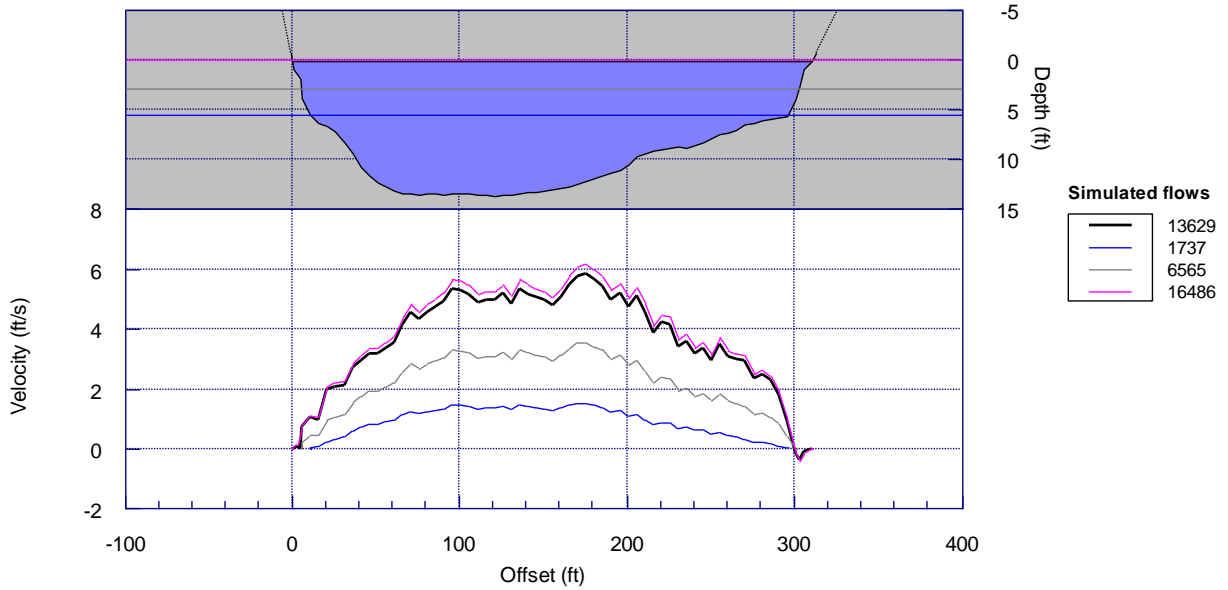
Cross-section: WR3-13 Glide: Manning Ns applied IFG4 method



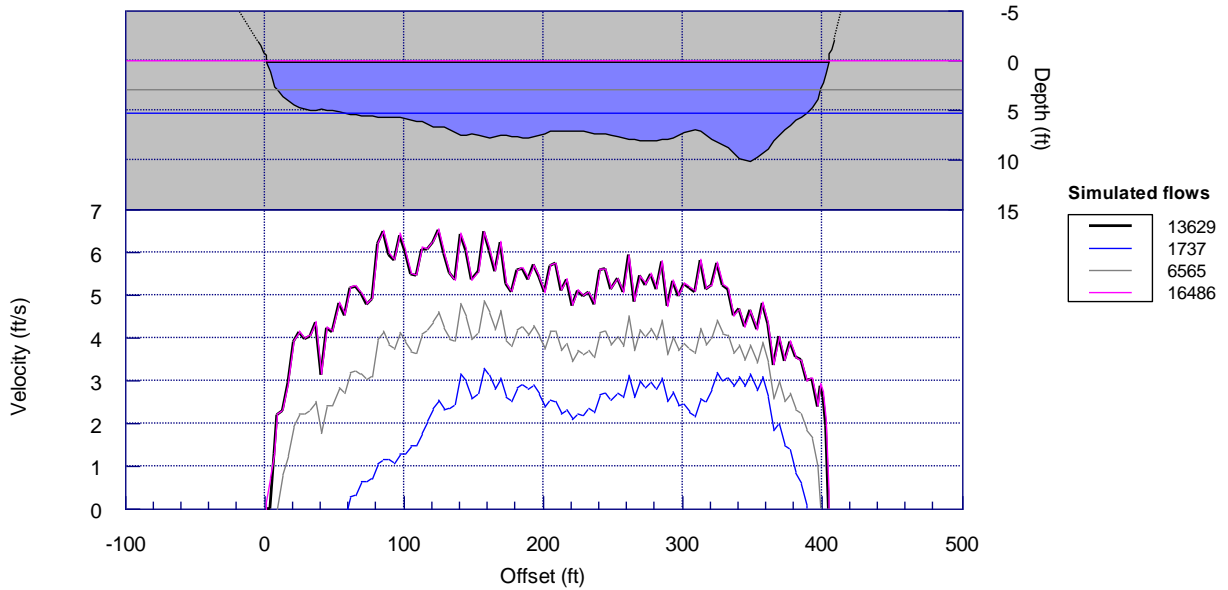
Cross-section: WR3-12 Riffle: Manning Ns applied IFG4 method



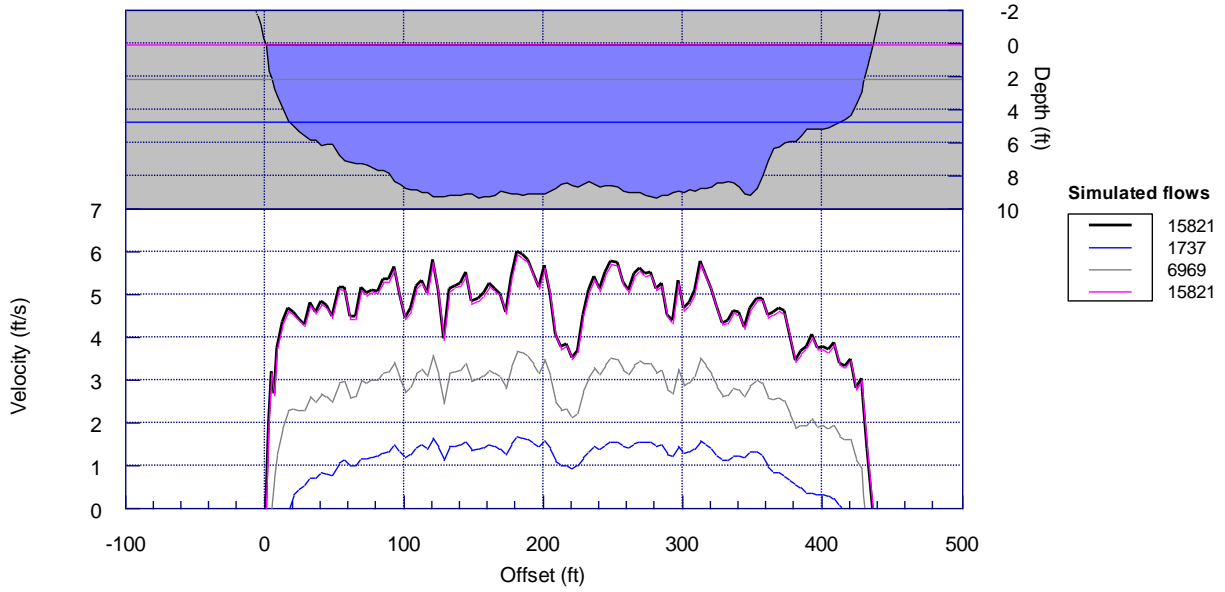
Cross-section: WR3-11 Pool: Manning Ns applied IFG4 method



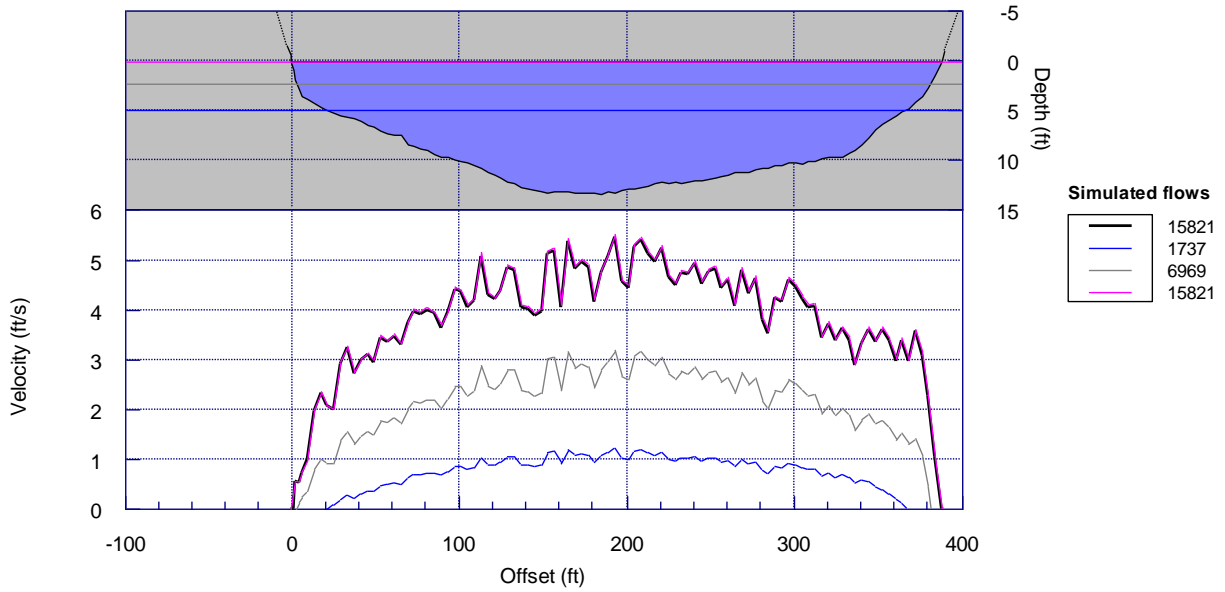
Cross-section: WR3-10 Riffle: Manning Ns applied IFG4 method



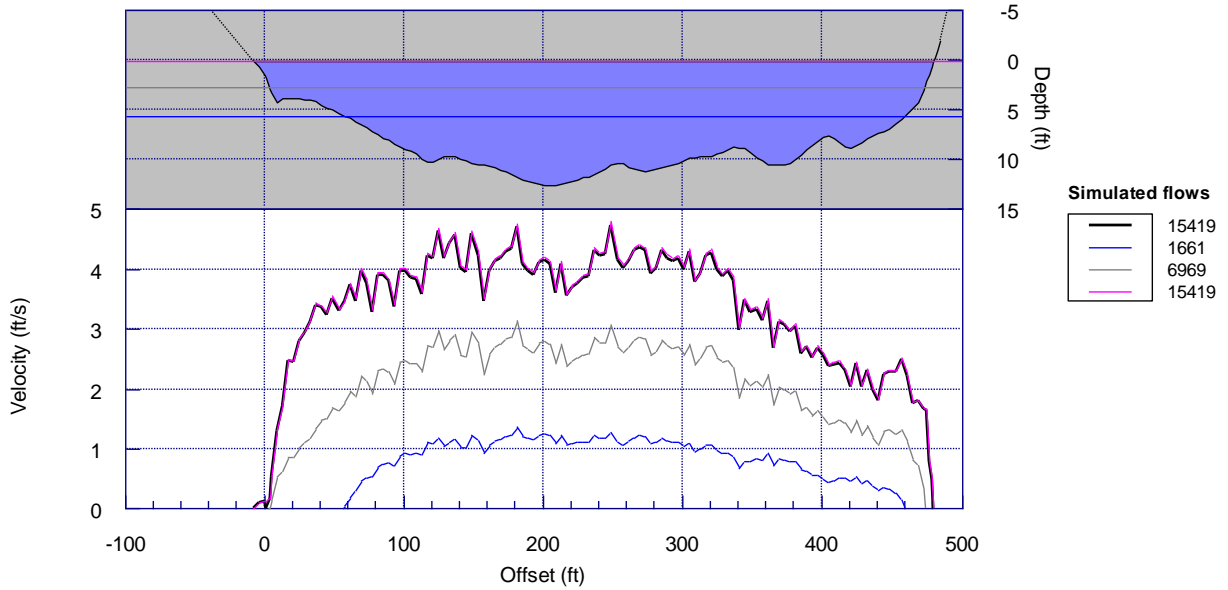
Cross-section: WR3-9 Glide: Manning Ns applied IFG4 method



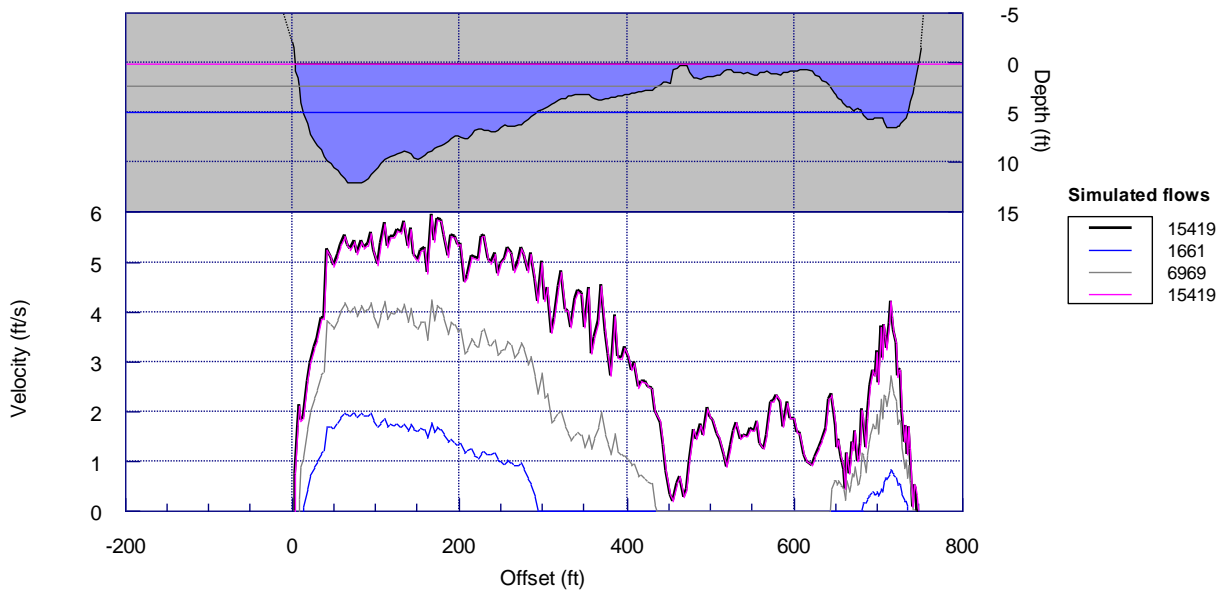
Cross-section: WR3-8 Pool: Manning Ns applied IFG4 method



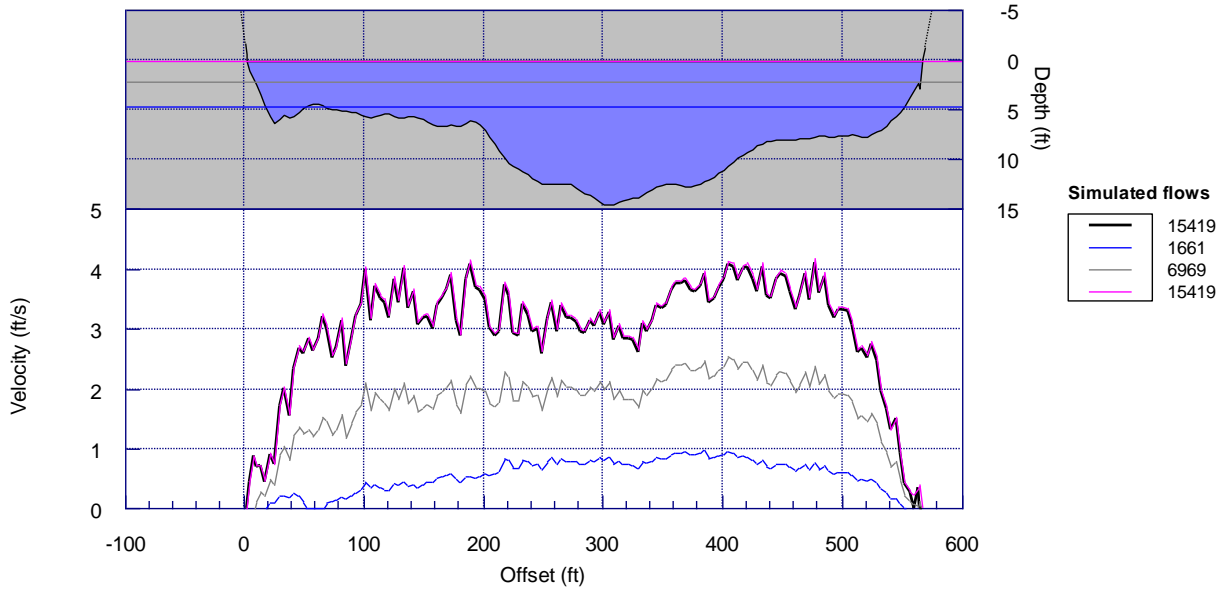
Cross-section: WR3-7 Glide: Manning Ns applied IFG4 method



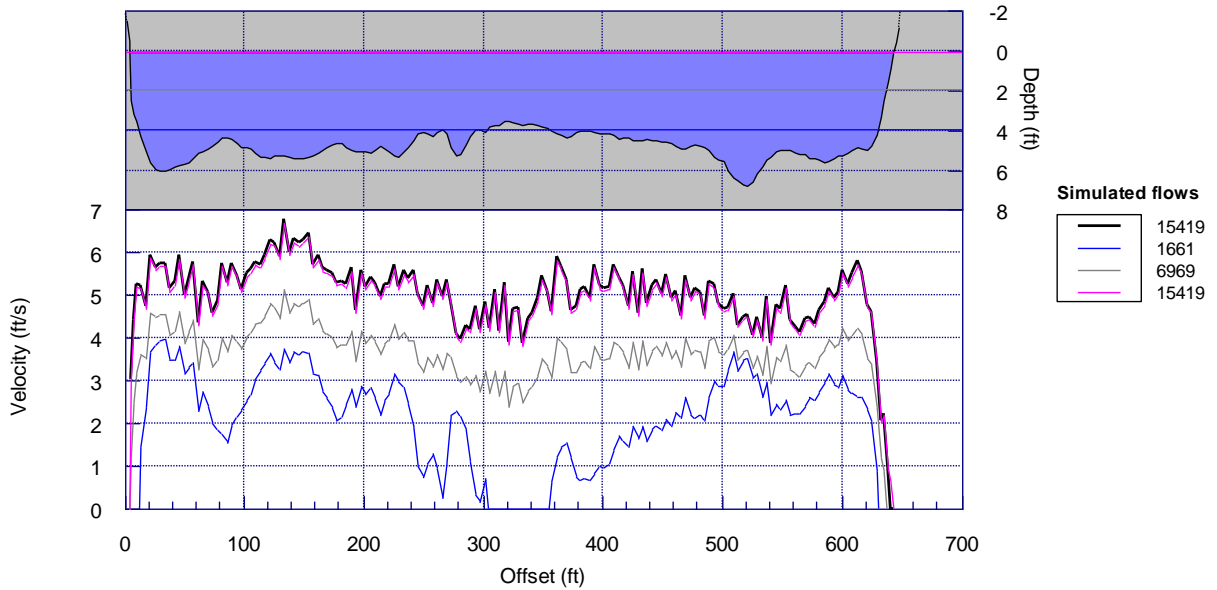
Cross-section: WR3-6 Run: Manning Ns applied IFG4 method



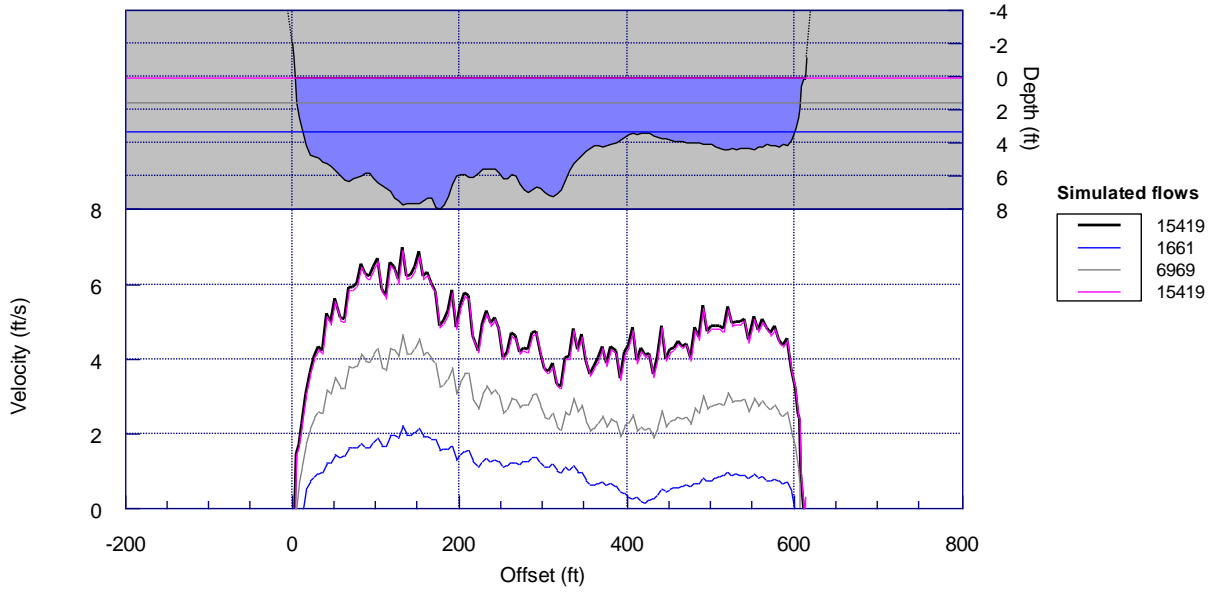
Cross-section: WR3-5 Run: Manning Ns applied IFG4 method



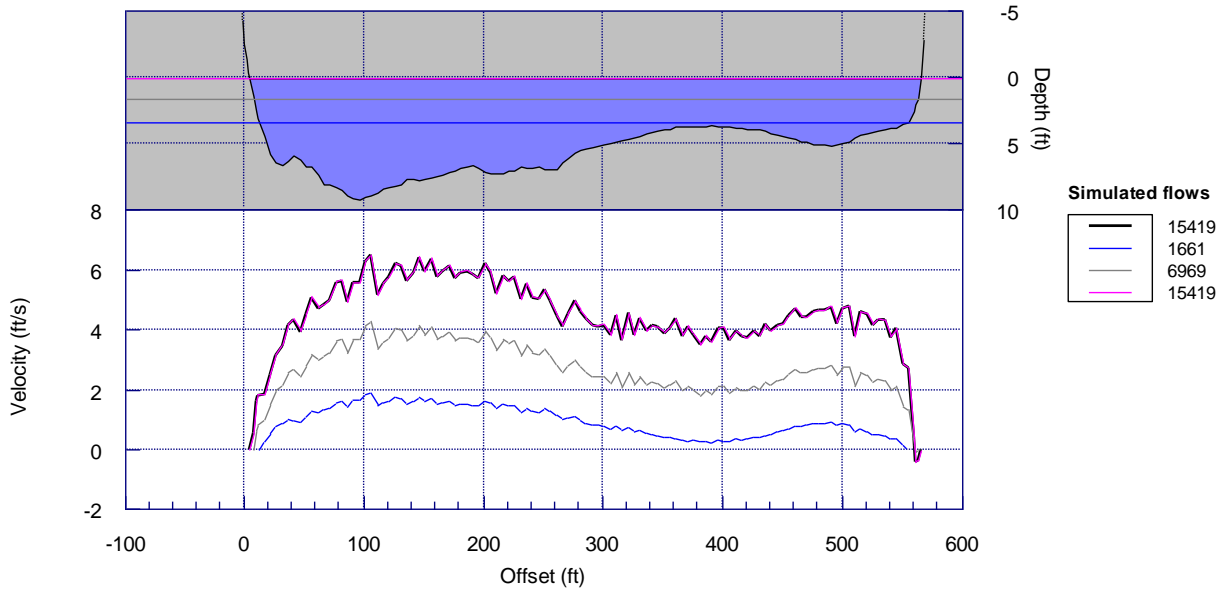
Cross-section: WR3-4 Riffle: Manning Ns applied IFG4 method



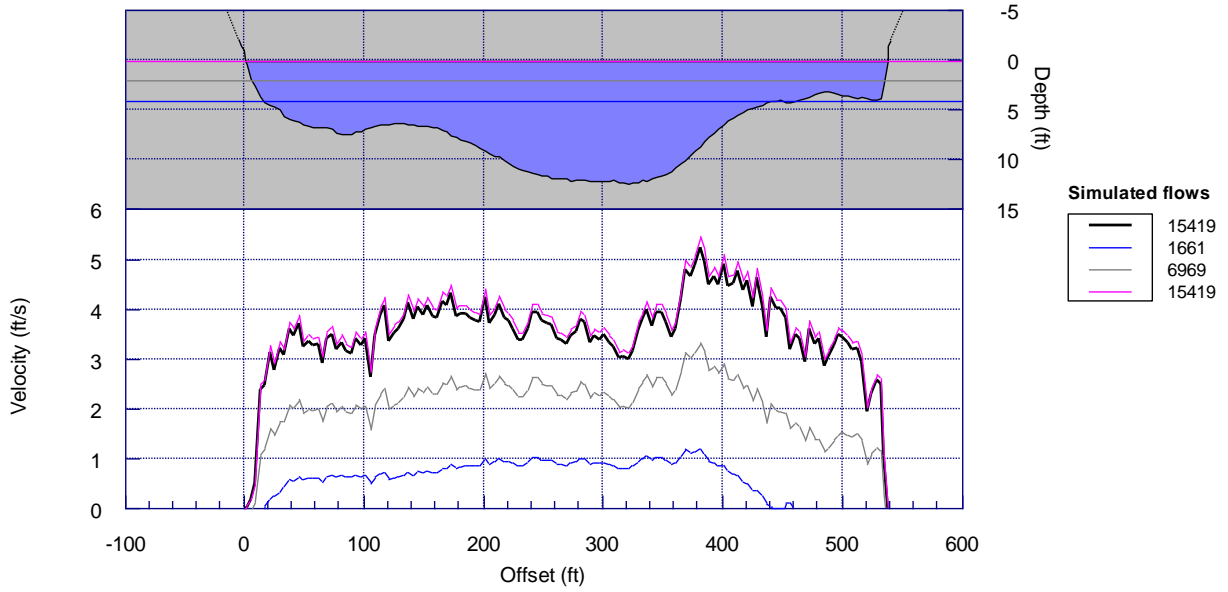
Cross-section: WR3-3 Glide: Manning Ns applied IFG4 method



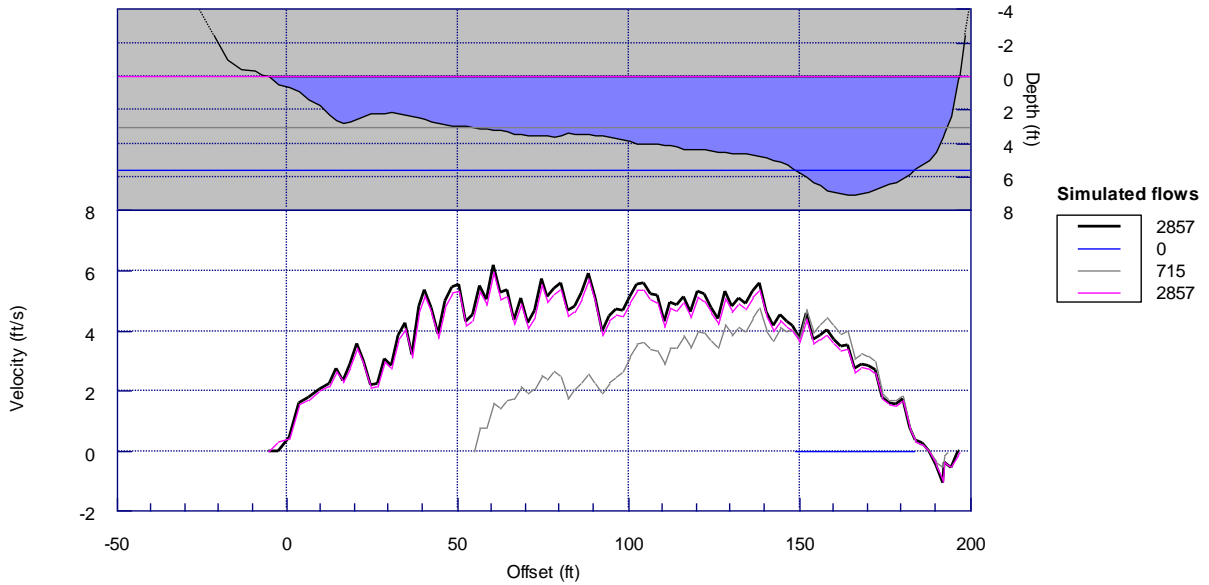
Cross-section: WR3-2 Pool: Manning Ns applied IFG4 method



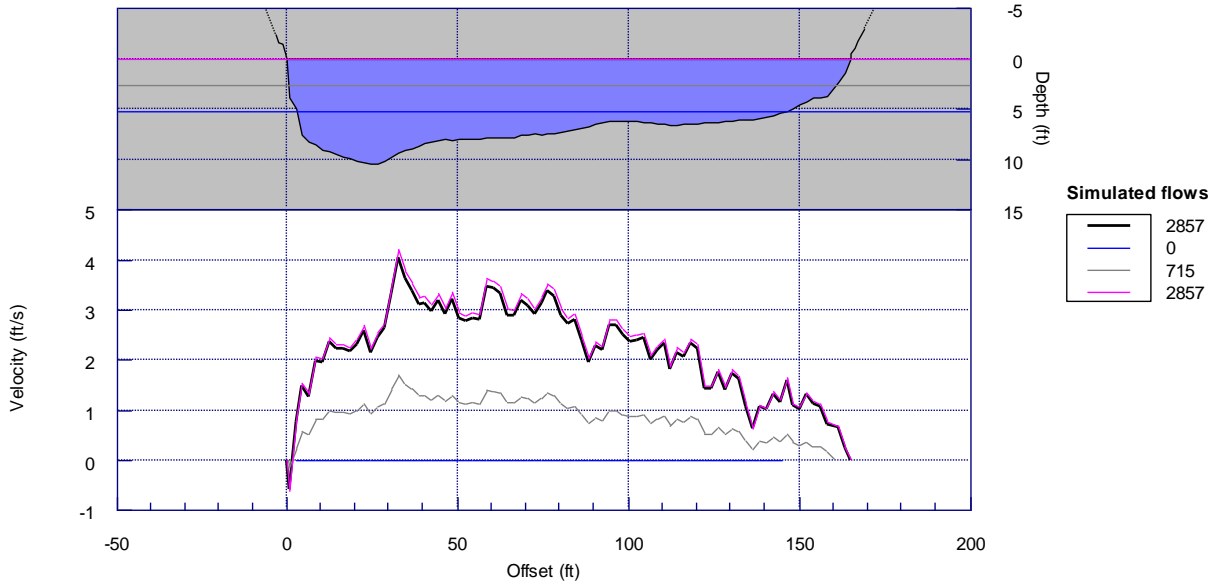
Cross-section: WR3-1 Glide: Manning Ns applied IFG4 method



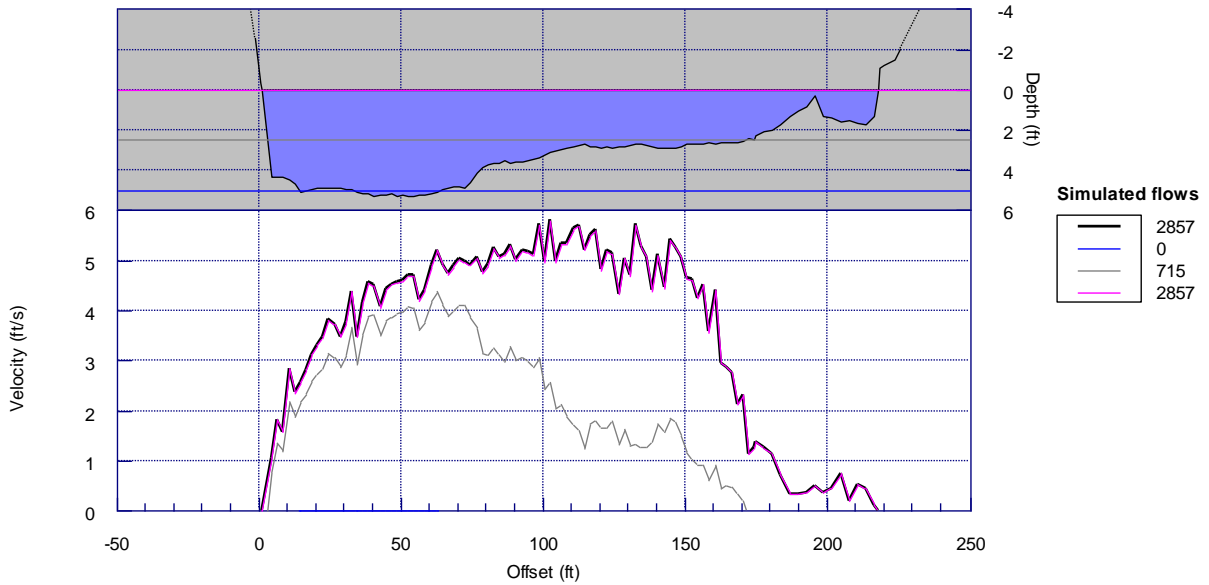
Cross-section: WR3-3 SC Riffle: Manning Ns applied IFG4 method



Cross-section: WR3-2 SC Pool: Manning Ns applied IFG4 method

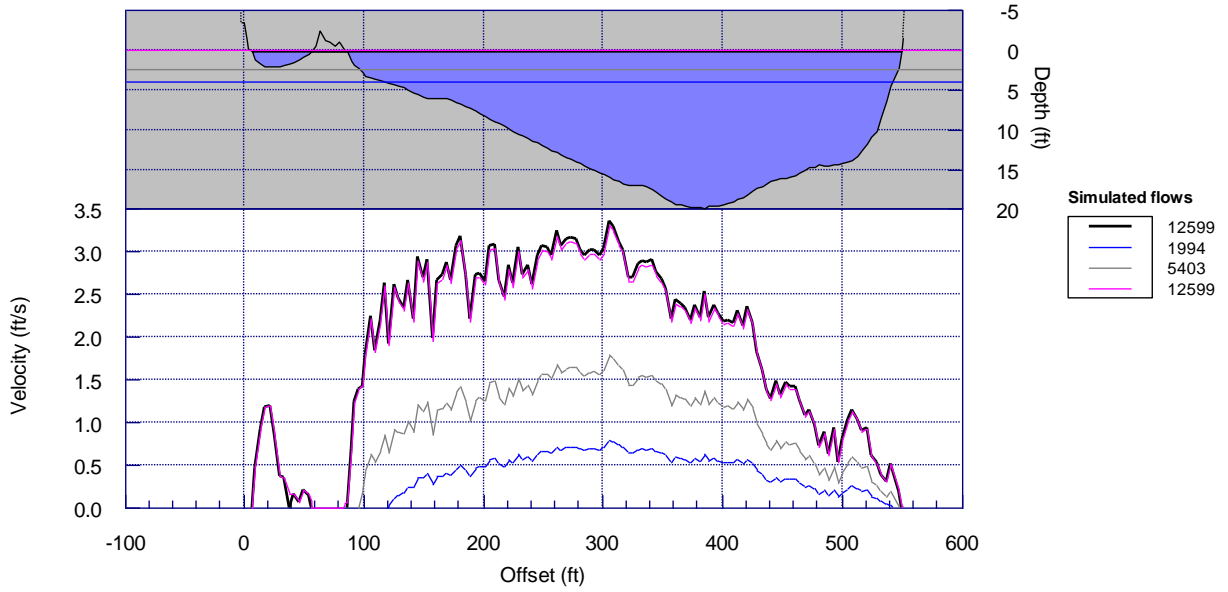


Cross-section: WR3-1 SC Riffle: Manning Ns applied IFG4 method

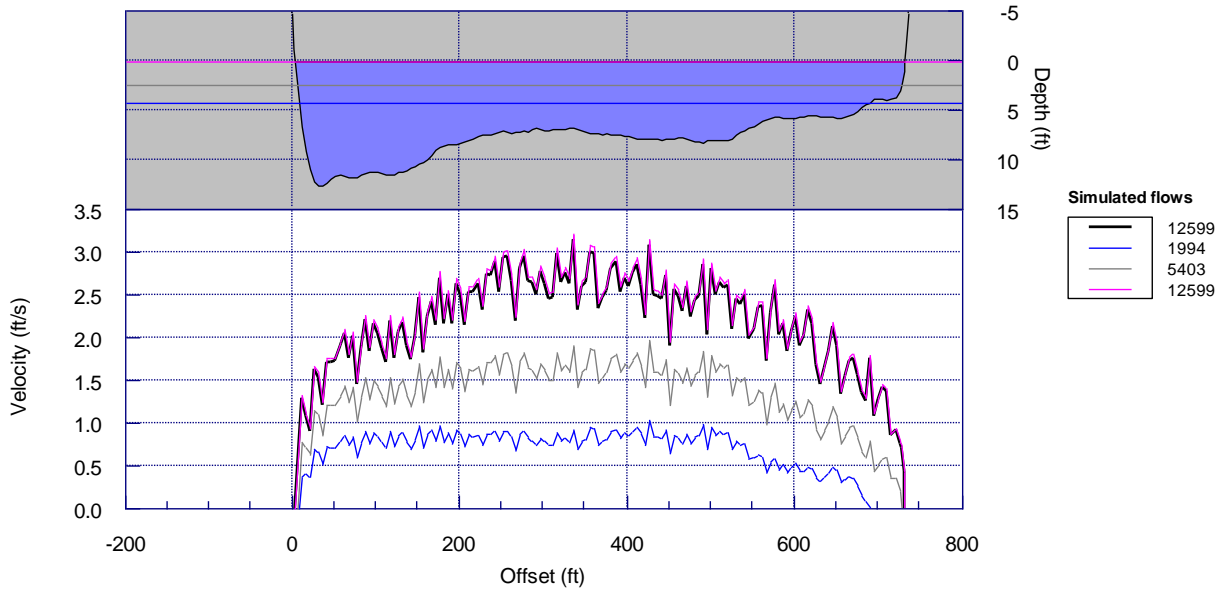


Bellows Falls

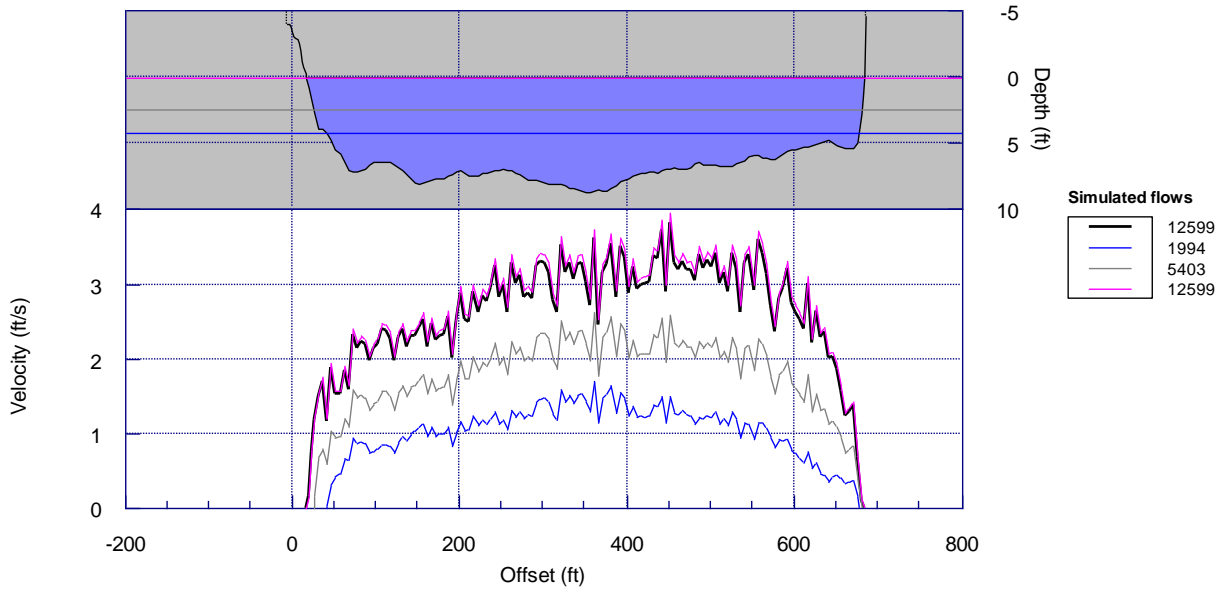
Cross-section: BF19 Pool: Manning Ns applied IFG4 method



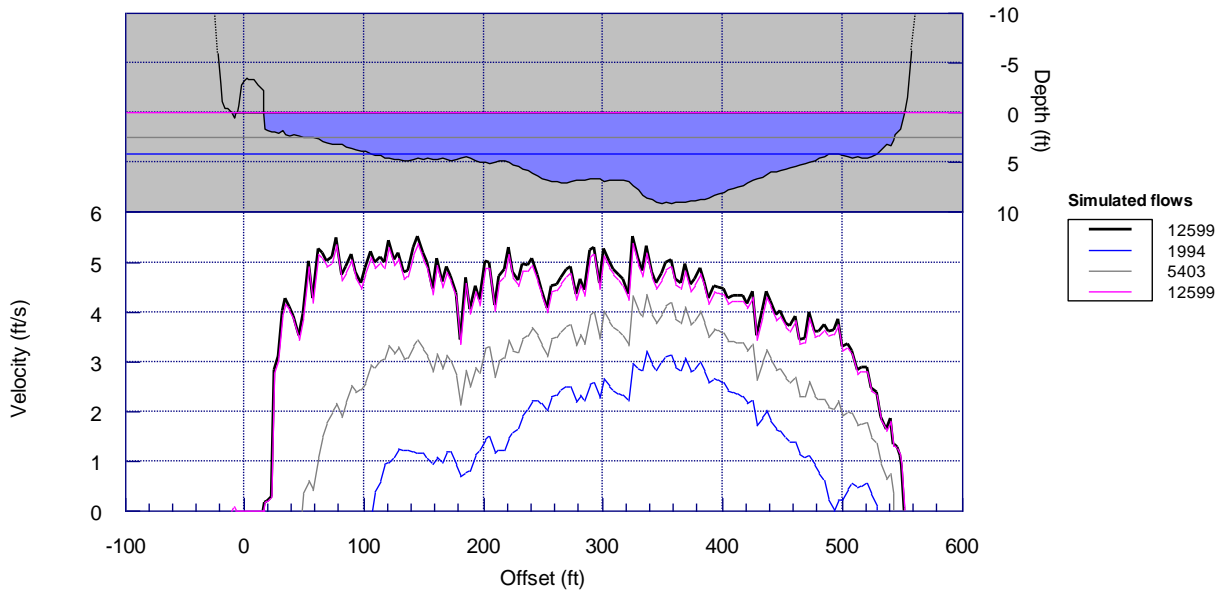
Cross-section: BF18 Glide: Manning Ns applied IFG4 method



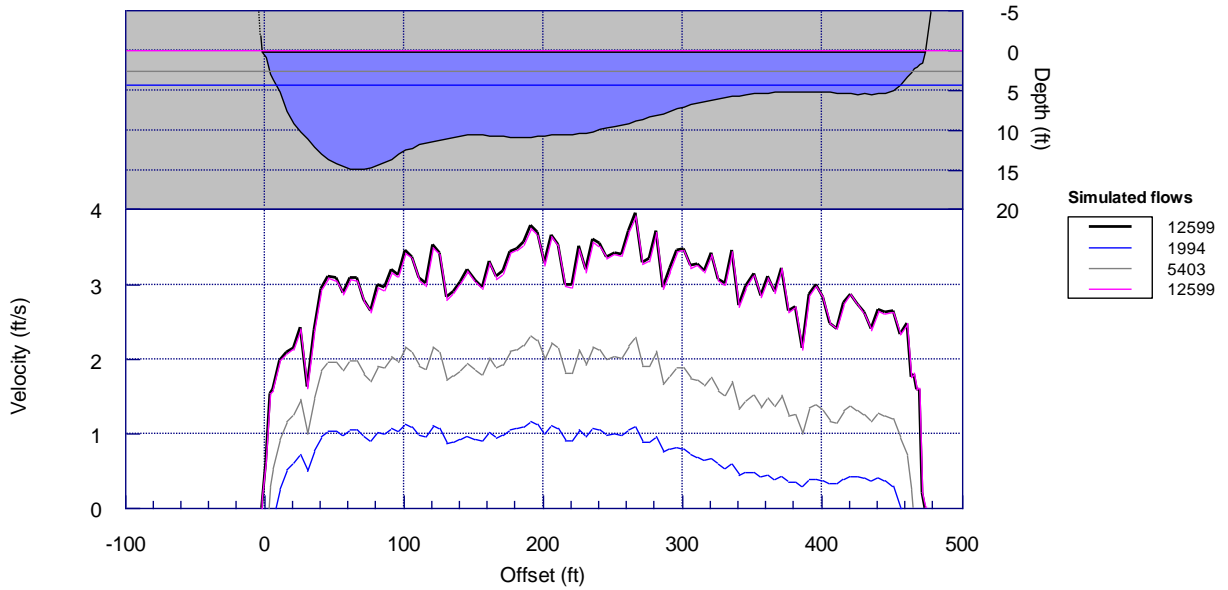
Cross-section: BF17 Pool: Manning Ns applied IFG4 method



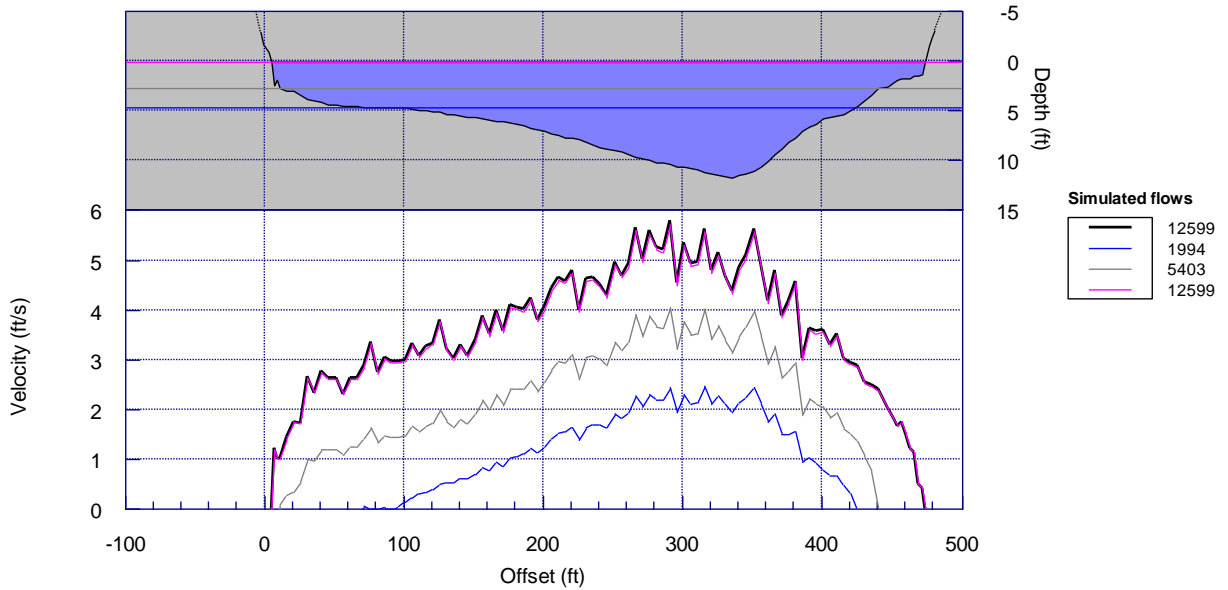
Cross-section: BF16 Glide: Manning Ns applied IFG4 method



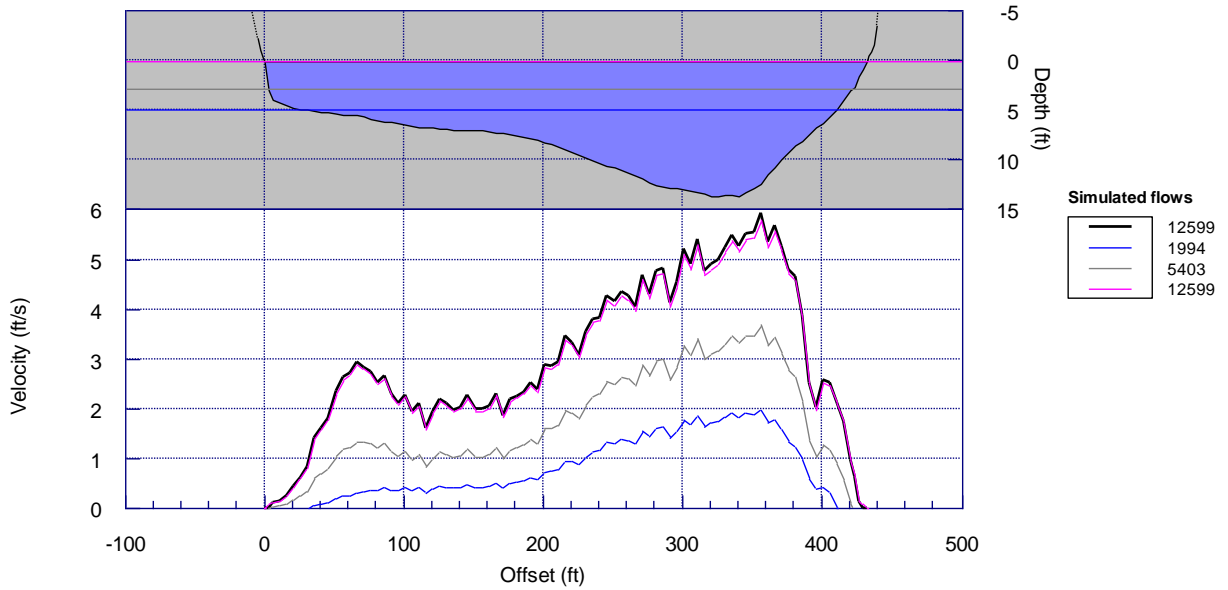
Cross-section: BF15 Pool: Manning Ns applied IFG4 method



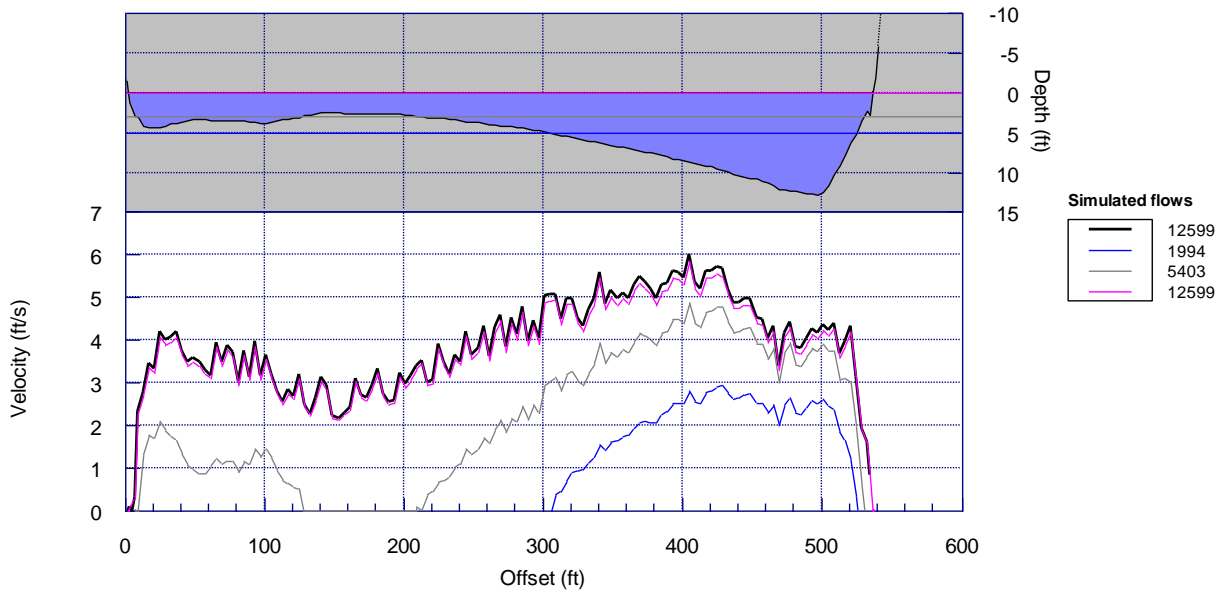
Cross-section: BF14 Glide: Manning Ns applied IFG4 method



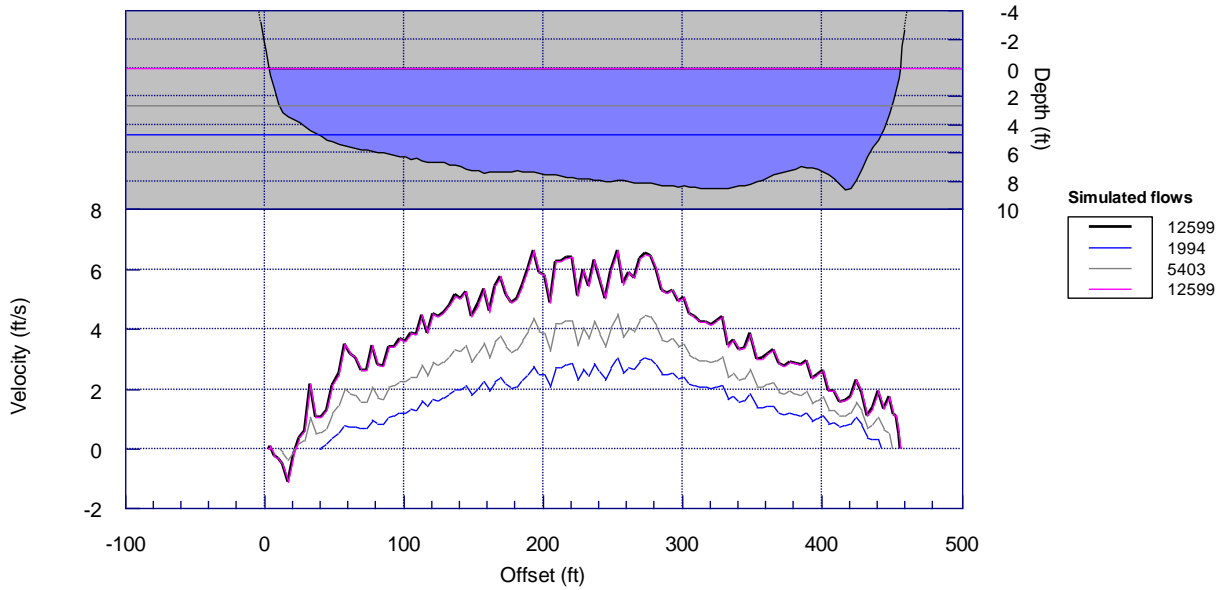
Cross-section: BF13 Pool: Manning Ns applied IFG4 method



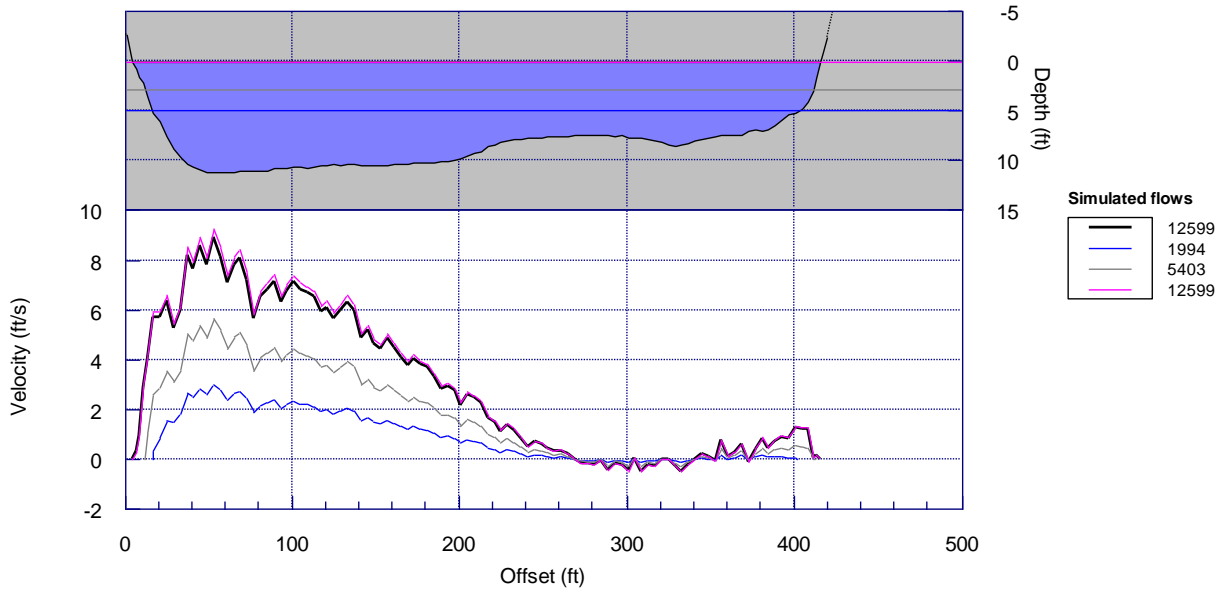
Cross-section: BF12 Run: Manning Ns applied IFG4 method



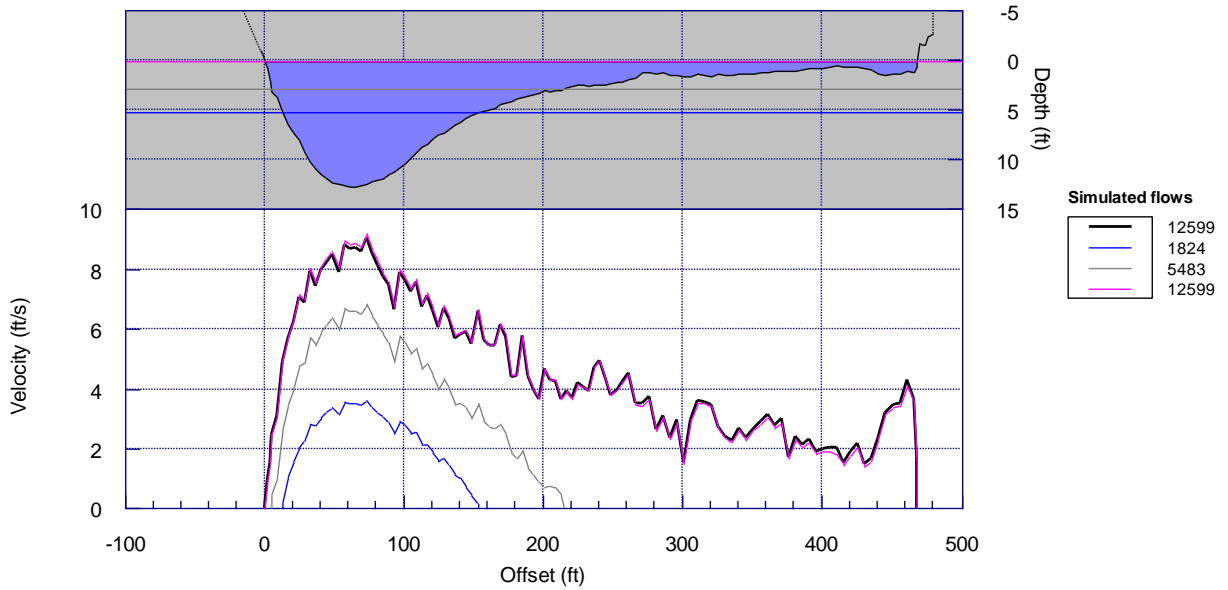
Cross-section: BF11 Glide: Manning Ns applied IFG4 method



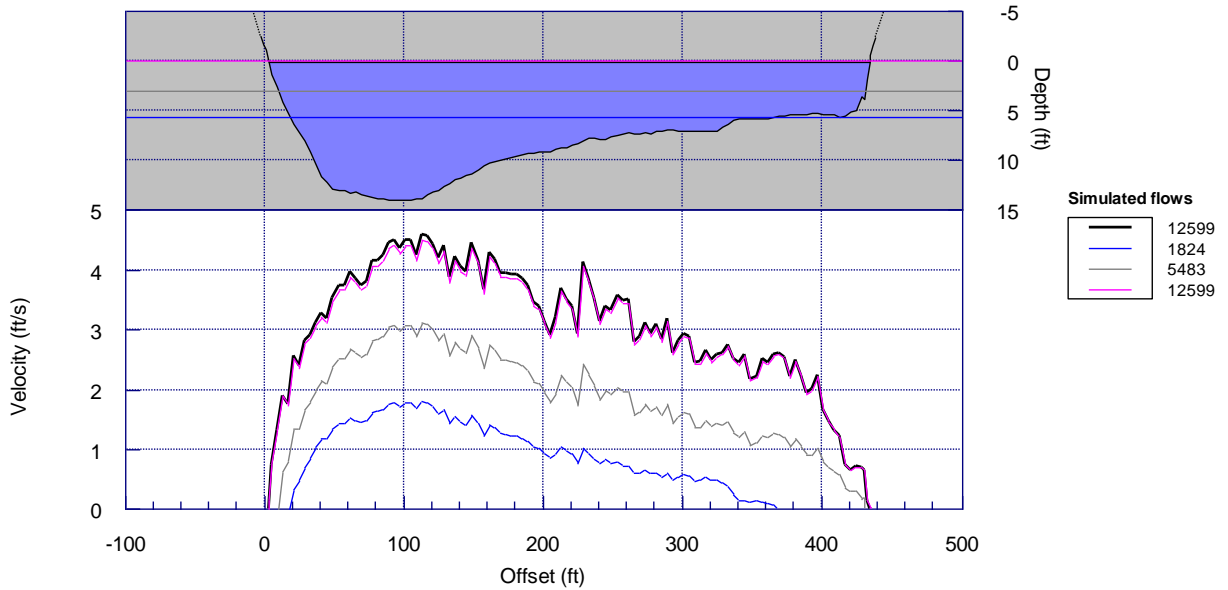
Cross-section: BF10 Pool: Manning Ns applied IFG4 method



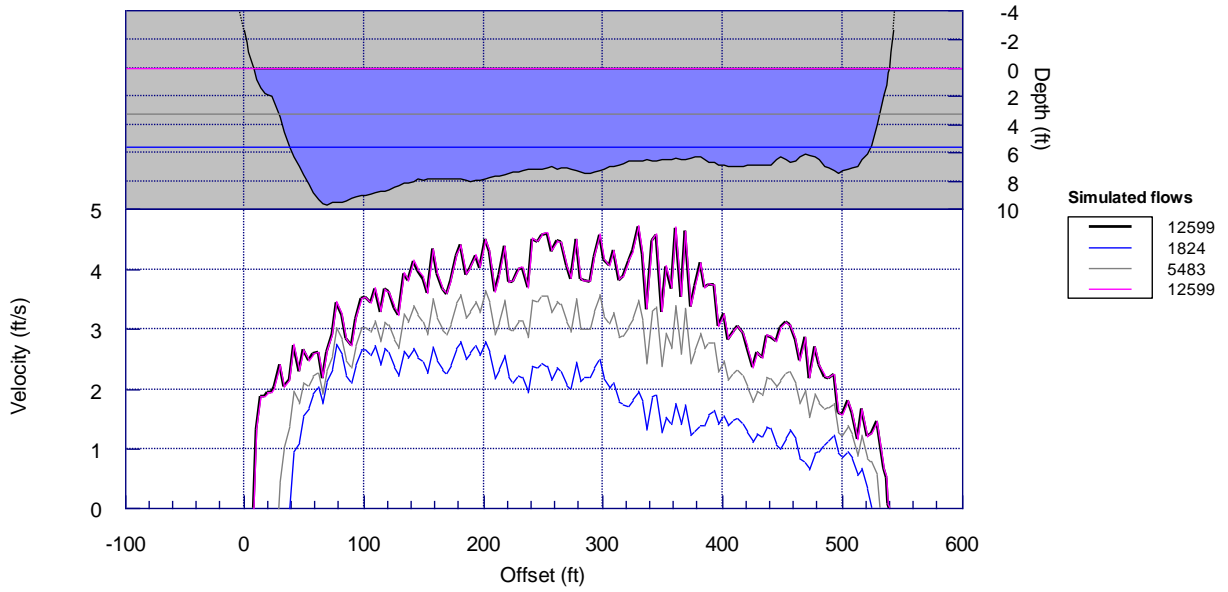
Cross-section: BF9 Run: Manning Ns applied IFG4 method



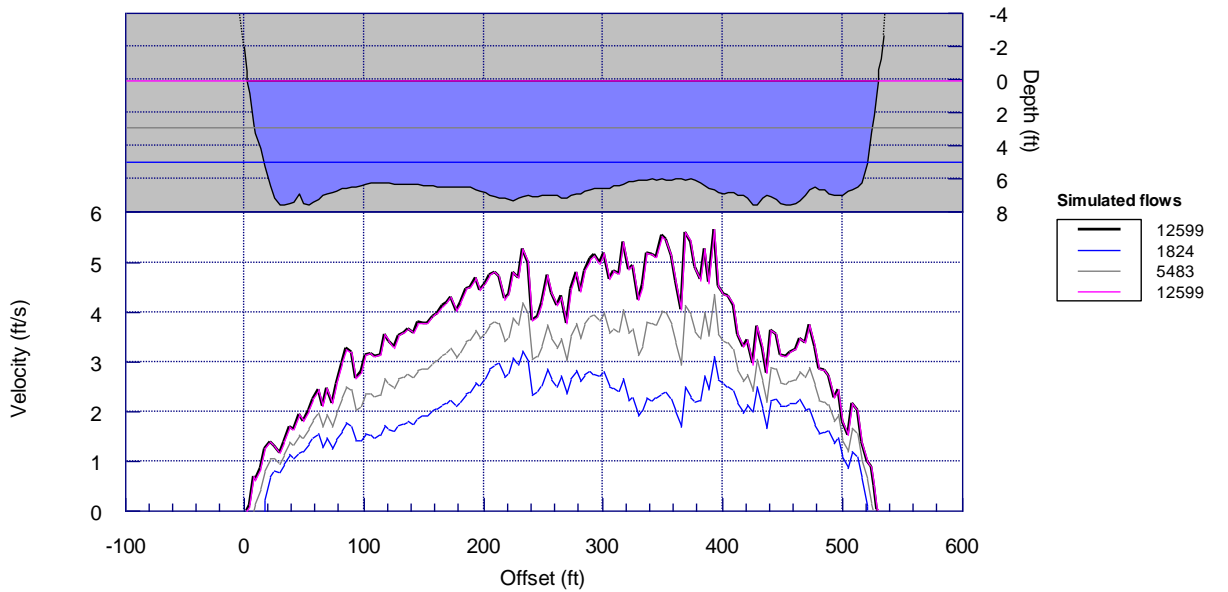
Cross-section: BF8 Run: Manning Ns applied IFG4 method



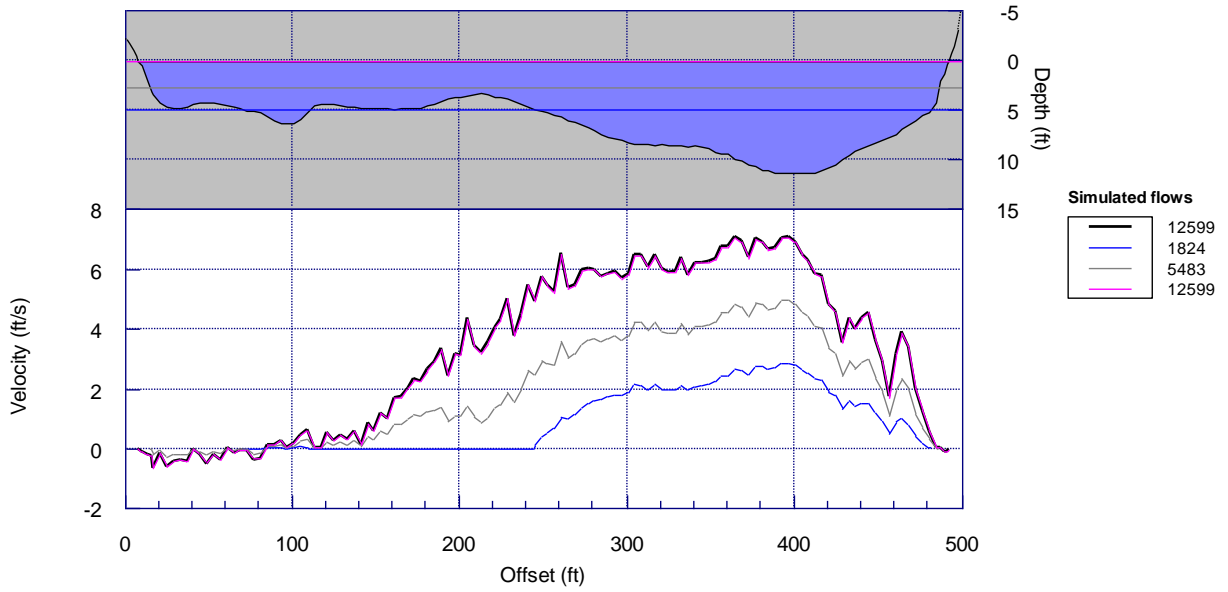
Cross-section: BF7 Riffle: Manning Ns applied IFG4 method



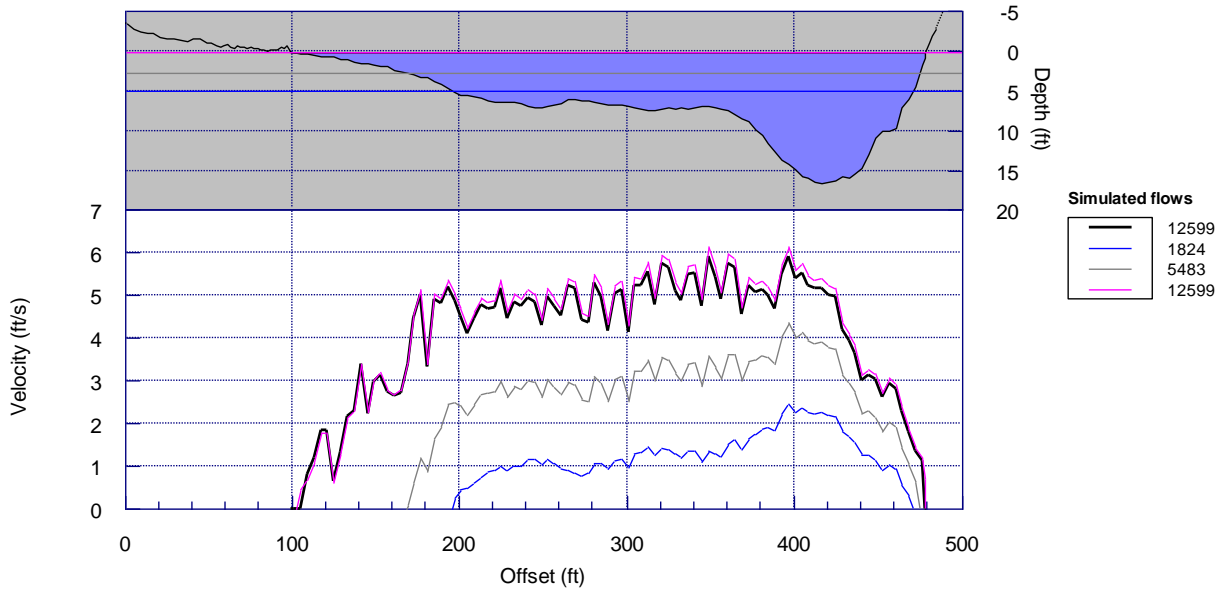
Cross-section: BF6 Riffle: Manning Ns applied IFG4 method



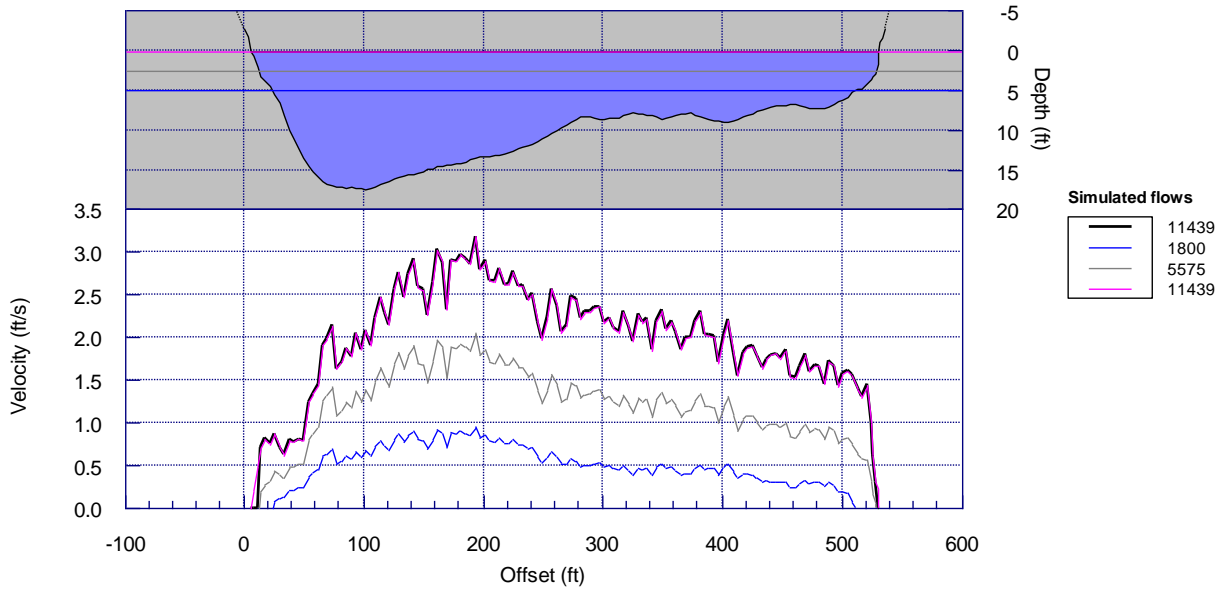
Cross-section: BF5 Glide: Manning Ns applied IFG4 method



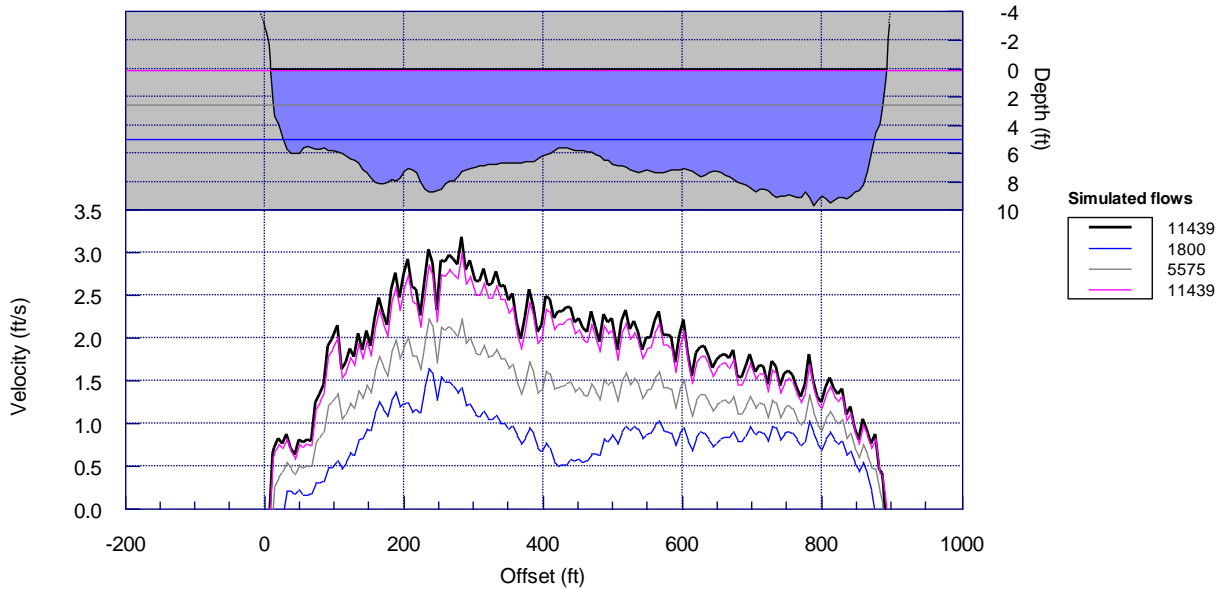
Cross-section: BF4 Run: Manning Ns applied IFG4 method



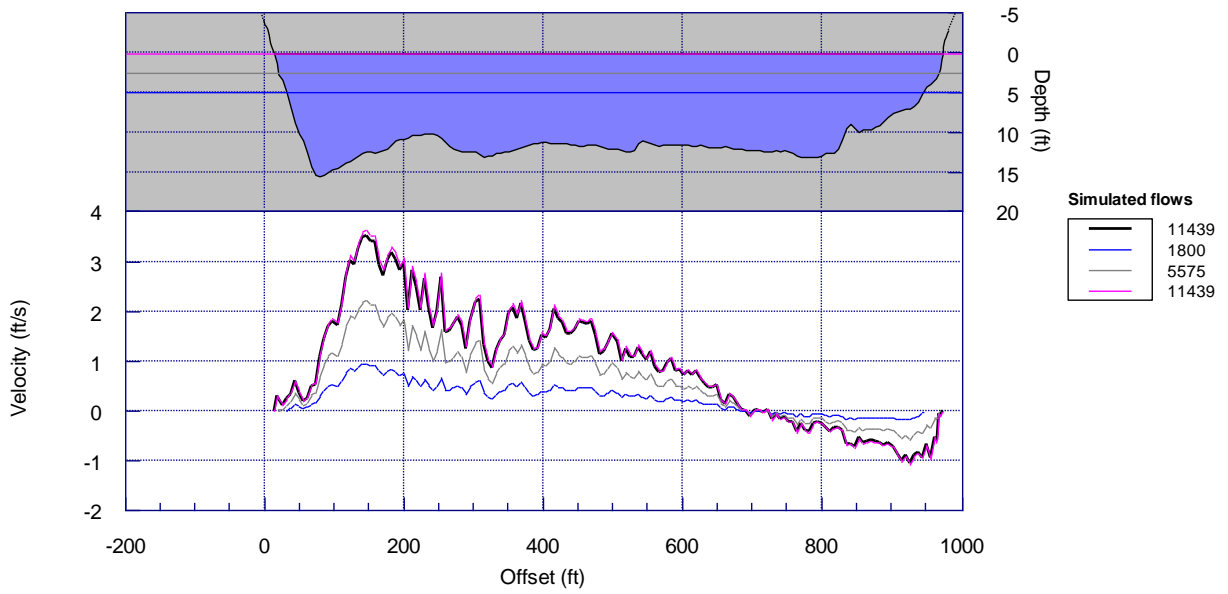
Cross-section: BF3 Glide: Manning Ns applied IFG4 method



Cross-section: BF2 Glide: Manning Ns applied IFG4 method

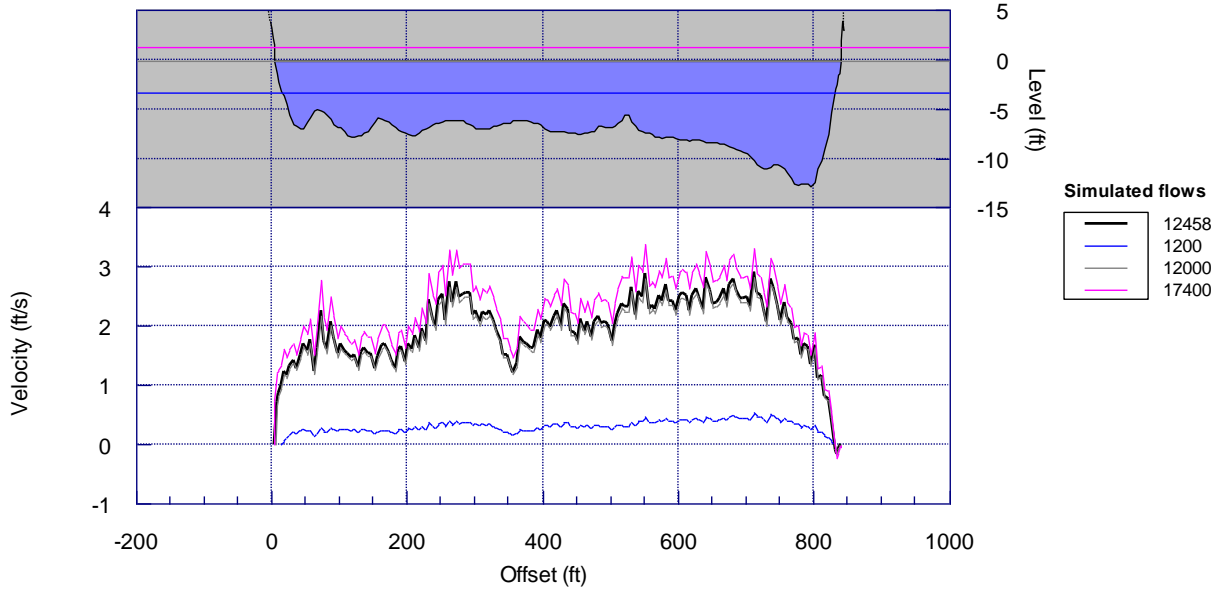


Cross-section: BF1 Pool: Manning Ns applied IFG4 method

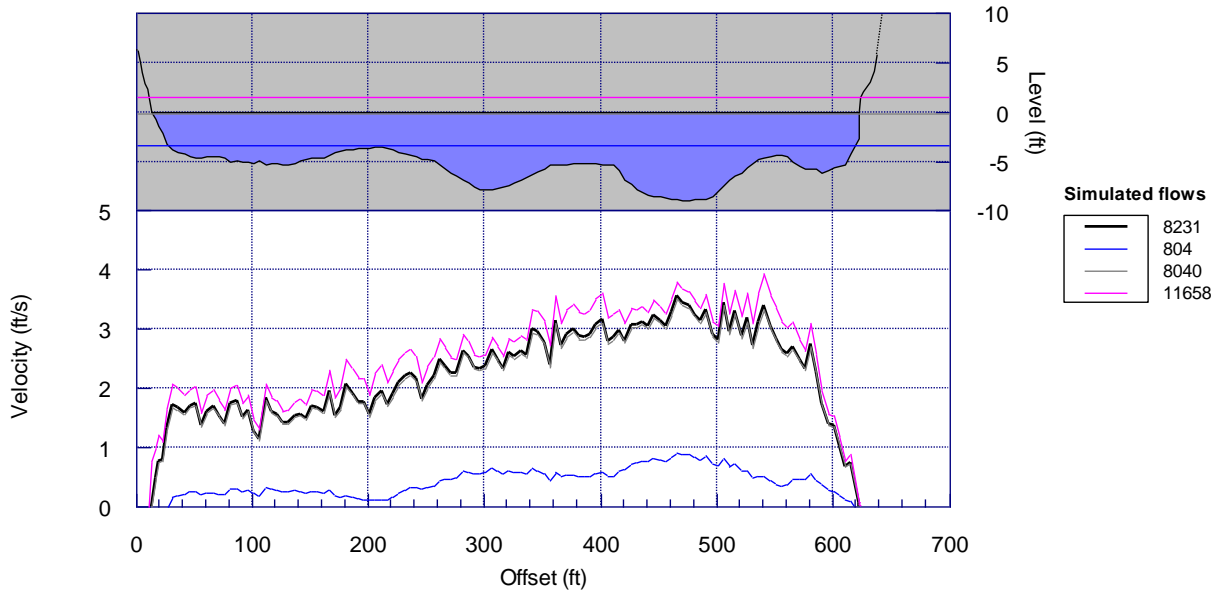


Vernon

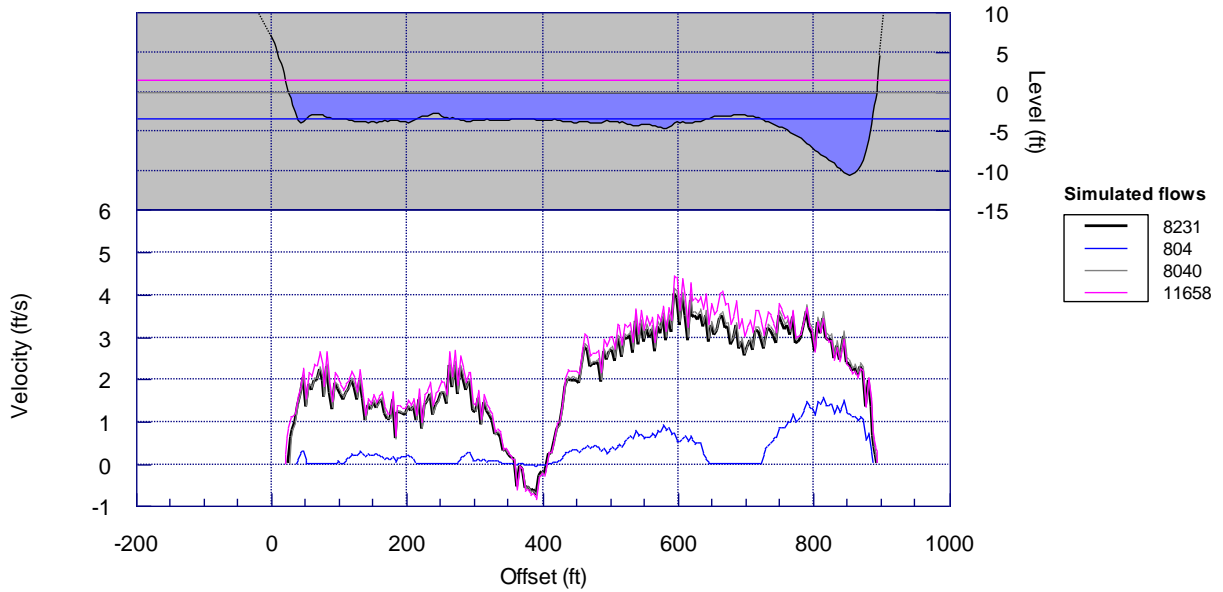
Cross-section: VR10 Pool: Manning Ns applied IFG4 method



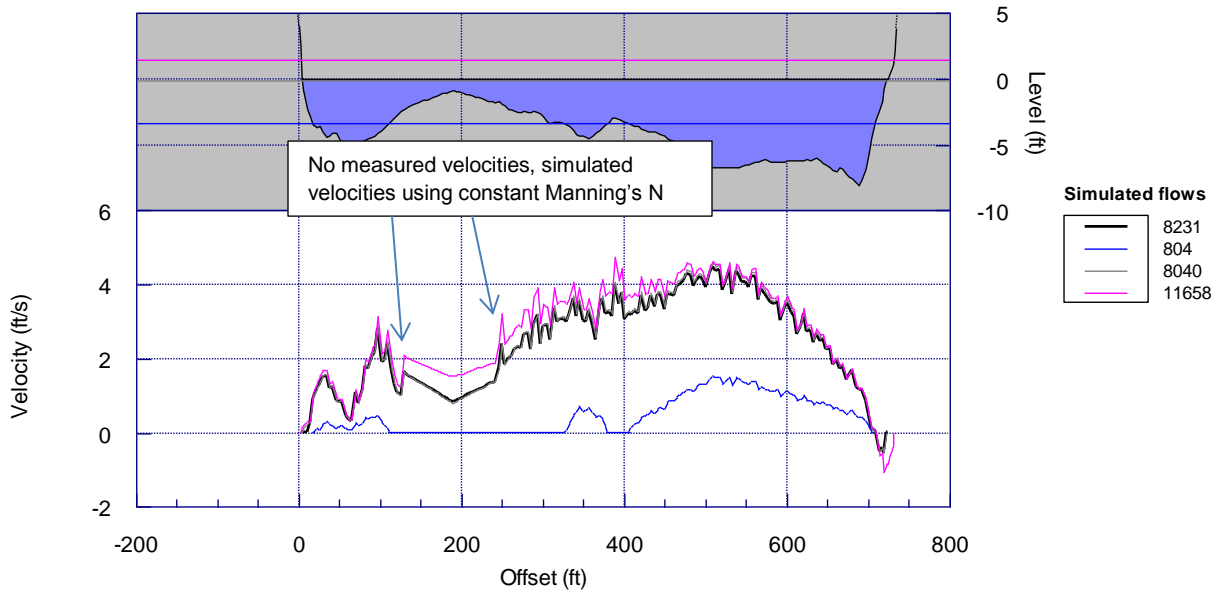
Cross-section: VR9 LC Glide: Manning Ns applied IFG4 method



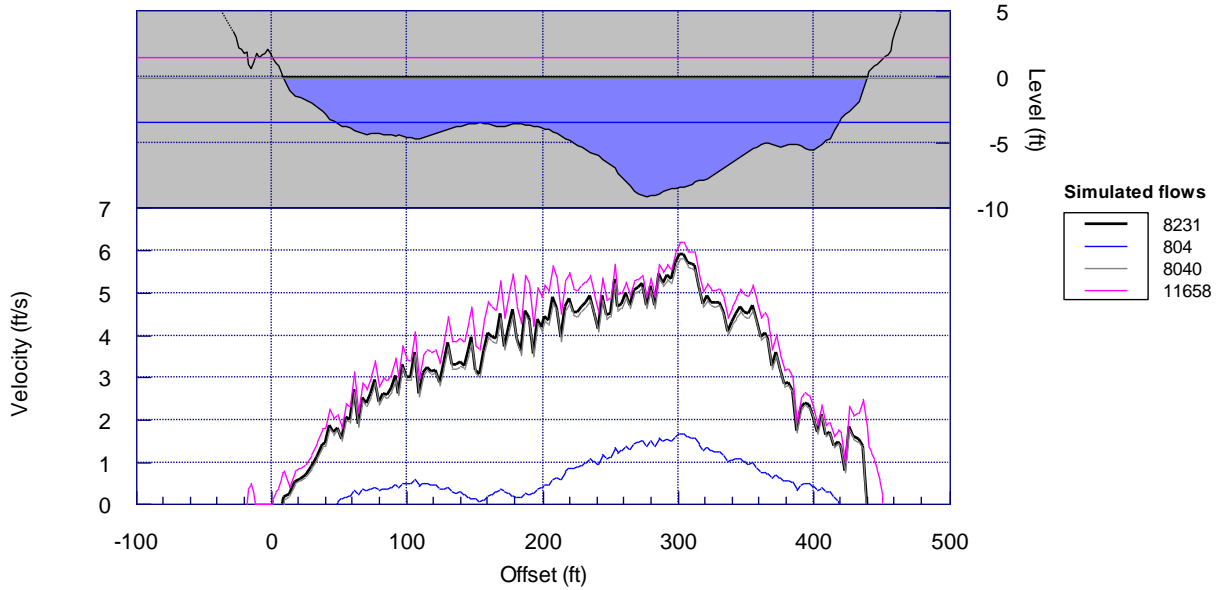
Cross-section: VR8 LC Run: Manning Ns applied IFG4 method



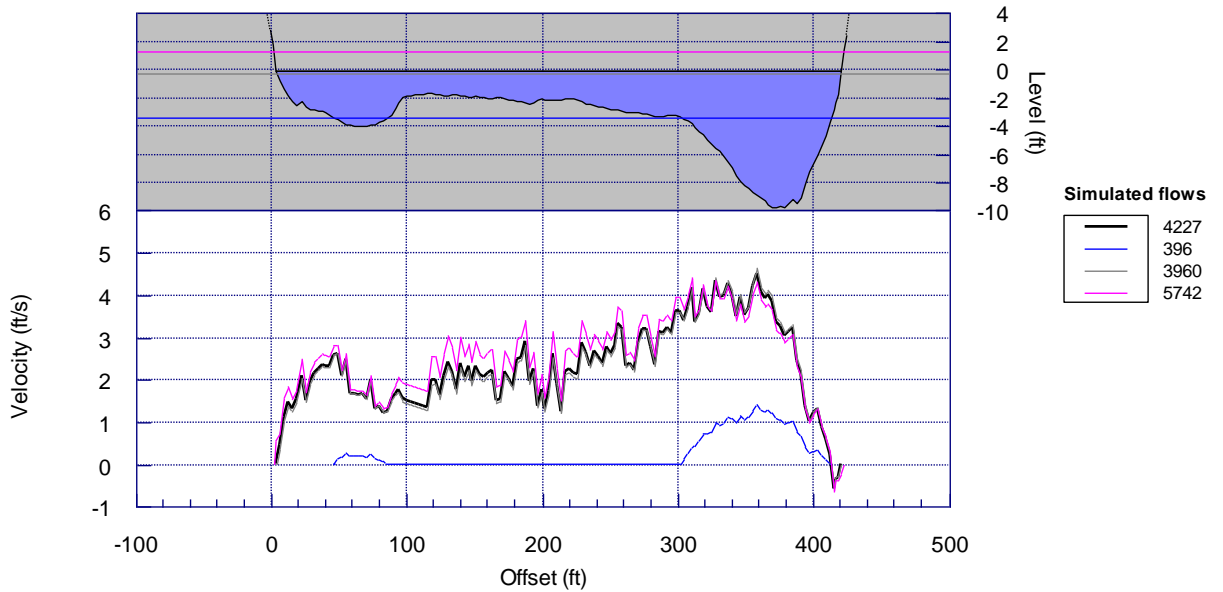
Cross-section: VR7 LC Glide: Manning Ns applied IFG4 method



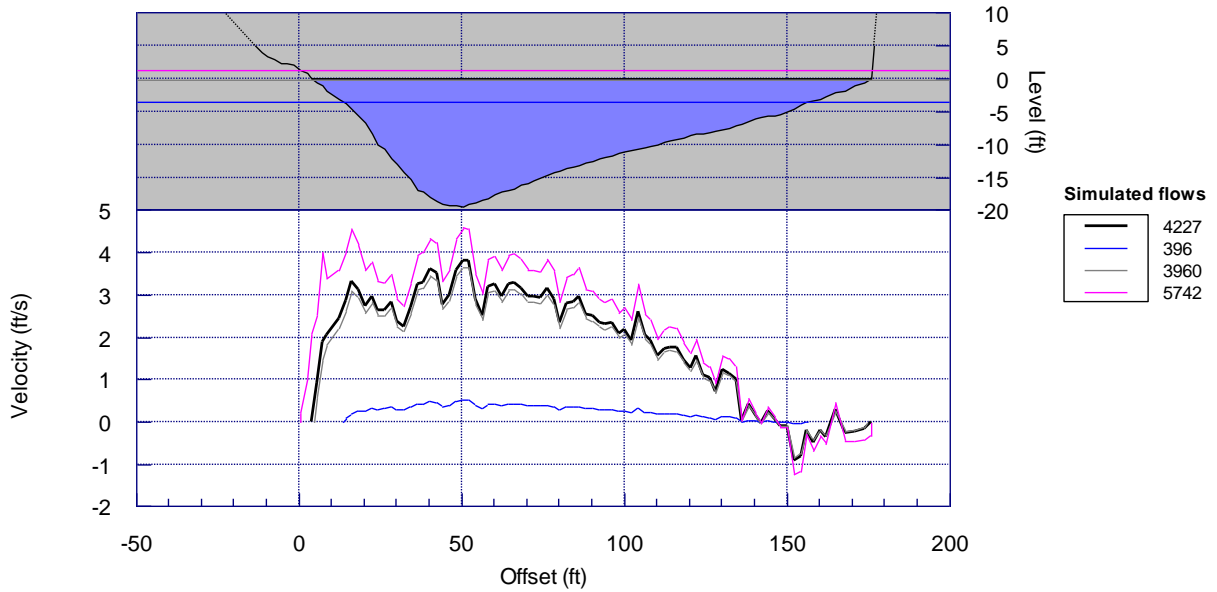
Cross-section: VR6 LC Run: Manning Ns applied IFG4 method



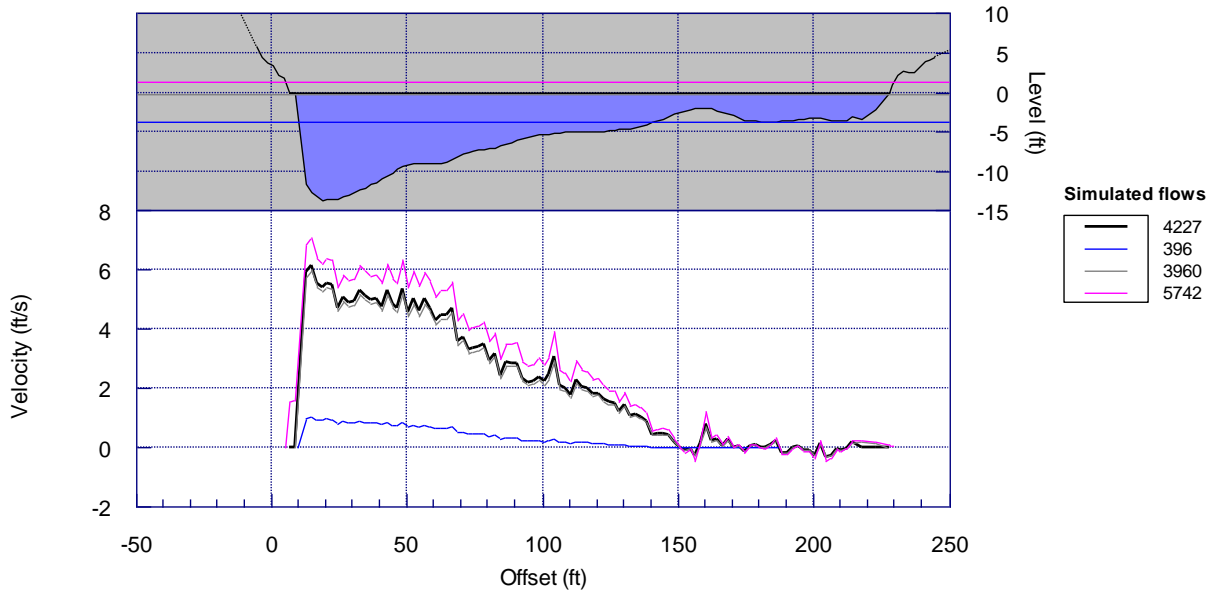
Cross-section: VR8 RC Run: Manning Ns applied IFG4 method



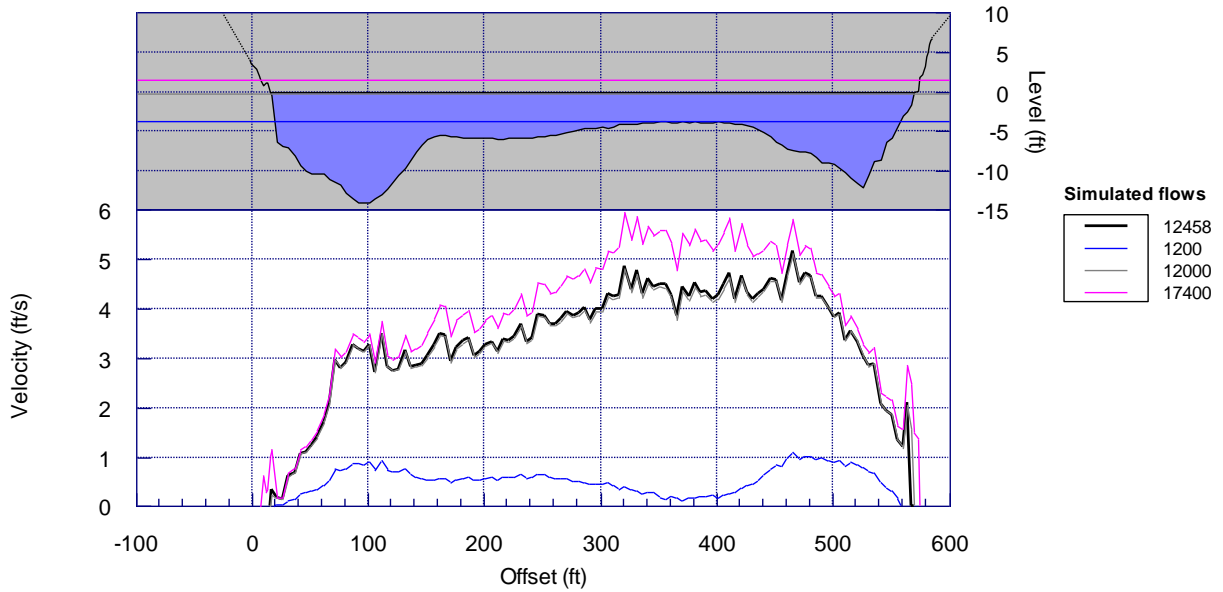
Cross-section: VR7 RC Pool: Manning Ns applied IFG4 method



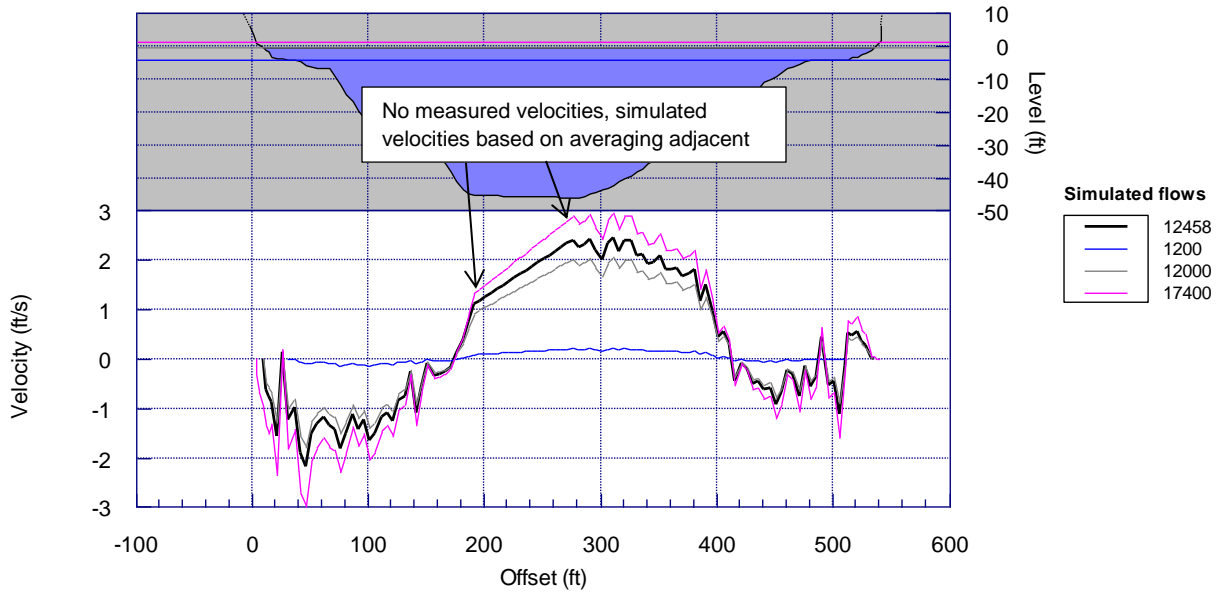
Cross-section: VR6 RC Run: Manning Ns applied IFG4 method



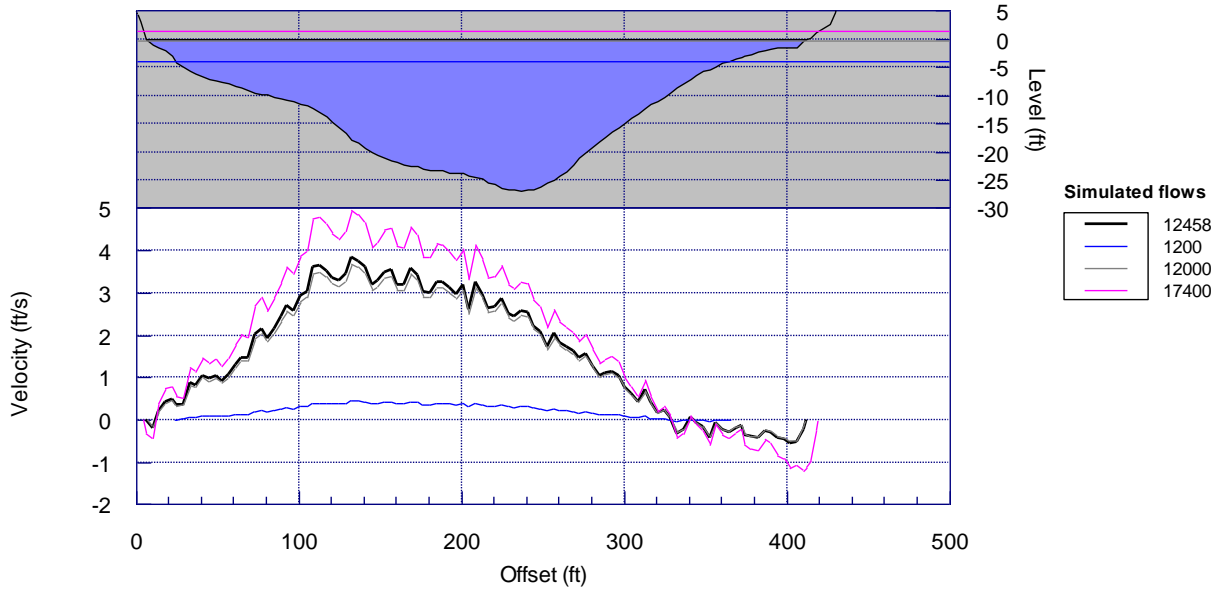
Cross-section: VR5 Glide: Manning Ns applied IFG4 method



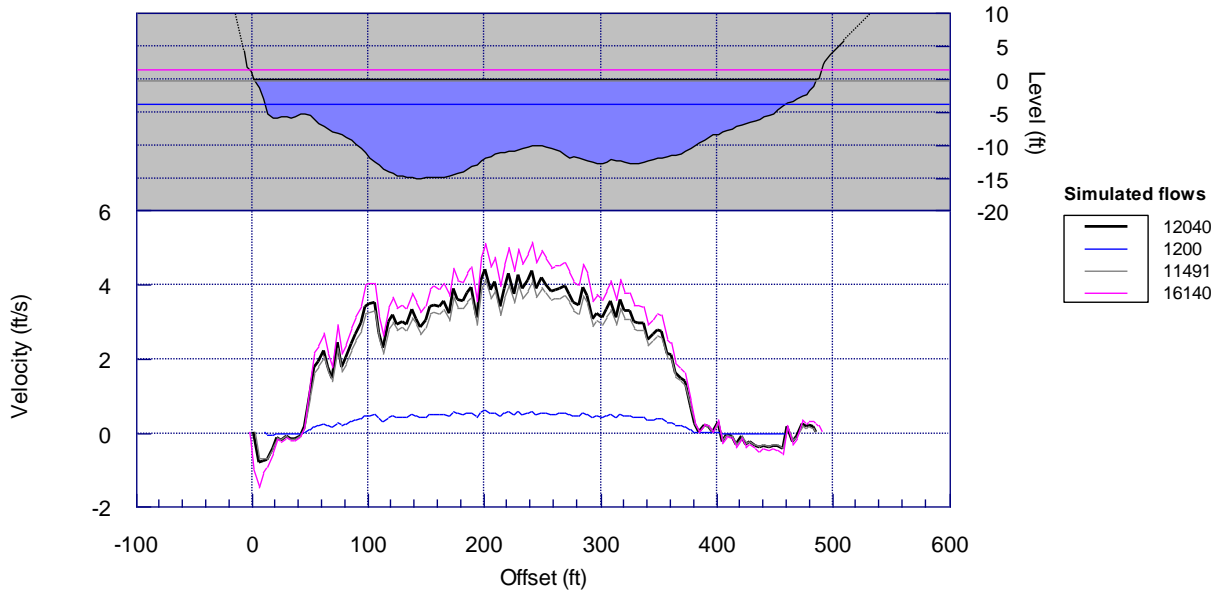
Cross-section: VR4 Pool: Manning Ns applied IFG4 method



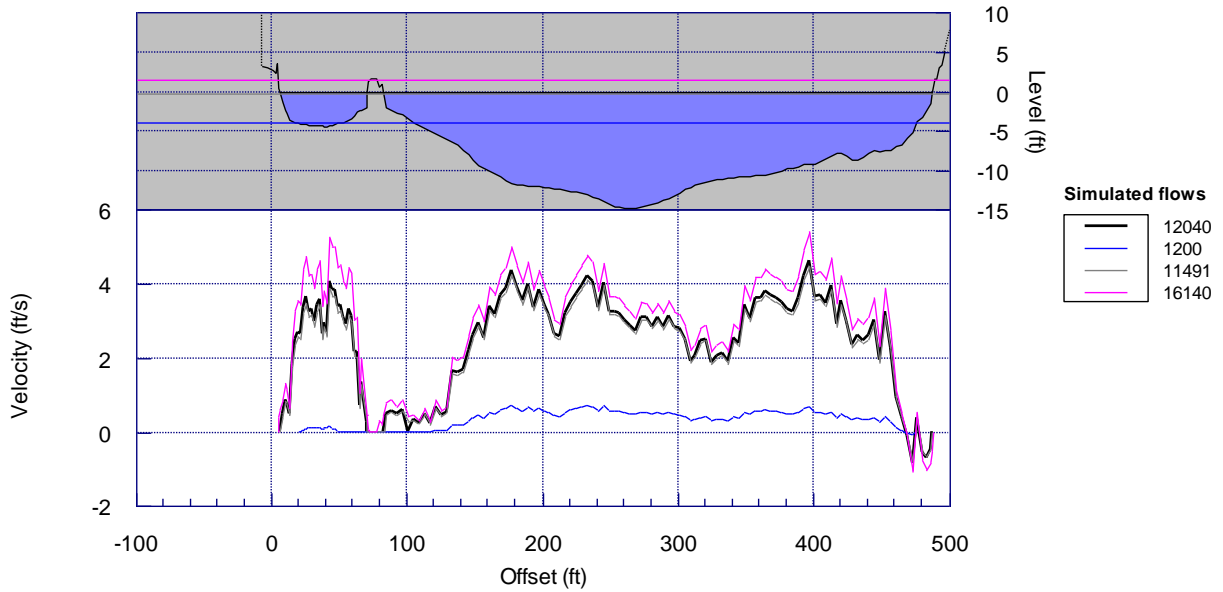
Cross-section: VR3 Pool: Manning Ns applied IFG4 method



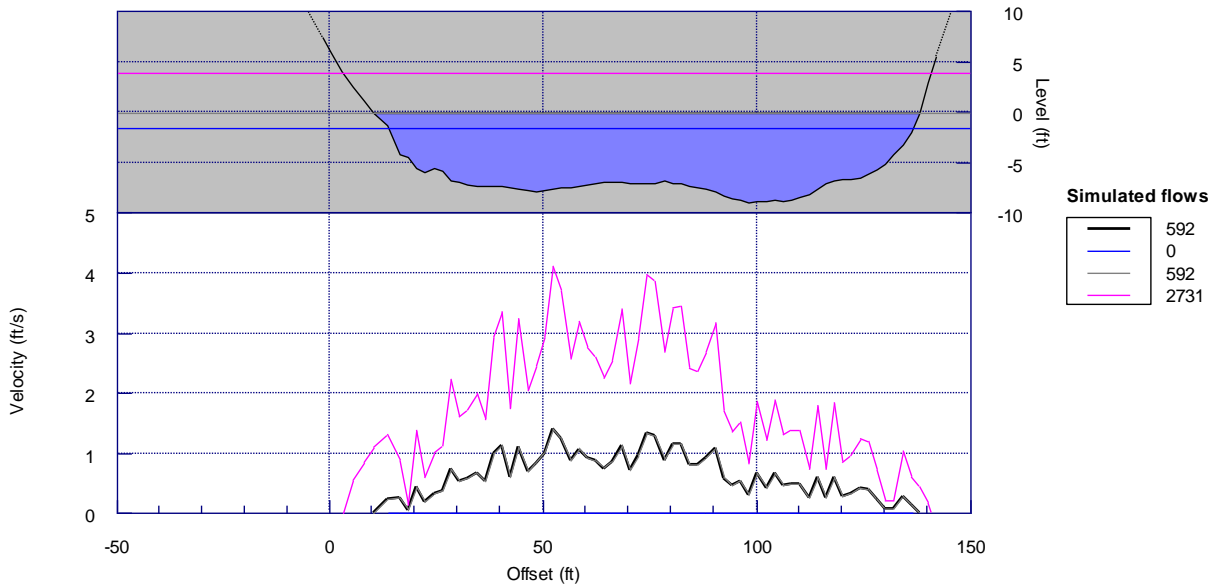
Cross-section: VR2 Run: Manning Ns applied IFG4 method



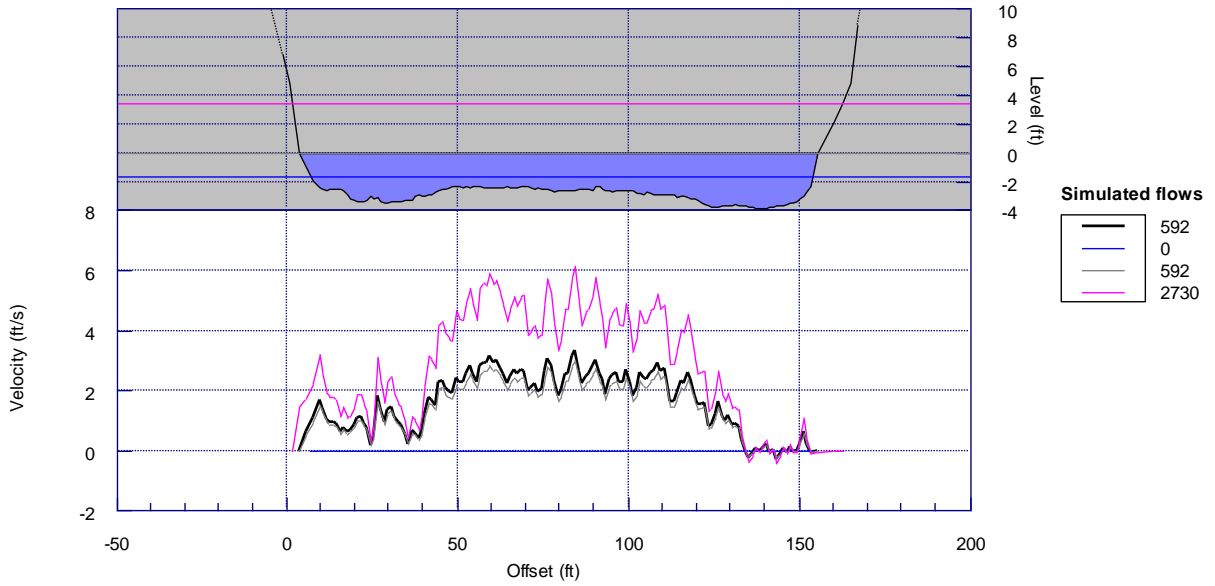
Cross-section: VR1 Run: Manning Ns applied IFG4 method



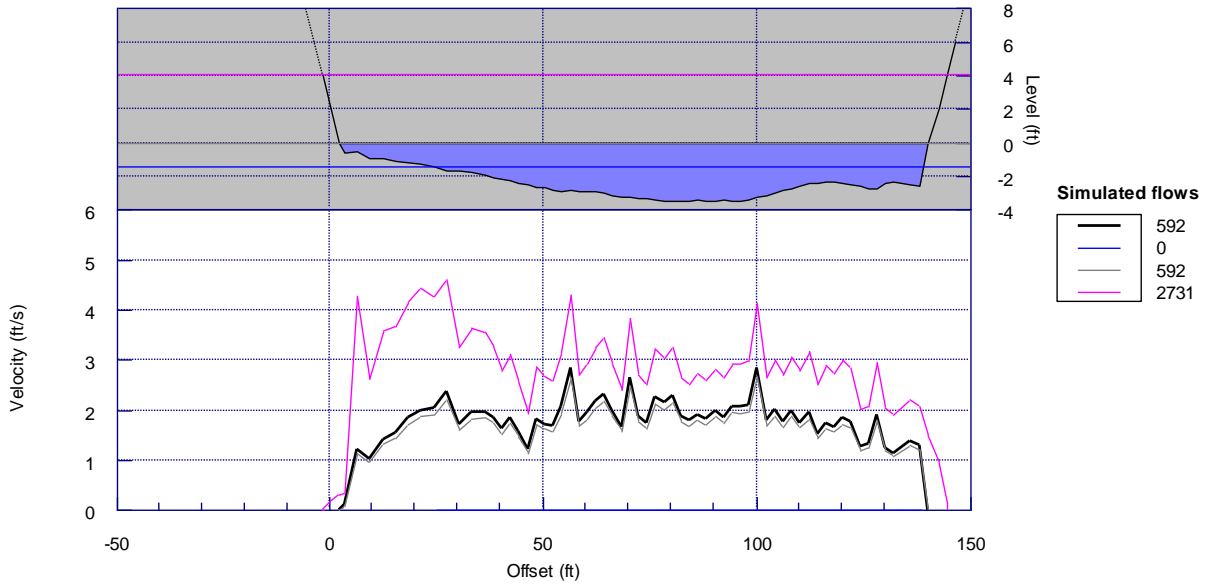
Cross-section: VR3 SC Pool: Manning Ns applied IFG4 method



Cross-section: VR2 SC Riffle: Manning Ns applied IFG4 method



Cross-section: VR1 SC Run: Manning Ns applied IFG4 method



| Vernon | |
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| General Information | |
| Owner | TransCanada Hydro Northeast Inc. |
| FERC Project Number | P-1904 |
| Current License Term | June 25, 1979 – April 30, 2018 |
| Authorized Generating Capacity | 32.4 MW |
| Vernon Project | |
| Location of Dam | Connecticut River at river mile 141.9 |
| Nearest Towns / Counties | Vernon, Windham Count, Vermont Hinsdale, Cheshire County, New Hampshire |
| Drainage Area | 6,266 square miles |
| Major Tributaries | NH – Cold River VT – Saxtons and West Rivers |
| Operating Range Elevation | 212.0 – 220.0 |
| Normal Range Elevation (89% of the time based on elevation exceedance curves) | 218.6 – 219.8 |
| Normal Tailwater Elevation | 184.63 |
| Impoundment Length | 26 miles (Walpole NH/Westminster VT) |
| Gross Storage | 40,000 acre-feet |
| Useable Storage | 18,300 acre-feet (at 8-foot drawdown) |
| Surface Area at Normal Full Pond | 2,550 acres |
| Average Annual Inflow at the Project | Approximately 12,200 cfs |
| Required Minimum Flow | 1,250 cfs or inflow, whichever is less |
| Generated Minimum Flow ^a | 1,600 cfs |
| Major Structures and Equipment | |
| Original Construction | 1909 |
| Dam | Composite overflow and non-overflow ogee type concrete gravity structure, 956 feet long with a maximum height of 58 feet and net head of 33.5 feet. |
| Spillway Gates | 6 tainter gates, 2 hydraulic panel bays, 8 hydraulic flood gates, 3 stanchion bays, 1 sluice gate |
| Powerhouse | Reinforced concrete substructure with a structural steel and brick superstructure, 336 feet long by 55 feet wide |
| Turbine/Generator Units | 10 |
| Turbine Manufacturer/Type | Units 1-2: Birdsboro / vertical Francis Units 3-4: S. Morgan Smith / vertical Francis Units 5-8: Litostroj / vertical Kaplan Units 9-10: S. Morgan Smith / vertical Francis |

| Vernon | |
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| Turbine Capacities | Units 1-4: 2.5 MW / 4,190 hp / 1,465 cfs @ 35 ft head Units 5-8: 4.0 MW / 9,276 hp / 1,800 cfs @ 32 ft head Units 9-10: 4.2 MW / 6,000 hp / 2,035 cfs @ 34 ft head |
| Generator Manufacturer | Units 1-4: General Electric Units 5-8: Koncar Units 9-10: General Electric |
| Generator Capacities | Units 1-4: 2,500 KVA/ 2,000 KW with 0.8 power factor Units 5-8: 5,000 KVA / 4,000 KW with 0.9 power factor Units 9-10: 6,000 KVA / 4,200 KW with 0.7 power factor |
| Total Discharge Capacity | 119,785 cfs |
| Fish Ladder | Reinforced concrete: overflow weir lower section comprised of 26 pools (12" rise), collection facility; viewing window; serpentine vertical slot upper section with 25 pools (6" rise). |
| Upgrades | Fish ladder completed in 1981. Spillway crest control reconstructed in 1986 including the addition of a skimmer gate, 6 tainter gates, 2 50' hydraulic panel bays. New rack raking system along powerhouse forebay. Downstream diversion barrier completed 1995. Station automated with remote control capability in 1998. Units 5–8 repowered and operational in the spring of 2008. |