Potential Effects of the Bell Bend Project on Aquatic Resources and Downstream Users

Proposed Bell Bend Nuclear Power Plant Site, Luzerne County, Pennsylvania

DRAFT FOR AGENCY REVIEW

Prepared for

PPL BELL BEND, LLC
2 North 9th Street
Allentown, PA 18101

Prepared by

NORMANDEAU ASSOCIATES, INC.
1921 River Road
Drumore, PA 17518

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ABBREVIATIONS

Abbreviation	Meaning
°F or °C	Degrees Fahrenheit or Celsius (water temperature)
ΔT	Change in temperature
7Q10	Seven-day, consecutive low flow with a ten-year return frequency.
ADCP	Acoustic Doppler Current Profiler, instrument to measure velocity at varying depths
ADF	Average Daily Flow computed on an annual basis
AMD	Acid Mine Drainage or Abandoned Mine Drainage
BBNPP	Bell Bend Nuclear Power Plant
BTA	Best Technology Available
cfs	Cubic feet per second; 1 cfs = 0.646 mgd
CORMIX	Cornell Mixing Zone Expert System, the USEPA mixing zone model
CU	Consumptive water use
DO	Dissolved oxygen
EPA	United States Environmental Protection Agency
HSC	Habitat Suitability Curve, index used to indicate fish preferences for microhabitat variables (e.g., water velocity, depth, substrate/cover);expressed on a scale of 0 (least suitable) to 1 (optimum)
IFIM	Instream Flow Incremental Methodology, habitat-based methodology to estimate available aquatic habitat under changing flow conditions; based on the premise that stream-dwelling organisms prefer a certain range of microhabitats (velocity,depth,and substrate/cover)
mgd	Million gallons per day; 1 mgd = 1.55 cfs
mg/L	Milligrams per liter
NRC	Nuclear Regulatory Commission
nWUA	Normalized WUA
PADEP	Pennsylvania Department of Environmental Protection
PFBC	Pennsylvania Fish & Boat Commission
PHABSIM	Physical Habitat Simulation, model integrates outputs of hydraulic model(s) and species micro-habitat preferences (depth, velocity, and substrate/cover)
PPL Bell Bend	PPL Bell Bend, LLC; sponsor of the BBNPP project
Sonde	Device that measures DO, temperature, pH and conductivity; French for "probe"
SRBC	Susquehanna River Basin Commission
SSES	Susquehanna Steam Electric Station
TRPA	Thomas R. Payne & Associates
TS	Time series
USFWS	United States Fish and Wildlife Service
USGS	United States Geological Survey
WBAN	Weather Bureau-Army-Navy
WUA	Weighted Usable Area, an index of available habitat
WWF	Warm Water Fishery

1. SUMMARY

In October 2008, PPL Bell Bend, LLC (PPL Bell Bend) applied to the U.S. Nuclear Regulatory Commission (NRC) for a combined license to construct and operate the Bell Bend Nuclear Power Plant (BBNPP). The BBNPP will be a single-unit plant with an electrical output of approximately 1,600 megawatts, located adjacent to the Susquehanna Steam Electric Station (SSES) in Salem Township, Luzerne County, Pennsylvania.

On May 13, 2009, PPL Bell Bend applied to the Susquehanna River Basin Commission (SRBC or Commission) for approval of water use at the proposed BBNPP. A supplement to the application was filed with the SRBC on October 9, 2009. In November 2009, PPL Bell Bend submitted a proposed study plan to the SRBC and cooperating agencies for review and comment. Subsequent discussions focused the study plan on five potential effects of consumptive water use. These potential effects have been studied and are addressed in this report in the form of responses to five questions. The study questions and a summary of the results of this study are presented below.

- ***What is the relationship between aquatic habitat and river flows for selected species and life stages with and without the BBNPP water withdrawal / consumptive use (BBNPP water use)?***

Physical Habitat Simulation (PHABSIM) analysis of aquatic habitat for eight fish species indicates that negative impacts on habitat due to the requested BBNPP water use are generally small and infrequent, and would not contribute to habitat-related population limitations.

- ***Is there a potential that BBNPP water use will cause an incremental impairment in water quality below Nescopeck Creek due to known acid mine drainage (AMD) in the Creek?***

Nescopeck Creek water quality is impaired due to AMD in the upper (eastern) part of the Creek's watershed. AMD from the Creek degrades water quality in the Susquehanna River. The potential for additional impairment of river water quality attributable to reduced dilutive capacity that could result from BBNPP water use was investigated by an extensive field program supplemented with mass balance calculations. It was determined that pH in the Susquehanna River recovered within a short distance of the Nescopeck Creek for all observed flow ranges. Flow from the Nescopeck Creek hugs the left shore of the river, effectively creating an AMD plume along the left shore. No surveys showed migration of the AMD plume into the main channel of the Susquehanna. Because the surveys were made over a large range of Susquehanna River flows and the behavior of the AMD plume was consistent from one survey to the next, it is concluded that a reduction in flow due to BBNPP water use would not affect either the extent of the AMD plume or the mixed pH in the Susquehanna River.

- ***What are the potential effects of BBNPP blowdown discharge on river water temperature and dissolved oxygen concentration?***

Because the BBNPP diffuser is nearly identical to the existing SSES diffuser, the latter's performance provides the best estimate of the anticipated performance of the BBNPP diffuser. The SSES blowdown discharge plume has been measured in three dimensions on five occasions covering a range of Susquehanna River flows. All five surveys showed small thermal plumes. The US Environmental Protection Agency's (EPA's) standard thermal plume model, the Cornell Mixing Zone Expert System (CORMIX), was shown to reproduce the observed dimensions of the SSES thermal plume. CORMIX replicated the BBNPP thermal plume under average and low flow conditions and indicated similar, small plumes for BBNPP. Potential reductions in dissolved oxygen concentrations due to the small rises in temperature adjacent to the BBNPP diffuser would be minimal and of limited extent.

- ***What is the impact of reduced river flow and stage due to BBNPP water use on dissolved oxygen and temperature in backwater areas habitable by smallmouth bass?***

There are few if any persistent backwater areas in this stretch of river and their extent varies seasonally. Smallmouth bass do spawn in the area and fry develop throughout the month of June. Once water temperatures consistently exceed 84-85°F, juveniles migrate from the shoreline backwater habitat into deeper river water. Collected water quality data confirm that during the summer low flow months similar to those recorded in 2005 and 2010, there are natural occurrences of water quality not meeting the Pennsylvania State criteria for WWF. These conditions were evaluated for the incremental change in flow and the potential of increased temperature associated with reduced depth for the 43 cfs BBNPP consumptive water use on the potential to extend the duration to additional stress-related conditions during the period of concern (July, August, September) for smallmouth bass juveniles. Results suggest no significant adverse change or increase in the stressors.

- ***Are there effects of BBNPP water use on downstream water withdrawers and dischargers?***

Users and dischargers of treated wastewater as far downstream as Danville were cataloged and phone interviewed with respect to anticipated impacts on either their water withdrawals or compliance with discharge limitations. One large water user expressed concern about the impact of BBNPP water use on its activities; several dischargers and one water user expressed interest in further evaluating impacts, but none voiced immediate objections. One large user anticipated little to no effect; two large dischargers anticipated no significant impact after running models and/or consulting with the Pennsylvania Department of Environmental Protection (PADEP). The smaller entities that responded did not anticipate any impacts from the proposed BBNPP water use, although one smaller discharger reserved the right of future comment.

2. *AQUATIC HABITAT MODELING USING IFIM*

To determine potential impacts of the BBNPP water use on aquatic habitat in the Susquehanna River, a PHABSIM habitat analysis study was completed. The study used the standard PHABSIM hydraulic model on 21 transects in four distinct habitat types in a seven-mile study reach downstream from the BBNPP site. Field data were collected in 2010 at river flows of approximately 1,570 cfs, 4,610 cfs, and 9,420 cfs. Combined with Habitat Suitability Criteria for multiple life stages of eight fish species (23 combinations, total), Weighted Usable Area (WUA) vs. flow response curves were generated for each species and life stage over a simulated flow range of 800 cfs to 25,000 cfs. Habitat time-series were prepared based on the daily river flow record at Wilkes-Barre, PA from 1899 to 2009, for both natural flows and flows adjusted to reflect various BBNPP water use scenarios. In this study the net impact of BBNPP water use, i.e. the consumptive water use (CU) of up to 28 mgd (43 cfs), was evaluated. The potential impact of the total BBNPP water withdrawal of 42 mgd (65 cfs) on the river area between the BBNPP intake and discharge point approximately 600 ft downstream of the intake has been considered and will be reported separately by PPL.

Habitat impact analysis was conducted to determine percent change in WUA over the range of flows due to the requested consumptive water use. There is no negative impact from any level of consumptive BBNPP water use at any flow for seven of 23 species and life stage combinations. For the remaining 16 species and life stage combinations, negative impacts due to the requested BBNPP consumptive water use are generally small (less than 5% of naturally available WUA) and infrequent (less than 20% of the time). Negative impacts also occur at times when available WUA is well above annual minima, so they do not contribute to habitat-related population limitations.

2.1. Overview of Instream Flow Incremental Methodology

The Instream Flow Incremental Methodology (IFIM), developed by the U.S. Fish and Wildlife Service (USFWS), is commonly used to determine the effects of water management practices on aquatic habitat within a specific reach of a stream. IFIM is based on the premise that stream-dwelling organisms prefer a certain range of depths, velocities, substrates, and cover types, depending on the species and life stage, and that the availability of these preferred habitat conditions varies with stream flow. The methodology is designed to quantify potential physical habitat available for each species and life stage of interest at various levels of stream discharge, using a series of computer programs, namely PHABSIM (Bovee, 1982).

A natural stream contains a complex mosaic of physical features. One area, such as a riffle, may be shallow and fast-moving over a substrate of cobble and gravel and provide no cover while another area, such as a pool, may be deep and slow-moving over a substrate of silt, with a large root wad along the shore. One species life stage may find the riffle desirable, while another species may prefer the pool; a third species may not prefer either. These different habitat types (e.g., pools, riffles, runs, and glides) are known as mesohabitats.

A fish species or life stage will utilize a particular mesohabitat type when microhabitat characteristics of depth, velocity, substrate, and cover are within its preferred range. Preferred velocity, depth, and substrate/cover for selected target species and life stages are expressed in an IFIM analysis in the form of habitat suitability curves in which the optimum range of a particular microhabitat variable is assigned a weighting factor of 1, and the least suitable range a weighting factor of 0. The weighting factors on the Y-axis (0 to 1) are used as input to each value on the X-axis in a series of programs within the PHABSIM model.

PHABSIM is a one-dimensional computational method, composed of a suite of programs used in an IFIM analysis. PHABSIM consists of three components: (1) channel structure, (2) hydraulic simulation, and (3) habitat suitability criteria. Channel structure includes all fixed-channel features that generally do not change with discharge. These include channel cross-sectional geometry, substrate composition and distribution, and structural cover. Hydraulic variables are those that change with discharge, such as water surface elevation, depth, velocity, wetted perimeter, and channel surface area.

In PHABSIM, habitat mapping through field studies is used to characterize and categorize the types of habitats (e.g., pools, runs, and riffles) in a river. Habitat mapping quantifies the amount and distribution of each habitat type. Results of habitat mapping are used in PHABSIM to select and weight each transect in proportion to the occurrence of that habitat type in the study reach.

Field measurements of microhabitat variables (depth, velocity, substrate, and cover) are collected at numerous points across the channel (i.e. transects) and at a number of locations along the length of the river. These locations represent the different habitat types found in the reach of river being studied. Hydraulic measurements are taken at each transect location at low- to high-flow conditions of interest. Once calibrated to the flows measured in the field, PHABSIM can predict habitat availability at flows other than those measured. The output of the habitat simulation is Weighted Usable Area (WUA) for a range of simulated stream discharges.

There are several methods to analyze the impact of flow alterations on aquatic habitat. These include habitat duration curves in various time steps (monthly, weekly, annual, etc.), and habitat impact analysis, using the difference in WUA between any two water usage schemes at a given river flow (Denslinger *et al.* 1988), among others. Water managers or regulatory agencies can then use this data analysis to determine whether the level of impact is acceptable, and/or whether mitigation is required.

A schematic of the sequence for the application of IFIM methodology is given in Figure 2-1.

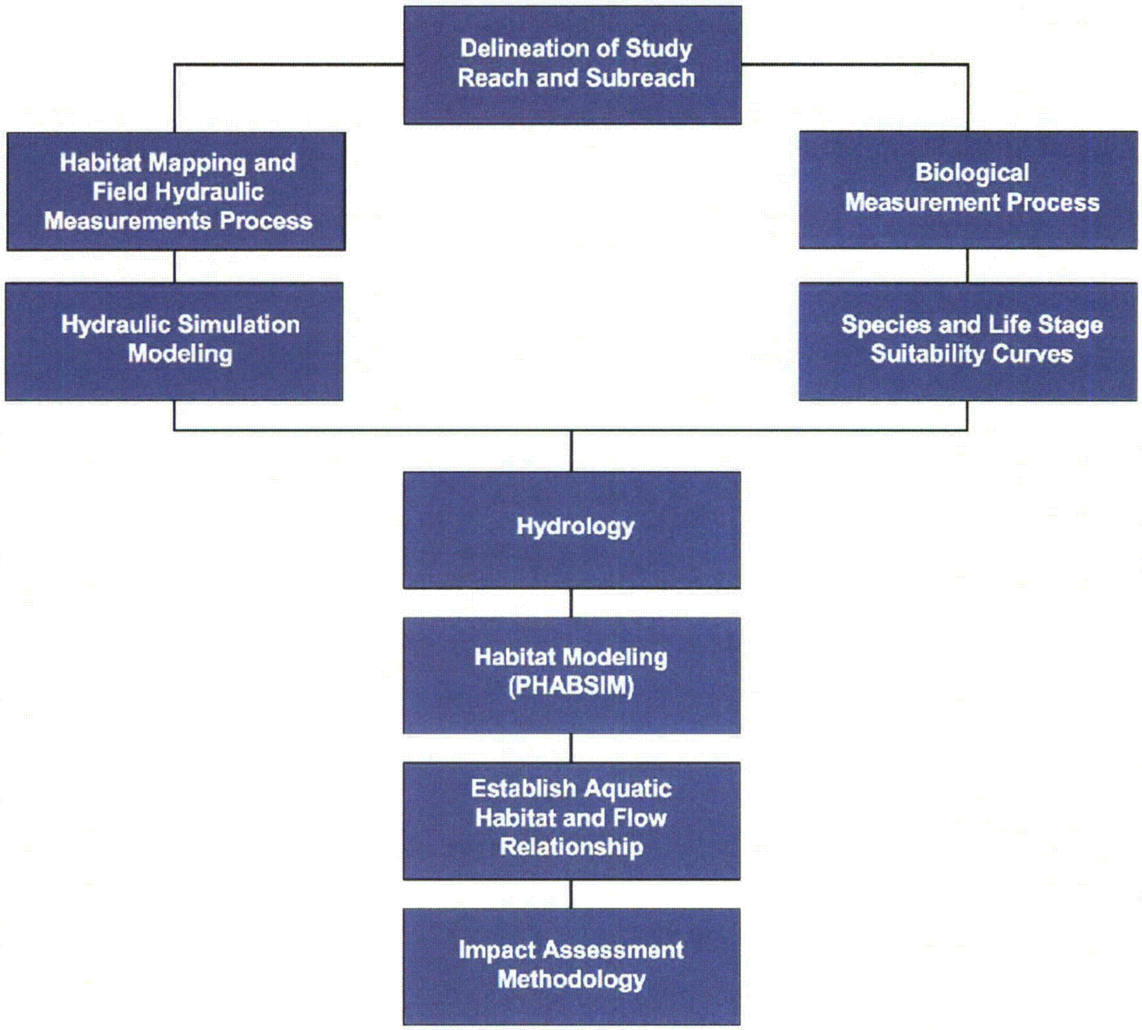


Figure 2-1 Generalized IFIM sequence

2.2. Habitat Suitability Criteria for Species of Concern

The submitted study plan proposed to develop incremental relationships between aquatic habitat and river flow for several species of special interest and for habitat-based species guilds. Subsequent review and conversations with the resource agencies resulted in an agreement on January 19, 2011 to study multiple life stages of eight fish species (23 combinations, total). These species and life stages are shown in Table 2-1 which also shows life stage seasonal periodicity of occurrence. Habitat Suitability Criteria (HSC) curves for these species were prepared from literature sources, reviewed by the resource agencies, amended, and agreed upon by all parties. Details and figures are provided in Appendix HSC.

Table 2-1 Seasonal periodicity of occurrence (blue-shaded rectangles) of species

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
American shad												
Spawning				■	■							
Fry				■	■	■						
Juvenile							■	■	■			
Adults					■	■						
River chub												
Adult/Juvenile	■	■	■	■	■	■	■	■	■	■	■	■
Northern hogsucker												
Spawning				■	■							
Fry					■							
Adults	■	■	■	■	■	■	■	■	■	■	■	■
Smallmouth bass												
Spawning					■	■						
Fry						■	■					
Juvenile								■	■	■	■	■
Adults	■	■	■	■	■	■	■	■	■	■	■	■
Tessellated darter												
Adult/Juvenile	■	■	■	■	■	■	■	■	■	■	■	■
Banded darter												
Spawning					■	■						
Juvenile	■	■	■	■	■	■	■	■	■	■	■	■
Adults	■	■	■	■	■	■	■	■	■	■	■	■
Walleye												
Spawning			■	■								
Fry				■	■	■	■					
Juvenile								■	■	■	■	■
Adults	■	■	■	■	■	■	■	■	■	■	■	■
Shorthead redhorse												
Spawning			■	■								
Juvenile									■	■	■	■
Adults	■	■	■	■	■	■	■	■	■	■	■	■

2.3. Habitat Representation and Transect Selection

An initial boat-based site visit in early September 2009, when the prevailing river flow was approximately 3,400 cfs, provided information for the classification of the major mesohabitat types within the study area. Figure 2-2 shows the four major mesohabitat types found: pool, run/glide, riffle, and narrow channel. The four mesohabitats are described in Table 2-2.

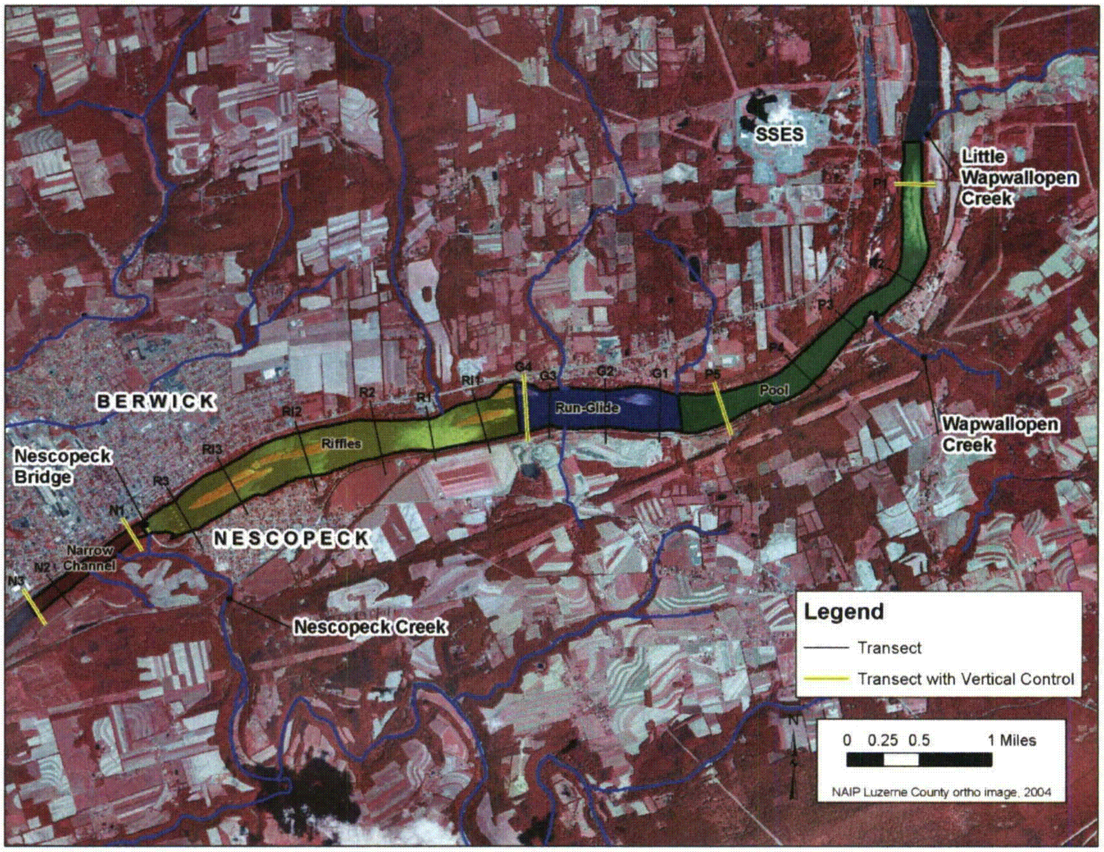


Figure 2-2 The four major mesohabitat types in the aquatic habitat study reach

The initial transect placement is also depicted.

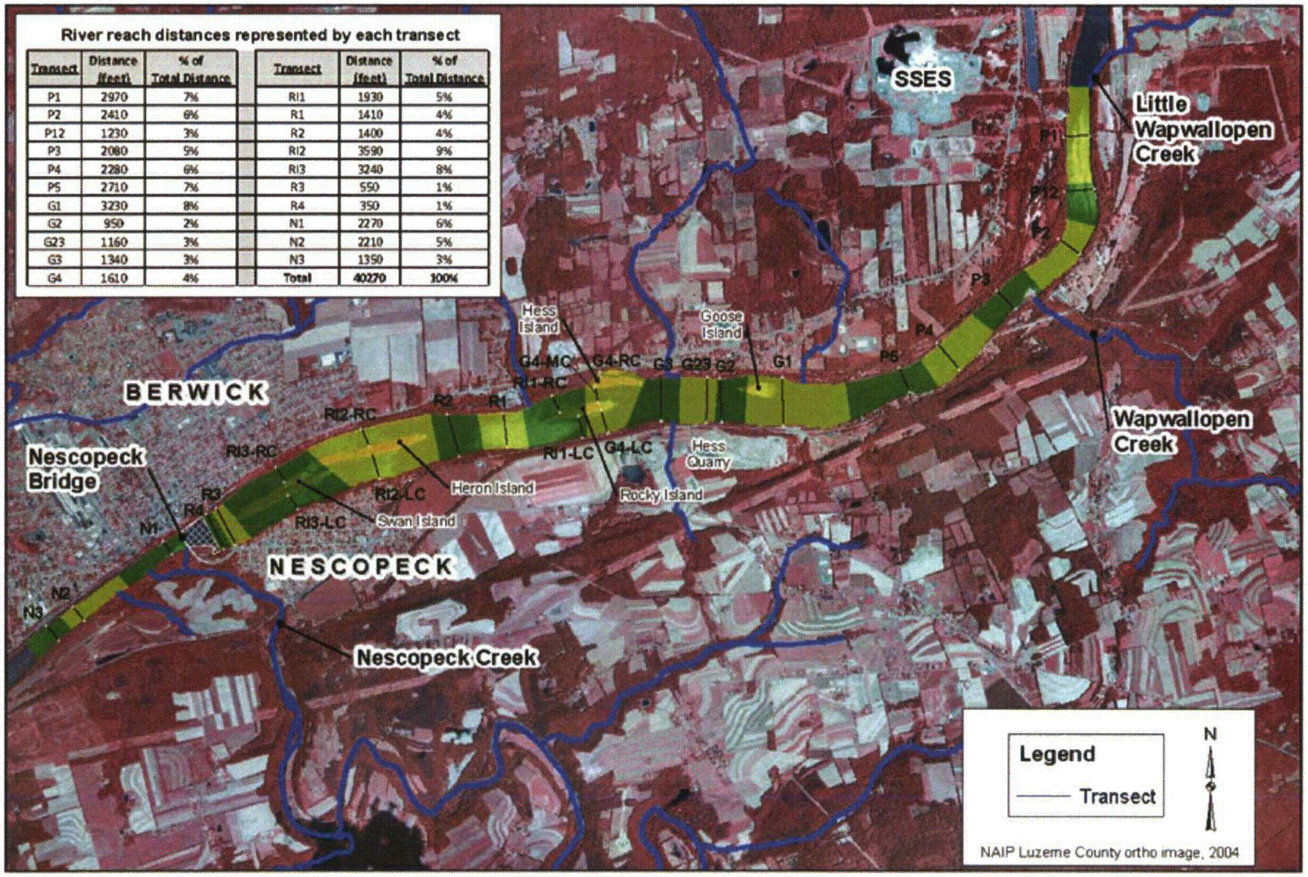
Table 2-2 Mesohabitat types for the Susquehanna River near the BBNPP

Mesohabitat Type	Description
Pool	Deep, slow water with turbulent flow (if present) only near the head. Retains standing water as discharge approaches zero.
Run/Glide	Shallow, fast water with smooth or laminar flow and little or no exposed substrates. Common in tailouts of deeper pools or interspersed with runs. Also referred to as flatwater or smooth run.
Riffle	Shallow with gravel, cobble, or boulder hydraulic control, fast water with turbulent flow. Possible exposed substrate, usually boulder.
Narrow Channel	Deep, fast water with turbulent flow and infrequent exposure of bedrock, boulders, or coarse substrate.

Transects were strategically placed in each mesohabitat type both to represent the proportion of each habitat type in the study area and to reflect the variability within the habitat type. Figure

2-2 shows an initial placement of habitat transects, based on available information from the September 2009 site visit, existing streambed profiles (ERM, 2008; Sutron Corp., 1985), and aerial photography (Pennsylvania Spatial Data Access website; Google Earth). Five transects (P1 to P5) were placed within the pool habitat type, to reflect variation in channel width and curvature. Four transects (G1 to G4) were placed within the run/glide habitat type, including one to represent the island and back channel at the lower end of that section. In the riffle habitat type, three transects (R1 to R3) were placed in the single-channel areas, reflecting variation in stream width and depth, and another three (RI1 to RI3) were placed to represent the split-channel areas created by islands. A final three transects (N1to N3) were placed in the "narrow channel" area downstream of Nescopeck Creek. An additional transect, R4, was placed downstream of the old bridge abutments based on professional judgment in the field in order to represent potential bass spawning sites. During a field visit with agency personnel on July 21, 2010, two supplemental transects (P1-2 and G2-3) were selected and later installed to represent additional habitat diversity apparent at lower flows.

The habitat transects were placed within each mesohabitat type and define locations where microhabitat variables (depth, velocity, substrate, and cover) were measured. Each transect represented a proportion of the study reach determined by the boundaries of the habitat within which it was placed. Figure 2-3 depicts the final transect placement and the habitat area represented by each transect. The tabular values are also shown. In the PHABSIM analysis each transect is weighted according to the length of river the transect represents.



River reach distances represented by each transect

Transect	Distance (feet)	% of Total Distance	Transect	Distance (feet)	% of Total Distance
P1	2970	7%	RI1	1930	5%
P2	2410	6%	R1	1410	4%
P12	1230	3%	R2	1400	4%
P3	2080	5%	RI2	3590	9%
P4	2280	6%	RI3	3240	8%
P5	2710	7%	R3	550	1%
G1	3230	8%	R4	350	1%
G2	950	2%	N1	2270	6%
G23	1160	3%	N2	2210	5%
G3	1340	3%	N3	1350	3%
G4	1610	4%	Total	40270	100%

Bell Bend PHABSIM Transects and Represented Areas

0 0.375 0.75 1.5 Miles

Figure 2-3 Final placement of the 21 PHABSIM transects in the BBNPP study reach and areas of habitat represented by each transect

The study reach length and percent represented by each transect is tabulated in the upper left corner.

2.4. *PHABSIM HYDRAULIC MODEL*

The hydraulic model was built with the data collected from 21 transects placed in four habitat types. Data collection targeted flows of approximately 2,000 cfs, 5,000 cfs, and 10,000 cfs. These targets permitted data extrapolation to flows as low as the 7Q10 (820 cfs at the Wilkes-Barre river gaging station), and as high as approximately 25,000 cfs. The hydraulic data measurements followed the guidelines established in the PHABSIM field techniques manuals (Trihey and Wegner, 1981; Milhous et al., 1984; Bovee, 1997). Water surface elevations and bank profiles were surveyed relative to temporary benchmarks, which were later surveyed to true elevation with an RTK GPS. Velocities and depths were measured at high flow primarily with an acoustic Doppler current profiler (ADCP), except for the two transects that were added during an agency site visit after the high flow measurements. The substrate and cover were coded at low flow. The flow at the four split-channel transects was partitioned by measuring discharge at each calibration flow in each channel. All data were entered into RHABSIM software developed by Thomas R. Payne & Associates (TRPA) that implements the equivalent algorithms of PHABSIM.

The hydraulic model utilized an empirical log/log regression calculation based on the three measured calibration flows to determine the stage/discharge relationship. Each channel of the split-channel transects was modeled independently. The channel conveyance method was used for quality control. Stations across each transect for depth and velocity measurements were incremented at four to six feet depending on channel width at individual transects. The single velocity method was used to simulate velocities at each station through the range of flows from 800 to 25,000 cfs. A complete description of the hydraulic model methods and results is presented in Appendix HYD.

2.5. *HYDROLOGY*

A time series of daily river flow at BBNPP was developed from the record of daily discharge as measured and recorded at the USGS gaging station No. 01536500, Susquehanna River at Wilkes-Barre, PA (Wilkes-Barre gage). The Wilkes-Barre gage record extends from April 1899 to the present. For purposes of this study, daily discharge data from the period April 1899 through March 2010 were used. The Wilkes-Barre gage daily discharges were not adjusted for upstream usage or flow regulation, insofar as usage and flow regulation were judged to be relatively insignificant and in any case not possible to determine.

The drainage area of the Susquehanna River at the Wilkes-Barre gage is 9,960 square miles. The drainage area of the river at the site of the proposed BBNPP intake is approximately 10,240 square miles. To represent flow at BBNPP as augmented by flow from the 280 square miles of drainage area between the Wilkes-Barre gage and BBNPP, the daily discharges measured and recorded at the Wilkes-Barre gage were increased by 2.8 percent.

Thus, daily river flow at BBNPP unaffected by BBNPP consumptive water use is represented by the recorded daily discharge at the Wilkes-Barre gage from April 1899 through March 2010 (110 years), with each daily discharge multiplied by 1.028.

To evaluate potential impact on aquatic habitat, two alternative levels of BBNPP consumptive water use (A and B) were considered. Alternative level A is based on the maximum (peak-day) consumptive water use of 28 mgd (43 cfs) for which PPL Bell Bend has applied to SRBC. Alternative level B is based on the expected maximum monthly average BBNPP consumptive water use simulated from long-term Wilkes-Barre meteorological data as 24.8 mgd (38.4 cfs). Each alternative's consumptive water usage will vary when considered on a monthly basis during the year due to variations in meteorological conditions. For purposes of this study, the alternatives were considered to vary, by month, in proportion to the variation of the maximum monthly averages experienced at SSES determined from records since 1987. Table 2-3 shows the resulting monthly average values of BBNPP consumptive water use assumed in the study.

Table 2-3 Projected monthly consumptive water use

Month	Experienced maximum consumptive water use at SSES as percentage of peak month (1987-2009)[1]	A - Maximum daily BBNPP consumptive water use applied for with SRBC, adjusted (cfs)[2]	B - Representative expected maximum average BBNPP consumptive water use (cfs)[3]
January	73%	31	28
February	74%	32	28
March	67%	29	26
April	76%	33	29
May	85%	37	33
June	86%	37	33
July	100%	43	38
August	100%	43	38
September	96%	41	37
October	89%	38	34
November	75%	32	29
December	73%	31	28

Five different project operating scenarios were considered in developing time series for this study. The first two considered BBNPP consumptive use scenarios (A and B, respectively) without mitigation. The third, fourth and fifth considered consumptive use alternative A with the following mitigation measures imposed:

- BBNPP water use is prohibited whenever river flow is below the 7Q10; the at-site 7Q10 is 843 cfs, derived as the 7Q10 at Wilkes-Barre (820 cfs) adjusted for the 2.8 percent additional drainage area at BBNPP.

- BBNPP water use is prohibited whenever river flow is below 20% of average daily flow (ADF); the at-site 20%ADF is 2,817 cfs, derived as the 20%ADF at Wilkes-Barre (2,740 cfs) adjusted for the 2.8 percent additional drainage area at BBNPP.

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[1] Percentages rounded to nearest percent. Maximum monthly monitored consumptive use at SSES 1987-2009 occurred July 2000.

[2] The amounts in this column are the product of the maximum (peak day) consumptive use applied for with SRBC (28 mgd, equivalent to 43 cfs) and the respective SSES percentages in the column to the left, rounded to nearest cfs. These amounts are extremely conservative and include sufficient allowance for in-river evaporation due to the thermal discharge.

[3] The amounts in this column are the product of the maximum monthly consumptive use at BBNPP simulated from long-term Wilkes-Barre meteorological data (24.8 mgd, equivalent to 38.4 cfs, in July 1955) and the respective SSES percentages in the second column to the left, rounded to nearest cfs. These amounts are conservative and include sufficient allowance for in-river evaporation due to the thermal discharge.

- 50% of BBNPP's consumptive water use is replaced by upstream flow augmentation ("make up" water) whenever the river flow is less than the 20%ADF flow.

Duration curves of effective daily consumptive use (CU) rates for these five project scenarios are shown in Figure 2-4. Note that with a 20% ADF passby flow, the daily consumptive use is zero (BBNPP cannot operate) about 21% of the time. With a 7Q10 passby flow, consumptive use is zero less than 1% of the time. The 50%-make-up scenario represents a net consumptive use; BBNPP would consume water per alternative A, but make up water would be added to the river upstream of BBNPP, augmenting flows both above and below the BBNPP site.

Duration curves of natural river flow and project alternative flow A are shown in Figure 2-5. The 20% ADF is exceeded about 79% of the time; the 7Q10 flow of 843 cfs is exceeded more than 99% of the time.

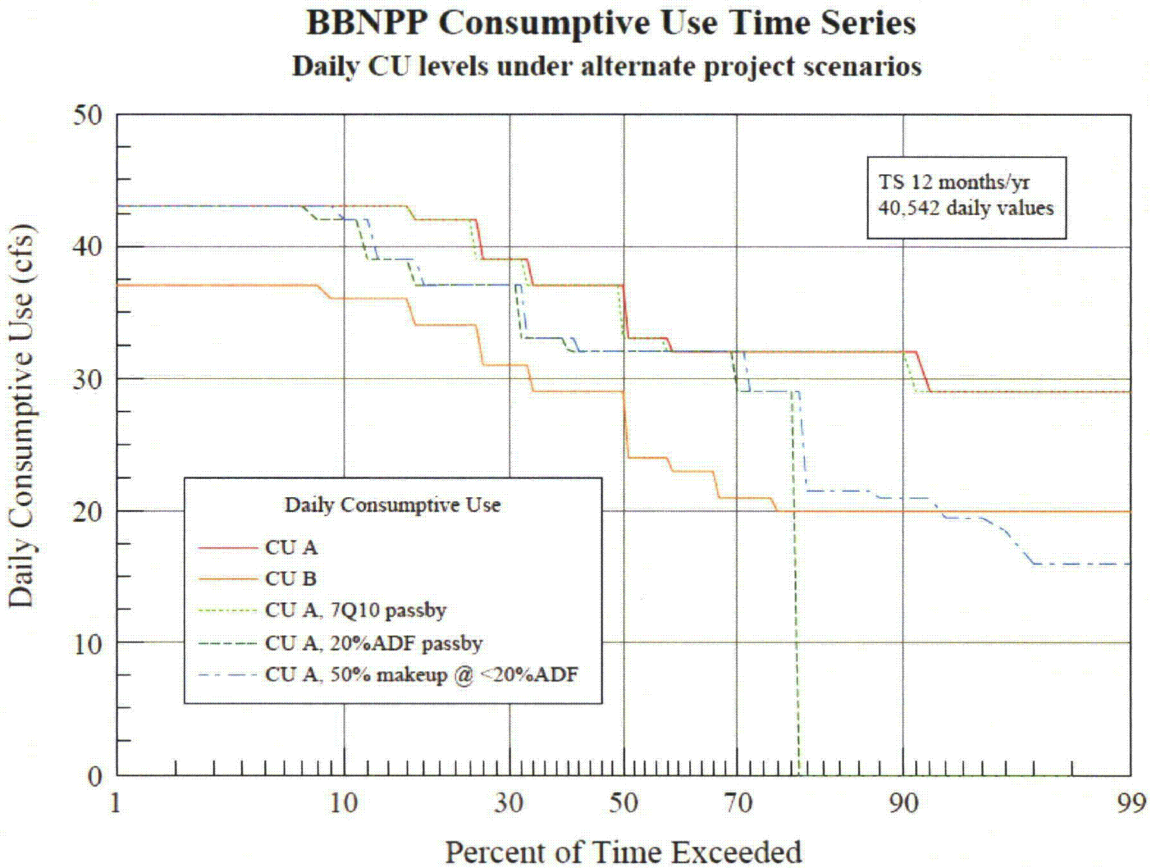


Figure 2-4 Duration curves for daily consumptive use rates

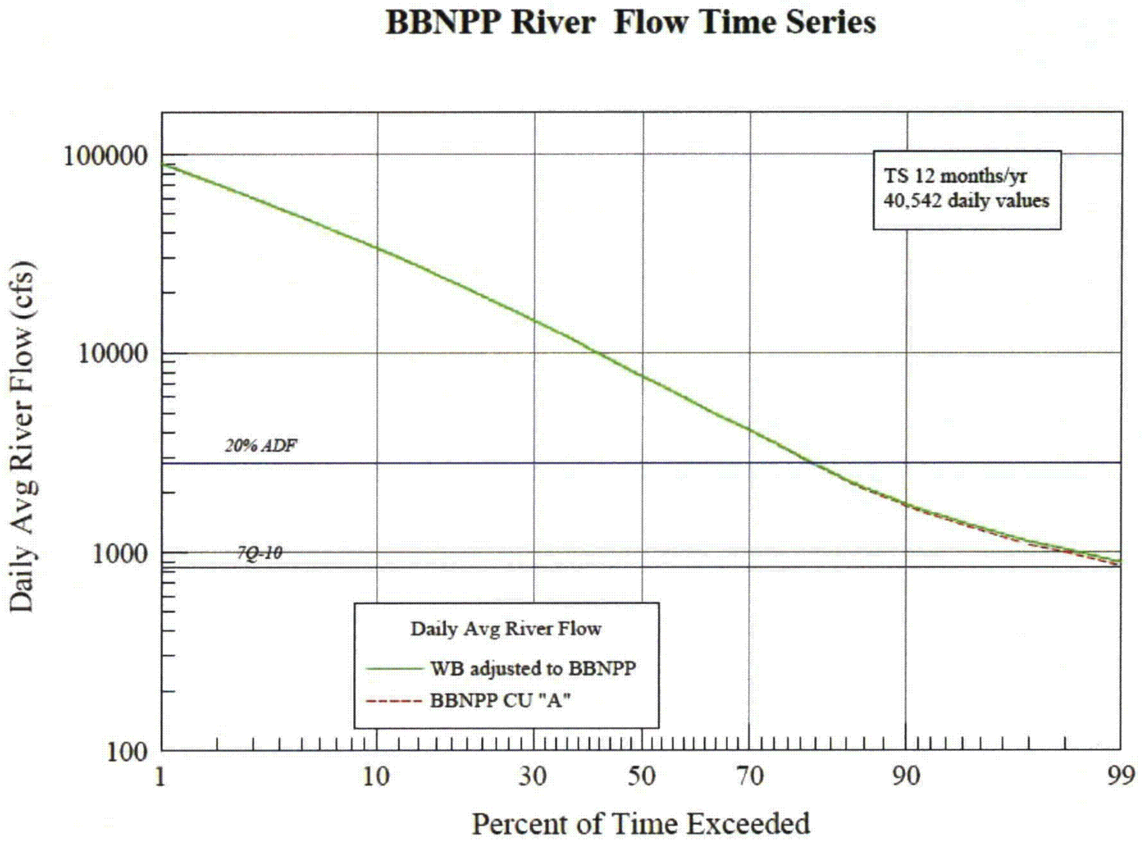


Figure 2-5 Duration curves for river flow at BBNPP

2.6. HABITAT MODELING

The flow-related depth and velocity estimates simulated by the hydraulic model, together with the agreed-upon Habitat Suitability Criteria curves, were used in the PHABSIM habitat simulation program to produce Weighted Usable Area (WUA) vs. river flow relationships for each species and life stage considered in this study. WUA is the building block upon which all other habitat analyses depend. Habitat vs. flow relationships are the quantitative estimates of the amount of suitable habitat available for each species and life stage over the simulated range of natural river flows (in this study, 800 cfs to 25,000 cfs). WUA is usually expressed as square feet per 1,000 feet of stream length.

In some instream flow studies, the objective is to determine a river flow (or at least a minimum flow) that yields the best response in WUA (i.e., the most suitable habitat) for the species and life stages of concern. However, this study was intended only to quantify and assess the impact of the requested consumptive use on suitable habitat availability, particularly at natural low flows. This information will be used by the Susquehanna River Basin Commission (SRBC) when determining the need for and amount of a passby flow. As such, the magnitude of the WUA

response curve is not as important; as the slope (positive or negative, and steepness) of the curve. Curve slope is critical to determining how WUA will change in response to small changes in flow, over the entire range of flows experienced in this river reach.

In general for this river reach, suitable aquatic habitat, quantified as WUA over the entire study reach, decreases as the river flow increases (see Appendix WUA). An example, for smallmouth bass, is shown in Figure 2-6. This section of the Susquehanna River is generally wide and shallow, and the higher water velocities associated with higher river flows become less suitable for fish habitat. For seven of the twenty-three species and life-stage combinations in this study (smallmouth bass fry and spawning; walleye adult, juvenile, and fry; northern hogsucker fry; and banded darter spawning), the WUA response to flow is monotonically decreasing. That means that a decrease in flow always yields an increase in WUA, such that any flow reduction due to BBNPP consumptive water use can never have a negative effect on the available suitable habitat. These seven species-life stage combinations were not considered further in the habitat analysis, since they are not negatively impacted by BBNPP consumptive water use at any level.

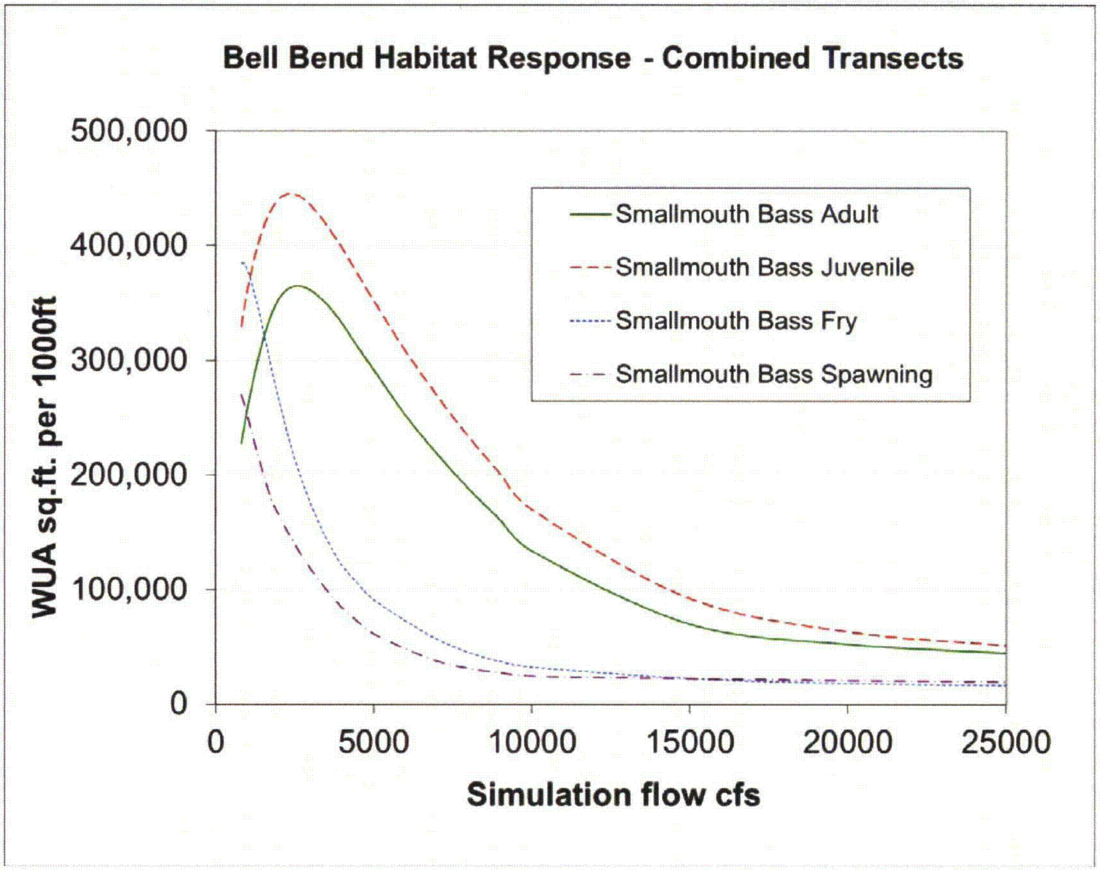


Figure 2-6 Habitat response to river flow for four life stages of smallmouth bass.

Shown is the Weighted Usable Area (WUA, sq. ft. per 1,000 ft of stream) v. flow (cfs) for four life stages of smallmouth bass in the Susquehanna River near the BBNPP site.

For the remaining sixteen species/life stage combinations in this study, the peak of the WUA response curve occurs at different flows, but is most often at lower flows (less than 5,000 cfs on ten curves), and the ascending limbs of the curves (where the slope is positive) are short. These are the ranges of river flow where a reduction in flow could have some negative impact on WUA. It is the slope of the ascending limb in the WUA response curve that is directly related to the magnitude of negative impact on WUA associated with a given flow reduction.

For several of the species and life stages in this study, the ascending slope of the WUA response curve at very low flows is fairly steep; however, it is also noted that this potential for negative impact also occurs near the peak of the curve. That is, for some portion of the year, when flows are higher, the available WUA is naturally much less than that available at low flows, with or without BBNPP consumptive water use reductions.

This general pattern in WUA response is not seen for American shad spawning and fry, walleye spawning, shorthead redhorse adult and spawning, and northern hogsucker adult. For these six species and life stages, the peak WUA response occurs at higher flows, but the ascending slopes (except for northern hogsucker) are less steep, indicating smaller negative impacts on WUA resulting from BBNPP consumptive water use flow reductions.

2.7. Habitat Impact Analysis

The WUA vs. flow relationships and the long-term daily hydrologic record for the Susquehanna River at the BBNPP site were used to generate daily habitat time-series (the WUA available in the study reach for each day of the historical record), and subsequently, habitat duration curves, for each of the sixteen species and life stage combinations with some potential for negative impact. For daily flow values outside the range of the hydraulic simulation (less than 800 cfs or greater than 25,000 cfs), daily WUA was estimated by linear extrapolation of the WUA response curve. Habitat time series were limited to the relevant months of seasonal occurrence for each species and life stage (Table 2-1). These time-series were used to estimate, in a manner similar to flow duration curves, the probability, or proportion of time, that a given level of WUA will be equaled or exceeded, with natural river flows. Similar curves were developed for the five alternative project flow scenarios discussed in Section 2.5, based on the historical natural river flows adjusted to reflect

- the requested BBNPP consumptive water use of 43 cfs, adjusted monthly (A),
- the expected maximum monthly BBNPP consumptive water use (B),
- Scenario A with a 7Q10 passby flow (no withdrawal below 843 cfs at BBNPP);
- Scenario A with a 20% ADF passby flow (no withdrawal below 2817 cfs at BBNPP); and
- Scenario A with 50% make-up additions below 20% ADF.

Comparison of habitat duration curves for natural flows and adjusted flows demonstrate the overall impact of the project on habitat availability.

In discussing habitat impact analysis, SRBC Publication 191 (Denslinger, *et al.* 1998) defines "impact" as "the percentage difference between habitat available without the withdrawal and habitat available with the withdrawal in place." This approach speaks more directly to the question of how BBNPP consumptive water use will affect available habitat at a range of river flows, and will allow consideration of whether the level of impact is acceptable or not. In the analysis presented below, the change in habitat resulting from the BBNPP consumptive water use is expressed both as an area and as a percentage of the habitat available at natural river flows, calculated for each in terms of WUA.

"Change in habitat" for a given species and life stage is essentially the difference, on the habitat axis, between two identical WUA vs. flow curves that are offset on the flow axis by an amount equal to the water use (consumptive use). That is, for any given river flow entering the study reach, the habitat available in the presence of a theoretical consumptive use would be the same as the habitat provided by a lower unimpacted river flow. The absolute change in WUA due to the theoretical consumptive use is compared, as a percentage, to the level of WUA that would be provided at the natural river flow (Figure 2-7).

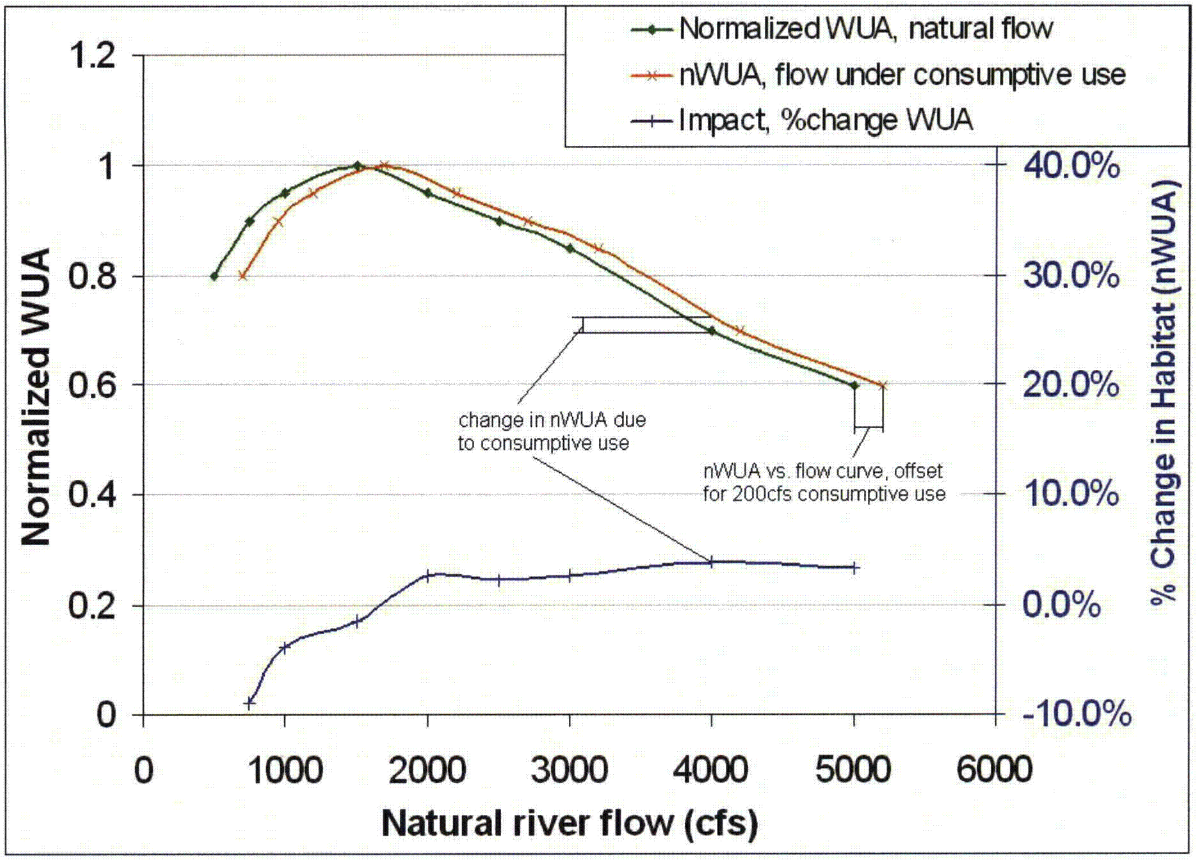


Figure 2-7 An example of habitat impact analysis, based on a hypothetical normalized WUA vs. river flow curve and a theoretical 200 cfs consumptive use

The WUA response curve at natural river flow is offset to the right to simulate a 200 cfs theoretical consumptive use; that is, the available habitat at a given natural flow under a consumptive use is the same as the available habitat at a natural flow 200 cfs lower. The vertical distance between the curves represents the change in habitat (positive or negative) due to the consumptive use at a given natural flow. This change is then expressed as either an area or a percent of the habitat available at the natural flow, resulting in the relationship of habitat impact to flow.

This calculation can also be expressed in equation form. Given:

WUA(q) = relationship of usable habitat to flow (per species and life stage)

I = impact: % difference between habitat with flow alteration and habitat without flow alteration

CU = theoretical consumptive use

CU(q) = flow-related consumptive use (e.g., with passby limit in effect)

then the habitat impact % at a given (natural) flow q is:

$$I(q) = (WUA(q-CU(q)) - WUA(q)) / WUA(q)$$

The resulting relationship of "percent change in habitat" versus flow can be examined directly to evaluate the habitat impacts, positive or negative, of a given, constant consumptive use at different river flows. For this analysis, the WUA vs. flow relationships were "normalized," or scaled as a proportion of the maximum WUA value from each curve, so that habitat responses for all species and life stages are expressed on a comparable zero-to-one scale of normalized WUA (nWUA). The calculation of percent change is not affected by this normalization.

The impact vs. flow relationships can also be converted, with a natural flow time-series, into "habitat impact duration curves" for a given, level of proposed consumptive use. However, since the project flow scenarios considered in this study represent a water use that is not constant, but varies by month and with passby restrictions, the habitat impact time-series were generated by calculating the daily difference, or percent change, in WUA between the natural flow habitat time-series and each of the alternate project flow habitat time-series. These daily impacts were then summarized in a duration analysis showing what percent of time (based on the historical flow record) a given percent change in usable habitat area can be expected to be equaled or exceeded in the positive (improvement) direction. This analysis allows the various project flow alternatives to be compared for both magnitude and duration of impact.

The results of these habitat impact analyses for sixteen species and life stage combinations are summarized in a table and shown in figures in Appendix TS. This appendix contains a series of four plots for each species and life stage. Example plots for smallmouth bass adult are shown in Figure 2-8 and Figure 2-9.

The first two plots, side by side, share the same vertical axis of WUA area (sq. ft./1,000 ft. of stream). The "WUA vs. Flow Response" plot shows the WUA vs. flow relationship over the 800 to 25,000 cfs range of simulation. A region of "low flows," defined as less than 20% of the ADF (2,817 cfs at BBNPP) and greater than the minimum flow observed in the time series for the species and life stage, is marked on the flow axis. Typically in this study, this is also the range of flows where a positive slope of the WUA response curve indicates the potential for negative impacts on habitat due to BBNPP consumptive water use. The corresponding range of WUA at these flow values is marked on the vertical axis, and carried across to the second plot, the "Habitat Time Series."

The seasonality and size of the time series (TS) are labeled on this plot. Lines labeled Natural Flow and CU A represent the frequency of occurrence, or duration, of WUA over the entire study reach for both the natural river flow and the requested BBNPP consumptive water use. Because the habitat impacts related to the requested BBNPP consumptive water use are so small, these two lines are generally indistinguishable, so the other alternative project flows are not shown (they all have lower water use levels, and would be even more similar). The conclusion of this time-series analysis for all BBNPP water use scenarios evaluated is that, overall (for the entire study reach, and over time), there is no substantial difference in aquatic habitat availability

between natural river flows and flows reduced by the requested BBNPP consumptive water use whether or not any form of mitigation is imposed.

The habitat duration curves also show that, for most species and life stages, the WUA available during times of low flow, typically when any potential negative habitat impacts occur, is not the lowest WUA available over the entire seasonal time-series. There are substantial periods of seasonally relevant time over the year when naturally available WUA, not impacted by BBNPP consumptive water use, is much lower. To the extent that fish populations are limited by available habitat (as represented by WUA) over time, any negative impacts due to the requested BBNPP consumptive water use would not be expected to be habitat limiting as BBNPP impacts at low flows do not produce the lowest levels of WUA over time.

The third line on the Habitat Time Series plot, "Daily Difference," represents the frequency of occurrence of daily differences in WUA (impact) between the natural flow and requested BBNPP consumptive water use time series. It is plotted on the same scale as the habitat time series to show the size and frequency of negative impacts, in particular, as compared to the total available WUA. Selected percentile values of the daily difference are tabulated in Appendix TS. (see Table, "BBNPP Habitat Impact Time-series Analysis", in the column labeled "WUA change sq.ft./1,000 ft."). As these are duration (frequency of occurrence) curves, the lines are not linked in the horizontal axis: The most-negative daily difference values do not necessarily occur at the same time as the smallest daily WUA values.

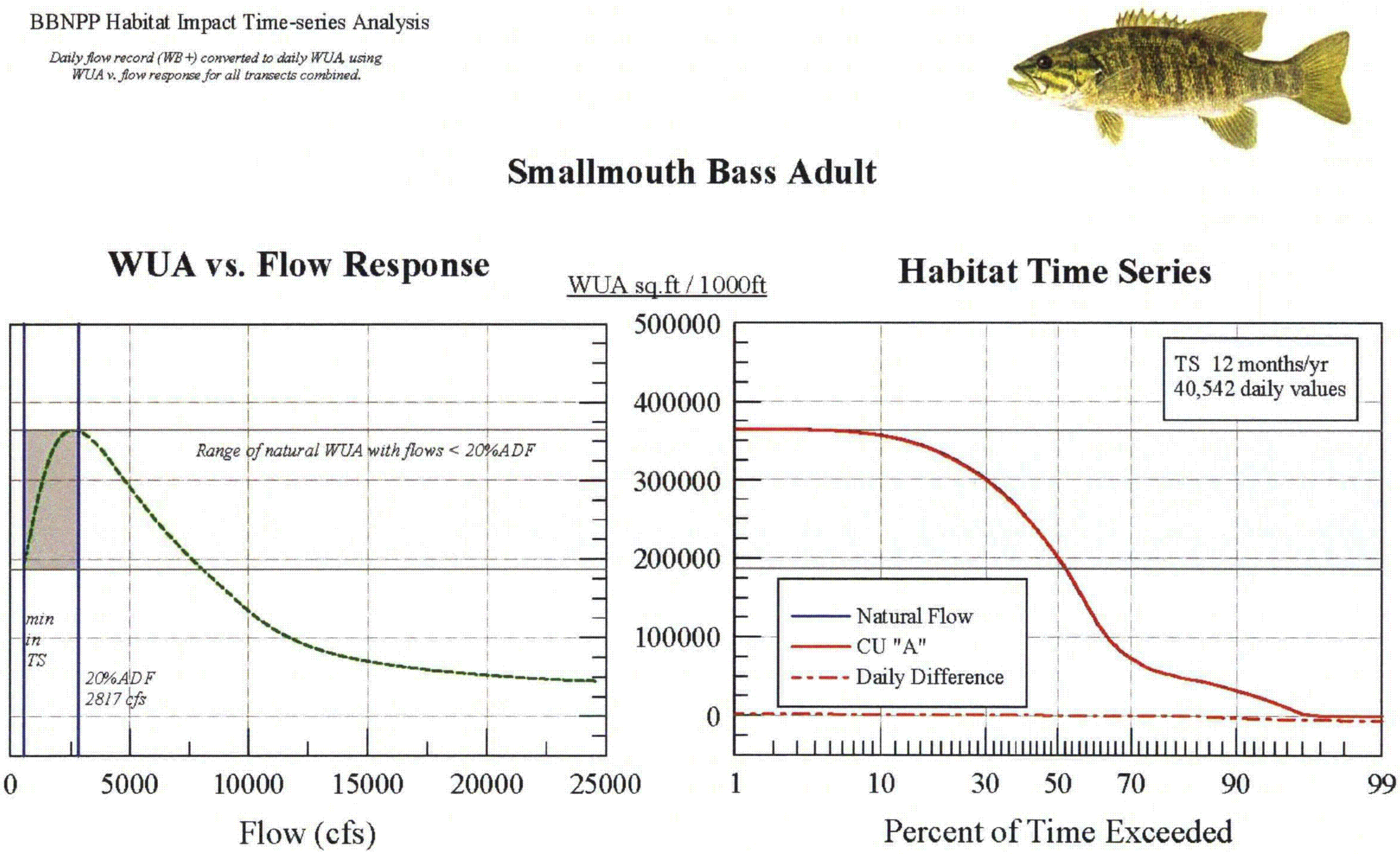


Figure 2-8 WUA for smallmouth bass adults

This figure highlights the range of WUA (sq. ft. per 1000 ft of stream) associated with flows less than 20% of the Average Daily Flow, and by duration frequency as seen in three habitat time series: daily WUA values at both natural river flows and flows reduced by the consumptive use scenario "A", as well as the daily difference in WUA between these two time series.

The third and fourth plots (example, Figure 2-9) for each species and life stage, side-by-side, share the same vertical axis of Habitat Impact (% Change due to CU). The "Habitat Impact – Level 43 cfs CU" plot shows the calculation of habitat impact vs. flow for a given level of BBNPP consumptive water use, in this case the maximum requested 43 cfs consumptive use. The WUA vs. flow response curve is normalized on a 0 to 1 scale, and then shifted right by 43 cfs. Again, since the requested consumptive use is so small in comparison to the observed range of river flows, the two curves are nearly indistinguishable. However, the vertical difference between them can be calculated, and is plotted as a percent of the natural flow WUA by the line labeled "Habitat % Impact." As expected, negative impacts occur where the WUA response curve has a positive slope, which is typically at lower flows in this study. Where the WUA response curve slopes down, there are positive changes in WUA when flows are reduced. The size of the % impact at a given flow depends on both the slope and the magnitude of the WUA response curve, but in general, negative impacts in this study are not large.

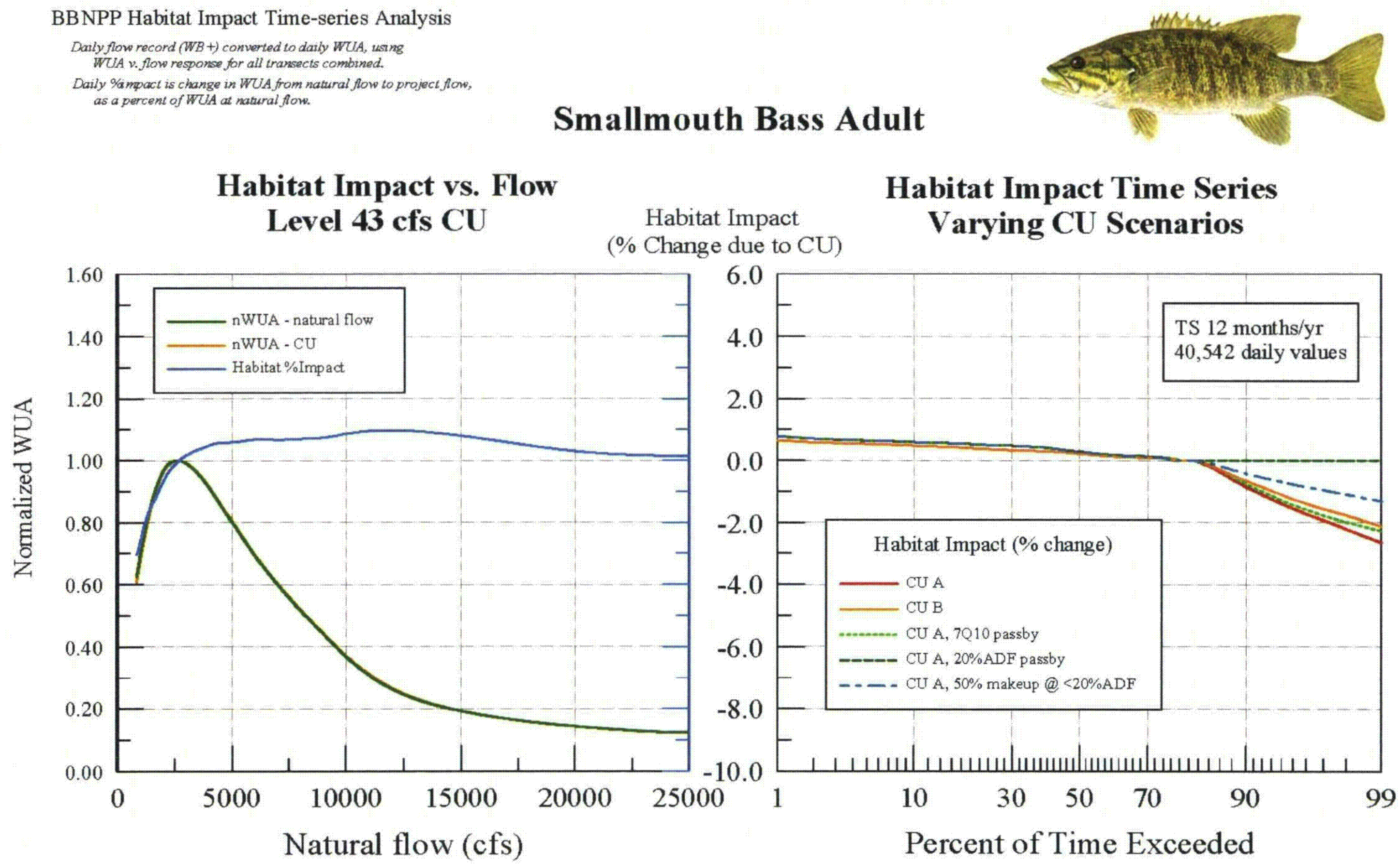


Figure 2-9 Habitat Impact for smallmouth bass adults

This figures shows % change in WUA from natural flow resulting from five alternate project flow scenarios by duration frequency as seen in five habitat time series.

The fourth plot, "Habitat Impact Time Series," takes into account both the possible seasonal variation in consumptive use (often less than the requested maximum 43 cfs), and the seasonal limits of the time series some life stages are not present year-round, and will not be affected by the full annual range of observed river flows. The five lines on this plot represent the frequency of occurrence, or duration, of daily habitat impact (% change in WUA) over the entire study reach for the five alternate project flow scenarios as compared to the natural river flow. The requested consumptive use (scenario A) typically results in the largest negative impacts. However, in general, the largest negative impacts are still small (less than 5% of natural WUA), and they occur infrequently (20% of the time, or less) within the seasonally relevant time series for each species and life stage. Selected percentile values of the % impact for the 5 project flow scenarios are tabulated in Appendix TS (see Table, "BBNPP Habitat Impact Time-Series Analysis").

Habitat impact time-series results are summarized in Figure 2-10. Each horizontal bar represents the 1st to 99th percentile range (which represents 98% of the overall time range) of the expected percent change from natural flow WUA due to consumptive use of water according to project flow scenario A (requested consumptive use, adjusted seasonally). This corresponds to the vertical range of the red line on the "Habitat Impact Time Series" plots. The differently colored sub-bars represent selected percentile points in the frequency distribution of the daily percent change values. Negative impacts on habitat are small and infrequent. For 99% of the time, habitat losses are less than 3% of naturally available WUA for all species and life stages except northern hogsucker adults. For 95% of the time, habitat losses are less than 2% of naturally available WUA. Habitat changes due to this consumptive use are actually positive (WUA increases) more than half of the time for nearly all species and life stages.

2.8. Conclusions

The potential for negative impacts on aquatic habitat due to reduction in flow in the Susquehanna River due to the proposed BBNPP consumptive water use was investigated using the PHABSIM model of the IFIM. Stream hydraulics were modeled on three sets of field data from 21 transects in the seven-mile study reach and were simulated for river flows ranging from 800 cfs to 25,000 cfs. Habitat Suitability Criteria were prepared for multiple life stages of eight fish species and, from these, the response of WUA vs. river flow was determined. Time-series analysis of WUA and habitat impact indicates that any negative impacts due to the requested BBNPP consumptive water use would be small and infrequent, and would not occur at times that could contribute to a habitat-related limitation on fish populations.

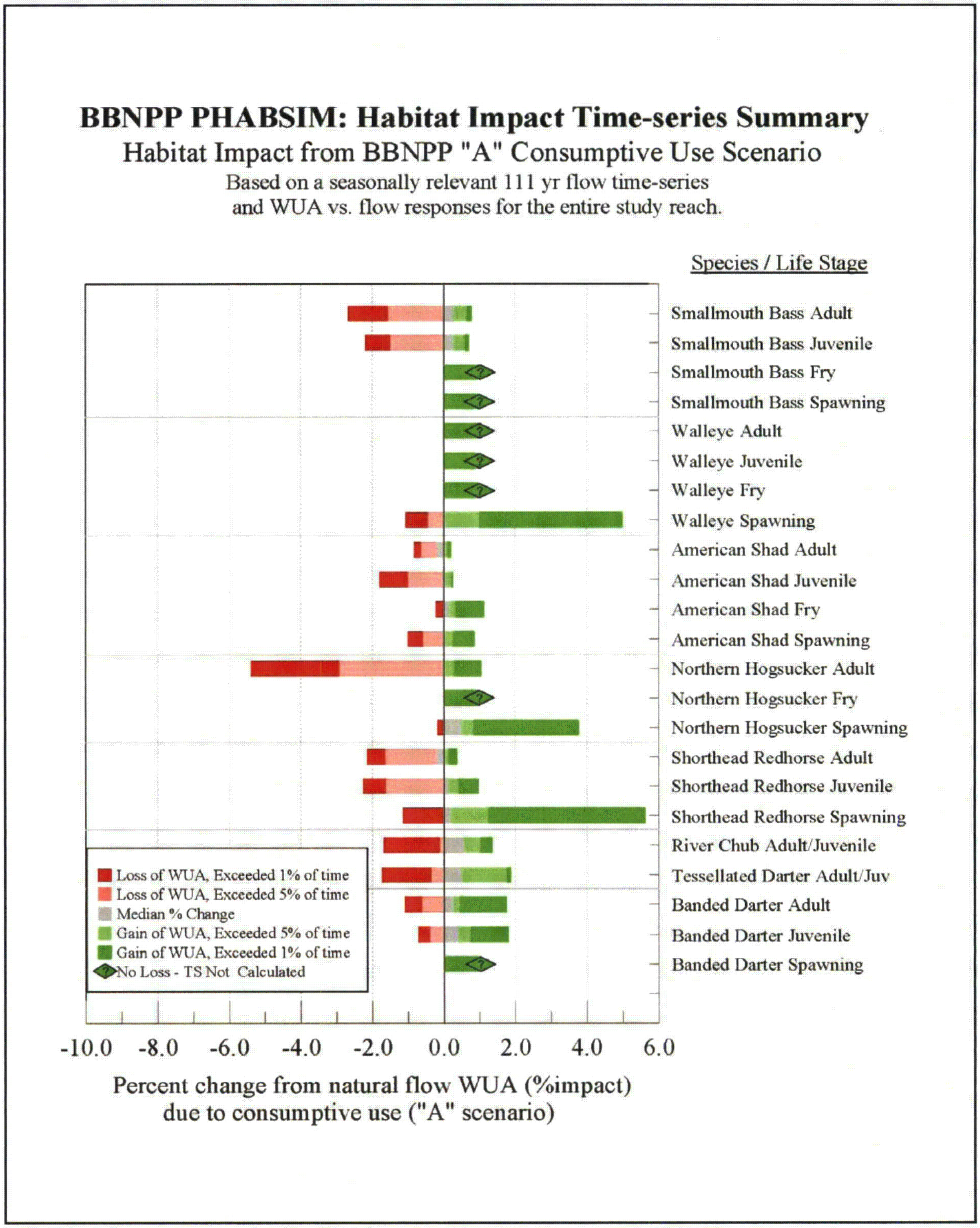


Figure 2-10 Summary of habitat impact time-series analysis

3. *WATER QUALITY ASSESSMENT OF NESCOPECK AMD DISCHARGES*

3.1. BACKGROUND

The Jeddo Tunnel system drains deep anthracite mines in watersheds adjacent to the Little Nescopeck and discharges AMD to the Little Nescopeck Creek. The Little Nescopeck Creek flows into the Nescopeck Creek and ultimately into the Susquehanna River just below the Nescopeck-Berwick Bridge.

Although the mines are no longer active, the Jeddo Tunnel system continues to drain the abandoned mine workings. Daily outflow from the tunnel as gaged by the USGS during 1974-79 and 1995-98 ranged from 20 to 435 cfs. Ballaron (1999) reports measured pH values at the tunnel portal in the range of 3.6 to 5, with an average pH value of approximately 4.3. The AMD-impaired Little Nescopeck reduces pH values in the Nescopeck Creek, and low pH waters are detectable in the Susquehanna River 6.5 miles downstream of the BBNPP site.

Flow reduction in the Susquehanna River has two potential consequences relative to low-pH water entering the river from the Nescopeck Creek. These are

(1) that a decrease in Susquehanna River flow will reduce dilution of AMD from Nescopeck Creek and thus decrease pH in the river to a level that will impact downstream users; and

(2) that a decrease in Susquehanna River flow will allow Nescopeck Creek AMD-impaired waters to extend farther into the Susquehanna River and potentially decrease habitat because aquatic organisms will be excluded from or reduced in the extended low-pH area.

These two concerns have been assessed using a combination of a field program and a mass-balance calculation. The mass-balance calculation uses observed values of hydronium ion (H^+) concentrations in the Susquehanna River and the Nescopeck Creek and incorporates the buffering capacity of the Susquehanna River. The mass balance calculation requires that Nescopeck Creek flows be estimated (see Section 3-3), since these flows are not routinely measured.

The Study Plan suggested that the study reach for this assessment extend as far downstream as the Fishing Creek in Bloomsburg, approximately 13 miles from the BBNPP site. The field study presented here indicates the downstream extent of low pH waters is significantly shorter than was supposed when the Study Plan was prepared.

An important objective of this study was to obtain field values of pH for a range of Nescopeck Creek and Susquehanna River flows. Having observations at a range of flows provides direct estimates of the distribution of Nescopeck Creek AMD-impacted water in the Susquehanna River if flows are reduced by BBNPP water use. For example, field observations of pH values when Susquehanna River flows are 1,460 cfs are equivalent to values that would be observed

when Susquehanna River flows are 1,503 cfs and BBNPP consumptive water use is the maximum anticipated 43 cfs.

3.2. Field Program

Ecology III implemented the field program and provided geo-referenced datasets. The field program consisted of measurements of pH, temperature, conductivity, and dissolved oxygen recorded using a YSI 650 MDS equipped with a 600 XL Multi-Parameter Water Quality Monitor. The YSI instrument was calibrated before each use in the field according to the manufacturer's procedure. The location of each sample point was recorded with a Magellan Meridian Platinum model GPS.

The sampling protocol consisted of taking measurements along transects across the river. Each transect consisted of four points across the river: one starting in the low-pH waters (the "AMD plume") near the south (left) bank of the river, one on the outside edge of the plume, one mid-river, and one on the west bank. Transects were extended downstream until low-pH waters could no longer be detected. The downstream-most transect was located approximately 2.5 miles from the mouth of Nescopeck Creek.

Ten surveys over a range of flows were conducted in 2010 (Table 3-1); four of the surveys were at flows less than 2,000 cfs.

Table 3-1 Survey data

Survey date	Number of samples	Downstream-most transect distance from the Nescopeck Creek (mi)	Susquehanna River at Wilkes-Barre (cfs)	Estimated Nescopeck Creek flow (cfs)	Susquehanna River pH[4]	Nescopeck Creek pH
5/21/2010	28	2.5	10,700	180	8.4	5.7
6/25/2010	15	2.1	3,910	118	8.1	6.7
8/6/2010	36	1.8	1,810	102	8.1	5.2
8/13/2010	42	2.1	2,180	108	7.9	4.9
9/21/2010	32	1.7	1,650	107	8.5	5.8
9/24/2010	27	1.7	1,580	121	8.4	5.9
9/29/2010	31	1.9	1,460	142	8.0	5.8
10/6/2010	37	1.9	30,600	644	7.3	6.9
10/20/2010	37	1.8	14,200	173	7.6	5.2
10/29/2010	32	1.8	22,400	173	7.6	5.3

The field data were examined graphically to determine the point at which Susquehanna River pH values recovered, and to determine the spatial extent of the low pH plume in the Susquehanna River. Examples of the data displays are shown in Figure 3-1, Figure 3-2, and Figure 3-3. These

[4] Measured immediately upstream of the Nescopeck Creek confluence.

figures show, respectively, low flow, low pH, and high flow events. The remaining surveys are presented in Appendix SRWQS. The scale on the figures represents the PA Chapter 93 criterion for pH, which designates values between 6 and 9 as acceptable. On the figures, orange and red dots indicate values below standard.

It can be seen that pH values in the Susquehanna River quickly return to values well in excess of the minimum pH value of 6. It is also clear how little of the Susquehanna River is affected in the downstream and lateral directions by low pH waters entering from the Nescopeck Creek.

Figure 3-1 Measurements of pH in the Susquehanna downstream of the Nescopeck-Berwick Bridge at low Susquehanna River flow

Survey of 29 September 2010: Susquehanna River flow at Wilkes-Barre was 1,460 cfs, and the pH upstream of the Nescopeck Creek was 8.0. Estimated Nescopeck Creek flow was 142 cfs, and pH measured at the Creek mouth was 5.8.

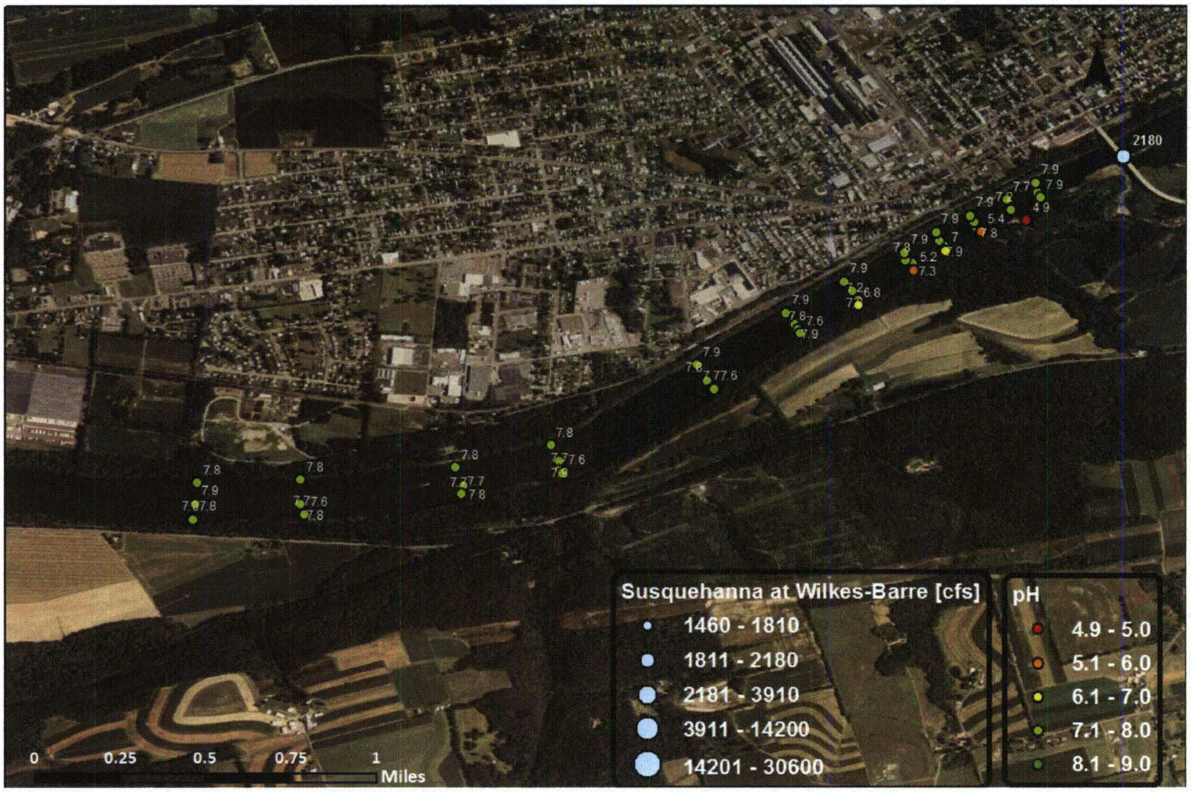


Figure 3-2 Measurements of pH in the Susquehanna downstream of the Nescopeck-Berwick Bridge at showing minimum observed pH

Survey of 13 August 2010: Susquehanna River flow at Wilkes-Barre was 2,180 cfs, and the pH upstream of the Nescopeck Creek was 7.9. Estimated Nescopeck Creek flow was 108 cfs, and pH measured at the Creek mouth was 4.9.

Figure 3-3 Measurements of pH in the Susquehanna downstream of the Nescopeck-Berwick Bridge at high Susquehanna River flow

Survey of 6 October 2010: Susquehanna River flow at Wilkes-Barre was 30,600 cfs, and the pH upstream of the Nescopeck Creek was 7.3. Estimated Nescopeck Creek flow was 644 cfs, and pH measured at the Creek mouth was 6.9.

The downstream extent of low pH waters can be estimated by developing a metric that allows a quantitative definition of recovery to acceptable pH values. The metric selected is the distance from the Nescopeck Creek confluence with the Susquehanna River to the first transect in which all values exceed a pH of 7 – a value exceeding water quality standards by one pH unit. These distances are shown in Table 3-2. The maximum distance (0.6 mi) occurs on the survey of 13 August (characterized as the minimum observed pH survey). The average distance to recovery is 0.2 mi.

Table 3-2 Distance to pH recovery by survey

Survey date	Closest transect with all pH measurements >7 (ft)	Closest transect with all pH measurements >7 (mi)	Average pH at the transect
5/21/2010	513	0.1	7.1
6/25/2010	647	0.1	7.6
8/6/2010	2,090	0.4	7.9
8/13/2010	3,127	0.6	7.6
9/21/2010	1,168	0.2	8.4
9/24/2010	1,119	0.2	8.1
9/29/2010	2,113	0.4	7.9
10/6/2010	528	0.1	7.4
10/20/2010	513	0.1	7.6
10/29/2010	676	0.1	7.6

3.3. Estimates of Nescopeck Creek Flow Rates

Although there are no currently active stream gages recording daily flows in the Nescopeck Creek watershed, the USGS maintains a partial-record gaging station in Nescopeck Creek at the Rt. 339 Bridge in Nescopeck (USGS gaging station No. 01538600, Nescopeck Creek at Nescopeck, PA). The USGS has taken approximately 140 flow measurements between 1949 and the present. The drainage area at the gage is 171 square miles, and the gage site is sufficiently close to the mouth of the stream so that it is not necessary to add "local" inflow to represent the total flow entering the Susquehanna River.

For this study, daily Nescopeck flows have been estimated assuming a linear relationship to the daily flow of Wapwallopen Creek. The USGS has recorded daily flow at the Wapwallopen gage since 1919. The drainage area of the stream at the gaging site is 43.8 square miles.

A Nescopeck-Wapwallopen flow relationship was first derived as the sum of two components, namely flow from the Jeddo Tunnel ("Jeddo flow") and flow from the remainder of the Nescopeck drainage. However, that relationship was not better than a direct relationship of Nescopeck flow to Wapwallopen flow. The resulting relationship is:

Nescopeck flow (cfs) = (3.46 x Wapwallopen flow (cfs)) + 76.5 cfs

The relationship was determined by linear regression as depicted in Figure 3-4. The plotted points (diamonds) are Nescopeck Creek flows measured by the USGS since 1982 (approximately 120 measured flows) plotted against the daily flow in Wapwallopen Creek gaged on the same day[5]. The R-squared value of the resulting regression is approximately 0.85.

[5] No flow measurements were taken between 1971 and 1982, when the gaging station was re-established. The flow measurements taken in 1971 and earlier were disregarded due to the length of the hiatus in measurements, the possibility that the earlier gaging records were less reliable, and the adequate number of measurements available since 1982.

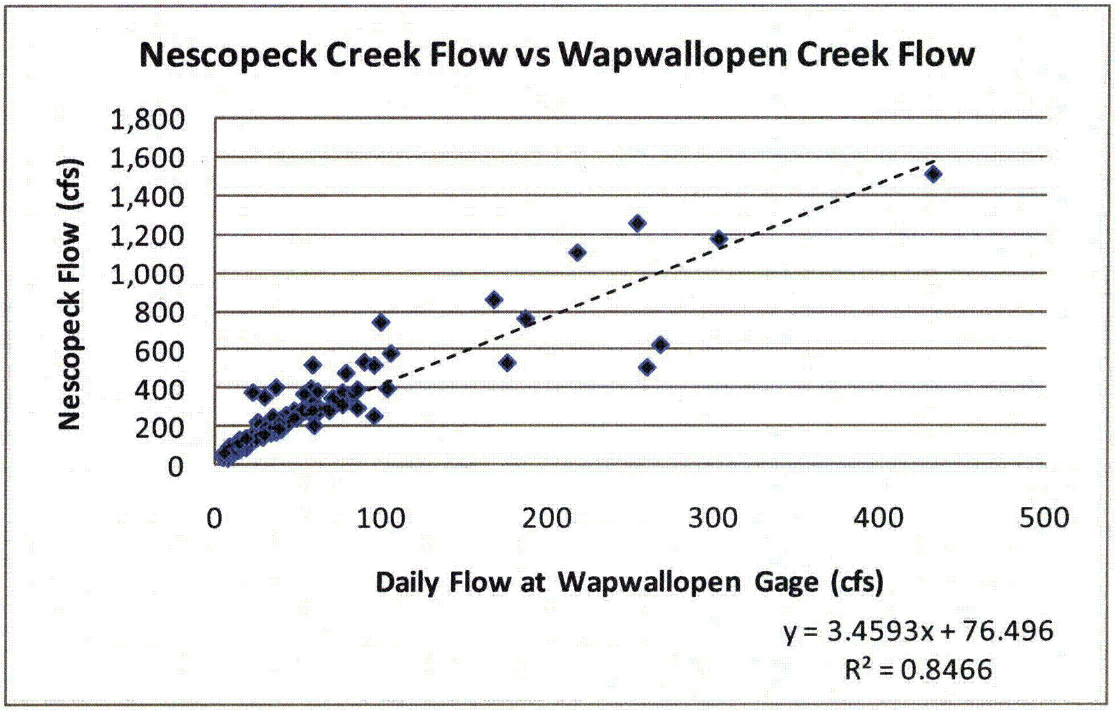


Figure 3-4 Relationship between Nescopeck Creek and Wapwallopen flows

3.4. Mass Balance Calculations

Table 3-3 shows the results of a mass balance modified by an alkalinity buffering calculation for each of the stream pH survey dates and the average observed pH at the farthest downstream transect. Table 3-3 also includes the impacts on pH due to the maximum consumptive use of 43 cfs at BBNPP. In this sequence of calculations, the H^+ ion flux is developed from Susquehanna River and Nescopeck Creek flows and pH values. Downstream pH is then calculated from the change in pH and observed alkalinities for the Susquehanna River[6].

Agreement between calculated and observed pH is good and indicates that the downstream pH is predictable from upstream pH, alkalinity, and flow data. Reduced flow due to consumptive use at BBNPP showed no significant effect on calculated pH.

[6] Alkalinity values for the Susquehanna River were not available for the first four surveys; these values were estimated from seasonal data.

Table 3-3 Calculated and observed pH downstream of the Nescopeck Creek confluence

Date	Susquehanna River upstream pH	Nescopeck pH	Susquehanna River calculated pH	Susquehanna River calculated pH with BBNPP consumptive water use	Susquehanna River pH observed at the farthest downstream transect
5/21/2010	8.4	5.7	8.3	8.1	8.4
6/25/2010	8.1	6.7	8.1	8.1	8.3
8/6/2010	8.1	5.2	8.1	8.1	8.1
8/13/2010	7.9	4.9	7.9	7.9	7.8
9/21/2010	8.5	5.8	8.5	8.5	8.6
9/24/2010	8.4	5.9	8.4	8.4	8.1
9/29/2010	8.0	5.8	8.0	8.0	7.8
10/6/2010	7.3	6.9	7.3	7.3	7.4
10/20/2010	7.6	5.2	7.6	7.6	7.7
10/29/2010	7.6	5.3	7.6	7.6	7.7

3.5. Conclusions

The potential for additional impairment of the Susquehanna River due to reduced dilutive capacity was investigated with an extensive field program supplemented with mass balance calculations. It was determined that pH in the Susquehanna River recovered within a short distance (the maximum observed is 0.6 mi; the average distance is 0.2 mi) of the Nescopeck Creek's entry point for all observed flows. The ten surveys conducted during the spring, summer and fall seasons of 2010 covered a range of flows from 1,460 to 30,600 cfs as measured at Wilkes-Barre with few pH values less than 6 in the Susquehanna. In addition, all surveys showed that the AMD plume remained attached to the south shoreline of the Susquehanna River. The anticipated reduction in flow from BBNPP consumptive water use would not change this observed behavior.

4. *ASSESSMENT OF COOLING TOWER BLOWDOWN IMPACTS*

This section describes the analyses that were performed to assess the potential increases in river water temperature due to the BBNPP cooling tower blowdown discharge and potential reductions of dissolved oxygen (DO). The analyses provide estimates of the size and configuration of the thermal plume for four scenarios. The scenarios include periods when relatively larger thermal plumes may be present: (1) a winter period when maximum differences between the BBNPP blowdown and river temperatures occur and (2) a late summer period when river flows are lowest. For each of these two periods, an average and a worst-case scenario was developed. The analyses were based on observations of the thermal plume from the nearly identical SSES cooling tower discharge plume and on calculations of the size and configuration of the thermal plume made with EPA's CORMIX model.

Potential changes in DO due to temperature rises were computed from changes in saturation concentrations of dissolved oxygen at representative ambient temperatures.

The temperature analysis shows that thermal plumes are small and temperature rises are limited to the immediate vicinity of the diffusers. Temperature rises from BBNPP's cooling blowdown would be virtually undetectable at the end of the pool in which the SSES and BBNPP discharge structures are located. Reductions in DO concentrations due to the small temperature rises that occur adjacent to the BBNPP diffuser would be minimal.

With respect to meeting Pennsylvania water quality criteria, the BBNPP uses Best Technology Available (BTA) for condenser cooling, i.e., cooling towers, and the discharge will be subject to NPDES permitting by PADEP.

4.1. COOLING TOWER OPERATION AND BLOWDOWN RELEASE SYSTEM

The BBNPP and SSES diffusers are virtually identical engineered structures designed to quickly mix released heat with the waters of the Susquehanna River. The diffusers are located on the bottom of the Susquehanna River approximately 80 ft from the shoreline, and separated by 350 ft (Figure 4-1). Each diffuser consists of a 120-ft long, 42-in. diameter manifold with 72 ports. Each port is four inches in diameter, spaced 18 inches apart, and angled upward at 45° to the horizontal facing downstream.

A significant difference between the SSES and BBNPP cooling towers is that the BBNPP towers are designed to limit discharge blowdown temperatures to 90°F whereas the SSES blowdown temperatures can exceed 90°F under certain conditions.

An important feature of evaporative cooling tower blowdown temperatures is that they are a function of air wet bulb temperature and the cooling tower "approach". The cooling tower approach is a design value that indicates how closely the cold side temperature can "approach" the wet bulb temperature, which is the theoretical cooling limit. Winter wet bulb temperatures can be high relative to winter river water temperatures because the latter respond slowly to

meteorological changes and can be near freezing for long periods. This means that the largest differences between blowdown temperatures and river water temperatures are expected during the winter.

Figure 4-1 Arrangement of the SSES and BBNPP intake and discharge structures

4.2. SSES Thermal Plume Surveys

Ecology III measured the SSES cooling tower blowdown discharge plume on five occasions covering winter, spring, summer, and fall periods. The surveys were performed for a range of Susquehanna River flows from 2,140 to 9,250 cfs. All surveys were made when SSES was fully operational. Each survey measured temperatures at a minimum of 20 stations. At each station, temperatures accurate to 0.1°F were measured at 1-ft intervals in the vertical (a total of 10 to 15 measurements at each station). Overall, about 300 temperatures were obtained for each survey. The surveys are documented in two Ecology III reports (1987 and 2009).

Susquehanna River and SSES conditions for each of the surveys are summarized in Table 4-1. The change in temperature (ΔT) is the difference between the discharge temperature as measured in the cooling tower basins (the cold side temperature) and the upstream Susquehanna River temperature as measured during the survey. The Susquehanna River temperature is also recorded by the plant information system, and this value is consistent with the values measured during the survey. Because the surveys took one to two hours to complete and were generally done later in the morning, the upstream temperature increased from the start to the end of the

survey. For the analysis, the upstream temperature at the start of the survey was used as the ambient temperature. Choosing the lower temperature as the ambient value tends to overestimate the size of the thermal plume.

The five surveys show that the largest ΔT occurred in the winter and the smallest ΔT in the summer. The maximum observed surface temperature rise was 1°F, which occurred during the low flow survey of 3 September 2008. The length of the 1°F temperature rise isotherm at the surface for this survey was 16 ft. On the other surveys, no 1°F temperature rise isotherm was detectable at the surface, and the maximum temperature rise isotherm rise for these surveys was 0.5°F. The average length of the 0.5°F isotherm (maximum distance from the diffuser to the isotherm in the downstream direction) for all surveys was 130 ft.

Table 4-1 Susquehanna River and SSES parameters for the five thermal plume surveys

	11/5/1986	1/9/1987	5/14/1987	8/21/2008	9/3/2008
Susquehanna River flow (reported), cfs	4,840	9,250	5,120	3,230	2,140
Water surface elevation, ft	487.8	489.0	487.9	487.0	486.5
Susquehanna River water temperature, °F	47.0	33.5	65.5	74.5	74.3
SSES blowdown flow rate, gpm	8,000	8,000	8,000	12,000	12,000
SSES blowdown temperature, °F	62.0	61.0	75.0	81.1	84.3
ΔT, °F	15.0	27.5	9.5	6.6	10.0

Of interest in the context of low summer flow and high winter ΔT conditions are the surveys of January and September. Results of these surveys are summarized in the plots shown in Figure 4-2 and Figure 4-3. These plots show the small surface temperature rises and the limited length of the thermal plumes. Also plotted in Figure 4-3 is the shape of the plume at depth.

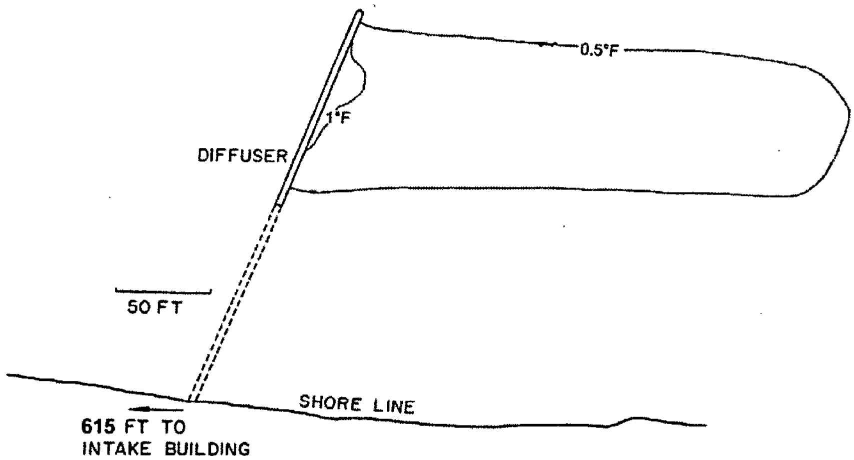


Figure 4-2 Observed surface temperature rises for the low-flow survey (3 September 2008)

The measured upstream temperature at the beginning of the survey was 74.3°F

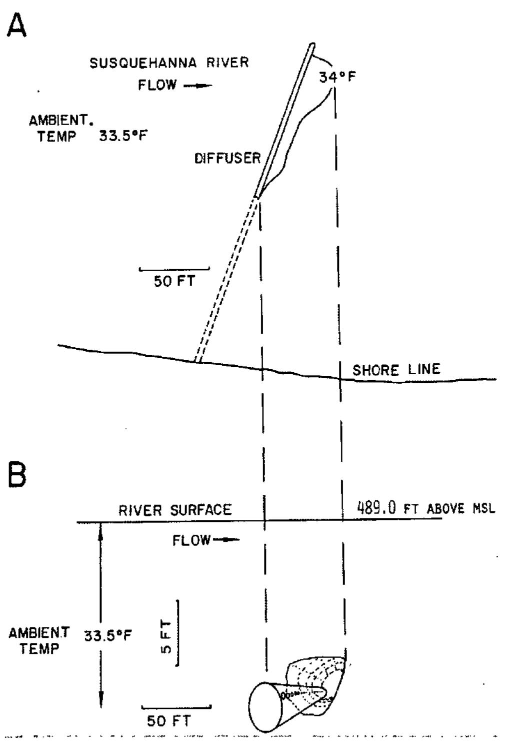


Figure 4-3 Plume configuration for the high-ΔT survey (9 January 1987)

A temperature of 34°F corresponds to a rise above ambient of 0.5°F; the isotherms indicated at the bottom adjacent to the diffuser ("B") are projected onto the water surface in "A".

4.3. *MODEL SELECTION*

EPA developed the CORMIX model specifically for the analysis of the wastewater plumes from surface discharges, submerged multi-port diffusers, and submerged single-port discharges. CORMIX is a rule-based expert system and is used both for design studies and analysis of existing discharges. Because the model is based on analytical solutions to the dynamic plume equations and on extensive experimental and field data, there are no calibration parameters. Example CORMIX applications can be found on the MixZon Inc. website (http://www.cormix.info/index.php), which also lists references, validations, and benchmarks.

CORMIX uses different algorithms for the near- and far-field regions. In the near-field, the size, configuration, and mixing characteristics of the plume are dominated by the diffuser exit velocity and buoyancy of the discharge. Beyond the near-field is the far-field, in which the plume is passive and its trajectory and mixing are dominated by the ambient velocity and temperature fields. The near-field algorithms for CORMIX are very detailed; the far-field algorithms less so. The thermal plume surveys demonstrate that the SSES thermal plume is confined to the near-field region.

CORMIX calculates the location of the plume centerline in three dimensions and, at each location, the temperature rise, the thickness and width of the plume, and the time of travel to that location. Temperature rises along the centerline are often presented as a way of summarizing results, but it should be noted that the temperature rises decrease rapidly with distance from the centerline as a Gaussian distribution. The plume edges are defined by CORMIX as occurring one standard deviation on each side of the centerline.

CORMIX also identifies the applicable flow class. As an example, the initial flow class is "acceleration zone of unidirectional co-flowing diffuser," which applies immediately adjacent to the diffuser. The flow classification system also indicates at what point the near-field ends and the far-field begins.

CORMIX has a number of limitations. It is a steady-state model[7] and assumes unidirectional ambient flow and a prismatic channel for the receiving waterbody. Neither of these limitations disqualifies its use for computing the size and configuration of the BBNPP blowdown plume. Its suitability can be demonstrated by comparing the computed CORMIX plume sizes with the observed plume sizes for each of the five surveys of the SSES thermal plume.

Table 4-2 shows computed and observed distances from the SSES diffuser to the 1°F and 0.5°F temperature rise isotherms. Computed distances to the 1°F isotherm show good agreement with those observed. CORMIX both over- and under predicts distances relative to the 0.5°F isotherm, notably over predicting the distance for the low-flow case.

[7] An implication of the steady-state nature of CORMIX is that the results are not indicative of changes in temperature over any particular period, instead they show temperature rises over background. Because SSES operates at a steady rate and BBNPP is expected to operate similarly, temperature changes are expected to be small.

Table 4-2 Observed and computed isotherm distances (SSES)

	11/5/1986	1/9/1987	5/14/1987	8/21/2008	9/3/2008
Observed distance to the 0.5°F isotherm, ft	125	25	80	120	300
Computed distance to the 0.5°F isotherm, ft	27	26	9	21	498
Observed distance to the 1.0°F isotherm, ft	0	0	0	0	16
Computed distance to the 1.0°F isotherm, ft	6	6	2	4	21

Based on its extensive use and applicability to the SSES discharge plume, CORMIX, Version 7 was chosen to estimate thermal plume sizes and configurations for the four BBNPP scenarios evaluated in this study.

4.4. Scenarios

Plume sizes for a total of four scenarios were computed with CORMIX using Susquehanna River and BBNPP blowdown parameters developed for the two periods when relatively larger thermal plumes may be present. These periods are (1) the winter period when temperatures in the Susquehanna River are lowest, and maximum differences between the BBNPP blowdown and river temperatures occur and (2) the late summer period when river flows are lowest, and dispersion and dilution of the plume may be limited by low flows. For each of these two periods, an average and a worst-case scenario was developed. The size and configuration of the SSES thermal plume was also computed for each scenario, so parameters for the SSES blowdown were also assembled.

Susquehanna River, BBNPP and SSES parameters were derived from daily calculations for the three-year period August 2004 to July 2007 ("three-year analysis period"). These calculations consisted of available observations, including monitoring of flow and temperature at SSES and calculated BBNP flows and temperatures. For the winter scenario ("high ΔT"), parameters were selected by choosing the day of the maximum BBNPP ΔT from the three-year analysis period (12/23/2004) and the withdrawal rate, blowdown rate, and blowdown temperature for that day. For Susquehanna River parameters, the period-of-record 7Q10 flow for December and the minimum observed temperature for the three-year analysis period were selected. For SSES the average withdrawal rate, blowdown rate, and blowdown temperature over all Decembers in the three-year analysis period were used

For the summer scenario ("low flow"), it was recognized that September is the month of the lowest minimum and median river flows, so the maximum BBNPP ΔT for September from the three-year analysis period (occurred 9/23/2004), was selected, as were the BBNPP withdrawal rate, blowdown rate, and blowdown temperature on the same day. Also selected were the minimum Susquehanna River temperature, the average SSES withdrawal rate, blowdown rate, and blowdown temperature for all Septembers in the three-year analysis period. At the resource agencies' request, the Susquehanna River annual 7Q10 for the period of record adjusted to the BBNPP site was used. The worst case scenarios therefore represent infrequent events of short duration.

Two similar scenarios were developed using average values of the Susquehanna River, BBNPP and SSES parameters. Parameters for these and the worst case scenarios are summarized in Table 4-3. The four scenarios are similar to those selected for analysis for the 1972 SSES Environmental Report and to conditions observed for the five plume surveys.

Table 4-3 Scenario parameters

Parameter	Winter low flow	Winter average	Summer low flow	Summer average
Nominal Susquehanna River flow, cfs	December 7Q10	December mean	Annual 7Q10	September mean
	2,220	14,906	843	4,729
Net Susquehanna River flow[8], cfs	2,146	14,836	755	4,641
Water surface elevation, ft	486.5	490.4	485.7	487.6
Susquehanna River water temperature, °F	12/23/2004	December mean	9/23/2004	September mean
	33.2	37.8	62.3	69.1
BBNPP blowdown flow rate, gpm	12/23/2004	December mean	9/23/2004	September mean
	6,867	5,967	7,664	7,620
BBNPP blowdown temperature, °F	12/23/2004	December mean	9/23/2004	September mean
	68.4	58.2	79.2	77.6
BBNPP ΔT, °F	35.2	20.4	16.9	8.5
SSES blowdown flow rate, gpm	December mean	September mean	December mean	September mean
	8,119	8,119	8,119	8,119
SSES blowdown temperature, °F	December mean	September mean	December mean	September mean
	62.4	79.5	62.4	79.5
SSES ΔT, °F	29.2	24.6	17.2	10.4

The selected parameters can be used to estimate fully-mixed temperature rises using a mass-balance approach. The fully-mixed temperatures for each of the scenarios are shown in Table 4-4. The fully-mixed calculation uses the net Susquehanna River flow shown in Table 4-3 as follows:

$$\Delta T_{FM} = \frac{\Delta T_{SSES} B_{SSES} + \Delta T_{BBNPP} B_{BBNPP}}{Q_{SRnet}}$$

[8] The net Susquehanna River flow is the nominal flow show minus the consumptive use at SSES and BBNPP.

where

ΔT_{FM}	Fully-mixed temperature rise, °F
$\Delta T_{SSES}, B_{SSES}$	SSES blowdown ΔT and flow rate, °F
$\Delta T_{BBNPP}, B_{BBNPP}$	BBNPP blowdown ΔT and flow rate, °F
Q_{SRnet}	Net Susquehanna River flow, cfs

These temperatures represent the temperature increases downstream after the blowdown discharges are mixed entirely with the Susquehanna River but do not account for surface heat loss, an important heat transfer process in the far-field. The temperatures in Table 4-4 are therefore overestimates of actual temperature increases.

Table 4-4 Fully-mixed temperature rises for BBNPP and SSES for the four scenarios

	Winter low flow	Winter average	Summer low flow	Summer average
BBNPP fully-mixed rise, °F	0.24	0.02	0.34	0.03
SSES fully-mixed rise, °F	0.24	0.03	0.49	0.05
Combined fully-mixed rise, °F	0.48	0.05	0.83	0.08

4.5. Thermal Plume Size and Configuration Estimates

For each of the four scenarios, CORMIX shows a short near-field region for the BBNPP plume consistent with the behavior observed in the plume surveys of the SSES plume. For the two worst-case scenarios (winter high ΔT and summer low flow) and the summer average scenario, the plume beyond the near-field becomes stratified, reflecting the buoyancy of the discharge. For the winter average scenario (Susquehanna River flow is higher and the ΔT is somewhat lower), the plume is mixed vertically in the far-field.

The near-field and stratified behaviors can be understood by studying side views of the plumes (Figure 4-4, Figure 4-5, Figure 4-6, and Figure 4-7). For all scenarios, the overall behavior is intense mixing at the diffuser (the near-field) followed by stratification in the far-field for the two low-flow and summer average scenarios or by vertical mixing for the winter average scenario. Although not shown, the CORMIX results indicate that the SSES plumes behave in a manner similar to that shown by the BBNPP plumes for each of the four scenarios.

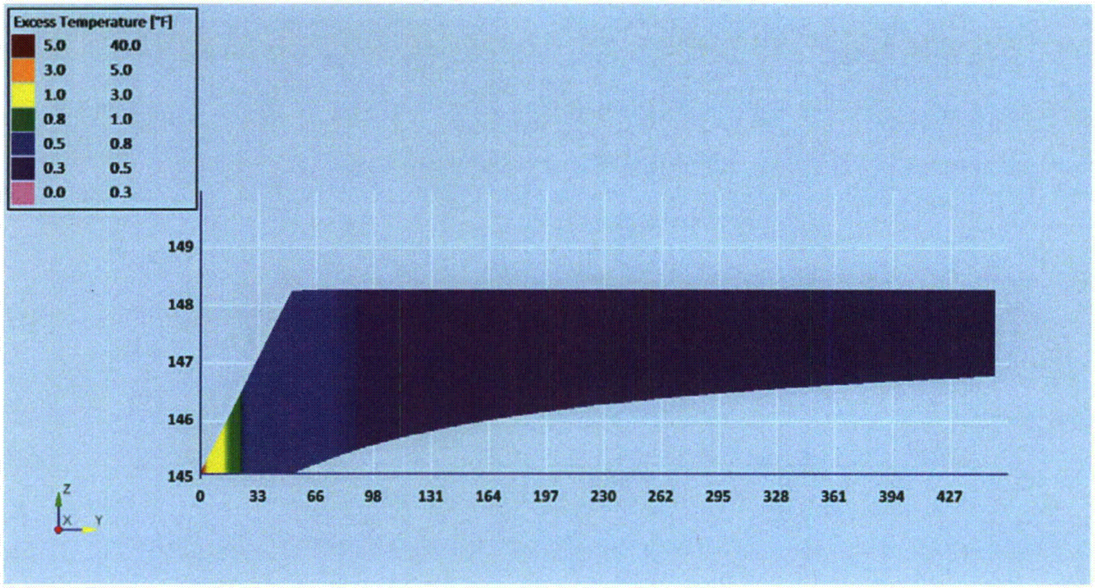


Figure 4-4 BBNPP winter low-flow scenario - plume side view

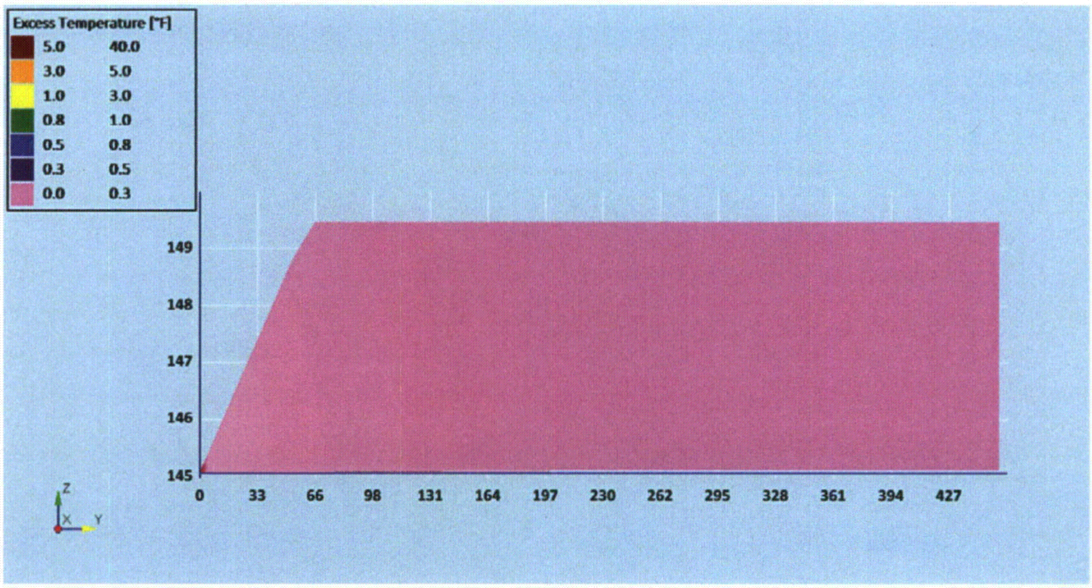


Figure 4-5 BBNPP winter average-flow scenario - plume side view

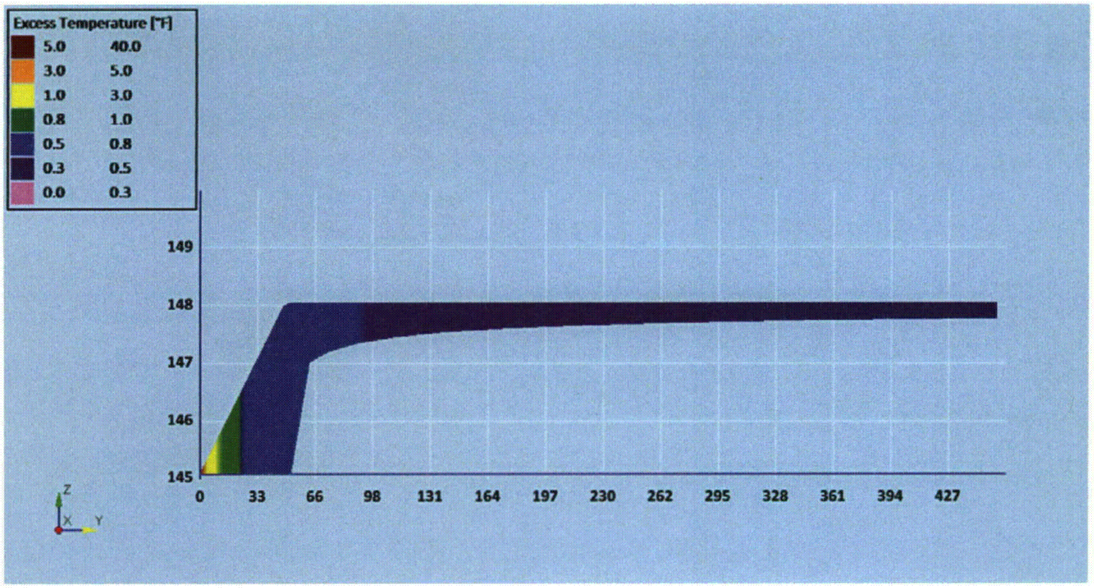


Figure 4-6 BBNPP summer low-flow scenario - plume side view

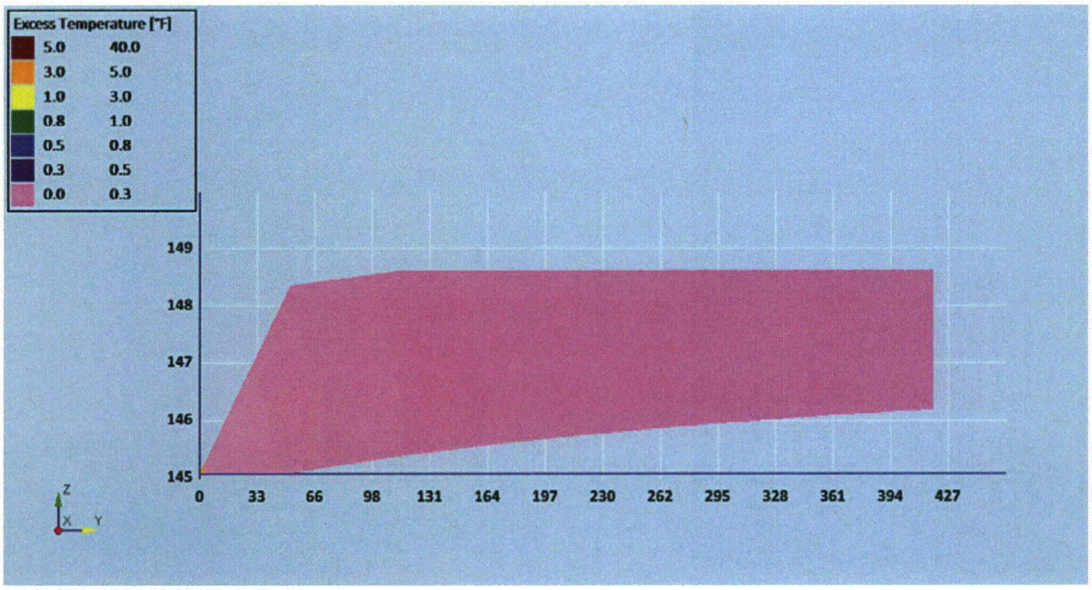


Figure 4-7 BBNPP summer average-flow scenario - plume side view

Although separated by 350 ft, the SSES discharge plume can overlap the BBNPP plume at low temperature rise values. An estimate of the extent of overlapping can be made by studying the temperature rise from SSES at the BBNPP discharge. Table 4-5 shows the temperature rise within the SSES thermal plume at a downstream distance of 350 ft. Only the low-flow scenarios (winter low flow and summer low flow) show an SSES plume that overlaps the BBNPP plume at a temperature rise above 1°F at the centerline. The temperature rise within the plume drops rapidly to less than 0.5°F at the plume edges. The temperature rise within the BBNPP plumes shown earlier can be expected to increase by the amount shown in Table 4-5 at the centerline and plume edges.

Table 4-5 Temperature rise from the SSES thermal plume at the BBNPP discharge

Scenario	Temperature rise at centerline, °F	Temperature rise at plume edge, °F
Winter low flow	1.09	0.40
Winter average	0.18	0.07
Summer low flow	1.29	0.48
Summer average	0.28	0.10

The overlapping of the plumes will result in an increase in the size of the combined plume. The worst-case scenario of summer low flow was used to study the implications of overlapped plumes. To illustrate the spatial relationship of the SSES and BBNPP thermal plumes, the plume can be shown as an isosurface (i.e., a three-dimensional surface defined by a constant temperature rise). Figure 4-8 shows the 1°F temperature rise isosurface due to the BBNPP discharge alone. In the presence of the SSES discharge, the 1°F isosurface will expand and is shown in the Figure 4-9. The downstream extent of the 1°F isosurface does not increase as much as the lateral extent, because the temperature rise drops quickly with downstream distance. The lateral extent of the overlapping plume as shown by the 1°F isosurface does not extend over the entire width of the Susquehanna River under the summer extreme low flow scenario.

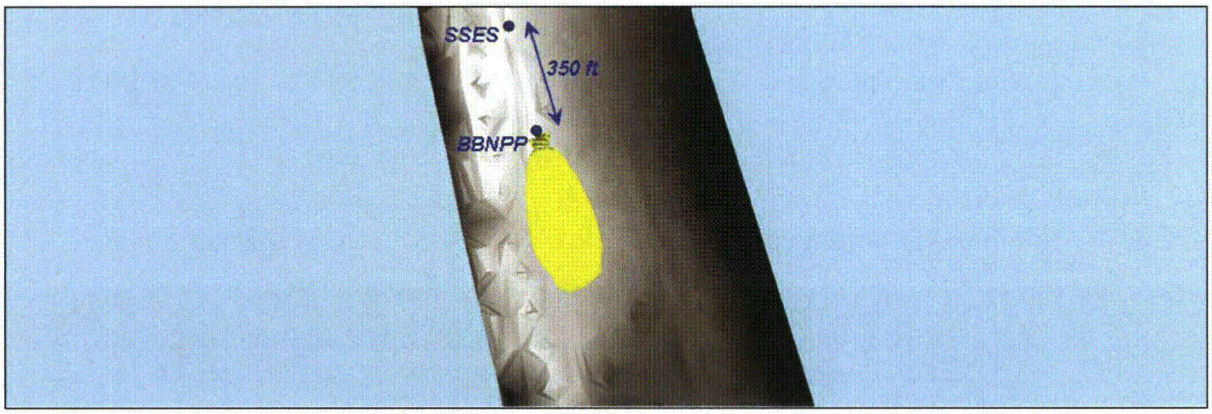


Figure 4-8 The 1°F temperature rise isosurface emerging from BBNPP discharge alone for the summer low-flow scenario

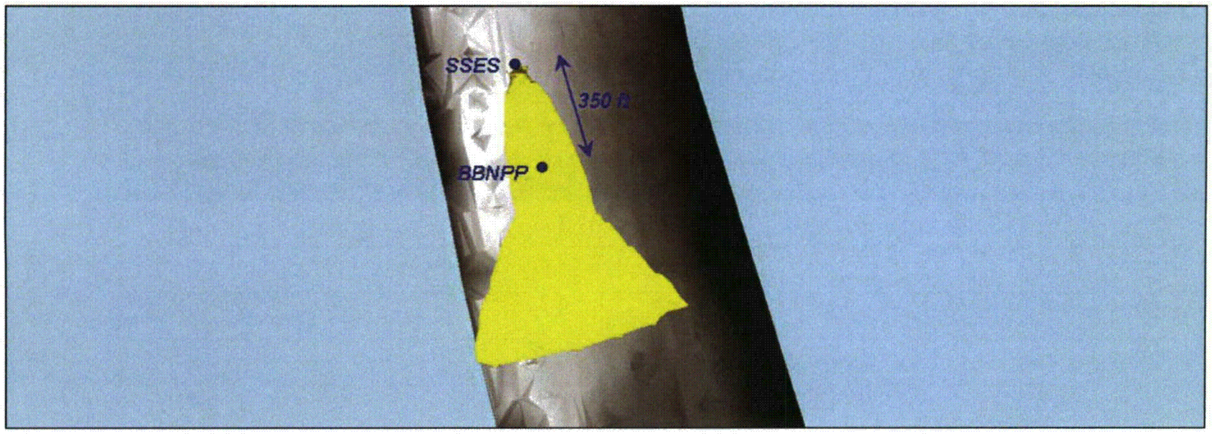


Figure 4-9 The 1°F temperature rise isosurface emerging from combined BBNPP and SSES discharge for the summer low-flow scenario

Besides the lateral extent of the plumes, the vertical extent is of interest in evaluating the potential for thermal blockage. As noted, all plumes calculated for the scenarios are stratified except for the winter average scenario. For this scenario, the temperature rise is so small (less than 0.25°F) as to make the plume indistinguishable from ambient water. For the other three scenarios, the average temperature rise in the stratified layers of the BBNPP can be calculated from the CORMIX results. These values are shown in Table 4-6 at a representative distance of 100 ft from the BBNPP discharge and indicate that the plume does not extend over the entire water column. There is a thin bottom layer (i.e., the layer unaffected by the plume) that occurs with the summer average flow scenario, but the temperature rise in the surface layer is only 0.19°F. The summer low-flow scenario that shows the highest temperature rise (1.35°F) has the thickest bottom layer at 7.6 ft.

Table 4-6 Surface and bottom layer temperature rises for the four scenarios

Location: 100 ft downstream of BBNPP discharge	Winter low flow	Winter average	Summer low flow	Summer average
Surface layer rise at the centerline, °F	1.32	0.12	1.35	0.19
Surface layer rise at plume edge, °F	0.49	0.04	0.50	0.07
Surface layer thickness, ft	7.9	14.4	2.1	10.6
Surface layer width, ft	150.9	110.3	193.6	124.7
Bottom layer rise, °F	0.00	(not stratified)	0.00	0.00
Bottom layer thickness, ft	2.0	(not stratified)	7.6	1.0

Plume overlapping and its implications in the vertical direction can be studied in a similar fashion to that in the horizontal plane. The summer low-flow scenario was used for this analysis. Figure 4-10 shows the 1°F temperature rise isosurface from the BBNPP discharge alone. Figure 4-11 shows the 1°F temperature rise isosurface from the combined SSES and BBNPP discharges. Due to the overlapping of the plumes, the BBNPP plume has increased in the vertical direction and in its downstream extent. However, the increase in size is small relative to

the river water column depth. The side view of the plume shows that the bottom ambient temperature layer occupies most of the water column and provides a large zone for fish passage.

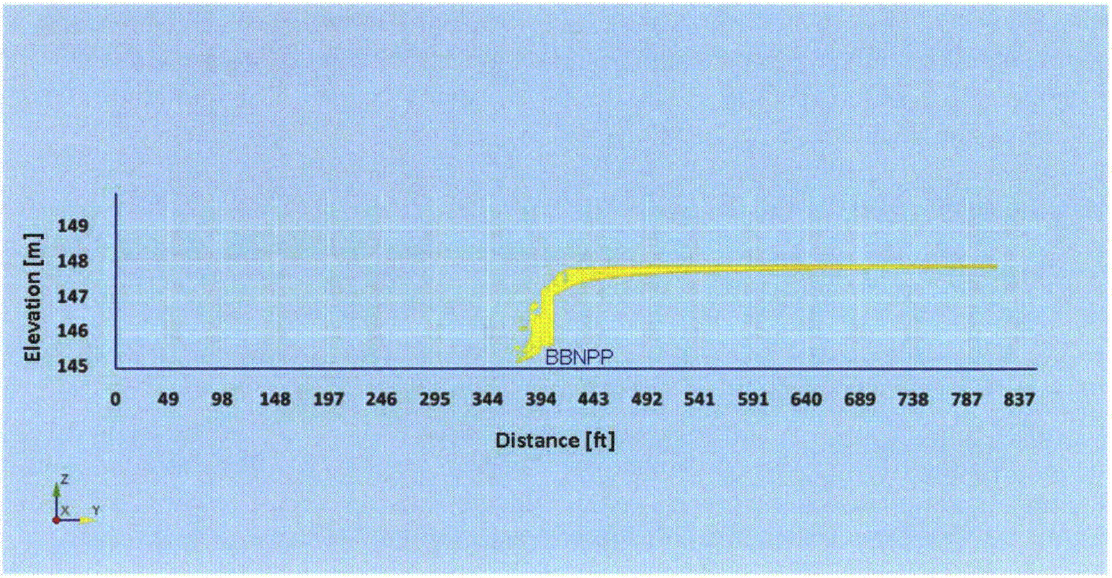


Figure 4-10 The 1°F temperature rise isosurface emerging from BBNPP discharge alone for the summer low-flow scenario

Distances are from the SSES discharge.

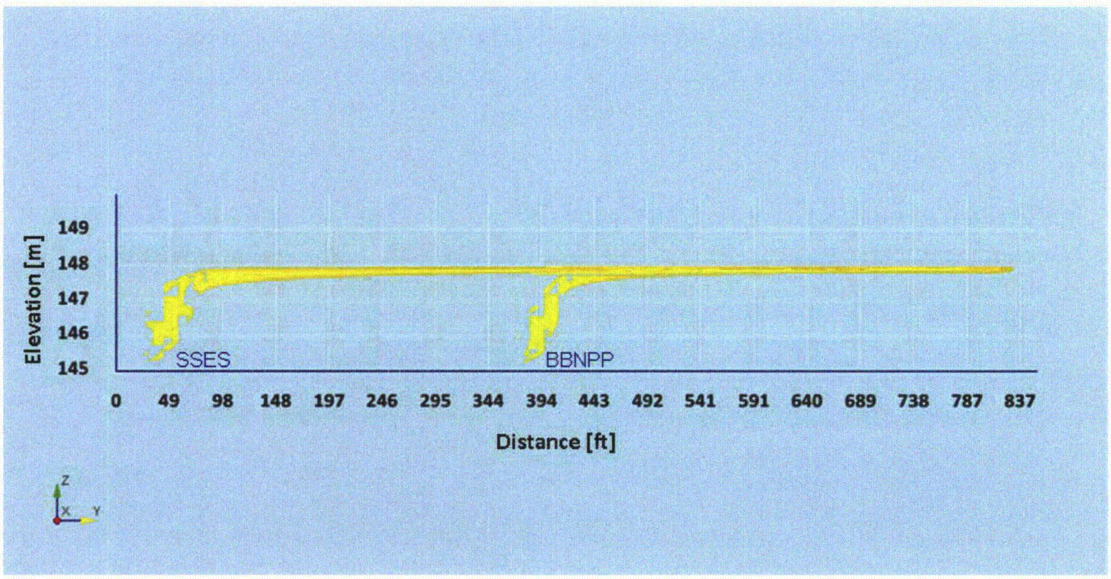


Figure 4-11 The 1°F temperature rise isosurface emerging from combined BBNPP and SSES discharge for the summer low-flow scenario

Distances are from the SSES discharge.

4.6. Dissolved Oxygen Effects

Increases in temperature in the BBNPP cooling tower blowdown plume may cause a decrease in dissolved oxygen (DO) concentration. This potential reduction can be estimated by comparing the saturation concentration at the ambient temperature to the saturation concentration at the ambient temperature plus temperature rise for each of the four scenarios. The saturation concentration can be calculated using Mortimer's (1981) formulation as shown below:

$$DO_{sat} = \exp(7.7117 - 1.31403 \ln[T + 45.93])$$

where T is the water temperature in °C.

Susquehanna River temperatures for the four scenarios were used to calculate the saturation DO values without the BBNPP thermal plume. The temperature rise obtained from CORMIX at a distance of 54 ft was added to the ambient value to recalculate the DO. The difference is the reduction in DO due to the presence of the thermal plume. The value of 54 ft corresponds to the end of the near-field for all scenarios except for the summer low-flow scenario. As noted earlier, CORMIX does not report a near-field termination distance for the summer low-flow scenario; for consistency the DO calculation for this scenario is also reported for the 54 ft distance. Use of the 54 ft distance for the DO calculation is conservative, because centerline temperature rises are used.

The calculated values of DO saturation concentration at the end of the near-field (54 ft) are shown in Table 4-7. The temperature rise is largest for the two low-flow scenarios; these scenarios show the largest reduction in saturation DO. However, the relative temperature rise is largest for the winter low-flow scenario; consequently, the largest DO saturation reduction (0.31 mg/L) is obtained for this scenario. For the summer low flow case the reduction (0.16 mg/L) is much smaller and likely to fall below detection by standard field instrumentation. None of the reductions in saturation DO would cause DO to fall below water quality standards. In addition, as noted in the thermal plume discussions, the plumes themselves are limited in extent so the volume of water in which saturation DO is reduced is similarly limited in extent.

Table 4-7 DO values at the plume centerline at the end of the near-field with and without the influence of the BBNPP thermal plume

Scenario	Winter low flow	Winter average flow	Summer low flow	Summer average flow
Susquehanna River temperature (°F)	33.2	37.8	62.3	69.1
Susquehanna River saturation DO (mg/L)	14.35	13.38	9.70	8.99
Temperature rise (°F)	1.41	0.12	1.40	0.19
Temperature (°F)	34.61	37.92	63.70	69.29
Saturation DO (mg/L)	14.04	13.35	9.55	8.97
Reduction in DO saturation (mg/L)	0.31	0.02	0.16	0.02

4.7. Temperature and Dissolved Oxygen Changes Due to Changes in Water Depth

An issue related to the thermal plume calculations above, but also of utility in assessing temperature and dissolved oxygen (DO) impacts in backwater areas discussed in the next section, is the change in water temperature due specifically to changes in water depth. These changes can be estimated by calculating the response temperature (Edinger et al., 1974) for various depths. Response temperature is defined as the temperature a column of fully-mixed water would have if surface heat exchange were the only active heat transfer process (i.e., the water temperature "responds" only to surface heat exchange).

The rate of change of response temperature can be written in terms of the net rate of surface heat exchange as

$$D\frac{dT}{dt} = \frac{R_n}{\rho c_p}$$

where

D = mean depth of the water column, m

dT = change water column temperature, °C

dt = change in time, s

R_n = net rate of surface heat exchange, W m^{-2}

ρ = density of water, 1000 kg m^{-3}

c_p = specific heat of water, 4186 J kg^{-1} $°C^{-1}$

The rate of surface heat exchange can be computed from air and dew point temperature, windspeed, cloud cover, solar radiation, and atmospheric pressure. These meteorological

variables are used to compute the seven individual terms that make up the net rate of surface heat exchange.

$$R_n = R_s - R_{sr} + R_a - R_{ar} - R_b - R_e - R_c$$

where

R_s = shortwave solar radiation, W m^{-2}

R_{sr} = reflected shortwave solar radiation, W m^{-2}

R_a = longwave atmospheric radiation, W m^{-2}

R_{ar} = reflected longwave atmospheric radiation, W m^{-2}

R_b = back radiation, W m^{-2}

R_e = evaporative heat loss, W m^{-2}

R_c = conduction, W m^{-2}

The response temperature calculation as programmed in the US EPA's one-dimensional water quality model QUAL2K includes formulations for each of these surface heat exchange terms.

The above analysis assumes all the incident solar radiation is absorbed in the water column. Adam and Sullivan (1989) point out that this assumption is correct given the turbulent nature of the Susquehanna River in shallow reaches:

> "Solar radiation could penetrate a clear stream with little absorption, but would then strike the streambed surface where absorption is very high (Crittenden, 1978). Very little of the solar radiation would be reflected by typical streambeds, particularly if they are rough or gravelly. Because the stream and streambed are both in contact with the surface of absorption, the solar energy will be split between the two. The characteristic which determines the relative split between the two is their effective thermal diffusivity (Crittenden, 1978). When the stream Reynolds number is high, its effective turbulent thermal diffusivity is several orders of magnitude higher than that for any natural streambed material of rocks and soil (Crittenden, 1978; Kreith, 1973). Under these circumstances the solar radiation absorbed by the streambed surface would be rapidly transferred to the stream, just as if it had been absorbed by the water in the first place."

To estimate the changes in temperature due to anticipated changes in depth in side channels and isolated pools, it was necessary have an estimate of the change in water depth for the anticipated consumptive water use rate. The PHABSIM Hydraulic Model provides this information. Based on log-log regressions of the stage-discharge curves developed for each transect, an average

depth reduction due to the requested consumptive use at 800 cfs is calculated to be 0.35 in. with a maximum reduction of 0.49 in. at Transect RI1-RC (see Figure 4-12). For this analysis a reduction of 0.5 in. in the value of D was assumed.

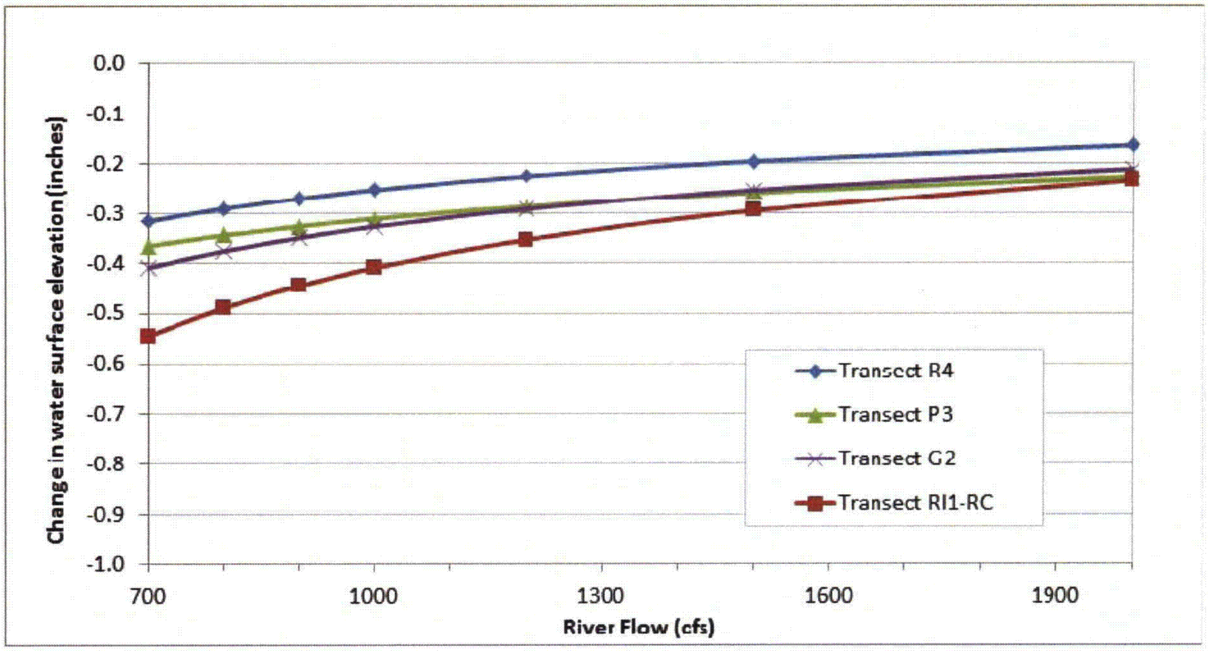


Figure 4-12 Changes in water surface elevation with a CU reduction of 43 cfs for representative transects

Representative transects include each habitat type; based on log-log regression of the transect stage-discharge curves

Hourly meteorological data from Avoca, PA (WBAN 14777) six miles southwest of Scranton and 27 miles northeast of BBNPP was used to calculate the response temperature for a 14-year period 1990 to 2003 (inclusive). For this calculation, depths of 0.2500 m and 0.2373 m (9.8 in. and 9.3 in., respectively) were used. Data for the day (15 August 2003) on which the maximum water temperature was estimated to have occurred were used in this calculation. The calculation was also performed for depths of 1 m and 0.9873 m (3 ft 3.4 in. and 3 ft 2.9 in., respectively) for comparison purposes. The results are summarized in Table 4-8; the entire diurnal cycle is shown in Figure 4-13.

When depths are reduced by 0.5 in, the calculation shows small increases in temperature at the time of the daily maximum and small decreases at the time of the daily minimum and nearly identical temperatures at other times. The increases in temperature decrease with increasing depth, reflecting an increase in water mass ("thermal inertia"). The calculated temperatures can be used to calculate the change in saturation DO values concentrations, as shown in Table 4-8. The changes in saturation DO are correspondingly small (Table 4-9).

Table 4-8 Calculated water temperatures for various depths for 15 August 2003

	Depth			Depth		
	3 ft 3.4 in	3 ft 2.9 in	Change	9.8 in	9.3 in	Change
Minimum temperature, °F	81.2	81.2	-0.05	71.1	70.5	-0.58
Average temperature, °F	84.0	84.0	-0.01	81.6	81.4	-0.14
Maximum temperature, °F	86.9	87.0	0.04	93.6	94.0	0.41

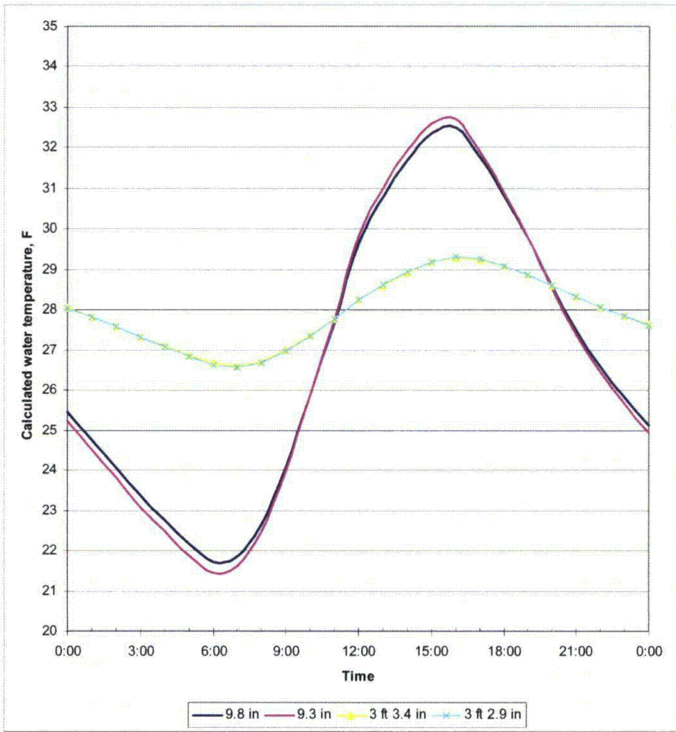


Figure 4-13 Diurnal, calculated water temperatures for various depths for 15 August 2003

Table 4-9 Calculated saturation DO values for various depths for 15 August 2003

	Depth			Depth		
Saturation DO (mg/L) at...	3 ft 3.4 in	3 ft 2.9 in	Change	9.8 in	9.3 in	Change
Minimum temperature, °F	7.92	7.92	0.00	8.79	8.85	0.05
Average temperature, °F	7.70	7.70	0.00	7.89	7.90	0.01
Maximum temperature, °F	7.49	7.48	0.00	7.04	7.01	-0.03

4.8. CONCLUSIONS

Because the BBNPP diffuser is nearly identical to the existing SSES diffuser, the latter's performance provides the best estimate of the anticipated performance of the BBNPP diffuser.

The SSES blowdown discharge plume has been measured on five occasions covering a range of flows, including a September survey when the Susquehanna River flow rate was 2,140 cfs. All five surveys showed small thermal plumes.

To provide estimates of the BBNPP thermal plume at lower flows, EPA's standard thermal plume model, CORMIX, was used. To confirm its applicability, the model was first used to reproduce the observed dimensions of the SSES thermal plume. EPA's model similarly calculates small sizes for the BBNPP thermal plume for average and worst case conditions.

Expected reductions in DO concentrations due to the small rises in temperature adjacent to the BBNPP diffuser would be minimal.

5. *WATER QUALITY ASSESSMENT OF BACKWATER AREAS USED BY JUVENILE SMALLMOUTH BASS*

5.1. OBJECTIVE

The Bell Bend water quality study was designed to identify whether stressful water-quality conditions occurred in 2010 in microhabitats and main-channel habitats during the critical period for juvenile smallmouth bass (*Micropterus dolomieui*). For the purpose of this report, stressful water quality conditions are assumed to be those which may deviate from the Pennsylvania State Water Quality Criteria for dissolved oxygen (DO), water temperature, and pH. A report by Chaplin *et al.* (2009) postulated that sub-optimal dissolved oxygen (DO), particularly during the nighttime and in combination with relatively warm temperatures in habitats of young-of-the-year smallmouth bass, may play a role in predisposing the fish to bacterial infections. The bacterium (*Flavobacterium columnare*) is common in soil and water and causes secondary infections in stressed fish (PFBC 2005, cited in Chaplin *et al.* 2010).

Microhabitats in which such sub-optimal DO and warm temperatures occur are typically in side channels or backwaters that are characterized by relatively low velocities (<0.1 ft/sec) and shallow depths (<2 ft) compared to the main river channel. These microhabitats, occupied by young smallmouth bass for the first 2-3 months of their lives, can be subject to wide fluctuations in DO and are susceptible to heating by solar radiation (Chaplin *et al.* 2009). Young smallmouth bass utilizing these habitats during a sustained, extreme low river flow may be subject to potentially stressful, low DO concentrations (<5.0 mg/L) at night and elevated water temperatures (>84°F) during the day. Relative to the proposed Bell Bend Project, a concern arose that its consumptive water use of the Susquehanna River water may exacerbate the summer water quality conditions in the smallmouth bass microhabitats concomitant with depth changes. Figure 5-1 shows smallmouth bass fry usage of shallow, low velocity areas in the study reach for the proposed Bell Bend Project.

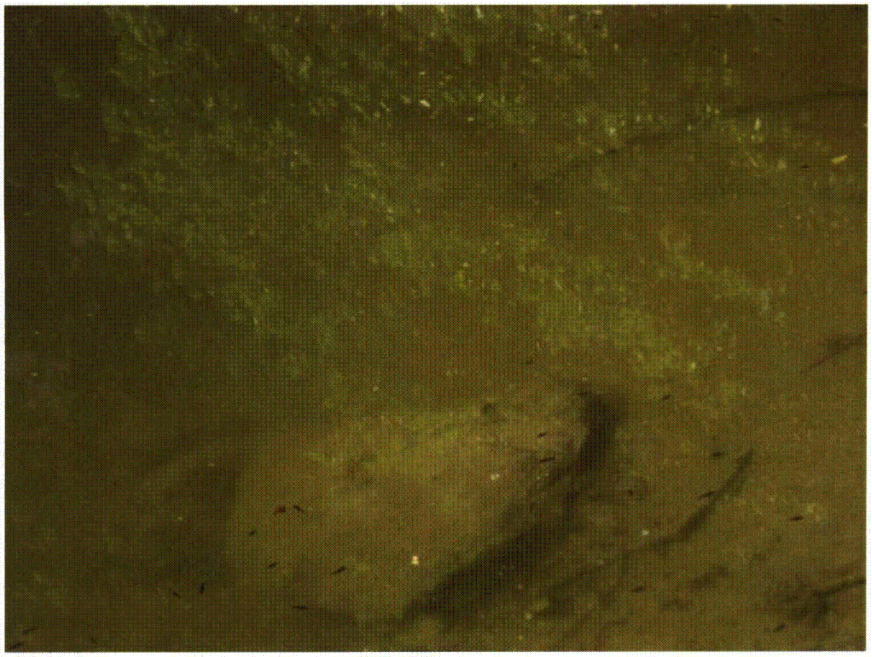


Figure 5-1 Smallmouth usage of shallow with negligible velocity microhabitat

There was no attempt as a part of this study effort to quantitatively identify "backwater areas" in absolute terms based on the stated characteristics described above for such microhabitats. It may generally be assumed that these areas are typically floodplain aquatic habitats that are seasonally or periodically connected to the main channel and for the purpose of this study, support early life stage maturation habitat for smallmouth bass juveniles. In the project area, these microhabitats are typically found during the summer months on the shallow side of island outcrops and/or naturally formed shallow coves sheltered from higher river velocities. It is important to note that there are few if any proper or persistent backwater areas in this stretch of river and that these intermittent backwater characteristics are subject to seasonal variation[9].

5.2. PENNSYLVANIA WATER QUALITY CRITERIA

The Susquehanna River adjacent to the proposed Bell Bend Project is designated as a Warm Water Fishery (WWF). The Pennsylvania Water Quality Standards, (Pa. Code, Chapter 93, §93.7) applicable to a WWF are as follows: For DO a minimum daily average of 5.0 mg/L and a minimum instantaneous 4.0 mg/L. The pH range is between 6.0 and 9.0 inclusive. Pennsylvania provides the following criteria (Table 5-1) for temperature. Maximum temperatures in the receiving water body resulting from heated waste sources are regulated under Chapters 92, 96 and other sources where temperature limits are necessary to protect designated and existing uses. Additionally, these wastes may not result in a change by more than 2°F during a 1-hour period.

[9] Ted Jacobsen, Ecology III. Personal Communication.

Table 5-1 Temperature limits applicable to Warm Water Fishery streams

Boldfaced dates denote the sampling period covered during the 2010 water quality study

Critical Use Period:	Temperature (°F)
January 1-31	40
February 1-29	40
March 1-31	46
April 1-15	52
April 16-30	58
May 1-15	64
May 16-31	72
June 1-15	80
June 16-30	**84**
July 1-31	**87**
August 1-15	**87**
August 16-30	**87**
September 1-15	**84**
September 16-30	78
October 1-15	72
October 16-31	66
November 1-15	58
November 16-30	50
December 1-31	42

5.3. Flows

While SRBC has generated flow statistics for the entire period of record for purposes of this study, we have selected the period 1960-2010 to reflect more current flow conditions. In July, river flow conditions (measured at USGS gaging station No. 01536500, Susquehanna River at Wilkes-Barre, PA) averaged 2,767 cfs in 2010 or 50% of the average flow for the 1960 through 2010 period of record for the month of July. The corresponding percentages for August and September were 84% and 40% (See Table 5-2). According to the flow exceedance calculations, the 2010 average monthly flows for July, August and September were between the P80 and P90 flows. The P80 flow is the flow which is exceeded in the River 80% of the time and the P90 is exceeded 90% of the time, therefore the flows during sampling were representative of low to average conditions. The BBNPP consumptive water use of 43 cfs during average summer periods would represent a small percentage of reduction in flow (approximately 1% of average flow). One of the primary objectives of the water quality study plan was to determine whether a BBNPP consumptive water use of 43 cfs could potentially affect water temperature associated with a reduction in depth in backwater areas inhabited by juvenile smallmouth bass and hence, DO.

Table 5-2 Comparison of summary Susquehanna River daily flow (cfs) statistics of historical (1960 through 2010) and 2010 study period

Source: USGS gaging station No. 01536500, Susquehanna River at Wilkes-Barre, PA

	All data	April through Sept.	April	May	June	July	August	Sept.
1960 through 2010								
Minimum	532	532	5,690	3,110	1,350	815	716	532
Average	14,176	12,141	31,175	16,432	10,602	5,540	4,227	5,210
Maximum	329,000	329,000	190,000	120,000	329,000	120,000	95,300	244,000
2010 (USGS Provisional Data)								
Minimum	1,390	1,390	7,840	3,950	3,330	1,880	1,590	1,390
Average	13,267	6,882	17,990	9,427	5,646	2,767	3,558	2,068
Maximum	112,000	57,900	57,900	15,900	10,500	4,460	13,900	4,130

One approach to evaluate the possible impact of consumptive use on smallmouth bass juveniles in backwater areas is to correlate the increased duration of potential exposure to the stress-related condition caused by the reduced flow and the associated decreased depth, increased temperature, and decreased DO during the period of concern (July, August, September). To assess the incremental effect of the 43 cfs BBNPP consumptive use, a flow exceedance analysis was applied to the period of concern for 2005 and 2010. Using the daily data for the Wilkes-Barre USGS gage for 1960 to present, flow exceedances were developed for all daily flows for the period of concern. The interval 1960 to present period (51 years) was used to capture the hydrologically altered period. Based on the period of concern which represents 92 days from July 1 through September 30, the total number of data points for the exceedance analysis is 4,692 (51 years x 92 days). The percent exceedance is determined for the flow of interest and then for that flow reduced by 43 cfs. The percent exceedances are the fraction of the number of days in the record that a flow was above a particular value, so they can also be represented as days as well as percentages. The difference (or "delta") between the two percentages is then multiplied by the number of data points to convert back to days and then divided by the number of years. The result is the number of equivalent extra days per summer that the stress-related condition would persist due to the reduced flow. Example:

2005: $((61.31\% - 60.66\%) \times 4692)/51 = 0.60$ equivalent extra days per summer

Table 5-3 considers both 2005 (the year of observed concern) and 2010 (the year of data collection for the study). For comparative purposes, the 7Q10 statistical flow is also evaluated and included.

The result of this evaluation indicates that a BBNPP consumptive water use of 43 cfs would have no appreciable effect on duration for potential exposure of smallmouth bass juveniles to additional stress-related temperature and low DO conditions.

Table 5-3 Summary of equivalent extra days per summer that stress-related conditions may persist for 2005 and the 2010 study period

	Average flow (cfs) for July, August, September	Percent exceedance existing conditions based on June, July August daily data	Percent exceedance less 43 cfs	Equivalent extra days per summer that stress related conditions may persist
2005 summer data	2225	60.66	61.31	0.60
2010 summer data	2805	48.98	49.59	0.56
843 cfs low flow	na	97.80	98.51	0.65

5.4. FIELD MEASUREMENTS AND OBSERVATIONS

The assessment of backwater areas in the vicinity of the Bell Bend Project was conducted during the summer of 2010 to identify water quality-related conditions that may be stressful to juvenile smallmouth bass. The assessment was also to determine if the proposed consumptive water use associated with the Bell Bend Project could potentially intensify those conditions.

Water temperature, DO, and pH were continuously monitored from June 22, 2010 to September 3, 2010 using the Hydro Lab data sonde recorders at three paired locations (inshore and main channel habitats). The three monitored locations were the Susquehanna SES Environmental Laboratory ("Environmental Lab") boat ramp, Goose Island, and Berwick Test Track ramp. The former location is upstream of the proposed Bell Bend Project and the latter two are downstream of the project with the Goose Island location 2.8 mi and the Berwick Test Track Ramp 8.4 mi downstream of the proposed discharge structure, respectively.

Continuous monitoring of DO and water temperature in representative backwater areas (upstream and downstream of the proposed Bell Bend Project intake) was conducted from June 22 to September 3, 2010, a potential period of high water temperature and low nighttime DO values in shallow areas. This monitoring program was implemented to identify whether stressful water quality conditions occur during the critical nursery and rearing times of juvenile smallmouth bass and to define the magnitude and frequency of occurrence of these conditions.

As in the Chaplin *et al.* (2009) study, paired sondes were deployed (one each in a microhabitat and a corresponding main channel location to monitor DO) water temperature, and pH (Figure 5-2). This pairing was intended to document the extent of differences in water quality between main channel and backwater microhabitats. Table 5-4 provides descriptions of sampled locations.

Figure 5-2 Data sonde locations for monitoring water quality parameters

Table 5-4 Water quality data sonde locations with habitat characteristics

Location	Sonde Number	Latitude/Longitude
Near southern tip of Goose Island – near east bank shoreline. Water depth <1.5 feet with very little current. Area contained abundant submerged aquatic vegetation. River width 1430 feet.	1	41°03.901N/076°10.151W
Near southern tip of Goose Island – approximately 100 feet from east bank. Water depth 3 feet with notably more current than Sonde 1 location. River width 1430 feet.	2	41°03.884N/076°10.160W
Near Environmental Lab boat ramp – near west bank. Water depth <1.5 feet located in an eddy situation. River width 870 feet.	3	41°05.580N/076°07.827W
Near Environmental Lab boat ramp – approximately 100 feet from west bank in main river channel. Water depth 3 feet. River width 870 feet.	4	41°05.588N/076°07.803W
Approximately ½-mile downriver from Berwick Test Track boat ramp – 100 feet from east bank in main river channel. Water depth 4 feet with a cobble substrate. River width 660 feet.	5	41°02.271N/076°16.126W
Approximately ½-mile downriver from Berwick Test Track boat ramp – near east bank. Water depth 2.5 feet near shoreline. Similar flow conditions as Sonde 5 location. River width 660 feet.	6	41°02.260N/076°16.126W

Figure 5-3 to Figure 5-5 show the sampling locations and their habitats for this monitoring study. These locations were selected for accessibility, ease of servicing, and representativeness of potential backwater habitat for assessing smallmouth bass spawning, fry emergence, juvenile nursery, and rearing. An upstream location (Data Sondes 3 and 4 at the Environmental Lab boat ramp) was selected to determine whether a relationship exists in water temperature and DO between upstream and downstream locations within the aquatic habitat study reach.

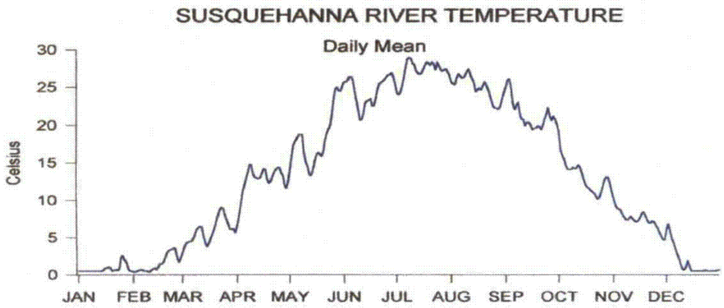
Figure 5-3 Environmental Lab boat ramp on west bank of Susquehanna River, July 2010 (data sonde locations 3, inshore, and 4, main channel)

Figure 5-4 Southeast shore of Goose Island on the Susquehanna River with abundant aquatic vegetation, July 2010 (data sonde locations 1, inshore, and 2, main channel)

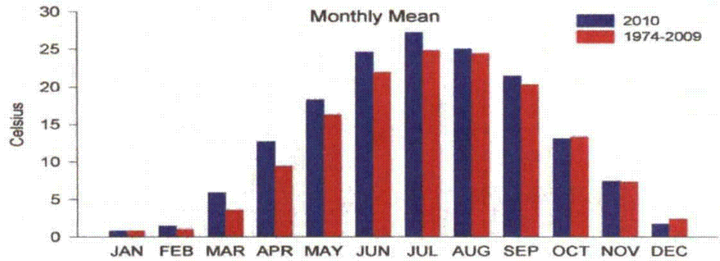
Figure 5-5 Southeast shore of Susquehanna River across from Berwick Test Track boat ramp, July 2010 (data sonde locations 5, main channel, and 6, inshore)

As specified in the study plan, the continuous monitoring data were analyzed for detection of deviations from the Pennsylvania State Water Quality Criteria. .

Mean daily temperature data by month for 2010 as recorded at the Environmental Lab shown in Figure 5-6 indicates that 2010 water temperatures in the Susquehanna River for the area of interest were higher than the average monthly historical temperature data (1974-2009).



The 2010 daily mean temperature of the Susquehanna River at the Susquehanna SES Environmental Laboratory. (Source: Ecology III, Inc.)



The 2010 monthly mean temperature of the Susquehanna River at the Susquehanna SES Environmental Laboratory compared to the 36-year (1974-2009) mean. (Source: Ecology III, Inc.)

Figure 5-6 Average daily water temperature in 2010 compared with the historical period (1974-2009)

Water temperature measured at the Environmental Lab boat ramp. (Source: Ecology III, Inc)

5.5. Results of Continuous Monitoring Measurements of Water Quality Parameters

Table 5-5 presents overall summary statistics for water temperature, dissolved oxygen, and pH hourly measurements recorded at the three paired continuous monitors within the study reach between June 22 and September 3, 2010.

The average water temperature for the monitoring period was highest (80.0°F) in the main channel location near the Goose Island site (Sonde #2) with similarity in average temperatures (77.9 °F to 78.8 °F) at other locations (Table 5-5). The widest range (21.8°F) in water temperature was measured at the inshore location near the Goose Island site (Sonde #1).

The average DO values were lowest at inshore locations near the Goose Island (Sonde #1) and Environmental Lab boat ramp (Sonde #3). The widest range in DO values (≥11.0 mg/L) also occurred at these locations.

Average pH values were lower at Goose Island and the Environmental Lab boat ramp locations (Table 5-5).

Table 5-5 Summary statistics of hourly measurements of water temperature (°F), dissolved oxygen (DO), and pH recorded on Data Sondes 1-6, June 23 – September 3, 2010

N = number of measurements

	Data Sondes[10]					
	1	2	3	4	5	6
Temp (°F)						
Range	70.0-91.8	70.3-85.8	69.7-89.0	70.5-87.1	69.4-87.1	68.7-89.6
Mean	78.8	80.0	78.3	78.6	77.9	78.3
N	1,595	1,718	1,733	1,336	1,339	1,518
DO (mg/L)						
Range	2.5-14.7	5.9-13.2	3.3-17.8	5.5-13.2	5.5-12.2	5.5-15.9
Mean	7.8	8.5	7.8	8.4	8.4	8.9
N	1,534	1,720	1,264	1,334	1,339	1,507
pH						
Range	6.7-9.0	7.1-9.0	6.9-8.9	7.2-9.1	7.3-9.2	7.2-9.0
Median	7.7	7.8	7.5	7.9	8.0	7.8
N	1,683	1,717	1,734	1,336	1,339	1,518

5.5.1. Water Temperature

Although daily fluctuations in temperature occurred at all locations, the amplitude of these fluctuations was higher at the inshore Goose Island site, particularly in July and August. See Figure 5-7. The frequency of temperatures exceeding 87°F was highest at the Goose Island inshore location; with most exceedances occurring in July. This location is characterized by shallow depth and negligible current and subject to elevated temperature during the daytime. Some values exceeded 87°F at other inshore locations though at much lower frequencies. See Figure 5-8. Analyses provided in Section 4.7 illustrate that small thermal and DO changes will occur due to reduced depth. The approximate impact on depth based on the BBNPP consumptive use of 43 cfs throughout the study area for flows <1,000 cfs is 0.5 inches (Figure 4-12). According to the analysis, at depths characteristic of backwater spawning area (<2 feet) produce a thermal change of approximately < 0.5°F degrees T based on a reduction in water depth of 0.5 inches under worst case summer conditions. These potential changes are small in comparison to natural diurnal T and DO changes.

[10] Data sondes 1, 3, and 6 monitored inshore microhabitats; data sondes 2, 4, and 5 measured water quality in main channel (see Figure 5-2).

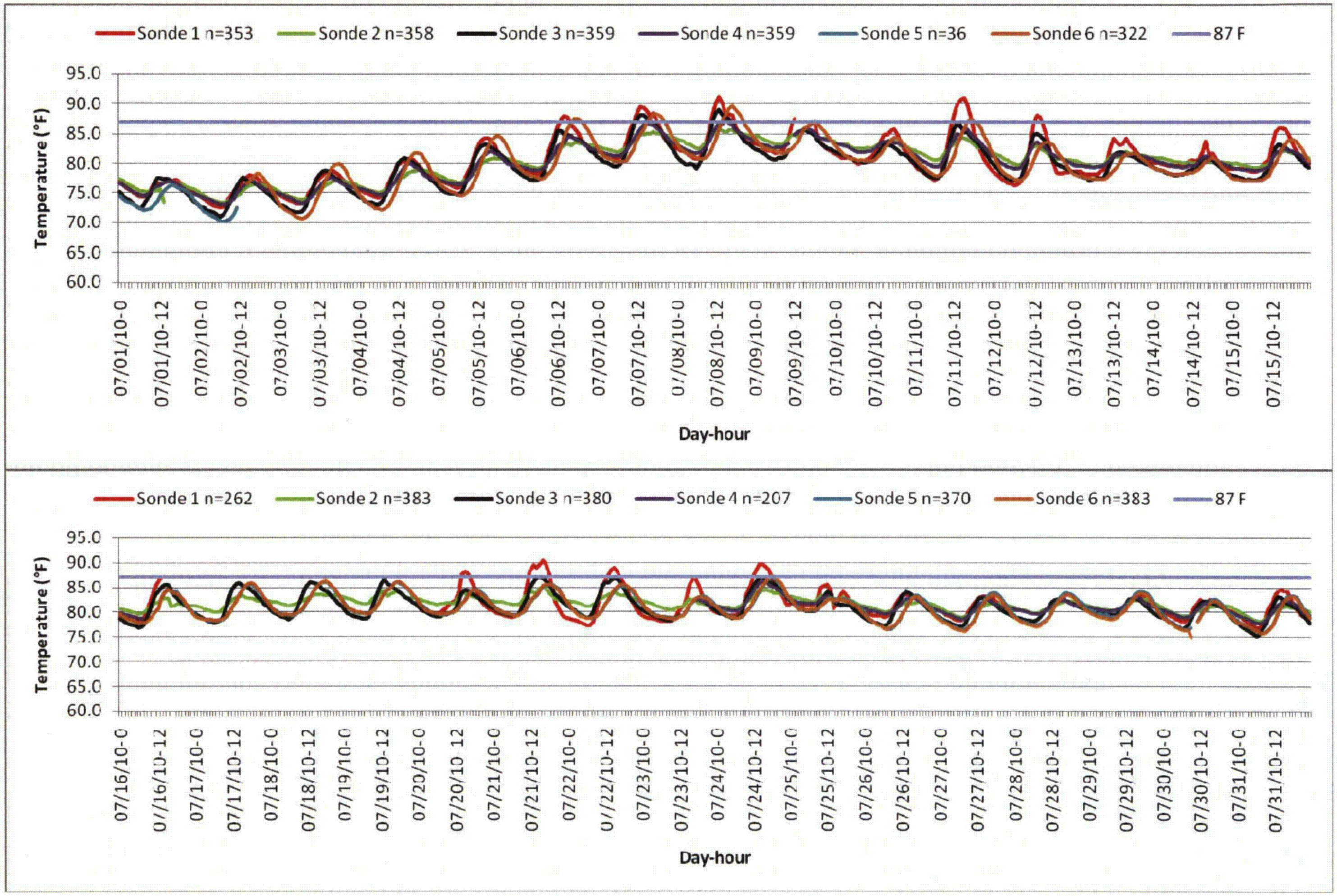


Figure 5-7 Hourly water temperature (°F) measurements recorded at six locations within the study reach, July – August, 2010

July Period; Goose Island: Sonde 1 (Inshore), Sonde 2 (Main Channel); Environmental Lab boat ramp: Sonde 3 (Inshore), Sonde 4 (Main Channel); Berwick Test Track Ramp: Sonde 6 (Inshore), Sonde 5 (Main Channel)

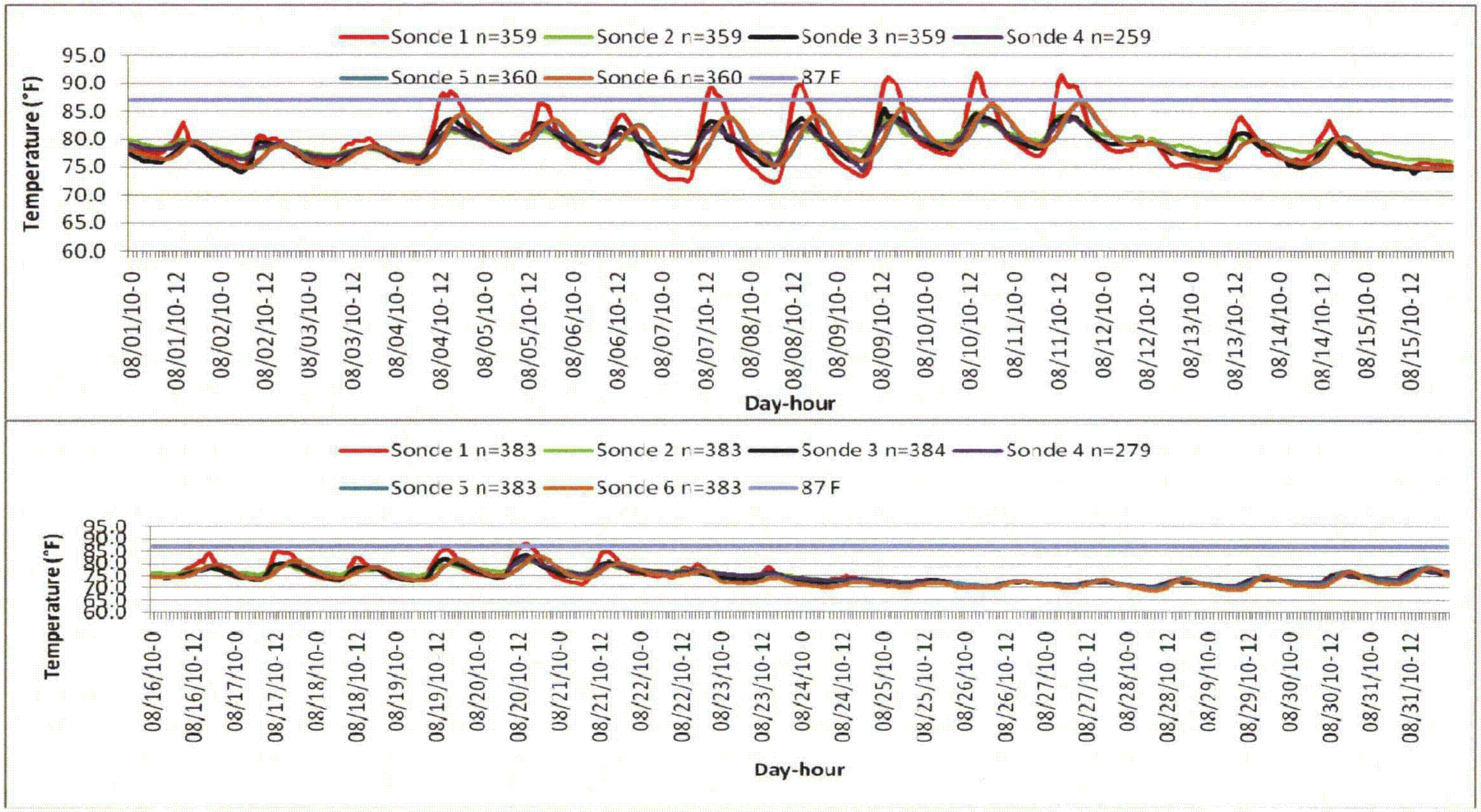


Figure 5-7 (continued -- August Period)

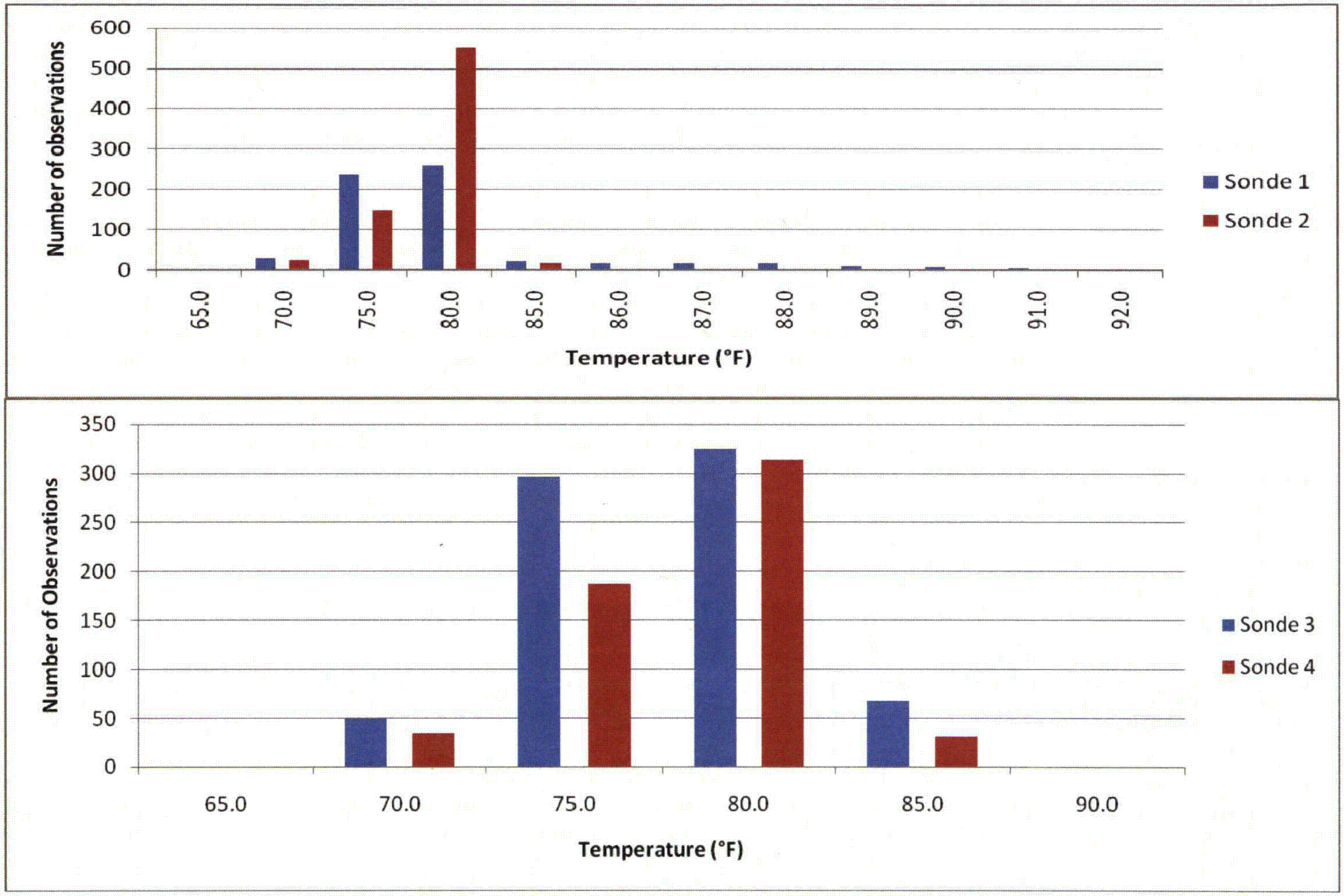


Figure 5-8 Frequency distribution of paired hourly water temperature measurements recorded at Data Sondes 1-6 in the study reach, July – August, 2010

July Period; Goose Island: Sonde 1 (Inshore), Sonde 2 (Main Channel); Environmental Lab boat ramp: Sonde 3 (Inshore), Sonde 4 (Main Channel).

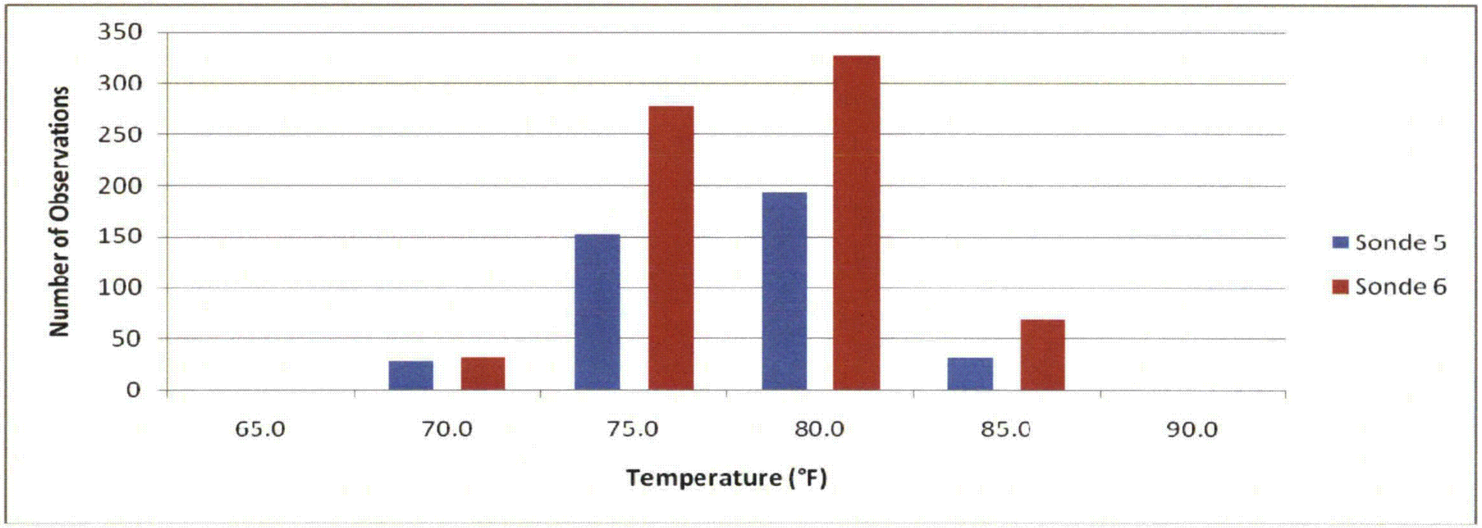


Figure 5-8 (continued)

July Period; Goose Island: Test Track Ramp: Sonde 6 (Inshore), Sonde 5 (Main Channel).

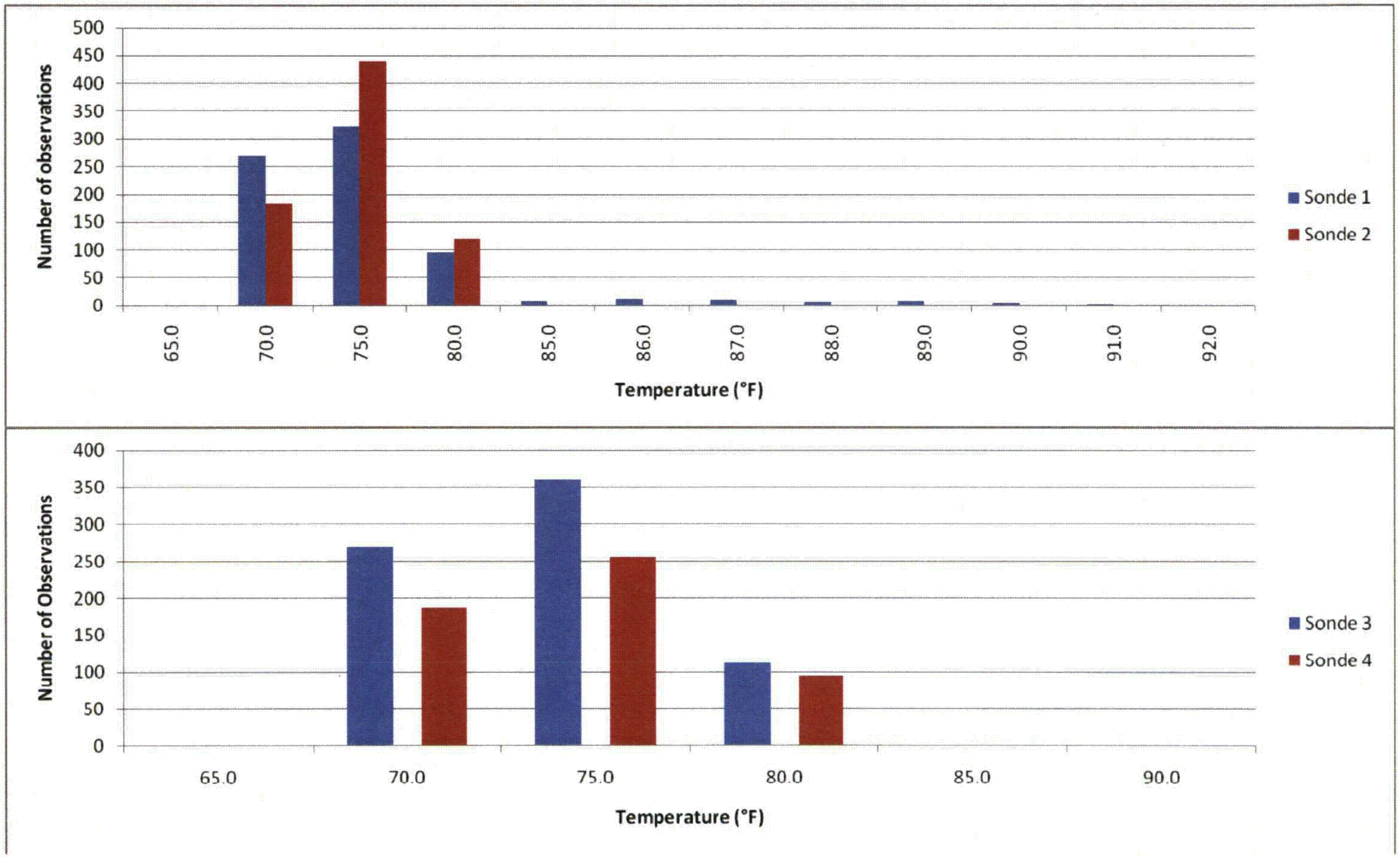


Figure 5-8 (continued)

August Period; Goose Island: Sonde 1 (Inshore), Sonde 2 (Main Channel); Environmental Lab boat ramp: Sonde 3 (Inshore), Sonde 4 (Main Channel).

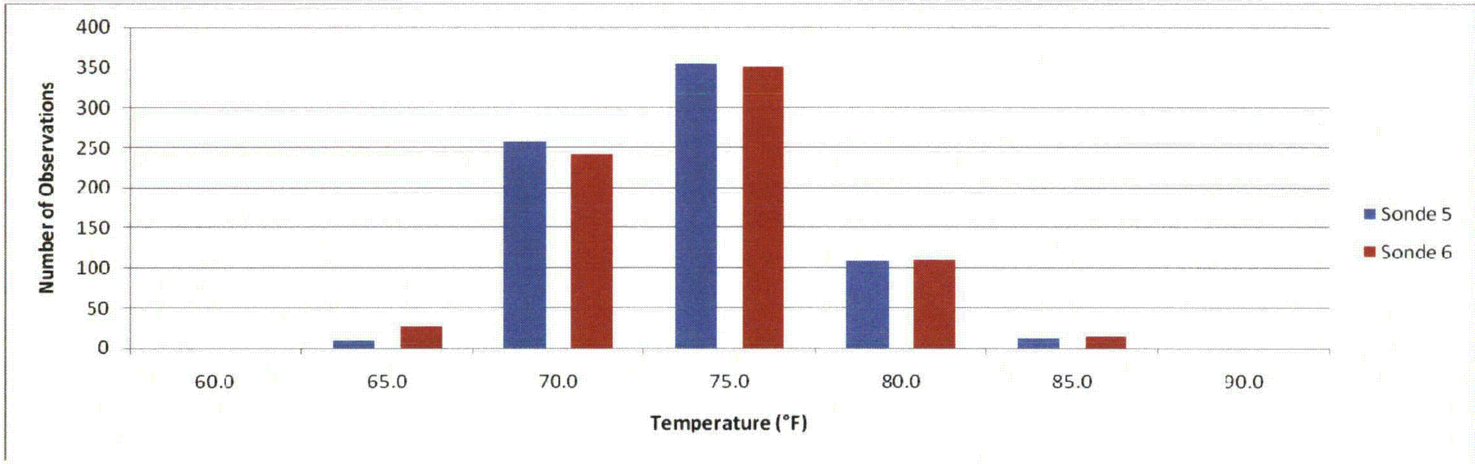


Figure 5-8 (continued)

August Period; Goose Island: Test Track Ramp: Sonde 6 (Inshore), Sonde 5 (Main Channel).

5.5.2. Dissolved Oxygen

Daily diurnal fluctuations of ≥11 mg/L were observed between the three monitored locations (Environmental Lab boat ramp, Goose Island, and Berwick Test Track ramp). The largest fluctuations were at the inshore (Sonde #1) Goose Island site (Figure 5-9).

Most hourly DO values <4.0 mg/L occurred at the inshore Goose Island location and in July (Figure 5-10). The Environmental Lab boat ramp inshore location (Sonde #3) ranked second in exhibiting < 4.0 mg/L DO. Other locations did not show DO < 4.0 mg/L. Although more hourly low DO values were observed at the Goose Island location (Sonde#1), the average daily DO was ≥ 5.0 mg/L.

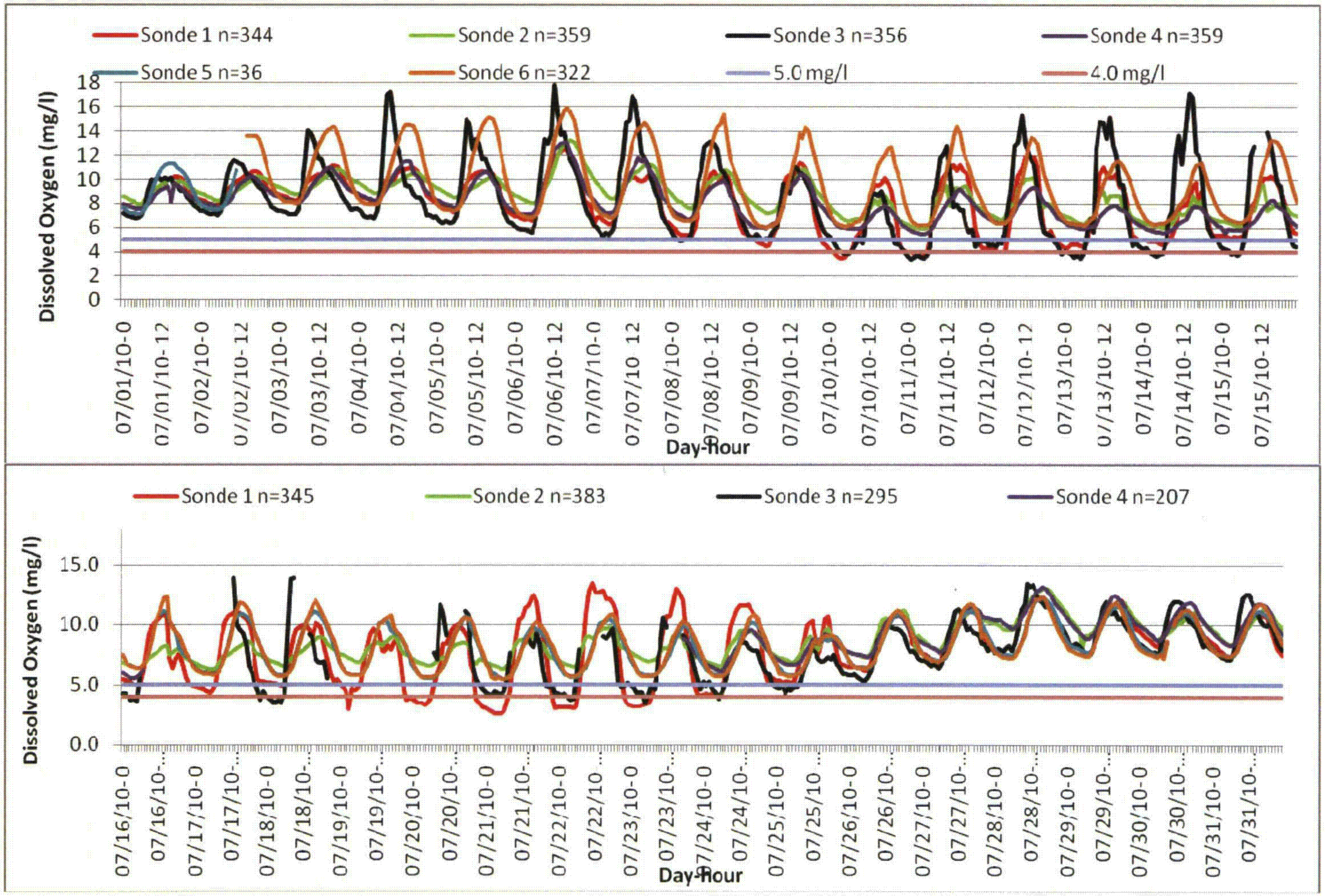


Figure 5-9 Hourly DO measurements (mg/L) recorded at six locations within the study reach, July - August, 2010

July Period; Goose Island: Sonde 1 (Inshore), Sonde 2 (Main Channel); Environmental Lab boat ramp: Sonde 3 (Inshore), Sonde 4 (Main Channel); Berwick Test Track Ramp: Sonde 6 (Inshore), Sonde 5 (Main Channel)

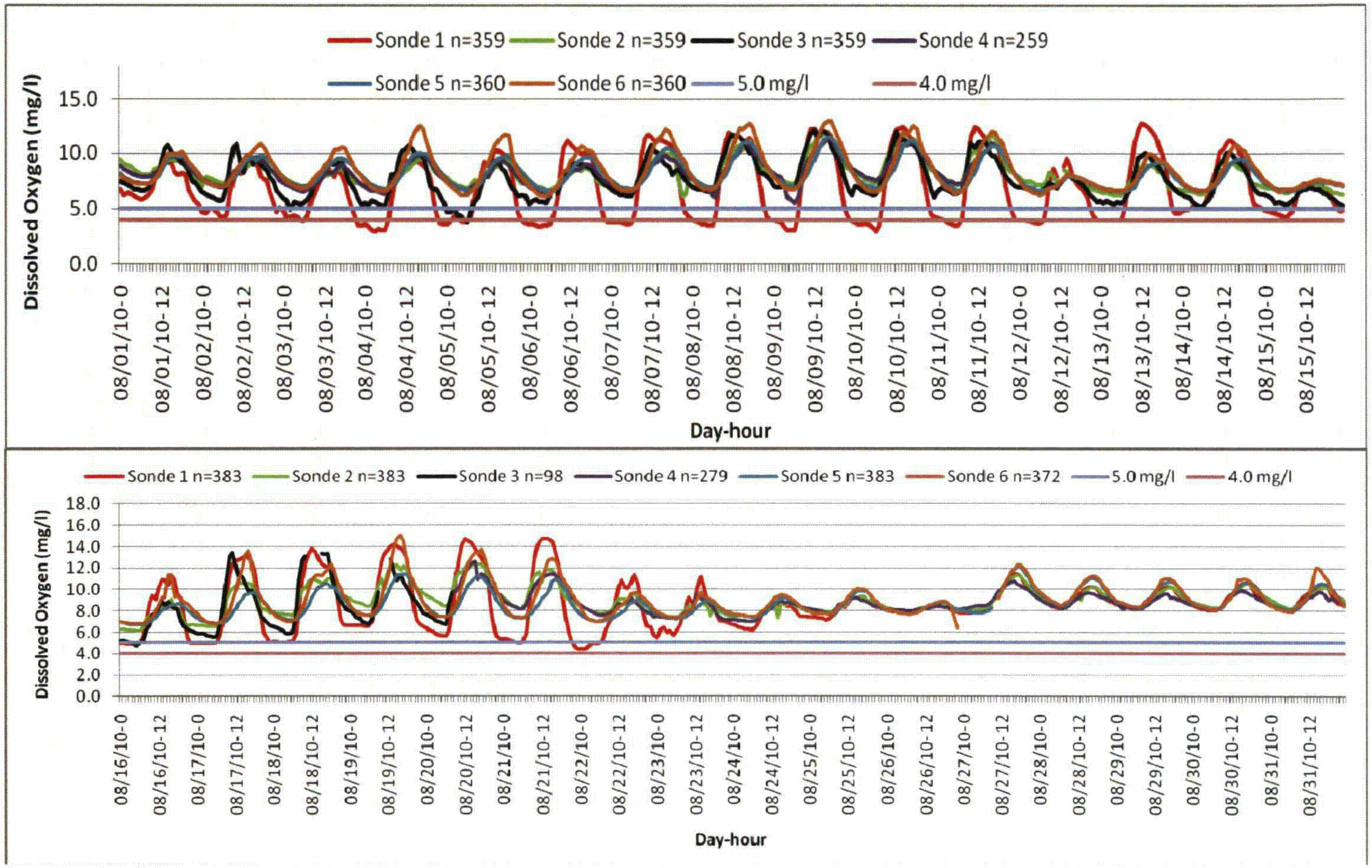


Figure 5-9 (continued -- August Period)

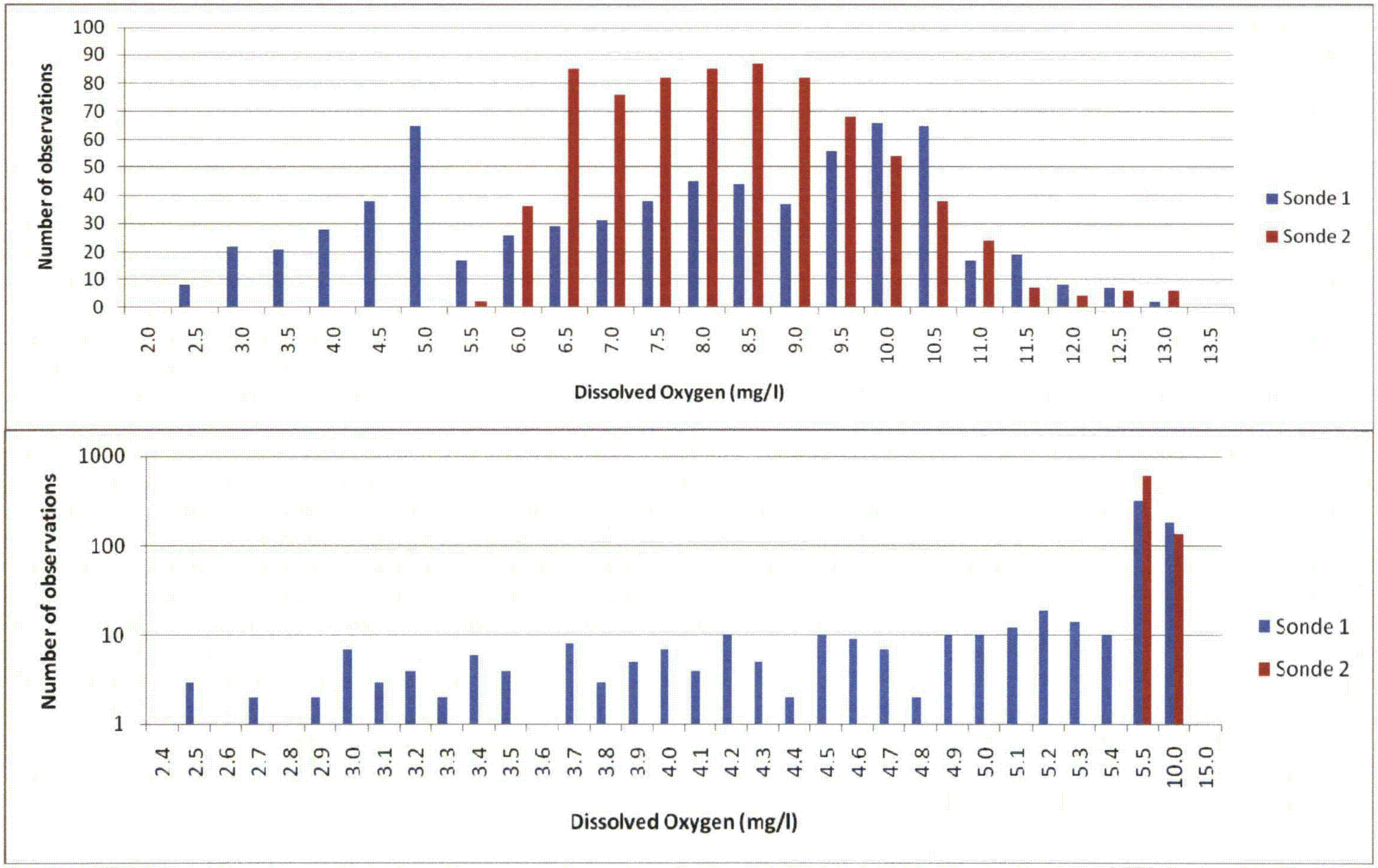


Figure 5-10 Frequency distribution of paired hourly DO measurements recorded at Data Sondes 1-6 in the study reach, July – August, 2010

July Period; Goose Island: Sonde 1 (Inshore), Sonde 2 (Main Channel). Bottom panel shows details for values <5.5 mg/L.

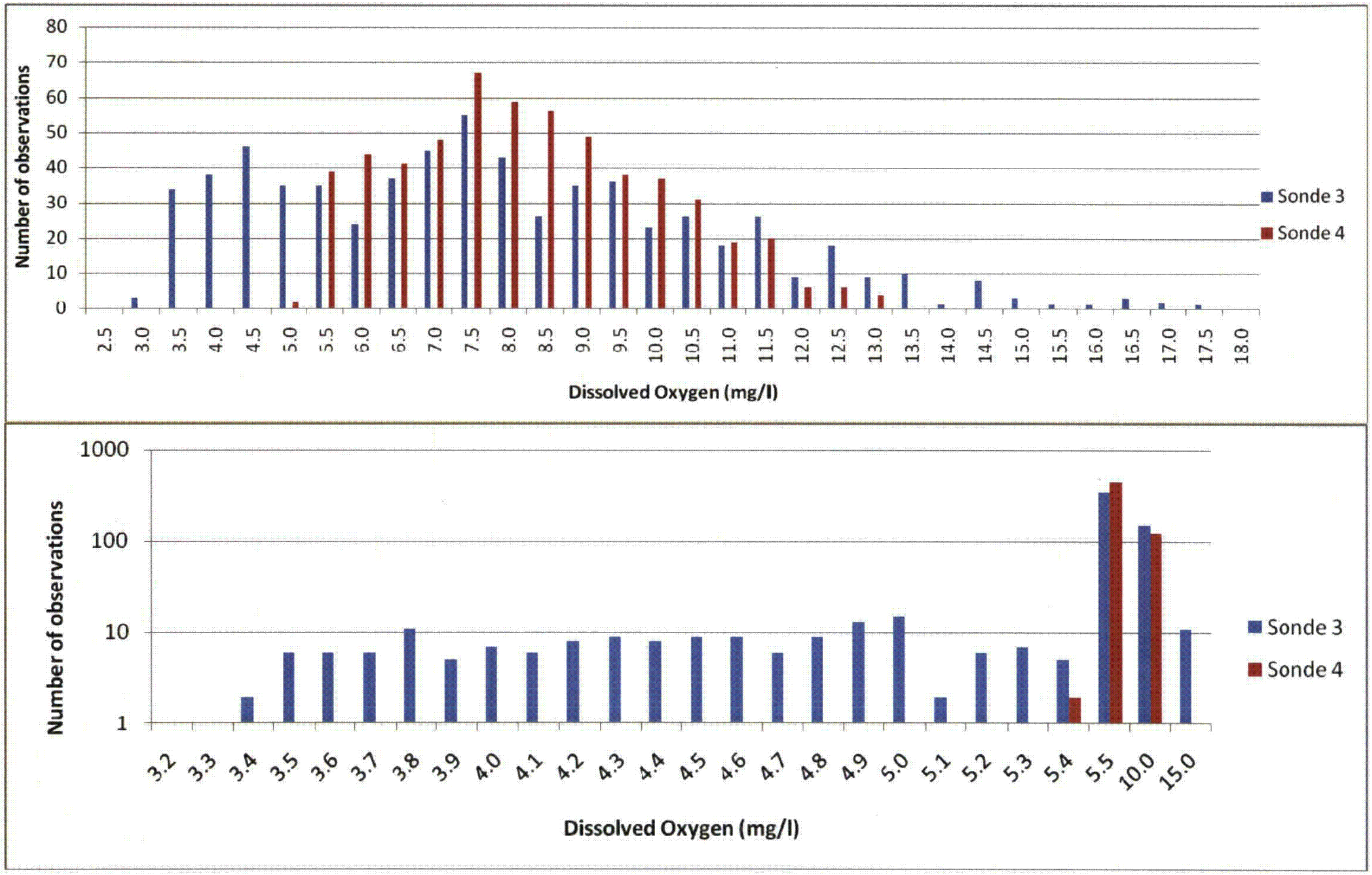


Figure 5-10 (continued)

July Period; Goose Island: Environmental Lab boat ramp: Sonde 3 (Inshore), Sonde 4 (Main Channel. Bottom panel shows details for values <5.5 mg/L.

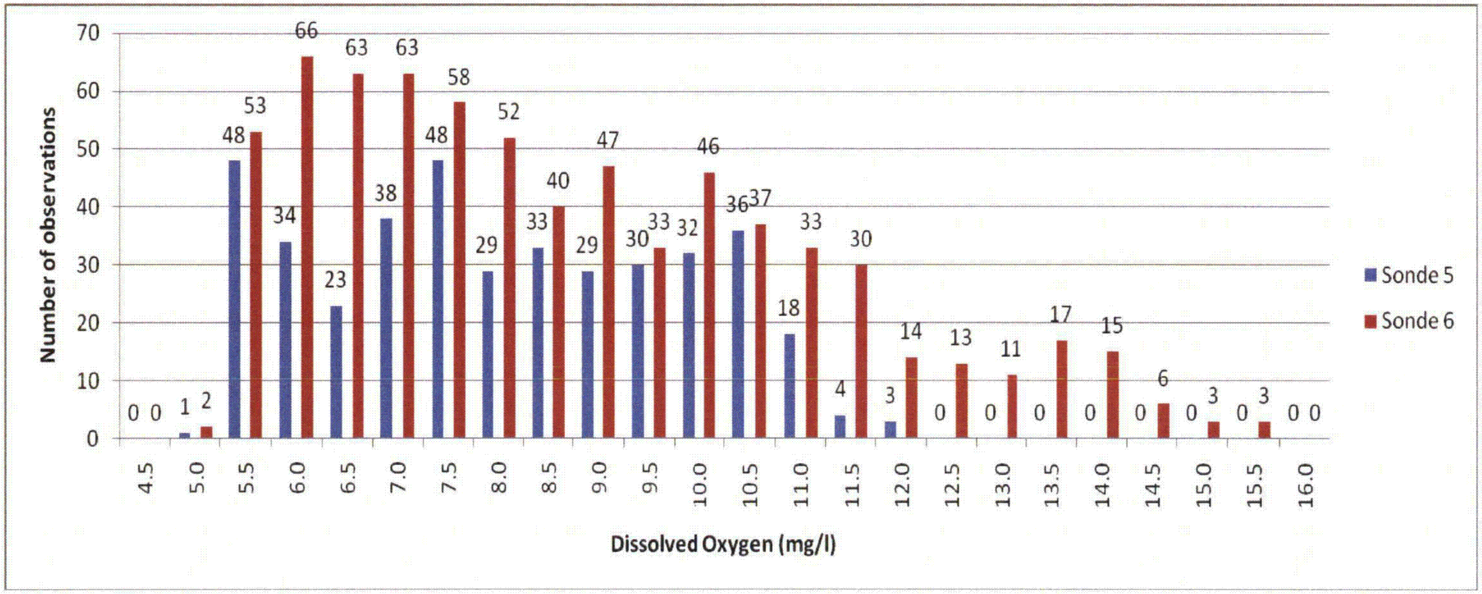


Figure 5-10 (continued)

July Period; Goose Island: Test Track Ramp: Sonde 6 (Inshore), Sonde 5 (Main Channel).

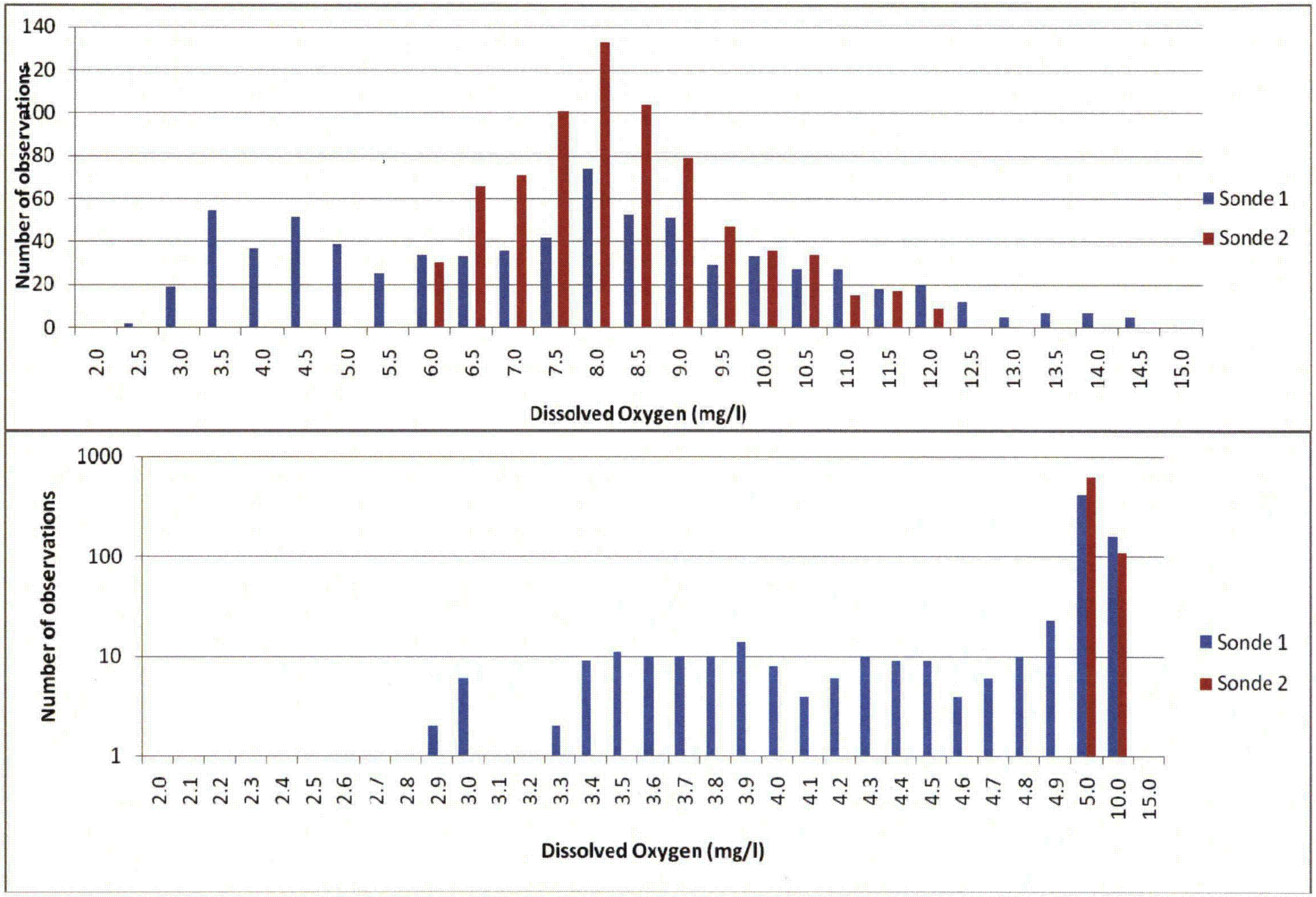


Figure 5-10 (continued)

August Period; Goose Island: Sonde 1 (Inshore), Sonde 2 (Main Channel). Bottom panel shows details for values <5.5 mg/L.

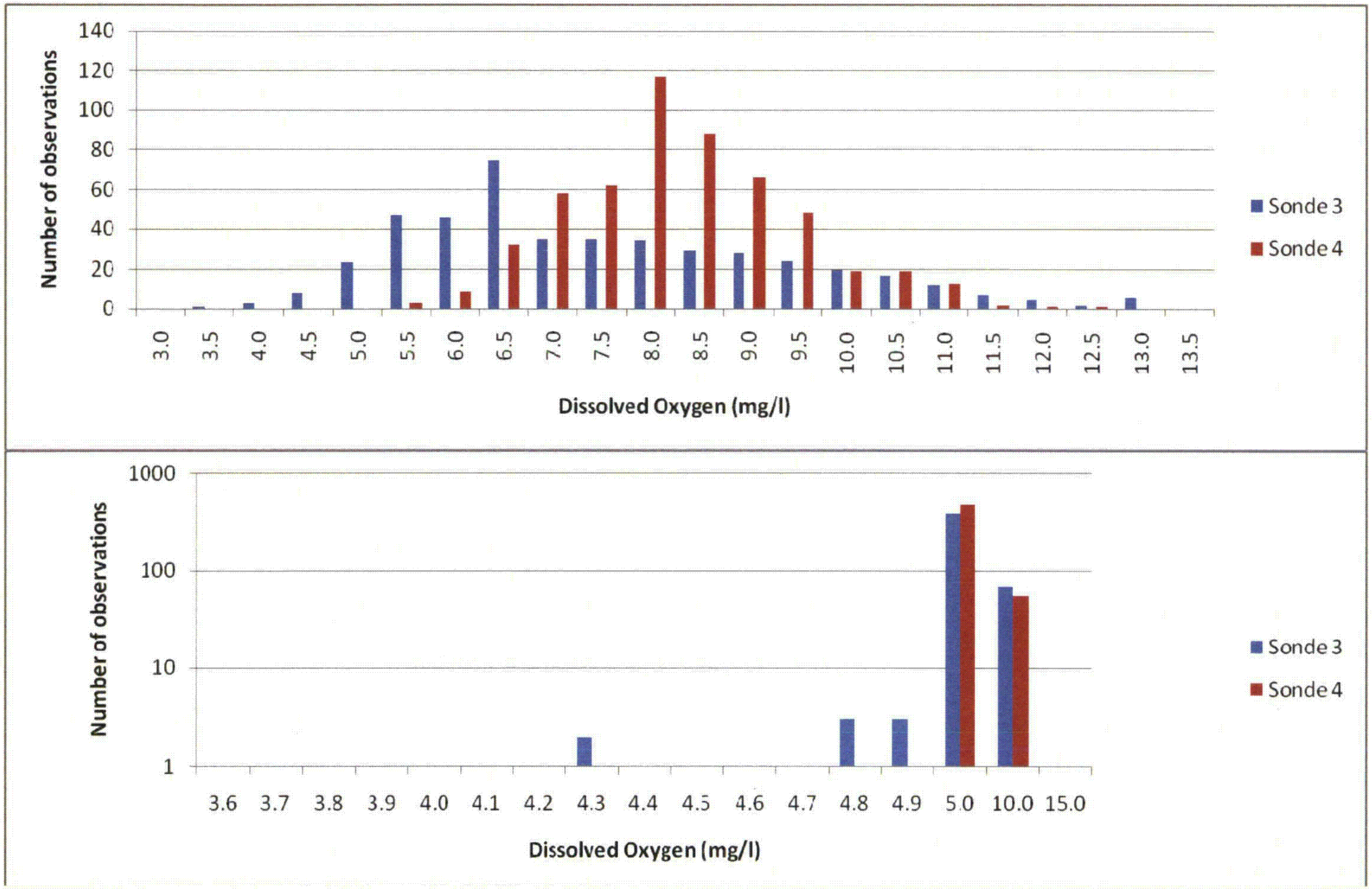


Figure 5-10 (continued)

August Period; Goose Island: Environmental Lab boat ramp: Sonde 3 (Inshore), Sonde 4 (Main Channel. Bottom panel shows details for values <5.5 mg/L.

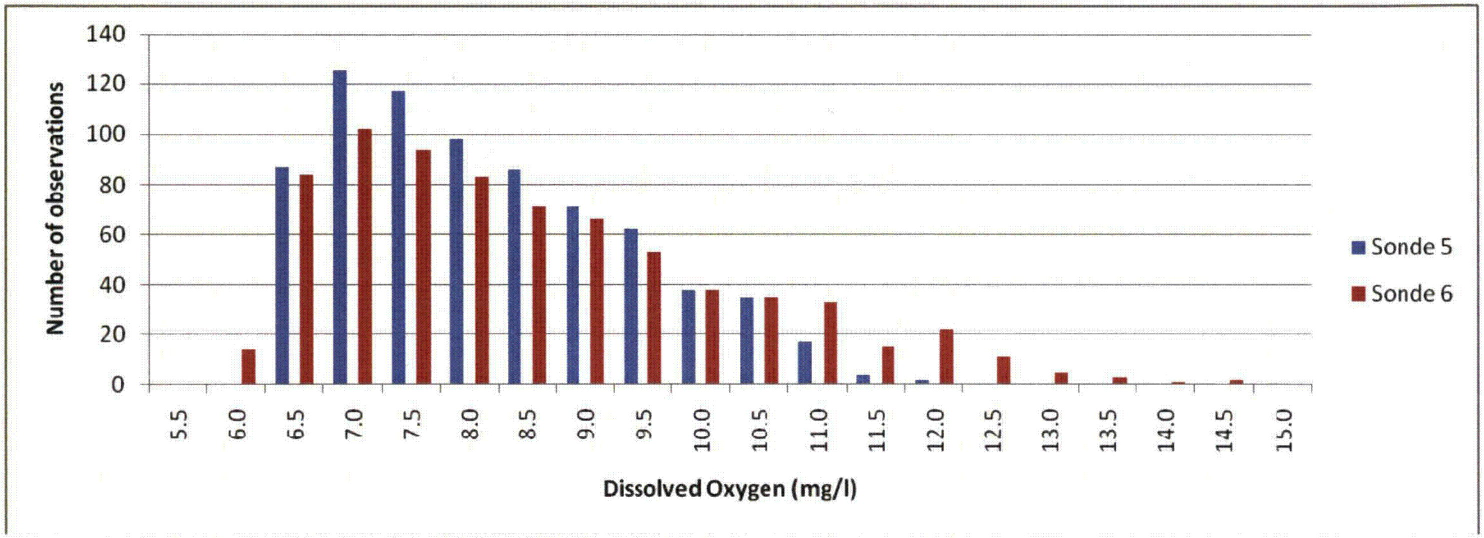


Figure 5-10 (continued)

August Period; Goose Island: Test Track Ramp: Sonde 6 (Inshore), Sonde 5 (Main Channel).

Table 5-6 summarizes the distribution of hourly DO measurements with respect to the Pennsylvania State Criteria.

Table 5-6 Number of hourly DO values at various levels recorded at Data Sondes 1-6 installed to monitor water quality parameters, June 22-September 3, 2010

	Data Sondes[11]					
	1	**2**	**3**	**4**	**5**	**6**
< 4.0 mg/L	127	0	39	0	0	0
4.0 - 4.9 mg/L	151	0	103	0	0	0
≥ 5.0 mg/L	1,255	1,720	1,122	1,336	1,339	1,507
Total	1,533	1,720	1,264	1,336	1,339	1,507

The maximum consecutive hours of DO < 4.0 mg/L was 11 (range 6-11 hours) at the Goose Island inshore location and 7 (range 3-7 hours) at the Environmental Lab boat ramp. All these were naturally occurring events in July and August, spread over 6 to 9 days.

5.5.3. pH

Figure 5-11 presents the temporal pattern of pH recorded at the six data sondes. Although pH varied between dates, the fluctuations were generally within 1.0 pH unit and followed a similar pattern at all sites.

Approximately 30 (2.2%) pH values out of 1,339 slightly exceeded the upper range of PA State criteria of 9.0 at the main channel habitat of Berwick Test Track; 5 (0.3%) out of 1,336 at main channel habitat at the Environmental Lab boat ramp. All were naturally occurring events in July and the longest consecutive period was 9 hours.

[11] Data sondes monitored inshore microhabitats 1, 3, and 6; data sondes 2, 4, and 5 monitored main channel habitats (see Figure 5-2).

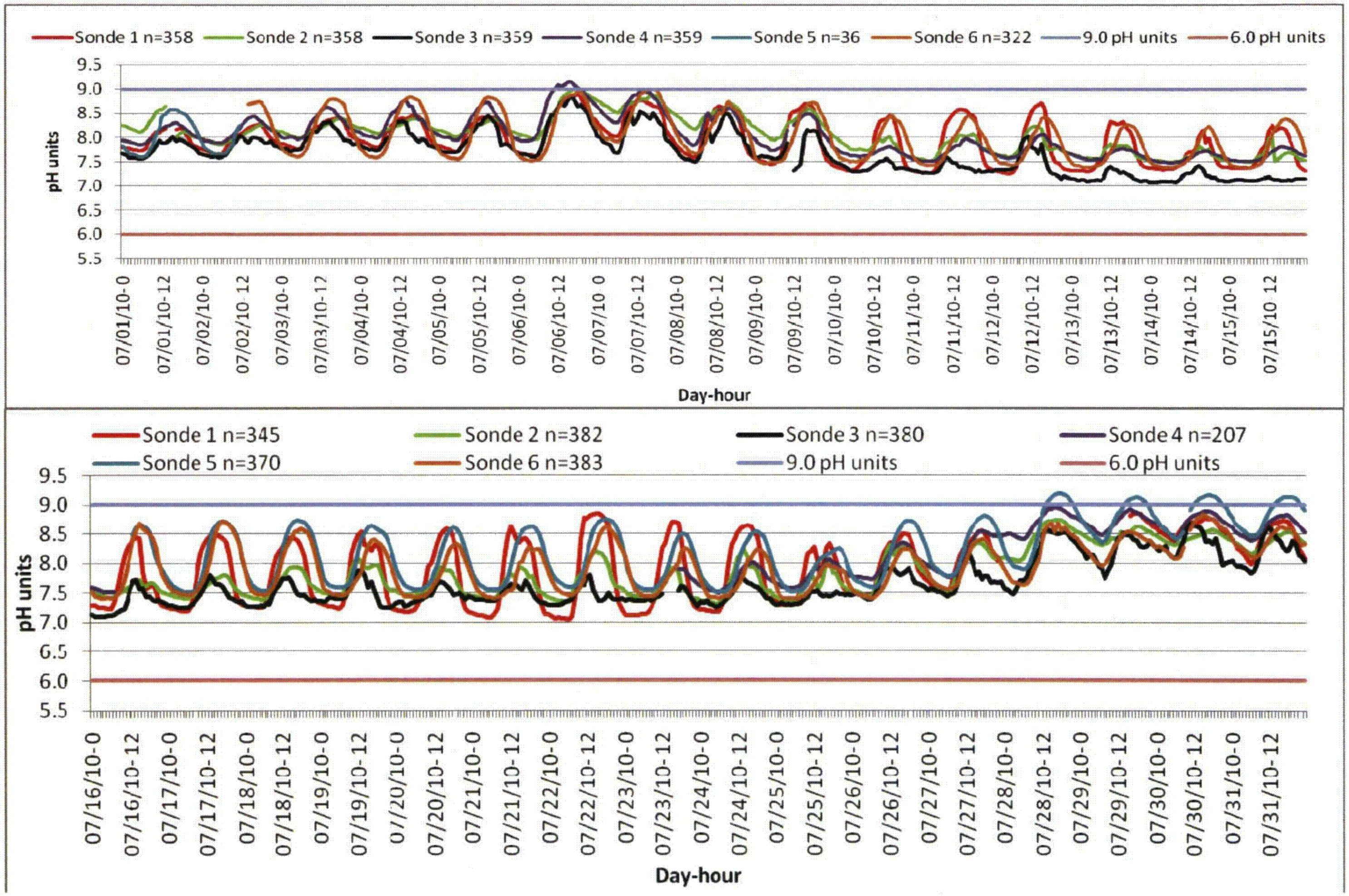


Figure 5-11 Hourly pH measurements at the six locations (three pairs) within the study reach, July – August, 2010

July Period; Goose Island: Sonde 1 (Inshore), Sonde 2 (Main Channel); Environmental Lab boat ramp: Sonde 3 (Inshore), Sonde 4 (Main Channel); Test Track Ramp: Sonde 6 (Inshore), Sonde 5 (Main Channel).

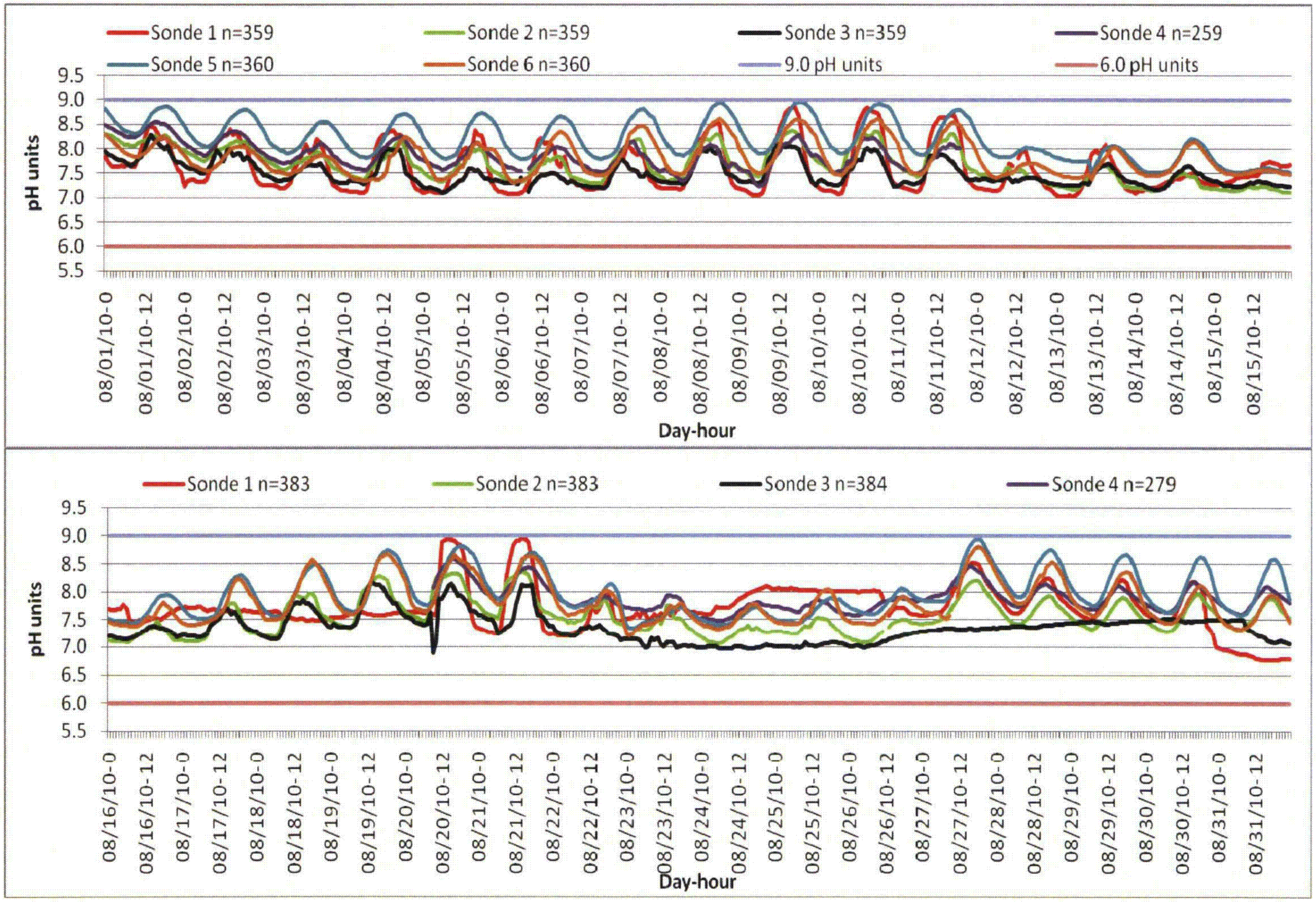


Figure 5-11 (continued -- August Period)

5.5.4. Observations on Smallmouth Bass Spawning, Rearing, and Nursery Areas

Ten surveys of smallmouth bass spawning activity, fry behavior, and subsequent survival were conducted from May through July 2010. A narrative of survey activities is provided in Appendix OSMB. Most observations were made in the upriver section of the study area which afforded the most spawning sites. A motorized kayak was used to gain easy access to the shoreline in shallow water.

Most spawning, fry emergence, and juvenile smallmouth bass were observed at Rocky Island, Goose Island, Environmental Lab boat ramp, and upriver of the mouth of Little Wapwallopen Creek. Spawning occurred in shallow areas (<2 ft deep) with little or no current, mostly on gravel substrate. Fry and juveniles utilized near-shore shallow (<1 ft deep) and low velocity areas. Occasionally in July and more often in August, naturally occurring water temperature exceeded 87°F in smallmouth bass nursery areas but field observations noted that juveniles vacated those locales when these temperatures occurred.

Young smallmouth bass, apparently infected by the bacterium *Flavobacterium columnare*, were observed in July; these infected juvenile bass appeared vulnerable to Blue Heron predation. These fish appeared stressed to the extent that they could be hand-dipped. A detailed description of observations is included in Appendix OSMB.

5.6. Conclusions

There are few if any proper or persistent backwater areas in the stretch of river associated with this study effort and these intermittent backwater characteristics are subject to seasonal variation. Smallmouth bass do spawn in the study area and fry develop throughout the month of June. Smallmouth bass juveniles tended to disperse from the schools, but remained along the shoreline in aquatic vegetation at the river banks and the islands. Once water temperature consistently exceeded 84-85°F, fry had grown to juvenile size and migrated from the shoreline backwater habitat into deeper river water. In early July, shoreline water temperatures were approaching 90°F. At this time, juvenile smallmouth bass were not observed in these areas.

Based on field observations and during naturally occurring flow events, some smallmouth bass juveniles appeared to suffer in 2010 from the same bacterial disease (*Flavobacterium*) experienced in 2005.

Collected water quality data indicates that during the summer low flow months similar to those recorded in 2005 and 2010, there are natural occurrences of water quality not meeting the Pennsylvania State criteria for WWF, primarily for water temperature and DO and to a much lesser extent, pH. These naturally occurring deviations from the Pennsylvania Water Quality Criteria in water temperature and dissolved oxygen, were of short duration and were limited to the shallow, inshore areas both upstream and downstream of the proposed BBNNP discharge location.

Deviations in water temperature and dissolved oxygen from the Pennsylvania Water Quality Criteria were usually of short duration and distributed over 1- 9 days. Deviations were limited to the shallow inshore locations at the Environmental Lab boat ramp (upstream of the proposed BBNNP Project) and Goose Island (2.6 mi downstream of the proposed project) and represent naturally occurring conditions.

Relative to the historical river flows, the study was performed under low flows in the P80 – P90 range. The water quality data collection was completed during stressed river conditions of low flows and high temperatures. These conditions were evaluated for the incremental effect of the 43 cfs BBNPP consumptive water use, which showed no significant change or increase in the stressors. It can be concluded that the proposed consumptive use of the Bell Bend Project will have no appreciable effect on the condition for smallmouth bass spawning, fry emergence, rearing, and nursery.

The study results indicate that consumptive use lacks any appreciable influence on overall flow and has no significant effect on exposure duration for smallmouth bass juveniles to additional stress-related temperature and low DO conditions during the period of concern (July, August, September).

Analyses provided in Section 4.7 illustrate that small thermal and DO changes will occur due to reduced depth. At depths characteristic of backwater spawning area (<2 feet), a thermal change of approximately < 0.5°F degrees T would be expected with a reduction in water depth of 0.5 inches under worst case summer conditions. These potential changes are small in comparison to natural diurnal T and DO changes.

6. *ASSESSMENT OF POTENTIAL IMPACTS ON DOWNSTREAM USERS*

Users of the waters of the Susquehanna River downstream of BBNPP can be classified as either direct withdrawers of water or dischargers that depend on the dilution and assimilative capacities of the Susquehanna. For direct withdrawers (e.g., municipal water utilities) the primary issue is availability of water and the functionality of intake structures at low water surface elevations. For dischargers, end-of-pipe concentration limits may depend on a specific flow rate used in calculations and models (e.g., PENTOXSD).

6.1. METHODS

The following evaluation of potential impacts on downstream water intakes and treated wastewater dischargers covers the area downstream of the BBNPP site as far as Danville and Riverside, PA (just over 30 miles in distance), as stated in the Study Plan. For each group (withdrawers, dischargers), we sought to understand the scope of impacts (physical, chemical, and regulatory) that might occur to the group, divided into large (1 MGD or more) and small (less than 1 MGD) withdrawal or flow. Inquiries were made by telephone and email, with repeated calls to facilities that did not respond, to attempt to ensure that each known withdrawer and discharger had the opportunity to be heard. Contacts with water withdrawal docket holders focused on defining impacts on their ability to serve their customer base and/or their ability to maintain suitable intake velocities because of reduced water availability, decreased river stage, or changed water quality. Other concerns included potentially increased chemical usage due to reduced river flow. Discussions with treated wastewater dischargers focused on potential reductions to effluent limits driven by reduced available dilution factors based upon a seven-day, ten-year low flow in the Susquehanna River reduced by a maximum of 48 cfs of added consumptive water use arising from the installation of a new generating unit at the BBNPP. The 48 cfs value was used because the downstream user survey was begun prior to the change to 43 cfs in PPL Bell bend's application to the SRBC. The 7Q10 at Bell Bend is 843 cfs; at Bloomsburg, it is estimated at 942 cfs; at Danville, it is estimated to be 1,010 cfs per http://paapps.er.usgs.gov/flowstats.

The list in Table 6-1 of water withdrawal docket holders in excess of 0.1 mgd is based on internet research on local water suppliers and telephone contacts with the docket holders. While three of the docket holders are extracting from wells, rather than directly from the Susquehanna River, these docket holders were included because of their wells' proximity to the river.

Table 6-1 Downstream water withdrawals

Facility/Location	Type	Design flow (mgd)	Distance downstream of the BBNPP intake (mi)	Expected Impact
PA-American Water Company (serves Berwick and Nescopeck)	Water supply - wells	4.6	6.5	No impact, reserves the right to reassess in the future (e-mail R. Schnitzler, 5/15/2011)
Mifflin Township Water Authority	Water supply - wells[12]	0.223 (typ.) 0.432 (max.)	11	No impact (e-mail P. Hartzell, 5/11/2011)
Catawissa Borough Municipal Authority	Water supply - wells[13]	0.12 (avg.) 0.2 (max.)	22	None expected (telecon C. Bachman, 5/3/11)
Danville Municipal Authority	Water supply	2 (avg.)	30	Potential impact on treatability (including chemical usage) of Authority's raw water and quantity of treatment residuals requiring disposal (e-mail D. Marks, Gannett-Fleming, 5/11/2011)
Cherokee Pharmaceuticals, Riverside	Process water supply	34.392	31.2	Could potentially impact the facility, but still under evaluation (e-mail J. Brenchley, 5/9/2011)

[12] within ¼ mi of river

[13] wells ½ mi upstream along Catawissa Creek, surface intake – not usually used – on Catawissa Creek

The list in Table 6-2 of downstream sanitary and industrial wastewater dischargers to the Susquehanna is based on a USEPA Envirofacts search (last updated in 2006) of all dischargers to the Susquehanna River having greater than 0.1 mgd flow. This flow cutoff was based on our assumption that flows smaller than this would not be impacted by the 43 cfs maximum BBNPP consumptive use, given that an 0.1 mgd discharge is only <1% of the seven-day, ten-year low of the Susquehanna River at the point of discharge.

Table 6-2 Downstream treated wastewater dischargers

Facility/Location	Type	Design flow (mgd)	Distance downstream of the SSES intake (mi)	Expected Impact
Nescopeck Borough	POTW	0.11	6.5	None (e-mail from J. Hendricks, Herbert, Rowland, & Grubic, Inc. for Nescopeck Borough, 4/28/2011)
Berwick Area Joint Sewer Authority	POTW	3.7	6.5	Little to no effect on BAJSA's effluent limits and their ability to meet them (e-mail and letter from E. Threet, Herbert Rowland & Grubic Inc., 5/16/2011)
Bloomsburg Municipal Authority	POTW	4.29	18	Based upon a check of PENTOX and a discussion with PADEP, no significant impact on Bloomsburg's WWTP discharge is anticipated (voice mail T. Jones, Gannett-Fleming, 5/22/2011)
Danville Municipal Authority	POTW	3.62	30	Authority suggests that PADEP be asked to rerun its models for effluent limit development based upon reduced Q7,10 (e-mail R. Jager, Gannett-Fleming, 5/10/2011)
Wise Foods, Berwick	Indust.	0.59	7.3	NPDES permit undergoing renewal at present; therefore, comment at this time would be premature. Wise Foods reserves the right to comment in the future on this matter (e-mail R. Wolfe, 5/6/2011).
DelMonte Corp., Bloomsburg	Indust.	0.671	12.9	No response after multiple calls
Cherokee Pharmaceuticals, Riverside	Indust.	12.2	31.7	Could potentially impact the facility, but still under evaluation (e-mail J. Brenchley, 5/9/2011)

6.2. CONCLUSIONS

One large downstream water user expressed concern about consumptive use impact on its activities; several downstream dischargers and one water user expressed interest in further

evaluation of quantitative impacts, but none voiced immediate objections. One large user anticipated little to no effect; two large dischargers anticipated no significant impact after running models and/or consulting with PADEP. The smaller entities that responded do not anticipate any impacts from the proposed consumptive use, although one smaller discharger reserves the right of future comment.

7. *STUDY CONCLUSIONS*

Potential effects of the requested level of the BBNPP consumptive water use were investigated using the procedures and methods identified in the Study Plan. These procedures and methods relied as much as possible on field programs in which data directly useful in addressing the study questions were obtained. Analysis of the data was supplemented with calculations and models as appropriate.

This study benefited from the opportunity to measure the characteristics and behavior of the Susquehanna River over the range of flows that occurred in 2010 including a period of sustained low flows.

For all five study questions, either minimal or no impacts due to 43 cfs of BBNPP consumptive water use were found. This result is largely due to the small fraction of the 7Q10 that consumptive water use represents (5%) and the consequent small reduction in water surface elevation (<0.5 in.) that is expected to occur.

8. LITERATURE CITED

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APPENDIX HSC. HABITAT SUITABILITY CRITERIA CURVES

APPENDIX HSC

HABITAT SUITABILITY CRITERIA CURVES

Preferred velocity, depth, and substrate/cover for selected target species and life stages are expressed in an IFIM analysis in the form of habitat suitability curves in which the optimum range of a particular microhabitat variable is assigned a weighting factor of 1, and the least suitable range a weighting factor of 0. The weighting factors on the Y-axis (0 to 1) are used as input to each value on the X-axis in a series of programs within the PHABSIM model.

A: microhabitat value or index

B: suitability weighting factor

VEL: mean column velocity, ft/s

DPTH: water depth, ft

CODE: substrate/cover code:

NCWRD System

Code	Cover	Substrate
1	No Cover	silt or terrestrial vegetation
2	No Cover	sand (<0.1")
3	No Cover	gravel (0.1-3.0")
4	No Cover	cobble (3.0-12.0")
5	No Cover	small boulder (12-36")
6	No Cover	boulder, angled bedrock, or WD
7	No Cover	mud or flat bedrock
8	Overhead Veg	and terrestrial vegetation
9	Overhead Veg	and gravel
10	Overhead Veg	and cobble
11	Overhead Veg	and boulder, angled bedrock or WD
12	Instream	cobble
13	Instream	and boulder, angled bedrock or WD
14	Proximal	cobble
15	Proximal	and boulder, angled bedrock or WD
16	Inst/Prox	gravel
17	Inst/Prox/Ovh	silt or sand
18	Aquatic Veg	macrophytes

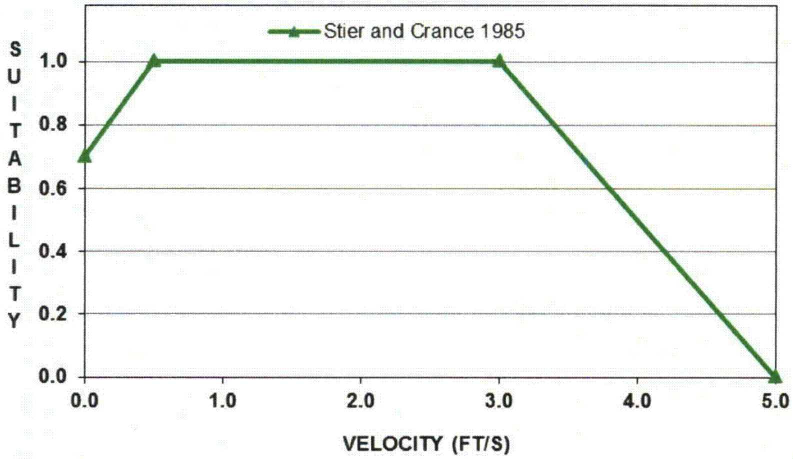
Curve Set ID:
00000001

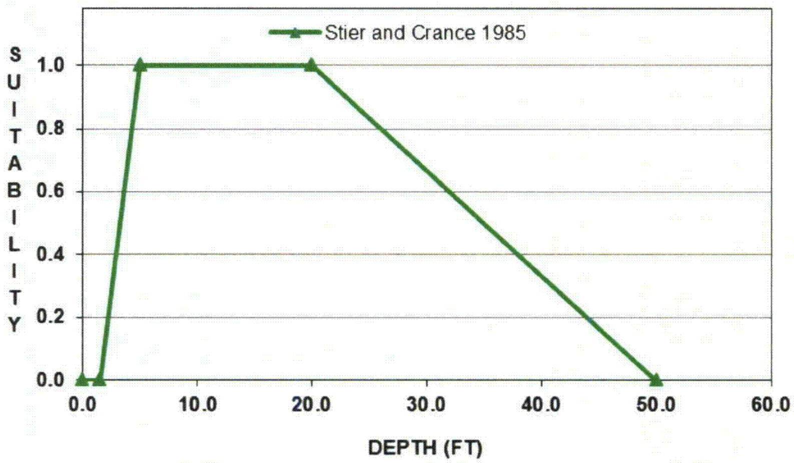
Species Name: American Shad

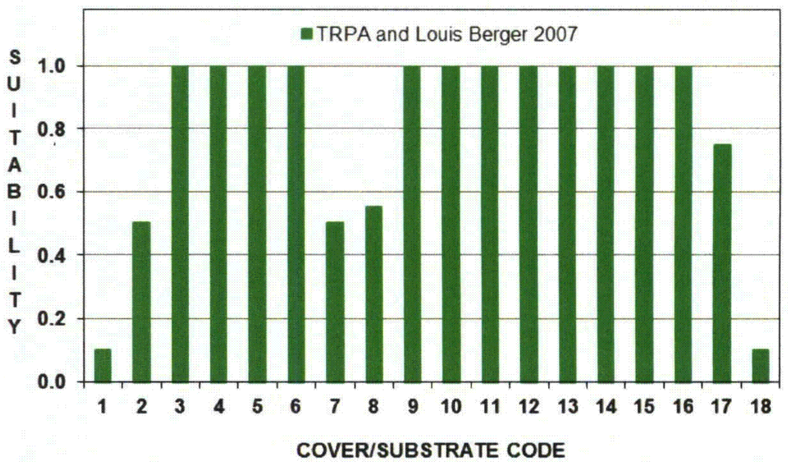
Life Stage: Adult

Misc Info:

VEL A	VEL B	DPTH A	DPTH B	CODE A	CODE B
0.00	0.70	0.00	0.00	0.00	0.00
0.50	1.00	1.50	0.00	1.00	0.10
3.00	1.00	5.00	1.00	2.00	0.50
5.00	0.00	20.00	1.00	3.00	1.00
10.00	0.00	50.00	0.00	4.00	1.00
		100.00	0.00	5.00	1.00
				6.00	1.00
				7.00	0.50
				8.00	0.55
				9.00	1.00
				10.00	1.00
				11.00	1.00
				12.00	1.00
				13.00	1.00
				14.00	1.00
				15.00	1.00
				16.00	1.00
				17.00	0.75
				18.00	0.10





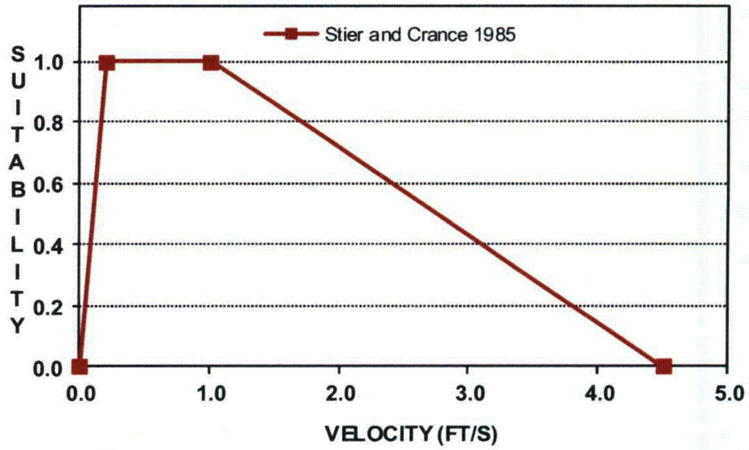


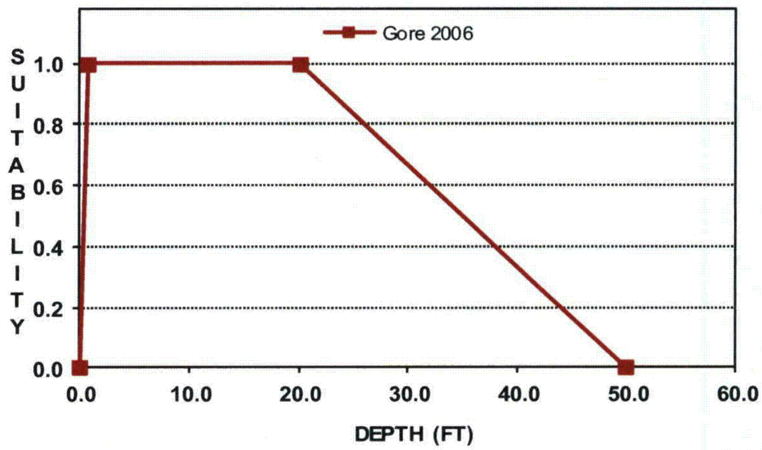
Curve Set ID:
00000002

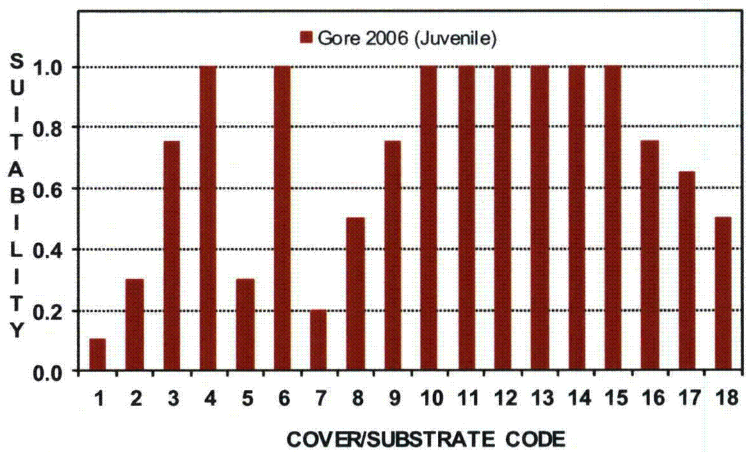
Species Name: American Shad
Life Stage: Juvenile

Misc Info:

VEL A	VEL B	DPTH A	DPTH B	CODE A	CODE B
0.00	0.00	0.00	0.00	0.00	0.00
0.20	1.00	0.70	1.00	1.00	0.10
1.00	1.00	20.00	1.00	2.00	0.30
4.50	0.00	50.00	0.00	3.00	0.75
10.00	0.00	100.00	0.00	4.00	1.00
				5.00	0.30
				6.00	1.00
				7.00	0.20
				8.00	0.50
				9.00	0.75
				10.00	1.00
				11.00	1.00
				12.00	1.00
				13.00	1.00
				14.00	1.00
				15.00	1.00
				16.00	0.75
				17.00	0.10
				18.00	0.50







Curve Set ID:
00000003

Species Name: American Shad
Life Stage: Fry

Misc Info:

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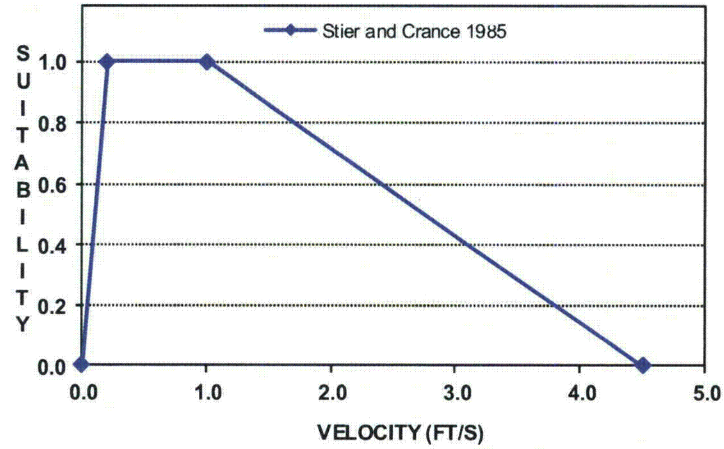
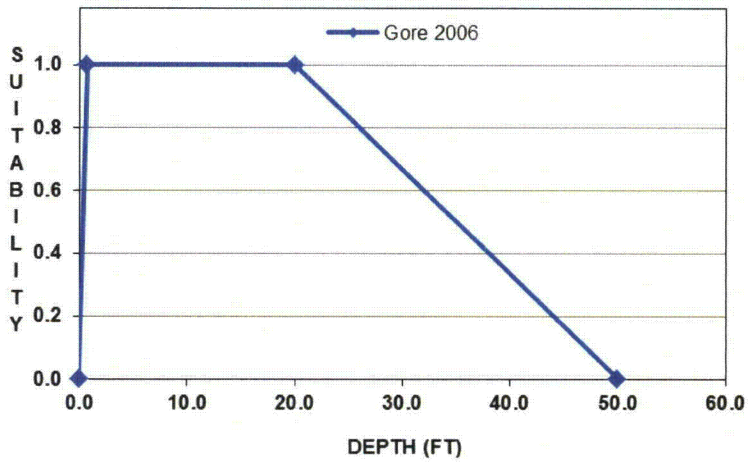
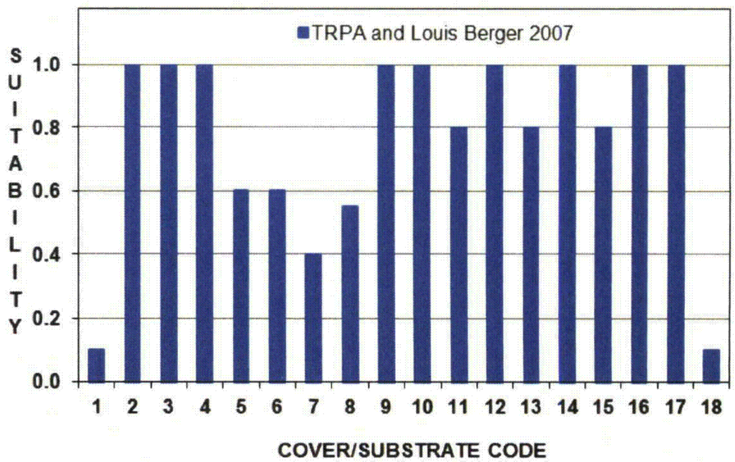
0.20	1.00	0.70	1.00	1.00	0.10
1.00	1.00	20.00	1.00	2.00	1.00
4.50	0.00	50.00	0.00	3.00	1.00
10.00	0.00	100.00	0.00	4.00	1.00
				5.00	0.60
				6.00	0.60
				7.00	0.40
				8.00	0.55
				9.00	1.00
				10.00	1.00
				11.00	0.80
				12.00	1.00
				13.00	0.80
				14.00	1.00
				15.00	0.80
				16.00	1.00
				17.00	1.00
				18.00	0.10







Curve Set ID: 00000004

Species Name: American Shad
Life Stage: Spawning

Misc Info:

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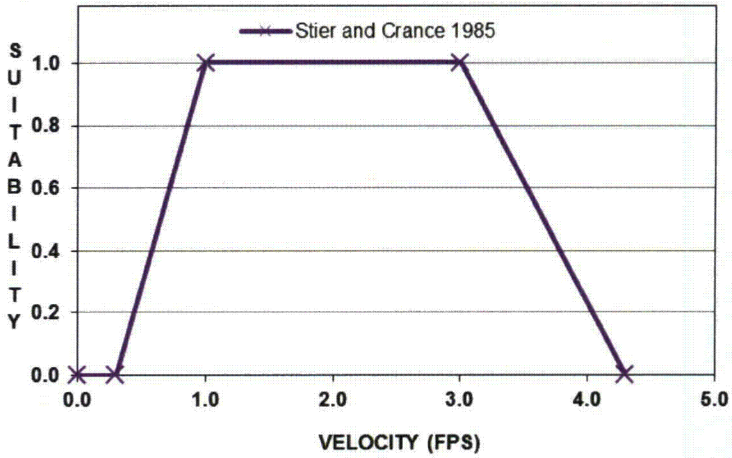
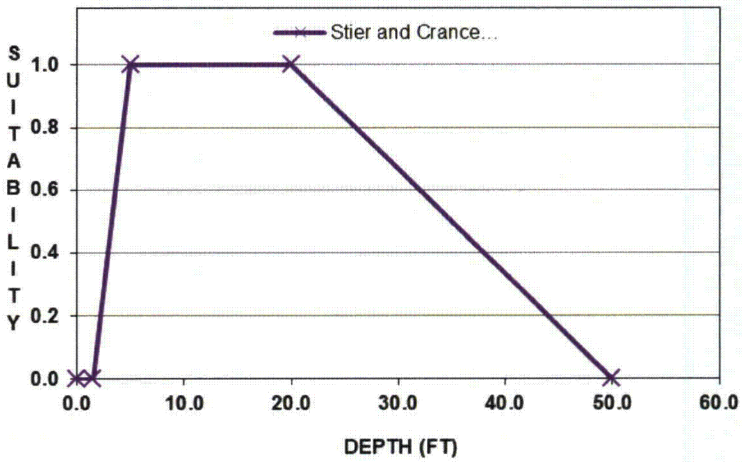
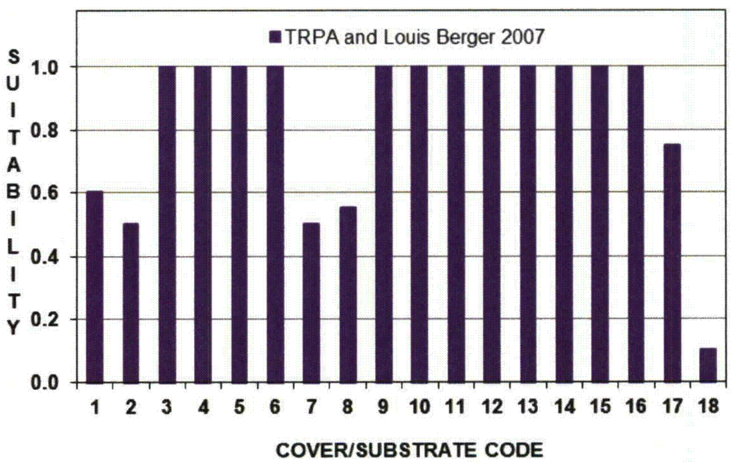
0.30	0.00	1.50	0.00	1.00	0.60
1.00	1.00	5.00	1.00	2.00	0.50
3.00	1.00	20.00	1.00	3.00	1.00
4.30	0.00	50.00	0.00	4.00	1.00
10.00	0.00	100.00	0.00	5.00	1.00
				6.00	1.00
				7.00	0.50
				8.00	0.55
				9.00	1.00
				10.00	1.00
				11.00	1.00
				12.00	1.00
				13.00	1.00
				14.00	1.00
				15.00	1.00
				16.00	1.00
				17.00	0.75
				18.00	0.10







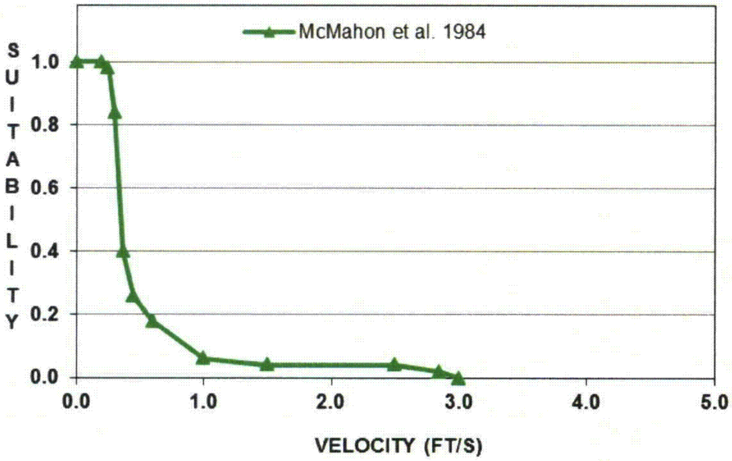
Curve Set ID:
00000005

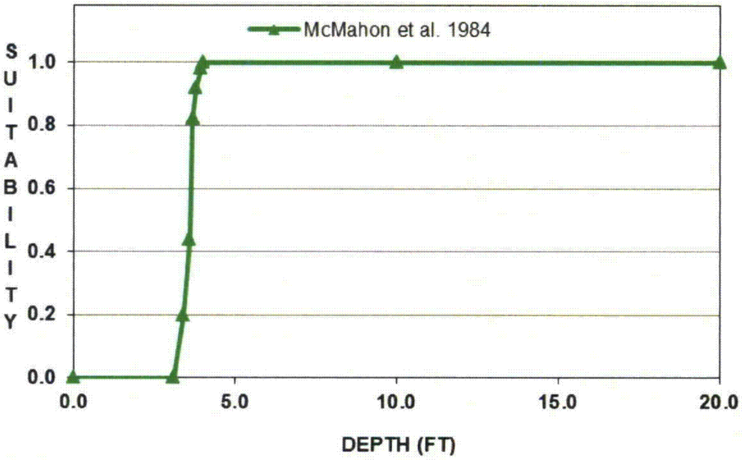
Species Name: Walleye

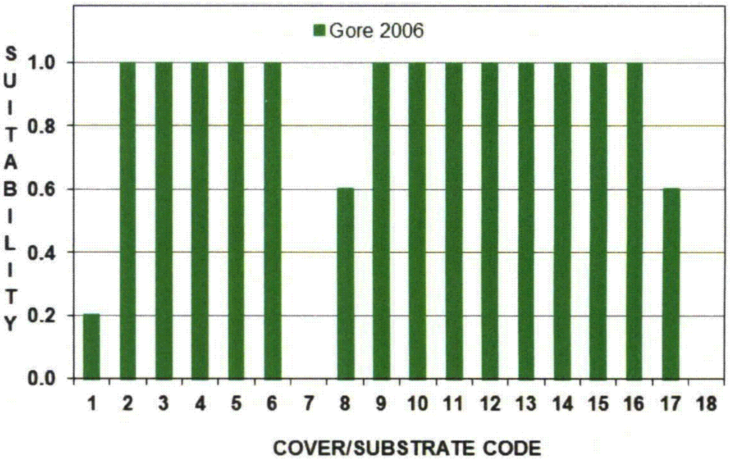
Life Stage: Adult

Misc Info:

VEL A	VEL B	DPTH A	DPTH B	CODE A	CODE B
0.00	1.00	0.00	0.00	0.00	0.00
0.20	1.00	3.10	0.00	1.00	0.20
0.25	0.98	3.40	0.20	2.00	1.00
0.30	0.84	3.60	0.44	3.00	1.00
0.37	0.40	3.70	0.82	4.00	1.00
0.45	0.26	3.80	0.92	5.00	1.00
0.60	0.18	3.95	0.98	6.00	1.00
1.00	0.06	4.00	1.00	7.00	0.00
1.50	0.04	10.00	1.00	8.00	0.60
2.50	0.04	20.00	1.00	9.00	1.00
2.85	0.02	100.00	0.00	10.00	1.00
3.00	0.00			11.00	1.00
10.00	0.00			12.00	1.00
				13.00	1.00
				14.00	1.00
				15.00	1.00
				16.00	1.00
				17.00	0.60
				18.00	0.00





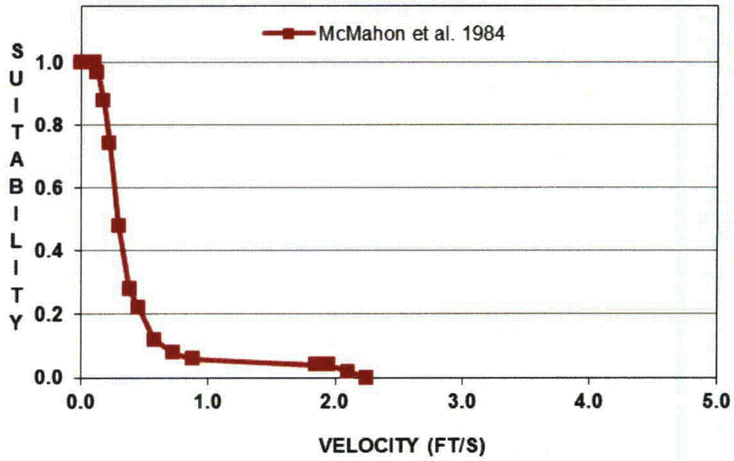


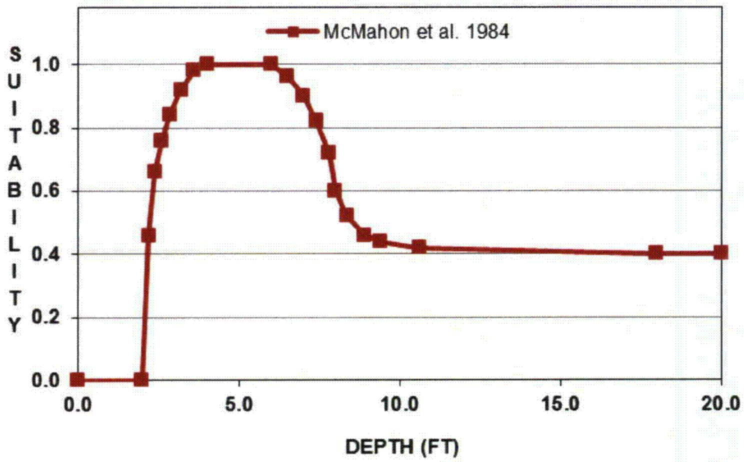
Curve Set ID: 00000006

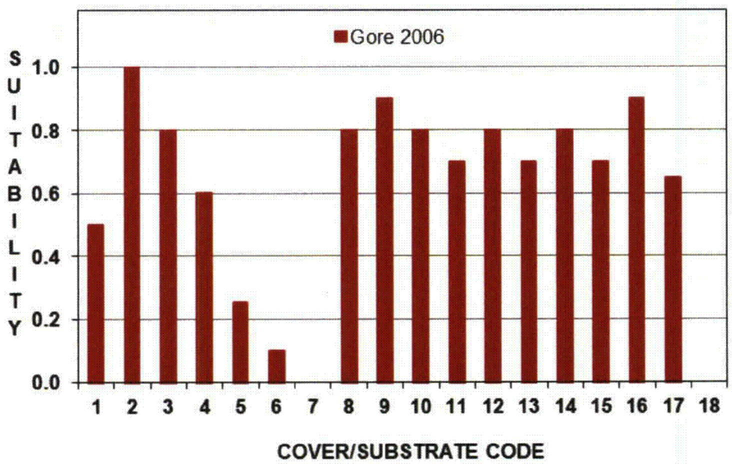
Species Name: Walleye
Life Stage: Juvenile

Misc Info:

VEL A	VEL B	DPTH A	DPTH B	CODE A	CODE B
0.00	1.00	0.00	0.00	0.00	0.00
0.11	1.00	2.00	0.00	1.00	0.50
0.13	0.97	2.20	0.46	2.00	1.00
0.18	0.88	2.40	0.66	3.00	0.80
0.23	0.74	2.60	0.76	4.00	0.60
0.30	0.48	2.85	0.84	5.00	0.25
0.39	0.28	3.20	0.92	6.00	0.10
0.46	0.22	3.60	0.98	7.00	0.00
0.58	0.12	4.00	1.00	8.00	0.80
0.73	0.08	6.00	1.00	9.00	0.90
0.88	0.06	6.50	0.96	10.00	0.80
1.85	0.04	7.00	0.90	11.00	0.70
1.95	0.04	7.40	0.82	12.00	0.80
2.10	0.02	7.80	0.72	13.00	0.70
2.25	0.00	8.00	0.60	14.00	0.80
10.00	0.00	8.35	0.52	15.00	0.70
		8.90	0.46	16.00	0.90
		9.40	0.44	17.00	0.65
		10.60	0.42	18.00	0.00
		18.00	0.40		
		20.00	0.40		
		100.00	0.00		







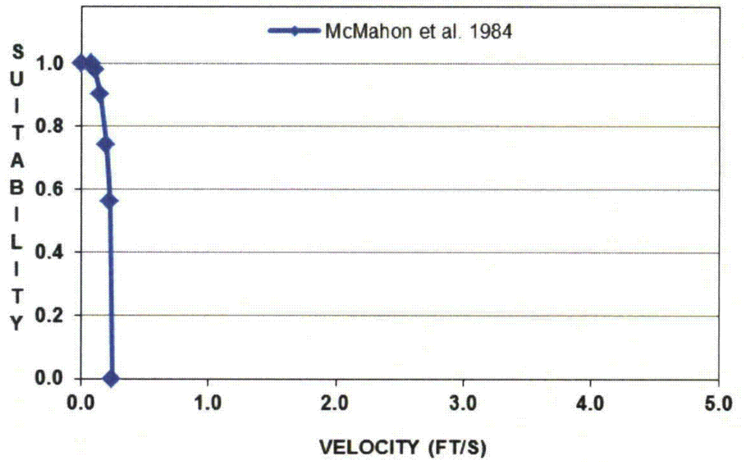
Curve Set ID: 00000007

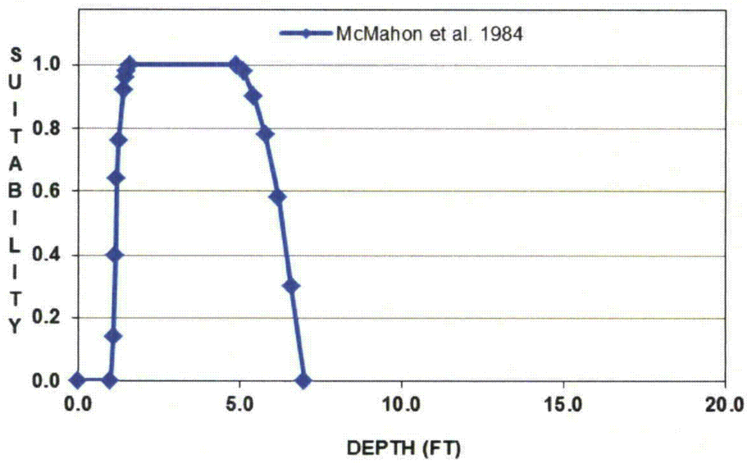
Species Name: Walleye

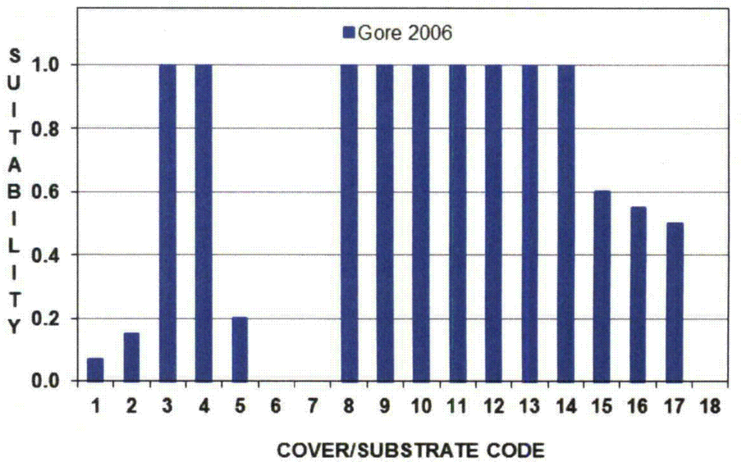
Life Stage: Fry

Misc Info:

VEL A	VEL B	DPTH A	DPTH B	CODE A	CODE B
0.00	1.00	0.00	0.00	0.00	0.00
0.08	1.00	1.00	0.00	1.00	0.07
0.11	0.98	1.10	0.14	2.00	0.15
0.15	0.90	1.16	0.40	3.00	1.00
0.20	0.74	1.20	0.64	4.00	1.00
0.23	0.56	1.25	0.76	5.00	0.20
0.25	0.00	1.40	0.92	6.00	0.00
10.00	0.00	1.45	0.96	7.00	0.00
		1.50	0.98	8.00	1.00
		1.60	1.00	9.00	1.00
		4.90	1.00	10.00	1.00
		5.10	0.98	11.00	1.00
		5.44	0.90	12.00	1.00
		5.80	0.78	13.00	1.00
		6.20	0.58	14.00	1.00
		6.60	0.30	15.00	0.60
		7.00	0.00	16.00	0.55
		100.00	0.00	17.00	0.50
				18.00	0.00







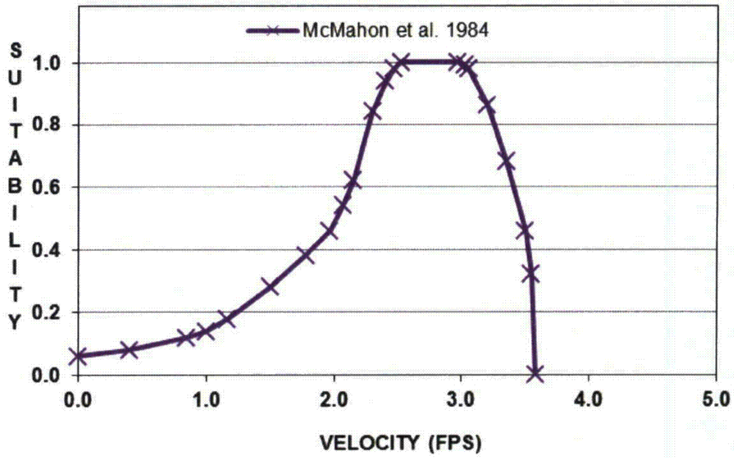
Curve Set ID: 00000008

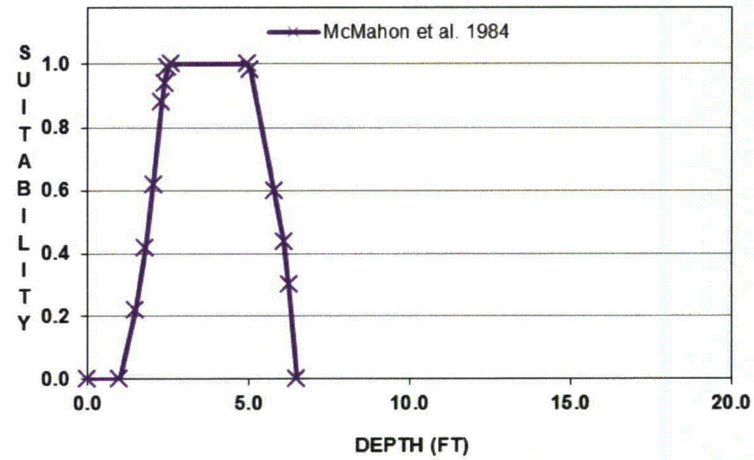
Species Name: Walleye

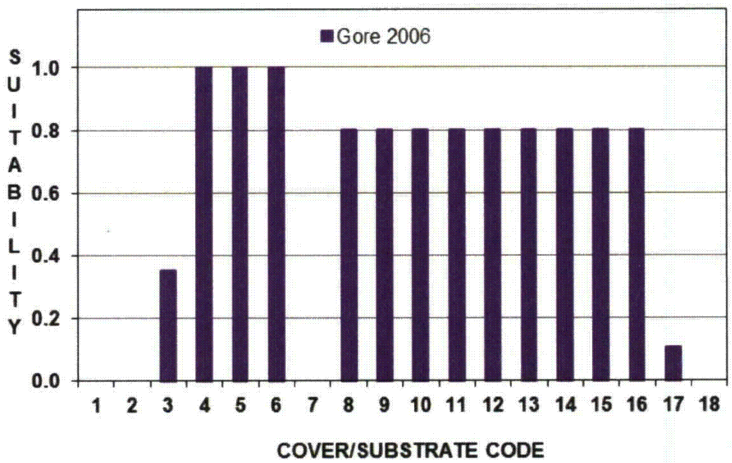
Life Stage: Spawning

Misc Info:

VEL A	VEL B	DPTH A	DPTH B	CODE A	CODE B
0.00	0.06	0.00	0.00	0.00	0.00
0.40	0.08	1.00	0.00	1.00	0.00
0.85	0.12	1.50	0.22	2.00	0.00
1.00	0.14	1.80	0.42	3.00	0.35
1.17	0.18	2.06	0.62	4.00	1.00
1.50	0.28	2.30	0.88	5.00	1.00
1.78	0.38	2.40	0.94	6.00	1.00
1.97	0.46	2.50	0.99	7.00	0.00
2.07	0.54	2.60	1.00	8.00	0.80
2.15	0.62	4.97	1.00	9.00	0.80
2.30	0.84	5.05	0.98	10.00	0.80
2.40	0.94	5.80	0.60	11.00	0.80
2.47	0.98	6.10	0.44	12.00	0.80
2.52	1.00	6.25	0.30	13.00	0.80
2.97	1.00	6.50	0.00	14.00	0.80
3.03	0.99	100.00	0.00	15.00	0.80
3.05	0.98			16.00	0.80
3.20	0.86			17.00	0.11
3.35	0.68			18.00	0.00
3.50	0.46				
3.55	0.32				
3.58	0.00				
10.00	0.00				





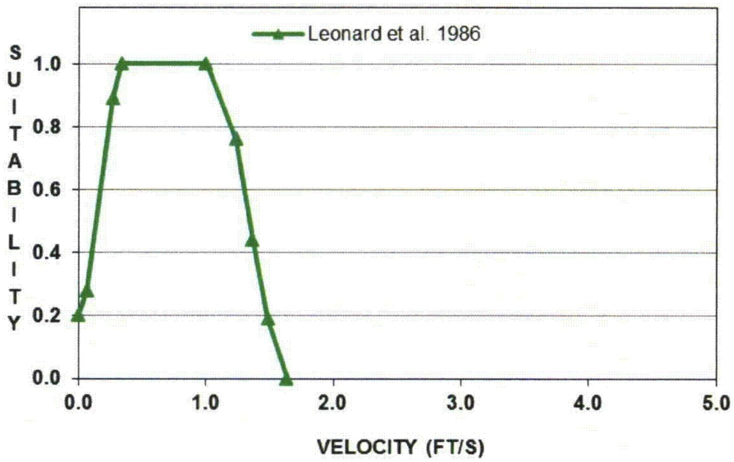


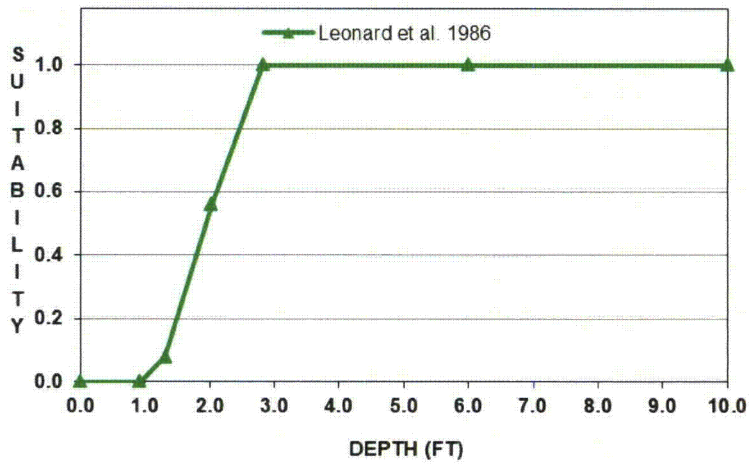
Curve Set ID: 00000009

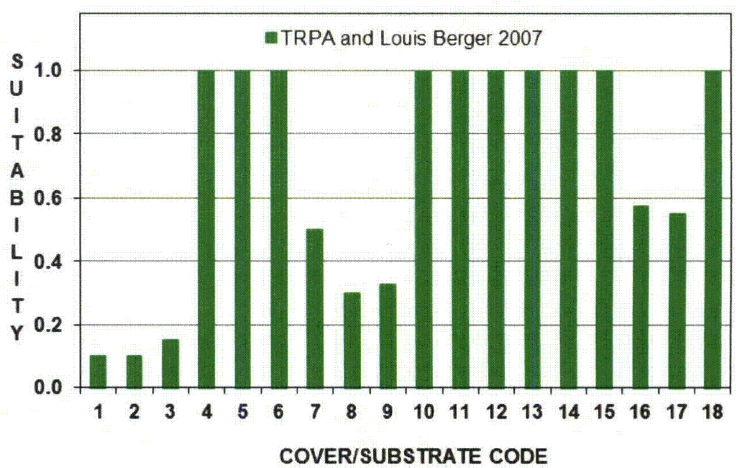
Species Name: Smallmouth Bass
Life Stage: Adult

Misc Info:

VEL A	VEL B	DPTH A	DPTH B	CODE A	CODE B
0.00	0.20	0.00	0.00	1.00	0.10
0.07	0.28	0.92	0.00	2.00	0.10
0.27	0.89	1.31	0.08	3.00	0.15
0.34	1.00	2.03	0.56	4.00	1.00
1.00	1.00	2.82	1.00	5.00	1.00
1.24	0.76	6.00	1.00	6.00	1.00
1.37	0.44	10.00	1.00	7.00	0.50
1.49	0.19	100.00	1.00	8.00	0.30
1.64	0.00			9.00	0.33
10.00	0.00			10.00	1.00
				11.00	1.00
				12.00	1.00
				13.00	1.00
				14.00	1.00
				15.00	1.00
				16.00	0.58
				17.00	0.55
				18.00	1.00





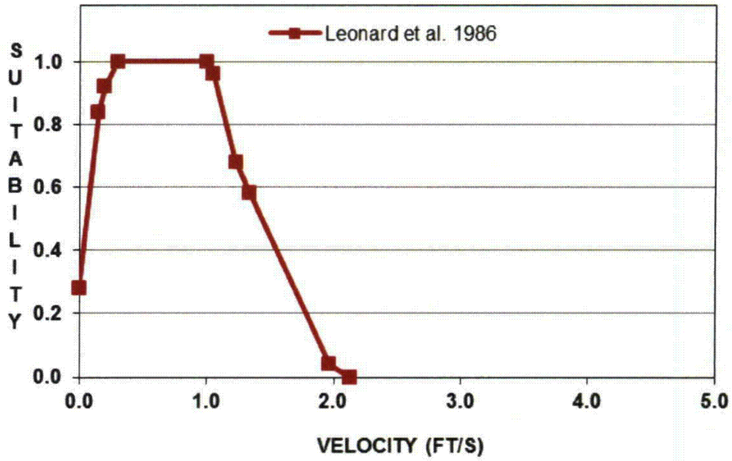


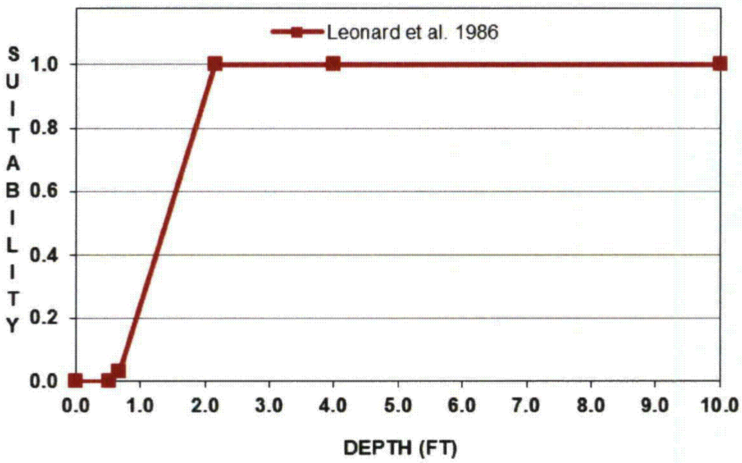
Curve Set ID: 00000010

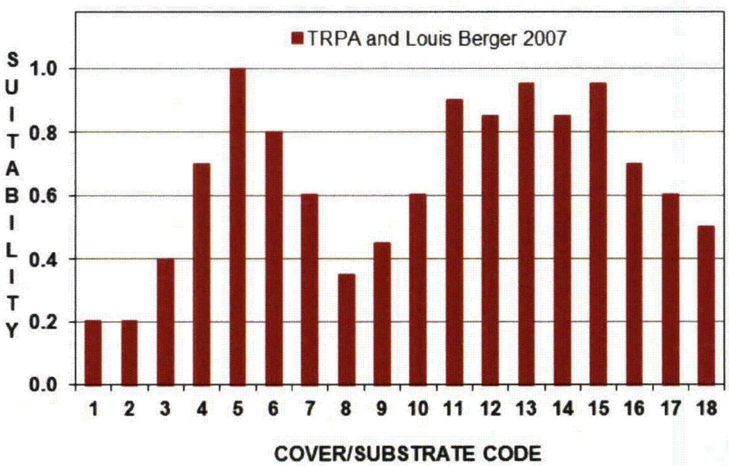
Species Name: Smallmouth Bass
Life Stage: Juvenile

Misc Info:

VEL A	VEL B	DPTH A	DPTH B	CODE A	CODE B
0.00	0.28	0.00	0.00	1.00	0.20
0.15	0.84	0.52	0.00	2.00	0.20
0.20	0.92	0.67	0.03	3.00	0.40
0.30	1.00	2.15	1.00	4.00	0.70
1.00	1.00	4.00	1.00	5.00	1.00
1.05	0.96	10.00	1.00	6.00	0.80
1.23	0.68	100.00	1.00	7.00	0.60
1.34	0.58			8.00	0.35
1.97	0.04			9.00	0.45
2.13	0.00			10.00	0.60
10.00	0.00			11.00	0.90
				12.00	0.85
				13.00	0.95
				14.00	0.85
				15.00	0.95
				16.00	0.70
				17.00	0.60
				18.00	0.50





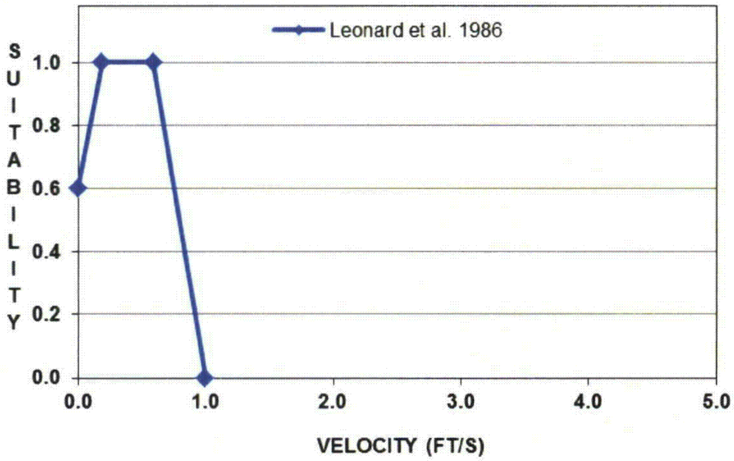


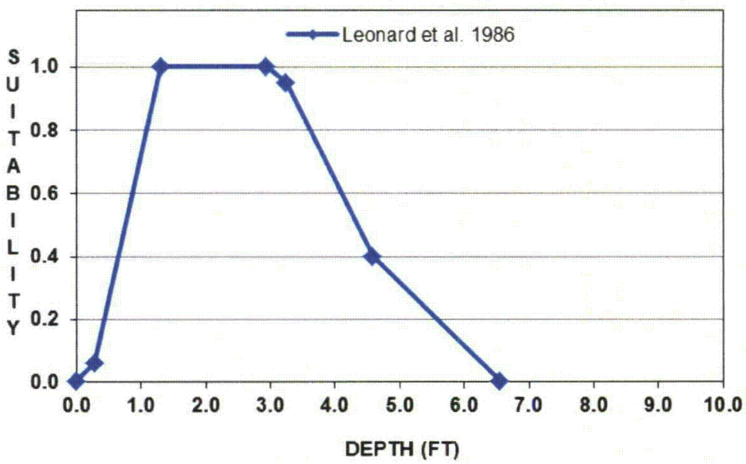
Curve Set ID: 00000011

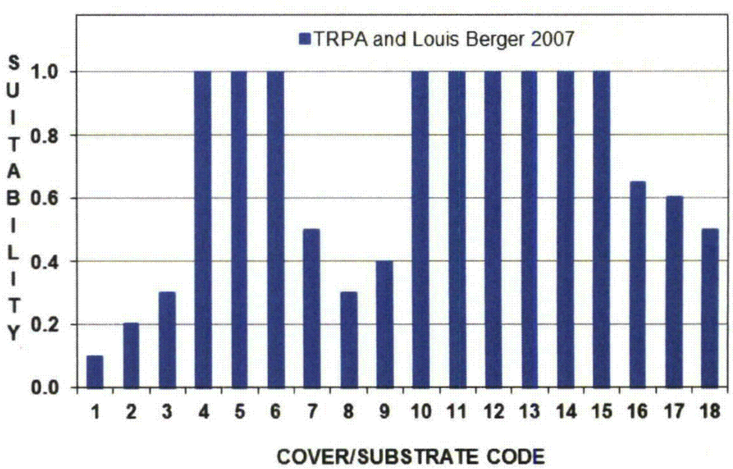
Species Name: Smallmouth Bass
Life Stage: Fry

Misc Info:

VEL A	VEL B	DPTH A	DPTH B	CODE A	CODE B
0.00	0.60	0.00	0.00	1.00	0.10
0.19	1.00	0.28	0.06	2.00	0.20
0.59	1.00	1.31	1.00	3.00	0.30
1.00	0.00	2.95	1.00	4.00	1.00
10.00	0.00	3.25	0.95	5.00	1.00
		4.59	0.40	6.00	1.00
		6.56	0.00	7.00	0.50
		100.00	0.00	8.00	0.30
				9.00	0.40
				10.00	1.00
				11.00	1.00
				12.00	1.00
				13.00	1.00
				14.00	1.00
				15.00	1.00
				16.00	0.65
				17.00	0.60
				18.00	0.50





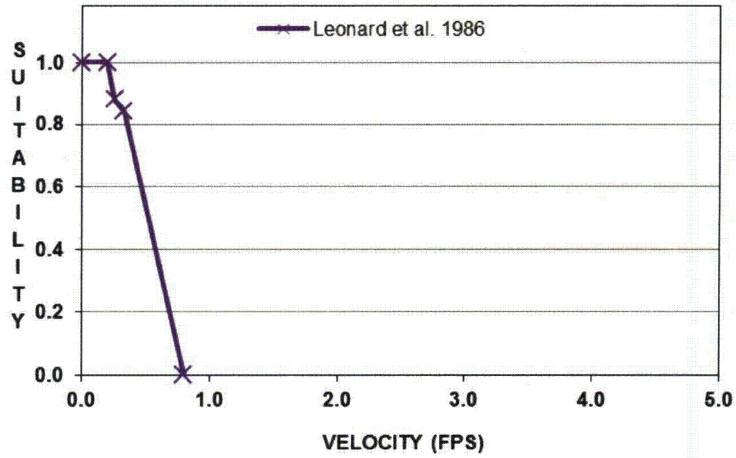


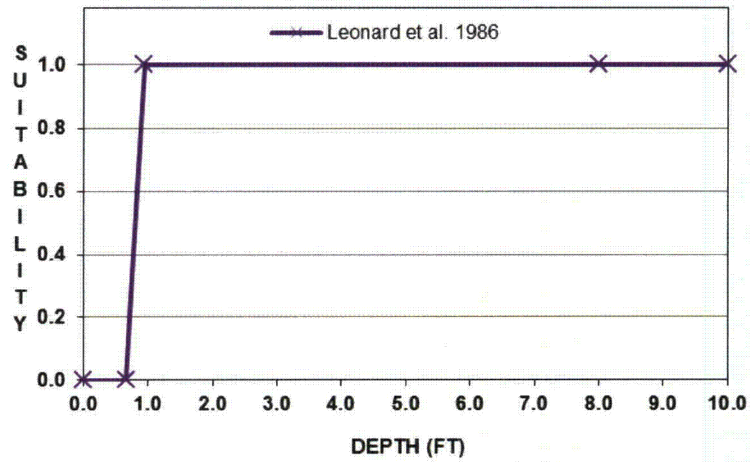
Curve Set ID: 00000012

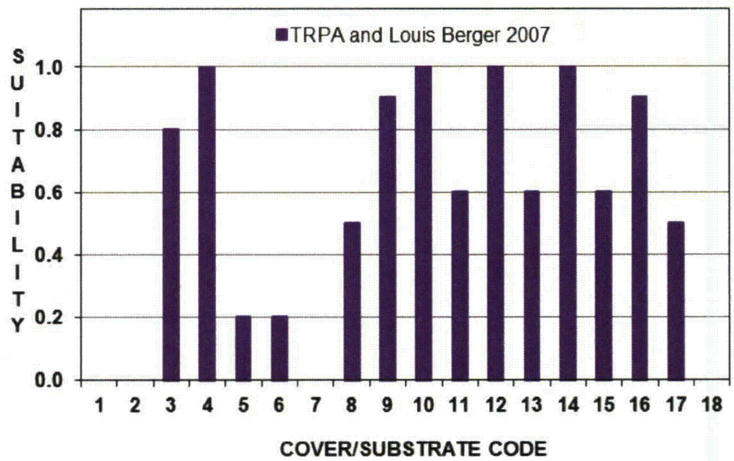
Species Name: Smallmouth Bass
Life Stage: Spawning

Misc Info:

VEL A	VEL B	DPTH A	DPTH B	CODE A	CODE B
0.00	1.00	0.00	0.00	1.00	0.00
0.20	1.00	0.66	0.00	2.00	0.00
0.26	0.88	0.94	1.00	3.00	0.80
0.33	0.84	8.00	1.00	4.00	1.00
0.80	0.00	10.00	1.00	5.00	0.20
10.00	0.00	100.00	1.00	6.00	0.20
				7.00	0.00
				8.00	0.50
				9.00	0.90
				10.00	1.00
				11.00	0.60
				12.00	1.00
				13.00	0.60
				14.00	1.00
				15.00	0.60
				16.00	0.90
				17.00	0.50
				18.00	0.00





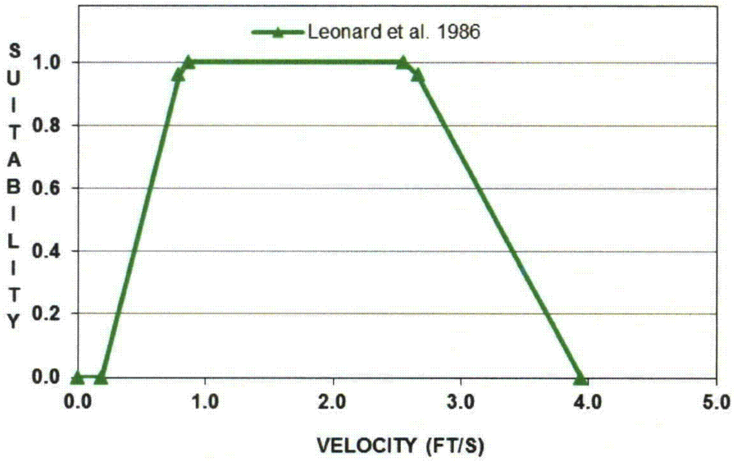


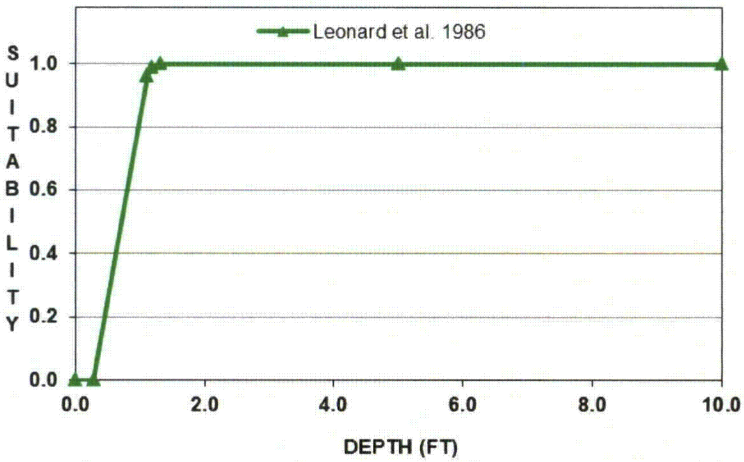
Curve Set ID: 00000013

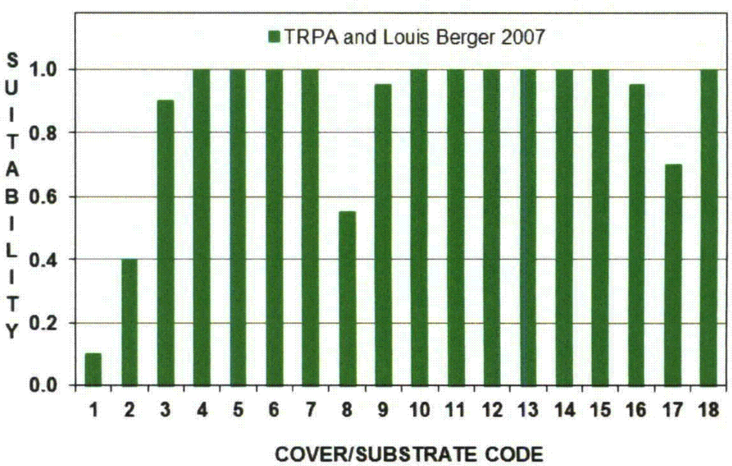
Species Name: Northern Hogsucker
Life Stage: Adult

Misc Info:

VEL A	VEL B	DPTH A	DPTH B	CODE A	CODE B
0.00	0.00	0.00	0.00	1.00	0.10
0.19	0.00	0.28	0.00	2.00	0.40
0.79	0.96	1.11	0.96	3.00	0.90
0.86	1.00	1.18	0.99	4.00	1.00
2.55	1.00	1.31	1.00	5.00	1.00
2.66	0.96	5.00	1.00	6.00	1.00
3.94	0.00	10.00	1.00	7.00	1.00
10.00	0.00	100.00	1.00	8.00	0.55
				9.00	0.95
				10.00	1.00
				11.00	1.00
				12.00	1.00
				13.00	1.00
				14.00	1.00
				15.00	1.00
				16.00	0.95
				17.00	0.70
				18.00	1.00





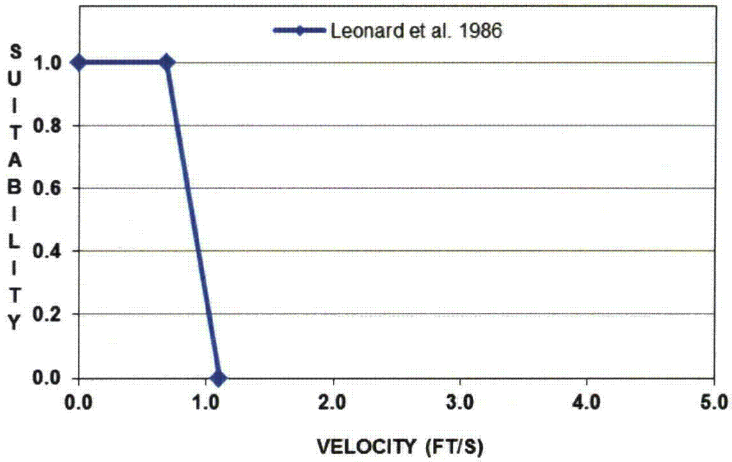


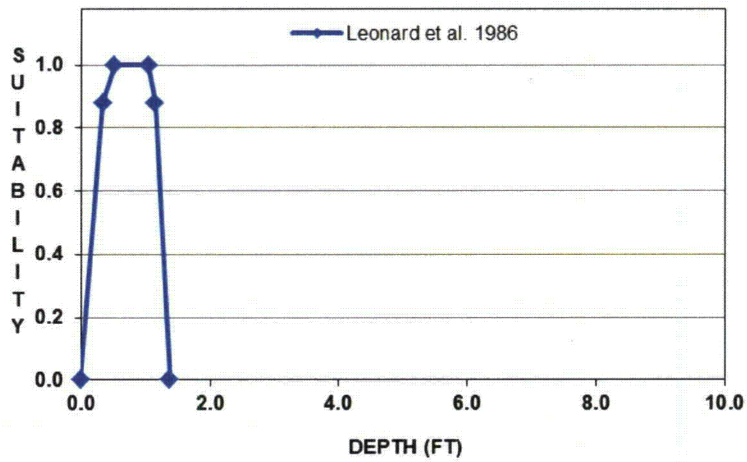
Curve Set ID: 00000014

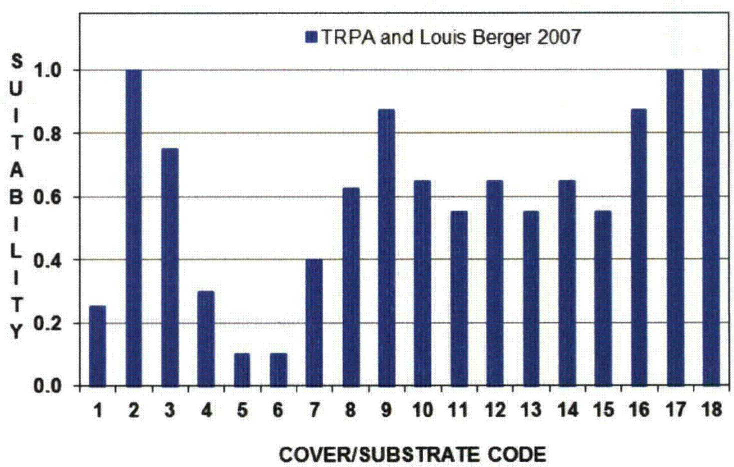
Species Name: Northern Hogsucker
Life Stage: Fry

Misc Info:

VEL A	VEL B	DPTH A	DPTH B	CODE A	CODE B
0.00	1.00	0.00	0.00	1.00	0.25
0.69	1.00	0.34	0.88	2.00	1.00
1.11	0.00	0.52	1.00	3.00	0.75
10.00	0.00	1.05	1.00	4.00	0.30
		1.15	0.88	5.00	0.10
		1.38	0.00	6.00	0.10
		100.00	0.00	7.00	0.40
				8.00	0.63
				9.00	0.88
				10.00	0.65
				11.00	0.55
				12.00	0.65
				13.00	0.55
				14.00	0.65
				15.00	0.55
				16.00	0.88
				17.00	1.00
				18.00	1.00





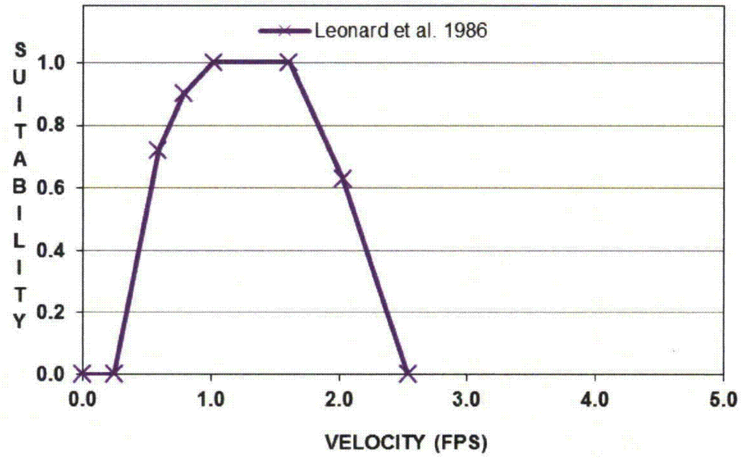


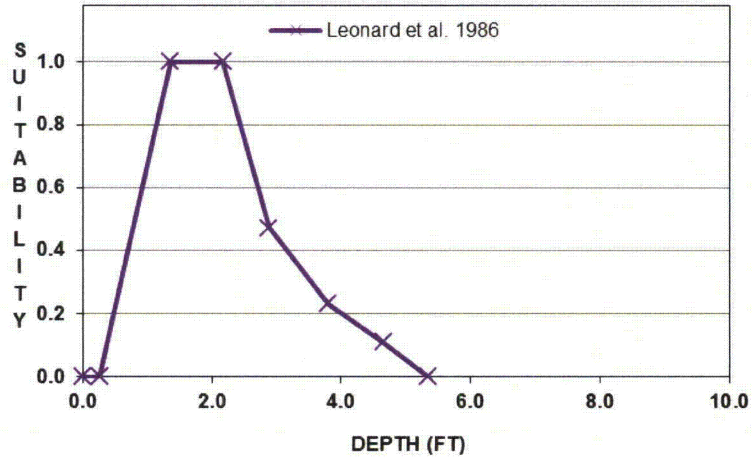
Curve Set ID: 00000015

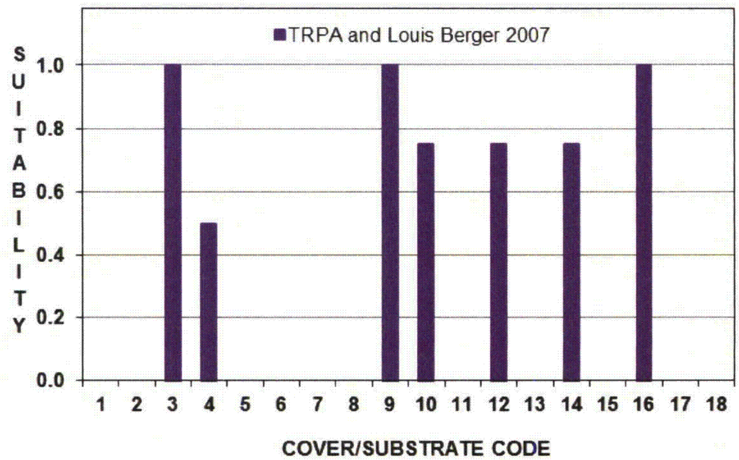
Species Name: Northern Hogsucker
Life Stage: Spawning

Misc Info:

VEL A	VEL B	DPTH A	DPTH B	CODE A	CODE B
0.00	0.00	0.00	0.00	1.00	0.00
0.25	0.00	0.26	0.00	2.00	0.00
0.59	0.72	1.36	1.00	3.00	1.00
0.79	0.90	2.17	1.00	4.00	0.50
1.02	1.00	2.89	0.47	5.00	0.00
1.61	1.00	3.81	0.23	6.00	0.00
2.03	0.63	4.66	0.11	7.00	0.00
2.54	0.00	5.35	0.00	8.00	0.00
10.00	0.00	100.00	0.00	9.00	1.00
				10.00	0.75
				11.00	0.00
				12.00	0.75
				13.00	0.00
				14.00	0.75
				15.00	0.00
				16.00	1.00
				17.00	0.00
				18.00	0.00







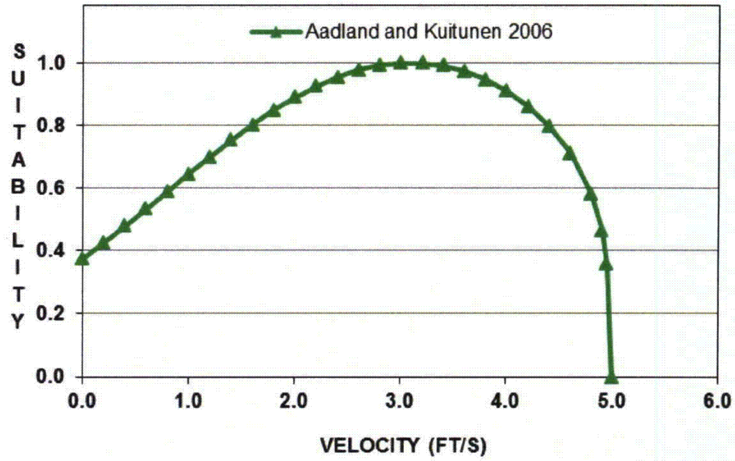
Curve Set ID: 00000016

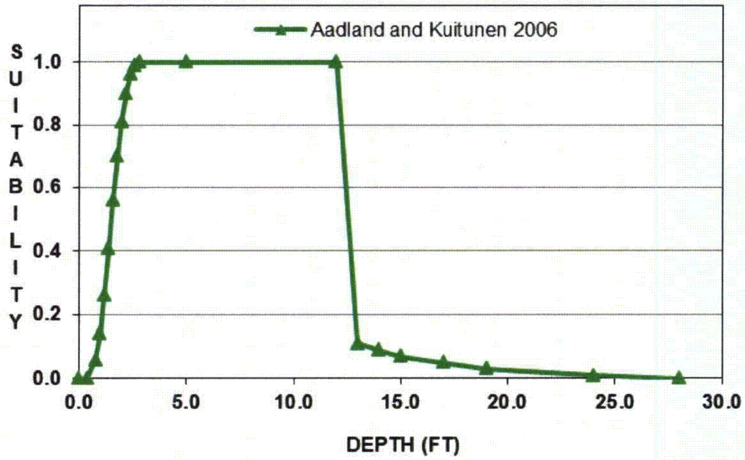
Species Name: Shorthead Redhorse

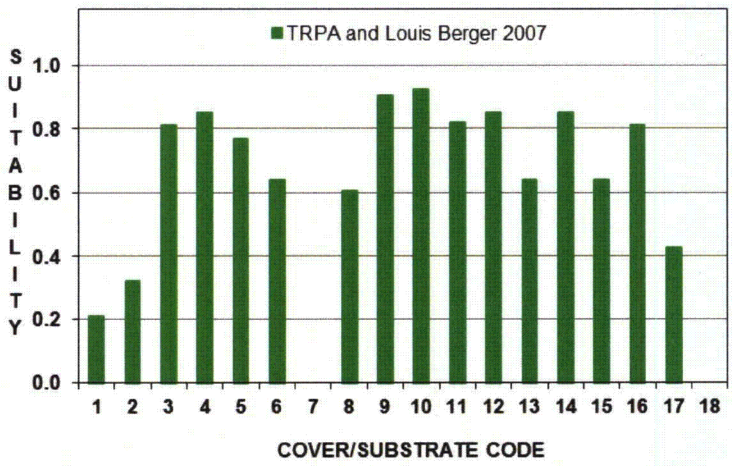
Life Stage: Adult

Misc Info:

VEL A	VEL B	DPTH A	DPTH B	CODE A	CODE B
0.00	0.37	0.00	0.00	1.00	0.21
0.20	0.42	0.40	0.00	2.00	0.32
0.40	0.48	0.80	0.06	3.00	0.70
0.60	0.53	1.00	0.14	4.00	0.74
0.80	0.59	1.20	0.26	5.00	0.52
1.00	0.64	1.40	0.41	6.00	0.57
1.20	0.70	1.60	0.56	7.00	0.31
1.40	0.75	1.80	0.70	8.00	0.45
1.60	0.80	2.00	0.81	9.00	0.70
1.80	0.85	2.20	0.90	10.00	0.74
2.00	0.89	2.40	0.96	11.00	0.63
2.20	0.92	2.60	0.99	12.00	0.74
2.40	0.95	2.80	1.00	13.00	0.79
2.60	0.98	5.00	1.00	14.00	0.74
2.80	0.99	12.00	1.00	15.00	0.79
3.00	1.00	13.00	0.11	16.00	0.85
3.20	1.00	14.00	0.09	17.00	0.69
3.40	0.99	15.00	0.07	18.00	0.00
3.60	0.97	17.00	0.05		
3.80	0.95	19.00	0.03		
4.00	0.91	24.00	0.01		
4.20	0.86	28.00	0.00		
4.40	0.80	100.00	0.00		
4.60	0.71				
4.80	0.58				
4.90	0.47				
4.95	0.36				
5.00	0.00				
10.00	0.00				





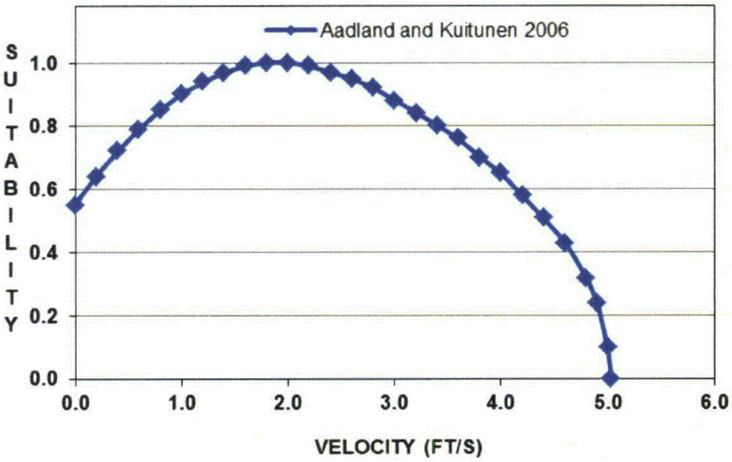


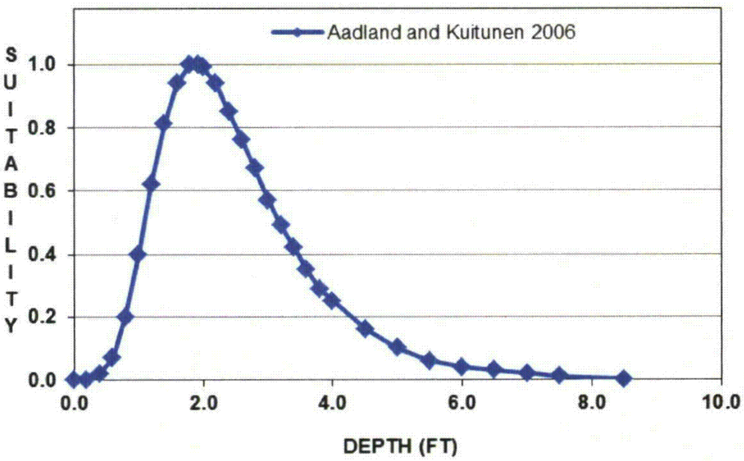
Curve Set ID: 00000017

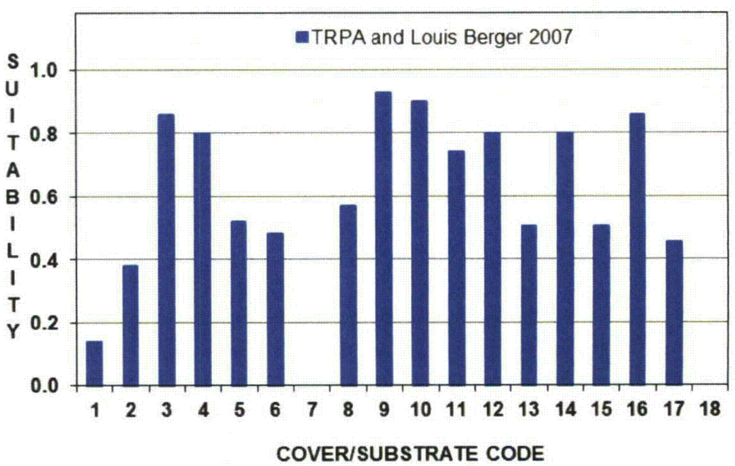
Species Name: Shorthead Redhorse
Life Stage: Juvenile

Misc Info:

VEL A	VEL B	DPTH A	DPTH B	CODE A	CODE B
0.00	0.55	0.00	0.00	1.00	0.06
0.20	0.64	0.20	0.00	2.00	0.26
0.40	0.72	0.40	0.02	3.00	0.55
0.60	0.79	0.60	0.07	4.00	0.66
0.80	0.85	0.80	0.20	5.00	0.57
1.00	0.90	1.00	0.40	6.00	0.49
1.20	0.94	1.20	0.62	7.00	0.31
1.40	0.97	1.40	0.81	8.00	0.30
1.60	0.99	1.60	0.94	9.00	0.55
1.80	1.00	1.80	1.00	10.00	0.66
2.00	1.00	1.92	1.00	11.00	0.52
2.20	0.99	2.00	0.99	12.00	0.66
2.40	0.97	2.20	0.94	13.00	0.75
2.60	0.95	2.40	0.85	14.00	0.66
2.80	0.92	2.60	0.76	15.00	0.75
3.00	0.88	2.80	0.67	16.00	0.78
3.20	0.84	3.00	0.57	17.00	0.63
3.40	0.80	3.20	0.49	18.00	0.00
3.60	0.76	3.40	0.42		
3.80	0.70	3.60	0.35		
4.00	0.65	3.80	0.29		
4.20	0.58	4.00	0.25		
4.40	0.51	4.50	0.16		
4.60	0.43	5.00	0.10		
4.80	0.32	5.50	0.06		
4.90	0.24	6.00	0.04		
5.00	0.10	6.50	0.03		
5.03	0.00	7.00	0.02		
10.00	0.00	7.50	0.01		
		8.50	0.00		
		100.00	0.00		





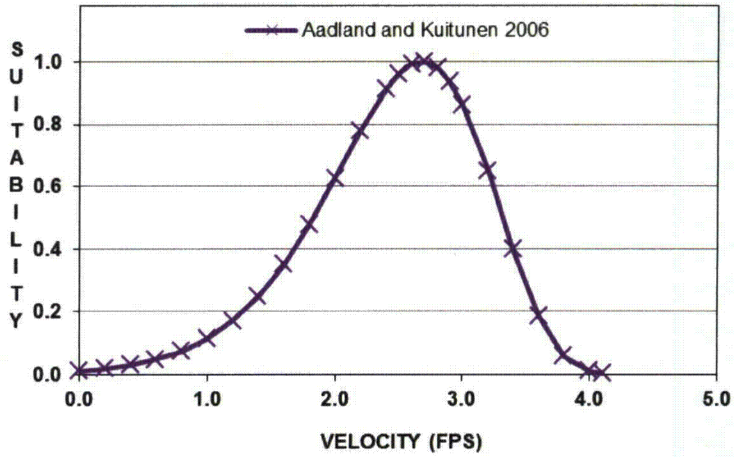


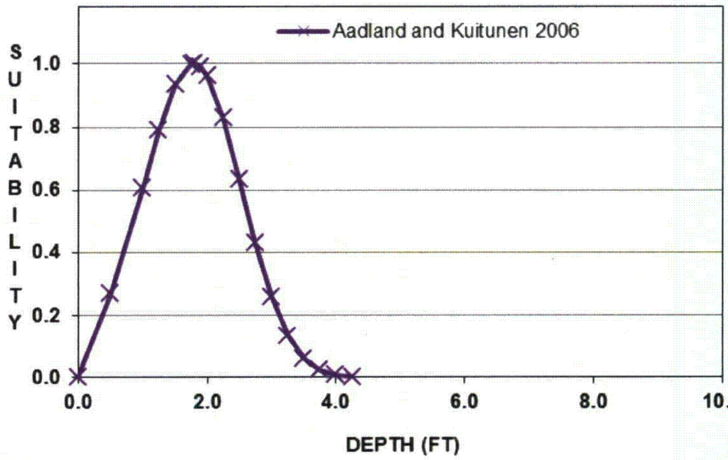
Curve Set ID: 00000018

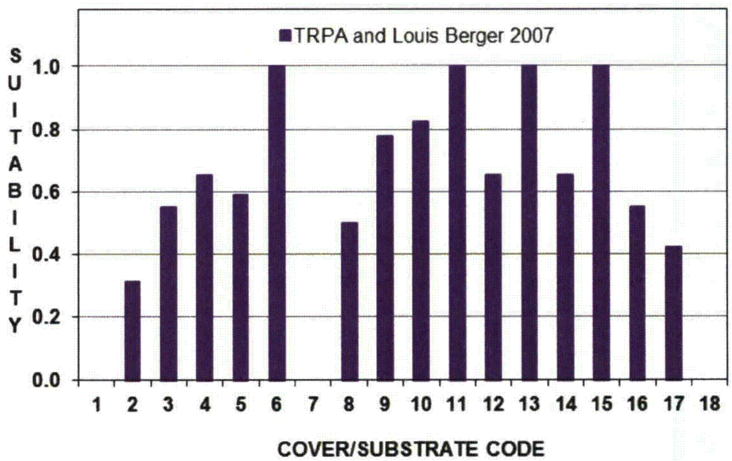
Species Name: Shorthead Redhorse
Life Stage: Spawning

Misc Info:

VEL A	VEL B	DPTH A	DPTH B	CODE A	CODE B
0.00	0.00	0.00	0.00	1.00	0.01
0.20	0.00	0.50	0.10	2.00	0.23
0.40	0.00	1.00	0.89	3.00	0.74
0.60	0.01	1.25	1.00	4.00	0.86
0.80	0.02	1.50	0.90	5.00	0.23
1.00	0.03	1.75	0.73	6.00	0.09
1.20	0.07	1.80	0.70	7.00	0.00
1.40	0.12	1.90	0.63	8.00	0.51
1.60	0.22	2.00	0.57	9.00	0.74
1.80	0.36	2.25	0.43	10.00	0.86
2.00	0.55	2.50	0.32	11.00	0.55
2.20	0.76	2.75	0.24	12.00	0.86
2.40	0.94	3.00	0.18	13.00	0.33
2.50	0.99	3.25	0.13	14.00	0.86
2.60	1.00	3.50	0.10	15.00	0.33
2.70	0.97	3.75	0.07	16.00	0.74
2.80	0.89	4.00	0.05	17.00	0.62
2.90	0.78	4.25	0.04	18.00	0.00
3.00	0.64	4.50	0.03		
3.20	0.35	4.75	0.02		
3.40	0.13	5.00	0.02		
3.60	0.03	5.25	0.01		
3.80	0.00	5.50	0.01		
10.00	0.00	5.75	0.01		
		6.00	0.01		
		6.25	0.00		
		100.00	0.00		







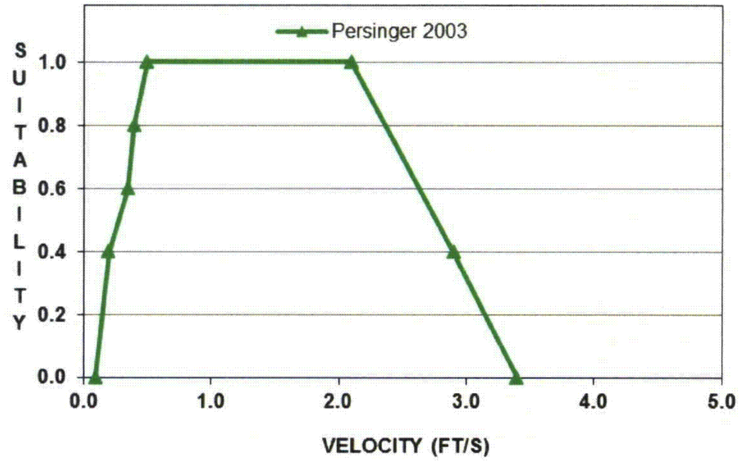
Curve Set ID: 00000019

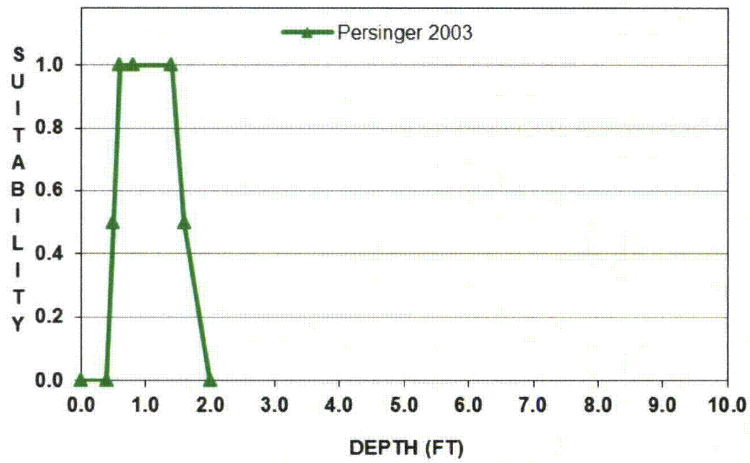
Species Name: River Chub

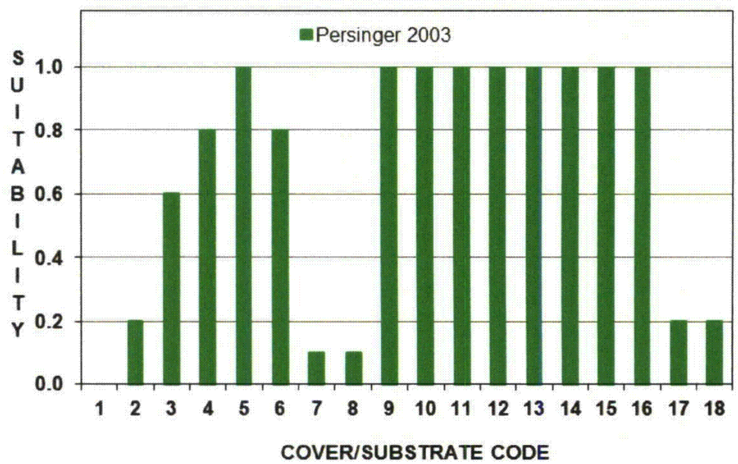
Life Stage: Adult/Juv

Misc Info:

VEL A	VEL B	DPTH A	DPTH B	CODE A	CODE B
0.00	0.20	0.00	0.00	1.00	0.00
0.03	0.20	0.30	0.20	2.00	0.10
0.16	0.50	0.39	0.50	3.00	0.50
0.39	1.00	0.59	1.00	4.00	1.00
1.77	1.00	1.71	1.00	5.00	1.00
2.30	0.50	2.10	0.50	6.00	0.50
3.08	0.20	2.79	0.20	7.00	0.20
3.61	0.00	3.28	0.00	8.00	0.00
10.00	0.00	100.00	0.00	9.00	0.75
				10.00	1.00
				11.00	1.00
				12.00	1.00
				13.00	1.00
				14.00	1.00
				15.00	1.00
				16.00	0.75
				17.00	0.55
				18.00	0.00







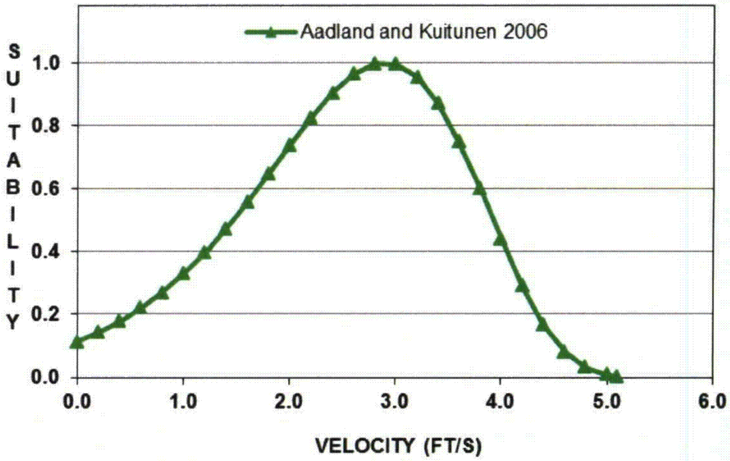
Curve Set ID: 00000023

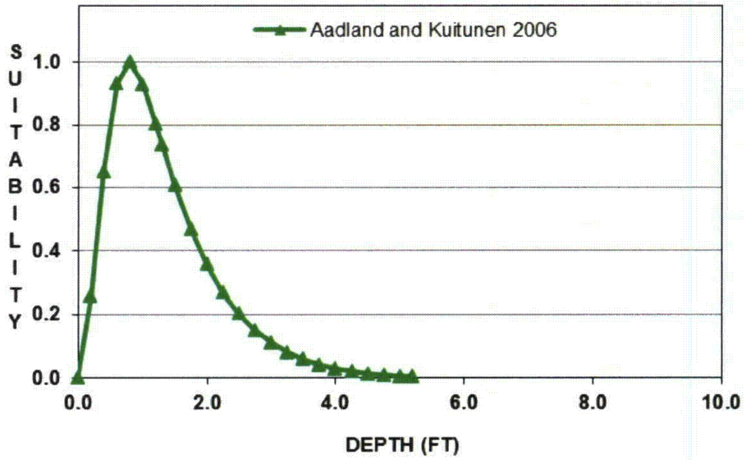
Species Name: Banded Darter

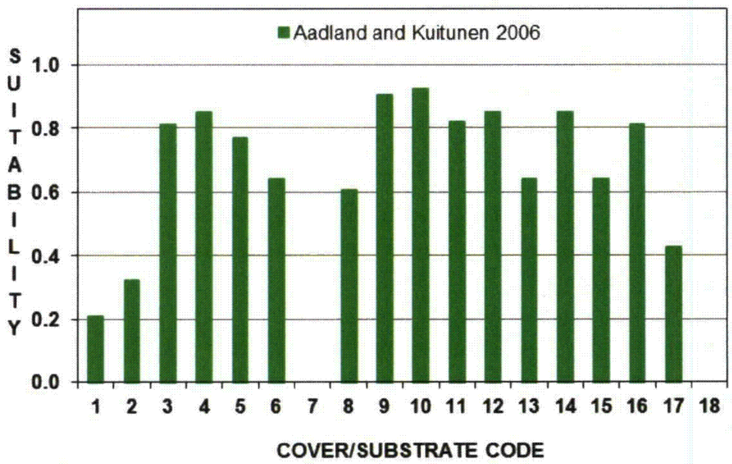
Life Stage: Adult

Misc Info:

VEL A	VEL B	DPTH A	DPTH B	CODE A	CODE B
0.00	0.11	0.00	0.00	1.00	0.21
0.20	0.14	0.20	0.26	2.00	0.32
0.40	0.18	0.40	0.65	3.00	0.81
0.60	0.22	0.60	0.93	4.00	0.85
0.80	0.27	0.80	1.00	5.00	0.77
1.00	0.33	1.00	0.93	6.00	0.64
1.20	0.40	1.20	0.80	7.00	0.00
1.40	0.47	1.30	0.74	8.00	0.61
1.60	0.56	1.50	0.61	9.00	0.91
1.80	0.65	1.75	0.47	10.00	0.93
2.00	0.74	2.00	0.36	11.00	0.82
2.20	0.83	2.25	0.27	12.00	0.85
2.40	0.90	2.50	0.20	13.00	0.64
2.60	0.96	2.75	0.15	14.00	0.85
2.80	1.00	3.00	0.11	15.00	0.64
3.00	0.99	3.25	0.08	16.00	0.81
3.20	0.95	3.50	0.06	17.00	0.43
3.40	0.87	3.75	0.04	18.00	0.00
3.60	0.75	4.00	0.03		
3.80	0.60	4.25	0.02		
4.00	0.44	4.50	0.01		
4.20	0.29	4.75	0.01		
4.40	0.17	5.00	0.01		
4.60	0.08	5.20	0.00		
4.80	0.03	100.00	0.00		
5.00	0.01				
5.10	0.00				
10.00	0.00				







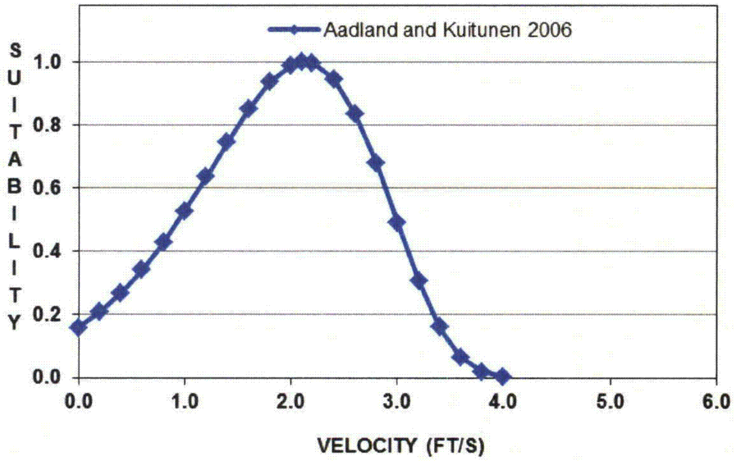
Curve Set ID: 00000024

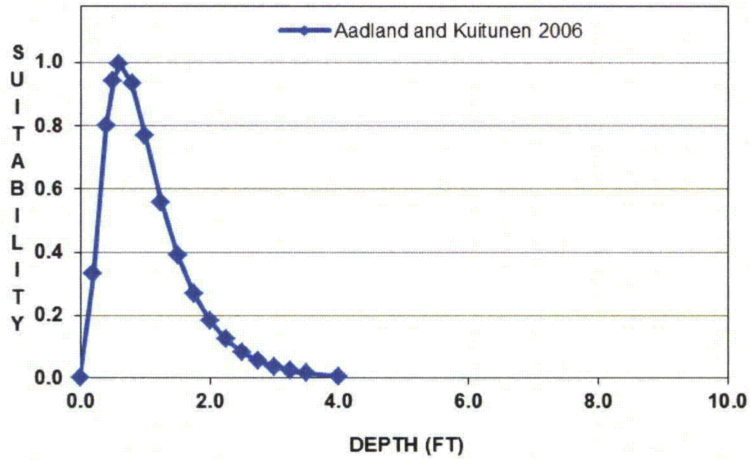
Species Name: Banded Darter

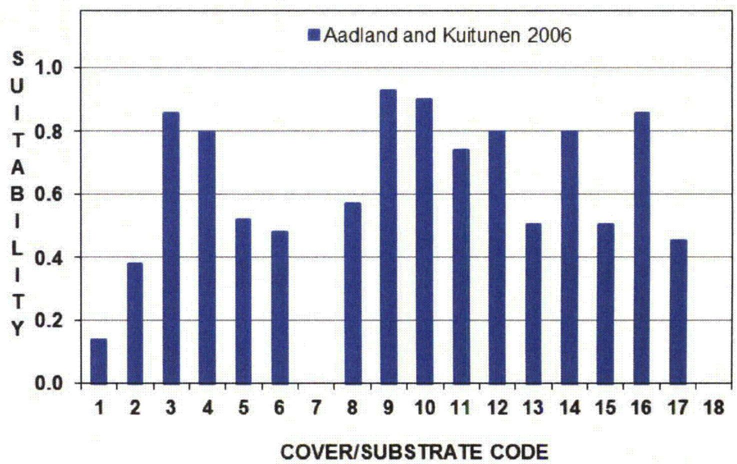
Life Stage: Juvenile

Misc Info:

VEL A	VEL B	DPTH A	DPTH B	CODE A	CODE B
0.00	0.16	0.00	0.00	1.00	0.14
0.20	0.21	0.20	0.33	2.00	0.38
0.40	0.27	0.40	0.80	3.00	0.86
0.60	0.34	0.50	0.94	4.00	0.80
0.80	0.43	0.60	1.00	5.00	0.52
1.00	0.53	0.80	0.93	6.00	0.48
1.20	0.63	1.00	0.77	7.00	0.00
1.40	0.74	1.25	0.56	8.00	0.57
1.60	0.85	1.50	0.39	9.00	0.93
1.80	0.94	1.75	0.27	10.00	0.90
2.00	0.99	2.00	0.18	11.00	0.74
2.10	1.00	2.25	0.12	12.00	0.80
2.20	1.00	2.50	0.08	13.00	0.51
2.40	0.95	2.75	0.05	14.00	0.80
2.60	0.84	3.00	0.04	15.00	0.51
2.80	0.68	3.25	0.02	16.00	0.86
3.00	0.49	3.50	0.01	17.00	0.46
3.20	0.31	4.00	0.01	18.00	0.00
3.40	0.16	4.25	0.00		
3.60	0.07	100.00	0.00		
3.80	0.02				
4.00	0.00				
10.00	0.00				







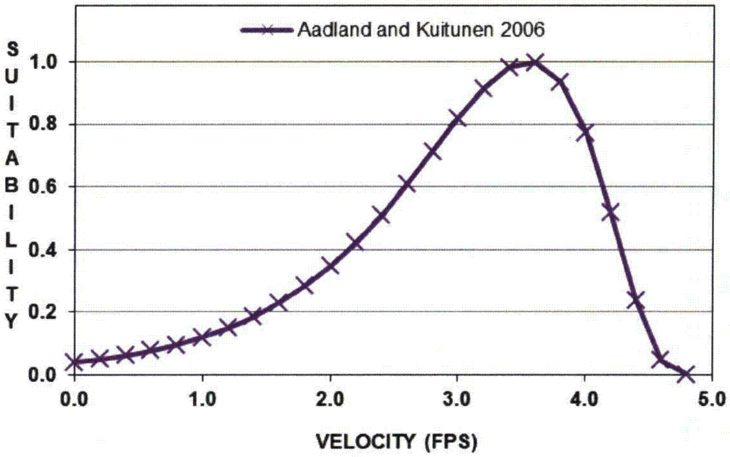
Curve Set ID: 00000025

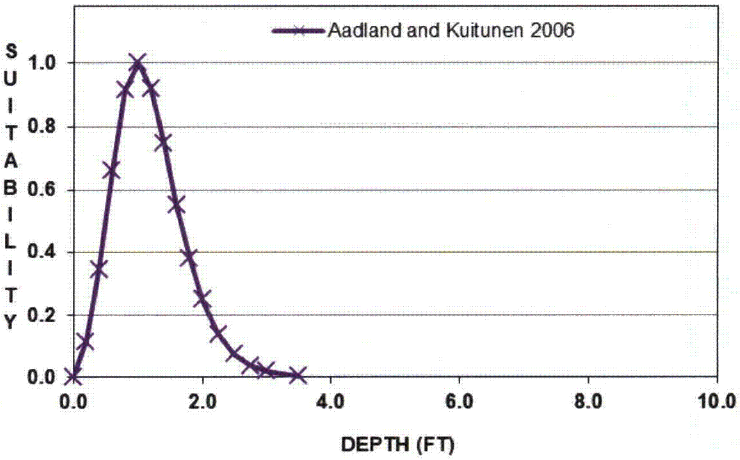
Species Name: Banded Darter

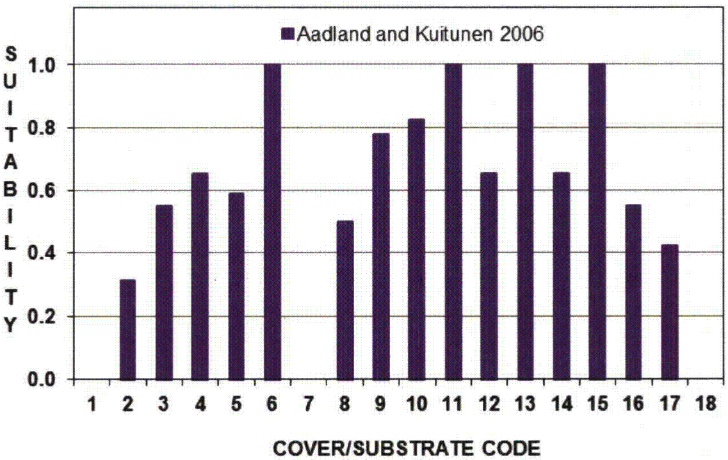
Life Stage: Spawning

Misc Info:

VEL A	VEL B	DPTH A	DPTH B	CODE A	CODE B
0.00	0.04	0.00	0.00	1.00	0.00
0.20	0.05	0.20	0.12	2.00	0.31
0.40	0.06	0.40	0.34	3.00	0.55
0.60	0.08	0.60	0.66	4.00	0.65
0.80	0.10	0.80	0.91	5.00	0.59
1.00	0.12	1.00	1.00	6.00	1.00
1.20	0.15	1.20	0.92	7.00	0.00
1.40	0.19	1.40	0.75	8.00	0.50
1.60	0.23	1.60	0.55	9.00	0.78
1.80	0.28	1.80	0.38	10.00	0.83
2.00	0.35	2.00	0.25	11.00	1.00
2.20	0.42	2.25	0.14	12.00	0.65
2.40	0.51	2.50	0.07	13.00	1.00
2.60	0.61	2.75	0.04	14.00	0.65
2.80	0.71	3.00	0.02	15.00	1.00
3.00	0.82	3.50	0.00	16.00	0.55
3.20	0.91	100.00	0.00	17.00	0.42
3.40	0.98			18.00	0.00
3.60	1.00				
3.80	0.93				
4.00	0.77				
4.20	0.52				
4.40	0.24				
4.60	0.05				
4.80	0.00				
10.00	0.00				





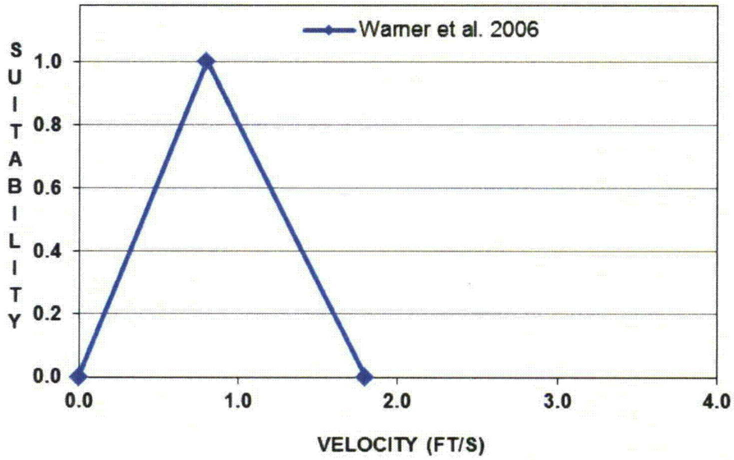


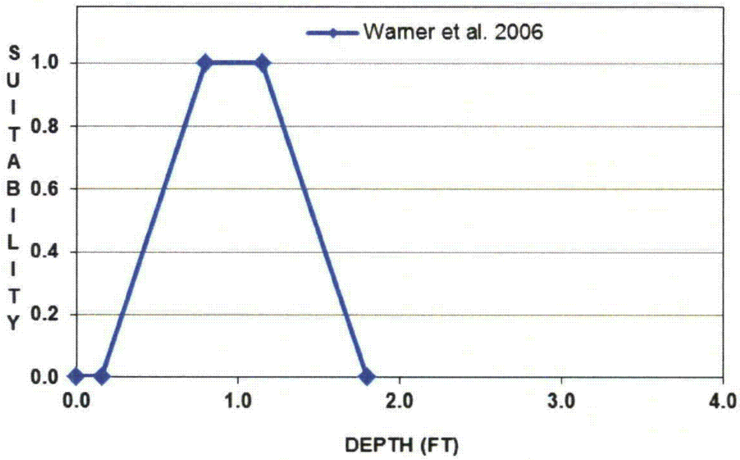
Curve Set ID: 00000026

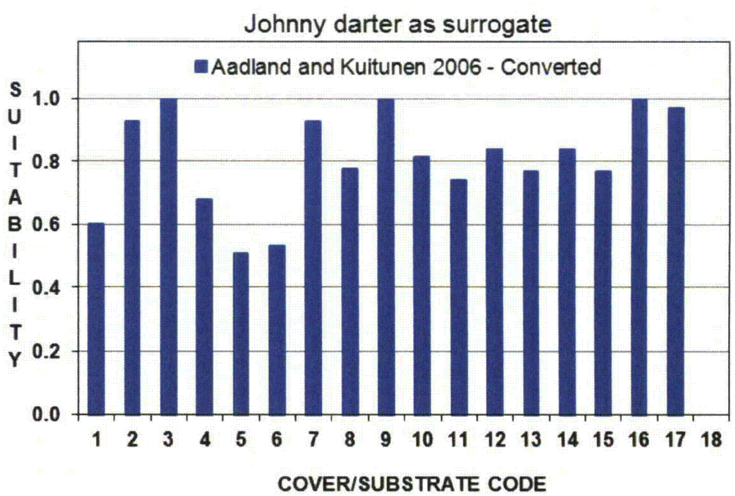
Species Name: Tessellated Darter
Life Stage: Adult/Juv

Misc Info:

VEL A	VEL B	DPTH A	DPTH B	CODE A	CODE B
0.00	0.00	0.00	0.00	0.00	0.00
0.80	1.00	0.16	0.00	1.00	0.60
1.80	0.00	0.80	1.00	2.00	0.93
		1.15	1.00	3.00	1.00
		1.80	0.00	4.00	0.68
				5.00	0.51
				6.00	0.53
				7.00	0.93
				8.00	0.78
				9.00	1.00
				10.00	0.82
				11.00	0.74
				12.00	0.84
				13.00	0.77
				14.00	0.84
				15.00	0.77
				16.00	1.00
				17.00	0.97
				18.00	0.00







BELL BEND HSC SOURCES and MODIFICATIONS

Species	Life Stage	HSC	ORIGINAL HSC Reference[1]	Modifications (Source)[2]
American Shad	Fry/Larvae	Velocity	Stier and Crance 1985	
		Depth	Gore 2006	decreased max depth suitability from 1.5 feet to 0.7 feet (Odom-USFWS)
		Substrate/Cover	TRPA and Louis Berger 2007	
	Juvenile	Velocity	Stier and Crance 1985	
		Depth	Gore 2006	decreased max depth suitability from 1.5 feet to 0.7 feet (Odom-USFWS)
		Substrate/Cover	Gore 2006	
	Adult	Velocity	Stier and Crance 1985	
		Depth	Stier and Crance 1985	
		Substrate/Cover	TRPA and Louis Berger 2007	
	Spawning	Velocity	Stier and Crance 1985	
		Depth	Stier and Crance 1985	
		Substrate/Cover	TRPA and Louis Berger 2007	
Smallmouth Bass	Fry	Velocity	Leonard et al. 1986	
		Depth	Leonard et al. 1986	
		Substrate/Cover	TRPA and Louis Berger 2007	
	Juvenile	Velocity	TRPA and Louis Berger 2007	increased max velocity suitability from 0.6 fps to 1.0 fps (IFNWG)
		Depth	Leonard et al. 1986	
		Substrate/Cover	TRPA and Louis Berger 2007	
	Adult	Velocity	TRPA and Louis Berger 2007	increased max velocity suitability from 0.6 fps to 1.0 fps (IFNWG)
		Depth	Leonard et al. 1986	
		Substrate/Cover	TRPA and Louis Berger 2007	
	Spawning	Velocity	Leonard et al. 1986	
		Depth	Leonard et al. 1986	
		Substrate/Cover	TRPA and Louis Berger 2007	

Walleye	Fry	Velocity	McMahon et al. 1984	
		Depth	McMahon et al. 1984	
		Substrate/Cover	TRPA and Louis Berger 2007	increased cover/gravel suitability code 9 from 0.52 to 1.0 (VDGIF)
	Juvenile	Velocity	McMahon et al. 1984	
		Depth	McMahon et al. 1984	
		Substrate/Cover	Gore 2006	
	Adult	Velocity	McMahon et al. 1984	
		Depth	McMahon et al. 1984	
		Substrate/Cover	Gore 2006	
	Spawning	Velocity	McMahon et al. 1984	
		Depth	McMahon et al. 1984	
		Substrate/Cover	TRPA and Louis Berger 2007	increased gravel (code 3) and cobble (code 4) substrate suitability (VDGIF)
Northern Hogsucker	Fry/Juvenile	Velocity	Leonard et al. 1986	
		Depth	Leonard et al. 1986	
		Substrate/Cover	TRPA and Louis Berger 2007	
	Adult	Velocity	Leonard et al. 1986	
		Depth	Leonard et al. 1986	
		Substrate/Cover	TRPA and Louis Berger 2007	
	Spawning	Velocity	Leonard et al. 1986	
		Depth	Leonard et al. 1986	
		Substrate/Cover	TRPA and Louis Berger 2007	
Shorthead Redhorse	YOY	Velocity	Aadland and Kuitunen 2006	
		Depth	Aadland and Kuitunen 2006	
		Substrate/Cover	TRPA and Louis Berger 2007	
	Adult	Velocity	Aadland and Kuitunen 2006	
		Depth	TRPA and Louis Berger 2007	increased maximum depth suitability from 3.0 ft to 12.0 ft (VDGIF)
		Substrate/Cover	TRPA and Louis Berger 2007	
	Spawning	Velocity	Aadland and Kuitunen 2006	
		Depth	Aadland and Kuitunen 2006	
		Substrate/Cover	Aadland and Kuitunen 2006	converted to NCDWR codes by TRPA for Bell Bend Project

River Chub	Juvenile/Adult	Velocity	Persinger 2003	
		Depth	Persinger 2003	
		Substrate/Cover	Persinger 2003	converted to NCDWR codes by TRPA for Bell Bend Project
Banded Darter	YOY	Velocity	Aadland and Kuitunen 2006	
		Depth	Aadland and Kuitunen 2006	
		Substrate/Cover	Aadland and Kuitunen 2006	converted to NCDWR codes by TRPA for Bell Bend Project
	Adult	Velocity	Aadland and Kuitunen 2006	
		Depth	Aadland and Kuitunen 2006	
		Substrate/Cover	Aadland and Kuitunen 2006	converted to NCDWR codes by TRPA for Bell Bend Project
	Spawning	Velocity	Aadland and Kuitunen 2006	
		Depth	Aadland and Kuitunen 2006	
		Substrate/Cover	Aadland and Kuitunen 2006	converted to NCDWR codes by TRPA for Bell Bend Project
Tessellated Darter	Juvenile/Adult	Velocity	Warner et al. 2006	
		Depth	Warner et al. 2006	
		Substrate/Cover	Aadland and Kuitunen 2006	Johnny darter as surrogate; converted to NCDWR codes for Bell Bend Project

[1] Substrate suitability from original source; Combined Substrate/Cover suitability derived from merging original source substrate and cover suitability (these two variables are commonly presented as separate metrics)

[2] TRPA-Thomas R. Payne & Associates; VDGIF-Virginia Department of Game and Inland Fish; IFNWG-Smith Mountain Instream Flow Needs Workgroup; NCDWR-North Carolina Department of Water Resources.

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APPENDIX HYD. PHABSIM HYDRAULIC MODEL DEVELOPMENT

Potential Effects of the Bell Bend Project on Aquatic Resources and Downstream Users

Hydraulic Model

This report describes the field methods and analytical methods used to build the Bell Bend PHABSIM hydraulic model.

Proposed Bell Bend Nuclear Power Plant Site, Luzerne County, Pennsylvania

Prepared for

PPL BELL BEND, LLC
2 North 9th Street
Allentown, PA 18101

Prepared by

NORMANDEAU ASSOCIATES, INC.
1921 River Road
Drumore, PA 17518

June 2011

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APPENDICES

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ABBREVIATIONS

Abbreviation	Meaning
ADCP	Acoustic Doppler Current Profiler
ADCP	Acoustic Doppler Current Profiler
G	Glide habitat type
HSC	Habitat Suitability Criteria
LGR	Low Gradient Riffle
N	Narrow habitat type
PHABSIM	Physical Habitat Simulation model developed by the U.S. Fish and Wildlife Service
P	Pool habitat type
R	Riffle habitat type
RI	Riffle Island split-channel habitat type
RHABSIM	Riverine Habitat Simulation software conversion and enhancement of PHABSIM by TRPA
SZF	Stage of zero flow
TRPA	Thomas R. Payne and Associates
VAF	Velocity Adjustment Factor
WSEL	Water Surface Elevation
WUA	Weighted Usable Area, a Habitat Index

1. *INTRODUCTION*

Development of a relationship between suitable aquatic habitat and river flow for selected species and life stages within the IFIM/PHABSIM framework depends on the measurement or estimation of physical habitat parameters (depth, velocity, substrate/cover) within the study reach. Generally, the lateral and longitudinal distribution of the values of these parameters at given river flows are determined at points along transect lines across the stream channel, positioned to account for spatial and flow-related variability. A variety of hydraulic modeling techniques can be used to simulate water depth and velocity as a function of river flow; substrate and cover values are generally fixed at a given point. With physical habitat thus characterized for a range of river flows, the suitability of the habitat (for a particular species and life stage) at each point is scaled from zero to one, usually by multiplying together the corresponding suitability values for depth, velocity, and substrate from the appropriate habitat suitability criteria (HSC) curves. These point estimates of suitability are then used to weight the physical area of the study represented by each point, and the weighted areas are accumulated for the entire study reach to produce an index of useable habitat as a function of river flow for each species and life stage.

The physical area represented by each transect point depends on the design of the PHABSIM study. This study used the mesohabitat typing, or habitat mapping, approach originally described by Morhardt *et al.* (1983) and summarized by Bovee *et al.* (1998). In this design, mesohabitats (broadly defined habitat generalizations) were mapped over the entire study reach, such that each area of the waterway was characterized by a general habitat type, and the total length and proportion of the study reach assigned to each mesohabitat type was determined.

Physical habitat parameters (river flow dependent depth and velocity, substrate, and cover) representative of each mesohabitat type were measured or modeled at one or more transects placed within the mesohabitat area. The exact number and placement of transects depended on the lateral and longitudinal variability of physical habitat within a mesohabitat type for the study reach, as well as practical issues such as accessibility. Generally, the total number of transects was distributed among mesohabitat types in proportion to the area of the study reach assigned to each mesohabitat. The physical area represented by each transect point was then determined by both the lateral distribution of points on a transect, and the length or proportion of the study reach that each transect represented.

2. *PHABSIM HYDRAULIC MODEL METHODS*

2.1. *HYDRAULIC DATA COLLECTION*

Field data collected at each transect included: depth, elevation, and mean column velocity profiles, water surface elevation (WSEL), substrate/cover coding, and discharge. The depth and velocity profiles were collected during high flow with the exception of two transects that were added at a later date. WSELs and discharges were collected at all calibration flows (high, middle, and low). The substrate/cover coding occurred at low flow for the best visibility. The true elevations of the pins and temporary benchmarks were surveyed with RTK GPS after the hydraulic data had been collected.

Field data collection and data recording generally followed the guidelines established in the field techniques manuals (Trihey and Wegner 1981; Milhous *et al.* 1984; Bovee 1997). Additional useful quality control checks from previous applications of the simulation models were included.

Implementation of PHABSIM, IFIM's aquatic habitat assessment component required depth measurements at three flow rates to establish stage-discharge curves at each of the habitat transects. The measurements were taken at a range of Susquehanna River flows that encompassed the flows of interest. The limit of reliable extrapolation is 40% of the lowest of the three flow measurements and 250% of the highest flow measured (Payne and Bremm 2003). As an example, to determine reliable depth and velocity estimates for a low flow value of 800 cfs, depth measurements at Susquehanna River flows no higher than 2,000 cfs are required.

Data collection targeted flows of approximately 2,000 cfs, 5,000 cfs, and 10,000 cfs. These targets permitted data extrapolation to flows as low as the 7Q10 (810 cfs), and as high as approximately 25,000 cfs, a low-frequency flow event.

2.2. *WATER SURFACE ELEVATIONS*

WSELs were surveyed relative to a temporary benchmark close to a transect end point. Where the river was too wide to survey both banks relative to one benchmark, benchmarks were established on both banks. The WSELs were post-processed with the true elevation data acquired with the RTK GPS. For the PHABSIM model, WSELs were typically averaged across a transect.

2.3. *VELOCITY AND DEPTH MEASUREMENTS*

Techniques for measuring discharge have evolved in recent years with the advent of Acoustic Doppler Current Profilers (ADCP's). The USGS has been using ADCP's in making stream flow measurements (depths and velocities) since 1985. Simply stated, ADCP's use sound energy to measure water velocity and depth and thereby compute stream flow. The use of ADCP's has increased steadily with manned boats used extensively on large rivers. With the addition of

smaller units, tethered small boat platforms and improved software, ADCP's can be used to measure almost any size stream or channel.

Data acquisition was made with a TRD Instruments Rio Grande ADCP. The ADCP gathered both depth and velocity information in user defined steps across a transect. The ADCP unit was either encased in an Ocean Science Riverboat trimaran or mounted directly to the survey vessel and operated direct cabled to a laptop computer for real-time viewing.

The ADCP only accurately measured to depths greater than approximately one foot. Edge station measurements were obtained by wading to complete the velocity and depth patterns in shallow areas for each transect, or in areas where the boat and ADCP could not be successfully deployed. Electromagnetic Marsh-McBirney or mechanical Price AA flow meters, attached to top-set rods were used for velocity measurements. Mean column velocity was determined by a single measurement at six-tenths of the water depth in depths less than 2.5 feet, and derived from a two-tenths and eight-tenths measurement for depths between 2.5 feet and 4.0 feet. All three points (two-, six- and eight-tenths) were measured where depths exceeded 4.0 feet, or the velocity distribution in the water column was abnormal, and one or two points was not adequate to derive an accurate mean column water velocity. Depths in shallow areas were measured with marked rods.

2.4. Split Channel Partitioning

Islands and split channels were problematic utilizing transect based, 1-D modeling due to the partitioning of flow through multiple channels. At varying flow levels different proportions of the total flow pass through a given channel depending on upstream and downstream hydraulic controls. For island study sites, discharge was measured at all calibration flows in each channel. This allowed for accurate flow allocation at the measured flows and the ability to compute flow splits at interpolated and extrapolated flows of interest.

2.5. Substrate and Cover Coding

The substrate and cover were visually coded during the low flow measurements. Where the water was too deep to see the substrate the bottom was sounded with a rod to determine the substrate type. In addition to the codes tabulated, proximal cover, four feet upstream or downstream, was noted.

Since the HSC had not been decided upon prior to the field data collection, this system was used as a "universal" coding system that could be translated to many of the multitude of potential systems used in the various HSC available. Once the HSC was decided upon, the field code was translated to the HSC code. The substrate and cover coding system used to collect the field data as well as the translation to the HSC coding system is detailed in Table 2-1 and Table 2-2.

Table 2-1 Bell Bend substrate and cover coding system

SUBSTRATE		
CODE	DESCRIPTION	DIMENSION (in.)
1	Organic detritus	
2	Silt/Mud	<0.02
3	Sand	0.02 – 0.1
4	Gravel	0.5 – 2.5
5	Cobble	2.5 – 5.0
6	Rubble	5.0 – 10.0
7	Small boulder	10.0 – 24.0
8	Large boulder	24+
9	Bedrock	
COVER		
CODE	**DESCRIPTION**	**NOTE**
0	None	
1	Undercut	Undercut bank
2	Overhang	Canopy or overhead structure
3	Wood	Woody matter
4	Boulder	Boulders >10 cm above streambed
5	Terrestrial vegetation	Rooted plants
6	Aquatic vegetation	Rooted or unrooted
7	Ledge	A break from high to low velocities

Table 2-2 The field codes were translated into the coding system and used in HSC for the habitat model

Substrate	Cover	Code	Cover	Substrate
1,2	0	1	No Cover	silt or terrestrial vegetation
3	0	2	No Cover	sand (<0.1")
4	0	3	No Cover	gravel (0.1-3.0")
6, 5	0	4	No Cover	cobble (3.0-12.0")
7, 8	0	5	No Cover	small boulder (12-36")
9	0	6	No Cover	boulder, angled bedrock, or WD
none		7	No Cover	mud or flat bedrock
1	2, 5	8	Overhead	vegetation and terrestrial vegetation
4	2, 5	9	Overhead	vegetation and gravel
5, 6	2, 5	10	Overhead	vegetation and cobble
7, 8, 9	2, 5	11	Overhead	vegetation and small boulder, boulder, angled bedrock, or WD
5, 6	1, 3, 4, 7	12	Instream	cobble
7, 8, 9	1, 3, 4, 7	13	Instream	small boulder, boulder, angled bedrock, or WD
5, 6	Any _ PROX	14	Proximal	cobble
7, 8, 9	Any _ PROX	15	Proximal	small boulder, boulder, angled bedrock, or WD
4	1, 3, 4, 7 & (Any _ PROX)	16	Inst/Prox	gravel
2,3	1, 2, 3, 4, 5, 7 & (Any _ PROX)	17	Inst/Prox/Ovh	silt or sand
1	1, 3, 4, 7 & (Any _ PROX)			
Any	6	18	Aquatic Veg	macrophytes

2.6. Quality Control

To assure QA/QC of field data for the Bell Bend Project instream flow study, the following procedures and protocols were used:

- Staff gages were established and continually monitored throughout the course of collecting data at each study site. Significant changes in gage readings were recorded, and if necessary, additional water surface elevation data was taken.

- An independent benchmark was established for each transect or set of transects. The benchmark was an immovable tree, boulder, or other naturally occurring object that was not be subject to tampering, vandalism, or movement. Headpins and tailpins consisted of either rebar or spikes, depending on bank topography and substrate composition. Upon establishment of headpin and tailpin elevations, a level loop was shot to check the auto-level for measurement accuracy. Allowable error tolerances on level loops were set at 0.02 feet. This tolerance was also applicable to both headpin and tailpin measurements except where extenuating circumstances (pins under sloped banks, shots through dense

foliage, etc.) explained discrepancies. All elevation surveying was done using a Zeiss Ni 30 or Sokkia B-20 auto-level and telescoping Sokkia fiberglass stadia rods.

- Water surface elevations were measured on both banks on each transect. If possible, on more complex and uneven transects such as riffles, water surface elevations were measured at multiple locations across a transect. An attempt was made to measure water surface elevations at each calibration flow at the same location (station or distance from pin) across each transect. Water-surface elevation measurements were obtained by placing the bottom of the rod at the water surface until a meniscus formed at the base or selecting a stable area next to the water's edge.

- Pin elevations and water surface elevations were calculated during field measurement and compared to previous measurements. Changes in stage since the previous flow measurement were calculated. Patterns of stage change were compared between transects and determined if reasonable. If any discrepancies were discovered, potential sources of error were explored and noted. Calculated discharges were compared between transects at the same flow to confirm accuracy.

- For areas where velocity measurements were obtained by wading, high-quality current velocity meters were used. Electromagnetic Marsh-McBirney meters were calibrated prior to mobilization and monitored continually for errors or discrepancies during data collection. Mechanical Price AA meters were inspected and spin tested daily. Pivot pins were replaced if significant wear was noted and pin clearances adjusted if a meter failed to pass the calibration spin test. Meters were continually monitored during the daily course of data collection to ensure that they functioned properly.

- Photographs were taken of all transects at the three calibration flows. An attempt was made to take each photograph from the same location at each of the three flows. These photographs provide a valuable record of the streamflow conditions (including velocity and depth), water surface levels, and channel configurations that were used for confirmation during the hydraulic model calibration.

2.7. HYDRAULIC MODEL

PHABSIM was originally developed and maintained by the U.S. Fish and Wildlife Service Instream Flow Group (now U.S. Geological Service, Aquatic Systems and Technology Application Group, Fort Collins Science Center). PHABSIM calculates a habitat index in part based on simulation of river depths and velocities from 1-D hydraulic models that represent the river by cross-sections. For 1-D applications in this study, the hydraulic and habitat index simulations were derived from the computer program RHABSIM (Riverine Habitat Simulation). RHABSIM is software developed by Thomas R. Payne & Associates (TRPA) that implements the equivalent algorithms of PHABSIM. RHABSIM is an enhancement of many of the original PHABSIM model's component programs with greatly expanded input, output, graphic, error-checking, calibration, and interpretation capabilities. Although RHABSIM will be the specific form of the PHABSIM software used for the Bell Bend study, the terms as used in this report are interchangeable.

The ADCP uses its own proprietary software (WinRiverII, TRD Instruments) for velocity and depth data acquisition and playback. Because the ADCP collects water velocities and depths throughout the water column at relatively short intervals, it was necessary to synthesize and condense the output into a form usable by PHABSIM software. For this task TRPA developed an ADCP data conversion program which allows a user to interactively view bottom profiles and velocity as a function of depth and establish stationing which can be directly entered into the hydraulic model module.

2.8. STAGE-DISCHARGE CALIBRATION

Stage-discharge relationships for the 1-D transects were developed from measured discharge and water surface elevations using either an empirical log/log formula or a channel conveyance method (MANSQ). Under these methods each transect was treated independently. The log/log formula method required a minimum of three sets of stage-discharge measurements and an estimate of stage of zero flow (SZF) for each transect. The quality of the stage-discharge relationships were evaluated by examination of mean error and slope output from the model. MANSQ only required a single stage-discharge pair and utilized Manning's equation to determine a stage-discharge relationship (Bovee and Milhous 1978). However, the stage-discharge relationship was validated by additional stage-discharge measurements. In situations where irregular channel features occur on a cross section, for instance bars or terraces, MANSQ was better at predicting higher stages than log/log. MANSQ was used either to model water surface elevations or as a verification of the log/log method on all transects

Stage-discharge relationships in split-channels were calibrated with each channel as a separate component. A stage-discharge relationship was calculated for each split-channel transect using the methods described above and measured discharges in each channel at each calibration flow. The proportion of the total Susquehanna River discharge in each side channel for simulation flows different than the calibration flows was calculated from a formula derived from the measured discharges.

2.9. VELOCITY CALIBRATION

A one-dimensional model represents a stream by means of vertical slices (transects) across the channel. Depths are simulated with the rise and fall of a single, level water surface elevation. The preferred method for simulating water velocities is the "one-flow" option. This technique uses a single set of measured velocities to predict individual station velocities over a range of flows. In the Bell Bend Study, simulated velocities were based on measured data and a relationship between a fixed roughness coefficient (Manning's n) and depth. In some cases, the roughness coefficient was modified for individual stations if substantial velocity errors were noted by the modeler at the simulation flows. Velocity Adjustment Factors (VAF's) indicate the degree to which the mean column velocity was adjusted to simulate a known discharge and were a measure of the quality of hydraulic simulations. The VAFs were examined to detect any significant deviations and to determine if velocities remain consistent with stage and total discharge. VAF's in the range of 0.8 to 1.2 at the calibration (measured) flow were considered acceptable.

3. *RESULTS*

3.1. *CALIBRATION FLOW DATA COLLECTION*

3.1.1. ***High Flow***

High flow data was collected on May 5, 6, and 7, 2010. The average daily flow at the study site ranged from 10,171 cfs to 9,206 cfs. During this field visit, the transects were established in the predetermined habitats, the depth and mean column velocity profiles measured, and the WSELs surveyed. Table 3-1 tabulates the measured or calculated discharge and the "given," best estimated discharge, at each transect. The best estimated discharge was derived by averaging the best measured discharges at several transects. The average of several measurements more accurately represents the true discharge than an individual measurement. For the split channels transects, the sum of the given split discharges is equal to the given full channel discharge. The difference between the given and measured discharge is accounted for in the hydraulic model by the velocity adjustment factor (VAF) described below.

WSELs were surveyed relative to a temporary benchmark and post-processed with the true elevations. The tabular values for each transect are presented in Table 3-2. The tabular profile and velocity data is presented in Appendix A and the graphical data is presented in Appendix B.

Table 3-1 Each transect in the Bell Bend PHABSIM study is listed with the measured discharge as calculated by the RHABSIM software and the "Given," or best estimated discharge at the time of measurement

Transects G_23 and P_12 were added after the high and middle flow measurements and were measured at low flow.

Transect		Discharge			Transect		Discharge	
Channel	Name	Calculated	Given		Channel	Name	Calculated	Given
Full	N_3	9626.99	9711		Split	G_4LC	7014.91	6939
Full	N_2	9795.38	9711		Split	G_4MC	2749.79	2750
Full	N_1	9411.05	9411		Split	G_4RC	481.74	482
Full	R_4	9552.1	9206		Split	RI_1LC	6475.1	6939
Full	R_3	8967.86	9206		Split	RI_1RC	3184.89	3232
Full	R_2	9206.65	9206		Split	RI_2LC	5475.47	5653
Full	R_1	10169.84	10171		Split	RI_2RC	3442.18	3553
Full	G_3	10307.09	10171		Split	RI_3LC	4636.08	4590
Full (Low)	G_23	2372.26	2295.6		Split	RI_3RC	4661.93	4616
Full	G_2	10380.6	10171					
Full	G_1	10474.23	10171					
Full	P_5	10486.74	10171					
Full	P_4	10352.53	10171					
Full	P_3	9958.74	10171					
Full	P_2	10102.28	10171					
Full (Low)	P_12	2256	2259.86					
Full	P_1	9727.68	10171					

Table 3-2 WSEL and SZF measured at each Bell Bend PHABSIM study transect at each calibration flow

Transect	High	Middle	Low	SZF
P1	487.965	486.345	485.235	483.530
P12	487.946	486.455	485.395	483.530
P2	487.645	486.155	485.095	483.530
P3	487.413	486.134	485.209	483.530
P4	487.301	486.125	485.262	483.530
P5	487.067	485.930	485.085	483.530
G1	486.672	485.599	484.782	483.100
G2	485.224	484.288	483.503	481.280
G23	485.002	484.066	483.281	481.210
G3	484.628	483.724	482.919	480.370
G4R	483.568	482.777	481.887	480.840
G4M	482.893	481.711	480.796	478.340
G4L	483.274	482.511	481.886	480.370
RI1L	482.951	482.370	481.905	480.370
RI1R	482.445	481.430	480.760	477.650
R1	480.428	479.401	478.628	477.100
R2	479.601	478.791	478.051	476.500
RI2R	478.504	477.817	477.362	477.100
RI2L	477.784	476.937	476.292	473.780
RI3R	475.281	474.274	473.454	472.310
RI3L	475.074	474.244	473.549	471.910
R3	473.894	473.039	472.429	470.730
R4	473.718	472.843	472.288	470.730
N1	467.110	465.259	463.614	460.850
N2	466.910	464.882	463.307	460.850
N3	466.710	464.849	463.269	460.850

3.1.2. Middle Flow

The middle flow WSELs and discharges were measured on June 23 and 24, 2010 with flows ranging from 4,973 cfs to 4,409 cfs. The WSELs are tabulated in Table 3-2.

3.1.3. Low Flow

The low flow WSEL and discharge measurements as well as the substrate/cover coding occurred on August 4, 5, 6, and 7; 2010 with discharges ranging from 2,296 cfs to 1,898 cfs. The WSELs are tabulated in Table 3-2and the substrate coding is depicted in Appendix C.

3.2. *HYDRAULIC MODEL*

3.2.1. *Simulation Flows*

RHABSIM allows for up to 30 simulation flows in the hydraulic model. The flows chosen are listed in Table 3-3. The low (800 cfs) and high (25,000 cfs) simulation flows are approximately 0.4 and 2.5 times the low and high calibration flows. The simulation flows are incremented by 100 cfs steps up to 2,000 cfs, then 200 cfs up to 4,000 cfs, 500 cfs up to 5,000 cfs, 1,000 cfs steps up to 10,000 cfs, and finally in 5,000 cfs increments to 25,000 cfs. The smaller increments are in the range of flows that are the primary interest, whereas the larger increments are in the flow ranges where project-related impacts are minimal and interpolation between the simulation flows has no consequence to the results.

The flow in each split channel had to be determined for each full channel simulation flow in order to use the hydraulic model results to calculate the study reach habitat index. Because the percentage of the full channel discharge in each split channel varied at each measured calibration flow, each split channel had to be modeled separately. The simulation flows for each split-channel were determined by fitting the curve produced by the measured split channel/full channel discharge relationship with a second order polynomial equation where the full channel discharge was represented by the independent variable. While the sum of second order polynomial regression calculated split channel simulation flows that, added together, very nearly equaled the measured full channel simulation flow, a better balance was achieved by regressing one split channel of a transect and subtracting that simulation flow from the full channel simulation flow to calculate the simulation flow of the second split channel.

The equations used for calculating the slit channel simulation flows are:

$$Q_{G4WC}=0.000003*Q_{FC}{}^{\wedge 2}+0.0209*Q_{FC}-47.057 \quad \text{Equation 3-1}$$

$$Q_{G4EC}=-0.00002*Q_{FC}{}^{\wedge 2}+0.8833*Q_{FC} \quad \text{Equation 3-2}$$

$$Q_{G4MC}=Q_{FC}-(Q_{G4WC}+Q_{G4EC}) \quad \text{Equation 3-3}$$

$$Q_{RI1EC}=-0.00002*Q_{FC}{}^{\wedge 2}+0.8833*Q_{FC} \quad \text{Equation 3-4}$$

$$Q_{RI1WC}=Q_{FC}-Q_{RI1EC} \quad \text{Equation 3-5}$$

$$Q_{RI2EC}=0.000009*Q_{FC}{}^{\wedge 2}+0.501*Q_{FC}+292.47 \quad \text{Equation 3-6}$$

$$Q_{RI2WC}=Q_{FC}-Q_{RI2EC} \quad \text{Equation 3-7}$$

$$Q_{RI3EC}=-0.000001*Q_{FC}{}^{\wedge 2}+0.4898*Q_{FC}+199.16 \quad \text{Equation 3-8}$$

$$Q_{RI3WC}=Q_{FC}-Q_{RI3EC} \quad \text{Equation 3-9}$$

Where Q_X = Simulation Flow for Transect X (FC = Full Channel).

Table 3-3 Simulation flows in cfs for the Bell Bend hydraulic model

Full channel transects	G4RC	G4MC	G4LC	R11RC	R11LC	R12RC	R12LC	R13RC	R13LC
800		106	694	106	694	101	699	210	590
900		121	779	121	779	149	751	261	639
1000		137	863	137	863	198	802	312	688
1100		153	947	153	947	246	854	363	737
1200		169	1031	169	1031	293	907	415	785
1300		186	1114	186	1114	341	959	466	834
1400		203	1197	203	1197	388	1012	517	883
1600		238	1362	238	1362	483	1117	620	980
1800	0	275	1525	275	1525	577	1223	722	1078
2000	7	307	1687	313	1687	670	1330	825	1175
2200	13	340	1846	354	1846	762	1438	928	1272
2400	20	375	2005	395	2005	853	1547	1031	1369
2600	28	411	2161	439	2161	944	1656	1134	1466
2800	35	449	2316	484	2316	1034	1766	1237	1563
3000	43	487	2470	530	2470	1124	1876	1340	1660
3200	51	528	2622	578	2622	1212	1988	1444	1756
3400	59	569	2772	628	2772	1300	2100	1547	1853
3600	67	612	2921	679	2921	1387	2213	1651	1949
3800	76	657	3068	732	3068	1474	2326	1754	2046
4000	85	702	3213	787	3213	1560	2440	1858	2142
4500	108	822	3570	930	3570	1771	2729	2117	2383
5000	132	951	3917	1084	3917	1978	3022	2377	2623
6000	186	1234	4580	1420	4580	2378	3622	2898	3102
7000	246	1551	5203	1797	5203	2760	4240	3421	3579
8000	312	1901	5786	2214	5786	3124	4876	3946	4054
9000	384	2286	6330	2670	6330	3470	5530	4474	4526
10000	462	2705	6833	3167	6833	3798	6202	5003	4997
15000	693	4058	10250	4751	10250	5696	9304	7504	7496
20000	924	5410	13666	6334	13666	7595	12405	10006	9994
25000	1155	6763	17083	7918	17083	9494	15506	12507	12493

3.2.2. Water Surface Elevation Prediction

All WSELs were simulated using an empirical log/log regression formula based on the measured stage/discharge pairs from the three calibration flows and checked with the channel conveyance (Manning's n) method. The two transects added to the study after the high and middle flow measurements (P12 and G23) were simulated with rating curves from adjacent transects. The WSELs were initially surveyed using temporary benchmarks with arbitrary elevations. The transect end-point pins and temporary benchmarks were surveyed with an RTK GPS after the hydraulic measurements. The arbitrary elevations were converted to true elevations after the RTK survey. This enabled the measured WSELs on each bank where the river was too wide to

survey across to be averaged for the model. It also connected the transects longitudinally giving the modeler additional quality control parameters (e.g. ensuring that the downstream simulated WSELs were not higher than the upstream WSELs). The end-points on several transects were not surveyed with the RTK GPS due to either time constrains or dense foliage obstructing the signal. These were P3, N1, N2, and N3. This has no effect on the hydraulic model results; however, it is important to note in case the elevations are used for other studies. The true elevation of transect P3 was interpolated from the elevations of P2 and P4 with fairly good accuracy due to the narrow range of elevation bounded by the adjacent transects. The true elevations of N1, N2, and N3 were estimated for continuity. Both banks of these transects were surveyed relative to benchmarks on one side of the river (i.e. the river was narrow enough to survey both banks from a single instrument setting) so that the RTK true elevations were not needed to average the WSELs surveyed on both banks. For the hydraulic model a theoretical SZF was used due to the difficulty in measuring a physical SZF in a large river.

The regression results from the WSEL simulation are listed in Table 3-4. N is the number of stage discharge pairs used and A and B are constants in the equation:

WSEL = A * Q(B + SZF) **Equation 3-10**

Where Q is the flow and SZF is the stage at zero flow.

The measured stage/discharge pairs for all transects except R4 fit into the log/log linear relationship with acceptable mean errors less than five percent. R4 is the riffle below the old bridge abutments in an area highly influenced by those channel modifications and cannot be expected to behave as well as a natural channel. The constants A and B are consistent for the full channel transects, but less so for the split channel transects. This is a result of upstream controls affecting the allocation of total discharge in the split channels and possibly variable backwater effects from the downstream confluence of the split channels. The rating curves fit the measured data; however, for those split channel transects where the A and B coefficients diverge from the others, there is less confidence in the extrapolation, particularly at higher discharge.

Table 3-4 Regression results from the simulated WSELs.

Full Channel Transects						
Name	N	A	B	MeanErr(%)	Variance	Std.Dev
N_3	3	370.353	1.8422	1.0866	0.2417	0.49162
N_2	3	374.3723	1.8085	0.3206	0.0196	0.14001
N_1	3	255.9578	1.9592	1.304	0.3522	0.59343
R_4	3	589.2983	2.5542	6.9309	7.1641	2.67658
R_3	3	431.1622	2.6913	4.7305	3.551	1.8844
R_2	3	734.4355	2.2372	0.3148	0.0193	0.13884
R_1	3	796.2224	2.122	0.6752	0.0841	0.29008
G_3	3	151.2728	2.8992	0.8222	0.1319	0.36316
G_23	3	381.7938	2.4577	0.8225	0.1319	0.36322
G_2	3	288.6081	2.5936	0.7534	0.1103	0.33217
G_1	3	801.481	1.9954	0.2035	0.0079	0.08881
P_5	3	1014.988	1.821	0.3406	0.0222	0.14906
P_4	3	786.3805	1.9314	0.4176	0.0324	0.17994
P_3	3	891.2697	1.7958	0.026	0.0001	0.01129
P_2	3	1130.189	1.5482	0.6403	0.0796	0.28212
P_12	3	756.7302	1.7507	0.2473	0.0114	0.10696
P_1	3	970.022	1.5765	0.0013	0	0.00059

Split Channel Transects						
Name	N	A	B	MeanErr(%)	Variance	Std.Dev
G_4LC	3	815.2152	2.0048	0.8786	0.1505	0.38799
G_4MC	3	21.9054	3.1795	1.9881	0.7927	0.89032
G_4RC	3	6.5366	4.2925	0.3603	0.03	0.1733
RI_1LC	3	644.1972	2.5114	0.4496	0.0373	0.1932
RI_1RC	3	1.5273	4.8695	4.3353	4.1476	2.03657
RI_2LC	3	64.3333	3.228	0.1238	0.0029	0.05376
RI_2RC	3	2466.459	1.0419	1.5106	0.505	0.71066
RI_3LC	3	376.7764	2.1671	0.825	0.1331	0.36488
RI_3RC	3	592.3397	1.8802	0.6504	0.0851	0.29175

3.2.3. Water Velocity Prediction

All water velocities were simulated using the one velocity method (using the water velocity at the highest measured calibration flow) and Manning's equation. For the two transects (G23 and P12) that were added to the study after the high and middle flow measurements, velocities were measured at low flow. For all of the other transects, velocities were measured at high flow. The calculated discharges were balanced with the given calibration flows by applying a velocity

adjustment factor (VAF) to the station velocities. All full channel VAFs fall within the 0.1 to 10 range of generally acceptable values and within the 0.8 to 1.2 values at the calibration flow at which the velocities were measured (Figure 3-1). All VAFs for split channels except G_4RC also fall within the accepted ranges (Figure 3-2). The VAF for the lowest simulated flow for Transect G_4RC (7 cfs – before the channel flow stops completely) falls to 0.08. This does not indicate an error in the simulation, but rather is a result of the very low flow simulated. The VAF curve for G_4MC has an odd shape, increasing at low flows. This is a result of the channel width decreasing substantially at the lower flows requiring the water column velocities to increase to convey the volume of water through the reduced cross-sectional area.

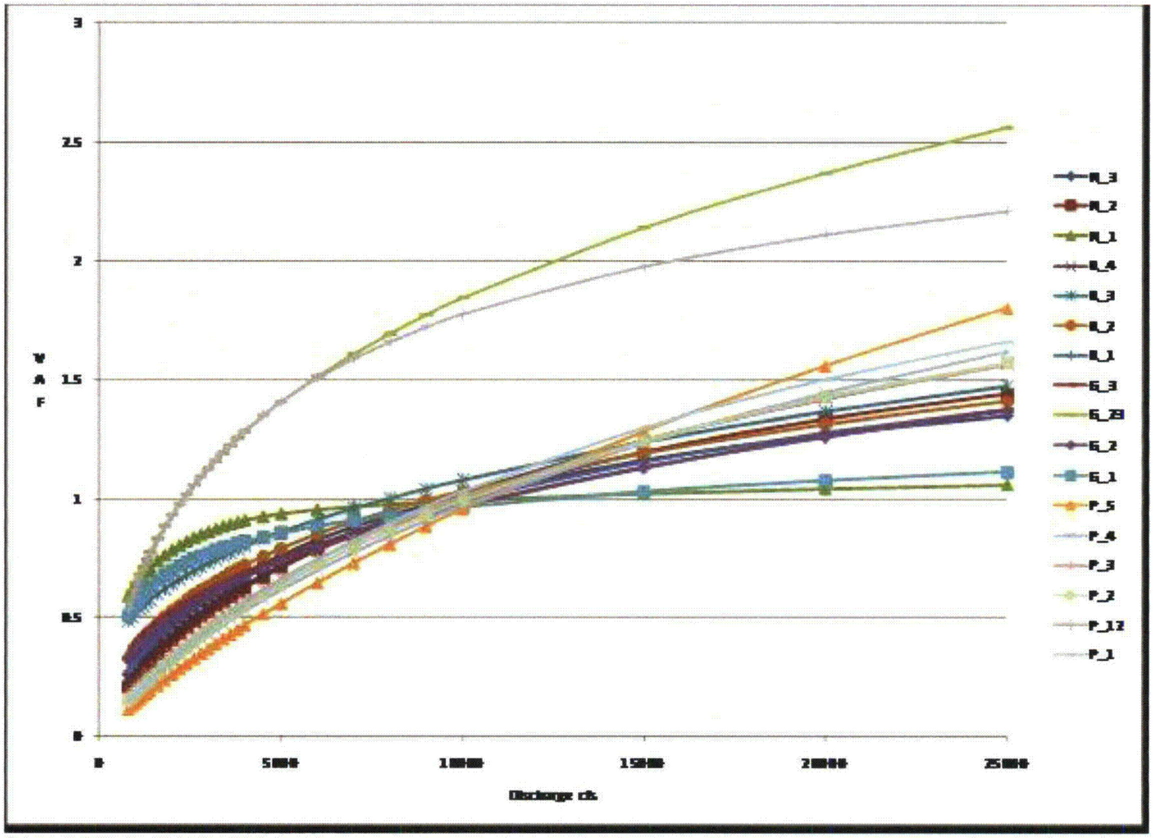

Figure 3-1 Full channel VAFs for the Bell Bend PHABSIM study transects. All VAFs are close to one at the measured calibration flow (approximately 10,000 cfs except for G23 and P12 which were measured at approximately 2,000 cfs)

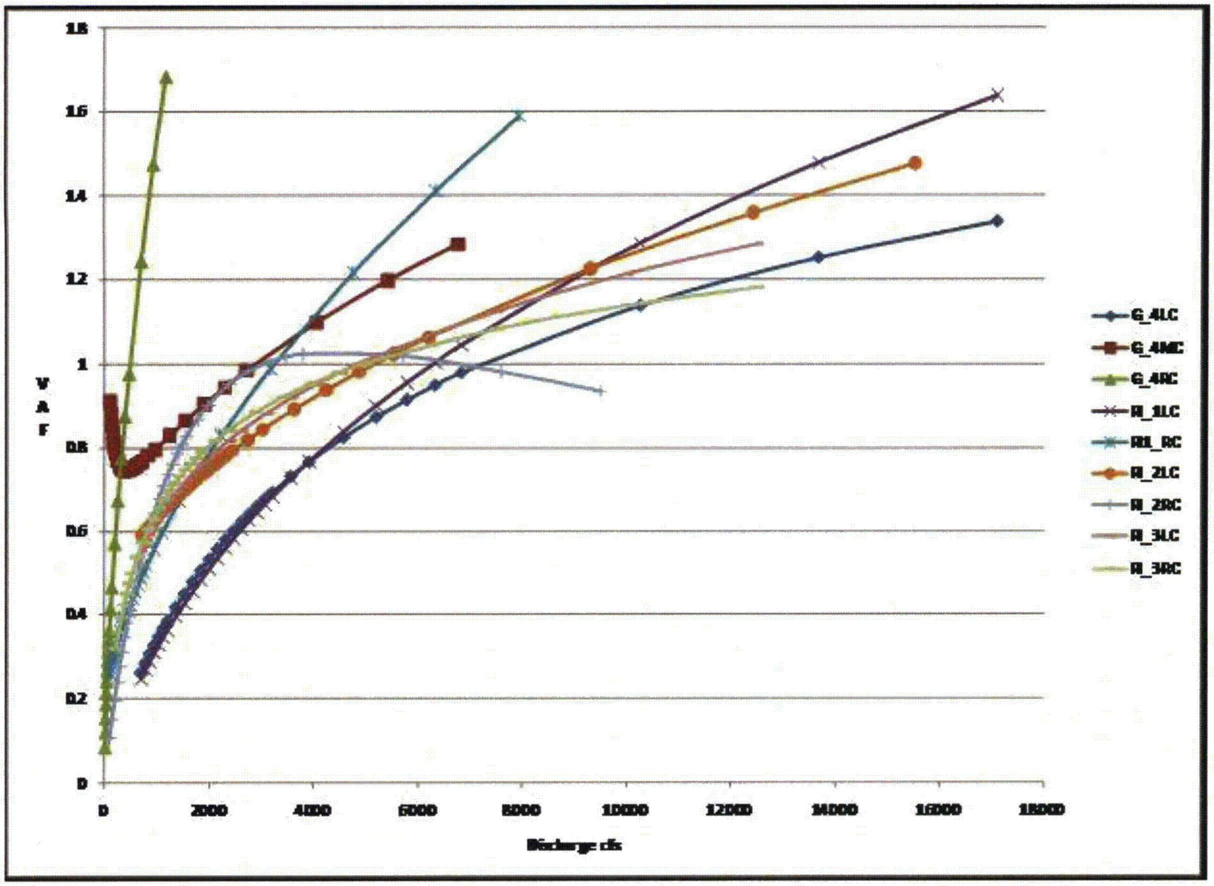

Figure 3-2 Split channel VAFs for the Bell Bend PHABSIM study transects. All VAFs are close to one at the measured calibration flow

Individual station velocities were calibrated by changing the roughness coefficient (Manning's n value) that the model initially assigned based on the measured velocity. Edge effects (e.g. debris in the water) in shallow margin stations can cause the water to be slow at the measured flow where the water would not be slow at higher simulated flows. The modeler may change the roughness coefficient in those stations so that slow water is not propagated up the bank at higher simulated flows. For the Bell Bend transect 7 edge station adjustments were made. Also measured velocities may be too high or be negative in other stations, producing unrealistic simulated velocities. Three of these calibrations were made. For G_23, P_12, and RI_1LC maximum and minimum roughness coefficients were stipulated. The ADCP measures near-zero velocities poorly unless the entire transect is shallow and slow. The near-zero measured velocities oscillate around zero and the oscillations are amplified into unreasonable positive/negative velocity patterns at high flows. Specifying maximum and minimum roughness coefficients mitigates this problem while maintaining the reasonable velocity patterns.

The simulated velocity patterns and WSELs are depicted in Appendix D and calibration summary in Appendix E.

4. REFERENCES

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APPENDIX A. TABULAR PROFILE, SZF, WSEL AND VELOCITY DATA FOR THE THREE CALIBRATION FLOWS

Bell Bend Project

Susquehanna River

Units = U.S.

Cross-section: N_3					High	Middle		Low
Station	**Elevation**	**SZF**	**Substrate/Cover**	**WSEL**	**Velocity**	**WSEL**	**Stage 3**	**WSEL**
0	471.32	0	10	0	0	0	0	0
4	469.76	0	10	0	0	0	0	0
8	468.53	0	10	0	0	0	0	0
12	466.71	0	12	466.71	0	0	0	0
14	466.01	0	12	466.71	0.035	0	0	0
16	465.41	0	12	466.71	0.224	0	0	0
18	464.61	0	12	466.71	0.641	464.85	0	0
20	464.11	0	12	466.71	1.119	464.85	0	0
22	462.51	0	17	466.71	1.129	464.85	463.27	0
24	462.31	0	17	466.71	1.298	464.85	463.27	0
26	461.3	0	4	466.71	1.362	464.85	463.27	0
28	460.46	460.85	4	466.71	1.492	464.85	463.27	0
30	459.87	460.85	4	466.71	1.778	464.85	463.27	0
32	459.2	460.85	4	466.71	1.996	464.85	463.27	0
34	458.88	460.85	4	466.71	1.901	464.85	463.27	0
36	458.4	460.85	4	466.71	1.758	464.85	463.27	0
38	457.94	460.85	4	466.71	1.849	464.85	463.27	0
40	457.59	460.85	4	466.71	1.831	464.85	463.27	0
42	457.05	460.85	4	466.71	1.76	464.85	463.27	0
44	456.8	460.85	4	466.71	1.901	464.85	463.27	0
46	456.64	460.85	4	466.71	1.918	464.85	463.27	0
48	456.56	460.85	4	466.71	2.081	464.85	463.27	0
50	456.83	460.85	4	466.71	2.173	464.85	463.27	0
52	457.08	460.85	4	466.71	2.131	464.85	463.27	0
54	456.56	460.85	4	466.71	2.429	464.85	463.27	0
56	456.75	460.85	4	466.71	2.334	464.85	463.27	0
58	456.78	460.85	4	466.71	2.224	464.85	463.27	0
60	456.58	460.85	4	466.71	2.257	464.85	463.27	0
62	456.57	460.85	4	466.71	2.131	464.85	463.27	0
64	456.62	460.85	4	466.71	1.878	464.85	463.27	0
66	456.62	460.85	4	466.71	2.217	464.85	463.27	0
68	456.57	460.85	4	466.71	2.198	464.85	463.27	0
70	456.51	460.85	4	466.71	2.079	464.85	463.27	0
72	456.49	460.85	4	466.71	2.394	464.85	463.27	0

74	456.56	460.85	4	466.71	2.436	464.85	463.27	0
76	456.44	460.85	4	466.71	2.377	464.85	463.27	0
78	456.35	460.85	4	466.71	2.457	464.85	463.27	0
80	456.47	460.85	4	466.71	2.292	464.85	463.27	0
82	456.52	460.85	4	466.71	2.155	464.85	463.27	0
84	456.54	460.85	4	466.71	2.176	464.85	463.27	0
86	456.58	460.85	4	466.71	1.839	464.85	463.27	0
88	456.58	460.85	4	466.71	1.906	464.85	463.27	0
90	456.63	460.85	4	466.71	2.058	464.85	463.27	0
92	456.79	460.85	4	466.71	2.103	464.85	463.27	0
94	456.83	460.85	4	466.71	2.249	464.85	463.27	0
96	456.79	460.85	4	466.71	2.368	464.85	463.27	0
98	456.83	460.85	4	466.71	2.267	464.85	463.27	0
100	456.79	460.85	4	466.71	2.275	464.85	463.27	0
102	456.76	460.85	4	466.71	2.332	464.85	463.27	0
104	456.74	460.85	4	466.71	2.105	464.85	463.27	0
106	456.7	460.85	4	466.71	2.196	464.85	463.27	0
108	456.67	460.85	4	466.71	2.412	464.85	463.27	0
110	456.68	460.85	4	466.71	2.319	464.85	463.27	0
112	456.7	460.85	4	466.71	2.408	464.85	463.27	0
114	456.77	460.85	4	466.71	2.459	464.85	463.27	0
116	456.88	460.85	4	466.71	2.373	464.85	463.27	0
118	456.88	460.85	4	466.71	2.224	464.85	463.27	0
120	456.86	460.85	4	466.71	2.245	464.85	463.27	0
122	456.92	460.85	4	466.71	2.26	464.85	463.27	0
124	456.91	460.85	4	466.71	2.31	464.85	463.27	0
126	456.87	460.85	4	466.71	2.411	464.85	463.27	0
128	456.89	460.85	4	466.71	2.394	464.85	463.27	0
130	456.87	460.85	4	466.71	2.359	464.85	463.27	0
132	456.85	460.85	4	466.71	2.382	464.85	463.27	0
134	456.84	460.85	4	466.71	2.537	464.85	463.27	0
136	456.83	460.85	4	466.71	2.486	464.85	463.27	0
138	456.84	460.85	4	466.71	2.432	464.85	463.27	0
140	456.86	460.85	4	466.71	2.627	464.85	463.27	0
142	456.91	460.85	4	466.71	2.63	464.85	463.27	0
144	456.97	460.85	4	466.71	2.463	464.85	463.27	0
146	457.05	460.85	4	466.71	2.528	464.85	463.27	0
148	457.16	460.85	4	466.71	2.604	464.85	463.27	0
150	457.24	460.85	4	466.71	2.565	464.85	463.27	0
152	457.31	460.85	4	466.71	2.43	464.85	463.27	0
154	457.39	460.85	4	466.71	2.393	464.85	463.27	0

156	457.49	460.85	4	466.71	2.447	464.85	463.27	0
158	457.39	460.85	4	466.71	2.38	464.85	463.27	0
160	457.27	460.85	4	466.71	2.305	464.85	463.27	0
162	457.3	460.85	4	466.71	2.451	464.85	463.27	0
164	457.24	460.85	4	466.71	2.581	464.85	463.27	0
166	457.26	460.85	4	466.71	2.483	464.85	463.27	0
168	457.18	460.85	4	466.71	2.394	464.85	463.27	0
170	457.17	460.85	4	466.71	2.217	464.85	463.27	0
172	457.22	460.85	4	466.71	1.915	464.85	463.27	0
174	457.24	460.85	4	466.71	2.429	464.85	463.27	0
176	457.24	460.85	4	466.71	2.753	464.85	463.27	0
178	457.29	460.85	4	466.71	2.808	464.85	463.27	0
180	457.27	460.85	4	466.71	2.719	464.85	463.27	0
182	457.24	460.85	4	466.71	2.583	464.85	463.27	0
184	457.21	460.85	4	466.71	2.381	464.85	463.27	0
186	457.18	460.85	4	466.71	2.288	464.85	463.27	0
188	457.17	460.85	4	466.71	2.244	464.85	463.27	0
190	457.23	460.85	4	466.71	2.158	464.85	463.27	0
192	457.3	460.85	4	466.71	2.094	464.85	463.27	0
194	457.43	460.85	4	466.71	2.064	464.85	463.27	0
196	457.56	460.85	4	466.71	2.377	464.85	463.27	0
198	457.56	460.85	4	466.71	2.635	464.85	463.27	0
200	457.49	460.85	4	466.71	2.813	464.85	463.27	0
202	457.46	460.85	4	466.71	2.73	464.85	463.27	0
204	457.5	460.85	4	466.71	2.471	464.85	463.27	0
206	457.52	460.85	4	466.71	2.42	464.85	463.27	0
208	457.49	460.85	4	466.71	2.269	464.85	463.27	0
210	457.49	460.85	4	466.71	2.076	464.85	463.27	0
212	457.55	460.85	4	466.71	2.209	464.85	463.27	0
214	457.67	460.85	4	466.71	2.348	464.85	463.27	0
216	457.68	460.85	4	466.71	2.607	464.85	463.27	0
218	457.66	460.85	4	466.71	2.662	464.85	463.27	0
220	457.71	460.85	4	466.71	2.572	464.85	463.27	0
222	457.76	460.85	4	466.71	2.646	464.85	463.27	0
224	457.81	460.85	4	466.71	2.565	464.85	463.27	0
226	457.76	460.85	4	466.71	2.434	464.85	463.27	0
228	457.72	460.85	4	466.71	2.163	464.85	463.27	0
230	457.79	460.85	4	466.71	2.108	464.85	463.27	0
232	457.68	460.85	4	466.71	2.347	464.85	463.27	0
234	457.55	460.85	4	466.71	2.497	464.85	463.27	0
236	457.7	460.85	4	466.71	2.96	464.85	463.27	0

238	457.56	460.85	4	466.71	2.249	464.85	463.27	0
240	457.48	460.85	4	466.71	2.181	464.85	463.27	0
242	457.45	460.85	4	466.71	2.622	464.85	463.27	0
244	457.52	460.85	4	466.71	2.603	464.85	463.27	0
246	457.51	460.85	4	466.71	2.558	464.85	463.27	0
248	457.41	460.85	4	466.71	2.609	464.85	463.27	0
250	457.4	460.85	4	466.71	2.664	464.85	463.27	0
252	457.42	460.85	4	466.71	2.605	464.85	463.27	0
254	457.42	460.85	4	466.71	2.599	464.85	463.27	0
256	457.41	460.85	4	466.71	2.642	464.85	463.27	0
258	457.37	460.85	4	466.71	2.644	464.85	463.27	0
260	457.3	460.85	4	466.71	2.515	464.85	463.27	0
262	457.2	460.85	4	466.71	2.364	464.85	463.27	0
264	457.07	460.85	4	466.71	2.334	464.85	463.27	0
266	457.07	460.85	4	466.71	2.266	464.85	463.27	0
268	457.07	460.85	4	466.71	2.228	464.85	463.27	0
270	457.03	460.85	4	466.71	2.245	464.85	463.27	0
272	457.01	460.85	4	466.71	2.475	464.85	463.27	0
274	457.01	460.85	4	466.71	2.638	464.85	463.27	0
276	457.02	460.85	4	466.71	2.674	464.85	463.27	0
278	456.97	460.85	4	466.71	2.907	464.85	463.27	0
280	456.99	460.85	4	466.71	2.915	464.85	463.27	0
282	456.91	460.85	4	466.71	2.705	464.85	463.27	0
284	456.86	460.85	4	466.71	2.601	464.85	463.27	0
286	456.77	460.85	4	466.71	2.54	464.85	463.27	0
288	456.67	460.85	4	466.71	2.932	464.85	463.27	0
290	456.7	460.85	4	466.71	2.98	464.85	463.27	0
292	456.58	460.85	4	466.71	2.752	464.85	463.27	0
294	456.47	460.85	4	466.71	2.713	464.85	463.27	0
296	456.39	460.85	4	466.71	2.483	464.85	463.27	0
298	456.35	460.85	4	466.71	2.398	464.85	463.27	0
300	456.34	460.85	4	466.71	2.41	464.85	463.27	0
302	456.28	460.85	4	466.71	2.663	464.85	463.27	0
304	456.18	460.85	4	466.71	2.85	464.85	463.27	0
306	456.16	460.85	4	466.71	2.628	464.85	463.27	0
308	456.02	460.85	4	466.71	2.621	464.85	463.27	0
310	456.06	460.85	4	466.71	2.672	464.85	463.27	0
312	456.35	460.85	4	466.71	2.608	464.85	463.27	0
314	456.39	460.85	4	466.71	2.49	464.85	463.27	0
316	456.53	460.85	4	466.71	2.594	464.85	463.27	0
318	456.7	460.85	4	466.71	2.829	464.85	463.27	0

320	456.73	460.85	4	466.71	2.796	464.85	463.27	0
322	456.7	460.85	4	466.71	2.726	464.85	463.27	0
324	456.65	460.85	4	466.71	2.589	464.85	463.27	0
326	456.55	460.85	4	466.71	2.392	464.85	463.27	0
328	456.48	460.85	4	466.71	2.317	464.85	463.27	0
330	456.49	460.85	4	466.71	2.331	464.85	463.27	0
332	456.54	460.85	4	466.71	2.287	464.85	463.27	0
334	456.57	460.85	4	466.71	2.579	464.85	463.27	0
336	456.57	460.85	4	466.71	2.977	464.85	463.27	0
338	456.59	460.85	4	466.71	2.891	464.85	463.27	0
340	456.61	460.85	4	466.71	2.535	464.85	463.27	0
342	456.64	460.85	4	466.71	2.371	464.85	463.27	0
344	456.65	460.85	4	466.71	2.53	464.85	463.27	0
346	456.73	460.85	4	466.71	2.476	464.85	463.27	0
348	456.77	460.85	4	466.71	2.405	464.85	463.27	0
350	456.65	460.85	4	466.71	2.305	464.85	463.27	0
352	456.56	460.85	4	466.71	2.338	464.85	463.27	0
354	456.61	460.85	4	466.71	2.625	464.85	463.27	0
356	456.69	460.85	4	466.71	2.699	464.85	463.27	0
358	456.75	460.85	4	466.71	2.675	464.85	463.27	0
360	456.85	460.85	4	466.71	2.422	464.85	463.27	0
362	456.92	460.85	4	466.71	2.225	464.85	463.27	0
364	456.94	460.85	4	466.71	2.544	464.85	463.27	0
366	457	460.85	4	466.71	2.315	464.85	463.27	0
368	457.16	460.85	4	466.71	2.143	464.85	463.27	0
370	457.36	460.85	4	466.71	2.186	464.85	463.27	0
372	457.58	460.85	4	466.71	2.323	464.85	463.27	0
374	457.72	460.85	4	466.71	2.365	464.85	463.27	0
376	457.88	460.85	4	466.71	2.356	464.85	463.27	0
378	458.08	460.85	4	466.71	2.449	464.85	463.27	0
380	458.23	460.85	4	466.71	2.383	464.85	463.27	0
382	458.49	460.85	4	466.71	2.349	464.85	463.27	0
384	458.72	460.85	4	466.71	2.332	464.85	463.27	0
386	458.89	460.85	4	466.71	2.216	464.85	463.27	0
388	459.13	460.85	4	466.71	2.205	464.85	463.27	0
390	459.4	460.85	4	466.71	2.359	464.85	463.27	0
392	459.62	460.85	4	466.71	2.438	464.85	463.27	0
394	459.68	460.85	4	466.71	2.423	464.85	463.27	0
396	459.9	460.85	4	466.71	2.638	464.85	463.27	0
398	460.08	460.85	4	466.71	2.415	464.85	463.27	0
400	460.27	460.85	4	466.71	2.229	464.85	463.27	0

402	460.47	460.85	4	466.71	2.082	464.85	463.27	0
404	460.55	460.85	4	466.71	2.425	464.85	463.27	0
406	460.68	460.85	4	466.71	2.355	464.85	463.27	0
408	460.79	460.85	4	466.71	2.371	464.85	463.27	0
410	460.98	0	4	466.71	2.413	464.85	463.27	0
412	461.12	0	4	466.71	2.467	464.85	463.27	0
414	461.18	0	4	466.71	2.238	464.85	463.27	0
416	461.31	0	4	466.71	1.915	464.85	463.27	0
418	461.43	0	4	466.71	1.773	464.85	463.27	0
420	461.57	0	4	466.71	1.675	464.85	463.27	0
422	461.74	0	4	466.71	1.942	464.85	463.27	0
424	461.84	0	4	466.71	1.929	464.85	463.27	0
426	461.89	0	4	466.71	1.975	464.85	463.27	0
428	461.91	0	4	466.71	2.2	464.85	463.27	0
430	462.08	0	4	466.71	2.213	464.85	463.27	0
432	462.3	0	4	466.71	2.219	464.85	463.27	0
434	462.33	0	4	466.71	1.975	464.85	463.27	0
436	462.33	0	4	466.71	1.751	464.85	463.27	0
438	462.34	0	4	466.71	1.866	464.85	463.27	0
440	462.32	0	4	466.71	1.766	464.85	463.27	0
442	462.38	0	4	466.71	1.927	464.85	463.27	0
444	462.45	0	4	466.71	1.618	464.85	463.27	0
446	462.62	0	4	466.71	1.136	464.85	463.27	0
448	462.6	0	4	466.71	1.61	464.85	463.27	0
450	462.62	0	4	466.71	1.862	464.85	463.27	0
452	462.66	0	4	466.71	1.986	464.85	463.27	0
454	462.67	0	4	466.71	2.01	464.85	463.27	0
456	462.67	0	4	466.71	1.951	464.85	463.27	0
458	462.72	0	4	466.71	1.957	464.85	463.27	0
460	462.78	0	4	466.71	1.849	464.85	463.27	0
462	462.88	0	4	466.71	1.553	464.85	463.27	0
464	462.9	0	4	466.71	1.57	464.85	463.27	0
466	462.86	0	4	466.71	1.68	464.85	463.27	0
468	462.78	0	4	466.71	1.672	464.85	463.27	0
470	462.75	0	4	466.71	1.621	464.85	463.27	0
472	462.63	0	4	466.71	1.494	464.85	463.27	0
474	462.58	0	4	466.71	1.607	464.85	463.27	0
476	462.59	0	4	466.71	1.7	464.85	463.27	0
478	462.57	0	4	466.71	1.667	464.85	463.27	0
480	462.57	0	4	466.71	1.332	464.85	463.27	0
482	462.58	0	4	466.71	0.972	464.85	463.27	0

484	462.55	0	4	466.71	1.194	464.85	463.27	0
486	462.61	0	4	466.71	1.696	464.85	463.27	0
488	462.73	0	14	466.71	1.704	464.85	463.27	0
490	462.75	0	14	466.71	1.699	464.85	463.27	0
492	462.7	0	14	466.71	1.449	464.85	463.27	0
494	462.66	0	14	466.71	1.095	464.85	463.27	0
496	462.72	0	14	466.71	1.324	464.85	463.27	0
498	462.72	0	14	466.71	1.511	464.85	463.27	0
500	462.73	0	14	466.71	1.474	464.85	463.27	0
502	462.78	0	14	466.71	1.48	464.85	463.27	0
504	462.79	0	14	466.71	1.297	464.85	463.27	0
506	462.87	0	14	466.71	1.28	464.85	463.27	0
508	463.06	0	14	466.71	1.454	464.85	463.27	0
510	463.14	0	14	466.71	1.424	464.85	463.27	0
512	462.97	0	14	466.71	1.473	464.85	463.27	0
514	462.89	0	14	466.71	1.602	464.85	463.27	0
516	462.9	0	14	466.71	1.675	464.85	463.27	0
518	462.85	0	14	466.71	1.45	464.85	463.27	0
520	462.84	0	14	466.71	1.318	464.85	463.27	0
522	462.88	0	14	466.71	1.299	464.85	463.27	0
524	462.91	0	14	466.71	1.165	464.85	463.27	0
526	462.95	0	14	466.71	1.109	464.85	463.27	0
528	462.9	0	14	466.71	1.284	464.85	463.27	0
530	462.87	0	14	466.71	1.229	464.85	463.27	0
532	462.92	0	14	466.71	1.179	464.85	463.27	0
534	462.91	0	14	466.71	1.066	464.85	463.27	0
536	462.9	0	14	466.71	1.129	464.85	463.27	0
538	463.02	0	14	466.71	1.134	464.85	463.27	0
540	463.09	0	1	466.71	1.047	464.85	463.27	0
542	463.13	0	1	466.71	0.806	464.85	463.27	0
544	463.24	0	8	466.71	0.376	464.85	463.27	0
545.2	464.76	0	8	466.71	0.31	464.85	0	0
548.2	465.21	0	8	466.71	0.24	0	0	0
551.2	465.31	0	8	466.71	0.08	0	0	0
554.2	465.91	0	8	466.71	0.15	0	0	0
557.2	466.21	0	8	466.71	0.07	0	0	0
560.2	465.71	0	17	466.71	0.15	0	0	0
563.2	465.51	0	8	466.71	0.21	0	0	0
566.2	466.01	0	8	466.71	0.27	0	0	0
569.2	466.21	0	8	466.71	0.13	0	0	0
572.2	466.56	0	8	466.71	0.02	0	0	0

574.6	466.71	0	8	466.71	0	0	0	0
579.2	466.88	0	8	0	0	0	0	0
583.2	467.51	0	8	0	0	0	0	0
587.2	469.48	0	8	0	0	0	0	0
591.2	471.32	0	8	0	0	0	0	0

Cross-section: N_2

				High		Middle		Low
Station	**Elevation**	**SZF**	**Substrate/Cover**	**WSEL**	**Velocity**	**WSEL**	**Stage 3**	**WSEL**
0	468.53	0	10	0	0	0	0	0
2.5	466.91	0	10	466.91	0	0	0	0
4	466.51	0	10	466.91	0	0	0	0
6	465.61	0	13	466.91	0.119	0	0	0
8	464.91	0	13	466.91	0.131	0	0	0
10	464.41	0	13	466.91	0.084	464.88	0	0
12	463.91	0	13	466.91	0.085	464.88	0	0
15	463.51	0	13	466.91	0.324	464.88	0	0
18	462.76	0	13	466.91	0.707	464.88	463.31	0
21	462.16	0	13	466.91	0.145	464.88	463.31	0
24	461.93	0	13	466.91	0.222	464.88	463.31	0
27	460.97	0	13	466.91	0.134	464.88	463.31	0
30	460.12	460.85	13	466.91	0.178	464.88	463.31	0
33	459.11	460.85	13	466.91	0.343	464.88	463.31	0
36	458.46	460.85	13	466.91	0.388	464.88	463.31	0
39	457.88	460.85	13	466.91	0.456	464.88	463.31	0
42	457.43	460.85	13	466.91	0.598	464.88	463.31	0
45	457.17	460.85	13	466.91	0.715	464.88	463.31	0
48	457.12	460.85	13	466.91	0.585	464.88	463.31	0
51	456.97	460.85	13	466.91	0.61	464.88	463.31	0
54	456.86	460.85	13	466.91	0.697	464.88	463.31	0
57	456.69	460.85	13	466.91	0.768	464.88	463.31	0
60	456.65	460.85	13	466.91	0.993	464.88	463.31	0
63	456.4	460.85	13	466.91	1.119	464.88	463.31	0
66	456.34	460.85	13	466.91	1.006	464.88	463.31	0
69	456.21	460.85	13	466.91	0.967	464.88	463.31	0
72	456.27	460.85	13	466.91	1.074	464.88	463.31	0
75	456.31	460.85	13	466.91	1.034	464.88	463.31	0
78	456.35	460.85	13	466.91	1.097	464.88	463.31	0
81	456.34	460.85	13	466.91	0.994	464.88	463.31	0
84	456.26	460.85	13	466.91	1.237	464.88	463.31	0
87	456.2	460.85	13	466.91	1.291	464.88	463.31	0
90	456.15	460.85	13	466.91	1.325	464.88	463.31	0

93	456.06	460.85	13	466.91	1.448	464.88	463.31	0
96	455.99	460.85	13	466.91	1.568	464.88	463.31	0
99	455.91	460.85	13	466.91	1.398	464.88	463.31	0
102	455.71	460.85	13	466.91	1.483	464.88	463.31	0
105	455.66	460.85	13	466.91	1.472	464.88	463.31	0
108	455.68	460.85	13	466.91	1.516	464.88	463.31	0
111	455.8	460.85	13	466.91	1.883	464.88	463.31	0
114	455.82	460.85	13	466.91	1.92	464.88	463.31	0
117	455.81	460.85	13	466.91	1.676	464.88	463.31	0
120	455.71	460.85	13	466.91	1.446	464.88	463.31	0
123	455.72	460.85	2	466.91	1.542	464.88	463.31	0
126	455.66	460.85	2	466.91	1.764	464.88	463.31	0
129	455.64	460.85	2	466.91	1.627	464.88	463.31	0
132	455.64	460.85	2	466.91	1.61	464.88	463.31	0
135	455.65	460.85	2	466.91	1.584	464.88	463.31	0
138	455.64	460.85	2	466.91	2.098	464.88	463.31	0
141	455.55	460.85	2	466.91	1.957	464.88	463.31	0
144	455.49	460.85	2	466.91	1.815	464.88	463.31	0
147	455.44	460.85	2	466.91	1.746	464.88	463.31	0
150	455.41	460.85	2	466.91	1.574	464.88	463.31	0
153	455.44	460.85	2	466.91	1.709	464.88	463.31	0
156	455.35	460.85	2	466.91	1.864	464.88	463.31	0
159	455.31	460.85	2	466.91	2.136	464.88	463.31	0
162	455.15	460.85	2	466.91	2.287	464.88	463.31	0
165	455.07	460.85	2	466.91	2.121	464.88	463.31	0
168	455.02	460.85	2	466.91	2.166	464.88	463.31	0
171	455	460.85	2	466.91	2.044	464.88	463.31	0
174	455.02	460.85	2	466.91	1.681	464.88	463.31	0
177	454.96	460.85	2	466.91	1.807	464.88	463.31	0
180	455.02	460.85	6	466.91	2.114	464.88	463.31	0
183	455.01	460.85	6	466.91	2.192	464.88	463.31	0
186	455.06	460.85	6	466.91	2.4	464.88	463.31	0
189	455.04	460.85	6	466.91	2.243	464.88	463.31	0
192	455.04	460.85	6	466.91	2.085	464.88	463.31	0
195	454.92	460.85	6	466.91	2.316	464.88	463.31	0
198	454.82	460.85	6	466.91	2.41	464.88	463.31	0
201	454.81	460.85	6	466.91	2.43	464.88	463.31	0
204	454.73	460.85	6	466.91	2.252	464.88	463.31	0
207	454.8	460.85	6	466.91	2.159	464.88	463.31	0
210	454.82	460.85	6	466.91	2.074	464.88	463.31	0
213	454.93	460.85	6	466.91	2.386	464.88	463.31	0

216	455.05	460.85	6	466.91	2.097	464.88	463.31	0
219	455.08	460.85	6	466.91	2.138	464.88	463.31	0
222	455.1	460.85	6	466.91	2.363	464.88	463.31	0
225	455.09	460.85	6	466.91	2.547	464.88	463.31	0
228	455.22	460.85	6	466.91	2.32	464.88	463.31	0
231	455.27	460.85	6	466.91	2.009	464.88	463.31	0
234	455.27	460.85	6	466.91	2.497	464.88	463.31	0
237	455.33	460.85	6	466.91	2.573	464.88	463.31	0
240	455.28	460.85	6	466.91	2.463	464.88	463.31	0
243	455.29	460.85	6	466.91	2.383	464.88	463.31	0
246	455.1	460.85	6	466.91	2.261	464.88	463.31	0
249	454.98	460.85	6	466.91	2.285	464.88	463.31	0
252	454.9	460.85	6	466.91	2.361	464.88	463.31	0
255	454.8	460.85	6	466.91	2.61	464.88	463.31	0
258	454.66	460.85	6	466.91	2.903	464.88	463.31	0
261	454.76	460.85	6	466.91	2.742	464.88	463.31	0
264	454.77	460.85	6	466.91	2.816	464.88	463.31	0
267	454.56	460.85	6	466.91	2.794	464.88	463.31	0
270	454.5	460.85	6	466.91	2.569	464.88	463.31	0
273	454.58	460.85	6	466.91	3.049	464.88	463.31	0
276	454.55	460.85	6	466.91	3.003	464.88	463.31	0
279	454.74	460.85	6	466.91	2.906	464.88	463.31	0
282	454.85	460.85	6	466.91	3.083	464.88	463.31	0
285	455	460.85	6	466.91	3.028	464.88	463.31	0
288	455.12	460.85	6	466.91	2.892	464.88	463.31	0
291	455.18	460.85	6	466.91	2.749	464.88	463.31	0
294	455.09	460.85	6	466.91	2.686	464.88	463.31	0
297	454.86	460.85	6	466.91	2.817	464.88	463.31	0
300	454.75	460.85	6	466.91	2.548	464.88	463.31	0
303	454.63	460.85	6	466.91	2.529	464.88	463.31	0
306	454.73	460.85	6	466.91	2.465	464.88	463.31	0
309	454.8	460.85	6	466.91	2.511	464.88	463.31	0
312	454.69	460.85	6	466.91	2.409	464.88	463.31	0
315	454.79	460.85	6	466.91	2.304	464.88	463.31	0
318	454.84	460.85	5	466.91	2.593	464.88	463.31	0
321	454.83	460.85	5	466.91	2.627	464.88	463.31	0
324	454.95	460.85	5	466.91	2.543	464.88	463.31	0
327	454.9	460.85	5	466.91	2.5	464.88	463.31	0
330	455.05	460.85	5	466.91	2.774	464.88	463.31	0
333	455.16	460.85	5	466.91	2.681	464.88	463.31	0
336	455.46	460.85	5	466.91	2.766	464.88	463.31	0

339	455.69	460.85	5	466.91	2.731	464.88	463.31	0
342	455.84	460.85	5	466.91	2.982	464.88	463.31	0
345	456.14	460.85	5	466.91	2.969	464.88	463.31	0
348	456.15	460.85	5	466.91	2.737	464.88	463.31	0
351	456.32	460.85	5	466.91	2.427	464.88	463.31	0
354	456.39	460.85	5	466.91	2.142	464.88	463.31	0
357	456.49	460.85	5	466.91	2.268	464.88	463.31	0
360	456.49	460.85	5	466.91	2.315	464.88	463.31	0
363	456.9	460.85	5	466.91	2.035	464.88	463.31	0
366	456.75	460.85	5	466.91	2.531	464.88	463.31	0
369	456.93	460.85	5	466.91	2.082	464.88	463.31	0
372	456.83	460.85	5	466.91	2.514	464.88	463.31	0
375	456.97	460.85	5	466.91	2.435	464.88	463.31	0
378	457.14	460.85	5	466.91	2.265	464.88	463.31	0
381	457.23	460.85	5	466.91	2.28	464.88	463.31	0
384	457.34	460.85	5	466.91	2.056	464.88	463.31	0
387	457.49	460.85	5	466.91	1.944	464.88	463.31	0
390	457.43	460.85	5	466.91	2.023	464.88	463.31	0
393	457.5	460.85	5	466.91	2.149	464.88	463.31	0
396	457.61	460.85	5	466.91	1.872	464.88	463.31	0
399	457.69	460.85	5	466.91	1.665	464.88	463.31	0
402	457.8	460.85	5	466.91	1.735	464.88	463.31	0
405	458.1	460.85	5	466.91	1.849	464.88	463.31	0
408	458.23	460.85	5	466.91	1.531	464.88	463.31	0
411	458.54	460.85	5	466.91	1.557	464.88	463.31	0
414	458.45	460.85	5	466.91	1.546	464.88	463.31	0
417	458.59	460.85	5	466.91	1.714	464.88	463.31	0
420	458.74	460.85	5	466.91	1.827	464.88	463.31	0
423	458.8	460.85	5	466.91	1.692	464.88	463.31	0
426	458.9	460.85	5	466.91	1.628	464.88	463.31	0
429	459.11	460.85	5	466.91	1.512	464.88	463.31	0
432	459.17	460.85	5	466.91	1.532	464.88	463.31	0
435	459.25	460.85	5	466.91	1.339	464.88	463.31	0
438	459.4	460.85	5	466.91	1.439	464.88	463.31	0
441	459.66	460.85	5	466.91	1.313	464.88	463.31	0
444	459.97	460.85	5	466.91	1.438	464.88	463.31	0
447	460.14	460.85	5	466.91	1.486	464.88	463.31	0
450	460.28	460.85	5	466.91	1.408	464.88	463.31	0
453	460.39	460.85	5	466.91	1.345	464.88	463.31	0
456	460.66	460.85	5	466.91	1.383	464.88	463.31	0
459	460.87	0	5	466.91	1.285	464.88	463.31	0

462	461.09	0	5	466.91	1.511	464.88	463.31	0
465	461.43	0	5	466.91	1.193	464.88	463.31	0
468	461.82	0	5	466.91	1.36	464.88	463.31	0
471	461.93	0	15	466.91	1.435	464.88	463.31	0
474	462.04	0	15	466.91	1.152	464.88	463.31	0
477	461.95	0	15	466.91	1.248	464.88	463.31	0
480	461.99	0	15	466.91	1.368	464.88	463.31	0
483	462.08	0	15	466.91	1.631	464.88	463.31	0
486	462.13	0	15	466.91	1.585	464.88	463.31	0
489	462.16	0	15	466.91	1.368	464.88	463.31	0
492	462.12	0	15	466.91	1.46	464.88	463.31	0
495	462.04	0	15	466.91	1.405	464.88	463.31	0
498	461.99	0	15	466.91	1.482	464.88	463.31	0
501	461.72	0	15	466.91	1.422	464.88	463.31	0
504	461.62	0	15	466.91	1.479	464.88	463.31	0
507	461.52	0	15	466.91	1.451	464.88	463.31	0
510	461.55	0	15	466.91	1.551	464.88	463.31	0
513	461.59	0	15	466.91	1.211	464.88	463.31	0
516	461.62	0	15	466.91	1.031	464.88	463.31	0
519	462.02	0	15	466.91	1.041	464.88	463.31	0
522	462.29	0	15	466.91	1.163	464.88	463.31	0
525	462.49	0	15	466.91	1.24	464.88	463.31	0
528	462.62	0	15	466.91	1.489	464.88	463.31	0
531	462.82	0	15	466.91	1.04	464.88	463.31	0
534	462.89	0	15	466.91	0.93	464.88	463.31	0
537	462.91	0	1	466.91	0.848	464.88	463.31	0
540	463.04	0	1	466.91	0.879	464.88	463.31	0
540.8	463.01	0	1	466.91	0.595	464.88	463.31	0
543.8	464.21	0	8	466.91	0.535	464.88	0	0
546.8	465.01	0	8	466.91	0.07	0	0	0
549.8	466.11	0	8	466.91	0.06	0	0	0
552.8	466.91	0	8	466.91	0	0	0	0
554.8	466.67	0	8	466.91	0	0	0	0
558.8	467	0	8	0	0	0	0	0
562.8	467.17	0	8	0	0	0	0	0
566.8	467.27	0	8	0	0	0	0	0
570.8	467.52	0	8	0	0	0	0	0
576.8	467.53	0	8	0	0	0	0	0
582.8	468.37	0	8	0	0	0	0	0
590.8	469.42	0	8	0	0	0	0	0
598.8	470.47	0	8	0	0	0	0	0

606.8	471.42	0	8	0	0	0	0	0

Cross-section: N_1

				High		Middle		Low
Station	**Elevation**	**SZF**	**Substrate/Cover**	**WSEL**	**Velocity**	**WSEL**	**Stage 3**	**WSEL**
0	475.9	0	8	0	0	0	0	0
4	472.5	0	12	0	0	0	0	0
8	471.8	0	12	0	0	0	0	0
12	472.68	0	13	0	0	0	0	0
16	469.79	0	10	0	0	0	0	0
20	469.5	0	10	0	0	0	0	0
24	469.16	0	10	0	0	0	0	0
28	468.73	0	10	0	0	0	0	0
32	468.27	0	10	0	0	0	0	0
36	467.54	0	10	0	0	0	0	0
38	467.11	0	10	467.11	0	0	0	0
42	466.61	0	10	467.11	0.149	0	0	0
46	466.46	0	12	467.11	0.246	0	0	0
50	466.11	0	12	467.11	0.132	0	0	0
54	465.61	0	12	467.11	0.569	0	0	0
58	465.16	0	12	467.11	0.693	465.26	0	0
62	464.76	0	12	467.11	0.925	465.26	0	0
66	464.51	0	12	467.11	1.067	465.26	0	0
68	464.24	0	12	467.11	1.533	465.26	0	0
70	464.08	0	12	467.11	1.727	465.26	0	0
72	464.03	0	12	467.11	1.911	465.26	0	0
74	463.93	0	12	467.11	3.004	465.26	0	0
76	463.67	0	12	467.11	2.664	465.26	0	0
78	463.44	0	12	467.11	2.474	465.26	463.61	0
80	463.22	0	12	467.11	2.26	465.26	463.61	0
82	462.93	0	12	467.11	2.232	465.26	463.61	0
84	462.46	0	12	467.11	2.779	465.26	463.61	0
86	462.27	0	12	467.11	2.811	465.26	463.61	0
88	462.11	0	13	467.11	2.981	465.26	463.61	0
90	461.91	0	13	467.11	3.48	465.26	463.61	0
92	461.71	0	13	467.11	3.604	465.26	463.61	0
94	461.57	0	13	467.11	3.095	465.26	463.61	0
96	461.21	0	13	467.11	3.172	465.26	463.61	0
98	460.85	460.85	13	467.11	2.884	465.26	463.61	0
100	460.66	460.85	13	467.11	2.862	465.26	463.61	0
102	460.36	460.85	13	467.11	3.398	465.26	463.61	0
104	460.17	460.85	13	467.11	2.857	465.26	463.61	0

106	459.99	460.85	13	467.11	2.774	465.26	463.61	0
108	459.66	460.85	13	467.11	3.317	465.26	463.61	0
110	459.56	460.85	13	467.11	3.409	465.26	463.61	0
112	459.44	460.85	13	467.11	3.378	465.26	463.61	0
114	459.32	460.85	13	467.11	3.325	465.26	463.61	0
116	459.28	460.85	13	467.11	2.843	465.26	463.61	0
118	459.2	460.85	13	467.11	2.614	465.26	463.61	0
120	459.15	460.85	13	467.11	3.188	465.26	463.61	0
122	459.13	460.85	13	467.11	3.593	465.26	463.61	0
124	459.02	460.85	13	467.11	3.358	465.26	463.61	0
126	458.99	460.85	13	467.11	3.116	465.26	463.61	0
128	459	460.85	13	467.11	3.236	465.26	463.61	0
130	459	460.85	13	467.11	3.509	465.26	463.61	0
132	459.01	460.85	13	467.11	3.615	465.26	463.61	0
134	459.15	460.85	13	467.11	3.432	465.26	463.61	0
136	459.4	460.85	13	467.11	3.119	465.26	463.61	0
138	459.49	460.85	13	467.11	3.159	465.26	463.61	0
140	459.54	460.85	13	467.11	3.396	465.26	463.61	0
142	459.53	460.85	13	467.11	4.316	465.26	463.61	0
144	459.53	460.85	13	467.11	4.763	465.26	463.61	0
146	459.49	460.85	13	467.11	4.831	465.26	463.61	0
148	459.39	460.85	13	467.11	4.885	465.26	463.61	0
150	459.14	460.85	13	467.11	5.411	465.26	463.61	0
152	459.01	460.85	13	467.11	5.878	465.26	463.61	0
154	458.85	460.85	13	467.11	5.609	465.26	463.61	0
156	458.76	460.85	13	467.11	5.726	465.26	463.61	0
158	458.77	460.85	13	467.11	5.751	465.26	463.61	0
160	458.78	460.85	13	467.11	5.563	465.26	463.61	0
162	458.69	460.85	13	467.11	5.463	465.26	463.61	0
164	458.62	460.85	13	467.11	5.475	465.26	463.61	0
166	458.67	460.85	13	467.11	5.034	465.26	463.61	0
168	458.76	460.85	13	467.11	5.144	465.26	463.61	0
170	458.84	460.85	13	467.11	6.44	465.26	463.61	0
172	459.1	460.85	13	467.11	6.975	465.26	463.61	0
174	459.24	460.85	13	467.11	6.837	465.26	463.61	0
176	459.49	460.85	13	467.11	6.821	465.26	463.61	0
178	459.79	460.85	13	467.11	7.191	465.26	463.61	0
180	459.92	460.85	13	467.11	7.27	465.26	463.61	0
182	459.94	460.85	13	467.11	6.905	465.26	463.61	0
184	459.97	460.85	13	467.11	6.891	465.26	463.61	0
186	460.15	460.85	13	467.11	7.329	465.26	463.61	0

188	460.19	460.85	13	467.11	7.584	465.26	463.61	0
190	460.34	460.85	13	467.11	7.798	465.26	463.61	0
192	460.51	460.85	13	467.11	7.024	465.26	463.61	0
194	460.6	460.85	13	467.11	6.652	465.26	463.61	0
196	460.86	0	13	467.11	6.836	465.26	463.61	0
198	460.92	0	13	467.11	7.524	465.26	463.61	0
200	460.91	0	13	467.11	7.973	465.26	463.61	0
202	460.97	0	13	467.11	7.976	465.26	463.61	0
204	461.04	0	13	467.11	8.712	465.26	463.61	0
206	460.99	0	13	467.11	8.85	465.26	463.61	0
208	460.99	0	13	467.11	8.412	465.26	463.61	0
210	460.93	0	6	467.11	7.826	465.26	463.61	0
212	461	0	6	467.11	8.39	465.26	463.61	0
214	461.23	0	6	467.11	7.795	465.26	463.61	0
216	461.29	0	6	467.11	7.221	465.26	463.61	0
218	461.43	0	6	467.11	7.542	465.26	463.61	0
220	461.44	0	6	467.11	8.029	465.26	463.61	0
222	461.41	0	6	467.11	8.289	465.26	463.61	0
224	461.35	0	6	467.11	8.267	465.26	463.61	0
226	461.32	0	6	467.11	8.498	465.26	463.61	0
228	461.19	0	6	467.11	8.462	465.26	463.61	0
230	460.97	0	6	467.11	7.954	465.26	463.61	0
232	460.95	0	6	467.11	7.571	465.26	463.61	0
234	461.05	0	6	467.11	8.55	465.26	463.61	0
236	460.96	0	6	467.11	8.157	465.26	463.61	0
238	460.82	460.85	6	467.11	7.721	465.26	463.61	0
240	460.77	460.85	6	467.11	7.678	465.26	463.61	0
242	460.78	460.85	6	467.11	7.969	465.26	463.61	0
244	460.68	460.85	6	467.11	7.72	465.26	463.61	0
246	460.61	460.85	6	467.11	7.384	465.26	463.61	0
248	460.6	460.85	6	467.11	6.985	465.26	463.61	0
250	460.58	460.85	6	467.11	6.673	465.26	463.61	0
252	460.66	460.85	6	467.11	6.904	465.26	463.61	0
254	460.71	460.85	6	467.11	7.206	465.26	463.61	0
256	460.55	460.85	6	467.11	7.14	465.26	463.61	0
258	460.47	460.85	6	467.11	6.98	465.26	463.61	0
260	460.62	460.85	6	467.11	6.996	465.26	463.61	0
262	460.65	460.85	6	467.11	6.781	465.26	463.61	0
264	460.65	460.85	6	467.11	6.831	465.26	463.61	0
266	460.64	460.85	6	467.11	6.855	465.26	463.61	0
268	460.62	460.85	6	467.11	6.806	465.26	463.61	0

270	460.63	460.85	6	467.11	7.091	465.26	463.61	0
272	460.73	460.85	6	467.11	7.865	465.26	463.61	0
274	460.79	460.85	6	467.11	8.018	465.26	463.61	0
276	460.88	0	6	467.11	6.514	465.26	463.61	0
278	460.99	0	6	467.11	5.757	465.26	463.61	0
280	461.18	0	6	467.11	6.672	465.26	463.61	0
282	461.25	0	6	467.11	7.392	465.26	463.61	0
284	461.41	0	6	467.11	6.957	465.26	463.61	0
286	461.54	0	6	467.11	6.192	465.26	463.61	0
288	461.67	0	6	467.11	5.56	465.26	463.61	0
290	461.94	0	6	467.11	5.701	465.26	463.61	0
292	462.25	0	6	467.11	6.081	465.26	463.61	0
294	462.64	0	6	467.11	6.109	465.26	463.61	0
296	462.87	0	6	467.11	5.192	465.26	463.61	0
298	463.06	0	13	467.11	4.649	465.26	463.61	0
300	463.15	0	13	467.11	4.727	465.26	463.61	0
302	463.31	0	13	467.11	4.167	465.26	463.61	0
304	463.58	0	13	467.11	4.806	465.26	463.61	0
306	463.71	0	13	467.11	4.611	465.26	0	0
308	463.78	0	13	467.11	4.167	465.26	0	0
310	463.82	0	13	467.11	4.069	465.26	0	0
312	463.88	0	13	467.11	3.579	465.26	0	0
314	464.06	0	12	467.11	3.664	465.26	0	0
316	464.24	0	12	467.11	4.465	465.26	0	0
318	464.12	0	12	467.11	4.669	465.26	0	0
320	464.01	0	12	467.11	4.431	465.26	0	0
322	463.99	0	12	467.11	3.83	465.26	0	0
324	464.07	0	12	467.11	4.119	465.26	0	0
326	464.17	0	12	467.11	5.066	465.26	0	0
328	464.39	0	12	467.11	3.417	465.26	0	0
330	464.45	0	12	467.11	2.497	465.26	0	0
332	464.49	0	12	467.11	3.679	465.26	0	0
334	464.55	0	12	467.11	4.567	465.26	0	0
336	464.56	0	12	467.11	3.733	465.26	0	0
338	464.68	0	12	467.11	1.994	465.26	0	0
340	464.8	0	12	467.11	2.995	465.26	0	0
342	464.76	0	12	467.11	3.48	465.26	0	0
344	464.66	0	12	467.11	2.55	465.26	0	0
346	464.64	0	12	467.11	2.15	465.26	0	0
348	464.65	0	12	467.11	2.561	465.26	0	0
350	464.69	0	12	467.11	3.276	465.26	0	0

352	464.83	0	12	467.11	3.104	465.26	0	0
354	464.83	0	12	467.11	2.354	465.26	0	0
356	464.79	0	12	467.11	1.973	465.26	0	0
358	464.79	0	12	467.11	2.265	465.26	0	0
360	464.77	0	12	467.11	2.337	465.26	0	0
362	464.8	0	12	467.11	1.032	465.26	0	0
364	464.8	0	12	467.11	1.077	465.26	0	0
366	464.77	0	12	467.11	2.382	465.26	0	0
368	464.74	0	12	467.11	2.413	465.26	0	0
370	464.75	0	12	467.11	1.872	465.26	0	0
372	464.83	0	12	467.11	1.914	465.26	0	0
374	464.92	0	12	467.11	1.755	465.26	0	0
376	464.85	0	12	467.11	0.989	465.26	0	0
378	464.72	0	12	467.11	1.192	465.26	0	0
380	464.75	0	12	467.11	1.908	465.26	0	0
382	464.8	0	12	467.11	1.283	465.26	0	0
384	464.83	0	12	467.11	0.545	465.26	0	0
386	464.75	0	12	467.11	0.237	465.26	0	0
388	464.71	0	12	467.11	1.489	465.26	0	0
390	464.73	0	12	467.11	2.318	465.26	0	0
392	464.79	0	12	467.11	1.422	465.26	0	0
394	464.82	0	12	467.11	1.301	465.26	0	0
396	464.86	0	12	467.11	1.121	465.26	0	0
398	464.88	0	12	467.11	1.336	465.26	0	0
400	464.91	0	12	467.11	1.639	465.26	0	0
402	464.91	0	12	467.11	1.704	465.26	0	0
404	464.94	0	12	467.11	1.13	465.26	0	0
406	465.06	0	12	467.11	1.054	465.26	0	0
408	464.98	0	12	467.11	1.186	465.26	0	0
410	464.91	0	12	467.11	0.786	465.26	0	0
412	464.92	0	12	467.11	0.664	465.26	0	0
414	464.99	0	12	467.11	1.043	465.26	0	0
416	464.97	0	12	467.11	1.146	465.26	0	0
418	464.85	0	12	467.11	0.73	465.26	0	0
420	464.85	0	12	467.11	0.886	465.26	0	0
422	464.91	0	12	467.11	0.206	465.26	0	0
424	464.85	0	12	467.11	0.44	465.26	0	0
426	464.79	0	12	467.11	0.878	465.26	0	0
428	464.77	0	12	467.11	0.719	465.26	0	0
430	464.75	0	12	467.11	0.58	465.26	0	0
432.9	464.71	0	12	467.11	0.51	465.26	0	0

435.9	464.81	0	12	467.11	0.54	465.26	0	0
438.9	464.76	0	12	467.11	0.45	465.26	0	0
441.9	464.71	0	17	467.11	0.41	465.26	0	0
444.9	464.96	0	17	467.11	0.49	465.26	0	0
447.9	465.36	0	17	467.11	0.39	0	0	0
450.9	465.21	0	17	467.11	0.19	465.26	0	0
453.9	465.96	0	12	467.11	0.19	0	0	0
456.9	467.06	0	12	467.11	0.02	0	0	0
458.7	467.11	0	12	467.11	0	0	0	0
460.9	467.31	0	12	0	0	0	0	0
464.9	467.85	0	12	0	0	0	0	0
468.9	468.46	0	12	0	0	0	0	0
472	471.6	0	12	0	0	0	0	0

Cross-section: R_4

					High	Middle		Low
Station	**Elevation**	**SZF**	**Substrate/Cover**	**WSEL**	**Velocity**	**WSEL**	**Stage 3**	**WSEL**
0	477.62	0	17	0	0	0	0	0
4	475.84	0	17	0	0	0	0	0
8	474.64	0	17	0	0	0	0	0
11	473.87	0	17	0	0	0	0	0
14	472.97	0	17	473.72	0.057	0	0	0
18	473.32	0	17	473.72	0.391	0	0	0
22	473.67	0	10	473.72	0.898	0	0	0
26	473.52	0	10	473.72	0.918	0	0	0
30	473.02	0	10	473.72	1.142	0	0	0
34	472.92	0	10	473.72	1.98	0	0	0
38	472.87	0	13	473.72	2.691	0	0	0
42	472.92	0	13	473.72	3.052	0	0	0
46	472.77	0	14	473.72	2.957	472.84	0	0
50	471.67	0	14	473.72	2.91	472.84	472.29	0
55	471.77	0	14	473.72	3.989	472.84	472.29	0
60	471.38	0	14	473.72	3.128	472.84	472.29	0
65	471.28	0	14	473.72	3.391	472.84	472.29	0
70	471.21	0	14	473.72	2.952	472.84	472.29	0
75	471.17	0	14	473.72	4.225	472.84	472.29	0
80	471.1	0	14	473.72	3.401	472.84	472.29	0
85	471.13	0	14	473.72	4.572	472.84	472.29	0
90	470.96	0	14	473.72	3.678	472.84	472.29	0
95	470.89	0	14	473.72	3.373	472.84	472.29	0
100	471.06	0	14	473.72	4.969	472.84	472.29	0
105	471.11	0	14	473.72	3.187	472.84	472.29	0

110	471.1	0	14	473.72	3.172	472.84	472.29	0
115	471.09	0	14	473.72	5.055	472.84	472.29	0
120	471.11	0	6	473.72	3.367	472.84	472.29	0
125	471.06	0	6	473.72	4.522	472.84	472.29	0
130	471.05	0	6	473.72	2.974	472.84	472.29	0
135	471.17	0	6	473.72	3.159	472.84	472.29	0
140	470.97	0	6	473.72	4.866	472.84	472.29	0
145	470.62	470.73	6	473.72	3.755	472.84	472.29	0
150	470.18	470.73	6	473.72	3.914	472.84	472.29	0
155	470.2	470.73	6	473.72	3.636	472.84	472.29	0
160	470.22	470.73	6	473.72	2.287	472.84	472.29	0
165	470.07	470.73	6	473.72	1.95	472.84	472.29	0
170	469.99	470.73	18	473.72	1.844	472.84	472.29	0
175	470.17	470.73	18	473.72	0.834	472.84	472.29	0
180	470.92	0	18	473.72	1.01	472.84	472.29	0
185	471.62	0	18	473.72	1.067	472.84	472.29	0
190	471.84	0	18	473.72	-0.867	472.84	472.29	0
195	471.27	0	18	473.72	-0.674	472.84	472.29	0
200	471.19	0	18	473.72	-1.154	472.84	472.29	0
205	471.03	0	18	473.72	-1.236	472.84	472.29	0
210	469.92	470.73	18	473.72	0.012	472.84	472.29	0
215	469.65	470.73	18	473.72	0.879	472.84	472.29	0
220	469.92	470.73	18	473.72	1.422	472.84	472.29	0
225	470.6	470.73	15	473.72	3.2	472.84	472.29	0
230	470.35	470.73	15	473.72	3.021	472.84	472.29	0
235	470.31	470.73	15	473.72	4.419	472.84	472.29	0
240	470.18	470.73	15	473.72	4.477	472.84	472.29	0
245	470.37	470.73	15	473.72	4.766	472.84	472.29	0
250	470.62	470.73	15	473.72	4.879	472.84	472.29	0
255	470.69	470.73	15	473.72	5.031	472.84	472.29	0
260	470.65	470.73	15	473.72	3.989	472.84	472.29	0
265	470.44	470.73	15	473.72	4.014	472.84	472.29	0
270	470.49	470.73	15	473.72	5.039	472.84	472.29	0
275	470.11	470.73	15	473.72	5.035	472.84	472.29	0
280	470.24	470.73	15	473.72	5.53	472.84	472.29	0
285	469.73	470.73	15	473.72	4.703	472.84	472.29	0
290	469.78	470.73	15	473.72	4.979	472.84	472.29	0
295	469.86	470.73	15	473.72	4.835	472.84	472.29	0
300	469.6	470.73	15	473.72	4.936	472.84	472.29	0
305	469.31	470.73	15	473.72	5.748	472.84	472.29	0
310	468.95	470.73	15	473.72	4.656	472.84	472.29	0

315	468.79	470.73	15	473.72	4.876	472.84	472.29	0
320	468.7	470.73	15	473.72	4.579	472.84	472.29	0
325	468.21	470.73	15	473.72	3.705	472.84	472.29	0
330	468.39	470.73	15	473.72	3.962	472.84	472.29	0
335	468.88	470.73	15	473.72	4.463	472.84	472.29	0
340	469.73	470.73	15	473.72	4.446	472.84	472.29	0
345	469.8	470.73	15	473.72	2.646	472.84	472.29	0
350	469.33	470.73	15	473.72	3.013	472.84	472.29	0
355	469.28	470.73	15	473.72	1.522	472.84	472.29	0
360	469.57	470.73	15	473.72	0.516	472.84	472.29	0
365	469.7	470.73	15	473.72	0.639	472.84	472.29	0
370	470.09	470.73	15	473.72	-0.254	472.84	472.29	0
375	470.05	470.73	14	473.72	0.135	472.84	472.29	0
380	470.1	470.73	14	473.72	-0.594	472.84	472.29	0
385	470.37	470.73	14	473.72	-0.628	472.84	472.29	0
390	469.88	470.73	14	473.72	-0.363	472.84	472.29	0
395	469.23	470.73	14	473.72	0.136	472.84	472.29	0
400	469.03	470.73	14	473.72	0.548	472.84	472.29	0
405	468.99	470.73	14	473.72	0.84	472.84	472.29	0
410	469.36	470.73	15	473.72	1.624	472.84	472.29	0
415	470.12	470.73	15	473.72	1.631	472.84	472.29	0
420	470.76	0	15	473.72	1.5	472.84	472.29	0
425	470.9	0	15	473.72	3.066	472.84	472.29	0
430	470.95	0	15	473.72	2.987	472.84	472.29	0
435	470.85	0	15	473.72	3.095	472.84	472.29	0
440	471	0	15	473.72	3.148	472.84	472.29	0
445	470.84	0	15	473.72	2.928	472.84	472.29	0
450	470.94	0	15	473.72	3.213	472.84	472.29	0
455	471.17	0	15	473.72	3.972	472.84	472.29	0
460	470.63	470.73	15	473.72	2.168	472.84	472.29	0
465	469.61	470.73	15	473.72	2.902	472.84	472.29	0
470	468.28	470.73	15	473.72	3.049	472.84	472.29	0
475	467.48	470.73	15	473.72	3.432	472.84	472.29	0
480	466.93	470.73	6	473.72	3.624	472.84	472.29	0
485	466.62	470.73	6	473.72	3.517	472.84	472.29	0
490	466.37	470.73	6	473.72	2.746	472.84	472.29	0
495	466.14	470.73	6	473.72	2.601	472.84	472.29	0
500	466.22	470.73	6	473.72	2.169	472.84	472.29	0
505	466.52	470.73	6	473.72	1.264	472.84	472.29	0
510	467.21	470.73	3	473.72	0.318	472.84	472.29	0
515	468.37	470.73	3	473.72	-0.305	472.84	472.29	0

520	469.49	470.73	3	473.72	-0.16	472.84	472.29	0
525	470.37	470.73	3	473.72	0.233	472.84	472.29	0
530	470.62	470.73	3	473.72	-0.077	472.84	472.29	0
535	470.49	470.73	3	473.72	-0.115	472.84	472.29	0
540	470.33	470.73	2	473.72	0.178	472.84	472.29	0
545	470.44	470.73	2	473.72	0.014	472.84	472.29	0
550	471.15	0	2	473.72	-0.239	472.84	472.29	0
555	471.33	0	2	473.72	0.307	472.84	472.29	0
560	471.27	0	2	473.72	-0.413	472.84	472.29	0
565	470.08	470.73	2	473.72	-1.147	472.84	472.29	0
570	467.94	470.73	2	473.72	-0.022	472.84	472.29	0
575	465.86	470.73	2	473.72	0.123	472.84	472.29	0
580	464.46	470.73	2	473.72	0.821	472.84	472.29	0
585	464.77	470.73	2	473.72	0.988	472.84	472.29	0
590	464.75	470.73	2	473.72	0.844	472.84	472.29	0
595	463.55	470.73	6	473.72	1.671	472.84	472.29	0
600	463.26	470.73	6	473.72	2.63	472.84	472.29	0
605	463.54	470.73	6	473.72	3.073	472.84	472.29	0
610	464.46	470.73	6	473.72	3.103	472.84	472.29	0
615	465.73	470.73	6	473.72	2.835	472.84	472.29	0
620	466.79	470.73	6	473.72	2.174	472.84	472.29	0
625	467.64	470.73	6	473.72	2.336	472.84	472.29	0
630	468.96	470.73	6	473.72	2.469	472.84	472.29	0
635	469.65	470.73	6	473.72	2.711	472.84	472.29	0
640	470.09	470.73	6	473.72	2.252	472.84	472.29	0
645	470.05	470.73	6	473.72	3.285	472.84	472.29	0
650	468.93	470.73	13	473.72	3.706	472.84	472.29	0
655	468.38	470.73	13	473.72	3.979	472.84	472.29	0
660	468.57	470.73	13	473.72	4.509	472.84	472.29	0
665	468.36	470.73	13	473.72	4.837	472.84	472.29	0
670	468.19	470.73	13	473.72	3.837	472.84	472.29	0
675	467.67	470.73	13	473.72	3.09	472.84	472.29	0
680	467.32	470.73	13	473.72	1.937	472.84	472.29	0
685	467.61	470.73	13	473.72	0.661	472.84	472.29	0
690	468.14	470.73	13	473.72	0.097	472.84	472.29	0
695	468.67	470.73	3	473.72	0.114	472.84	472.29	0
700	469.36	470.73	3	473.72	-0.202	472.84	472.29	0
705	470.36	470.73	3	473.72	-0.06	472.84	472.29	0
710	471.42	0	3	473.72	0.195	472.84	472.29	0
715	472.05	0	3	473.72	1.488	472.84	472.29	0
720	471.96	0	3	473.72	1.19	472.84	472.29	0

725	471.56	0	3	473.72	1.011	472.84	472.29	0
730	471.09	0	3	473.72	0.844	472.84	472.29	0
735	470.98	0	3	473.72	1.244	472.84	472.29	0
740	470.6	470.73	3	473.72	1.106	472.84	472.29	0
745	470.28	470.73	3	473.72	1.949	472.84	472.29	0
750	469.74	470.73	3	473.72	3.202	472.84	472.29	0
755	469.4	470.73	3	473.72	2.636	472.84	472.29	0
760	469.19	470.73	3	473.72	3.37	472.84	472.29	0
765	469.49	470.73	3	473.72	3.032	472.84	472.29	0
770	469.68	470.73	13	473.72	3.132	472.84	472.29	0
775	469.72	470.73	13	473.72	3.446	472.84	472.29	0
780	470.06	470.73	13	473.72	3.754	472.84	472.29	0
785	470.18	470.73	13	473.72	2.726	472.84	472.29	0
790	470.2	470.73	13	473.72	2.769	472.84	472.29	0
795	470.2	470.73	13	473.72	2.828	472.84	472.29	0
800	470.39	470.73	13	473.72	2.592	472.84	472.29	0
805	470.19	470.73	13	473.72	3.122	472.84	472.29	0
810	470.15	470.73	13	473.72	2.649	472.84	472.29	0
815	470.02	470.73	13	473.72	2.24	472.84	472.29	0
820	470.06	470.73	13	473.72	2.379	472.84	472.29	0
825	470.06	470.73	13	473.72	2.361	472.84	472.29	0
830	469.91	470.73	13	473.72	1.83	472.84	472.29	0
835	469.96	470.73	13	473.72	1.476	472.84	472.29	0
840	469.93	470.73	13	473.72	1.091	472.84	472.29	0
845	469.88	470.73	13	473.72	0.746	472.84	472.29	0
850	469.79	470.73	13	473.72	1.505	472.84	472.29	0
855	469.84	470.73	13	473.72	0.916	472.84	472.29	0
860	469.83	470.73	13	473.72	1.918	472.84	472.29	0
865	470.03	470.73	13	473.72	1.926	472.84	472.29	0
870	470.36	470.73	13	473.72	1.729	472.84	472.29	0
875	470.48	470.73	13	473.72	1.913	472.84	472.29	0
880	470.7	470.73	13	473.72	2.065	472.84	472.29	0
885	470.73	470.73	13	473.72	1.724	472.84	472.29	0
890	470.92	0	3	473.72	1.627	472.84	472.29	0
895	471.17	0	3	473.72	2.152	472.84	472.29	0
900	471.17	0	3	473.72	2.729	472.84	472.29	0
905	471.14	0	3	473.72	2.708	472.84	472.29	0
910	470.87	0	3	473.72	2.499	472.84	472.29	0
915	470.73	470.73	3	473.72	2.488	472.84	472.29	0
920	470.42	470.73	13	473.72	2.476	472.84	472.29	0
925	470.12	470.73	13	473.72	2.221	472.84	472.29	0

930	470.02	470.73	13	473.72	2.99	472.84	472.29	0
935	469.79	470.73	13	473.72	2.699	472.84	472.29	0
940	469.57	470.73	13	473.72	2.436	472.84	472.29	0
945	469.39	470.73	13	473.72	2.258	472.84	472.29	0
950	469.21	470.73	13	473.72	2.331	472.84	472.29	0
955	469.36	470.73	13	473.72	2.288	472.84	472.29	0
960	469.49	470.73	13	473.72	2.425	472.84	472.29	0
965	469.63	470.73	13	473.72	1.579	472.84	472.29	0
970	469.73	470.73	13	473.72	1.393	472.84	472.29	0
975	469.81	470.73	13	473.72	1.474	472.84	472.29	0
980	469.88	470.73	13	473.72	1.612	472.84	472.29	0
985	469.93	470.73	13	473.72	1.86	472.84	472.29	0
990	470.06	470.73	13	473.72	1.38	472.84	472.29	0
995	470.08	470.73	13	473.72	1.79	472.84	472.29	0
1000	470.08	470.73	13	473.72	1.438	472.84	472.29	0
1005	470.06	470.73	13	473.72	1.273	472.84	472.29	0
1010	470.05	470.73	13	473.72	1.547	472.84	472.29	0
1015	470.07	470.73	13	473.72	1.153	472.84	472.29	0
1020	470.13	470.73	13	473.72	1.574	472.84	472.29	0
1025	470.31	470.73	13	473.72	1.275	472.84	472.29	0
1030	470.26	470.73	13	473.72	0.919	472.84	472.29	0
1035	470.44	470.73	6	473.72	0.973	472.84	472.29	0
1040	470.52	470.73	6	473.72	1.047	472.84	472.29	0
1045	470.66	470.73	6	473.72	1.15	472.84	472.29	0
1050	471.04	0	3	473.72	1.146	472.84	472.29	0
1055	471.42	0	3	473.72	1.194	472.84	472.29	0
1060	471.84	0	3	473.72	0.494	472.84	472.29	0
1065	471.98	0	12	473.72	0.965	472.84	472.29	0
1070	471.48	0	12	473.72	1.156	472.84	472.29	0
1075	471.18	0	12	473.72	1.11	472.84	472.29	0
1080	470.99	0	12	473.72	1.591	472.84	472.29	0
1085	470.86	0	6	473.72	1.108	472.84	472.29	0
1090	470.37	470.73	6	473.72	0.663	472.84	472.29	0
1095	470.37	470.73	6	473.72	1.617	472.84	472.29	0
1100	470.57	470.73	6	473.72	1.582	472.84	472.29	0
1105	470.62	470.73	6	473.72	1.683	472.84	472.29	0
1110	470.84	0	6	473.72	1.818	472.84	472.29	0
1115	471.12	0	6	473.72	0.754	472.84	472.29	0
1120	471.1	0	6	473.72	1.167	472.84	472.29	0
1125	471.59	0	6	473.72	0.545	472.84	472.29	0
1130	471.59	0	4	473.72	1.211	472.84	472.29	0

1135	471.26	0	13	473.72	2.047	472.84	472.29	0
1140	470.91	0	13	473.72	1.603	472.84	472.29	0
1145	470.96	0	14	473.72	1.898	472.84	472.29	0
1150	470.74	0	14	473.72	1.748	472.84	472.29	0
1155	470.79	0	14	473.72	2.369	472.84	472.29	0
1160	470.95	0	4	473.72	1.509	472.84	472.29	0
1165	471.15	0	4	473.72	1.705	472.84	472.29	0
1170	471.29	0	4	473.72	1.224	472.84	472.29	0
1175	471.59	0	4	473.72	1.368	472.84	472.29	0
1180	471.77	0	4	473.72	0.49	472.84	472.29	0
1183.6	471.97	0	4	473.72	0.26	472.84	472.29	0
1186.6	472.37	0	4	473.72	0.25	472.84	0	0
1189.6	472.17	0	14	473.72	0.09	472.84	472.29	0
1192.6	472.42	0	14	473.72	-0.08	472.84	0	0
1195.6	472.42	0	14	473.72	-0.12	472.84	0	0
1198.6	472.67	0	14	473.72	-0.16	472.84	0	0
1201.6	472.67	0	14	473.72	-0.19	472.84	0	0
1204.6	472.92	0	14	473.72	-0.06	0	0	0
1207.6	473.12	0	14	473.72	-0.04	0	0	0
1210.1	473.87	0	14	0	0	0	0	0
1213.6	475.85	0	8	0	0	0	0	0

Cross-section: R_3

				High		Middle	Low	
Station	**Elevation**	**SZF**	**Substrate/Cover**	**WSEL**	**Velocity**	**WSEL**	**Stage 3**	**WSEL**
0	478.19	0	10	0	0	0	0	0
4	475.74	0	10	0	0	0	0	0
8	474.84	0	10	0	0	0	0	0
12	474.27	0	10	0	0	0	0	0
16	474.06	0	10	0	0	0	0	0
18.5	473.89	0	10	473.89	0	0	0	0
22	473.69	0	10	473.89	0.368	0	0	0
26	472.59	0	10	473.89	0.552	473.04	0	0
30	473.34	0	10	473.89	0.735	0	0	0
34	473.09	0	4	473.89	1.103	0	0	0
38	472.79	0	4	473.89	1.66	473.04	0	0
42	472.54	0	4	473.89	1.787	473.04	0	0
46	471.89	0	4	473.89	2.036	473.04	472.43	0
50	471.64	0	4	473.89	1.97	473.04	472.43	0
54	471.74	0	4	473.89	2.281	473.04	472.43	0
60	471.31	0	12	473.89	2.388	473.04	472.43	0
65	471.23	0	12	473.89	2.464	473.04	472.43	0

70	471.21	0	4	473.89	2.557	473.04	472.43	0
75	471.06	0	4	473.89	2.81	473.04	472.43	0
80	470.91	0	4	473.89	3.264	473.04	472.43	0
85	470.8	0	4	473.89	3.065	473.04	472.43	0
90	470.75	0	4	473.89	3.477	473.04	472.43	0
95	470.72	470.73	4	473.89	3.503	473.04	472.43	0
100	470.73	470.73	4	473.89	2.861	473.04	472.43	0
105	470.74	0	4	473.89	3.362	473.04	472.43	0
110	470.74	0	12	473.89	2.997	473.04	472.43	0
115	470.67	470.73	12	473.89	2.977	473.04	472.43	0
120	470.65	470.73	4	473.89	2.782	473.04	472.43	0
125	470.62	470.73	4	473.89	3.025	473.04	472.43	0
130	470.75	0	4	473.89	3.377	473.04	472.43	0
135	470.62	470.73	4	473.89	3.359	473.04	472.43	0
140	470.59	470.73	4	473.89	3.388	473.04	472.43	0
145	470.45	470.73	4	473.89	3.024	473.04	472.43	0
150	470.39	470.73	4	473.89	3.3	473.04	472.43	0
155	470.27	470.73	4	473.89	2.839	473.04	472.43	0
160	470.26	470.73	4	473.89	3.429	473.04	472.43	0
165	470.48	470.73	4	473.89	3.667	473.04	472.43	0
170	470.27	470.73	4	473.89	3.342	473.04	472.43	0
175	470.3	470.73	4	473.89	3.904	473.04	472.43	0
180	470.46	470.73	4	473.89	3.415	473.04	472.43	0
185	470.4	470.73	4	473.89	2.841	473.04	472.43	0
190	470.16	470.73	4	473.89	3.11	473.04	472.43	0
195	470.23	470.73	4	473.89	3.177	473.04	472.43	0
200	470.35	470.73	4	473.89	3.203	473.04	472.43	0
205	470.59	470.73	5	473.89	3.901	473.04	472.43	0
210	470.85	0	5	473.89	3.937	473.04	472.43	0
215	470.93	0	5	473.89	4.011	473.04	472.43	0
220	470.75	0	5	473.89	3.97	473.04	472.43	0
225	470.88	0	5	473.89	3.887	473.04	472.43	0
230	470.98	0	4	473.89	4.651	473.04	472.43	0
235	471.08	0	4	473.89	3.781	473.04	472.43	0
240	471	0	4	473.89	4.239	473.04	472.43	0
245	471.09	0	4	473.89	5.001	473.04	472.43	0
250	471.18	0	4	473.89	4.053	473.04	472.43	0
255	471.08	0	4	473.89	4.745	473.04	472.43	0
260	471.07	0	6	473.89	4.699	473.04	472.43	0
265	471.17	0	6	473.89	4.187	473.04	472.43	0
270	471.28	0	6	473.89	4.305	473.04	472.43	0

275	471.3	0	6	473.89	3.784	473.04	472.43	0
280	471.41	0	14	473.89	3.903	473.04	472.43	0
285	471.32	0	14	473.89	4.174	473.04	472.43	0
290	471.27	0	14	473.89	4.081	473.04	472.43	0
295	471.14	0	14	473.89	4.238	473.04	472.43	0
300	471.11	0	14	473.89	3.658	473.04	472.43	0
305	471.13	0	14	473.89	4.062	473.04	472.43	0
310	471	0	14	473.89	3.853	473.04	472.43	0
315	470.93	0	14	473.89	3.253	473.04	472.43	0
320	470.96	0	14	473.89	3.532	473.04	472.43	0
325	471	0	5	473.89	3.655	473.04	472.43	0
330	470.85	0	5	473.89	3.274	473.04	472.43	0
335	470.7	470.73	5	473.89	2.861	473.04	472.43	0
340	470.68	470.73	5	473.89	3.323	473.04	472.43	0
345	470.62	470.73	5	473.89	2.806	473.04	472.43	0
350	470.67	470.73	5	473.89	3.117	473.04	472.43	0
355	470.81	0	5	473.89	3.079	473.04	472.43	0
360	470.83	0	5	473.89	3.4	473.04	472.43	0
365	470.72	470.73	5	473.89	2.821	473.04	472.43	0
370	470.59	470.73	5	473.89	3.125	473.04	472.43	0
375	470.68	470.73	4	473.89	2.672	473.04	472.43	0
380	470.67	470.73	4	473.89	2.928	473.04	472.43	0
385	470.6	470.73	4	473.89	2.571	473.04	472.43	0
390	470.58	470.73	4	473.89	2.576	473.04	472.43	0
395	470.64	470.73	4	473.89	2.279	473.04	472.43	0
400	470.69	470.73	4	473.89	2.423	473.04	472.43	0
405	470.77	0	4	473.89	2.308	473.04	472.43	0
410	470.88	0	4	473.89	2.124	473.04	472.43	0
415	471.08	0	4	473.89	1.894	473.04	472.43	0
420	471.25	0	4	473.89	2.069	473.04	472.43	0
425	471.43	0	4	473.89	2.455	473.04	472.43	0
430	471.5	0	10	473.89	2.146	473.04	472.43	0
435	471.28	0	10	473.89	2.405	473.04	472.43	0
440	471.04	0	12	473.89	2.293	473.04	472.43	0
445	471.12	0	12	473.89	2.245	473.04	472.43	0
450	471.14	0	12	473.89	2.673	473.04	472.43	0
455	471.06	0	12	473.89	2.131	473.04	472.43	0
460	470.99	0	12	473.89	2.063	473.04	472.43	0
465	471.2	0	12	473.89	1.679	473.04	472.43	0
470	471.37	0	12	473.89	2.135	473.04	472.43	0
475	471.45	0	4	473.89	2.216	473.04	472.43	0

480	471.56	0	4	473.89	2.078	473.04	472.43	0
485	471.5	0	4	473.89	2.291	473.04	472.43	0
490	471.54	0	4	473.89	2.288	473.04	472.43	0
495	471.58	0	4	473.89	2.33	473.04	472.43	0
500	471.52	0	3	473.89	2.451	473.04	472.43	0
505	471.55	0	3	473.89	1.987	473.04	472.43	0
510	471.73	0	3	473.89	2.038	473.04	472.43	0
515	471.77	0	3	473.89	1.918	473.04	472.43	0
520	471.89	0	3	473.89	1.814	473.04	472.43	0
525	471.89	0	3	473.89	1.71	473.04	472.43	0
530	471.74	0	3	473.89	1.606	473.04	472.43	0
535	471.7	0	3	473.89	1.769	473.04	472.43	0
540	471.67	0	3	473.89	1.512	473.04	472.43	0
545	471.62	0	3	473.89	2.099	473.04	472.43	0
550	471.57	0	3	473.89	2.302	473.04	472.43	0
555	471.51	0	3	473.89	2.483	473.04	472.43	0
560	471.43	0	3	473.89	2.245	473.04	472.43	0
565	471.31	0	3	473.89	2.449	473.04	472.43	0
570	471.26	0	3	473.89	2.078	473.04	472.43	0
575	471.23	0	3	473.89	2.387	473.04	472.43	0
580	471.31	0	3	473.89	2.373	473.04	472.43	0
585	471.21	0	3	473.89	2.597	473.04	472.43	0
590	471.06	0	3	473.89	2.16	473.04	472.43	0
595	470.99	0	3	473.89	1.968	473.04	472.43	0
600	470.99	0	3	473.89	2.126	473.04	472.43	0
605	471.05	0	3	473.89	2.793	473.04	472.43	0
610	471.09	0	3	473.89	2.912	473.04	472.43	0
615	471.07	0	3	473.89	2.823	473.04	472.43	0
620	471.06	0	3	473.89	2.542	473.04	472.43	0
625	471.04	0	18	473.89	2.651	473.04	472.43	0
630	470.96	0	18	473.89	2.669	473.04	472.43	0
635	470.9	0	18	473.89	2.839	473.04	472.43	0
640	470.78	0	18	473.89	2.677	473.04	472.43	0
645	470.72	470.73	18	473.89	2.58	473.04	472.43	0
650	470.75	0	18	473.89	2.363	473.04	472.43	0
655	470.73	470.73	18	473.89	2.264	473.04	472.43	0
660	470.8	0	18	473.89	2.524	473.04	472.43	0
665	470.82	0	18	473.89	2.739	473.04	472.43	0
670	470.78	0	18	473.89	2.499	473.04	472.43	0
675	470.7	470.73	18	473.89	2.371	473.04	472.43	0
680	470.62	470.73	18	473.89	3.125	473.04	472.43	0

685	470.74	0	3	473.89	2.868	473.04	472.43	0
690	470.77	0	3	473.89	2.792	473.04	472.43	0
695	470.87	0	3	473.89	2.857	473.04	472.43	0
700	471.03	0	3	473.89	2.645	473.04	472.43	0
705	470.88	0	3	473.89	2.719	473.04	472.43	0
710	470.96	0	3	473.89	2.619	473.04	472.43	0
715	470.93	0	3	473.89	2.47	473.04	472.43	0
720	471.09	0	3	473.89	2.382	473.04	472.43	0
725	471.15	0	3	473.89	2.021	473.04	472.43	0
730	471.26	0	3	473.89	2.132	473.04	472.43	0
735	471.28	0	3	473.89	2.585	473.04	472.43	0
740	471.34	0	3	473.89	1.782	473.04	472.43	0
745	471.35	0	3	473.89	1.556	473.04	472.43	0
750	471.41	0	3	473.89	1.785	473.04	472.43	0
755	471.43	0	3	473.89	1.525	473.04	472.43	0
760	471.45	0	3	473.89	1.589	473.04	472.43	0
765	471.51	0	3	473.89	2.062	473.04	472.43	0
770	471.49	0	3	473.89	1.956	473.04	472.43	0
775	471.48	0	3	473.89	2.097	473.04	472.43	0
780	471.51	0	3	473.89	2.109	473.04	472.43	0
785	471.47	0	3	473.89	2.054	473.04	472.43	0
790	471.42	0	3	473.89	1.838	473.04	472.43	0
795	471.39	0	3	473.89	1.993	473.04	472.43	0
800	471.37	0	3	473.89	1.725	473.04	472.43	0
805	471.21	0	3	473.89	1.834	473.04	472.43	0
810	471.1	0	16	473.89	1.757	473.04	472.43	0
815	470.98	0	16	473.89	2.015	473.04	472.43	0
820	470.89	0	16	473.89	1.895	473.04	472.43	0
825	470.84	0	16	473.89	1.889	473.04	472.43	0
830	470.89	0	16	473.89	2.061	473.04	472.43	0
835	470.8	0	16	473.89	2.124	473.04	472.43	0
840	470.75	0	15	473.89	2.217	473.04	472.43	0
845	470.66	470.73	16	473.89	1.903	473.04	472.43	0
850	470.66	470.73	16	473.89	2.173	473.04	472.43	0
855	470.73	470.73	16	473.89	1.618	473.04	472.43	0
860	470.95	0	16	473.89	1.376	473.04	472.43	0
865	471.05	0	16	473.89	1.09	473.04	472.43	0
870	471.16	0	16	473.89	1.032	473.04	472.43	0
875	471.08	0	16	473.89	0.876	473.04	472.43	0
880	471.07	0	16	473.89	0.775	473.04	472.43	0
885	470.93	0	16	473.89	0.979	473.04	472.43	0

890	471.02	0	3	473.89	1.422	473.04	472.43	0
895	471.23	0	3	473.89	1.254	473.04	472.43	0
900	471.28	0	3	473.89	1.139	473.04	472.43	0
905	471.33	0	6	473.89	1.941	473.04	472.43	0
910	471.31	0	6	473.89	2.002	473.04	472.43	0
915	471.34	0	6	473.89	2.719	473.04	472.43	0
920	471.21	0	6	473.89	2.438	473.04	472.43	0
925	470.77	0	6	473.89	2.66	473.04	472.43	0
930	470.59	470.73	6	473.89	2.254	473.04	472.43	0
935	470.67	470.73	6	473.89	2.236	473.04	472.43	0
940	470.93	0	6	473.89	2.35	473.04	472.43	0
945	470.89	0	6	473.89	2.088	473.04	472.43	0
950	470.74	0	6	473.89	2.286	473.04	472.43	0
955	470.91	0	6	473.89	2.458	473.04	472.43	0
960	471.05	0	6	473.89	2.59	473.04	472.43	0
965	470.77	0	6	473.89	2.372	473.04	472.43	0
970	470.7	470.73	6	473.89	2.395	473.04	472.43	0
975	470.76	0	6	473.89	2.43	473.04	472.43	0
980	471.2	0	6	473.89	2.285	473.04	472.43	0
985	471.18	0	6	473.89	2.68	473.04	472.43	0
990	471.03	0	6	473.89	2.31	473.04	472.43	0
995	471.09	0	6	473.89	2.303	473.04	472.43	0
1000	471.03	0	6	473.89	2.27	473.04	472.43	0
1005	471.01	0	6	473.89	2.333	473.04	472.43	0
1010	470.96	0	6	473.89	2.558	473.04	472.43	0
1015	470.98	0	6	473.89	2.417	473.04	472.43	0
1020	471.09	0	6	473.89	2.126	473.04	472.43	0
1025	471.04	0	6	473.89	2.462	473.04	472.43	0
1030	470.75	0	3	473.89	2.598	473.04	472.43	0
1035	470.67	470.73	3	473.89	2.076	473.04	472.43	0
1040	470.97	0	3	473.89	2.579	473.04	472.43	0
1045	471.25	0	3	473.89	2.509	473.04	472.43	0
1050	470.96	0	3	473.89	1.612	473.04	472.43	0
1055	470.56	470.73	3	473.89	1.902	473.04	472.43	0
1060	470.46	470.73	3	473.89	1.9	473.04	472.43	0
1065	470.31	470.73	3	473.89	2.552	473.04	472.43	0
1070	470.37	470.73	3	473.89	1.865	473.04	472.43	0
1075	470.5	470.73	3	473.89	2.281	473.04	472.43	0
1080	470.37	470.73	3	473.89	1.565	473.04	472.43	0
1085	470.49	470.73	3	473.89	2.21	473.04	472.43	0
1090	470.61	470.73	3	473.89	1.998	473.04	472.43	0

1095	470.61	470.73	3	473.89	2.055	473.04	472.43	0
1100	470.58	470.73	13	473.89	1.642	473.04	472.43	0
1105	470.46	470.73	16	473.89	1.666	473.04	472.43	0
1110	470.29	470.73	16	473.89	2.097	473.04	472.43	0
1115	470.26	470.73	16	473.89	1.485	473.04	472.43	0
1120	470.27	470.73	16	473.89	1.442	473.04	472.43	0
1125	470.06	470.73	16	473.89	1.356	473.04	472.43	0
1130	469.97	470.73	16	473.89	1.252	473.04	472.43	0
1135	469.83	470.73	16	473.89	1.063	473.04	472.43	0
1140	469.91	470.73	4	473.89	1.608	473.04	472.43	0
1145	470	470.73	4	473.89	2.119	473.04	472.43	0
1150	470.06	470.73	4	473.89	2.153	473.04	472.43	0
1155	470.02	470.73	4	473.89	1.649	473.04	472.43	0
1160	470.06	470.73	4	473.89	2.026	473.04	472.43	0
1165	470.05	470.73	4	473.89	2.145	473.04	472.43	0
1170	470.08	470.73	4	473.89	1.533	473.04	472.43	0
1175	470.04	470.73	4	473.89	1.972	473.04	472.43	0
1180	470.54	470.73	4	473.89	1.797	473.04	472.43	0
1185	471.04	0	4	473.89	2.314	473.04	472.43	0
1190	471.36	0	4	473.89	2.116	473.04	472.43	0
1195	471.22	0	4	473.89	2.009	473.04	472.43	0
1200	470.59	470.73	4	473.89	2.089	473.04	472.43	0
1205	470.5	470.73	4	473.89	2.149	473.04	472.43	0
1210	470.56	470.73	18	473.89	2.521	473.04	472.43	0
1215	470.61	470.73	18	473.89	2.542	473.04	472.43	0
1220	470.76	0	18	473.89	2.267	473.04	472.43	0
1225	470.9	0	18	473.89	2.069	473.04	472.43	0
1230	470.91	0	15	473.89	2.321	473.04	472.43	0
1235	471.07	0	15	473.89	2.26	473.04	472.43	0
1240	471.21	0	15	473.89	2.108	473.04	472.43	0
1245	471.48	0	3	473.89	2.033	473.04	472.43	0
1246	471.49	0	3	473.89	1.72	473.04	472.43	0
1249	471.59	0	3	473.89	1.55	473.04	472.43	0
1252	471.69	0	3	473.89	1.61	473.04	472.43	0
1255	471.79	0	3	473.89	1.83	473.04	472.43	0
1258	471.94	0	3	473.89	1.52	473.04	472.43	0
1261	472.09	0	3	473.89	1.89	473.04	472.43	0
1264	472.29	0	17	473.89	1.18	473.04	472.43	0
1267	472.99	0	17	473.89	0.2	473.04	0	0
1270	473.34	0	8	473.89	0.28	0	0	0
1273	473.89	0	8	473.89	0	0	0	0

1277	475.06	0	8	0	0	0	0	0
1281	475.98	0	8	0	0	0	0	0
1285	477.39	0	8	0	0	0	0	0

Cross-section: RI_3RC

				High		Middle		Low
Station	**Elevation**	**SZF**	**Substrate/Cover**	**WSEL**	**Velocity**	**WSEL**	**Stage 3**	**WSEL**
0	478.14	0	8	0	0	0	0	0
4	476.33	0	1	0	0	0	0	0
5.5	475.28	0	1	475.28	0	0	0	0
8	474.28	0	1	475.28	0.039	0	0	0
12	473.63	0	12	475.28	0.219	474.27	0	0
16	473.43	0	12	475.28	0.765	474.27	473.45	0
20	473.23	0	4	475.28	1.005	474.27	473.45	0
24	472.98	0	4	475.28	1.191	474.27	473.45	0
28	473.03	0	4	475.28	1.741	474.27	473.45	0
32	473.16	0	4	475.28	1.486	474.27	473.45	0
36	473.16	0	4	475.28	1.711	474.27	473.45	0
40	473.09	0	4	475.28	2.198	474.27	473.45	0
44	473.02	0	4	475.28	1.939	474.27	473.45	0
48	472.91	0	4	475.28	2.323	474.27	473.45	0
52	472.68	0	4	475.28	2.23	474.27	473.45	0
56	472.68	0	4	475.28	2.665	474.27	473.45	0
60	472.47	0	4	475.28	2.029	474.27	473.45	0
64	472.32	0	4	475.28	3.02	474.27	473.45	0
68	472.56	0	4	475.28	2.492	474.27	473.45	0
72	472.54	0	4	475.28	2.601	474.27	473.45	0
76	472.57	0	6	475.28	2.649	474.27	473.45	0
80	472.51	0	4	475.28	3.059	474.27	473.45	0
84	472.6	0	4	475.28	3.077	474.27	473.45	0
88	472.5	0	4	475.28	3.292	474.27	473.45	0
92	472.49	0	4	475.28	3.228	474.27	473.45	0
96	472.39	0	4	475.28	2.825	474.27	473.45	0
100	472.27	472.31	4	475.28	3.222	474.27	473.45	0
104	472.23	472.31	4	475.28	3.392	474.27	473.45	0
108	472.37	0	4	475.28	2.949	474.27	473.45	0
112	472.43	0	4	475.28	3.504	474.27	473.45	0
116	472.28	472.31	4	475.28	3.623	474.27	473.45	0
120	472.28	472.31	4	475.28	3.087	474.27	473.45	0
124	472.23	472.31	4	475.28	3.38	474.27	473.45	0
128	472.09	472.31	4	475.28	2.87	474.27	473.45	0
132	472.18	472.31	4	475.28	3.347	474.27	473.45	0

136	472.11	472.31	4	475.28	3.409	474.27	473.45	0
140	472.1	472.31	4	475.28	3.022	474.27	473.45	0
144	472.1	472.31	4	475.28	3.259	474.27	473.45	0
148	472.02	472.31	4	475.28	3.448	474.27	473.45	0
152	472.12	472.31	4	475.28	2.94	474.27	473.45	0
156	472.25	472.31	4	475.28	3.33	474.27	473.45	0
160	472.23	472.31	4	475.28	3.871	474.27	473.45	0
164	472.1	472.31	4	475.28	3.096	474.27	473.45	0
168	472.31	0	4	475.28	3.739	474.27	473.45	0
172	472.24	472.31	13	475.28	3.093	474.27	473.45	0
176	472.36	0	13	475.28	3.264	474.27	473.45	0
180	472.34	0	13	475.28	3.171	474.27	473.45	0
184	472.1	472.31	13	475.28	3.545	474.27	473.45	0
188	471.96	472.31	13	475.28	3.489	474.27	473.45	0
192	471.69	472.31	13	475.28	3.254	474.27	473.45	0
196	471.65	472.31	13	475.28	3.109	474.27	473.45	0
200	471.7	472.31	4	475.28	3.029	474.27	473.45	0
204	471.66	472.31	4	475.28	3.497	474.27	473.45	0
208	471.65	472.31	4	475.28	3.124	474.27	473.45	0
212	471.55	472.31	4	475.28	3.673	474.27	473.45	0
216	471.63	472.31	4	475.28	3.999	474.27	473.45	0
220	471.73	472.31	4	475.28	4.004	474.27	473.45	0
224	471.53	472.31	4	475.28	3.897	474.27	473.45	0
228	471.56	472.31	4	475.28	3.118	474.27	473.45	0
232	471.5	472.31	4	475.28	2.901	474.27	473.45	0
236	471.41	472.31	4	475.28	3.514	474.27	473.45	0
240	471.65	472.31	4	475.28	3.355	474.27	473.45	0
244	471.45	472.31	4	475.28	3.545	474.27	473.45	0
248	471.45	472.31	4	475.28	3.706	474.27	473.45	0
252	471.49	472.31	15	475.28	3.345	474.27	473.45	0
256	471.44	472.31	15	475.28	3.749	474.27	473.45	0
260	471.51	472.31	15	475.28	3.088	474.27	473.45	0
264	471.47	472.31	15	475.28	2.944	474.27	473.45	0
268	471.43	472.31	15	475.28	3.145	474.27	473.45	0
272	471.49	472.31	15	475.28	2.875	474.27	473.45	0
276	471.49	472.31	15	475.28	3.378	474.27	473.45	0
280	471.68	472.31	15	475.28	3.119	474.27	473.45	0
284	471.73	472.31	15	475.28	3.283	474.27	473.45	0
288	471.89	472.31	15	475.28	2.872	474.27	473.45	0
292	471.8	472.31	15	475.28	3.765	474.27	473.45	0
296	471.52	472.31	15	475.28	2.784	474.27	473.45	0

300	471.46	472.31	15	475.28	2.957	474.27	473.45	0
304	471.53	472.31	15	475.28	3.06	474.27	473.45	0
308	471.59	472.31	15	475.28	3.157	474.27	473.45	0
312	471.45	472.31	15	475.28	3.562	474.27	473.45	0
316	471.41	472.31	4	475.28	3.362	474.27	473.45	0
320	471.34	472.31	4	475.28	3.243	474.27	473.45	0
324	471.54	472.31	4	475.28	3.394	474.27	473.45	0
328	471.66	472.31	4	475.28	3.769	474.27	473.45	0
332	471.65	472.31	4	475.28	3.724	474.27	473.45	0
336	471.47	472.31	4	475.28	3.261	474.27	473.45	0
340	471.35	472.31	4	475.28	3.242	474.27	473.45	0
344	471.28	472.31	4	475.28	3.507	474.27	473.45	0
348	471.25	472.31	4	475.28	3.395	474.27	473.45	0
352	471.29	472.31	4	475.28	3.792	474.27	473.45	0
356	471.15	472.31	4	475.28	3.283	474.27	473.45	0
360	470.96	472.31	4	475.28	3.112	474.27	473.45	0
364	470.84	472.31	4	475.28	2.905	474.27	473.45	0
368	470.95	472.31	6	475.28	2.948	474.27	473.45	0
372	470.99	472.31	6	475.28	3.529	474.27	473.45	0
376	471.26	472.31	6	475.28	3.379	474.27	473.45	0
380	471.45	472.31	6	475.28	3.185	474.27	473.45	0
384	471.5	472.31	4	475.28	3.655	474.27	473.45	0
388	471.52	472.31	4	475.28	3.506	474.27	473.45	0
392	471.46	472.31	4	475.28	3.339	474.27	473.45	0
396	471.57	472.31	4	475.28	3.62	474.27	473.45	0
400	471.66	472.31	4	475.28	3.29	474.27	473.45	0
404	471.66	472.31	4	475.28	3.518	474.27	473.45	0
408	471.62	472.31	4	475.28	3.359	474.27	473.45	0
412	471.69	472.31	6	475.28	3.154	474.27	473.45	0
416	471.72	472.31	6	475.28	3.192	474.27	473.45	0
420	471.78	472.31	6	475.28	3.433	474.27	473.45	0
424	471.78	472.31	6	475.28	3.32	474.27	473.45	0
428	471.82	472.31	4	475.28	3.687	474.27	473.45	0
432	472.02	472.31	4	475.28	3.035	474.27	473.45	0
436	472.38	0	4	475.28	3.169	474.27	473.45	0
440	472.63	0	4	475.28	2.906	474.27	473.45	0
444	472.84	0	3	475.28	2.362	474.27	473.45	0
445.1	472.98	0	3	475.28	2.74	474.27	473.45	0
449.1	473.23	0	3	475.28	2.55	474.27	473.45	0
453.1	473.43	0	3	475.28	2.12	474.27	473.45	0
457.1	473.68	0	3	475.28	1.63	474.27	0	0

461.1	473.98	0	3	475.28	1.56	474.27	0	0
465.1	474.18	0	9	475.28	1.14	474.27	0	0
469.1	474.53	0	9	475.28	0.87	0	0	0
473.1	474.63	0	9	475.28	0.55	0	0	0
477.1	474.83	0	9	475.28	0.28	0	0	0
481.1	475.08	0	9	475.28	0.07	0	0	0
485.1	475.18	0	9	475.28	0.05	0	0	0
489.1	475.13	0	9	475.28	0.03	0	0	0
493.1	475.03	0	9	475.28	0.12	0	0	0
497.1	475.03	0	9	475.28	0.19	0	0	0
501.1	475.08	0	9	475.28	0.02	0	0	0
505.1	475.08	0	9	475.28	0.2	0	0	0
509.1	475.18	0	9	475.28	0.05	0	0	0
513.1	475.23	0	17	475.28	0.35	0	0	0
517.1	474.88	0	17	475.28	0.36	0	0	0
520.1	475.28	0	17	475.28	0	0	0	0
521.1	475.33	0	17	0	0	0	0	0
525	478.14	0	17	0	0	0	0	0

Cross-section: RI_3LC

				High		Middle		Low
Station	**Elevation**	**SZF**	**Substrate/Cover**	**WSEL**	**Velocity**	**WSEL**	**Stage 3**	**WSEL**
0	479.42	0	8	0	0	0	0	0
4	475.07	0	16	475.07	0	0	0	0
6	473.27	0	16	475.07	1.201	474.24	473.55	0
8	472.77	0	16	475.07	1.895	474.24	473.55	0
10	472.47	0	3	475.07	2.313	474.24	473.55	0
12	472.21	0	3	475.07	2.242	474.24	473.55	0
16	471.93	0	3	475.07	2.604	474.24	473.55	0
20	471.95	0	3	475.07	2.444	474.24	473.55	0
24	472.04	0	3	475.07	2.865	474.24	473.55	0
28	471.9	471.91	3	475.07	3.535	474.24	473.55	0
32	471.7	471.91	3	475.07	3.459	474.24	473.55	0
36	471.92	0	3	475.07	3.194	474.24	473.55	0
40	471.71	471.91	3	475.07	2.869	474.24	473.55	0
44	471.82	471.91	3	475.07	2.96	474.24	473.55	0
48	471.82	471.91	3	475.07	2.998	474.24	473.55	0
52	471.66	471.91	3	475.07	3.298	474.24	473.55	0
56	471.65	471.91	6	475.07	2.932	474.24	473.55	0
60	471.73	471.91	6	475.07	2.915	474.24	473.55	0
64	471.98	0	6	475.07	3.338	474.24	473.55	0
68	472.15	0	6	475.07	3.065	474.24	473.55	0

72	471.92	0	6	475.07	3.215	474.24	473.55	0
76	471.72	471.91	6	475.07	2.874	474.24	473.55	0
80	471.85	471.91	6	475.07	3.408	474.24	473.55	0
84	472.11	0	6	475.07	2.674	474.24	473.55	0
88	471.58	471.91	6	475.07	2.836	474.24	473.55	0
92	471.63	471.91	6	475.07	2.817	474.24	473.55	0
96	471.53	471.91	6	475.07	3.407	474.24	473.55	0
100	471.57	471.91	6	475.07	2.797	474.24	473.55	0
104	471.93	0	6	475.07	2.876	474.24	473.55	0
108	472.29	0	6	475.07	3.473	474.24	473.55	0
112	472.15	0	6	475.07	3.296	474.24	473.55	0
116	472.19	0	6	475.07	3.275	474.24	473.55	0
120	472.2	0	6	475.07	3.187	474.24	473.55	0
124	472.22	0	6	475.07	2.848	474.24	473.55	0
128	472.15	0	6	475.07	3.393	474.24	473.55	0
132	472.1	0	6	475.07	2.768	474.24	473.55	0
136	472.03	0	6	475.07	3.205	474.24	473.55	0
140	472.23	0	6	475.07	2.617	474.24	473.55	0
144	472.1	0	6	475.07	2.469	474.24	473.55	0
148	471.86	471.91	6	475.07	3.01	474.24	473.55	0
152	472.08	0	6	475.07	2.889	474.24	473.55	0
156	471.95	0	6	475.07	3.086	474.24	473.55	0
160	471.77	471.91	6	475.07	2.375	474.24	473.55	0
164	471.74	471.91	6	475.07	2.328	474.24	473.55	0
168	471.99	0	6	475.07	2.831	474.24	473.55	0
172	471.9	471.91	6	475.07	2.601	474.24	473.55	0
176	472.46	0	6	475.07	2.313	474.24	473.55	0
180	472.47	0	6	475.07	2.213	474.24	473.55	0
184	472.33	0	6	475.07	2.712	474.24	473.55	0
188	471.93	0	6	475.07	2.422	474.24	473.55	0
192	471.67	471.91	6	475.07	2.543	474.24	473.55	0
196	471.57	471.91	6	475.07	2.68	474.24	473.55	0
200	471.88	471.91	6	475.07	2.93	474.24	473.55	0
204	471.85	471.91	6	475.07	2.603	474.24	473.55	0
208	471.61	471.91	6	475.07	2.381	474.24	473.55	0
212	471.33	471.91	6	475.07	2.502	474.24	473.55	0
216	471.26	471.91	6	475.07	2.837	474.24	473.55	0
220	471.29	471.91	6	475.07	2.63	474.24	473.55	0
224	471.19	471.91	6	475.07	2.557	474.24	473.55	0
228	471.11	471.91	6	475.07	2.458	474.24	473.55	0
232	471.06	471.91	6	475.07	2.583	474.24	473.55	0

236	471.28	471.91	6	475.07	2.221	474.24	473.55	0
240	471.34	471.91	6	475.07	2.334	474.24	473.55	0
244	471.23	471.91	6	475.07	2.658	474.24	473.55	0
248	471.41	471.91	6	475.07	3.055	474.24	473.55	0
252	471.29	471.91	6	475.07	2.689	474.24	473.55	0
256	471.4	471.91	6	475.07	2.498	474.24	473.55	0
260	471.8	471.91	6	475.07	2.615	474.24	473.55	0
264	471.65	471.91	6	475.07	2.36	474.24	473.55	0
268	471.56	471.91	6	475.07	2.697	474.24	473.55	0
272	471.61	471.91	6	475.07	2.296	474.24	473.55	0
276	471.57	471.91	6	475.07	2.151	474.24	473.55	0
280	471.68	471.91	6	475.07	2.459	474.24	473.55	0
284	471.5	471.91	6	475.07	2.577	474.24	473.55	0
288	471.53	471.91	6	475.07	2.466	474.24	473.55	0
292	471.44	471.91	6	475.07	2.58	474.24	473.55	0
296	471.44	471.91	6	475.07	2.655	474.24	473.55	0
300	471.33	471.91	6	475.07	2.675	474.24	473.55	0
304	471.14	471.91	6	475.07	2.357	474.24	473.55	0
308	471.3	471.91	6	475.07	2.859	474.24	473.55	0
312	471.34	471.91	6	475.07	2.859	474.24	473.55	0
316	471.36	471.91	6	475.07	2.292	474.24	473.55	0
320	471.29	471.91	6	475.07	2.329	474.24	473.55	0
324	471.26	471.91	6	475.07	2.668	474.24	473.55	0
328	471.3	471.91	6	475.07	2.201	474.24	473.55	0
332	471.32	471.91	6	475.07	1.945	474.24	473.55	0
336	471.2	471.91	6	475.07	1.578	474.24	473.55	0
340	471.09	471.91	6	475.07	2.593	474.24	473.55	0
344	471.23	471.91	6	475.07	2.412	474.24	473.55	0
348	471.7	471.91	6	475.07	2.272	474.24	473.55	0
352	471.56	471.91	6	475.07	2.748	474.24	473.55	0
356	471.6	471.91	6	475.07	2.765	474.24	473.55	0
360	471.43	471.91	6	475.07	2.683	474.24	473.55	0
364	471.43	471.91	6	475.07	2.854	474.24	473.55	0
368	471.06	471.91	6	475.07	2.642	474.24	473.55	0
372	471.06	471.91	6	475.07	2.968	474.24	473.55	0
376	470.91	471.91	6	475.07	2.947	474.24	473.55	0
380	471.02	471.91	6	475.07	3.121	474.24	473.55	0
384	471.04	471.91	6	475.07	3.303	474.24	473.55	0
388	471.36	471.91	6	475.07	3.086	474.24	473.55	0
392	471.38	471.91	6	475.07	3.065	474.24	473.55	0
396	471.36	471.91	6	475.07	2.665	474.24	473.55	0

400	471.46	471.91	6	475.07	3.081	474.24	473.55	0
404	471.4	471.91	4	475.07	2.822	474.24	473.55	0
408	471.3	471.91	4	475.07	2.668	474.24	473.55	0
412	471.41	471.91	4	475.07	3.351	474.24	473.55	0
416	471.57	471.91	4	475.07	3.201	474.24	473.55	0
420	471.59	471.91	4	475.07	3.338	474.24	473.55	0
424	471.55	471.91	4	475.07	3.492	474.24	473.55	0
428	471.57	471.91	4	475.07	2.823	474.24	473.55	0
432	471.63	471.91	4	475.07	2.834	474.24	473.55	0
436	471.71	471.91	4	475.07	3.2	474.24	473.55	0
440	471.88	471.91	4	475.07	2.075	474.24	473.55	0
444	472.05	0	6	475.07	3.334	474.24	473.55	0
448	471.97	0	6	475.07	3.066	474.24	473.55	0
452	471.95	0	6	475.07	3.605	474.24	473.55	0
456	472.09	0	6	475.07	2.728	474.24	473.55	0
460	472.07	0	6	475.07	3.175	474.24	473.55	0
464	471.94	0	6	475.07	3.273	474.24	473.55	0
468	471.97	0	6	475.07	2.773	474.24	473.55	0
472	472	0	6	475.07	2.557	474.24	473.55	0
476	471.85	471.91	6	475.07	3.229	474.24	473.55	0
480	472.13	0	6	475.07	2.479	474.24	473.55	0
484	472.44	0	6	475.07	2.337	474.24	473.55	0
488	472.31	0	6	475.07	2.243	474.24	473.55	0
492	472.35	0	6	475.07	2.572	474.24	473.55	0
496	472.19	0	6	475.07	2.104	474.24	473.55	0
500	472.24	0	1	475.07	1.787	474.24	473.55	0
504	472.48	0	1	475.07	1.642	474.24	473.55	0
505.2	472.32	0	1	475.07	1.635	474.24	473.55	0
508.2	472.72	0	1	475.07	1.58	474.24	473.55	0
511.2	472.62	0	1	475.07	0.51	474.24	473.55	0
514.2	472.82	0	17	475.07	0.1	474.24	473.55	0
517.2	473.27	0	17	475.07	-0.05	474.24	473.55	0
520.2	473.77	0	17	475.07	-0.08	474.24	0	0
523.2	474.17	0	3	475.07	-0.07	474.24	0	0
525.2	475.07	0	1	475.07	0	0	0	0
529.2	476.61	0	1	0	0	0	0	0
533	479.42	0	1	0	0	0	0	0

Cross-section: RI_2RC

				High		Middle		Low
Station	**Elevation**	**SZF**	**Substrate/Cover**	**WSEL**	**Velocity**	**WSEL**	**Stage 3**	**WSEL**
0	482.11	0	10	0	0	0	0	0

4	480.26	0	10	0	0	0	0	0
8	479.46	0	10	0	0	0	0	0
12	477.95	0	10	478.5	0	0	0	0
16	478.35	0	10	478.5	0	0	0	0
18	478	0	3	478.5	0.499	0	0	0
22	477.7	0	3	478.5	1.559	477.82	0	0
26	477.2	0	3	478.5	1.878	477.82	477.36	0
30	476.8	477.1	3	478.5	2.139	477.82	477.36	0
34	476.65	477.1	6	478.5	2.325	477.82	477.36	0
36	476.52	477.1	6	478.5	1.793	477.82	477.36	0
40	476.36	477.1	6	478.5	2.372	477.82	477.36	0
44	476.26	477.1	14	478.5	2.182	477.82	477.36	0
48	476.25	477.1	14	478.5	2.183	477.82	477.36	0
52	476.08	477.1	14	478.5	2.806	477.82	477.36	0
56	476.06	477.1	14	478.5	2.069	477.82	477.36	0
60	475.95	477.1	14	478.5	2.36	477.82	477.36	0
64	475.96	477.1	14	478.5	2.961	477.82	477.36	0
68	476.35	477.1	16	478.5	2.977	477.82	477.36	0
72	476.09	477.1	16	478.5	2.755	477.82	477.36	0
76	475.94	477.1	16	478.5	2.697	477.82	477.36	0
80	475.72	477.1	16	478.5	2.597	477.82	477.36	0
84	475.46	477.1	16	478.5	2.045	477.82	477.36	0
88	475.59	477.1	16	478.5	3.474	477.82	477.36	0
92	475.59	477.1	15	478.5	3.13	477.82	477.36	0
96	475.54	477.1	15	478.5	2.975	477.82	477.36	0
100	475.79	477.1	15	478.5	3.325	477.82	477.36	0
104	475.88	477.1	15	478.5	2.864	477.82	477.36	0
108	475.94	477.1	15	478.5	2.796	477.82	477.36	0
112	475.78	477.1	15	478.5	2.388	477.82	477.36	0
116	475.69	477.1	15	478.5	2.653	477.82	477.36	0
120	475.65	477.1	15	478.5	3.035	477.82	477.36	0
124	475.58	477.1	15	478.5	2.8	477.82	477.36	0
128	475.55	477.1	15	478.5	3.165	477.82	477.36	0
132	475.51	477.1	15	478.5	3.057	477.82	477.36	0
136	475.56	477.1	15	478.5	2.585	477.82	477.36	0
140	475.75	477.1	15	478.5	3.824	477.82	477.36	0
144	475.83	477.1	15	478.5	2.328	477.82	477.36	0
148	476.13	477.1	15	478.5	3.168	477.82	477.36	0
152	476.09	477.1	15	478.5	3.497	477.82	477.36	0
156	475.86	477.1	15	478.5	2.864	477.82	477.36	0
160	475.38	477.1	15	478.5	2.545	477.82	477.36	0

164	475.17	477.1	15	478.5	3.097	477.82	477.36	0
168	475.16	477.1	15	478.5	3.095	477.82	477.36	0
172	475.21	477.1	16	478.5	2.344	477.82	477.36	0
176	475.41	477.1	16	478.5	2.487	477.82	477.36	0
180	475.92	477.1	16	478.5	2.527	477.82	477.36	0
184	475.96	477.1	16	478.5	2.798	477.82	477.36	0
188	475.8	477.1	16	478.5	3.459	477.82	477.36	0
192	475.93	477.1	16	478.5	2.834	477.82	477.36	0
196	475.55	477.1	16	478.5	2.553	477.82	477.36	0
200	475.61	477.1	16	478.5	3.236	477.82	477.36	0
204	475.8	477.1	16	478.5	2.771	477.82	477.36	0
208	476.16	477.1	16	478.5	3.446	477.82	477.36	0
212	476.03	477.1	16	478.5	2.403	477.82	477.36	0
216	476.1	477.1	16	478.5	2.571	477.82	477.36	0
220	476.21	477.1	16	478.5	2.593	477.82	477.36	0
224	476.24	477.1	16	478.5	2.889	477.82	477.36	0
228	476.14	477.1	16	478.5	2.887	477.82	477.36	0
232	475.9	477.1	16	478.5	3.101	477.82	477.36	0
236	475.8	477.1	16	478.5	2.821	477.82	477.36	0
240	475.55	477.1	16	478.5	2.731	477.82	477.36	0
244	475.53	477.1	16	478.5	2.613	477.82	477.36	0
248	475.56	477.1	15	478.5	2.039	477.82	477.36	0
252	475.54	477.1	15	478.5	2.729	477.82	477.36	0
256	475.54	477.1	15	478.5	2.226	477.82	477.36	0
260	475.43	477.1	15	478.5	2.187	477.82	477.36	0
264	475.57	477.1	15	478.5	2.244	477.82	477.36	0
268	475.65	477.1	15	478.5	1.851	477.82	477.36	0
272	475.59	477.1	15	478.5	2.015	477.82	477.36	0
276	475.54	477.1	15	478.5	2.131	477.82	477.36	0
280	475.5	477.1	15	478.5	2.279	477.82	477.36	0
284	475.55	477.1	15	478.5	1.941	477.82	477.36	0
288	475.4	477.1	15	478.5	2.06	477.82	477.36	0
292	475.32	477.1	18	478.5	2.42	477.82	477.36	0
296	475.17	477.1	18	478.5	2.34	477.82	477.36	0
300	475.11	477.1	18	478.5	2.512	477.82	477.36	0
304	475.09	477.1	18	478.5	2.198	477.82	477.36	0
308	475.28	477.1	18	478.5	2.123	477.82	477.36	0
312	475.4	477.1	18	478.5	2.314	477.82	477.36	0
316	475.62	477.1	18	478.5	2.158	477.82	477.36	0
320	475.99	477.1	18	478.5	2.023	477.82	477.36	0
324	476.21	477.1	18	478.5	2.71	477.82	477.36	0

328	476.29	477.1	18	478.5	3.062	477.82	477.36	0
332	475.96	477.1	18	478.5	2.187	477.82	477.36	0
336	476.21	477.1	18	478.5	2.601	477.82	477.36	0
340	476.44	477.1	18	478.5	2.384	477.82	477.36	0
344	476.54	477.1	18	478.5	2.711	477.82	477.36	0
348	476.51	477.1	18	478.5	1.877	477.82	477.36	0
352	476.45	477.1	18	478.5	2.792	477.82	477.36	0
356	476.36	477.1	18	478.5	1.68	477.82	477.36	0
360	476.19	477.1	18	478.5	2.383	477.82	477.36	0
364	476	477.1	18	478.5	2.398	477.82	477.36	0
368	475.97	477.1	18	478.5	2.868	477.82	477.36	0
372	475.95	477.1	18	478.5	2.922	477.82	477.36	0
376	475.82	477.1	18	478.5	1.814	477.82	477.36	0
380	475.69	477.1	18	478.5	2.483	477.82	477.36	0
384	475.77	477.1	18	478.5	1.863	477.82	477.36	0
388	476.03	477.1	18	478.5	2.536	477.82	477.36	0
392	475.89	477.1	18	478.5	2.378	477.82	477.36	0
396	476.04	477.1	18	478.5	2.34	477.82	477.36	0
400	476.14	477.1	18	478.5	2.734	477.82	477.36	0
404	476.42	477.1	18	478.5	3.239	477.82	477.36	0
408	476.3	477.1	18	478.5	2.744	477.82	477.36	0
412	476.46	477.1	18	478.5	3.712	477.82	477.36	0
416	476.67	477.1	15	478.5	2.923	477.82	477.36	0
420	476.5	477.1	15	478.5	2.199	477.82	477.36	0
424	476.4	477.1	15	478.5	2.568	477.82	477.36	0
428	476.43	477.1	15	478.5	3.159	477.82	477.36	0
432	476.25	477.1	15	478.5	2.737	477.82	477.36	0
436	476.43	477.1	15	478.5	2.014	477.82	477.36	0
440	476.33	477.1	15	478.5	1.884	477.82	477.36	0
444	476.3	477.1	15	478.5	2.948	477.82	477.36	0
448	476.4	477.1	15	478.5	2.305	477.82	477.36	0
452	476.19	477.1	15	478.5	2.529	477.82	477.36	0
456	476.21	477.1	15	478.5	2.884	477.82	477.36	0
460	475.88	477.1	15	478.5	2.198	477.82	477.36	0
464	475.92	477.1	15	478.5	1.815	477.82	477.36	0
468	476.18	477.1	15	478.5	3.082	477.82	477.36	0
472	476.32	477.1	15	478.5	2.514	477.82	477.36	0
476	476.29	477.1	15	478.5	2.544	477.82	477.36	0
480	476.36	477.1	16	478.5	2.765	477.82	477.36	0
484	476.33	477.1	16	478.5	2.156	477.82	477.36	0
488	476.26	477.1	16	478.5	2.652	477.82	477.36	0

492	476.34	477.1	16	478.5	2.188	477.82	477.36	0
496	476.36	477.1	16	478.5	2.259	477.82	477.36	0
500	476.35	477.1	16	478.5	1.761	477.82	477.36	0
504	476.23	477.1	16	478.5	2.086	477.82	477.36	0
508	476.3	477.1	16	478.5	2.112	477.82	477.36	0
512	476.43	477.1	16	478.5	2.31	477.82	477.36	0
516	476.48	477.1	16	478.5	1.896	477.82	477.36	0
520	476.49	477.1	16	478.5	2.529	477.82	477.36	0
524	476.5	477.1	16	478.5	2.6	477.82	477.36	0
528	476.56	477.1	16	478.5	2.193	477.82	477.36	0
532	476.55	477.1	3	478.5	1.969	477.82	477.36	0
536	476.52	477.1	3	478.5	2.045	477.82	477.36	0
540	476.46	477.1	3	478.5	1.928	477.82	477.36	0
544	476.44	477.1	3	478.5	1.762	477.82	477.36	0
548	476.45	477.1	3	478.5	1.242	477.82	477.36	0
552	476.41	477.1	3	478.5	1.827	477.82	477.36	0
554	476.45	477.1	3	478.5	2.06	477.82	477.36	0
557	476.45	477.1	3	478.5	1.78	477.82	477.36	0
560	476.5	477.1	3	478.5	1.85	477.82	477.36	0
563	476.5	477.1	3	478.5	1.65	477.82	477.36	0
566	476.5	477.1	3	478.5	1.64	477.82	477.36	0
569	476.6	477.1	3	478.5	1.39	477.82	477.36	0
572	476.7	477.1	3	478.5	1.11	477.82	477.36	0
575	476.9	477.1	3	478.5	1.09	477.82	477.36	0
578	477	477.1	3	478.5	0.94	477.82	477.36	0
581	477.3	0	3	478.5	1	477.82	477.36	0
584	477.35	0	17	478.5	0.2	477.82	477.36	0
587	477.65	0	17	478.5	-0.13	477.82	0	0
589	478.5	0	8	478.5	0	0	0	0
593	480.55	0	8	0	0	0	0	0
597	482.11	0	8	0	0	0	0	0

Cross-section: RI_2LC

				High		Middle		Low
Station	**Elevation**	**SZF**	**Substrate/Cover**	**WSEL**	**Velocity**	**WSEL**	**Stage 3**	**WSEL**
0	479.34	0	17	0	0	0	0	0
4	478.64	0	17	0	0	0	0	0
7	477.78	0	1	477.78	0	0	0	0
8	477.28	0	1	477.78	-0.154	0	0	0
12	475.98	0	1	477.78	-0.048	476.94	476.29	0
16	476.23	0	1	477.78	-0.052	476.94	476.29	0
20	475.98	0	1	477.78	-0.052	476.94	476.29	0

24	475.83	0	1	477.78	0	476.94	476.29	0
28	475.58	0	1	477.78	0.025	476.94	476.29	0
32	475.23	0	1	477.78	0.085	476.94	476.29	0
36	474.88	0	1	477.78	0.289	476.94	476.29	0
40	474.66	0	6	477.78	0.151	476.94	476.29	0
44	474.53	0	6	477.78	0.171	476.94	476.29	0
48	474.62	0	6	477.78	0.624	476.94	476.29	0
52	474.61	0	6	477.78	0.935	476.94	476.29	0
56	474.7	0	6	477.78	1.696	476.94	476.29	0
60	474.88	0	3	477.78	1.647	476.94	476.29	0
64	475.21	0	3	477.78	1.491	476.94	476.29	0
68	475.48	0	3	477.78	1.69	476.94	476.29	0
72	475.59	0	3	477.78	1.877	476.94	476.29	0
76	475.6	0	3	477.78	2.49	476.94	476.29	0
80	475.55	0	3	477.78	2.324	476.94	476.29	0
84	475.53	0	3	477.78	2.331	476.94	476.29	0
88	475.44	0	3	477.78	2.286	476.94	476.29	0
92	475.37	0	3	477.78	2.305	476.94	476.29	0
96	475.29	0	3	477.78	2.572	476.94	476.29	0
100	475.25	0	3	477.78	2.82	476.94	476.29	0
104	475.17	0	3	477.78	2.621	476.94	476.29	0
108	474.95	0	3	477.78	2.525	476.94	476.29	0
112	474.77	0	3	477.78	3.104	476.94	476.29	0
116	474.78	0	6	477.78	3.365	476.94	476.29	0
120	474.77	0	6	477.78	2.395	476.94	476.29	0
124	474.75	0	6	477.78	2.844	476.94	476.29	0
128	474.74	0	6	477.78	2.504	476.94	476.29	0
132	474.84	0	6	477.78	2.486	476.94	476.29	0
136	474.76	0	6	477.78	2.908	476.94	476.29	0
140	474.77	0	6	477.78	2.975	476.94	476.29	0
144	474.81	0	6	477.78	2.818	476.94	476.29	0
148	474.78	0	6	477.78	2.846	476.94	476.29	0
152	474.68	0	6	477.78	2.786	476.94	476.29	0
156	474.9	0	15	477.78	2.835	476.94	476.29	0
160	474.97	0	15	477.78	2.731	476.94	476.29	0
164	474.94	0	15	477.78	2.471	476.94	476.29	0
168	475.1	0	15	477.78	2.774	476.94	476.29	0
172	475.1	0	18	477.78	3.065	476.94	476.29	0
176	475.17	0	18	477.78	2.836	476.94	476.29	0
180	475.11	0	18	477.78	2.6	476.94	476.29	0
184	474.95	0	18	477.78	2.723	476.94	476.29	0

188	474.93	0		18	477.78	2.934	476.94	476.29	0
192	474.79	0		18	477.78	2.946	476.94	476.29	0
196	474.83	0		18	477.78	2.814	476.94	476.29	0
200	474.79	0		18	477.78	3.208	476.94	476.29	0
204	474.82	0		18	477.78	2.25	476.94	476.29	0
208	474.87	0		18	477.78	2.634	476.94	476.29	0
212	474.81	0		18	477.78	2.09	476.94	476.29	0
216	474.78	0		18	477.78	2.742	476.94	476.29	0
220	474.73	0		18	477.78	2.423	476.94	476.29	0
224	474.8	0		18	477.78	2.664	476.94	476.29	0
228	474.73	0		18	477.78	2.523	476.94	476.29	0
232	474.49	0		18	477.78	2.514	476.94	476.29	0
236	474.45	0		18	477.78	2.55	476.94	476.29	0
240	474.33	0		18	477.78	2.696	476.94	476.29	0
244	474.34	0		6	477.78	2.939	476.94	476.29	0
248	474.36	0		6	477.78	2.83	476.94	476.29	0
252	474.41	0		6	477.78	2.627	476.94	476.29	0
256	474.63	0		6	477.78	2.468	476.94	476.29	0
260	474.89	0		6	477.78	2.686	476.94	476.29	0
264	474.62	0		6	477.78	2.408	476.94	476.29	0
268	474.59	0		6	477.78	2.501	476.94	476.29	0
272	474.35	0		6	477.78	2.089	476.94	476.29	0
276	474.35	0		6	477.78	1.974	476.94	476.29	0
280	474.56	0		6	477.78	1.836	476.94	476.29	0
284	474.54	0		6	477.78	2.044	476.94	476.29	0
288	474.66	0		6	477.78	2.029	476.94	476.29	0
292	474.69	0		6	477.78	2	476.94	476.29	0
296	474.66	0		6	477.78	2.573	476.94	476.29	0
300	474.94	0		6	477.78	2.633	476.94	476.29	0
304	475.16	0		6	477.78	2.093	476.94	476.29	0
308	475.11	0		6	477.78	2.249	476.94	476.29	0
312	474.87	0		6	477.78	2.614	476.94	476.29	0
316	474.97	0		6	477.78	1.925	476.94	476.29	0
320	474.92	0		6	477.78	1.885	476.94	476.29	0
324	475.01	0		6	477.78	2.345	476.94	476.29	0
328	475.18	0		6	477.78	1.885	476.94	476.29	0
332	475.15	0		6	477.78	2.3	476.94	476.29	0
336	475.02	0		6	477.78	2.62	476.94	476.29	0
340	474.74	0		6	477.78	2.598	476.94	476.29	0
344	474.77	0		6	477.78	2.443	476.94	476.29	0
348	475.16	0		6	477.78	2.326	476.94	476.29	0

352	474.66	0	6	477.78	2.155	476.94	476.29	0
356	474.9	0	6	477.78	2.236	476.94	476.29	0
360	474.9	0	6	477.78	2.509	476.94	476.29	0
364	474.9	0	6	477.78	2.358	476.94	476.29	0
368	474.72	0	6	477.78	2.499	476.94	476.29	0
372	474.97	0	6	477.78	2.367	476.94	476.29	0
376	474.65	0	6	477.78	2.619	476.94	476.29	0
380	474.53	0	6	477.78	2.629	476.94	476.29	0
384	475.3	0	6	477.78	2.485	476.94	476.29	0
388	475.03	0	6	477.78	2.653	476.94	476.29	0
392	474.53	0	6	477.78	3.034	476.94	476.29	0
396	474.14	0	15	477.78	3.361	476.94	476.29	0
400	474.01	0	15	477.78	2.37	476.94	476.29	0
404	474.05	0	15	477.78	3.037	476.94	476.29	0
408	473.92	0	15	477.78	2.386	476.94	476.29	0
412	474.01	0	15	477.78	2.818	476.94	476.29	0
416	473.98	0	15	477.78	3.055	476.94	476.29	0
420	474.01	0	15	477.78	2.69	476.94	476.29	0
424	473.95	0	15	477.78	3.149	476.94	476.29	0
428	473.8	0	15	477.78	3.02	476.94	476.29	0
432	473.89	0	15	477.78	3.379	476.94	476.29	0
436	474.05	0	15	477.78	2.934	476.94	476.29	0
440	474.42	0	15	477.78	2.428	476.94	476.29	0
444	474.76	0	15	477.78	3.102	476.94	476.29	0
448	475.24	0	15	477.78	3.357	476.94	476.29	0
452	474.85	0	15	477.78	2.624	476.94	476.29	0
456	474.52	0	15	477.78	2.849	476.94	476.29	0
460	474.32	0	15	477.78	2.676	476.94	476.29	0
464	474.09	0	15	477.78	2.409	476.94	476.29	0
468	474.21	0	15	477.78	2.531	476.94	476.29	0
472	474.15	0	15	477.78	2.51	476.94	476.29	0
476	474.2	0	15	477.78	2.793	476.94	476.29	0
480	474.26	0	15	477.78	2.843	476.94	476.29	0
484	474.33	0	15	477.78	2.413	476.94	476.29	0
488	474.37	0	15	477.78	2.485	476.94	476.29	0
492	474.51	0	15	477.78	2.975	476.94	476.29	0
496	474.55	0	15	477.78	3.318	476.94	476.29	0
500	474.4	0	15	477.78	2.945	476.94	476.29	0
504	474.21	0	15	477.78	3.019	476.94	476.29	0
508	474.19	0	15	477.78	2.86	476.94	476.29	0
512	474.14	0	15	477.78	2.997	476.94	476.29	0

516	474.4	0	15	477.78	2.445	476.94	476.29	0
520	474.67	0	15	477.78	3.058	476.94	476.29	0
524	474.82	0	15	477.78	2.84	476.94	476.29	0
528	474.81	0	15	477.78	3.288	476.94	476.29	0
532	474.76	0	15	477.78	2.935	476.94	476.29	0
536	474.34	0	15	477.78	2.763	476.94	476.29	0
540	474.37	0	15	477.78	2.41	476.94	476.29	0
544	474.65	0	15	477.78	2.96	476.94	476.29	0
548	474.58	0	15	477.78	2.47	476.94	476.29	0
552	474.48	0	6	477.78	2.557	476.94	476.29	0
556	474.73	0	6	477.78	2.664	476.94	476.29	0
560	474.94	0	6	477.78	2.395	476.94	476.29	0
564	474.59	0	6	477.78	2.387	476.94	476.29	0
568	474.32	0	6	477.78	2.336	476.94	476.29	0
572	474.22	0	6	477.78	2.041	476.94	476.29	0
576	474.06	0	6	477.78	2.3	476.94	476.29	0
580	474.01	0	6	477.78	2.244	476.94	476.29	0
584	474	0	6	477.78	2.378	476.94	476.29	0
588	474.14	0	6	477.78	2.33	476.94	476.29	0
592	474.28	0	6	477.78	2.425	476.94	476.29	0
596	474.26	0	6	477.78	1.901	476.94	476.29	0
600	474.15	0	6	477.78	1.845	476.94	476.29	0
604	474.65	0	6	477.78	1.488	476.94	476.29	0
608	474.78	0	6	477.78	1.725	476.94	476.29	0
612	474.52	0	6	477.78	1.403	476.94	476.29	0
616	474.15	0	15	477.78	1.488	476.94	476.29	0
620	474.57	0	15	477.78	1.467	476.94	476.29	0
624	474.92	0	15	477.78	1.438	476.94	476.29	0
628	475.08	0	15	477.78	1.589	476.94	476.29	0
632	474.74	0	15	477.78	1.222	476.94	476.29	0
636	474.52	0	15	477.78	1.849	476.94	476.29	0
640	474.47	0	15	477.78	2.158	476.94	476.29	0
644	474.34	0	15	477.78	1.725	476.94	476.29	0
648	474.38	0	15	477.78	2.232	476.94	476.29	0
652	474.3	0	15	477.78	1.908	476.94	476.29	0
656	474.48	0	15	477.78	2.107	476.94	476.29	0
660	474.43	0	15	477.78	2.665	476.94	476.29	0
664	474.33	0	15	477.78	2.115	476.94	476.29	0
668	474.22	0	15	477.78	2.701	476.94	476.29	0
672	473.93	0	15	477.78	2.637	476.94	476.29	0
676	473.78	473.78	15	477.78	2.691	476.94	476.29	0

680	473.93	0	15	477.78	2.736	476.94	476.29	0
684	473.84	0	15	477.78	3.118	476.94	476.29	0
688	473.78	473.78	15	477.78	2.799	476.94	476.29	0
692	473.8	0	15	477.78	2.895	476.94	476.29	0
696	473.92	0	15	477.78	2.762	476.94	476.29	0
700	474.11	0	15	477.78	2.782	476.94	476.29	0
704	474.2	0	15	477.78	2.442	476.94	476.29	0
708	474.5	0	15	477.78	2.529	476.94	476.29	0
712	474.58	0	15	477.78	2.916	476.94	476.29	0
716	474.82	0	15	477.78	2.264	476.94	476.29	0
720	475.27	0	15	477.78	2.975	476.94	476.29	0
724	475.28	0	15	477.78	1.991	476.94	476.29	0
729	475.23	0	14	477.78	1.68	476.94	476.29	0
732	475.28	0	14	477.78	2.46	476.94	476.29	0
735	475.58	0	14	477.78	2.28	476.94	476.29	0
738	475.88	0	14	477.78	2.33	476.94	476.29	0
741	476.08	0	14	477.78	1.97	476.94	476.29	0
744	476.13	0	14	477.78	2.11	476.94	476.29	0
747	476.38	0	14	477.78	2.13	476.94	0	0
750	476.53	0	14	477.78	1.57	476.94	0	0
753	476.88	0	14	477.78	1.9	476.94	0	0
756	476.93	0	14	477.78	1.53	476.94	0	0
759	477.13	0	14	477.78	0.89	0	0	0
762	477.38	0	14	477.78	1.21	0	0	0
765	477.53	0	14	477.78	0.74	0	0	0
767	477.78	0	10	477.78	0	0	0	0
769	477.91	0	10	0	0	0	0	0
773	478.32	0	10	0	0	0	0	0
777	478.62	0	10	0	0	0	0	0
781	479.34	0	10	0	0	0	0	0

Cross-section: R_2				High		Middle		Low
Station	**Elevation**	**SZF**	**Substrate/Cover**	**WSEL**	**Velocity**	**WSEL**	**Stage 3**	**WSEL**
0	482.81	0	17	0	0	0	0	0
4	479.96	0	9	0	0	0	0	0
8	479.67	0	9	0	0	0	0	0
11	479.6	0	9	479.6	0	0	0	0
12	479.5	0	9	479.6	0	0	0	0
16	479.4	0	9	479.6	0.297	0	0	0
20	479.25	0	9	479.6	0.765	0	0	0
24	479.1	0	9	479.6	0.793	0	0	0

28	478.8	0	16	479.6	1.114	0	0	0
32	478.55	0	16	479.6	1.287	478.79	0	0
36	478.55	0	16	479.6	1.2	478.79	0	0
40	478.3	0	16	479.6	1.256	478.79	0	0
44	477.85	0	3	479.6	1.604	478.79	478.05	0
48	477.7	0	3	479.6	1.863	478.79	478.05	0
52	477.55	0	3	479.6	2.069	478.79	478.05	0
55	477.36	0	3	479.6	1.946	478.79	478.05	0
60	477.06	0	3	479.6	1.681	478.79	478.05	0
65	476.92	0	3	479.6	1.864	478.79	478.05	0
70	476.81	0	3	479.6	1.735	478.79	478.05	0
75	476.73	0	3	479.6	1.596	478.79	478.05	0
80	476.79	0	18	479.6	1.639	478.79	478.05	0
85	476.64	0	18	479.6	1.326	478.79	478.05	0
90	476.76	0	18	479.6	1.517	478.79	478.05	0
95	476.81	0	18	479.6	1.705	478.79	478.05	0
100	476.75	0	18	479.6	1.609	478.79	478.05	0
105	476.7	0	18	479.6	1.426	478.79	478.05	0
110	476.54	0	18	479.6	1.772	478.79	478.05	0
115	476.45	476.5	18	479.6	1.234	478.79	478.05	0
120	476.42	476.5	18	479.6	1.881	478.79	478.05	0
125	476.35	476.5	18	479.6	1.608	478.79	478.05	0
130	476.48	476.5	18	479.6	1.921	478.79	478.05	0
135	476.61	0	18	479.6	1.483	478.79	478.05	0
140	476.61	0	18	479.6	1.688	478.79	478.05	0
145	476.46	476.5	18	479.6	1.418	478.79	478.05	0
150	476.31	476.5	18	479.6	1.691	478.79	478.05	0
155	476.14	476.5	18	479.6	1.861	478.79	478.05	0
160	476.12	476.5	18	479.6	2.13	478.79	478.05	0
165	476.07	476.5	18	479.6	2.02	478.79	478.05	0
170	476.01	476.5	18	479.6	2.089	478.79	478.05	0
175	475.75	476.5	18	479.6	2.309	478.79	478.05	0
180	475.58	476.5	4	479.6	1.695	478.79	478.05	0
185	475.48	476.5	4	479.6	1.893	478.79	478.05	0
190	475.35	476.5	4	479.6	1.931	478.79	478.05	0
195	475.31	476.5	4	479.6	2.054	478.79	478.05	0
200	475.27	476.5	4	479.6	2.467	478.79	478.05	0
205	475.2	476.5	4	479.6	2.117	478.79	478.05	0
210	475.12	476.5	4	479.6	1.953	478.79	478.05	0
215	475.11	476.5	4	479.6	2.609	478.79	478.05	0
220	474.97	476.5	4	479.6	2.177	478.79	478.05	0

225	474.92	476.5	4	479.6	2.173	478.79	478.05	0
230	474.84	476.5	3	479.6	2.309	478.79	478.05	0
235	474.84	476.5	3	479.6	2.47	478.79	478.05	0
240	474.83	476.5	3	479.6	2.493	478.79	478.05	0
245	474.78	476.5	3	479.6	2.56	478.79	478.05	0
250	474.76	476.5	3	479.6	2.599	478.79	478.05	0
255	474.75	476.5	3	479.6	2.539	478.79	478.05	0
260	474.77	476.5	3	479.6	2.593	478.79	478.05	0
265	474.73	476.5	3	479.6	2.894	478.79	478.05	0
270	474.61	476.5	3	479.6	2.543	478.79	478.05	0
275	474.58	476.5	3	479.6	2.627	478.79	478.05	0
280	474.6	476.5	3	479.6	2.618	478.79	478.05	0
285	474.56	476.5	3	479.6	2.718	478.79	478.05	0
290	474.47	476.5	3	479.6	2.46	478.79	478.05	0
295	474.54	476.5	3	479.6	2.629	478.79	478.05	0
300	474.48	476.5	3	479.6	2.716	478.79	478.05	0
305	474.5	476.5	3	479.6	2.792	478.79	478.05	0
310	474.42	476.5	3	479.6	2.706	478.79	478.05	0
315	474.39	476.5	3	479.6	2.842	478.79	478.05	0
320	474.28	476.5	3	479.6	2.073	478.79	478.05	0
325	474.23	476.5	3	479.6	2.638	478.79	478.05	0
330	474.3	476.5	3	479.6	2.091	478.79	478.05	0
335	474.22	476.5	6	479.6	2.237	478.79	478.05	0
340	474.13	476.5	6	479.6	2.029	478.79	478.05	0
345	474.09	476.5	6	479.6	2.066	478.79	478.05	0
350	474.12	476.5	6	479.6	1.836	478.79	478.05	0
355	474.16	476.5	6	479.6	2.098	478.79	478.05	0
360	474.28	476.5	6	479.6	1.896	478.79	478.05	0
365	474.43	476.5	6	479.6	1.433	478.79	478.05	0
370	474.65	476.5	6	479.6	1.883	478.79	478.05	0
375	474.88	476.5	6	479.6	1.646	478.79	478.05	0
380	475.12	476.5	6	479.6	1.951	478.79	478.05	0
385	475.53	476.5	6	479.6	2.382	478.79	478.05	0
390	475.95	476.5	6	479.6	1.969	478.79	478.05	0
395	476.14	476.5	3	479.6	2.053	478.79	478.05	0
400	476.33	476.5	3	479.6	1.445	478.79	478.05	0
405	476.27	476.5	3	479.6	1.737	478.79	478.05	0
410	476.41	476.5	3	479.6	1.947	478.79	478.05	0
415	476.34	476.5	3	479.6	1.697	478.79	478.05	0
420	476.34	476.5	3	479.6	2.011	478.79	478.05	0
425	476.2	476.5	6	479.6	1.972	478.79	478.05	0

430	476.03	476.5	6	479.6	2.41	478.79	478.05	0
435	475.8	476.5	6	479.6	2.073	478.79	478.05	0
440	475.65	476.5	6	479.6	2.102	478.79	478.05	0
445	475.97	476.5	6	479.6	2.03	478.79	478.05	0
450	475.79	476.5	6	479.6	2.127	478.79	478.05	0
455	475.69	476.5	4	479.6	1.892	478.79	478.05	0
460	475.85	476.5	4	479.6	1.745	478.79	478.05	0
465	475.88	476.5	4	479.6	2.052	478.79	478.05	0
470	475.93	476.5	4	479.6	1.74	478.79	478.05	0
475	475.96	476.5	4	479.6	2.278	478.79	478.05	0
480	475.77	476.5	4	479.6	2.199	478.79	478.05	0
485	475.51	476.5	4	479.6	2.177	478.79	478.05	0
490	475.78	476.5	4	479.6	1.853	478.79	478.05	0
495	476.04	476.5	6	479.6	1.763	478.79	478.05	0
500	476.08	476.5	6	479.6	1.91	478.79	478.05	0
505	476.14	476.5	6	479.6	2.12	478.79	478.05	0
510	475.81	476.5	3	479.6	2.155	478.79	478.05	0
515	476.04	476.5	3	479.6	2.302	478.79	478.05	0
520	476.22	476.5	3	479.6	2.161	478.79	478.05	0
525	476.15	476.5	3	479.6	1.559	478.79	478.05	0
530	476.23	476.5	6	479.6	1.979	478.79	478.05	0
535	476.36	476.5	6	479.6	2.391	478.79	478.05	0
540	476.52	0	6	479.6	2.491	478.79	478.05	0
545	476.31	476.5	6	479.6	1.749	478.79	478.05	0
550	476.08	476.5	6	479.6	2.162	478.79	478.05	0
555	475.99	476.5	3	479.6	2.488	478.79	478.05	0
560	476.07	476.5	3	479.6	2.466	478.79	478.05	0
565	476.19	476.5	3	479.6	2.074	478.79	478.05	0
570	476.15	476.5	3	479.6	2.149	478.79	478.05	0
575	476.04	476.5	3	479.6	2.499	478.79	478.05	0
580	476	476.5	3	479.6	1.817	478.79	478.05	0
585	476.16	476.5	3	479.6	2.479	478.79	478.05	0
590	476.13	476.5	3	479.6	2.424	478.79	478.05	0
595	476.34	476.5	3	479.6	2.813	478.79	478.05	0
600	476.16	476.5	3	479.6	2.866	478.79	478.05	0
605	475.85	476.5	3	479.6	2.506	478.79	478.05	0
610	475.81	476.5	3	479.6	1.867	478.79	478.05	0
615	475.94	476.5	3	479.6	2.218	478.79	478.05	0
620	475.95	476.5	3	479.6	1.979	478.79	478.05	0
625	475.91	476.5	3	479.6	2.245	478.79	478.05	0
630	475.88	476.5	3	479.6	2.223	478.79	478.05	0

635	475.79	476.5	3	479.6	1.804	478.79	478.05	0
640	475.66	476.5	3	479.6	2.507	478.79	478.05	0
645	475.75	476.5	6	479.6	2.354	478.79	478.05	0
650	475.75	476.5	6	479.6	2.218	478.79	478.05	0
655	475.8	476.5	6	479.6	2.493	478.79	478.05	0
660	475.54	476.5	3	479.6	2.572	478.79	478.05	0
665	475.52	476.5	3	479.6	2.473	478.79	478.05	0
670	475.55	476.5	3	479.6	1.587	478.79	478.05	0
675	475.65	476.5	3	479.6	2.496	478.79	478.05	0
680	475.75	476.5	3	479.6	2.26	478.79	478.05	0
685	475.73	476.5	3	479.6	2.459	478.79	478.05	0
690	475.64	476.5	3	479.6	2.584	478.79	478.05	0
695	475.6	476.5	6	479.6	2.159	478.79	478.05	0
700	475.69	476.5	6	479.6	2.383	478.79	478.05	0
705	475.5	476.5	6	479.6	2.294	478.79	478.05	0
710	475.42	476.5	6	479.6	2.119	478.79	478.05	0
715	475.47	476.5	6	479.6	2.139	478.79	478.05	0
720	475.45	476.5	6	479.6	2.26	478.79	478.05	0
725	475.43	476.5	4	479.6	2.276	478.79	478.05	0
730	475.37	476.5	4	479.6	2.254	478.79	478.05	0
735	475.4	476.5	4	479.6	1.784	478.79	478.05	0
740	475.42	476.5	4	479.6	1.959	478.79	478.05	0
745	475.45	476.5	4	479.6	2.417	478.79	478.05	0
750	475.5	476.5	4	479.6	2.233	478.79	478.05	0
755	475.6	476.5	4	479.6	2.252	478.79	478.05	0
760	475.54	476.5	4	479.6	2.052	478.79	478.05	0
765	475.48	476.5	4	479.6	1.784	478.79	478.05	0
770	475.46	476.5	4	479.6	2.177	478.79	478.05	0
775	475.45	476.5	4	479.6	1.964	478.79	478.05	0
780	475.52	476.5	4	479.6	2.756	478.79	478.05	0
785	475.6	476.5	4	479.6	2.111	478.79	478.05	0
790	475.7	476.5	4	479.6	2.735	478.79	478.05	0
795	475.8	476.5	4	479.6	2.265	478.79	478.05	0
800	475.7	476.5	4	479.6	2.272	478.79	478.05	0
805	475.9	476.5	4	479.6	1.854	478.79	478.05	0
810	475.97	476.5	15	479.6	2.13	478.79	478.05	0
815	476.22	476.5	15	479.6	1.681	478.79	478.05	0
820	476.58	0	15	479.6	1.832	478.79	478.05	0
825	476.46	476.5	15	479.6	1.835	478.79	478.05	0
830	476.4	476.5	15	479.6	1.374	478.79	478.05	0
835	476.25	476.5	15	479.6	2.09	478.79	478.05	0

840	476.21	476.5	15	479.6	1.847	478.79	478.05	0
845	476.31	476.5	4	479.6	1.836	478.79	478.05	0
850	476.41	476.5	4	479.6	1.411	478.79	478.05	0
855	476.31	476.5	4	479.6	1.435	478.79	478.05	0
860	476.34	476.5	4	479.6	1.768	478.79	478.05	0
865	476.21	476.5	4	479.6	2.019	478.79	478.05	0
870	476.31	476.5	4	479.6	1.728	478.79	478.05	0
875	476.42	476.5	3	479.6	2.095	478.79	478.05	0
880	476.4	476.5	3	479.6	1.999	478.79	478.05	0
885	476.69	0	3	479.6	1.769	478.79	478.05	0
890	476.54	0	3	479.6	2.115	478.79	478.05	0
895	476.58	0	3	479.6	1.911	478.79	478.05	0
900	476.71	0	3	479.6	1.821	478.79	478.05	0
905	476.67	0	3	479.6	1.521	478.79	478.05	0
910	476.58	0	3	479.6	2.013	478.79	478.05	0
915	476.44	476.5	3	479.6	1.797	478.79	478.05	0
920	476.3	476.5	3	479.6	1.285	478.79	478.05	0
925	476.13	476.5	15	479.6	1.881	478.79	478.05	0
930	476.1	476.5	15	479.6	1.571	478.79	478.05	0
935	476.16	476.5	15	479.6	1.888	478.79	478.05	0
940	476.13	476.5	15	479.6	1.164	478.79	478.05	0
945	476.19	476.5	15	479.6	1.457	478.79	478.05	0
950	476.06	476.5	15	479.6	1.719	478.79	478.05	0
955	476.03	476.5	5	479.6	1.75	478.79	478.05	0
960	476.16	476.5	5	479.6	1.853	478.79	478.05	0
965	476.08	476.5	5	479.6	1.683	478.79	478.05	0
970	475.98	476.5	5	479.6	2.001	478.79	478.05	0
975	475.92	476.5	5	479.6	2.007	478.79	478.05	0
980	475.88	476.5	5	479.6	1.42	478.79	478.05	0
985	476.05	476.5	5	479.6	1.82	478.79	478.05	0
990	475.97	476.5	5	479.6	1.516	478.79	478.05	0
995	475.88	476.5	14	479.6	1.751	478.79	478.05	0
1000	475.72	476.5	14	479.6	1.561	478.79	478.05	0
1005	475.79	476.5	14	479.6	1.181	478.79	478.05	0
1010	476.03	476.5	14	479.6	1.367	478.79	478.05	0
1015	476.05	476.5	3	479.6	1.608	478.79	478.05	0
1020	476	476.5	3	479.6	1.707	478.79	478.05	0
1025	476	476.5	3	479.6	1.514	478.79	478.05	0
1030	476.13	476.5	3	479.6	1.479	478.79	478.05	0
1035	476.19	476.5	3	479.6	1.507	478.79	478.05	0
1040	476.15	476.5	3	479.6	1.606	478.79	478.05	0

1045	476.12	476.5	14	479.6	1.502	478.79	478.05	0
1050	476.28	476.5	14	479.6	1.476	478.79	478.05	0
1055	476.29	476.5	14	479.6	1.514	478.79	478.05	0
1060	476.35	476.5	14	479.6	1.648	478.79	478.05	0
1065	476.36	476.5	14	479.6	1.626	478.79	478.05	0
1070	476.52	0	14	479.6	1.864	478.79	478.05	0
1075	476.73	0	14	479.6	1.36	478.79	478.05	0
1080	476.95	0	4	479.6	1.605	478.79	478.05	0
1085	476.96	0	4	479.6	2.023	478.79	478.05	0
1090	476.92	0	4	479.6	0.986	478.79	478.05	0
1095	476.69	0	4	479.6	1.327	478.79	478.05	0
1100	476.55	0	4	479.6	1.593	478.79	478.05	0
1105	476.38	476.5	14	479.6	1.682	478.79	478.05	0
1110	476.51	0	14	479.6	1.544	478.79	478.05	0
1115	476.4	476.5	14	479.6	1.54	478.79	478.05	0
1120	476.5	476.5	14	479.6	1.637	478.79	478.05	0
1125	476.64	0	14	479.6	1.589	478.79	478.05	0
1130	476.61	0	14	479.6	1.9	478.79	478.05	0
1135	476.55	0	14	479.6	2.044	478.79	478.05	0
1140	476.63	0	14	479.6	1.612	478.79	478.05	0
1145	476.69	0	14	479.6	1.289	478.79	478.05	0
1150	476.66	0	14	479.6	1.201	478.79	478.05	0
1155	476.47	476.5	14	479.6	1.354	478.79	478.05	0
1160	476.53	0	14	479.6	1.731	478.79	478.05	0
1165	476.61	0	14	479.6	1.7	478.79	478.05	0
1170	476.68	0	14	479.6	1.285	478.79	478.05	0
1175	476.73	0	14	479.6	1.124	478.79	478.05	0
1180	476.63	0	6	479.6	1.322	478.79	478.05	0
1185	476.64	0	6	479.6	1.576	478.79	478.05	0
1190	476.83	0	6	479.6	1.81	478.79	478.05	0
1195	476.8	0	6	479.6	1.955	478.79	478.05	0
1200	476.59	0	6	479.6	1.395	478.79	478.05	0
1205	476.66	0	14	479.6	1.933	478.79	478.05	0
1210	476.53	0	14	479.6	1.299	478.79	478.05	0
1215	476.14	476.5	14	479.6	1.488	478.79	478.05	0
1220	476.28	476.5	14	479.6	1.55	478.79	478.05	0
1225	476.08	476.5	14	479.6	1.546	478.79	478.05	0
1230	476.2	476.5	14	479.6	1.546	478.79	478.05	0
1235	476.09	476.5	4	479.6	1.675	478.79	478.05	0
1240	475.91	476.5	4	479.6	1.686	478.79	478.05	0
1245	475.9	476.5	4	479.6	1.869	478.79	478.05	0

1250	475.99	476.5	3	479.6	1.822	478.79	478.05	0
1255	476.14	476.5	14	479.6	1.861	478.79	478.05	0
1260	476.18	476.5	14	479.6	1.351	478.79	478.05	0
1265	476.24	476.5	14	479.6	1.749	478.79	478.05	0
1270	476.47	476.5	14	479.6	1.559	478.79	478.05	0
1275	476.64	0	14	479.6	1.707	478.79	478.05	0
1280	476.92	0	14	479.6	1.738	478.79	478.05	0
1285	477.12	0	3	479.6	1.637	478.79	478.05	0
1290	477.21	0	3	479.6	1.614	478.79	478.05	0
1295	477.24	0	3	479.6	1.163	478.79	478.05	0
1300	477.26	0	3	479.6	1.355	478.79	478.05	0
1305	477.26	0	3	479.6	1.826	478.79	478.05	0
1310	477.24	0	3	479.6	1.51	478.79	478.05	0
1311.7	477.35	0	3	479.6	1.27	478.79	478.05	0
1314.7	477.45	0	3	479.6	1.47	478.79	478.05	0
1317.7	477.6	0	3	479.6	1.47	478.79	478.05	0
1320.7	477.4	0	3	479.6	1.36	478.79	478.05	0
1323.7	477.6	0	3	479.6	1.46	478.79	478.05	0
1326.7	477.9	0	3	479.6	1.35	478.79	478.05	0
1329.7	477.95	0	4	479.6	1.36	478.79	478.05	0
1332.7	478.15	0	4	479.6	1.35	478.79	0	0
1335.7	478.3	0	4	479.6	1.14	478.79	0	0
1338.7	478.7	0	4	479.6	1.01	478.79	0	0
1341.7	479.1	0	4	479.6	0.69	0	0	0
1344.7	479.5	0	9	479.6	-0.15	0	0	0
1345.8	479.6	0	9	479.6	0	0	0	0
1346.7	479.9	0	9	0	0	0	0	0
1350.7	480.63	0	9	0	0	0	0	0
1354	482.2	0	9	0	0	0	0	0

Cross-section: R_1

				High		Middle		Low
Station	**Elevation**	**SZF**	**Substrate/Cover**	**WSEL**	**Velocity**	**WSEL**	**Stage 3**	**WSEL**
0	485.24	0	17	0	0	0	0	0
4	484.7	0	17	0	0	0	0	0
8	484.07	0	17	0	0	0	0	0
12	483.4	0	17	0	0	0	0	0
16	482.85	0	17	0	0	0	0	0
20	481.77	0	17	0	0	0	0	0
24	481.29	0	17	0	0	0	0	0
28	480.72	0	17	0	0	0	0	0
32	480.23	0	17	480.43	0.447	0	0	0

36	479.83	0	17	480.43	0.877	0	0	0
40	479.43	0	17	480.43	0.823	0	0	0
44	479.28	0	1	480.43	0.98	479.4	0	0
48	479.03	0	1	480.43	1.169	479.4	0	0
52	478.73	0	18	480.43	1.25	479.4	0	0
56	478.28	0	18	480.43	1.337	479.4	478.63	0
60	477.49	0	18	480.43	1.377	479.4	478.63	0
64	477.27	0	18	480.43	1.73	479.4	478.63	0
68	477.03	477.1	18	480.43	1.124	479.4	478.63	0
72	477.05	477.1	18	480.43	0.987	479.4	478.63	0
76	476.96	477.1	18	480.43	1.461	479.4	478.63	0
80	476.97	477.1	18	480.43	1.808	479.4	478.63	0
84	476.73	477.1	18	480.43	2.209	479.4	478.63	0
88	476.73	477.1	18	480.43	1.765	479.4	478.63	0
92	476.75	477.1	18	480.43	2.094	479.4	478.63	0
96	476.75	477.1	18	480.43	1.875	479.4	478.63	0
100	476.37	477.1	3	480.43	1.252	479.4	478.63	0
104	476.12	477.1	3	480.43	2.394	479.4	478.63	0
108	475.97	477.1	3	480.43	1.353	479.4	478.63	0
112	476.06	477.1	3	480.43	1.588	479.4	478.63	0
116	475.94	477.1	3	480.43	2.287	479.4	478.63	0
120	475.66	477.1	4	480.43	1.829	479.4	478.63	0
124	475.04	477.1	4	480.43	1.759	479.4	478.63	0
128	474.66	477.1	4	480.43	1.679	479.4	478.63	0
132	474.85	477.1	6	480.43	1.659	479.4	478.63	0
136	475.31	477.1	6	480.43	1.632	479.4	478.63	0
140	475.29	477.1	6	480.43	2.007	479.4	478.63	0
144	475.15	477.1	6	480.43	1.877	479.4	478.63	0
148	475.08	477.1	6	480.43	1.604	479.4	478.63	0
152	475.19	477.1	6	480.43	2.26	479.4	478.63	0
156	474.95	477.1	6	480.43	2.139	479.4	478.63	0
160	474.81	477.1	5	480.43	1.522	479.4	478.63	0
164	474.33	477.1	5	480.43	1.861	479.4	478.63	0
168	474.1	477.1	5	480.43	2.264	479.4	478.63	0
172	473.99	477.1	5	480.43	1.932	479.4	478.63	0
176	473.76	477.1	5	480.43	2.275	479.4	478.63	0
180	473.88	477.1	5	480.43	2.373	479.4	478.63	0
184	473.95	477.1	5	480.43	2.691	479.4	478.63	0
188	474.28	477.1	6	480.43	2.371	479.4	478.63	0
192	474.14	477.1	6	480.43	1.784	479.4	478.63	0
196	474.15	477.1	6	480.43	2.03	479.4	478.63	0

200	473.86	477.1	6	480.43	1.703	479.4	478.63	0
204	473.68	477.1	6	480.43	2.603	479.4	478.63	0
208	473.73	477.1	6	480.43	2.283	479.4	478.63	0
212	473.78	477.1	6	480.43	2.405	479.4	478.63	0
216	473.59	477.1	6	480.43	1.919	479.4	478.63	0
220	473.84	477.1	6	480.43	2.716	479.4	478.63	0
224	473.79	477.1	6	480.43	1.935	479.4	478.63	0
228	473.95	477.1	6	480.43	3.01	479.4	478.63	0
232	474.27	477.1	6	480.43	2.841	479.4	478.63	0
236	474.67	477.1	6	480.43	3.538	479.4	478.63	0
240	474.86	477.1	6	480.43	2.711	479.4	478.63	0
244	475.22	477.1	6	480.43	3.242	479.4	478.63	0
248	475.77	477.1	6	480.43	2.735	479.4	478.63	0
252	475.78	477.1	6	480.43	2.758	479.4	478.63	0
256	475.41	477.1	6	480.43	2.741	479.4	478.63	0
260	475.25	477.1	6	480.43	2.77	479.4	478.63	0
264	475.33	477.1	6	480.43	2.831	479.4	478.63	0
268	475.31	477.1	6	480.43	2.195	479.4	478.63	0
272	475.15	477.1	6	480.43	1.945	479.4	478.63	0
276	475.11	477.1	6	480.43	2.78	479.4	478.63	0
280	476.6	477.1	3	480.43	2.063	479.4	478.63	0
284	477.99	0	3	480.43	3.447	479.4	478.63	0
288	477.65	0	6	480.43	2.562	479.4	478.63	0
292	476.35	477.1	3	480.43	1.895	479.4	478.63	0
296	475.8	477.1	3	480.43	2.319	479.4	478.63	0
300	475.67	477.1	3	480.43	1.302	479.4	478.63	0
304	475.34	477.1	3	480.43	1.934	479.4	478.63	0
308	475.11	477.1	3	480.43	2.473	479.4	478.63	0
312	475.02	477.1	3	480.43	1.76	479.4	478.63	0
316	474.84	477.1	3	480.43	1.864	479.4	478.63	0
320	474.78	477.1	6	480.43	2.242	479.4	478.63	0
324	474.81	477.1	6	480.43	2.061	479.4	478.63	0
328	474.98	477.1	6	480.43	2.197	479.4	478.63	0
332	474.98	477.1	6	480.43	2.968	479.4	478.63	0
336	474.7	477.1	6	480.43	2.409	479.4	478.63	0
340	474.57	477.1	6	480.43	2.49	479.4	478.63	0
344	474.5	477.1	6	480.43	1.652	479.4	478.63	0
348	474.54	477.1	6	480.43	2.295	479.4	478.63	0
352	474.59	477.1	6	480.43	2.351	479.4	478.63	0
356	474.58	477.1	6	480.43	2.26	479.4	478.63	0
360	474.59	477.1	6	480.43	2.589	479.4	478.63	0

364	474.34	477.1	6	480.43	2.183	479.4	478.63	0
368	474.43	477.1	6	480.43	2.781	479.4	478.63	0
372	474.27	477.1	6	480.43	2.382	479.4	478.63	0
376	474.22	477.1	6	480.43	2.715	479.4	478.63	0
380	474.38	477.1	6	480.43	2.923	479.4	478.63	0
384	474.32	477.1	6	480.43	2.295	479.4	478.63	0
388	474.15	477.1	3	480.43	2.7	479.4	478.63	0
392	474	477.1	3	480.43	2.584	479.4	478.63	0
396	474.06	477.1	3	480.43	2.787	479.4	478.63	0
400	474.14	477.1	3	480.43	2.882	479.4	478.63	0
404	474.15	477.1	3	480.43	2.285	479.4	478.63	0
408	474.21	477.1	3	480.43	2.549	479.4	478.63	0
412	474.29	477.1	3	480.43	2.597	479.4	478.63	0
416	474.31	477.1	3	480.43	2.907	479.4	478.63	0
420	474.22	477.1	3	480.43	2.544	479.4	478.63	0
424	474.31	477.1	3	480.43	2.038	479.4	478.63	0
428	474.65	477.1	3	480.43	2.372	479.4	478.63	0
432	474.85	477.1	3	480.43	2.272	479.4	478.63	0
436	475.01	477.1	3	480.43	2.242	479.4	478.63	0
440	474.93	477.1	3	480.43	2.836	479.4	478.63	0
444	474.87	477.1	3	480.43	2.073	479.4	478.63	0
448	474.86	477.1	3	480.43	2.941	479.4	478.63	0
452	474.95	477.1	3	480.43	2.054	479.4	478.63	0
456	475.02	477.1	3	480.43	2.11	479.4	478.63	0
460	475.16	477.1	3	480.43	2.382	479.4	478.63	0
464	475.32	477.1	3	480.43	1.961	479.4	478.63	0
468	475.47	477.1	3	480.43	1.726	479.4	478.63	0
472	475.71	477.1	3	480.43	2.451	479.4	478.63	0
476	475.64	477.1	3	480.43	1.796	479.4	478.63	0
480	475.7	477.1	2	480.43	2.11	479.4	478.63	0
484	475.74	477.1	2	480.43	2.751	479.4	478.63	0
488	476.07	477.1	2	480.43	2.651	479.4	478.63	0
492	475.89	477.1	2	480.43	1.752	479.4	478.63	0
496	475.98	477.1	2	480.43	2.318	479.4	478.63	0
500	476.12	477.1	2	480.43	2.1	479.4	478.63	0
504	476.27	477.1	2	480.43	2.265	479.4	478.63	0
508	476.39	477.1	2	480.43	2.849	479.4	478.63	0
512	476.45	477.1	2	480.43	1.677	479.4	478.63	0
516	476.19	477.1	6	480.43	2.472	479.4	478.63	0
520	476.24	477.1	6	480.43	1.797	479.4	478.63	0
524	476.44	477.1	6	480.43	2.401	479.4	478.63	0

528	476.39	477.1	6	480.43	2.485	479.4	478.63	0
532	476.61	477.1	6	480.43	2.059	479.4	478.63	0
536	476.58	477.1	6	480.43	2.279	479.4	478.63	0
540	476.63	477.1	6	480.43	2.043	479.4	478.63	0
544	476.55	477.1	6	480.43	3.154	479.4	478.63	0
548	476.52	477.1	6	480.43	2.795	479.4	478.63	0
552	476.54	477.1	6	480.43	2.753	479.4	478.63	0
556	476.46	477.1	6	480.43	2.889	479.4	478.63	0
560	476.38	477.1	6	480.43	2.635	479.4	478.63	0
564	476.19	477.1	6	480.43	1.801	479.4	478.63	0
568	476.17	477.1	6	480.43	2.504	479.4	478.63	0
572	476	477.1	3	480.43	2.125	479.4	478.63	0
576	476.07	477.1	3	480.43	2.482	479.4	478.63	0
580	476.18	477.1	3	480.43	2.299	479.4	478.63	0
584	476.27	477.1	3	480.43	2.543	479.4	478.63	0
588	476.23	477.1	3	480.43	2.663	479.4	478.63	0
592	476.3	477.1	3	480.43	2.55	479.4	478.63	0
596	476.17	477.1	3	480.43	1.681	479.4	478.63	0
600	476.08	477.1	3	480.43	2.208	479.4	478.63	0
604	476.2	477.1	3	480.43	2.034	479.4	478.63	0
608	476.31	477.1	6	480.43	1.945	479.4	478.63	0
612	476.28	477.1	6	480.43	2.179	479.4	478.63	0
616	476.32	477.1	6	480.43	2.047	479.4	478.63	0
620	476.44	477.1	6	480.43	2.466	479.4	478.63	0
624	476.46	477.1	6	480.43	1.771	479.4	478.63	0
628	476.44	477.1	6	480.43	1.78	479.4	478.63	0
632	476.43	477.1	6	480.43	1.788	479.4	478.63	0
636	477.03	477.1	6	480.43	2.024	479.4	478.63	0
640	478.15	0	6	480.43	2.341	479.4	478.63	0
644	478.14	0	6	480.43	2.98	479.4	478.63	0
648	477.79	0	6	480.43	3.345	479.4	478.63	0
652	477.77	0	6	480.43	2.897	479.4	478.63	0
656	478.24	0	6	480.43	3.065	479.4	478.63	0
660	480.43	0	6	480.43	0	0	0	0
664	478.12	0	6	480.43	1.645	479.4	478.63	0
668	477.63	0	6	480.43	1.899	479.4	478.63	0
672	476.84	477.1	6	480.43	1.838	479.4	478.63	0
676	476.52	477.1	6	480.43	2.139	479.4	478.63	0
680	476.8	477.1	6	480.43	2.547	479.4	478.63	0
684	476.65	477.1	6	480.43	2.132	479.4	478.63	0
688	476.61	477.1	6	480.43	2.291	479.4	478.63	0

692	476.72	477.1	6	480.43	2.467	479.4	478.63	0
696	476.67	477.1	6	480.43	2.688	479.4	478.63	0
700	476.46	477.1	6	480.43	1.847	479.4	478.63	0
704	476.27	477.1	6	480.43	2.182	479.4	478.63	0
708	476.31	477.1	6	480.43	2.164	479.4	478.63	0
712	476.55	477.1	6	480.43	2.388	479.4	478.63	0
716	476.64	477.1	6	480.43	2.95	479.4	478.63	0
720	476.59	477.1	6	480.43	2.288	479.4	478.63	0
724	476.44	477.1	6	480.43	2.846	479.4	478.63	0
728	476.69	477.1	6	480.43	2.665	479.4	478.63	0
732	476.85	477.1	6	480.43	2.382	479.4	478.63	0
736	476.86	477.1	6	480.43	2.796	479.4	478.63	0
740	476.76	477.1	6	480.43	2.667	479.4	478.63	0
744	476.72	477.1	6	480.43	2.193	479.4	478.63	0
748	476.89	477.1	6	480.43	2.655	479.4	478.63	0
752	477.08	477.1	6	480.43	2.732	479.4	478.63	0
756	477.21	0	6	480.43	2.431	479.4	478.63	0
760	477.23	0	6	480.43	2.649	479.4	478.63	0
764	477.13	0	6	480.43	2.883	479.4	478.63	0
768	477.02	477.1	6	480.43	2.326	479.4	478.63	0
772	477.07	477.1	6	480.43	2.513	479.4	478.63	0
776	476.74	477.1	6	480.43	3.074	479.4	478.63	0
780	476.91	477.1	6	480.43	2.472	479.4	478.63	0
784	477.24	0	6	480.43	2.067	479.4	478.63	0
788	477.41	0	6	480.43	2.781	479.4	478.63	0
792	477.31	0	6	480.43	2.564	479.4	478.63	0
796	477.36	0	4	480.43	3.066	479.4	478.63	0
800	477.27	0	4	480.43	2.483	479.4	478.63	0
804	477.19	0	4	480.43	2.415	479.4	478.63	0
808	476.7	477.1	4	480.43	2.761	479.4	478.63	0
812	476.69	477.1	4	480.43	2.611	479.4	478.63	0
816	476.69	477.1	4	480.43	2.171	479.4	478.63	0
820	477.05	477.1	4	480.43	2.647	479.4	478.63	0
824	477.17	0	6	480.43	2.818	479.4	478.63	0
828	477.06	477.1	6	480.43	2.423	479.4	478.63	0
832	476.85	477.1	6	480.43	1.723	479.4	478.63	0
836	476.88	477.1	6	480.43	1.848	479.4	478.63	0
840	476.89	477.1	12	480.43	1.991	479.4	478.63	0
844	477.17	0	12	480.43	2.046	479.4	478.63	0
848	477.28	0	12	480.43	2.768	479.4	478.63	0
852	477.3	0	12	480.43	2.71	479.4	478.63	0

856	477.2	0	12	480.43	2.079	479.4	478.63	0
860	477.01	477.1	13	480.43	2.191	479.4	478.63	0
864	476.78	477.1	13	480.43	2.591	479.4	478.63	0
868	476.62	477.1	13	480.43	2.285	479.4	478.63	0
872	476.44	477.1	13	480.43	2.084	479.4	478.63	0
876	476.47	477.1	13	480.43	2.216	479.4	478.63	0
880	476.5	477.1	13	480.43	1.778	479.4	478.63	0
884	476.67	477.1	13	480.43	2.317	479.4	478.63	0
888	476.7	477.1	13	480.43	2.042	479.4	478.63	0
892	476.82	477.1	13	480.43	1.744	479.4	478.63	0
896	477.02	477.1	13	480.43	2.409	479.4	478.63	0
900	476.99	477.1	13	480.43	2.318	479.4	478.63	0
904	476.79	477.1	13	480.43	1.975	479.4	478.63	0
908	476.68	477.1	13	480.43	2.261	479.4	478.63	0
912	476.46	477.1	13	480.43	2.238	479.4	478.63	0
916	476.52	477.1	13	480.43	2.603	479.4	478.63	0
920	476.53	477.1	13	480.43	2.189	479.4	478.63	0
924	476.71	477.1	13	480.43	2.647	479.4	478.63	0
928	476.76	477.1	13	480.43	1.764	479.4	478.63	0
932	476.84	477.1	13	480.43	1.872	479.4	478.63	0
936	477.26	0	13	480.43	2.183	479.4	478.63	0
940	477.02	477.1	13	480.43	2.185	479.4	478.63	0
944	476.84	477.1	13	480.43	2.718	479.4	478.63	0
948	476.98	477.1	13	480.43	2.344	479.4	478.63	0
952	477.23	0	13	480.43	2.174	479.4	478.63	0
956	477.1	477.1	13	480.43	3.038	479.4	478.63	0
960	477.12	0	13	480.43	3.316	479.4	478.63	0
964	477.29	0	13	480.43	3.669	479.4	478.63	0
968	477.24	0	13	480.43	2.716	479.4	478.63	0
972	477.15	0	13	480.43	2.763	479.4	478.63	0
976	477.15	0	13	480.43	2.231	479.4	478.63	0
980	477	477.1	13	480.43	2.251	479.4	478.63	0
984	477.2	0	13	480.43	2.622	479.4	478.63	0
988	476.41	477.1	13	480.43	2.629	479.4	478.63	0
992	476.31	477.1	13	480.43	2.576	479.4	478.63	0
996	476.47	477.1	13	480.43	2.915	479.4	478.63	0
1000	476.93	477.1	13	480.43	3.137	479.4	478.63	0
1004	477.32	0	13	480.43	2.725	479.4	478.63	0
1008	477.06	477.1	13	480.43	2.457	479.4	478.63	0
1012	477.16	0	13	480.43	2.058	479.4	478.63	0
1016	477.22	0	13	480.43	2.37	479.4	478.63	0

1020	477.07	477.1	13	480.43	2.974	479.4	478.63	0
1024	477.33	0	6	480.43	2.635	479.4	478.63	0
1028	477.37	0	6	480.43	2.648	479.4	478.63	0
1032	477.68	0	6	480.43	2.741	479.4	478.63	0
1036	477.65	0	6	480.43	2.95	479.4	478.63	0
1040	477.38	0	6	480.43	2.937	479.4	478.63	0
1044	477.24	0	4	480.43	2.974	479.4	478.63	0
1048	477.21	0	4	480.43	2.319	479.4	478.63	0
1052	477.49	0	4	480.43	2.328	479.4	478.63	0
1056	477.81	0	6	480.43	2.363	479.4	478.63	0
1058.7	478.43	0	6	480.43	2.39	479.4	478.63	0
1061.7	479.13	0	6	480.43	2.32	479.4	0	0
1064.7	478.73	0	6	480.43	1.55	479.4	0	0
1067.7	478.88	0	12	480.43	1.84	479.4	0	0
1070.7	479.18	0	12	480.43	1.1	479.4	0	0
1073.7	479.33	0	12	480.43	0.67	479.4	0	0
1076.7	479.68	0	13	480.43	0.58	0	0	0
1079.7	480.23	0	13	480.43	-0.01	0	0	0
1080.7	480.43	0	13	480.43	0	0	0	0
1081.7	480.22	0	11	480.43	0	0	0	0
1085.7	480.35	0	11	480.43	0	0	0	0
1089.7	480.4	0	11	480.43	0	0	0	0
1093.7	481.08	0	11	0	0	0	0	0
1097.7	481.31	0	11	0	0	0	0	0
1101.7	482.2	0	11	0	0	0	0	0

Cross-section: RI_1RC

				High		Middle		Low
Station	**Elevation**	**SZF**	**Substrate/Cover**	**WSEL**	**Velocity**	**WSEL**	**Stage 3**	**WSEL**
0	484.52	0	8	0	0	0	0	0
4	483.83	0	8	0	0	0	0	0
8	483.37	0	8	0	0	0	0	0
12	483.05	0	8	0	0	0	0	0
13	482.44	0	8	482.44	0	0	0	0
16	481.64	0	3	482.44	0.711	0	0	0
18	480.94	0	3	482.44	0.695	481.43	0	0
20	480.89	0	3	482.44	0.856	481.43	0	0
22	480.84	0	3	482.44	0.817	481.43	0	0
24	480.79	0	3	482.44	0.88	481.43	0	0
26	480.69	0	3	482.44	0.918	481.43	480.76	0
28	480.64	0	3	482.44	0.995	481.43	480.76	0
32	480.58	0	3	482.44	0.823	481.43	480.76	0

36	480.4	0	4	482.44	1.274	481.43	480.76	0
40	480.19	0	4	482.44	1.497	481.43	480.76	0
44	480.18	0	4	482.44	0.752	481.43	480.76	0
48	480.17	0	4	482.44	0.258	481.43	480.76	0
52	480.18	0	4	482.44	1.093	481.43	480.76	0
56	480.1	0	4	482.44	1.386	481.43	480.76	0
60	480.02	0	4	482.44	1.238	481.43	480.76	0
64	479.88	0	4	482.44	1.356	481.43	480.76	0
68	479.8	0	4	482.44	2.788	481.43	480.76	0
72	479.73	0	4	482.44	1.647	481.43	480.76	0
76	479.32	0	4	482.44	1.249	481.43	480.76	0
80	479.17	0	4	482.44	1.383	481.43	480.76	0
84	479.11	0	3	482.44	2.199	481.43	480.76	0
88	479.21	0	3	482.44	1.878	481.43	480.76	0
92	479.39	0	3	482.44	1.521	481.43	480.76	0
96	479.59	0	3	482.44	1.709	481.43	480.76	0
100	479.94	0	3	482.44	0.954	481.43	480.76	0
104	479.79	0	3	482.44	1.335	481.43	480.76	0
108	479.67	0	3	482.44	1.515	481.43	480.76	0
112	479.56	0	3	482.44	1.255	481.43	480.76	0
116	479.66	0	3	482.44	1.84	481.43	480.76	0
120	479.6	0	3	482.44	2.225	481.43	480.76	0
124	479.9	0	3	482.44	2.179	481.43	480.76	0
128	479.92	0	3	482.44	1.549	481.43	480.76	0
132	479.82	0	3	482.44	1.212	481.43	480.76	0
136	479.74	0	6	482.44	1.621	481.43	480.76	0
140	479.64	0	6	482.44	1.866	481.43	480.76	0
144	479.5	0	6	482.44	1.766	481.43	480.76	0
148	479.41	0	6	482.44	1.293	481.43	480.76	0
152	479.42	0	6	482.44	1.315	481.43	480.76	0
156	479.61	0	6	482.44	2.344	481.43	480.76	0
160	479.57	0	6	482.44	2.015	481.43	480.76	0
164	479.56	0	6	482.44	2.263	481.43	480.76	0
168	479.68	0	6	482.44	2.11	481.43	480.76	0
172	479.36	0	6	482.44	1.758	481.43	480.76	0
176	479.32	0	6	482.44	2.489	481.43	480.76	0
180	479.05	0	6	482.44	1.665	481.43	480.76	0
184	478.54	0	12	482.44	2.498	481.43	480.76	0
188	478.38	0	12	482.44	1.622	481.43	480.76	0
192	478.51	0	12	482.44	1.388	481.43	480.76	0
196	478.46	0	12	482.44	2.072	481.43	480.76	0

200	478.26	0	12	482.44	2.162	481.43	480.76	0
204	478.25	0	12	482.44	1.921	481.43	480.76	0
208	478.22	0	12	482.44	1.375	481.43	480.76	0
212	478.13	0	12	482.44	2.015	481.43	480.76	0
216	478.39	0	12	482.44	1.39	481.43	480.76	0
220	478.75	0	12	482.44	2.033	481.43	480.76	0
224	479.29	0	13	482.44	1.548	481.43	480.76	0
228	479.19	0	13	482.44	1.311	481.43	480.76	0
232	479.26	0	13	482.44	2.131	481.43	480.76	0
236	479.28	0	13	482.44	1.446	481.43	480.76	0
240	479.22	0	13	482.44	1.572	481.43	480.76	0
244	479.04	0	13	482.44	1.71	481.43	480.76	0
248	479.03	0	13	482.44	1.453	481.43	480.76	0
252	479.16	0	13	482.44	1.656	481.43	480.76	0
256	479.17	0	13	482.44	1.842	481.43	480.76	0
260	479.05	0	13	482.44	1.178	481.43	480.76	0
264	479.02	0	13	482.44	1.904	481.43	480.76	0
268	478.87	0	13	482.44	1.606	481.43	480.76	0
272	479.05	0	13	482.44	1.151	481.43	480.76	0
276	479.06	0	13	482.44	2.004	481.43	480.76	0
280	479	0	13	482.44	1.558	481.43	480.76	0
284	479.12	0	13	482.44	1.486	481.43	480.76	0
288	479.09	0	13	482.44	0.666	481.43	480.76	0
292	479	0	13	482.44	1.098	481.43	480.76	0
296	479.04	0	13	482.44	2.193	481.43	480.76	0
300	478.58	0	13	482.44	1.766	481.43	480.76	0
304	478.35	0	13	482.44	1.804	481.43	480.76	0
308	478.19	0	13	482.44	1.798	481.43	480.76	0
312	477.99	0	18	482.44	1.983	481.43	480.76	0
316	477.88	0	18	482.44	1.649	481.43	480.76	0
320	477.9	0	18	482.44	1.59	481.43	480.76	0
324	477.65	477.65	6	482.44	2.946	481.43	480.76	0
328	477.92	0	6	482.44	1.614	481.43	480.76	0
332	478.31	0	6	482.44	1.937	481.43	480.76	0
336	478.55	0	6	482.44	1.634	481.43	480.76	0
340	478.73	0	6	482.44	1.92	481.43	480.76	0
344	478.68	0	6	482.44	1.836	481.43	480.76	0
348	478.64	0	6	482.44	2.22	481.43	480.76	0
352	478.55	0	6	482.44	1.823	481.43	480.76	0
356	478.35	0	6	482.44	2.233	481.43	480.76	0
360	478.43	0	13	482.44	1.464	481.43	480.76	0

364	478.77	0	13	482.44	1.751	481.43	480.76	0
368	478.89	0	13	482.44	2.585	481.43	480.76	0
372	478.84	0	13	482.44	2.383	481.43	480.76	0
376	478.51	0	13	482.44	2.001	481.43	480.76	0
380	478.55	0	13	482.44	1.455	481.43	480.76	0
384	478.32	0	13	482.44	2.104	481.43	480.76	0
388	478.22	0	6	482.44	1.703	481.43	480.76	0
392	478.18	0	6	482.44	1.514	481.43	480.76	0
396	478.51	0	6	482.44	1.418	481.43	480.76	0
400	478.79	0	6	482.44	1.968	481.43	480.76	0
404	478.73	0	6	482.44	1.857	481.43	480.76	0
408	478.67	0	6	482.44	1.829	481.43	480.76	0
412	478.7	0	6	482.44	1.871	481.43	480.76	0
416	479.17	0	6	482.44	2.749	481.43	480.76	0
420	479.18	0	6	482.44	1.954	481.43	480.76	0
424	479.06	0	6	482.44	1.714	481.43	480.76	0
428	478.86	0	6	482.44	2.691	481.43	480.76	0
432	478.78	0	6	482.44	1.558	481.43	480.76	0
436	478.72	0	6	482.44	1.792	481.43	480.76	0
440	478.95	0	6	482.44	1.665	481.43	480.76	0
444	479.04	0	6	482.44	1.66	481.43	480.76	0
448	479.17	0	6	482.44	2.009	481.43	480.76	0
452	479.16	0	6	482.44	1.092	481.43	480.76	0
456	479.32	0	6	482.44	2.427	481.43	480.76	0
460	479.47	0	6	482.44	1.507	481.43	480.76	0
464	479.42	0	6	482.44	2.213	481.43	480.76	0
468	479.37	0	6	482.44	1.896	481.43	480.76	0
472	479.54	0	6	482.44	2.241	481.43	480.76	0
476	479.53	0	6	482.44	2.024	481.43	480.76	0
480	479.36	0	6	482.44	1.759	481.43	480.76	0
484	479.24	0	6	482.44	2.406	481.43	480.76	0
488	479.38	0	6	482.44	1.885	481.43	480.76	0
492	479.63	0	6	482.44	2.463	481.43	480.76	0
496	479.57	0	6	482.44	1.054	481.43	480.76	0
500	479.44	0	6	482.44	2.002	481.43	480.76	0
504	479.37	0	6	482.44	2.116	481.43	480.76	0
508	479.48	0	6	482.44	1.032	481.43	480.76	0
512	479.48	0	6	482.44	2.036	481.43	480.76	0
516	479.25	0	6	482.44	1.58	481.43	480.76	0
520	479.61	0	4	482.44	1.376	481.43	480.76	0
524	479.57	0	4	482.44	1.481	481.43	480.76	0

528	479.64	0	4	482.44	1.5	481.43	480.76	0	
532	479.75	0	4	482.44	2.113	481.43	480.76	0	
536	479.63	0	4	482.44	1.86	481.43	480.76	0	
540	479.62	0	4	482.44	1.871	481.43	480.76	0	
544	479.63	0	4	482.44	1.388	481.43	480.76	0	
548	479.62	0	4	482.44	1.478	481.43	480.76	0	
552	479.67	0	4	482.44	1.921	481.43	480.76	0	
556	479.66	0	3	482.44	2.285	481.43	480.76	0	
560	479.93	0	3	482.44	1.937	481.43	480.76	0	
564	479.85	0	3	482.44	1.439	481.43	480.76	0	
568	479.82	0	17	482.44	1.292	481.43	480.76	0	
572	479.83	0	17	482.44	1.067	481.43	480.76	0	
576	480.05	0	17	482.44	1.89	481.43	480.76	0	
579.6	479.64	0	17	482.44	1.138	481.43	480.76	0	
580	479.93	0	17	482.44	1.188	481.43	480.76	0	
582.6	479.84	0	17	482.44	0.97	481.43	480.76	0	
585.6	480.49	0	17	482.44	0.68	481.43	480.76	0	
587.6	482.43	0	17	482.44	0	0	0	0	
591.6	484.69	0	8	0	0	0	0	0	

Cross-section: RI_1LC

					High		Middle	Low	
Station	**Elevation**	**SZF**	**Substrate/Cover**	**WSEL**	**Velocity**	**WSEL**	**Stage 3**	**WSEL**	
-4	485.5	0	9	0	0	0	0	0	
0	483.77	0	9	0	0	0	0	0	
4	483.15	0	9	0	0	0	0	0	
8	483.24	0	9	0	0	0	0	0	
9.8	483.23	0	9	0	0	0	0	0	
12	483.08	0	9	0	0.17	0	0	0	
16	482.93	0	9	482.95	0.25	0	0	0	
20	482.93	0	9	482.95	0.34	0	0	0	
24	482.88	0	9	482.95	0.39	0	0	0	
28	482.73	0	9	482.95	0.66	0	0	0	
32	482.13	0	17	482.95	0.96	482.37	0	0	
36	482.13	0	17	482.95	1.36	482.37	0	0	
40	482.63	0	17	482.95	0.74	0	0	0	
44	482.83	0	17	482.95	0.63	0	0	0	
48	482.93	0	17	482.95	0.44	0	0	0	
52	481.68	0	16	482.95	0.92	482.37	481.91	0	
56	481.38	0	16	482.95	1.48	482.37	481.91	0	
60	481.03	0	16	482.95	2.41	482.37	481.91	0	
64	481.28	0	16	482.95	2.27	482.37	481.91	0	

68	480.9	0	16	482.95	2.047	482.37	481.91	0
72	480.81	0	16	482.95	2.515	482.37	481.91	0
76	480.81	0	16	482.95	2.234	482.37	481.91	0
80	480.91	0	16	482.95	1.87	482.37	481.91	0
84	480.73	0	16	482.95	2.655	482.37	481.91	0
88	481.01	0	12	482.95	2.949	482.37	481.91	0
92	480.6	0	12	482.95	2.875	482.37	481.91	0
96	480.41	0	12	482.95	2.81	482.37	481.91	0
100	480.49	0	12	482.95	3.256	482.37	481.91	0
104	480.63	0	12	482.95	3.197	482.37	481.91	0
108	480.26	480.37	12	482.95	2.327	482.37	481.91	0
112	480.44	0	12	482.95	2.274	482.37	481.91	0
116	480.34	480.37	12	482.95	2.38	482.37	481.91	0
120	480.38	0	13	482.95	3.085	482.37	481.91	0
124	480.2	480.37	13	482.95	2.617	482.37	481.91	0
128	480.21	480.37	13	482.95	1.996	482.37	481.91	0
132	480.21	480.37	13	482.95	2.554	482.37	481.91	0
136	480.11	480.37	13	482.95	2.215	482.37	481.91	0
140	480.03	480.37	13	482.95	3.058	482.37	481.91	0
144	479.95	480.37	13	482.95	3.423	482.37	481.91	0
148	479.83	480.37	13	482.95	2.144	482.37	481.91	0
152	479.86	480.37	13	482.95	1.947	482.37	481.91	0
156	479.7	480.37	13	482.95	3.03	482.37	481.91	0
160	479.59	480.37	13	482.95	2.107	482.37	481.91	0
164	479.52	480.37	13	482.95	1.86	482.37	481.91	0
168	479.52	480.37	5	482.95	2.65	482.37	481.91	0
172	479.8	480.37	5	482.95	2.185	482.37	481.91	0
176	479.71	480.37	5	482.95	2.319	482.37	481.91	0
180	479.97	480.37	5	482.95	1.786	482.37	481.91	0
184	480.13	480.37	5	482.95	2.895	482.37	481.91	0
188	480.06	480.37	5	482.95	2.722	482.37	481.91	0
192	480.1	480.37	5	482.95	1.901	482.37	481.91	0
196	480.21	480.37	5	482.95	2.537	482.37	481.91	0
200	480.43	0	6	482.95	1.607	482.37	481.91	0
204	480.54	0	6	482.95	2.232	482.37	481.91	0
208	480.98	0	6	482.95	2.872	482.37	481.91	0
212	481.13	0	6	482.95	3.419	482.37	481.91	0
216	481.08	0	4	482.95	1.789	482.37	481.91	0
220	480.68	0	4	482.95	2.863	482.37	481.91	0
224	480.39	0	4	482.95	3.206	482.37	481.91	0
228	480.31	480.37	4	482.95	2.532	482.37	481.91	0

232	480.36	480.37	4	482.95	2.954	482.37	481.91	0
236	480.47	0	4	482.95	2.297	482.37	481.91	0
240	480.68	0	4	482.95	3.707	482.37	481.91	0
244	480.31	480.37	4	482.95	2.909	482.37	481.91	0
248	480.23	480.37	4	482.95	2.357	482.37	481.91	0
252	480.25	480.37	4	482.95	2.676	482.37	481.91	0
256	480.28	480.37	4	482.95	2.54	482.37	481.91	0
260	480.24	480.37	4	482.95	1.422	482.37	481.91	0
264	480.61	0	4	482.95	2.614	482.37	481.91	0
268	480.65	0	4	482.95	1.714	482.37	481.91	0
272	480.63	0	6	482.95	1.518	482.37	481.91	0
276	480.92	0	6	482.95	0.902	482.37	481.91	0
280	480.93	0	6	482.95	0.919	482.37	481.91	0
284	480.58	0	6	482.95	2.233	482.37	481.91	0
288	480.39	0	6	482.95	2.389	482.37	481.91	0
292	480.05	480.37	6	482.95	3.035	482.37	481.91	0
296	480.07	480.37	6	482.95	2.363	482.37	481.91	0
300	480.62	0	6	482.95	2.039	482.37	481.91	0
304	480.11	480.37	6	482.95	2.492	482.37	481.91	0
308	479.78	480.37	6	482.95	2.296	482.37	481.91	0
312	479.87	480.37	18	482.95	2.241	482.37	481.91	0
316	480.29	480.37	18	482.95	0.838	482.37	481.91	0
320	480.6	0	18	482.95	2.594	482.37	481.91	0
324	480.95	0	18	482.95	1.004	482.37	481.91	0
328	481.31	0	6	482.95	-0.587	482.37	481.91	0
332	481.28	0	6	482.95	-0.07	482.37	481.91	0
336	481.25	0	6	482.95	0.446	482.37	481.91	0
340	481.19	0	6	482.95	2.145	482.37	481.91	0
344	480.92	0	6	482.95	2.364	482.37	481.91	0
348	481.2	0	6	482.95	2.364	482.37	481.91	0
352	480.98	0	6	482.95	3.156	482.37	481.91	0
356	481.09	0	6	482.95	2.374	482.37	481.91	0
360	481.02	0	6	482.95	2.749	482.37	481.91	0
364	480.86	0	6	482.95	2.127	482.37	481.91	0
368	480.85	0	6	482.95	2.784	482.37	481.91	0
372	480.37	480.37	6	482.95	2.733	482.37	481.91	0
376	480.14	480.37	6	482.95	2.335	482.37	481.91	0
380	479.58	480.37	6	482.95	1.853	482.37	481.91	0
384	479.51	480.37	6	482.95	2.335	482.37	481.91	0
388	479.68	480.37	6	482.95	2.594	482.37	481.91	0
392	479.59	480.37	6	482.95	2.856	482.37	481.91	0

396	479.04	480.37	6	482.95	2.346	482.37	481.91	0
400	478.94	480.37	6	482.95	2.342	482.37	481.91	0
404	479.18	480.37	6	482.95	2.538	482.37	481.91	0
408	479.26	480.37	6	482.95	2.45	482.37	481.91	0
412	479.42	480.37	6	482.95	2.981	482.37	481.91	0
416	479.35	480.37	6	482.95	3.141	482.37	481.91	0
420	479.78	480.37	6	482.95	2.019	482.37	481.91	0
424	479.82	480.37	6	482.95	2.402	482.37	481.91	0
428	479.98	480.37	6	482.95	3.298	482.37	481.91	0
432	479.73	480.37	6	482.95	3.09	482.37	481.91	0
436	478.82	480.37	6	482.95	2.99	482.37	481.91	0
440	479.11	480.37	6	482.95	2.603	482.37	481.91	0
444	479.23	480.37	6	482.95	2.345	482.37	481.91	0
448	479.52	480.37	6	482.95	3.446	482.37	481.91	0
452	479.91	480.37	6	482.95	3.645	482.37	481.91	0
456	480.09	480.37	6	482.95	3.341	482.37	481.91	0
460	479.17	480.37	6	482.95	3.68	482.37	481.91	0
464	479.32	480.37	6	482.95	3.02	482.37	481.91	0
468	479.4	480.37	6	482.95	3.434	482.37	481.91	0
472	479.67	480.37	6	482.95	3.389	482.37	481.91	0
476	479.5	480.37	6	482.95	3.07	482.37	481.91	0
480	478.92	480.37	6	482.95	2.435	482.37	481.91	0
484	478.87	480.37	6	482.95	2.748	482.37	481.91	0
488	478.99	480.37	6	482.95	2.743	482.37	481.91	0
492	478.93	480.37	6	482.95	2.464	482.37	481.91	0
496	480.03	480.37	6	482.95	2.56	482.37	481.91	0
500	480.21	480.37	6	482.95	4.231	482.37	481.91	0
504	479.88	480.37	6	482.95	3.138	482.37	481.91	0
508	479.32	480.37	6	482.95	2.352	482.37	481.91	0
512	478.88	480.37	6	482.95	2.496	482.37	481.91	0
516	478.79	480.37	6	482.95	2.759	482.37	481.91	0
520	478.74	480.37	6	482.95	2.749	482.37	481.91	0
524	478.72	480.37	6	482.95	2.437	482.37	481.91	0
528	478.91	480.37	5	482.95	3.182	482.37	481.91	0
532	478.96	480.37	5	482.95	2.374	482.37	481.91	0
536	479.38	480.37	5	482.95	2.958	482.37	481.91	0
540	478.4	480.37	5	482.95	3.209	482.37	481.91	0
544	477.89	480.37	5	482.95	3.015	482.37	481.91	0
548	477.77	480.37	5	482.95	2.947	482.37	481.91	0
552	477.75	480.37	5	482.95	3.094	482.37	481.91	0
556	477.46	480.37	5	482.95	3.382	482.37	481.91	0

560	477.02	480.37	5	482.95	3.348	482.37	481.91	0
564	476.83	480.37	5	482.95	3.147	482.37	481.91	0
568	476.79	480.37	5	482.95	2.873	482.37	481.91	0
572	476.89	480.37	5	482.95	4.262	482.37	481.91	0
576	476.71	480.37	5	482.95	3.753	482.37	481.91	0
580	476.77	480.37	5	482.95	3.128	482.37	481.91	0
584	476.9	480.37	5	482.95	3.388	482.37	481.91	0
588	476.57	480.37	5	482.95	4.085	482.37	481.91	0
592	476.36	480.37	5	482.95	3.499	482.37	481.91	0
596	476.53	480.37	5	482.95	4.352	482.37	481.91	0
600	476.74	480.37	5	482.95	4.122	482.37	481.91	0
604	477.09	480.37	5	482.95	3.945	482.37	481.91	0
608	477.54	480.37	5	482.95	3.986	482.37	481.91	0
612	477.58	480.37	5	482.95	3.833	482.37	481.91	0
616	477.04	480.37	4	482.95	3.689	482.37	481.91	0
620	476.78	480.37	4	482.95	4.15	482.37	481.91	0
624	476.26	480.37	4	482.95	3.876	482.37	481.91	0
628	475.9	480.37	4	482.95	4.058	482.37	481.91	0
632	475.93	480.37	4	482.95	3.556	482.37	481.91	0
636	476.12	480.37	4	482.95	4.184	482.37	481.91	0
640	476.17	480.37	4	482.95	4.073	482.37	481.91	0
644	476.38	480.37	4	482.95	3.317	482.37	481.91	0
648	476.58	480.37	4	482.95	2.713	482.37	481.91	0
652	476.61	480.37	4	482.95	3.636	482.37	481.91	0
656	477.02	480.37	4	482.95	3.92	482.37	481.91	0
660	477.24	480.37	4	482.95	3.045	482.37	481.91	0
664	477.95	480.37	4	482.95	3.389	482.37	481.91	0
668	478.38	480.37	4	482.95	3.029	482.37	481.91	0
672	478.74	480.37	4	482.95	2.953	482.37	481.91	0
676	479.1	480.37	4	482.95	2.649	482.37	481.91	0
680	479.6	480.37	4	482.95	1.911	482.37	481.91	0
680.6	480.78	0	4	482.95	1.754	482.37	481.91	0
682.6	481.23	0	4	482.95	2.195	482.37	481.91	0
684.6	481.58	0	4	482.95	2.219	482.37	481.91	0
686.6	481.63	0	4	482.95	2.07	482.37	481.91	0
688.6	481.98	0	5	482.95	2.091	482.37	0	0
690.6	482.03	0	5	482.95	1.741	482.37	0	0
692.6	482.13	0	5	482.95	1.671	482.37	0	0
694.6	482.33	0	4	482.95	1.333	482.37	0	0
696.6	482.43	0	4	482.95	0.956	0	0	0
698.6	482.63	0	4	482.95	0.788	0	0	0

700.6	482.73	0	4	482.95	0.549	0	0	0	
702.6	483.23	0	13	0	0	0	0	0	
706.6	486.17	0	13	0	0	0	0	0	
710.6	485.56	0	10	0	0	0	0	0	

Cross-section: G_4LC

				High		Middle		Low	
Station	**Elevation**	**SZF**	**Substrate/Cover**	**WSEL**	**Velocity**	**WSEL**	**Stage 3**	**WSEL**	
-4	485.39	0	17	0	0	0	0	0	
0	484.67	0	17	0	0	0	0	0	
4	483.14	0	17	483.27	0	0	0	0	
5	483.27	0	17	483.27	0	0	0	0	
8	483.02	0	17	483.27	0	0	0	0	
12	483.02	0	17	483.27	0	0	0	0	
16	482.77	0	17	483.27	0	0	0	0	
20	483.27	0	17	483.27	0	0	0	0	
24	483.27	0	17	483.27	0	0	0	0	
28	482.52	0	17	483.27	0.07	0	0	0	
32	482.07	0	17	483.27	0.67	482.51	0	0	
36	481.42	0	3	483.27	1.75	482.51	481.89	0	
40	481.32	0	3	483.27	1.77	482.51	481.89	0	
44	481.32	0	3	483.27	1.85	482.51	481.89	0	
48	481.47	0	3	483.27	2.01	482.51	481.89	0	
52	481.62	0	3	483.27	2.04	482.51	481.89	0	
56	481.67	0	3	483.27	1.62	482.51	481.89	0	
60	481.77	0	9	483.27	1.77	482.51	481.89	0	
64	482.02	0	9	483.27	1.58	482.51	0	0	
68	482.07	0	9	483.27	1.8	482.51	0	0	
72	483.02	0	9	483.27	2.09	0	0	0	
76	481.72	0	9	483.27	1.63	482.51	481.89	0	
80	482.17	0	9	483.27	1.54	482.51	0	0	
84	482.17	0	9	483.27	1.26	482.51	0	0	
88	482.37	0	9	483.27	1.22	482.51	0	0	
92	482.62	0	9	483.27	1.17	0	0	0	
96	482.72	0	9	483.27	0.94	0	0	0	
100	482.72	0	9	483.27	1.32	0	0	0	
104	483.02	0	9	483.27	0.99	0	0	0	
108	482.97	0	9	483.27	0.91	0	0	0	
112	482.77	0	9	483.27	1.09	0	0	0	
116	482.52	0	9	483.27	0.81	0	0	0	
120	481.72	0	9	483.27	1.51	482.51	481.89	0	
124	481.77	0	9	483.27	1.98	482.51	481.89	0	

128	481.97	0	9	483.27	2.11	482.51	0	0
132	482.17	0	9	483.27	1.84	482.51	0	0
136	482.27	0	9	483.27	1.76	482.51	0	0
140	482.17	0	9	483.27	1.54	482.51	0	0
144	482.17	0	9	483.27	1.47	482.51	0	0
148	481.47	0	18	483.27	0.58	482.51	481.89	0
152	481.52	0	18	483.27	1.2	482.51	481.89	0
156	481.77	0	18	483.27	0.55	482.51	481.89	0
160	481.72	0	18	483.27	1.75	482.51	481.89	0
164	482.72	0	18	483.27	1.72	0	0	0
168	481.67	0	18	483.27	1.4	482.51	481.89	0
172	481.92	0	18	483.27	1.22	482.51	0	0
176	481.97	0	18	483.27	2.12	482.51	0	0
180	481.07	0	18	483.27	2.31	482.51	481.89	0
184	481.07	0	18	483.27	2.13	482.51	481.89	0
188	481.27	0	18	483.27	2.58	482.51	481.89	0
192	481.27	0	18	483.27	2.7	482.51	481.89	0
196	481	0	18	483.27	2.485	482.51	481.89	0
200	481	0	18	483.27	2.604	482.51	481.89	0
204	480.95	0	18	483.27	1.912	482.51	481.89	0
208	480.88	0	18	483.27	2.611	482.51	481.89	0
212	481.04	0	18	483.27	2.954	482.51	481.89	0
216	480.55	0	18	483.27	2.566	482.51	481.89	0
220	480.36	480.37	18	483.27	2.685	482.51	481.89	0
224	480.28	480.37	18	483.27	2.894	482.51	481.89	0
228	480.86	0	18	483.27	2.205	482.51	481.89	0
232	480.71	0	18	483.27	2.377	482.51	481.89	0
236	480.36	480.37	18	483.27	2.306	482.51	481.89	0
240	480.58	0	18	483.27	2.495	482.51	481.89	0
244	480.85	0	18	483.27	2.635	482.51	481.89	0
248	480.74	0	18	483.27	2.658	482.51	481.89	0
252	480.9	0	18	483.27	3.003	482.51	481.89	0
256	480.75	0	18	483.27	2.959	482.51	481.89	0
260	481.29	0	6	483.27	2.914	482.51	481.89	0
264	481.41	0	6	483.27	2.87	482.51	481.89	0
268	481.41	0	6	483.27	2.826	482.51	481.89	0
272	481.53	0	6	483.27	2.782	482.51	481.89	0
276	481.2	0	6	483.27	1.875	482.51	481.89	0
280	481.13	0	18	483.27	1.763	482.51	481.89	0
284	480.92	0	18	483.27	2.945	482.51	481.89	0
288	480.61	0	18	483.27	2.036	482.51	481.89	0

292	480.4	0	18	483.27	1.847	482.51	481.89	0
296	480.53	0	18	483.27	2.352	482.51	481.89	0
300	480.74	0	18	483.27	1.714	482.51	481.89	0
304	480.77	0	18	483.27	1.782	482.51	481.89	0
308	480.6	0	18	483.27	2.015	482.51	481.89	0
312	480.97	0	6	483.27	2.586	482.51	481.89	0
316	480.43	0	6	483.27	1.635	482.51	481.89	0
320	480.21	480.37	6	483.27	2.201	482.51	481.89	0
324	480.32	480.37	6	483.27	2.343	482.51	481.89	0
328	480.27	480.37	6	483.27	1.449	482.51	481.89	0
332	480.4	0	6	483.27	2.257	482.51	481.89	0
336	480.43	0	6	483.27	2.468	482.51	481.89	0
340	480.21	480.37	6	483.27	1.988	482.51	481.89	0
344	480.43	0	6	483.27	1.121	482.51	481.89	0
348	480.27	480.37	6	483.27	1.686	482.51	481.89	0
352	480.77	0	6	483.27	3.165	482.51	481.89	0
356	480	480.37	6	483.27	1.86	482.51	481.89	0
360	479.73	480.37	6	483.27	2.19	482.51	481.89	0
364	479.48	480.37	6	483.27	1.981	482.51	481.89	0
368	479.14	480.37	6	483.27	2.555	482.51	481.89	0
372	479.78	480.37	6	483.27	2.681	482.51	481.89	0
376	479.81	480.37	6	483.27	2.28	482.51	481.89	0
380	479.87	480.37	6	483.27	2.406	482.51	481.89	0
384	479.84	480.37	6	483.27	3.011	482.51	481.89	0
388	479.41	480.37	6	483.27	3.614	482.51	481.89	0
392	479.49	480.37	6	483.27	3.02	482.51	481.89	0
396	479.42	480.37	6	483.27	2.75	482.51	481.89	0
400	479.62	480.37	6	483.27	3.059	482.51	481.89	0
404	479.54	480.37	6	483.27	3.818	482.51	481.89	0
408	479.92	480.37	6	483.27	2.981	482.51	481.89	0
412	479.69	480.37	6	483.27	3.286	482.51	481.89	0
416	479.14	480.37	6	483.27	3.104	482.51	481.89	0
420	478.89	480.37	6	483.27	2.895	482.51	481.89	0
424	478.4	480.37	6	483.27	3.078	482.51	481.89	0
428	478.22	480.37	6	483.27	2.998	482.51	481.89	0
432	478.04	480.37	6	483.27	3.458	482.51	481.89	0
436	478.33	480.37	6	483.27	3.019	482.51	481.89	0
440	478.76	480.37	6	483.27	3.61	482.51	481.89	0
444	478.84	480.37	6	483.27	3.178	482.51	481.89	0
448	478.48	480.37	6	483.27	3.755	482.51	481.89	0
452	478.44	480.37	6	483.27	3.288	482.51	481.89	0

456	478.46	480.37	6	483.27	2.635	482.51	481.89	0
460	479.12	480.37	6	483.27	2.811	482.51	481.89	0
464	479.29	480.37	6	483.27	2.659	482.51	481.89	0
468	479.27	480.37	6	483.27	2.986	482.51	481.89	0
472	479.16	480.37	6	483.27	3.036	482.51	481.89	0
476	478.76	480.37	6	483.27	3.254	482.51	481.89	0
480	478.6	480.37	6	483.27	2.947	482.51	481.89	0
484	478.53	480.37	6	483.27	2.686	482.51	481.89	0
488	478.42	480.37	6	483.27	2.696	482.51	481.89	0
492	478.42	480.37	6	483.27	3.377	482.51	481.89	0
496	478.49	480.37	6	483.27	3.196	482.51	481.89	0
500	478.37	480.37	6	483.27	3.612	482.51	481.89	0
504	478.15	480.37	6	483.27	3.098	482.51	481.89	0
508	478.28	480.37	6	483.27	3.7	482.51	481.89	0
512	478.13	480.37	6	483.27	2.621	482.51	481.89	0
516	477.81	480.37	6	483.27	2.952	482.51	481.89	0
520	477.7	480.37	6	483.27	2.993	482.51	481.89	0
524	477.67	480.37	6	483.27	2.35	482.51	481.89	0
528	477.6	480.37	6	483.27	2.862	482.51	481.89	0
532	477.43	480.37	6	483.27	2.721	482.51	481.89	0
536	477.4	480.37	6	483.27	2.933	482.51	481.89	0
540	477.77	480.37	6	483.27	2.778	482.51	481.89	0
544	477.89	480.37	6	483.27	2.982	482.51	481.89	0
548	477.86	480.37	6	483.27	3.029	482.51	481.89	0
552	477.79	480.37	6	483.27	3.05	482.51	481.89	0
556	477.62	480.37	6	483.27	3.072	482.51	481.89	0
560	477.29	480.37	6	483.27	2.849	482.51	481.89	0
564	477.15	480.37	6	483.27	3.098	482.51	481.89	0
568	477.28	480.37	6	483.27	3.115	482.51	481.89	0
572	477.45	480.37	6	483.27	3.315	482.51	481.89	0
576	477.08	480.37	6	483.27	3.096	482.51	481.89	0
580	476.97	480.37	6	483.27	3.407	482.51	481.89	0
584	476.95	480.37	6	483.27	3.09	482.51	481.89	0
588	476.96	480.37	6	483.27	2.497	482.51	481.89	0
592	477.05	480.37	6	483.27	2.517	482.51	481.89	0
596	477.07	480.37	4	483.27	2.936	482.51	481.89	0
600	477.03	480.37	4	483.27	3.155	482.51	481.89	0
604	477.09	480.37	4	483.27	2.94	482.51	481.89	0
608	477.19	480.37	4	483.27	3.081	482.51	481.89	0
612	477.05	480.37	4	483.27	2.571	482.51	481.89	0
616	476.86	480.37	4	483.27	3.189	482.51	481.89	0

620	476.9	480.37	4	483.27	2.866	482.51	481.89	0
624	477.15	480.37	4	483.27	3.416	482.51	481.89	0
628	477.34	480.37	4	483.27	3.885	482.51	481.89	0
632	477.59	480.37	4	483.27	3.29	482.51	481.89	0
636	477.41	480.37	4	483.27	3.066	482.51	481.89	0
640	477.25	480.37	4	483.27	2.992	482.51	481.89	0
644	477.21	480.37	4	483.27	3.376	482.51	481.89	0
648	477.06	480.37	4	483.27	3.13	482.51	481.89	0
652	477.01	480.37	4	483.27	3.522	482.51	481.89	0
656	476.93	480.37	4	483.27	3.151	482.51	481.89	0
660	476.87	480.37	4	483.27	3.032	482.51	481.89	0
664	476.85	480.37	4	483.27	3.192	482.51	481.89	0
668	476.93	480.37	4	483.27	3.357	482.51	481.89	0
672	476.94	480.37	4	483.27	3.369	482.51	481.89	0
676	476.96	480.37	4	483.27	2.99	482.51	481.89	0
680	477.29	480.37	4	483.27	3.633	482.51	481.89	0
684	477.53	480.37	4	483.27	3.325	482.51	481.89	0
688	477.76	480.37	4	483.27	2.927	482.51	481.89	0
692	478.05	480.37	4	483.27	2.887	482.51	481.89	0
696	478.32	480.37	4	483.27	2.911	482.51	481.89	0
700	478.57	480.37	5	483.27	2.494	482.51	481.89	0
704	478.2	480.37	5	483.27	2.253	482.51	481.89	0
708	478.35	480.37	5	483.27	2.324	482.51	481.89	0
712	478.68	480.37	5	483.27	2.294	482.51	481.89	0
716	479.07	480.37	5	483.27	1.983	482.51	481.89	0
720	479.59	480.37	5	483.27	2.118	482.51	481.89	0
724	480.22	480.37	3	483.27	2.03	482.51	481.89	0
725.6	480.37	480.37	3	483.27	1.882	482.51	481.89	0
727.6	480.97	0	3	483.27	1.98	482.51	481.89	0
729.6	481.42	0	3	483.27	1.658	482.51	481.89	0
731.6	481.87	0	3	483.27	1.625	482.51	481.89	0
733.6	482.17	0	3	483.27	1.376	482.51	0	0
735.6	482.57	0	3	483.27	1.111	0	0	0
737.6	482.82	0	3	483.27	0.721	0	0	0
739.6	483.07	0	10	483.27	0	0	0	0
741.6	483.33	0	10	0	0	0	0	0
745.6	484.13	0	8	0	0	0	0	0
749.6	485.39	0	8	0	0	0	0	0

Cross-section: G_4RC

				High		Middle		Low
Station	**Elevation**	**SZF**	**Substrate/Cover**	**WSEL**	**Velocity**	**WSEL**	**Stage 3**	**WSEL**

0	486.31	0	8	0	0	0	0	0
4	483.9	0	8	0	0	0	0	0
7	483.57	0	8	483.57	0	0	0	0
8	482.97	0	8	483.57	0	0	0	0
10	482.52	0	8	483.57	-0.073	482.78	0	0
12	482.12	0	4	483.57	-0.193	482.78	0	0
14	481.92	0	4	483.57	-0.112	482.78	0	0
16	481.62	0	4	483.57	0.078	482.78	481.89	0
20	481.3	0	4	483.57	0.643	482.78	481.89	0
24	481.23	0	4	483.57	1.276	482.78	481.89	0
28	481.14	0	4	483.57	1.063	482.78	481.89	0
32	481.14	0	3	483.57	1.557	482.78	481.89	0
36	481.03	0	3	483.57	1.627	482.78	481.89	0
40	480.93	0	3	483.57	1.744	482.78	481.89	0
44	480.94	0	3	483.57	0.908	482.78	481.89	0
48	480.97	0	3	483.57	0.914	482.78	481.89	0
52	481	0	3	483.57	0.645	482.78	481.89	0
56	481.09	0	3	483.57	0.552	482.78	481.89	0
60	481.12	0	3	483.57	0.212	482.78	481.89	0
64	480.93	0	3	483.57	0.234	482.78	481.89	0
68	480.77	480.84	3	483.57	0.249	482.78	481.89	0
72	480.73	480.84	3	483.57	0.15	482.78	481.89	0
76	480.64	480.84	3	483.57	-0.216	482.78	481.89	0
80	480.51	480.84	3	483.57	-0.241	482.78	481.89	0
84	480.41	480.84	3	483.57	0.054	482.78	481.89	0
88	480.44	480.84	3	483.57	0.47	482.78	481.89	0
92	480.56	480.84	12	483.57	0.498	482.78	481.89	0
96	480.51	480.84	12	483.57	0.696	482.78	481.89	0
100	480.53	480.84	12	483.57	2.383	482.78	481.89	0
104	480.64	480.84	4	483.57	2.629	482.78	481.89	0
108	480.71	480.84	4	483.57	1.684	482.78	481.89	0
112	480.73	480.84	4	483.57	2.64	482.78	481.89	0
116	480.82	480.84	4	483.57	2.435	482.78	481.89	0
120	480.82	480.84	4	483.57	2.49	482.78	481.89	0
124	480.81	480.84	4	483.57	2.2	482.78	481.89	0
128	480.94	0	6	483.57	2.345	482.78	481.89	0
132	481.05	0	6	483.57	2.198	482.78	481.89	0
136	481.17	0	6	483.57	1.984	482.78	481.89	0
140	481.11	0	3	483.57	2.327	482.78	481.89	0
144	481.16	0	3	483.57	1.619	482.78	481.89	0
148	481.2	0	3	483.57	1.842	482.78	481.89	0

152	481.22	0	3	483.57	1.499	482.78	481.89	0
156	481.27	0	3	483.57	1.449	482.78	481.89	0
160	481.49	0	3	483.57	1.216	482.78	481.89	0
164.5	481.97	0	3	483.57	0.129	482.78	0	0
166.5	482.17	0	3	483.57	0.011	482.78	0	0
168.5	482.32	0	3	483.57	0.04	482.78	0	0
170.5	482.47	0	3	483.57	0.126	482.78	0	0
172.5	482.47	0	3	483.57	0.179	482.78	0	0
174.5	482.57	0	3	483.57	0.026	482.78	0	0
176.5	482.67	0	3	483.57	0.074	482.78	0	0
178.5	483.07	0	1	483.57	0.062	0	0	0
180.5	482.97	0	1	483.57	0.058	0	0	0
184.5	483	0	1	483.57	0	0	0	0
188.5	484.71	0	17	0	0	0	0	0
192.5	486.16	0	17	0	0	0	0	0

Cross-section: G_4MC

				High		Middle		Low
Station	**Elevation**	**SZF**	**Substrate/Cover**	**WSEL**	**Velocity**	**WSEL**	**Stage 3**	**WSEL**
0	486.01	0	17	0	0	0	0	0
4	484.54	0	17	0	0	0	0	0
8	484.14	0	17	0	0	0	0	0
12	484.22	0	17	0	0	0	0	0
16	484.56	0	17	0	0	0	0	0
20	484.68	0	17	0	0	0	0	0
24	484.49	0	17	0	0	0	0	0
28	484.27	0	17	0	0	0	0	0
32	484.28	0	17	0	0	0	0	0
36	483.06	0	17	0	0	0	0	0
38	482.39	0	17	482.89	0	0	0	0
42	481.74	0	17	482.89	0.184	0	0	0
46	482.39	0	9	482.89	0.428	0	0	0
50	481.99	0	9	482.89	0.616	0	0	0
54	481.74	0	9	482.89	0.868	0	0	0
58	481.34	0	9	482.89	1.095	481.71	0	0
62	481.14	0	9	482.89	0.954	481.71	0	0
66	480.99	0	9	482.89	1.078	481.71	0	0
70	480.84	0	9	482.89	0.909	481.71	0	0
76	480.54	0	18	482.89	1.175	481.71	480.8	0
80	480.41	0	18	482.89	0.598	481.71	480.8	0
84	480.34	0	18	482.89	0.705	481.71	480.8	0
88	480.15	0	18	482.89	1.454	481.71	480.8	0

92	480.2	0	18	482.89	0.862	481.71	480.8	0
96	480.16	0	6	482.89	0.472	481.71	480.8	0
100	480.12	0	6	482.89	0.747	481.71	480.8	0
104	479.94	0	6	482.89	0.761	481.71	480.8	0
108	480.09	0	6	482.89	1.112	481.71	480.8	0
112	480.18	0	6	482.89	2.452	481.71	480.8	0
116	480.28	0	14	482.89	2.192	481.71	480.8	0
120	480.25	0	14	482.89	3.059	481.71	480.8	0
124	480.16	0	14	482.89	3.102	481.71	480.8	0
128	480.12	0	14	482.89	3.534	481.71	480.8	0
132	480.08	0	14	482.89	3.577	481.71	480.8	0
136	480.03	0	15	482.89	3.567	481.71	480.8	0
140	480.07	0	15	482.89	4.338	481.71	480.8	0
144	480.01	0	15	482.89	4.155	481.71	480.8	0
148	479.88	0	15	482.89	3.3	481.71	480.8	0
152	479.91	0	15	482.89	3.604	481.71	480.8	0
156	479.83	0	15	482.89	3.228	481.71	480.8	0
160	479.68	0	15	482.89	3.984	481.71	480.8	0
164	479.55	0	15	482.89	3.255	481.71	480.8	0
168	479.67	0	15	482.89	3.642	481.71	480.8	0
172	479.59	0	16	482.89	2.972	481.71	480.8	0
176	479.68	0	16	482.89	3.349	481.71	480.8	0
180	479.8	0	16	482.89	3.241	481.71	480.8	0
184	479.74	0	16	482.89	3.286	481.71	480.8	0
188	479.51	0	15	482.89	3.107	481.71	480.8	0
192	479.31	0	15	482.89	2.705	481.71	480.8	0
196	479.32	0	15	482.89	3.754	481.71	480.8	0
200	479.31	0	15	482.89	2.75	481.71	480.8	0
204	479.14	0	15	482.89	2.992	481.71	480.8	0
208	479.34	0	15	482.89	2.571	481.71	480.8	0
212	479.57	0	15	482.89	3.014	481.71	480.8	0
216	479.5	0	15	482.89	2.61	481.71	480.8	0
220	479.75	0	15	482.89	1.825	481.71	480.8	0
224	479.51	0	15	482.89	3.022	481.71	480.8	0
228	479.13	0	15	482.89	2.582	481.71	480.8	0
232	479.33	0	15	482.89	2.531	481.71	480.8	0
236	479.81	0	15	482.89	2.517	481.71	480.8	0
240	479.49	0	15	482.89	2.817	481.71	480.8	0
244	479.27	0	15	482.89	2.26	481.71	480.8	0
248	479.45	0	15	482.89	2.166	481.71	480.8	0
252	479.55	0	15	482.89	2.139	481.71	480.8	0

256	479.41	0	15	482.89	1.262	481.71	480.8	0
260	479.44	0	15	482.89	1.091	481.71	480.8	0
264	479.49	0	15	482.89	1.354	481.71	480.8	0
268	479.38	0	15	482.89	1.306	481.71	480.8	0
272	479.33	0	6	482.89	2.117	481.71	480.8	0
276	479.07	0	6	482.89	1.96	481.71	480.8	0
280	478.88	0	6	482.89	1.963	481.71	480.8	0
284	478.91	0	6	482.89	2.009	481.71	480.8	0
288	478.92	0	6	482.89	1.04	481.71	480.8	0
292	478.88	0	6	482.89	1.162	481.71	480.8	0
296	478.56	0	6	482.89	1.639	481.71	480.8	0
300	478.64	0	6	482.89	1.691	481.71	480.8	0
304	478.69	0	6	482.89	1.747	481.71	480.8	0
308	478.5	0	6	482.89	1.714	481.71	480.8	0
312	478.34	478.34	6	482.89	2.276	481.71	480.8	0
316	478.66	0	6	482.89	2.734	481.71	480.8	0
320	478.92	0	6	482.89	2.163	481.71	480.8	0
324	479.43	0	6	482.89	3.04	481.71	480.8	0
328	479.51	0	6	482.89	1.976	481.71	480.8	0
332	479.36	0	6	482.89	2.363	481.71	480.8	0
336	479.35	0	6	482.89	2.389	481.71	480.8	0
340	479.74	0	6	482.89	2.826	481.71	480.8	0
344	479.63	0	6	482.89	2.339	481.71	480.8	0
348	479.6	0	6	482.89	1.455	481.71	480.8	0
352	479.58	0	6	482.89	2.396	481.71	480.8	0
356	479.41	0	6	482.89	1.686	481.71	480.8	0
360	479.4	0	6	482.89	2.091	481.71	480.8	0
364	479.43	0	6	482.89	1.383	481.71	480.8	0
368	479.47	0	6	482.89	1.717	481.71	480.8	0
372	479.36	0	6	482.89	1.84	481.71	480.8	0
376	479.38	0	6	482.89	1.961	481.71	480.8	0
380	479.11	0	6	482.89	2.179	481.71	480.8	0
384	479.25	0	6	482.89	2.416	481.71	480.8	0
388	479.44	0	6	482.89	2.103	481.71	480.8	0
392	479.53	0	6	482.89	2.052	481.71	480.8	0
396	479.7	0	6	482.89	1.337	481.71	480.8	0
400	479.69	0	6	482.89	1.94	481.71	480.8	0
404	479.83	0	6	482.89	1.535	481.71	480.8	0
408	480	0	6	482.89	1.451	481.71	480.8	0
412	479.89	0	6	482.89	1.683	481.71	480.8	0
416	480	0	6	482.89	1.045	481.71	480.8	0

420	480.08	0	6	482.89	1.616	481.71	480.8	0
424	480.16	0	6	482.89	1.248	481.71	480.8	0
428	480.28	0	6	482.89	1.596	481.71	480.8	0
432	480.13	0	6	482.89	1.098	481.71	480.8	0
436	480.14	0	3	482.89	1.606	481.71	480.8	0
440	480.46	0	3	482.89	1.244	481.71	480.8	0
444	480.8	0	3	482.89	0.903	481.71	480.8	0
444.7	481.09	0	3	482.89	1.15	481.71	0	0
447.7	481.09	0	3	482.89	1.03	481.71	0	0
450.7	481.14	0	3	482.89	0.89	481.71	0	0
453.7	481.14	0	3	482.89	0.8	481.71	0	0
456.7	481.14	0	3	482.89	0.78	481.71	0	0
459.7	481.09	0	3	482.89	0.69	481.71	0	0
462.7	480.99	0	3	482.89	0.47	481.71	0	0
465.7	480.94	0	6	482.89	0.39	481.71	0	0
468.7	480.89	0	6	482.89	0.4	481.71	0	0
471.7	480.89	0	6	482.89	0.19	481.71	0	0
474.7	480.89	0	6	482.89	0.23	481.71	0	0
477.7	481.19	0	8	482.89	0.12	481.71	0	0
480.7	482.14	0	8	482.89	0.06	0	0	0
483.7	482.89	0	8	482.89	0	0	0	0
484.7	483.04	0	8	0	0	0	0	0
488.7	483.84	0	8	0	0	0	0	0
492.7	484.29	0	8	0	0	0	0	0
496.7	485	0	8	0	0	0	0	0

Cross-section: G_3

				High		Middle		Low
Station	**Elevation**	**SZF**	**Substrate/Cover**	**WSEL**	**Velocity**	**WSEL**	**Stage 3**	**WSEL**
0	490.03	0	8	0	0	0	0	0
4	487.73	0	8	0	0	0	0	0
7	484.48	0	3	484.63	0	0	0	0
10	483.83	0	3	484.63	0.281	0	0	0
14	483.23	0	3	484.63	0.249	483.72	0	0
18	482.98	0	3	484.63	0.81	483.72	0	0
22	483.73	0	3	484.63	0.894	0	0	0
26	482.73	0	3	484.63	0.988	483.72	482.92	0
30	482.88	0	3	484.63	0.873	483.72	482.92	0
34	482.93	0	14	484.63	0.943	483.72	0	0
38	482.93	0	14	484.63	0.894	483.72	0	0
42	482.83	0	14	484.63	0.868	483.72	482.92	0
46	482.68	0	14	484.63	0.702	483.72	482.92	0

50	482.38	0	14	484.63	0.741	483.72	482.92	0
54	482.83	0	14	484.63	0.916	483.72	482.92	0
58	482.83	0	14	484.63	1.158	483.72	482.92	0
62	482.83	0	4	484.63	1.404	483.72	482.92	0
66	482.83	0	4	484.63	1.439	483.72	482.92	0
70	482.38	0	4	484.63	1.457	483.72	482.92	0
74	482.58	0	4	484.63	1.136	483.72	482.92	0
78	482.43	0	4	484.63	1.197	483.72	482.92	0
82	482.38	0	4	484.63	1.347	483.72	482.92	0
86	482.18	0	4	484.63	1.294	483.72	482.92	0
90	482.16	0	4	484.63	1.534	483.72	482.92	0
95	482.01	0	4	484.63	1.695	483.72	482.92	0
100	481.85	0	4	484.63	2.015	483.72	482.92	0
105	481.81	0	4	484.63	1.952	483.72	482.92	0
110	482.03	0	4	484.63	2.292	483.72	482.92	0
115	482.14	0	4	484.63	1.622	483.72	482.92	0
120	482.08	0	4	484.63	2.288	483.72	482.92	0
125	481.85	0	4	484.63	1.638	483.72	482.92	0
130	481.45	0	4	484.63	1.889	483.72	482.92	0
135	481.4	0	4	484.63	1.97	483.72	482.92	0
140	481.59	0	4	484.63	1.994	483.72	482.92	0
145	481.49	0	4	484.63	1.577	483.72	482.92	0
150	481.28	0	4	484.63	1.364	483.72	482.92	0
155	481.17	0	4	484.63	1.213	483.72	482.92	0
160	481.28	0	4	484.63	1.564	483.72	482.92	0
165	481.09	0	4	484.63	1.69	483.72	482.92	0
170	480.88	0	4	484.63	1.995	483.72	482.92	0
175	481.03	0	4	484.63	2.037	483.72	482.92	0
180	481.09	0	4	484.63	1.984	483.72	482.92	0
185	481.11	0	4	484.63	1.439	483.72	482.92	0
190	480.79	0	4	484.63	1.03	483.72	482.92	0
195	480.32	480.37	6	484.63	1.484	483.72	482.92	0
200	480.35	480.37	6	484.63	1.64	483.72	482.92	0
205	480.6	0	6	484.63	1.842	483.72	482.92	0
210	480.88	0	6	484.63	2.118	483.72	482.92	0
215	480.9	0	6	484.63	2.002	483.72	482.92	0
220	480.51	0	6	484.63	1.46	483.72	482.92	0
225	480.9	0	6	484.63	1.905	483.72	482.92	0
230	481.17	0	6	484.63	2.097	483.72	482.92	0
235	480.75	0	6	484.63	1.821	483.72	482.92	0
240	481.3	0	6	484.63	2.375	483.72	482.92	0

245	481.15	0	6	484.63	1.842	483.72	482.92	0
250	480.87	0	6	484.63	2.319	483.72	482.92	0
255	480.34	480.37	6	484.63	2.305	483.72	482.92	0
260	480.3	480.37	6	484.63	1.667	483.72	482.92	0
265	481.22	0	6	484.63	2.462	483.72	482.92	0
270	480.79	0	6	484.63	1.985	483.72	482.92	0
275	481.78	0	6	484.63	1.911	483.72	482.92	0
280	481.63	0	6	484.63	1.93	483.72	482.92	0
285	481.41	0	6	484.63	2.372	483.72	482.92	0
290	481.64	0	6	484.63	2.162	483.72	482.92	0
295	481.12	0	6	484.63	1.703	483.72	482.92	0
300	481.22	0	6	484.63	2.098	483.72	482.92	0
305	481.55	0	6	484.63	1.589	483.72	482.92	0
310	481.17	0	6	484.63	2.148	483.72	482.92	0
315	480.97	0	6	484.63	1.643	483.72	482.92	0
320	480.75	0	3	484.63	2.144	483.72	482.92	0
325	480.86	0	3	484.63	1.781	483.72	482.92	0
330	481.56	0	3	484.63	1.642	483.72	482.92	0
335	481.06	0	3	484.63	1.519	483.72	482.92	0
340	481.43	0	3	484.63	1.87	483.72	482.92	0
345	480.94	0	3	484.63	2.272	483.72	482.92	0
350	480.45	0	3	484.63	1.808	483.72	482.92	0
355	480.7	0	3	484.63	2.281	483.72	482.92	0
360	481.08	0	3	484.63	1.726	483.72	482.92	0
365	481.15	0	3	484.63	1.915	483.72	482.92	0
370	480.81	0	3	484.63	2.011	483.72	482.92	0
375	480.58	0	3	484.63	1.909	483.72	482.92	0
380	480.5	0	15	484.63	2.008	483.72	482.92	0
385	480.28	480.37	15	484.63	1.937	483.72	482.92	0
390	480.51	0	15	484.63	2.181	483.72	482.92	0
395	481.04	0	3	484.63	1.792	483.72	482.92	0
400	482.6	0	3	484.63	1.751	483.72	482.92	0
405	482.23	0	3	484.63	1.709	483.72	482.92	0
410	481.39	0	3	484.63	1.749	483.72	482.92	0
415	480.98	0	3	484.63	1.917	483.72	482.92	0
420	480.78	0	3	484.63	1.69	483.72	482.92	0
425	480.62	0	6	484.63	1.598	483.72	482.92	0
430	480.87	0	6	484.63	2.039	483.72	482.92	0
435	480.73	0	6	484.63	1.673	483.72	482.92	0
440	480.79	0	6	484.63	1.721	483.72	482.92	0
445	480.84	0	6	484.63	1.888	483.72	482.92	0

450	481.36	0	6	484.63	1.685	483.72	482.92	0
455	481.88	0	3	484.63	1.469	483.72	482.92	0
460	481.66	0	3	484.63	1.778	483.72	482.92	0
465	481.41	0	3	484.63	1.824	483.72	482.92	0
470	481.48	0	3	484.63	2.019	483.72	482.92	0
475	481.4	0	3	484.63	1.781	483.72	482.92	0
480	481.28	0	3	484.63	1.546	483.72	482.92	0
485	481.39	0	3	484.63	1.703	483.72	482.92	0
490	481.35	0	3	484.63	1.733	483.72	482.92	0
495	481.22	0	3	484.63	2.09	483.72	482.92	0
500	481	0	3	484.63	1.909	483.72	482.92	0
505	480.89	0	3	484.63	1.374	483.72	482.92	0
510	480.73	0	3	484.63	2.042	483.72	482.92	0
515	480.63	0	6	484.63	2.016	483.72	482.92	0
520	480.45	0	6	484.63	1.685	483.72	482.92	0
525	480.41	0	6	484.63	1.777	483.72	482.92	0
530	481.05	0	6	484.63	1.68	483.72	482.92	0
535	480.95	0	6	484.63	2.091	483.72	482.92	0
540	481.06	0	6	484.63	1.698	483.72	482.92	0
545	480.98	0	6	484.63	1.9	483.72	482.92	0
550	480.7	0	6	484.63	1.71	483.72	482.92	0
555	481.01	0	3	484.63	1.792	483.72	482.92	0
560	481.42	0	3	484.63	1.836	483.72	482.92	0
565	481.42	0	3	484.63	1.912	483.72	482.92	0
570	481.37	0	3	484.63	1.906	483.72	482.92	0
575	481.11	0	3	484.63	1.861	483.72	482.92	0
580	481.01	0	3	484.63	2.063	483.72	482.92	0
585	481.02	0	3	484.63	2.315	483.72	482.92	0
590	481.14	0	3	484.63	2.1	483.72	482.92	0
595	481.06	0	3	484.63	1.758	483.72	482.92	0
600	481.03	0	3	484.63	1.467	483.72	482.92	0
605	480.96	0	3	484.63	1.696	483.72	482.92	0
610	480.89	0	3	484.63	1.965	483.72	482.92	0
615	480.9	0	3	484.63	1.439	483.72	482.92	0
620	480.84	0	3	484.63	1.841	483.72	482.92	0
625	480.88	0	3	484.63	2.118	483.72	482.92	0
630	480.82	0	3	484.63	2.12	483.72	482.92	0
635	480.8	0	3	484.63	2.025	483.72	482.92	0
640	480.8	0	6	484.63	1.875	483.72	482.92	0
645	480.87	0	6	484.63	2.127	483.72	482.92	0
650	480.79	0	6	484.63	2.326	483.72	482.92	0

655	480.81	0	6	484.63	2.105	483.72	482.92	0
660	480.79	0	6	484.63	1.594	483.72	482.92	0
665	481.06	0	6	484.63	1.802	483.72	482.92	0
670	480.79	0	6	484.63	1.986	483.72	482.92	0
675	480.44	0	6	484.63	2.159	483.72	482.92	0
680	480.43	0	6	484.63	2.22	483.72	482.92	0
685	480.41	0	6	484.63	1.615	483.72	482.92	0
690	480.51	0	6	484.63	1.754	483.72	482.92	0
695	480.59	0	6	484.63	2.185	483.72	482.92	0
700	480.72	0	3	484.63	1.751	483.72	482.92	0
705	480.77	0	3	484.63	1.816	483.72	482.92	0
710	480.73	0	3	484.63	2.016	483.72	482.92	0
715	480.49	0	3	484.63	2.234	483.72	482.92	0
720	480.4	0	3	484.63	2.063	483.72	482.92	0
725	480.29	480.37	3	484.63	2.001	483.72	482.92	0
730	480.29	480.37	6	484.63	1.896	483.72	482.92	0
735	480.17	480.37	6	484.63	1.99	483.72	482.92	0
740	479.94	480.37	6	484.63	1.753	483.72	482.92	0
745	480.17	480.37	6	484.63	1.798	483.72	482.92	0
750	480.72	0	6	484.63	1.863	483.72	482.92	0
755	481.35	0	6	484.63	1.448	483.72	482.92	0
760	481.87	0	6	484.63	1.827	483.72	482.92	0
765	482.01	0	6	484.63	1.877	483.72	482.92	0
770	482.05	0	6	484.63	2.101	483.72	482.92	0
775	482.04	0	6	484.63	2.358	483.72	482.92	0
780	481.96	0	6	484.63	1.927	483.72	482.92	0
785	481.41	0	6	484.63	1.914	483.72	482.92	0
790	480.9	0	6	484.63	1.932	483.72	482.92	0
795	481	0	6	484.63	2.011	483.72	482.92	0
800	481.17	0	6	484.63	1.875	483.72	482.92	0
805	481.12	0	6	484.63	2.002	483.72	482.92	0
810	481.32	0	6	484.63	1.901	483.72	482.92	0
815	481.31	0	6	484.63	1.66	483.72	482.92	0
820	480.84	0	6	484.63	1.659	483.72	482.92	0
825	480.81	0	6	484.63	1.908	483.72	482.92	0
830	481.06	0	6	484.63	1.991	483.72	482.92	0
835	480.99	0	6	484.63	2.022	483.72	482.92	0
840	480.91	0	6	484.63	2.008	483.72	482.92	0
845	480.88	0	6	484.63	1.992	483.72	482.92	0
850	480.69	0	6	484.63	2.138	483.72	482.92	0
855	480.62	0	6	484.63	2.067	483.72	482.92	0

860	481.09	0		6	484.63	1.98	483.72	482.92	0
865	480.99	0		6	484.63	2.061	483.72	482.92	0
870	480.74	0		6	484.63	2.106	483.72	482.92	0
875	480.86	0		6	484.63	2.141	483.72	482.92	0
880	480.66	0		6	484.63	2.314	483.72	482.92	0
885	480.44	0		6	484.63	1.943	483.72	482.92	0
890	480.54	0		6	484.63	2.024	483.72	482.92	0
895	480.98	0		6	484.63	2.243	483.72	482.92	0
900	480.62	0		6	484.63	2.501	483.72	482.92	0
905	480.7	0		6	484.63	1.976	483.72	482.92	0
910	481.63	0		6	484.63	1.901	483.72	482.92	0
915	481.39	0		6	484.63	1.891	483.72	482.92	0
920	480.98	0		6	484.63	2.059	483.72	482.92	0
925	481.52	0		6	484.63	1.55	483.72	482.92	0
930	481.46	0		6	484.63	1.915	483.72	482.92	0
935	481.15	0		6	484.63	1.669	483.72	482.92	0
940	480.83	0		6	484.63	1.784	483.72	482.92	0
945	480.51	0		6	484.63	1.877	483.72	482.92	0
950	480.21	480.37		6	484.63	1.891	483.72	482.92	0
955	480.17	480.37		6	484.63	1.82	483.72	482.92	0
960	480.29	480.37		6	484.63	1.893	483.72	482.92	0
965	480.31	480.37		6	484.63	1.419	483.72	482.92	0
970	480.18	480.37		6	484.63	2.194	483.72	482.92	0
975	480.14	480.37		6	484.63	1.877	483.72	482.92	0
980	480.42	0		6	484.63	2.257	483.72	482.92	0
985	481.28	0		6	484.63	2.492	483.72	482.92	0
990	481.36	0		6	484.63	2.056	483.72	482.92	0
995	480.94	0		3	484.63	2.011	483.72	482.92	0
1000	480.21	480.37		3	484.63	2.179	483.72	482.92	0
1005	479.83	480.37		3	484.63	1.858	483.72	482.92	0
1010	479.87	480.37		3	484.63	2.12	483.72	482.92	0
1015	479.79	480.37		3	484.63	2.383	483.72	482.92	0
1020	479.93	480.37		3	484.63	1.763	483.72	482.92	0
1025	479.54	480.37		3	484.63	1.801	483.72	482.92	0
1030	479.52	480.37		3	484.63	1.856	483.72	482.92	0
1035	479.84	480.37		3	484.63	2.28	483.72	482.92	0
1040	479.99	480.37		3	484.63	2.443	483.72	482.92	0
1045	479.69	480.37		3	484.63	2.341	483.72	482.92	0
1050	479.51	480.37		3	484.63	1.969	483.72	482.92	0
1055	479.33	480.37		3	484.63	2.479	483.72	482.92	0
1060	479.23	480.37		3	484.63	2.111	483.72	482.92	0

1065	478.96	480.37	6	484.63	2.239	483.72	482.92	0
1070	478.92	480.37	6	484.63	2.015	483.72	482.92	0
1075	479.05	480.37	6	484.63	1.96	483.72	482.92	0
1080	479.34	480.37	6	484.63	2.14	483.72	482.92	0
1085	479.45	480.37	6	484.63	2.202	483.72	482.92	0
1090	479.74	480.37	6	484.63	2.419	483.72	482.92	0
1095	480.45	0	6	484.63	2.339	483.72	482.92	0
1100	480.93	0	6	484.63	2.396	483.72	482.92	0
1105	480.9	0	6	484.63	2.802	483.72	482.92	0
1110	480.35	480.37	6	484.63	2.972	483.72	482.92	0
1115	480.11	480.37	6	484.63	2.465	483.72	482.92	0
1120	480.23	480.37	6	484.63	2.978	483.72	482.92	0
1125	480.4	0	6	484.63	2.807	483.72	482.92	0
1130	479.95	480.37	6	484.63	2.824	483.72	482.92	0
1135	479.79	480.37	6	484.63	2.719	483.72	482.92	0
1140	479.48	480.37	6	484.63	2.419	483.72	482.92	0
1145	479.24	480.37	6	484.63	2.085	483.72	482.92	0
1150	479.21	480.37	6	484.63	2.38	483.72	482.92	0
1155	479.34	480.37	6	484.63	2.567	483.72	482.92	0
1160	479.34	480.37	6	484.63	2.569	483.72	482.92	0
1165	479.35	480.37	6	484.63	2.589	483.72	482.92	0
1170	478.93	480.37	6	484.63	2.577	483.72	482.92	0
1175	478.36	480.37	6	484.63	2.728	483.72	482.92	0
1180	478.12	480.37	6	484.63	2.779	483.72	482.92	0
1185	477.93	480.37	6	484.63	2.642	483.72	482.92	0
1190	477.99	480.37	6	484.63	2.077	483.72	482.92	0
1195	478.08	480.37	6	484.63	2.012	483.72	482.92	0
1200	478.06	480.37	6	484.63	2.437	483.72	482.92	0
1205	478.08	480.37	3	484.63	2.202	483.72	482.92	0
1210	478.2	480.37	3	484.63	2.204	483.72	482.92	0
1215	478.65	480.37	3	484.63	2.135	483.72	482.92	0
1220	479.41	480.37	3	484.63	2.364	483.72	482.92	0
1225	479.7	480.37	3	484.63	2.318	483.72	482.92	0
1230	479.49	480.37	3	484.63	2.444	483.72	482.92	0
1235	479.6	480.37	3	484.63	2.294	483.72	482.92	0
1240	479.77	480.37	3	484.63	2.235	483.72	482.92	0
1245	480.29	480.37	6	484.63	1.971	483.72	482.92	0
1250	480.32	480.37	6	484.63	2.55	483.72	482.92	0
1255	480.58	0	6	484.63	2.385	483.72	482.92	0
1260	480.89	0	6	484.63	2.692	483.72	482.92	0
1265	480.46	0	6	484.63	2.168	483.72	482.92	0

1270	480.38	0	6	484.63	1.905	483.72	482.92	0
1275	480.41	0	6	484.63	2.324	483.72	482.92	0
1280	480.29	480.37	6	484.63	2.283	483.72	482.92	0
1285	480.48	0	6	484.63	2.573	483.72	482.92	0
1290	480.47	0	6	484.63	2.215	483.72	482.92	0
1295	480.48	0	6	484.63	2.405	483.72	482.92	0
1300	480.35	480.37	4	484.63	2.738	483.72	482.92	0
1305	480.22	480.37	4	484.63	2.447	483.72	482.92	0
1310	480.24	480.37	4	484.63	2.676	483.72	482.92	0
1315	480.17	480.37	4	484.63	2.489	483.72	482.92	0
1320	480.47	0	4	484.63	2.604	483.72	482.92	0
1323.3	480.98	0	4	484.63	2.435	483.72	482.92	0
1325	481.7	0	4	484.63	2.033	483.72	482.92	0
1326.3	481.93	0	4	484.63	2.24	483.72	482.92	0
1329.3	482.48	0	4	484.63	2.3	483.72	482.92	0
1332.3	482.63	0	4	484.63	2.43	483.72	482.92	0
1335.3	483.03	0	4	484.63	2.34	483.72	0	0
1338.3	483.58	0	4	484.63	1.84	483.72	0	0
1341.3	483.38	0	4	484.63	2.04	483.72	0	0
1344.3	483.28	0	4	484.63	1.61	483.72	0	0
1347.3	483.43	0	4	484.63	2	483.72	0	0
1350.3	483.78	0	4	484.63	1.72	0	0	0
1353.3	484.03	0	4	484.63	1.17	0	0	0
1356.3	484.43	0	4	484.63	0.76	0	0	0
1359.3	484.63	0	4	484.63	0	0	0	0
1360.3	484.78	0	10	0	0	0	0	0
1364.3	485.55	0	10	0	0	0	0	0
1368.3	486.29	0	10	0	0	0	0	0

Cross-section: G_23

				High		Middle	Low	
Station	**Elevation**	**SZF**	**Substrate/Cover**	**WSEL**	**Velocity**	**WSEL**	**Stage 3**	**WSEL**
-6	487	0	1	0	0	0	0	0
4	484.64	0	1	485	0	0	0	0
8	483.18	0	1	485	0	484.07	483.28	-0.08
12	482.08	0	1	485	0	484.07	483.28	0.15
20	481.58	0	1	485	0	484.07	483.28	0.11
24	481.78	0	6	485	0	484.07	483.28	0.2
32	481.88	0	6	485	0	484.07	483.28	0.2
36	481.48	0	6	485	0	484.07	483.28	0.24
40	481.18	481.21	6	485	0	484.07	483.28	0.2
44	481.08	481.21	6	485	0	484.07	483.28	0.23

48	480.88	481.21	6	485	0	484.07	483.28	0.2
52	480.88	481.21	6	485	0	484.07	483.28	0.15
56	480.78	481.21	6	485	0	484.07	483.28	0.24
60	480.28	481.21	6	485	0	484.07	483.28	0.22
65	481.86	0	6	485	0	484.07	483.28	0.05
70	481.92	0	6	485	0	484.07	483.28	0.256
75	481.97	0	6	485	0	484.07	483.28	-0.242
80	481.74	0	6	485	0	484.07	483.28	0.22
85	481.58	0	6	485	0	484.07	483.28	0.496
90	480.85	481.21	6	485	0	484.07	483.28	0.152
95	480.69	481.21	6	485	0	484.07	483.28	0.422
100	480.59	481.21	6	485	0	484.07	483.28	0.388
105	479.96	481.21	6	485	0	484.07	483.28	0.289
110	479.79	481.21	6	485	0	484.07	483.28	-0.117
115	479.51	481.21	6	485	0	484.07	483.28	0.252
120	479.44	481.21	6	485	0	484.07	483.28	0.16
125	479.82	481.21	6	485	0	484.07	483.28	0.254
130	480.01	481.21	6	485	0	484.07	483.28	0.075
135	480.01	481.21	6	485	0	484.07	483.28	-0.098
140	480.22	481.21	6	485	0	484.07	483.28	-0.239
145	480.29	481.21	6	485	0	484.07	483.28	0.048
150	480.63	481.21	18	485	0	484.07	483.28	-0.093
155	480.53	481.21	18	485	0	484.07	483.28	-0.062
160	480.35	481.21	18	485	0	484.07	483.28	-0.021
165	480.02	481.21	18	485	0	484.07	483.28	-0.237
170	480.27	481.21	18	485	0	484.07	483.28	-0.089
175	480.49	481.21	18	485	0	484.07	483.28	-0.162
180	481.68	0	18	485	0	484.07	483.28	0.15
184	482.18	0	6	485	0	484.07	483.28	0.03
188	482.38	0	6	485	0	484.07	483.28	0.09
192	482.68	0	6	485	0	484.07	483.28	0.05
196	483.7	0	6	485	0	484.07	0	0
200	482.88	0	6	485	0	484.07	483.28	0.18
204	482.88	0	6	485	0	484.07	483.28	0.3
208	483.08	0	6	485	0	484.07	483.28	0.14
212	482.48	0	3	485	0	484.07	483.28	0.43
216	482.48	0	3	485	0	484.07	483.28	0.33
220	482.28	0	6	485	0	484.07	483.28	0.46
224	482.08	0	6	485	0	484.07	483.28	0.59
228	482.28	0	6	485	0	484.07	483.28	0.55
232	482.33	0	6	485	0	484.07	483.28	0.54

236	482.28	0	6	485	0	484.07	483.28	0.46
240	482.38	0	6	485	0	484.07	483.28	0.56
244	482.33	0	6	485	0	484.07	483.28	0.59
248	482.08	0	6	485	0	484.07	483.28	0.33
252	481.78	0	6	485	0	484.07	483.28	0.66
256	481.83	0	6	485	0	484.07	483.28	0.59
260	482.08	0	6	485	0	484.07	483.28	0.34
264	482.08	0	6	485	0	484.07	483.28	0.56
268	481.88	0	6	485	0	484.07	483.28	0.76
272	481.63	0	6	485	0	484.07	483.28	0.78
276	481.73	0	6	485	0	484.07	483.28	0.54
280	481.88	0	6	485	0	484.07	483.28	0.22
284	481.88	0	6	485	0	484.07	483.28	0.36
288	481.88	0	3	485	0	484.07	483.28	0.76
292	483.03	0	3	485	0	484.07	483.28	0.72
296	482.68	0	3	485	0	484.07	483.28	0.86
300	482.58	0	3	485	0	484.07	483.28	0.54
304	482.43	0	3	485	0	484.07	483.28	0.14
308	482.48	0	3	485	0	484.07	483.28	0.11
312	482.88	0	3	485	0	484.07	483.28	0.02
316	483.08	0	3	485	0	484.07	483.28	0.77
320	482.93	0	3	485	0	484.07	483.28	0.84
324	482.68	0	6	485	0	484.07	483.28	0.69
328	482.58	0	6	485	0	484.07	483.28	0.05
332	483.26	0	6	485	0	484.07	483.28	0
336	482.93	0	6	485	0	484.07	483.28	0.03
340	482.98	0	6	485	0	484.07	483.28	-0.04
344	483.08	0	6	485	0	484.07	483.28	-0.78
348	483.08	0	6	485	0	484.07	483.28	0.4
352	482.98	0	3	485	0	484.07	483.28	0.2
356	483.66	0	3	485	0	484.07	0	0
362	483.54	0	6	485	0	484.07	0	0
366	482.68	0	6	485	0	484.07	483.28	1.15
370	482.28	0	6	485	0	484.07	483.28	1.16
374	482.88	0	6	485	0	484.07	483.28	1.02
378	482.14	0	6	485	0	484.07	483.28	0.66
382	481.98	0	3	485	0	484.07	483.28	0.67
386	481.88	0	3	485	0	484.07	483.28	0.43
390	481.83	0	6	485	0	484.07	483.28	0.89
394	481.78	0	6	485	0	484.07	483.28	0.85
398	481.83	0	6	485	0	484.07	483.28	0.74

402	481.63	0	6	485	0	484.07	483.28	0.58
404	481.78	0	6	485	0	484.07	483.28	0.34
408	481.83	0	6	485	0	484.07	483.28	0.42
412	482.18	0	6	485	0	484.07	483.28	0.34
416	481.73	0	6	485	0	484.07	483.28	0.16
421	483.37	0	6	485	0	484.07	0	0
430	481.43	0	6	485	0	484.07	483.28	0.844
435	481.56	0	6	485	0	484.07	483.28	-0.431
440	481.71	0	6	485	0	484.07	483.28	0.418
445	481.83	0	6	485	0	484.07	483.28	-0.264
450	481.76	0	6	485	0	484.07	483.28	0.373
455	481.54	0	6	485	0	484.07	483.28	0.219
460	481.88	0	6	485	0	484.07	483.28	0.75
465	481.75	0	6	485	0	484.07	483.28	0.86
470	481.8	0	6	485	0	484.07	483.28	0.147
475	481.82	0	6	485	0	484.07	483.28	1.317
480	482.05	0	6	485	0	484.07	483.28	-0.674
485	481.58	0	6	485	0	484.07	483.28	0.154
490	481.82	0	6	485	0	484.07	483.28	0.692
495	481.8	0	6	485	0	484.07	483.28	1.382
500	482.03	0	6	485	0	484.07	483.28	0.074
505	481.93	0	6	485	0	484.07	483.28	1.622
510	481.84	0	6	485	0	484.07	483.28	0.523
515	481.89	0	6	485	0	484.07	483.28	0.318
520	483.28	0	6	485	0	484.07	483.28	0
525	481.82	0	6	485	0	484.07	483.28	1.194
530	481.7	0	6	485	0	484.07	483.28	0.063
535	481.42	0	6	485	0	484.07	483.28	0.946
540	480.95	481.21	6	485	0	484.07	483.28	0.477
545	481.31	0	6	485	0	484.07	483.28	2.144
550	481.4	0	6	485	0	484.07	483.28	0.801
555	481.47	0	6	485	0	484.07	483.28	0.822
560	481.64	0	6	485	0	484.07	483.28	0.391
565	481.61	0	3	485	0	484.07	483.28	1.309
570	481.85	0	3	485	0	484.07	483.28	0.097
575	482.08	0	3	485	0	484.07	483.28	-0.127
580	481.73	0	3	485	0	484.07	483.28	1.104
585	481.85	0	3	485	0	484.07	483.28	1.69
590	481.71	0	3	485	0	484.07	483.28	0.664
595	481.53	0	3	485	0	484.07	483.28	0.304
600	481.32	0	3	485	0	484.07	483.28	0.71

605	481.43	0	3	485	0	484.07	483.28	0.902
610	481.53	0	3	485	0	484.07	483.28	0.393
615	481.56	0	3	485	0	484.07	483.28	0.835
620	481.54	0	3	485	0	484.07	483.28	1.034
625	481.5	0	3	485	0	484.07	483.28	1.484
630	481.7	0	3	485	0	484.07	483.28	0.431
635	481.94	0	3	485	0	484.07	483.28	0.587
640	481.91	0	3	485	0	484.07	483.28	-0.512
645	481.86	0	3	485	0	484.07	483.28	1.318
650	481.78	0	3	485	0	484.07	483.28	0.756
655	481.78	0	3	485	0	484.07	483.28	1.608
660	481.76	0	3	485	0	484.07	483.28	0.867
665	481.6	0	3	485	0	484.07	483.28	-0.356
670	481.87	0	12	485	0	484.07	483.28	0.351
675	481.68	0	12	485	0	484.07	483.28	0.587
680	481.78	0	12	485	0	484.07	483.28	1.531
685	481.72	0	12	485	0	484.07	483.28	1.855
690	481.64	0	12	485	0	484.07	483.28	0.361
695	481.63	0	12	485	0	484.07	483.28	-0.318
700	481.95	0	12	485	0	484.07	483.28	-0.17
705	481.76	0	12	485	0	484.07	483.28	0.989
710	481.56	0	12	485	0	484.07	483.28	1.616
715	481.5	0	12	485	0	484.07	483.28	1.678
720	481.47	0	12	485	0	484.07	483.28	0.787
725	481.91	0	12	485	0	484.07	483.28	-0.232
730	481.62	0	12	485	0	484.07	483.28	0.384
735	481.66	0	12	485	0	484.07	483.28	0.804
740	481.57	0	12	485	0	484.07	483.28	0.751
745	481.8	0	13	485	0	484.07	483.28	0.054
750	483.28	0	13	485	0	484.07	483.28	0
755	481.87	0	13	485	0	484.07	483.28	0.26
760	481.78	0	13	485	0	484.07	483.28	-0.202
765	481.88	0	13	485	0	484.07	483.28	0.459
770	481.87	0	13	485	0	484.07	483.28	-1.095
775	481.71	0	13	485	0	484.07	483.28	0.896
780	481.61	0	13	485	0	484.07	483.28	-0.296
785	481.73	0	3	485	0	484.07	483.28	1.578
790	481.67	0	3	485	0	484.07	483.28	2.685
795	481.72	0	3	485	0	484.07	483.28	0.014
800	481.69	0	3	485	0	484.07	483.28	0.568
805	481.65	0	3	485	0	484.07	483.28	-0.519

810	481.56	0	13	485	0	484.07	483.28	0.125
815	481.77	0	13	485	0	484.07	483.28	1.49
820	481.81	0	13	485	0	484.07	483.28	3
825	483.28	0	13	485	0	484.07	483.28	0
830	481.85	0	13	485	0	484.07	483.28	-0.887
835	481.91	0	13	485	0	484.07	483.28	0.137
840	482.14	0	13	485	0	484.07	483.28	0.917
845	482.14	0	3	485	0	484.07	483.28	0.628
850	483.28	0	3	485	0	484.07	483.28	0
855	482.18	0	3	485	0	484.07	483.28	-0.037
860	482.17	0	3	485	0	484.07	483.28	-0.544
865	482.13	0	3	485	0	484.07	483.28	-0.244
870	481.78	0	3	485	0	484.07	483.28	1.129
875	481.69	0	3	485	0	484.07	483.28	0.45
880	481.35	0	3	485	0	484.07	483.28	0.453
885	480.91	481.21	3	485	0	484.07	483.28	1.442
890	480.59	481.21	3	485	0	484.07	483.28	0.854
895	480.86	481.21	3	485	0	484.07	483.28	1.068
900	480.93	481.21	3	485	0	484.07	483.28	1.754
905	480.74	481.21	3	485	0	484.07	483.28	0.447
910	480.18	481.21	6	485	0	484.07	483.28	0.459
915	479.8	481.21	6	485	0	484.07	483.28	0.676
920	479.59	481.21	6	485	0	484.07	483.28	0.607
925	479.3	481.21	6	485	0	484.07	483.28	0.594
930	479.17	481.21	6	485	0	484.07	483.28	0.944
935	478.9	481.21	6	485	0	484.07	483.28	0.787
940	478.76	481.21	6	485	0	484.07	483.28	0.773
945	478.64	481.21	6	485	0	484.07	483.28	0.716
950	478.48	481.21	6	485	0	484.07	483.28	0.628
955	478.25	481.21	6	485	0	484.07	483.28	0.887
960	477.97	481.21	6	485	0	484.07	483.28	0.945
970	477.87	481.21	6	485	0	484.07	483.28	0.732
975	477.82	481.21	6	485	0	484.07	483.28	1.122
980	477.85	481.21	6	485	0	484.07	483.28	0.987
985	478.13	481.21	6	485	0	484.07	483.28	1.047
990	478.21	481.21	6	485	0	484.07	483.28	1.558
995	478.28	481.21	6	485	0	484.07	483.28	0.986
1000	478.54	481.21	6	485	0	484.07	483.28	0.43
1005	478.65	481.21	6	485	0	484.07	483.28	0.952
1010	478.88	481.21	6	485	0	484.07	483.28	1.429
1015	479.12	481.21	6	485	0	484.07	483.28	1.343

1020	479.34	481.21	6	485	0	484.07	483.28	1.302
1025	479.39	481.21	6	485	0	484.07	483.28	1.149
1030	479.53	481.21	6	485	0	484.07	483.28	1.279
1035	480.03	481.21	6	485	0	484.07	483.28	1.066
1040	480.71	481.21	3	485	0	484.07	483.28	0.721
1045	480.62	481.21	3	485	0	484.07	483.28	0.762
1050	480.74	481.21	3	485	0	484.07	483.28	1.149
1055	480.89	481.21	3	485	0	484.07	483.28	1.693
1060	480.96	481.21	3	485	0	484.07	483.28	0.606
1065	481.24	0	3	485	0	484.07	483.28	1.1
1070	481.59	0	3	485	0	484.07	483.28	2.058
1075	481.57	0	3	485	0	484.07	483.28	1.646
1080	481.58	0	3	485	0	484.07	483.28	1.172
1085	481.12	481.21	3	485	0	484.07	483.28	0.886
1090	481.18	481.21	3	485	0	484.07	483.28	1.076
1095	481.09	481.21	3	485	0	484.07	483.28	1.467
1100	481.06	481.21	3	485	0	484.07	483.28	2.28
1105	480.91	481.21	3	485	0	484.07	483.28	1.138
1110	480.81	481.21	3	485	0	484.07	483.28	1.161
1115	480.54	481.21	3	485	0	484.07	483.28	1.372
1120	480.62	481.21	3	485	0	484.07	483.28	0.991
1125	480.65	481.21	3	485	0	484.07	483.28	0.967
1130	480.34	481.21	3	485	0	484.07	483.28	0.925
1135	480.33	481.21	3	485	0	484.07	483.28	1.34
1140	480.43	481.21	3	485	0	484.07	483.28	1.899
1145	480.46	481.21	3	485	0	484.07	483.28	1.483
1150	480.4	481.21	3	485	0	484.07	483.28	1.276
1155	480.02	481.21	3	485	0	484.07	483.28	1.582
1160	479.91	481.21	3	485	0	484.07	483.28	1.425
1165	480	481.21	3	485	0	484.07	483.28	1.13
1170	479.98	481.21	3	485	0	484.07	483.28	1.15
1175	479.93	481.21	3	485	0	484.07	483.28	1.794
1180	479.83	481.21	3	485	0	484.07	483.28	1.54
1185	479.76	481.21	6	485	0	484.07	483.28	1.213
1190	479.72	481.21	6	485	0	484.07	483.28	1.291
1195	479.71	481.21	6	485	0	484.07	483.28	0.602
1200	479.56	481.21	6	485	0	484.07	483.28	1.046
1205	479.52	481.21	6	485	0	484.07	483.28	1.278
1210	479.51	481.21	6	485	0	484.07	483.28	0.696
1215	479.15	481.21	6	485	0	484.07	483.28	0.879
1220	479.09	481.21	6	485	0	484.07	483.28	1.097

1225	478.86	481.21	6	485	0	484.07	483.28	1.234
1230	478.77	481.21	6	485	0	484.07	483.28	1.234
1235	478.62	481.21	6	485	0	484.07	483.28	1.173
1240	478.49	481.21	6	485	0	484.07	483.28	0.544
1245	478.33	481.21	6	485	0	484.07	483.28	0.946
1250	478.18	481.21	6	485	0	484.07	483.28	1.257
1255	478.08	481.21	6	485	0	484.07	483.28	1.3
1260	478.09	481.21	6	485	0	484.07	483.28	0.798
1265	477.94	481.21	13	485	0	484.07	483.28	1.386
1270	478.16	481.21	13	485	0	484.07	483.28	1.345
1275	478.27	481.21	13	485	0	484.07	483.28	1.262
1280	478.22	481.21	13	485	0	484.07	483.28	1.323
1285	478.32	481.21	13	485	0	484.07	483.28	1.052
1290	478.63	481.21	13	485	0	484.07	483.28	0.7
1295	478.82	481.21	13	485	0	484.07	483.28	1.175
1300	479.34	481.21	13	485	0	484.07	483.28	0.872
1305	479.62	481.21	13	485	0	484.07	483.28	1.251
1310	480.03	481.21	13	485	0	484.07	483.28	0.037
1315	480.2	481.21	13	485	0	484.07	483.28	1.033
1320	480.37	481.21	13	485	0	484.07	483.28	0.853
1325	481.04	481.21	13	485	0	484.07	483.28	1.147
1330	481.21	481.21	13	485	0	484.07	483.28	1.066
1335	481.45	0	13	485	0	484.07	483.28	-0.175
1340	481.65	0	13	485	0	484.07	483.28	0.959
1345	481.64	0	13	485	0	484.07	483.28	0.37
1350	481.81	0	13	485	0	484.07	483.28	0.868
1355	481.57	0	4	485	0	484.07	483.28	1.148
1360	481.58	0	4	485	0	484.07	483.28	0.906
1367.5	481.63	0	4	485	0	484.07	483.28	0.58
1371.5	482.03	0	13	485	0	484.07	483.28	0.01
1375.5	484.48	0	13	485	0	0	0	0
1379.5	482.23	0	4	485	0	484.07	483.28	0.6
1383.5	482.38	0	4	485	0	484.07	483.28	0.68
1387.5	482.18	0	4	485	0	484.07	483.28	0.61
1391.5	482.33	0	4	485	0	484.07	483.28	0.73
1395.5	482.58	0	13	485	0	484.07	483.28	0.57
1399.5	483.28	0	13	485	0	484.07	483.28	0
1403.5	482.68	0	4	485	0	484.07	483.28	0.58
1407.5	482.63	0	4	485	0	484.07	483.28	0.53
1411.5	482.73	0	4	485	0	484.07	483.28	0.37
1415.5	482.78	0	1	485	0	484.07	483.28	0.36

1419.5	482.78	0	1	485	0	484.07	483.28	0.03
1427.5	483.73	0	1	485	0	484.07	0	0
1435.5	487	0	4	0	0	0	0	0

Cross-section: G_2

				High		Middle	Low	
Station	**Elevation**	**SZF**	**Substrate/Cover**	**WSEL**	**Velocity**	**WSEL**	**Stage 3**	**WSEL**
0	487.6	0	17	0	0	0	0	0
4	486.46	0	17	0	0	0	0	0
8	485.51	0	1	0	0	0	0	0
9.5	485.22	0	1	485.22	0	0	0	0
12	484.02	0	1	485.22	1.106	484.29	0	0
16	484.02	0	15	485.22	1.712	484.29	0	0
20	483.67	0	15	485.22	1.704	484.29	0	0
24	483.92	0	15	485.22	1.7	484.29	0	0
28	483.22	0	15	485.22	1.407	484.29	483.5	0
32	482.87	0	15	485.22	1.601	484.29	483.5	0
36	482.72	0	15	485.22	1.667	484.29	483.5	0
40	483.07	0	15	485.22	1.446	484.29	483.5	0
44	483.32	0	15	485.22	1.737	484.29	483.5	0
48	483.92	0	6	485.22	1.638	484.29	0	0
52	483.02	0	6	485.22	1.956	484.29	483.5	0
56	482.62	0	6	485.22	1.613	484.29	483.5	0
60	482.52	0	6	485.22	1.48	484.29	483.5	0
65	482.34	0	6	485.22	1.556	484.29	483.5	0
70	482.23	0	6	485.22	1.676	484.29	483.5	0
75	481.94	0	6	485.22	2.067	484.29	483.5	0
80	481.53	0	6	485.22	1.949	484.29	483.5	0
85	481.58	0	6	485.22	1.891	484.29	483.5	0
90	482.03	0	6	485.22	2.404	484.29	483.5	0
95	481.95	0	6	485.22	2.124	484.29	483.5	0
100	482.27	0	6	485.22	2.42	484.29	483.5	0
105	482.31	0	6	485.22	2.678	484.29	483.5	0
110	482.26	0	6	485.22	2.228	484.29	483.5	0
115	482.24	0	6	485.22	2.192	484.29	483.5	0
120	482.44	0	6	485.22	2.71	484.29	483.5	0
125	481.74	0	6	485.22	1.808	484.29	483.5	0
130	481.52	0	6	485.22	1.934	484.29	483.5	0
135	481.44	0	6	485.22	2.123	484.29	483.5	0
140	481.43	0	6	485.22	2.004	484.29	483.5	0
145	481.28	481.28	6	485.22	1.665	484.29	483.5	0
150	480.91	481.28	6	485.22	1.93	484.29	483.5	0

155	480.99	481.28	6	485.22	1.925	484.29	483.5	0
160	481.1	481.28	6	485.22	2.072	484.29	483.5	0
165	481.43	0	6	485.22	1.856	484.29	483.5	0
170	481.32	0	6	485.22	1.674	484.29	483.5	0
175	480.89	481.28	6	485.22	1.764	484.29	483.5	0
180	480.72	481.28	6	485.22	1.795	484.29	483.5	0
185	480.8	481.28	6	485.22	1.883	484.29	483.5	0
190	480.97	481.28	6	485.22	1.841	484.29	483.5	0
195	481.12	481.28	6	485.22	1.875	484.29	483.5	0
200	481.34	0	6	485.22	1.956	484.29	483.5	0
205	481.39	0	6	485.22	2.116	484.29	483.5	0
210	481.22	481.28	6	485.22	1.664	484.29	483.5	0
215	481.16	481.28	6	485.22	1.912	484.29	483.5	0
220	481.07	481.28	6	485.22	2.209	484.29	483.5	0
225	481.12	481.28	6	485.22	2.13	484.29	483.5	0
230	481.38	0	6	485.22	2.142	484.29	483.5	0
235	481.34	0	3	485.22	2.135	484.29	483.5	0
240	481.35	0	3	485.22	1.808	484.29	483.5	0
245	481.44	0	3	485.22	2.175	484.29	483.5	0
250	481.45	0	3	485.22	2.408	484.29	483.5	0
255	481.48	0	3	485.22	2.043	484.29	483.5	0
260	481.52	0	3	485.22	2.273	484.29	483.5	0
265	481.56	0	3	485.22	2.215	484.29	483.5	0
270	481.52	0	3	485.22	1.933	484.29	483.5	0
275	481.45	0	3	485.22	2.387	484.29	483.5	0
280	481.42	0	3	485.22	2.125	484.29	483.5	0
285	481.49	0	3	485.22	2.336	484.29	483.5	0
290	481.61	0	3	485.22	2.074	484.29	483.5	0
295	481.77	0	3	485.22	2.417	484.29	483.5	0
300	481.81	0	3	485.22	2.53	484.29	483.5	0
305	481.87	0	3	485.22	1.894	484.29	483.5	0
310	481.92	0	3	485.22	1.619	484.29	483.5	0
315	482	0	3	485.22	1.75	484.29	483.5	0
320	482.03	0	3	485.22	1.632	484.29	483.5	0
325	482.15	0	3	485.22	1.714	484.29	483.5	0
330	482.26	0	3	485.22	1.438	484.29	483.5	0
335	482.25	0	3	485.22	1.321	484.29	483.5	0
340	482.41	0	18	485.22	1.637	484.29	483.5	0
345	482.45	0	18	485.22	1.399	484.29	483.5	0
350	482.17	0	18	485.22	1.31	484.29	483.5	0
355	481.89	0	18	485.22	1.595	484.29	483.5	0

360	481.55	0	18	485.22	1.436	484.29	483.5	0
365	481.35	0	18	485.22	1.344	484.29	483.5	0
370	481.1	481.28	18	485.22	1.325	484.29	483.5	0
375	481.04	481.28	18	485.22	1.909	484.29	483.5	0
380	480.77	481.28	18	485.22	1.659	484.29	483.5	0
385	480.68	481.28	18	485.22	1.324	484.29	483.5	0
390	480.75	481.28	18	485.22	1.42	484.29	483.5	0
395	480.76	481.28	18	485.22	1.632	484.29	483.5	0
400	480.95	481.28	18	485.22	1.332	484.29	483.5	0
405	480.96	481.28	18	485.22	1.476	484.29	483.5	0
410	480.91	481.28	18	485.22	1.816	484.29	483.5	0
415	480.93	481.28	18	485.22	1.813	484.29	483.5	0
420	480.92	481.28	18	485.22	1.757	484.29	483.5	0
425	481.04	481.28	18	485.22	1.756	484.29	483.5	0
430	480.9	481.28	18	485.22	1.882	484.29	483.5	0
435	481.12	481.28	18	485.22	1.921	484.29	483.5	0
440	481.28	481.28	18	485.22	2.308	484.29	483.5	0
445	481.36	0	18	485.22	2.257	484.29	483.5	0
450	481.39	0	18	485.22	2.13	484.29	483.5	0
455	481.22	481.28	18	485.22	2.239	484.29	483.5	0
460	481.15	481.28	18	485.22	2.234	484.29	483.5	0
465	481.06	481.28	18	485.22	2.108	484.29	483.5	0
470	481.21	481.28	18	485.22	2.101	484.29	483.5	0
475	481.06	481.28	18	485.22	1.968	484.29	483.5	0
480	480.97	481.28	18	485.22	2.213	484.29	483.5	0
485	480.97	481.28	18	485.22	2.526	484.29	483.5	0
490	480.83	481.28	3	485.22	1.966	484.29	483.5	0
495	480.66	481.28	3	485.22	2.279	484.29	483.5	0
500	480.8	481.28	3	485.22	2.725	484.29	483.5	0
505	480.71	481.28	3	485.22	2.18	484.29	483.5	0
510	480.36	481.28	3	485.22	2.29	484.29	483.5	0
515	480.28	481.28	3	485.22	2.339	484.29	483.5	0
520	479.97	481.28	3	485.22	2.317	484.29	483.5	0
525	480.01	481.28	3	485.22	2.511	484.29	483.5	0
530	479.99	481.28	3	485.22	2.448	484.29	483.5	0
535	479.95	481.28	3	485.22	2.201	484.29	483.5	0
540	479.9	481.28	3	485.22	2.395	484.29	483.5	0
545	480.09	481.28	3	485.22	2.293	484.29	483.5	0
550	480.32	481.28	3	485.22	2.121	484.29	483.5	0
555	480.49	481.28	3	485.22	1.921	484.29	483.5	0
560	480.58	481.28	6	485.22	1.974	484.29	483.5	0

565	480.23	481.28	6	485.22	1.92	484.29	483.5	0
570	480.46	481.28	6	485.22	1.966	484.29	483.5	0
575	480.73	481.28	6	485.22	1.766	484.29	483.5	0
580	480.73	481.28	6	485.22	1.841	484.29	483.5	0
585	480.88	481.28	6	485.22	1.861	484.29	483.5	0
590	480.99	481.28	6	485.22	1.599	484.29	483.5	0
595	481.09	481.28	6	485.22	2.072	484.29	483.5	0
600	481.06	481.28	6	485.22	1.324	484.29	483.5	0
605	481.29	0	6	485.22	1.406	484.29	483.5	0
610	481.45	0	6	485.22	1.641	484.29	483.5	0
615	481.45	0	6	485.22	1.307	484.29	483.5	0
620	481.59	0	6	485.22	1.621	484.29	483.5	0
625	481.78	0	6	485.22	1.569	484.29	483.5	0
630	481.86	0	14	485.22	1.629	484.29	483.5	0
635	482.18	0	14	485.22	1.391	484.29	483.5	0
640	482.39	0	14	485.22	1.728	484.29	483.5	0
645	482.01	0	14	485.22	1.416	484.29	483.5	0
650	481.95	0	14	485.22	1.659	484.29	483.5	0
655	482.04	0	14	485.22	1.525	484.29	483.5	0
660	482.2	0	14	485.22	1.67	484.29	483.5	0
665	482.26	0	14	485.22	1.831	484.29	483.5	0
670	482.09	0	14	485.22	1.778	484.29	483.5	0
675	482.19	0	14	485.22	1.738	484.29	483.5	0
680	481.97	0	14	485.22	1.694	484.29	483.5	0
685	481.79	0	14	485.22	1.481	484.29	483.5	0
690	481.91	0	14	485.22	1.579	484.29	483.5	0
695	482.03	0	14	485.22	1.829	484.29	483.5	0
700	482.08	0	14	485.22	1.761	484.29	483.5	0
705	482.23	0	14	485.22	1.955	484.29	483.5	0
710	482.24	0	14	485.22	1.623	484.29	483.5	0
715	482.04	0	14	485.22	1.624	484.29	483.5	0
720	482.04	0	14	485.22	1.949	484.29	483.5	0
725	482.15	0	14	485.22	1.83	484.29	483.5	0
730	482.08	0	14	485.22	1.755	484.29	483.5	0
735	482.08	0	14	485.22	1.654	484.29	483.5	0
740	482.05	0	15	485.22	1.783	484.29	483.5	0
745	482.28	0	15	485.22	1.73	484.29	483.5	0
750	482.11	0	15	485.22	1.725	484.29	483.5	0
755	482.05	0	15	485.22	1.702	484.29	483.5	0
760	481.99	0	15	485.22	1.843	484.29	483.5	0
765	481.99	0	15	485.22	1.514	484.29	483.5	0

770	482.15	0	15	485.22	1.759	484.29	483.5	0
775	482.17	0	15	485.22	1.33	484.29	483.5	0
780	482.16	0	15	485.22	1.628	484.29	483.5	0
785	482.04	0	15	485.22	1.511	484.29	483.5	0
790	481.84	0	15	485.22	1.475	484.29	483.5	0
795	482.11	0	15	485.22	1.662	484.29	483.5	0
800	482.29	0	15	485.22	1.574	484.29	483.5	0
805	482.25	0	13	485.22	1.871	484.29	483.5	0
810	482.2	0	13	485.22	1.956	484.29	483.5	0
815	481.76	0	13	485.22	1.225	484.29	483.5	0
820	481.33	0	13	485.22	1.978	484.29	483.5	0
825	481.26	481.28	13	485.22	1.386	484.29	483.5	0
830	481.32	0	13	485.22	1.963	484.29	483.5	0
835	481.27	481.28	13	485.22	1.659	484.29	483.5	0
840	481.23	481.28	13	485.22	1.709	484.29	483.5	0
845	481.25	481.28	13	485.22	1.965	484.29	483.5	0
850	481.25	481.28	13	485.22	2.257	484.29	483.5	0
855	481.33	0	13	485.22	1.885	484.29	483.5	0
860	481.42	0	13	485.22	1.716	484.29	483.5	0
865	481.58	0	6	485.22	1.403	484.29	483.5	0
870	481.5	0	6	485.22	2.213	484.29	483.5	0
875	481.37	0	6	485.22	2.192	484.29	483.5	0
880	481.21	481.28	6	485.22	2.032	484.29	483.5	0
885	481.11	481.28	6	485.22	2.186	484.29	483.5	0
890	481.04	481.28	6	485.22	1.887	484.29	483.5	0
895	480.95	481.28	6	485.22	2.911	484.29	483.5	0
900	481.03	481.28	6	485.22	1.907	484.29	483.5	0
905	481.01	481.28	6	485.22	1.957	484.29	483.5	0
910	480.99	481.28	6	485.22	2.473	484.29	483.5	0
915	481.07	481.28	6	485.22	1.643	484.29	483.5	0
920	481.09	481.28	6	485.22	2.321	484.29	483.5	0
925	481.26	481.28	6	485.22	2.005	484.29	483.5	0
930	481.1	481.28	6	485.22	2.596	484.29	483.5	0
935	481.03	481.28	6	485.22	1.942	484.29	483.5	0
940	480.66	481.28	6	485.22	1.743	484.29	483.5	0
945	480.54	481.28	6	485.22	2.089	484.29	483.5	0
950	480.05	481.28	6	485.22	1.763	484.29	483.5	0
955	479.66	481.28	6	485.22	1.863	484.29	483.5	0
960	479.16	481.28	6	485.22	1.819	484.29	483.5	0
965	478.93	481.28	6	485.22	2.01	484.29	483.5	0
970	479.07	481.28	6	485.22	1.748	484.29	483.5	0

975	478.87	481.28	6	485.22	2.184	484.29	483.5	0
980	478.62	481.28	6	485.22	1.879	484.29	483.5	0
985	478.37	481.28	6	485.22	2.15	484.29	483.5	0
990	478.09	481.28	6	485.22	2.232	484.29	483.5	0
995	478.03	481.28	6	485.22	1.958	484.29	483.5	0
1000	478.21	481.28	6	485.22	2.177	484.29	483.5	0
1005	478.59	481.28	6	485.22	2.212	484.29	483.5	0
1010	478.89	481.28	6	485.22	2.231	484.29	483.5	0
1015	479.06	481.28	6	485.22	2.075	484.29	483.5	0
1020	479.19	481.28	6	485.22	2.516	484.29	483.5	0
1025	479.45	481.28	6	485.22	2.502	484.29	483.5	0
1030	479.58	481.28	6	485.22	2.257	484.29	483.5	0
1035	479.65	481.28	6	485.22	2.52	484.29	483.5	0
1040	479.56	481.28	6	485.22	2.326	484.29	483.5	0
1045	479.65	481.28	6	485.22	1.965	484.29	483.5	0
1050	479.65	481.28	6	485.22	2.715	484.29	483.5	0
1055	479.8	481.28	6	485.22	2.33	484.29	483.5	0
1060	480.28	481.28	6	485.22	2.659	484.29	483.5	0
1065	479.27	481.28	6	485.22	1.842	484.29	483.5	0
1070	478.96	481.28	6	485.22	2.16	484.29	483.5	0
1075	478.99	481.28	6	485.22	2.065	484.29	483.5	0
1080	478.89	481.28	6	485.22	2.239	484.29	483.5	0
1085	478.75	481.28	6	485.22	2.04	484.29	483.5	0
1090	478.72	481.28	6	485.22	2.049	484.29	483.5	0
1095	478.94	481.28	6	485.22	1.899	484.29	483.5	0
1100	479.1	481.28	6	485.22	1.667	484.29	483.5	0
1105	479.59	481.28	6	485.22	1.602	484.29	483.5	0
1110	479.88	481.28	6	485.22	1.87	484.29	483.5	0
1115	479.79	481.28	6	485.22	1.899	484.29	483.5	0
1120	479.89	481.28	6	485.22	1.978	484.29	483.5	0
1125	479.56	481.28	6	485.22	2.005	484.29	483.5	0
1130	479.82	481.28	6	485.22	2.107	484.29	483.5	0
1135	479.96	481.28	6	485.22	1.65	484.29	483.5	0
1140	479.64	481.28	6	485.22	1.942	484.29	483.5	0
1145	479.65	481.28	6	485.22	1.785	484.29	483.5	0
1150	479.69	481.28	6	485.22	2.492	484.29	483.5	0
1155	479.96	481.28	6	485.22	2.026	484.29	483.5	0
1160	479.93	481.28	6	485.22	1.896	484.29	483.5	0
1165	479.91	481.28	6	485.22	2.392	484.29	483.5	0
1170	479.98	481.28	6	485.22	2.153	484.29	483.5	0
1175	479.71	481.28	6	485.22	2.063	484.29	483.5	0

1180	479.92	481.28	6	485.22	1.97	484.29	483.5	0
1185	480.6	481.28	6	485.22	2.091	484.29	483.5	0
1190	480.84	481.28	6	485.22	2.053	484.29	483.5	0
1195	480.74	481.28	6	485.22	1.804	484.29	483.5	0
1200	481.04	481.28	6	485.22	1.865	484.29	483.5	0
1205	480.95	481.28	6	485.22	1.62	484.29	483.5	0
1210	481.61	0	6	485.22	1.534	484.29	483.5	0
1215	481.33	0	6	485.22	1.774	484.29	483.5	0
1220	481.31	0	13	485.22	1.649	484.29	483.5	0
1225	481.58	0	13	485.22	1.548	484.29	483.5	0
1230	481.91	0	13	485.22	1.808	484.29	483.5	0
1235	482.14	0	13	485.22	2.348	484.29	483.5	0
1240	482.28	0	13	485.22	1.44	484.29	483.5	0
1245	481.94	0	13	485.22	1.685	484.29	483.5	0
1250	481.88	0	13	485.22	1.849	484.29	483.5	0
1255	481.75	0	13	485.22	1.699	484.29	483.5	0
1260	481.69	0	13	485.22	1.601	484.29	483.5	0
1265	481.81	0	13	485.22	1.894	484.29	483.5	0
1270	481.95	0	13	485.22	2.354	484.29	483.5	0
1275	481.94	0	13	485.22	1.59	484.29	483.5	0
1280	481.87	0	13	485.22	1.68	484.29	483.5	0
1285	482.08	0	13	485.22	1.505	484.29	483.5	0
1290	482.52	0	13	485.22	1.486	484.29	483.5	0
1295	482.43	0	13	485.22	1.484	484.29	483.5	0
1300	482.32	0	13	485.22	1.84	484.29	483.5	0
1305	482.22	0	13	485.22	2.011	484.29	483.5	0
1310	482.16	0	13	485.22	1.667	484.29	483.5	0
1315	482.16	0	13	485.22	1.58	484.29	483.5	0
1320	482.46	0	13	485.22	1.362	484.29	483.5	0
1325	482.6	0	13	485.22	1.426	484.29	483.5	0
1326.7	482.87	0	13	485.22	1.12	484.29	483.5	0
1329.7	482.92	0	13	485.22	1.32	484.29	483.5	0
1332.7	482.92	0	13	485.22	1.1	484.29	483.5	0
1335.7	482.97	0	13	485.22	1.29	484.29	483.5	0
1338.7	483.17	0	13	485.22	0.92	484.29	483.5	0
1341.7	483.02	0	13	485.22	0.95	484.29	483.5	0
1344.7	483.17	0	13	485.22	0.93	484.29	483.5	0
1347.7	483.47	0	13	485.22	0.29	484.29	483.5	0
1350.7	483.92	0	13	485.22	0.25	484.29	0	0
1353.7	484.72	0	13	485.22	0.3	0	0	0
1356.7	485.12	0	17	485.22	0.01	0	0	0

1358	485.22	0	17	485.22	0	0	0	0
1358.7	485.38	0	17	0	0	0	0	0
1362.7	487.37	0	17	0	0	0	0	0

Cross-section: G_1

				High		Middle	Low	
Station	**Elevation**	**SZF**	**Substrate/Cover**	**WSEL**	**Velocity**	**WSEL**	**Stage 3**	**WSEL**
0	491.2	0	8	0	0	0	0	0
4	489.92	0	8	0	0	0	0	0
8	488.46	0	8	0	0	0	0	0
12	487.48	0	8	0	0	0	0	0
16	486.37	0	8	486.67	0	0	0	0
20	486.02	0	8	486.67	0.12	0	0	0
22	485.37	0	8	486.67	0.228	485.6	0	0
24	484.92	0	8	486.67	0.375	485.6	0	0
26	484.32	0	8	486.67	0.72	485.6	484.78	0
30	483.56	0	16	486.67	0.897	485.6	484.78	0
36	483.2	0	16	486.67	1.343	485.6	484.78	0
42	483.1	483.1	16	486.67	1.109	485.6	484.78	0
48	482.84	483.1	16	486.67	1.614	485.6	484.78	0
54	482.68	483.1	16	486.67	2.118	485.6	484.78	0
60	482.49	483.1	16	486.67	2.028	485.6	484.78	0
66	482.56	483.1	16	486.67	1.815	485.6	484.78	0
72	482.54	483.1	16	486.67	1.948	485.6	484.78	0
78	482.73	483.1	16	486.67	2.098	485.6	484.78	0
84	482.91	483.1	16	486.67	1.7	485.6	484.78	0
90	483.01	483.1	16	486.67	2.133	485.6	484.78	0
96	483.06	483.1	16	486.67	2.135	485.6	484.78	0
102	483.16	0	3	486.67	2.102	485.6	484.78	0
108	483.28	0	3	486.67	1.599	485.6	484.78	0
114	483.22	0	3	486.67	1.852	485.6	484.78	0
120	483.09	483.1	3	486.67	1.989	485.6	484.78	0
126	483.18	0	3	486.67	1.752	485.6	484.78	0
132	483.27	0	3	486.67	2.145	485.6	484.78	0
138	483.28	0	3	486.67	2.085	485.6	484.78	0
144	483.35	0	3	486.67	1.75	485.6	484.78	0
150	483.33	0	3	486.67	1.827	485.6	484.78	0
156	483.31	0	3	486.67	1.796	485.6	484.78	0
162	483.36	0	3	486.67	1.557	485.6	484.78	0
168	483.43	0	3	486.67	1.899	485.6	484.78	0
174	483.48	0	3	486.67	1.766	485.6	484.78	0
180	483.54	0	3	486.67	1.542	485.6	484.78	0

186	483.54	0	3	486.67	1.844	485.6	484.78	0
192	483.59	0	3	486.67	1.842	485.6	484.78	0
198	483.59	0	3	486.67	2.027	485.6	484.78	0
204	483.57	0	3	486.67	1.778	485.6	484.78	0
210	483.61	0	3	486.67	1.492	485.6	484.78	0
216	483.61	0	3	486.67	1.828	485.6	484.78	0
222	483.67	0	3	486.67	1.501	485.6	484.78	0
228	483.69	0	3	486.67	1.813	485.6	484.78	0
234	483.61	0	3	486.67	2.115	485.6	484.78	0
240	483.58	0	3	486.67	1.74	485.6	484.78	0
246	483.6	0	3	486.67	1.962	485.6	484.78	0
252	483.63	0	3	486.67	1.957	485.6	484.78	0
258	483.62	0	3	486.67	1.577	485.6	484.78	0
264	483.62	0	3	486.67	1.577	485.6	484.78	0
270	483.66	0	3	486.67	1.553	485.6	484.78	0
276	483.72	0	3	486.67	1.771	485.6	484.78	0
282	483.71	0	3	486.67	1.701	485.6	484.78	0
288	483.73	0	3	486.67	1.778	485.6	484.78	0
294	483.79	0	3	486.67	1.925	485.6	484.78	0
300	483.87	0	3	486.67	2.18	485.6	484.78	0
306	483.91	0	3	486.67	1.64	485.6	484.78	0
312	483.92	0	3	486.67	1.586	485.6	484.78	0
318	483.96	0	3	486.67	1.244	485.6	484.78	0
324	484.02	0	3	486.67	1.653	485.6	484.78	0
330	484.14	0	3	486.67	1.803	485.6	484.78	0
336	484.2	0	3	486.67	1.695	485.6	484.78	0
342	484.21	0	3	486.67	1.641	485.6	484.78	0
348	484.21	0	3	486.67	0.88	485.6	484.78	0
354	484.26	0	3	486.67	1.977	485.6	484.78	0
360	484.26	0	3	486.67	1.977	485.6	484.78	0
366	484.27	0	3	486.67	1.633	485.6	484.78	0
372	484.27	0	3	486.67	1.848	485.6	484.78	0
378	484.26	0	3	486.67	1.676	485.6	484.78	0
384	484.35	0	3	486.67	1.48	485.6	484.78	0
390	484.37	0	3	486.67	1.69	485.6	484.78	0
396	484.36	0	3	486.67	1.676	485.6	484.78	0
402	484.35	0	3	486.67	1.092	485.6	484.78	0
408	484.37	0	3	486.67	2.008	485.6	484.78	0
414	484.37	0	3	486.67	2.14	485.6	484.78	0
420	484.35	0	3	486.67	0.936	485.6	484.78	0
426	484.34	0	3	486.67	1.486	485.6	484.78	0

432	484.34	0	3	486.67	1.332	485.6	484.78	0
438	484.34	0	3	486.67	1.35	485.6	484.78	0
444	484.29	0	3	486.67	1.702	485.6	484.78	0
450	484.27	0	3	486.67	1.517	485.6	484.78	0
456	484.26	0	3	486.67	2.014	485.6	484.78	0
462	484.29	0	3	486.67	1.329	485.6	484.78	0
468	484.22	0	3	486.67	2.116	485.6	484.78	0
474	484.19	0	3	486.67	1.506	485.6	484.78	0
480	484.16	0	3	486.67	1.319	485.6	484.78	0
486	484.1	0	3	486.67	1.703	485.6	484.78	0
492	484.09	0	3	486.67	1.769	485.6	484.78	0
498	484.06	0	3	486.67	1.563	485.6	484.78	0
504	484.08	0	3	486.67	1.973	485.6	484.78	0
510	484.08	0	3	486.67	1.778	485.6	484.78	0
516	484.1	0	3	486.67	1.551	485.6	484.78	0
522	484.09	0	3	486.67	1.684	485.6	484.78	0
528	484.13	0	3	486.67	1.371	485.6	484.78	0
534	484.15	0	3	486.67	1.514	485.6	484.78	0
540	484.16	0	3	486.67	1.997	485.6	484.78	0
546	484.13	0	3	486.67	1.641	485.6	484.78	0
552	484.21	0	3	486.67	2.023	485.6	484.78	0
558	484.21	0	3	486.67	2.119	485.6	484.78	0
564	484.19	0	3	486.67	2.018	485.6	484.78	0
570	484.21	0	3	486.67	1.744	485.6	484.78	0
576	484.21	0	3	486.67	1.603	485.6	484.78	0
582	484.21	0	3	486.67	1.563	485.6	484.78	0
588	484.16	0	3	486.67	1.648	485.6	484.78	0
594	484.1	0	3	486.67	1.724	485.6	484.78	0
600	484.14	0	3	486.67	1.436	485.6	484.78	0
606	484.12	0	3	486.67	1.55	485.6	484.78	0
612	484.08	0	3	486.67	1.729	485.6	484.78	0
618	484.07	0	3	486.67	1.734	485.6	484.78	0
624	484.05	0	3	486.67	1.775	485.6	484.78	0
630	484.01	0	3	486.67	1.649	485.6	484.78	0
636	483.95	0	3	486.67	1.742	485.6	484.78	0
642	483.97	0	3	486.67	1.779	485.6	484.78	0
648	483.87	0	3	486.67	1.876	485.6	484.78	0
654	483.88	0	3	486.67	1.87	485.6	484.78	0
660	483.89	0	3	486.67	1.947	485.6	484.78	0
666	483.92	0	3	486.67	2.011	485.6	484.78	0
672	483.86	0	3	486.67	1.862	485.6	484.78	0

678	483.82	0	3	486.67	1.767	485.6	484.78	0
684	483.8	0	3	486.67	2.062	485.6	484.78	0
690	483.76	0	3	486.67	2.2	485.6	484.78	0
696	483.8	0	3	486.67	1.873	485.6	484.78	0
702	483.81	0	3	486.67	2.232	485.6	484.78	0
708	483.82	0	3	486.67	2.325	485.6	484.78	0
714	483.74	0	3	486.67	1.936	485.6	484.78	0
720	483.74	0	18	486.67	1.863	485.6	484.78	0
726	483.72	0	18	486.67	1.921	485.6	484.78	0
732	483.67	0	18	486.67	2.215	485.6	484.78	0
738	483.62	0	18	486.67	1.958	485.6	484.78	0
744	483.54	0	18	486.67	2.044	485.6	484.78	0
750	483.5	0	18	486.67	1.92	485.6	484.78	0
756	483.5	0	18	486.67	1.988	485.6	484.78	0
762	483.54	0	18	486.67	2.014	485.6	484.78	0
768	483.55	0	18	486.67	2.288	485.6	484.78	0
774	483.59	0	18	486.67	2.025	485.6	484.78	0
780	483.55	0	18	486.67	2.006	485.6	484.78	0
786	483.56	0	18	486.67	2.349	485.6	484.78	0
792	483.53	0	18	486.67	2.422	485.6	484.78	0
798	483.51	0	18	486.67	2	485.6	484.78	0
804	483.44	0	18	486.67	2.217	485.6	484.78	0
810	483.47	0	18	486.67	2.378	485.6	484.78	0
816	483.46	0	18	486.67	2.429	485.6	484.78	0
822	483.49	0	18	486.67	2.309	485.6	484.78	0
828	483.54	0	18	486.67	2.501	485.6	484.78	0
834	483.53	0	18	486.67	1.928	485.6	484.78	0
840	483.53	0	18	486.67	2.252	485.6	484.78	0
846	483.55	0	18	486.67	1.995	485.6	484.78	0
852	483.64	0	18	486.67	2.232	485.6	484.78	0
858	483.6	0	18	486.67	2.039	485.6	484.78	0
864	483.6	0	18	486.67	2.035	485.6	484.78	0
870	483.52	0	18	486.67	2.228	485.6	484.78	0
876	483.48	0	18	486.67	2.207	485.6	484.78	0
882	483.42	0	18	486.67	2.218	485.6	484.78	0
888	483.46	0	18	486.67	2.216	485.6	484.78	0
894	483.41	0	18	486.67	2.125	485.6	484.78	0
900	483.39	0	18	486.67	2.253	485.6	484.78	0
906	483.39	0	18	486.67	2.078	485.6	484.78	0
912	483.41	0	18	486.67	2.234	485.6	484.78	0
918	483.36	0	18	486.67	2.2	485.6	484.78	0

924	483.33	0	18	486.67	1.905	485.6	484.78	0
930	483.38	0	18	486.67	2.189	485.6	484.78	0
936	483.3	0	18	486.67	2.275	485.6	484.78	0
942	483.33	0	18	486.67	2.175	485.6	484.78	0
948	483.36	0	18	486.67	2.256	485.6	484.78	0
954	483.35	0	18	486.67	2.194	485.6	484.78	0
960	483.34	0	18	486.67	2.215	485.6	484.78	0
966	483.38	0	18	486.67	2.406	485.6	484.78	0
972	483.36	0	18	486.67	2.506	485.6	484.78	0
978	483.28	0	18	486.67	2.239	485.6	484.78	0
984	483.26	0	18	486.67	2.234	485.6	484.78	0
990	483.31	0	18	486.67	2.33	485.6	484.78	0
996	483.26	0	18	486.67	2.458	485.6	484.78	0
1002	483.16	0	18	486.67	2.227	485.6	484.78	0
1008	483.03	483.1	18	486.67	2.157	485.6	484.78	0
1014	483.01	483.1	18	486.67	2.302	485.6	484.78	0
1020	482.96	483.1	18	486.67	1.971	485.6	484.78	0
1026	482.89	483.1	18	486.67	1.915	485.6	484.78	0
1032	482.86	483.1	18	486.67	2.325	485.6	484.78	0
1038	482.65	483.1	18	486.67	2.613	485.6	484.78	0
1044	482.64	483.1	18	486.67	2.543	485.6	484.78	0
1050	482.71	483.1	4	486.67	2.181	485.6	484.78	0
1056	482.49	483.1	4	486.67	2.349	485.6	484.78	0
1062	482.35	483.1	4	486.67	2.032	485.6	484.78	0
1068	482.4	483.1	4	486.67	2.085	485.6	484.78	0
1074	482.39	483.1	4	486.67	2.193	485.6	484.78	0
1080	482.29	483.1	4	486.67	2.271	485.6	484.78	0
1086	482.21	483.1	4	486.67	2.214	485.6	484.78	0
1092	482.32	483.1	4	486.67	2.237	485.6	484.78	0
1098	482.41	483.1	4	486.67	2.358	485.6	484.78	0
1104	482.14	483.1	4	486.67	2.193	485.6	484.78	0
1110	482.17	483.1	4	486.67	2.231	485.6	484.78	0
1116	482.3	483.1	4	486.67	2.282	485.6	484.78	0
1122	482.54	483.1	4	486.67	2.733	485.6	484.78	0
1128	482.51	483.1	4	486.67	2.228	485.6	484.78	0
1134	482.63	483.1	4	486.67	2.177	485.6	484.78	0
1140	482.7	483.1	4	486.67	2.254	485.6	484.78	0
1146	482.66	483.1	4	486.67	2.28	485.6	484.78	0
1152	482.63	483.1	4	486.67	2.059	485.6	484.78	0
1158	482.76	483.1	4	486.67	1.827	485.6	484.78	0
1164	482.83	483.1	4	486.67	2.143	485.6	484.78	0

1170	482.8	483.1		4	486.67	2.126	485.6	484.78	0
1176	482.66	483.1		4	486.67	2.182	485.6	484.78	0
1182	482.75	483.1		4	486.67	2.078	485.6	484.78	0
1188	482.82	483.1		13	486.67	2.479	485.6	484.78	0
1194	482.56	483.1		13	486.67	1.986	485.6	484.78	0
1200	482.19	483.1		13	486.67	2.051	485.6	484.78	0
1206	482.14	483.1		13	486.67	2.107	485.6	484.78	0
1212	482.25	483.1		13	486.67	2.152	485.6	484.78	0
1218	482.42	483.1		13	486.67	2.225	485.6	484.78	0
1224	482.44	483.1		13	486.67	2.257	485.6	484.78	0
1230	482.62	483.1		13	486.67	2.188	485.6	484.78	0
1236	482.85	483.1		13	486.67	2.167	485.6	484.78	0
1242	482.73	483.1		13	486.67	2.082	485.6	484.78	0
1248	482.26	483.1		13	486.67	2.007	485.6	484.78	0
1254	482.24	483.1		13	486.67	1.929	485.6	484.78	0
1260	482.39	483.1		13	486.67	2.212	485.6	484.78	0
1266	482.55	483.1		13	486.67	1.843	485.6	484.78	0
1272	482.49	483.1		13	486.67	2.114	485.6	484.78	0
1278	482.24	483.1		13	486.67	1.971	485.6	484.78	0
1284	482.35	483.1		13	486.67	1.95	485.6	484.78	0
1290	482.53	483.1		13	486.67	2.14	485.6	484.78	0
1296	482.48	483.1		13	486.67	1.971	485.6	484.78	0
1302	482.33	483.1		13	486.67	1.69	485.6	484.78	0
1308	482.26	483.1		13	486.67	1.947	485.6	484.78	0
1314	481.69	483.1		13	486.67	2.081	485.6	484.78	0
1320	481.06	483.1		13	486.67	1.748	485.6	484.78	0
1326	480.63	483.1		13	486.67	1.673	485.6	484.78	0
1332	480.42	483.1		13	486.67	1.662	485.6	484.78	0
1338	480.44	483.1		13	486.67	1.79	485.6	484.78	0
1344	480.37	483.1		13	486.67	1.79	485.6	484.78	0
1350	480.4	483.1		13	486.67	1.834	485.6	484.78	0
1356	480.37	483.1		13	486.67	1.453	485.6	484.78	0
1362	480.23	483.1		13	486.67	1.866	485.6	484.78	0
1368	480.2	483.1		13	486.67	2.253	485.6	484.78	0
1374	480.45	483.1		13	486.67	1.982	485.6	484.78	0
1380	480.51	483.1		13	486.67	2.088	485.6	484.78	0
1386	480.39	483.1		13	486.67	2.122	485.6	484.78	0
1392	480.49	483.1		13	486.67	2.231	485.6	484.78	0
1398	480.63	483.1		13	486.67	2.163	485.6	484.78	0
1404	480.78	483.1		13	486.67	2.22	485.6	484.78	0
1410	480.97	483.1		13	486.67	2.287	485.6	484.78	0

1416	481	483.1	13	486.67	2.417	485.6	484.78	0
1422	480.81	483.1	13	486.67	2.301	485.6	484.78	0
1428	480.73	483.1	13	486.67	1.924	485.6	484.78	0
1434	480.68	483.1	13	486.67	2.062	485.6	484.78	0
1440	480.88	483.1	13	486.67	2.089	485.6	484.78	0
1446	481.39	483.1	13	486.67	2.257	485.6	484.78	0
1452	481.77	483.1	13	486.67	1.962	485.6	484.78	0
1458	481.94	483.1	13	486.67	1.875	485.6	484.78	0
1464	482.28	483.1	13	486.67	2.152	485.6	484.78	0
1470	482.57	483.1	13	486.67	1.892	485.6	484.78	0
1476	482.77	483.1	13	486.67	1.618	485.6	484.78	0
1482	482.76	483.1	3	486.67	1.819	485.6	484.78	0
1488	482.83	483.1	3	486.67	1.689	485.6	484.78	0
1494	482.78	483.1	3	486.67	1.953	485.6	484.78	0
1500	482.94	483.1	3	486.67	1.882	485.6	484.78	0
1506	483.11	0	3	486.67	2.233	485.6	484.78	0
1512	483.31	0	3	486.67	2.084	485.6	484.78	0
1518	483.39	0	3	486.67	1.837	485.6	484.78	0
1520.9	483.67	0	3	486.67	1.86	485.6	484.78	0
1523.9	484.07	0	3	486.67	1.43	485.6	484.78	0
1526.9	484.52	0	3	486.67	1.45	485.6	484.78	0
1529.9	484.72	0	3	486.67	1.17	485.6	484.78	0
1532.9	485.27	0	3	486.67	1.25	485.6	0	0
1535.9	485.87	0	3	486.67	1.01	0	0	0
1537.9	486.37	0	10	486.67	0	0	0	0
1541.9	488.27	0	10	0	0	0	0	0
1545	490	0	10	0	0	0	0	0

Cross-section: P_5

					High	Middle		Low
Station	**Elevation**	**SZF**	**Substrate/Cover**	**WSEL**	**Velocity**	**WSEL**	**Stage 3**	**WSEL**
0	492.07	0	1	0	0	0	0	0
4	490.53	0	1	0	0	0	0	0
8	489.87	0	1	0	0	0	0	0
12	488.58	0	17	0	0	0	0	0
16	488.16	0	17	0	0	0	0	0
20	487.41	0	2	0	0	0	0	0
22	487.07	0	2	487.07	0	0	0	0
26	486.62	0	2	487.07	0	0	0	0
30	486.07	0	2	487.07	0.044	0	0	0
34	485.57	0	2	487.07	0.043	485.93	0	0
38	484.77	0	17	487.07	0.08	485.93	485.08	0

42	483.77	0	17	487.07	0.055	485.93	485.08	0
44	483.77	0	17	487.07	-0.003	485.93	485.08	0
48	483.03	483.53	17	487.07	0.22	485.93	485.08	0
52	482.7	483.53	17	487.07	0.288	485.93	485.08	0
56	482.57	483.53	17	487.07	0.333	485.93	485.08	0
60	482.45	483.53	3	487.07	0.343	485.93	485.08	0
64	482.27	483.53	3	487.07	0.573	485.93	485.08	0
68	482.33	483.53	3	487.07	0.395	485.93	485.08	0
72	482.21	483.53	3	487.07	0.451	485.93	485.08	0
76	482.08	483.53	4	487.07	0.493	485.93	485.08	0
80	481.9	483.53	4	487.07	0.2	485.93	485.08	0
84	481.78	483.53	4	487.07	0.502	485.93	485.08	0
88	481.6	483.53	4	487.07	0.343	485.93	485.08	0
92	481.5	483.53	4	487.07	0.612	485.93	485.08	0
96	481.37	483.53	4	487.07	0.635	485.93	485.08	0
100	481.26	483.53	3	487.07	0.743	485.93	485.08	0
104	481.11	483.53	3	487.07	0.764	485.93	485.08	0
108	481.07	483.53	3	487.07	1.039	485.93	485.08	0
112	480.96	483.53	3	487.07	0.497	485.93	485.08	0
116	480.81	483.53	3	487.07	0.818	485.93	485.08	0
120	480.55	483.53	3	487.07	0.645	485.93	485.08	0
124	480.26	483.53	3	487.07	0.628	485.93	485.08	0
128	479.95	483.53	3	487.07	0.799	485.93	485.08	0
132	479.86	483.53	3	487.07	0.712	485.93	485.08	0
136	479.71	483.53	3	487.07	0.888	485.93	485.08	0
140	479.58	483.53	3	487.07	0.911	485.93	485.08	0
144	479.48	483.53	3	487.07	0.787	485.93	485.08	0
148	479.37	483.53	3	487.07	0.921	485.93	485.08	0
152	479.17	483.53	4	487.07	0.796	485.93	485.08	0
156	478.79	483.53	4	487.07	0.738	485.93	485.08	0
160	478.2	483.53	4	487.07	0.911	485.93	485.08	0
164	478.02	483.53	4	487.07	0.717	485.93	485.08	0
168	477.92	483.53	4	487.07	0.854	485.93	485.08	0
172	478.12	483.53	4	487.07	1.195	485.93	485.08	0
176	478.09	483.53	4	487.07	0.929	485.93	485.08	0
180	477.96	483.53	4	487.07	0.947	485.93	485.08	0
184	477.84	483.53	4	487.07	0.806	485.93	485.08	0
188	477.76	483.53	4	487.07	0.927	485.93	485.08	0
192	477.63	483.53	4	487.07	0.974	485.93	485.08	0
196	477.6	483.53	3	487.07	0.803	485.93	485.08	0
200	477.58	483.53	3	487.07	0.87	485.93	485.08	0

204	477.46	483.53	3	487.07	1.099	485.93	485.08	0
208	477.33	483.53	3	487.07	0.848	485.93	485.08	0
212	477.29	483.53	3	487.07	1.111	485.93	485.08	0
216	477.17	483.53	3	487.07	0.976	485.93	485.08	0
220	477.1	483.53	3	487.07	0.886	485.93	485.08	0
224	477.01	483.53	3	487.07	1.084	485.93	485.08	0
228	476.91	483.53	3	487.07	1.095	485.93	485.08	0
232	476.71	483.53	3	487.07	1.116	485.93	485.08	0
236	476.73	483.53	3	487.07	1.018	485.93	485.08	0
240	476.63	483.53	3	487.07	1.119	485.93	485.08	0
244	476.63	483.53	3	487.07	0.978	485.93	485.08	0
248	476.5	483.53	3	487.07	0.999	485.93	485.08	0
252	476.44	483.53	3	487.07	1.312	485.93	485.08	0
256	476.34	483.53	3	487.07	1.217	485.93	485.08	0
260	476.4	483.53	3	487.07	0.885	485.93	485.08	0
264	476.34	483.53	4	487.07	1.088	485.93	485.08	0
268	476.33	483.53	4	487.07	1.148	485.93	485.08	0
272	476.22	483.53	4	487.07	1.1	485.93	485.08	0
276	476.24	483.53	4	487.07	1.127	485.93	485.08	0
280	476.13	483.53	4	487.07	1.156	485.93	485.08	0
284	476.15	483.53	4	487.07	1.201	485.93	485.08	0
288	476.16	483.53	4	487.07	1.251	485.93	485.08	0
292	476.22	483.53	4	487.07	1.529	485.93	485.08	0
296	476.2	483.53	4	487.07	1.24	485.93	485.08	0
300	476.17	483.53	4	487.07	1.525	485.93	485.08	0
304	476.26	483.53	4	487.07	1.301	485.93	485.08	0
308	476.25	483.53	4	487.07	1.167	485.93	485.08	0
312	476.28	483.53	4	487.07	1.149	485.93	485.08	0
316	476.35	483.53	4	487.07	1.244	485.93	485.08	0
320	476.4	483.53	4	487.07	1.121	485.93	485.08	0
324	476.37	483.53	4	487.07	1.295	485.93	485.08	0
328	476.41	483.53	4	487.07	1.407	485.93	485.08	0
332	476.37	483.53	4	487.07	1.401	485.93	485.08	0
336	476.51	483.53	4	487.07	1.339	485.93	485.08	0
340	476.38	483.53	4	487.07	1.389	485.93	485.08	0
344	476.33	483.53	4	487.07	1.223	485.93	485.08	0
348	476.38	483.53	4	487.07	1.387	485.93	485.08	0
352	476.39	483.53	4	487.07	1.386	485.93	485.08	0
356	476.39	483.53	4	487.07	1.363	485.93	485.08	0
360	476.37	483.53	2	487.07	1.303	485.93	485.08	0
364	476.38	483.53	2	487.07	1.278	485.93	485.08	0

368	476.32	483.53	2	487.07	1.368	485.93	485.08	0
372	476.42	483.53	2	487.07	1.587	485.93	485.08	0
376	476.38	483.53	2	487.07	1.357	485.93	485.08	0
380	476.42	483.53	2	487.07	1.441	485.93	485.08	0
384	476.42	483.53	2	487.07	1.373	485.93	485.08	0
388	476.38	483.53	2	487.07	1.598	485.93	485.08	0
392	476.4	483.53	2	487.07	1.54	485.93	485.08	0
396	476.43	483.53	2	487.07	1.599	485.93	485.08	0
400	476.34	483.53	2	487.07	1.339	485.93	485.08	0
404	476.23	483.53	2	487.07	1.461	485.93	485.08	0
408	476.26	483.53	2	487.07	1.299	485.93	485.08	0
412	476.22	483.53	2	487.07	1.508	485.93	485.08	0
416	476.24	483.53	2	487.07	1.432	485.93	485.08	0
420	476.25	483.53	2	487.07	1.221	485.93	485.08	0
424	476.07	483.53	2	487.07	1.382	485.93	485.08	0
428	476.15	483.53	4	487.07	1.562	485.93	485.08	0
432	476.09	483.53	4	487.07	1.55	485.93	485.08	0
436	476.04	483.53	4	487.07	1.496	485.93	485.08	0
440	475.95	483.53	4	487.07	1.633	485.93	485.08	0
444	475.91	483.53	4	487.07	1.492	485.93	485.08	0
448	475.82	483.53	4	487.07	1.609	485.93	485.08	0
452	475.78	483.53	4	487.07	1.371	485.93	485.08	0
456	475.78	483.53	4	487.07	1.416	485.93	485.08	0
460	475.68	483.53	4	487.07	1.368	485.93	485.08	0
464	475.75	483.53	4	487.07	1.567	485.93	485.08	0
468	475.51	483.53	4	487.07	1.418	485.93	485.08	0
472	475.51	483.53	4	487.07	1.38	485.93	485.08	0
476	475.45	483.53	4	487.07	1.402	485.93	485.08	0
480	475.32	483.53	4	487.07	1.474	485.93	485.08	0
484	475.27	483.53	4	487.07	1.191	485.93	485.08	0
488	475.12	483.53	4	487.07	1.381	485.93	485.08	0
492	475.1	483.53	4	487.07	1.412	485.93	485.08	0
496	474.98	483.53	4	487.07	1.458	485.93	485.08	0
500	474.85	483.53	4	487.07	1.289	485.93	485.08	0
504	474.72	483.53	4	487.07	1.381	485.93	485.08	0
508	474.64	483.53	4	487.07	1.482	485.93	485.08	0
512	474.55	483.53	4	487.07	1.362	485.93	485.08	0
516	474.43	483.53	4	487.07	1.206	485.93	485.08	0
520	474.3	483.53	4	487.07	1.609	485.93	485.08	0
524	474.2	483.53	4	487.07	1.474	485.93	485.08	0
528	474.16	483.53	4	487.07	1.58	485.93	485.08	0

532	473.97	483.53	4	487.07	1.378	485.93	485.08	0
536	473.89	483.53	4	487.07	1.339	485.93	485.08	0
540	473.76	483.53	4	487.07	1.359	485.93	485.08	0
544	473.64	483.53	4	487.07	1.577	485.93	485.08	0
548	473.63	483.53	4	487.07	1.459	485.93	485.08	0
552	473.47	483.53	4	487.07	1.422	485.93	485.08	0
556	473.37	483.53	4	487.07	1.199	485.93	485.08	0
560	473.17	483.53	4	487.07	1.246	485.93	485.08	0
564	473	483.53	4	487.07	1.263	485.93	485.08	0
568	472.87	483.53	3	487.07	1.253	485.93	485.08	0
572	472.7	483.53	3	487.07	1.371	485.93	485.08	0
576	472.46	483.53	3	487.07	1.458	485.93	485.08	0
580	472.31	483.53	3	487.07	1.36	485.93	485.08	0
584	472.19	483.53	3	487.07	1.386	485.93	485.08	0
588	472.06	483.53	3	487.07	1.266	485.93	485.08	0
592	471.91	483.53	4	487.07	1.199	485.93	485.08	0
596	471.85	483.53	4	487.07	1.192	485.93	485.08	0
600	471.68	483.53	4	487.07	1.292	485.93	485.08	0
604	471.54	483.53	4	487.07	1.244	485.93	485.08	0
608	471.36	483.53	4	487.07	1.156	485.93	485.08	0
612	471.11	483.53	4	487.07	1.166	485.93	485.08	0
616	470.9	483.53	5	487.07	1.175	485.93	485.08	0
620	470.69	483.53	5	487.07	1.158	485.93	485.08	0
624	470.5	483.53	5	487.07	1.238	485.93	485.08	0
628	470.27	483.53	5	487.07	1.374	485.93	485.08	0
632	470.16	483.53	5	487.07	1.29	485.93	485.08	0
636	469.97	483.53	5	487.07	1.224	485.93	485.08	0
640	469.82	483.53	5	487.07	1.328	485.93	485.08	0
644	469.74	483.53	5	487.07	1.259	485.93	485.08	0
648	469.55	483.53	5	487.07	1.226	485.93	485.08	0
652	469.35	483.53	5	487.07	1.173	485.93	485.08	0
656	469.21	483.53	5	487.07	1.257	485.93	485.08	0
660	469.13	483.53	5	487.07	1.234	485.93	485.08	0
664	468.92	483.53	5	487.07	1.254	485.93	485.08	0
668	468.75	483.53	3	487.07	1.244	485.93	485.08	0
672	468.66	483.53	3	487.07	1.276	485.93	485.08	0
676	468.49	483.53	3	487.07	1.24	485.93	485.08	0
680	468.37	483.53	3	487.07	1.082	485.93	485.08	0
684	468.34	483.53	3	487.07	1.091	485.93	485.08	0
688	468.25	483.53	3	487.07	1.118	485.93	485.08	0
692	468.14	483.53	3	487.07	1.146	485.93	485.08	0

696	468.14	483.53	3	487.07	1.094	485.93	485.08	0
700	468.12	483.53	3	487.07	1.035	485.93	485.08	0
704	468.16	483.53	3	487.07	1.074	485.93	485.08	0
708	468.25	483.53	3	487.07	1.072	485.93	485.08	0
712	468.37	483.53	3	487.07	1.142	485.93	485.08	0
716	468.61	483.53	3	487.07	1.265	485.93	485.08	0
720	468.65	483.53	5	487.07	1.127	485.93	485.08	0
724	468.78	483.53	5	487.07	1.148	485.93	485.08	0
728	469.11	483.53	5	487.07	1.336	485.93	485.08	0
732	469.41	483.53	5	487.07	1.303	485.93	485.08	0
736	469.86	483.53	5	487.07	1.208	485.93	485.08	0
740	470.1	483.53	5	487.07	1.112	485.93	485.08	0
744	470.37	483.53	5	487.07	1.248	485.93	485.08	0
748	470.91	483.53	5	487.07	1.425	485.93	485.08	0
752	471.6	483.53	5	487.07	1.364	485.93	485.08	0
756	472	483.53	5	487.07	1.181	485.93	485.08	0
760	472.69	483.53	5	487.07	1.352	485.93	485.08	0
764	473.44	483.53	5	487.07	1.316	485.93	485.08	0
768	474.15	483.53	5	487.07	1.095	485.93	485.08	0
772	474.76	483.53	5	487.07	0.842	485.93	485.08	0
776	475.25	483.53	4	487.07	0.49	485.93	485.08	0
780	475.76	483.53	4	487.07	0.161	485.93	485.08	0
784	476.15	483.53	4	487.07	0.044	485.93	485.08	0
788	476.78	483.53	4	487.07	-0.043	485.93	485.08	0
792	477.99	483.53	4	487.07	-0.027	485.93	485.08	0
796	479.43	483.53	4	487.07	-0.216	485.93	485.08	0
800	481.02	483.53	4	487.07	-0.173	485.93	485.08	0
802.1	482.77	483.53	12	487.07	-0.055	485.93	485.08	0
804	482.71	483.53	12	487.07	0.035	485.93	485.08	0
805.1	483.77	0	12	487.07	-0.22	485.93	485.08	0
808.1	484.97	0	12	487.07	-0.22	485.93	485.08	0
811.1	485.57	0	14	487.07	-0.01	485.93	0	0
814.1	486.52	0	14	487.07	0.01	0	0	0
818.5	486.25	0	14	487.07	0	0	0	0
820.1	487.85	0	14	0	0	0	0	0
820.7	488.45	0	14	0	0	0	0	0
821.12	488.87	0	14	0	0	0	0	0
825	492	0	14	0	0	0	0	0

Cross-section: P_4				**High**		**Middle**		**Low**
Station	**Elevation**	**SZF**	**Substrate/Cover**	**WSEL**	**Velocity**	**WSEL**	**Stage 3**	**WSEL**

0	491.03	0	17	0	0	0	0	0
4	489.69	0	17	0	0	0	0	0
8	488.49	0	17	0	0	0	0	0
12	487.69	0	10	0	0	0	0	0
16	486.55	0	10	487.3	0.215	0	0	0
18	485.8	0	14	487.3	0.347	486.12	0	0
20	485.4	0	14	487.3	0.302	486.12	0	0
22	485.2	0	14	487.3	0.482	486.12	485.26	0
24	484.9	0	14	487.3	0.448	486.12	485.26	0
26	484.75	0	14	487.3	0.467	486.12	485.26	0
28	484.45	0	14	487.3	0.621	486.12	485.26	0
32	484.26	0	14	487.3	0.886	486.12	485.26	0
36	484.24	0	14	487.3	0.614	486.12	485.26	0
40	484.25	0	14	487.3	0.622	486.12	485.26	0
44	484.22	0	18	487.3	0.722	486.12	485.26	0
48	484.17	0	18	487.3	0.882	486.12	485.26	0
52	484.06	0	18	487.3	0.713	486.12	485.26	0
56	483.88	0	18	487.3	0.87	486.12	485.26	0
60	483.85	0	18	487.3	0.522	486.12	485.26	0
64	483.72	0	18	487.3	0.877	486.12	485.26	0
68	483.69	0	18	487.3	0.532	486.12	485.26	0
72	483.63	0	18	487.3	1.221	486.12	485.26	0
76	483.64	0	18	487.3	0.931	486.12	485.26	0
80	483.58	0	18	487.3	1.005	486.12	485.26	0
84	483.56	0	18	487.3	0.604	486.12	485.26	0
88	483.5	483.53	16	487.3	0.408	486.12	485.26	0
92	483.5	483.53	16	487.3	0.877	486.12	485.26	0
96	483.3	483.53	16	487.3	1.008	486.12	485.26	0
100	483.24	483.53	3	487.3	0.872	486.12	485.26	0
104	483.14	483.53	3	487.3	1.145	486.12	485.26	0
108	482.72	483.53	3	487.3	1.345	486.12	485.26	0
112	482.6	483.53	3	487.3	0.792	486.12	485.26	0
116	482.42	483.53	3	487.3	0.86	486.12	485.26	0
120	482.27	483.53	3	487.3	0.575	486.12	485.26	0
124	482.06	483.53	3	487.3	0.767	486.12	485.26	0
128	482.2	483.53	3	487.3	0.981	486.12	485.26	0
132	482.18	483.53	4	487.3	1.127	486.12	485.26	0
136	482.05	483.53	4	487.3	0.762	486.12	485.26	0
140	482.06	483.53	4	487.3	0.924	486.12	485.26	0
144	482.03	483.53	4	487.3	0.678	486.12	485.26	0
148	481.9	483.53	4	487.3	1.568	486.12	485.26	0

152	481.86	483.53	4	487.3	0.876	486.12	485.26	0
156	481.84	483.53	4	487.3	0.791	486.12	485.26	0
160	481.8	483.53	4	487.3	1.41	486.12	485.26	0
164	481.8	483.53	4	487.3	0.894	486.12	485.26	0
168	481.73	483.53	4	487.3	1.54	486.12	485.26	0
172	481.62	483.53	4	487.3	0.984	486.12	485.26	0
176	481.55	483.53	4	487.3	1.093	486.12	485.26	0
180	481.32	483.53	4	487.3	1.218	486.12	485.26	0
184	481.23	483.53	4	487.3	0.945	486.12	485.26	0
188	481.25	483.53	4	487.3	1.355	486.12	485.26	0
192	481.18	483.53	4	487.3	1.661	486.12	485.26	0
196	480.99	483.53	4	487.3	0.865	486.12	485.26	0
200	480.65	483.53	4	487.3	1.309	486.12	485.26	0
204	480.4	483.53	4	487.3	0.964	486.12	485.26	0
208	480.2	483.53	3	487.3	1.332	486.12	485.26	0
212	480.17	483.53	3	487.3	0.729	486.12	485.26	0
216	480.11	483.53	3	487.3	1.196	486.12	485.26	0
220	479.94	483.53	3	487.3	1.083	486.12	485.26	0
224	479.88	483.53	3	487.3	1.022	486.12	485.26	0
228	479.7	483.53	3	487.3	1.02	486.12	485.26	0
232	479.74	483.53	3	487.3	0.841	486.12	485.26	0
236	479.73	483.53	3	487.3	1.023	486.12	485.26	0
240	479.57	483.53	3	487.3	1.041	486.12	485.26	0
244	479.66	483.53	4	487.3	1.011	486.12	485.26	0
248	479.45	483.53	4	487.3	1.075	486.12	485.26	0
252	479.4	483.53	4	487.3	1.294	486.12	485.26	0
256	479.4	483.53	4	487.3	0.199	486.12	485.26	0
260	479.08	483.53	4	487.3	1.241	486.12	485.26	0
264	478.94	483.53	4	487.3	0.975	486.12	485.26	0
268	478.92	483.53	4	487.3	1.793	486.12	485.26	0
272	478.89	483.53	4	487.3	0.948	486.12	485.26	0
276	478.72	483.53	4	487.3	1.351	486.12	485.26	0
280	478.78	483.53	6	487.3	1.268	486.12	485.26	0
284	478.66	483.53	6	487.3	1.324	486.12	485.26	0
288	478.47	483.53	6	487.3	1.265	486.12	485.26	0
292	478.36	483.53	6	487.3	1.063	486.12	485.26	0
296	478.28	483.53	6	487.3	1.334	486.12	485.26	0
300	478.13	483.53	6	487.3	1.53	486.12	485.26	0
304	477.99	483.53	6	487.3	0.956	486.12	485.26	0
308	477.85	483.53	6	487.3	1.378	486.12	485.26	0
312	477.9	483.53	6	487.3	1.515	486.12	485.26	0

316	477.69	483.53	6	487.3	1.489	486.12	485.26	0
320	477.81	483.53	6	487.3	1.436	486.12	485.26	0
324	477.38	483.53	3	487.3	1.044	486.12	485.26	0
328	477.2	483.53	3	487.3	1.572	486.12	485.26	0
332	477.13	483.53	3	487.3	1.437	486.12	485.26	0
336	476.94	483.53	3	487.3	0.898	486.12	485.26	0
340	476.56	483.53	3	487.3	1.21	486.12	485.26	0
344	476.5	483.53	3	487.3	0.767	486.12	485.26	0
348	476.47	483.53	3	487.3	1.278	486.12	485.26	0
352	476.4	483.53	3	487.3	1.17	486.12	485.26	0
356	476.41	483.53	3	487.3	1.253	486.12	485.26	0
360	476.45	483.53	3	487.3	1.053	486.12	485.26	0
364	476.41	483.53	3	487.3	1.154	486.12	485.26	0
368	476.3	483.53	3	487.3	1.223	486.12	485.26	0
372	476.38	483.53	3	487.3	1.152	486.12	485.26	0
376	476.43	483.53	3	487.3	1.162	486.12	485.26	0
380	476.23	483.53	6	487.3	1.184	486.12	485.26	0
384	476.14	483.53	6	487.3	1.244	486.12	485.26	0
388	476.15	483.53	6	487.3	1.504	486.12	485.26	0
392	476.02	483.53	6	487.3	1.551	486.12	485.26	0
396	476.01	483.53	6	487.3	1.27	486.12	485.26	0
400	475.99	483.53	6	487.3	1.48	486.12	485.26	0
404	475.97	483.53	6	487.3	1.482	486.12	485.26	0
408	476.1	483.53	6	487.3	1.619	486.12	485.26	0
412	476.17	483.53	6	487.3	1.645	486.12	485.26	0
416	476.08	483.53	6	487.3	1.366	486.12	485.26	0
420	476.02	483.53	6	487.3	1.208	486.12	485.26	0
424	476.13	483.53	6	487.3	1.524	486.12	485.26	0
428	475.86	483.53	6	487.3	1.528	486.12	485.26	0
432	475.7	483.53	6	487.3	1.523	486.12	485.26	0
436	475.31	483.53	6	487.3	2.133	486.12	485.26	0
440	475.32	483.53	6	487.3	1.354	486.12	485.26	0
444	475.29	483.53	6	487.3	1.793	486.12	485.26	0
448	475.49	483.53	6	487.3	1.629	486.12	485.26	0
452	475.39	483.53	6	487.3	1.951	486.12	485.26	0
456	475.52	483.53	6	487.3	1.203	486.12	485.26	0
460	475.55	483.53	6	487.3	2.109	486.12	485.26	0
464	475.63	483.53	6	487.3	1.741	486.12	485.26	0
468	475.6	483.53	6	487.3	1.612	486.12	485.26	0
472	475.54	483.53	6	487.3	1.716	486.12	485.26	0
476	475.51	483.53	6	487.3	1.225	486.12	485.26	0

480	475.53	483.53	6	487.3	1.332	486.12	485.26	0
484	475.55	483.53	6	487.3	2.301	486.12	485.26	0
488	475.59	483.53	6	487.3	2.08	486.12	485.26	0
492	475.56	483.53	6	487.3	1.566	486.12	485.26	0
496	475.54	483.53	6	487.3	1.628	486.12	485.26	0
500	475.57	483.53	6	487.3	1.644	486.12	485.26	0
504	475.45	483.53	6	487.3	1.924	486.12	485.26	0
508	475.42	483.53	3	487.3	2.007	486.12	485.26	0
512	475.48	483.53	3	487.3	1.715	486.12	485.26	0
516	475.62	483.53	3	487.3	1.675	486.12	485.26	0
520	475.79	483.53	3	487.3	1.574	486.12	485.26	0
524	476.1	483.53	3	487.3	1.689	486.12	485.26	0
528	476.29	483.53	3	487.3	2.001	486.12	485.26	0
532	476.27	483.53	3	487.3	1.843	486.12	485.26	0
536	476.26	483.53	3	487.3	1.87	486.12	485.26	0
540	476.37	483.53	3	487.3	2.021	486.12	485.26	0
544	476.41	483.53	3	487.3	1.596	486.12	485.26	0
548	476.43	483.53	3	487.3	1.695	486.12	485.26	0
552	476.59	483.53	3	487.3	2.251	486.12	485.26	0
556	476.72	483.53	3	487.3	1.743	486.12	485.26	0
560	476.8	483.53	3	487.3	1.877	486.12	485.26	0
564	476.73	483.53	3	487.3	1.603	486.12	485.26	0
568	476.75	483.53	3	487.3	1.713	486.12	485.26	0
572	476.77	483.53	3	487.3	1.802	486.12	485.26	0
576	476.91	483.53	3	487.3	1.613	486.12	485.26	0
580	477.04	483.53	3	487.3	1.665	486.12	485.26	0
584	477.16	483.53	3	487.3	1.999	486.12	485.26	0
588	477.29	483.53	3	487.3	1.863	486.12	485.26	0
592	477.37	483.53	3	487.3	1.79	486.12	485.26	0
596	477.55	483.53	4	487.3	1.602	486.12	485.26	0
600	477.57	483.53	4	487.3	1.632	486.12	485.26	0
604	477.66	483.53	4	487.3	2.16	486.12	485.26	0
608	477.78	483.53	4	487.3	1.776	486.12	485.26	0
612	477.92	483.53	4	487.3	1.798	486.12	485.26	0
616	478.04	483.53	4	487.3	1.665	486.12	485.26	0
620	478.1	483.53	4	487.3	1.944	486.12	485.26	0
624	478.11	483.53	4	487.3	2.026	486.12	485.26	0
628	478.18	483.53	4	487.3	1.543	486.12	485.26	0
632	478.26	483.53	4	487.3	1.581	486.12	485.26	0
636	478.36	483.53	4	487.3	1.72	486.12	485.26	0
640	478.51	483.53	4	487.3	1.647	486.12	485.26	0

644	478.63	483.53	4	487.3	1.869	486.12	485.26	0
648	478.75	483.53	4	487.3	1.701	486.12	485.26	0
652	478.91	483.53	4	487.3	1.608	486.12	485.26	0
656	478.98	483.53	4	487.3	1.572	486.12	485.26	0
660	478.99	483.53	4	487.3	1.808	486.12	485.26	0
664	479.1	483.53	4	487.3	1.752	486.12	485.26	0
668	479.17	483.53	4	487.3	1.645	486.12	485.26	0
672	479.24	483.53	6	487.3	1.623	486.12	485.26	0
676	479.32	483.53	6	487.3	1.553	486.12	485.26	0
680	479.39	483.53	6	487.3	1.585	486.12	485.26	0
684	479.51	483.53	6	487.3	1.259	486.12	485.26	0
688	479.52	483.53	6	487.3	1.58	486.12	485.26	0
692	479.54	483.53	6	487.3	1.81	486.12	485.26	0
696	479.58	483.53	6	487.3	1.586	486.12	485.26	0
700	479.66	483.53	6	487.3	1.549	486.12	485.26	0
704	479.73	483.53	6	487.3	1.576	486.12	485.26	0
708	479.78	483.53	6	487.3	1.623	486.12	485.26	0
712	479.83	483.53	6	487.3	1.778	486.12	485.26	0
716	479.82	483.53	6	487.3	1.603	486.12	485.26	0
720	479.88	483.53	6	487.3	1.545	486.12	485.26	0
724	479.91	483.53	6	487.3	1.162	486.12	485.26	0
728	479.93	483.53	6	487.3	1.659	486.12	485.26	0
732	479.98	483.53	6	487.3	1.624	486.12	485.26	0
736	480.03	483.53	6	487.3	1.436	486.12	485.26	0
740	479.94	483.53	6	487.3	1.082	486.12	485.26	0
744	479.99	483.53	6	487.3	1.461	486.12	485.26	0
748	480.07	483.53	6	487.3	1.699	486.12	485.26	0
752	480.1	483.53	6	487.3	1.299	486.12	485.26	0
756	480.14	483.53	6	487.3	1.244	486.12	485.26	0
760	480.11	483.53	6	487.3	1.2	486.12	485.26	0
764	480.15	483.53	6	487.3	1.201	486.12	485.26	0
768	480.13	483.53	6	487.3	1.241	486.12	485.26	0
772	480.12	483.53	6	487.3	1.512	486.12	485.26	0
776	480.12	483.53	3	487.3	1.31	486.12	485.26	0
780	480.15	483.53	3	487.3	1.321	486.12	485.26	0
784	480.14	483.53	3	487.3	1.095	486.12	485.26	0
788	480.19	483.53	3	487.3	1.525	486.12	485.26	0
792	480.28	483.53	3	487.3	1.384	486.12	485.26	0
796	480.25	483.53	3	487.3	1.265	486.12	485.26	0
800	480.18	483.53	3	487.3	1.412	486.12	485.26	0
804	480.18	483.53	3	487.3	1.608	486.12	485.26	0

808	480.22	483.53	3	487.3	1.483	486.12	485.26	0
812	480.24	483.53	3	487.3	1.386	486.12	485.26	0
816	480.22	483.53	3	487.3	1.288	486.12	485.26	0
820	480.21	483.53	3	487.3	1.724	486.12	485.26	0
824	480.21	483.53	3	487.3	1.452	486.12	485.26	0
828	480.24	483.53	3	487.3	1.307	486.12	485.26	0
832	480.25	483.53	3	487.3	1.387	486.12	485.26	0
836	480.21	483.53	3	487.3	0.649	486.12	485.26	0
840	480.32	483.53	3	487.3	1.384	486.12	485.26	0
844	480.35	483.53	3	487.3	1.185	486.12	485.26	0
848	480.32	483.53	3	487.3	1.036	486.12	485.26	0
852	480.36	483.53	6	487.3	1.131	486.12	485.26	0
856	480.44	483.53	6	487.3	1.211	486.12	485.26	0
860	480.54	483.53	6	487.3	1.036	486.12	485.26	0
864	480.7	483.53	6	487.3	1.108	486.12	485.26	0
868	480.95	483.53	6	487.3	1.145	486.12	485.26	0
872	481.13	483.53	6	487.3	1.236	486.12	485.26	0
876	481.21	483.53	6	487.3	0.825	486.12	485.26	0
880	481.44	483.53	6	487.3	1.155	486.12	485.26	0
884	481.77	483.53	6	487.3	0.955	486.12	485.26	0
888	482	483.53	6	487.3	0.832	486.12	485.26	0
892	482.21	483.53	18	487.3	1.165	486.12	485.26	0
896	482.47	483.53	18	487.3	1.131	486.12	485.26	0
900	482.74	483.53	18	487.3	0.864	486.12	485.26	0
904	482.99	483.53	18	487.3	1.134	486.12	485.26	0
908	483.18	483.53	18	487.3	0.779	486.12	485.26	0
912	483.32	483.53	18	487.3	1.039	486.12	485.26	0
916	483.57	0	18	487.3	1.046	486.12	485.26	0
920	483.82	0	18	487.3	1.045	486.12	485.26	0
924	483.79	0	18	487.3	0.4	486.12	485.26	0
928	484.09	0	18	487.3	0.572	486.12	485.26	0
932	484.12	0	18	487.3	0.272	486.12	485.26	0
936	484.19	0	18	487.3	-0.065	486.12	485.26	0
940	484.22	0	18	487.3	0.186	486.12	485.26	0
944	484.25	0	18	487.3	1.049	486.12	485.26	0
948	484.22	0	18	487.3	0.264	486.12	485.26	0
952	484.1	0	18	487.3	0.52	486.12	485.26	0
956	484.03	0	18	487.3	0.14	486.12	485.26	0
960	484.03	0	18	487.3	0.906	486.12	485.26	0
964	483.75	0	18	487.3	0.94	486.12	485.26	0
968	483.63	0	18	487.3	0.793	486.12	485.26	0

972	483.67	0	18	487.3	1.004	486.12	485.26	0
976	483.69	0	18	487.3	1.168	486.12	485.26	0
980	483.9	0	18	487.3	0.127	486.12	485.26	0
984	483.95	0	18	487.3	0.227	486.12	485.26	0
988	483.95	0	18	487.3	0.079	486.12	485.26	0
992	483.81	0	18	487.3	0.182	486.12	485.26	0
996	483.93	0	18	487.3	0.146	486.12	485.26	0
1000	484.03	0	18	487.3	-0.047	486.12	485.26	0
1004	484.06	0	18	487.3	0.549	486.12	485.26	0
1008	483.68	0	18	487.3	0.07	486.12	485.26	0
1012	483.52	483.53	18	487.3	0.641	486.12	485.26	0
1016	483.47	483.53	18	487.3	0.061	486.12	485.26	0
1020	483.29	483.53	18	487.3	0.184	486.12	485.26	0
1024	483.1	483.53	18	487.3	0.443	486.12	485.26	0
1028	483.05	483.53	18	487.3	0.368	486.12	485.26	0
1032	482.99	483.53	18	487.3	-0.034	486.12	485.26	0
1036	482.97	483.53	18	487.3	0.341	486.12	485.26	0
1040	483.13	483.53	18	487.3	0.295	486.12	485.26	0
1044	483.62	0	18	487.3	-0.056	486.12	485.26	0
1048	484.4	0	1	487.3	-0.293	486.12	485.26	0
1049.5	485.28	0	1	487.3	-0.02	486.12	0	0
1052.5	485.7	0	1	487.3	-0.01	486.12	0	0
1055.5	486.15	0	12	487.3	0.04	0	0	0
1058.5	486.8	0	12	487.3	0.04	0	0	0
1060.5	487.18	0	12	487.3	0	0	0	0
1064.5	489.18	0	12	0	0	0	0	0
1068	491.2	0	12	0	0	0	0	0

Cross-section: P_3

				High		Middle		Low
Station	**Elevation**	**SZF**	**Substrate/Cover**	**WSEL**	**Velocity**	**WSEL**	**Stage 3**	**WSEL**
-4	491	0	17	0	0	0	0	0
0	489.96	0	17	0	0	0	0	0
4	486.76	0	11	487.41	0	0	0	0
8	485.91	0	11	487.41	0	486.13	0	0
12	484.77	0	11	487.41	0	486.13	485.21	0
16	486.66	0	6	487.41	0.186	0	0	0
20	486.11	0	6	487.41	0.477	486.13	0	0
24	485.51	0	6	487.41	0.829	486.13	0	0
28	485.16	0	6	487.41	0.898	486.13	485.21	0
32	485.11	0	6	487.41	1.095	486.13	485.21	0
36	485.61	0	13	487.41	1.219	486.13	0	0

40	485.46	0	12	487.41	1.117	486.13	0	0
44	485.26	0	12	487.41	1.07	486.13	0	0
48	485.21	0	13	487.41	1.327	486.13	0	0
52	484.96	0	13	487.41	1.166	486.13	485.21	0
56	486.11	0	13	487.41	1.191	486.13	0	0
60	485.31	0	13	487.41	1.163	486.13	0	0
64	485.01	0	13	487.41	1.02	486.13	485.21	0
68	485.16	0	13	487.41	0.665	486.13	485.21	0
72	484.81	0	13	487.41	0.925	486.13	485.21	0
76	485.28	0	13	487.41	0.823	486.13	0	0
80	484.79	0	13	487.41	1.144	486.13	485.21	0
84	484.79	0	13	487.41	1.151	486.13	485.21	0
88	484.68	0	13	487.41	1.011	486.13	485.21	0
92	484.46	0	13	487.41	0.933	486.13	485.21	0
96	484.46	0	13	487.41	1.515	486.13	485.21	0
100	484.3	0	6	487.41	1.248	486.13	485.21	0
104	484.13	0	6	487.41	1.39	486.13	485.21	0
108	483.8	0	6	487.41	1.716	486.13	485.21	0
112	483.8	0	6	487.41	1.239	486.13	485.21	0
116	483.14	483.53	6	487.41	1.397	486.13	485.21	0
120	482.82	483.53	6	487.41	1.214	486.13	485.21	0
124	482.82	483.53	6	487.41	0.92	486.13	485.21	0
128	482.82	483.53	6	487.41	1.142	486.13	485.21	0
132	483.31	483.53	6	487.41	0.819	486.13	485.21	0
136	483.8	0	6	487.41	1.828	486.13	485.21	0
140	483.8	0	6	487.41	1.644	486.13	485.21	0
144	483.8	0	6	487.41	1.031	486.13	485.21	0
148	482.82	483.53	6	487.41	1.939	486.13	485.21	0
152	481.18	483.53	6	487.41	1.382	486.13	485.21	0
156	481.18	483.53	6	487.41	2.026	486.13	485.21	0
160	481.18	483.53	6	487.41	1.008	486.13	485.21	0
164	481.18	483.53	6	487.41	1.254	486.13	485.21	0
168	481.18	483.53	6	487.41	1.275	486.13	485.21	0
172	481.18	483.53	6	487.41	2.094	486.13	485.21	0
176	481.18	483.53	6	487.41	1.908	486.13	485.21	0
180	481.18	483.53	6	487.41	1.77	486.13	485.21	0
184	480.85	483.53	6	487.41	1.931	486.13	485.21	0
188	480.52	483.53	6	487.41	1.755	486.13	485.21	0
192	480.52	483.53	6	487.41	1.363	486.13	485.21	0
196	480.52	483.53	6	487.41	2.095	486.13	485.21	0
200	480.52	483.53	6	487.41	1.083	486.13	485.21	0

204	480.52	483.53	6	487.41	1.792	486.13	485.21	0
208	480.19	483.53	6	487.41	2.213	486.13	485.21	0
212	480.85	483.53	6	487.41	2.153	486.13	485.21	0
216	480.85	483.53	6	487.41	1.602	486.13	485.21	0
220	480.52	483.53	6	487.41	1.845	486.13	485.21	0
224	479.86	483.53	6	487.41	1.756	486.13	485.21	0
228	479.7	483.53	6	487.41	2.177	486.13	485.21	0
232	479.54	483.53	6	487.41	1.632	486.13	485.21	0
236	479.54	483.53	6	487.41	1.616	486.13	485.21	0
240	479.54	483.53	6	487.41	2.536	486.13	485.21	0
244	480.19	483.53	6	487.41	2.116	486.13	485.21	0
248	480.19	483.53	6	487.41	1.717	486.13	485.21	0
252	480.19	483.53	6	487.41	1.613	486.13	485.21	0
256	480.03	483.53	6	487.41	1.552	486.13	485.21	0
260	479.86	483.53	6	487.41	2.629	486.13	485.21	0
264	479.86	483.53	6	487.41	2.01	486.13	485.21	0
268	479.54	483.53	6	487.41	2.259	486.13	485.21	0
272	479.05	483.53	6	487.41	2.144	486.13	485.21	0
276	478.55	483.53	6	487.41	2.457	486.13	485.21	0
280	477.57	483.53	6	487.41	2.464	486.13	485.21	0
284	476.75	483.53	6	487.41	1.795	486.13	485.21	0
288	476.8	483.53	6	487.41	1.796	486.13	485.21	0
292	477.41	483.53	6	487.41	2.253	486.13	485.21	0
296	477.41	483.53	6	487.41	2.915	486.13	485.21	0
300	476.91	483.53	6	487.41	3.341	486.13	485.21	0
304	475.27	483.53	6	487.41	3.355	486.13	485.21	0
308	474.45	483.53	6	487.41	3.486	486.13	485.21	0
312	473.63	483.53	6	487.41	2.883	486.13	485.21	0
316	473.14	483.53	6	487.41	2.779	486.13	485.21	0
320	472.65	483.53	6	487.41	3.064	486.13	485.21	0
324	472.65	483.53	6	487.41	2.962	486.13	485.21	0
328	472.65	483.53	6	487.41	3.279	486.13	485.21	0
332	472.71	483.53	6	487.41	3.092	486.13	485.21	0
336	472.97	483.53	6	487.41	2.145	486.13	485.21	0
340	472.97	483.53	6	487.41	2.955	486.13	485.21	0
344	472.86	483.53	6	487.41	3.551	486.13	485.21	0
348	472.81	483.53	6	487.41	3.478	486.13	485.21	0
352	473.19	483.53	6	487.41	3.637	486.13	485.21	0
356	472.43	483.53	6	487.41	2.831	486.13	485.21	0
360	472.65	483.53	6	487.41	3.595	486.13	485.21	0
364	472.65	483.53	6	487.41	3.888	486.13	485.21	0

368	472.97	483.53	6	487.41	3.839	486.13	485.21	0
372	472.81	483.53	6	487.41	3.357	486.13	485.21	0
376	472.65	483.53	6	487.41	3.222	486.13	485.21	0
380	472.65	483.53	6	487.41	3.152	486.13	485.21	0
384	473.19	483.53	6	487.41	2.871	486.13	485.21	0
388	473.3	483.53	6	487.41	2.931	486.13	485.21	0
392	473.3	483.53	6	487.41	2.904	486.13	485.21	0
396	473.8	483.53	6	487.41	3.195	486.13	485.21	0
400	474.29	483.53	6	487.41	2.825	486.13	485.21	0
404	474.72	483.53	6	487.41	2.753	486.13	485.21	0
408	476.25	483.53	6	487.41	3.011	486.13	485.21	0
412	476.58	483.53	6	487.41	2.943	486.13	485.21	0
416	477.02	483.53	6	487.41	2.586	486.13	485.21	0
420	477.9	483.53	6	487.41	2.552	486.13	485.21	0
424	478.88	483.53	6	487.41	2.511	486.13	485.21	0
428	479.54	483.53	6	487.41	2.241	486.13	485.21	0
432	480.19	483.53	6	487.41	1.966	486.13	485.21	0
436	481.02	483.53	6	487.41	2.024	486.13	485.21	0
440	481.5	483.53	6	487.41	1.967	486.13	485.21	0
444	481.83	483.53	6	487.41	1.644	486.13	485.21	0
448	482	483.53	6	487.41	1.953	486.13	485.21	0
452	481.83	483.53	6	487.41	1.773	486.13	485.21	0
456	482.49	483.53	6	487.41	1.422	486.13	485.21	0
460	482.82	483.53	6	487.41	1.997	486.13	485.21	0
464	483.47	483.53	6	487.41	2.254	486.13	485.21	0
468	483.31	483.53	6	487.41	1.446	486.13	485.21	0
472	483.47	483.53	6	487.41	1.64	486.13	485.21	0
476	483.47	483.53	6	487.41	0.822	486.13	485.21	0
480	483.14	483.53	6	487.41	1.357	486.13	485.21	0
484	483.47	483.53	6	487.41	2.062	486.13	485.21	0
488	483.47	483.53	6	487.41	1.811	486.13	485.21	0
492	483.47	483.53	6	487.41	0.977	486.13	485.21	0
496	483.14	483.53	6	487.41	1.302	486.13	485.21	0
500	483.47	483.53	6	487.41	1.51	486.13	485.21	0
504	483.47	483.53	6	487.41	1.382	486.13	485.21	0
508	483.64	0	6	487.41	1.52	486.13	485.21	0
512	483.8	0	6	487.41	1.555	486.13	485.21	0
516	483.47	483.53	6	487.41	1.483	486.13	485.21	0
520	483.47	483.53	6	487.41	1.029	486.13	485.21	0
524	483.47	483.53	6	487.41	0.699	486.13	485.21	0
528	483.47	483.53	6	487.41	1.056	486.13	485.21	0

532	483.47	483.53	6	487.41	2.601	486.13	485.21	0
536	483.8	0	6	487.41	0.249	486.13	485.21	0
540	483.47	483.53	6	487.41	1.37	486.13	485.21	0
544	483.14	483.53	6	487.41	1.539	486.13	485.21	0
548	483.14	483.53	12	487.41	1.392	486.13	485.21	0
552	483.47	483.53	12	487.41	1.734	486.13	485.21	0
556	483.14	483.53	12	487.41	1.295	486.13	485.21	0
560	482.82	483.53	12	487.41	1.478	486.13	485.21	0
564	483.14	483.53	12	487.41	1.332	486.13	485.21	0
568	482.98	483.53	12	487.41	1.434	486.13	485.21	0
572	482.82	483.53	12	487.41	1.01	486.13	485.21	0
576	482.49	483.53	12	487.41	2.948	486.13	485.21	0
580	482.16	483.53	12	487.41	1.107	486.13	485.21	0
584	482.16	483.53	12	487.41	0.379	486.13	485.21	0
588	482.16	483.53	12	487.41	1.648	486.13	485.21	0
592	481.83	483.53	12	487.41	1.23	486.13	485.21	0
596	481.83	483.53	12	487.41	1.181	486.13	485.21	0
600	481.83	483.53	12	487.41	1.665	486.13	485.21	0
604	481.83	483.53	12	487.41	1.651	486.13	485.21	0
608	481.83	483.53	12	487.41	1.281	486.13	485.21	0
612	481.5	483.53	12	487.41	1.506	486.13	485.21	0
616	481.5	483.53	12	487.41	0.915	486.13	485.21	0
620	481.5	483.53	12	487.41	2.055	486.13	485.21	0
624	481.5	483.53	12	487.41	-0.299	486.13	485.21	0
628	481.5	483.53	12	487.41	0.852	486.13	485.21	0
632	481.5	483.53	12	487.41	2.52	486.13	485.21	0
636	481.5	483.53	12	487.41	0.758	486.13	485.21	0
640	481.5	483.53	12	487.41	0.753	486.13	485.21	0
644	481.5	483.53	12	487.41	0.935	486.13	485.21	0
648	481.5	483.53	12	487.41	0.681	486.13	485.21	0
652	481.5	483.53	12	487.41	1.129	486.13	485.21	0
656	481.83	483.53	12	487.41	0.991	486.13	485.21	0
660	481.83	483.53	12	487.41	0.896	486.13	485.21	0
664	482.16	483.53	12	487.41	0.797	486.13	485.21	0
668	482.33	483.53	12	487.41	1.007	486.13	485.21	0
672	482.49	483.53	12	487.41	1.147	486.13	485.21	0
676	482.82	483.53	16	487.41	0.961	486.13	485.21	0
680	483.47	483.53	16	487.41	1.094	486.13	485.21	0
684	483.15	483.53	16	487.41	1.245	486.13	485.21	0
688	482.82	483.53	16	487.41	0.876	486.13	485.21	0
692	482.82	483.53	16	487.41	0.872	486.13	485.21	0

696	483.14	483.53	16	487.41	0.874	486.13	485.21	0
700	483.14	483.53	16	487.41	0.835	486.13	485.21	0
704	483.14	483.53	16	487.41	0.787	486.13	485.21	0
708	483.14	483.53	16	487.41	1.2	486.13	485.21	0
712	483.14	483.53	16	487.41	1.186	486.13	485.21	0
716	483.14	483.53	16	487.41	0.771	486.13	485.21	0
720	482.82	483.53	16	487.41	0.725	486.13	485.21	0
724	482.82	483.53	16	487.41	1.233	486.13	485.21	0
728	483.14	483.53	16	487.41	0.616	486.13	485.21	0
732	482.98	483.53	17	487.41	0.811	486.13	485.21	0
736	483.47	483.53	17	487.41	0.473	486.13	485.21	0
740	483.31	483.53	17	487.41	0.573	486.13	485.21	0
744	483.64	0	18	487.41	0.728	486.13	485.21	0
746.7	484.21	0	18	487.41	0.555	486.13	485.21	0
749.7	484.51	0	18	487.41	0.495	486.13	485.21	0
752.7	485.11	0	18	487.41	0.52	486.13	485.21	0
755.7	484.91	0	18	487.41	0.435	486.13	485.21	0
758.7	485.06	0	17	487.41	0.47	486.13	485.21	0
761.7	485.31	0	17	487.41	0.37	486.13	0	0
764.7	485.96	0	17	487.41	0.31	486.13	0	0
767.7	486.11	0	17	487.41	0.28	486.13	0	0
770.7	486.46	0	17	487.41	0.07	0	0	0
773.7	487.11	0	17	487.41	-0.06	0	0	0
776.7	487.8	0	17	0	0	0	0	0
780.7	488.62	0	17	0	0	0	0	0
784.7	489.04	0	17	0	0	0	0	0
788.7	489.11	0	17	0	0	0	0	0
796.7	489.32	0	17	0	0	0	0	0
804.7	489.22	0	17	0	0	0	0	0
812.7	488.98	0	17	0	0	0	0	0
820.7	489.21	0	17	0	0	0	0	0
828.7	489.22	0	17	0	0	0	0	0
832	491	0	17	0	0	0	0	0

Cross-section: P_2

				High		Middle		Low
Station	**Elevation**	**SZF**	**Substrate/Cover**	**WSEL**	**Velocity**	**WSEL**	**Stage 3**	**WSEL**
0	492.86	0	9	0	0	0	0	0
4	490.44	0	9	0	0	0	0	0
8	489.36	0	9	0	0	0	0	0
12	488.81	0	9	0	0	0	0	0
18	488.16	0	9	0	0	0	0	0

22	487.57	0		9	487.65	0	0	0	0
26	486.55	0		16	487.65	0.049	0	0	0
28	485.65	0		17	487.65	0.07	486.15	0	0
32	484.65	0		17	487.65	0.1	486.15	485.09	0
36	483.95	0		1	487.65	0.173	486.15	485.09	0
40	483.97	0		1	487.65	0.315	486.15	485.09	0
44	483.71	0		4	487.65	0.16	486.15	485.09	0
48	483.17	483.53		4	487.65	0.584	486.15	485.09	0
52	482.62	483.53		4	487.65	0.7	486.15	485.09	0
56	482.07	483.53		4	487.65	0.744	486.15	485.09	0
60	481.85	483.53		5	487.65	0.616	486.15	485.09	0
64	481.63	483.53		5	487.65	0.886	486.15	485.09	0
68	481.09	483.53		5	487.65	0.686	486.15	485.09	0
72	480.76	483.53		5	487.65	1.124	486.15	485.09	0
76	480.21	483.53		5	487.65	0.967	486.15	485.09	0
80	480.1	483.53		5	487.65	1.118	486.15	485.09	0
84	479.29	483.53		5	487.65	1	486.15	485.09	0
88	478.79	483.53		5	487.65	1.034	486.15	485.09	0
92	478.79	483.53		5	487.65	0.867	486.15	485.09	0
96	478.3	483.53		5	487.65	1.141	486.15	485.09	0
100	477.98	483.53		5	487.65	0.767	486.15	485.09	0
104	477.65	483.53		5	487.65	1.512	486.15	485.09	0
108	477.15	483.53		5	487.65	0.894	486.15	485.09	0
112	476.99	483.53		5	487.65	1.182	486.15	485.09	0
116	476.82	483.53		4	487.65	1.428	486.15	485.09	0
120	475.84	483.53		4	487.65	1.888	486.15	485.09	0
124	475.84	483.53		4	487.65	1.062	486.15	485.09	0
128	475.84	483.53		4	487.65	1.327	486.15	485.09	0
132	475.51	483.53		4	487.65	1.409	486.15	485.09	0
136	475.02	483.53		4	487.65	1.37	486.15	485.09	0
140	474.53	483.53		4	487.65	1.196	486.15	485.09	0
144	474.53	483.53		4	487.65	1.106	486.15	485.09	0
148	474.2	483.53		4	487.65	0.908	486.15	485.09	0
152	473.87	483.53		4	487.65	1.123	486.15	485.09	0
156	473.71	483.53		4	487.65	1.301	486.15	485.09	0
160	473.38	483.53		2	487.65	1.01	486.15	485.09	0
164	473.38	483.53		2	487.65	1.179	486.15	485.09	0
168	473.21	483.53		2	487.65	0.985	486.15	485.09	0
172	472.89	483.53		2	487.65	0.66	486.15	485.09	0
176	472.73	483.53		2	487.65	1.297	486.15	485.09	0
180	472.56	483.53		2	487.65	0.998	486.15	485.09	0

184	472.56	483.53	2	487.65	1.234	486.15	485.09	0
188	472.23	483.53	2	487.65	1.116	486.15	485.09	0
192	472.23	483.53	2	487.65	1.322	486.15	485.09	0
196	472.23	483.53	2	487.65	1.106	486.15	485.09	0
200	472.23	483.53	2	487.65	1.255	486.15	485.09	0
204	472.23	483.53	2	487.65	1.205	486.15	485.09	0
208	472.23	483.53	2	487.65	0.908	486.15	485.09	0
212	472.23	483.53	2	487.65	1.554	486.15	485.09	0
216	472.4	483.53	2	487.65	1.311	486.15	485.09	0
220	472.56	483.53	2	487.65	1.137	486.15	485.09	0
224	472.23	483.53	2	487.65	1.332	486.15	485.09	0
228	472.23	483.53	2	487.65	1.346	486.15	485.09	0
232	472.23	483.53	2	487.65	1.218	486.15	485.09	0
236	472.07	483.53	2	487.65	1.573	486.15	485.09	0
240	471.9	483.53	2	487.65	1.213	486.15	485.09	0
244	472.23	483.53	2	487.65	1.616	486.15	485.09	0
248	471.9	483.53	2	487.65	1.24	486.15	485.09	0
252	471.9	483.53	2	487.65	1.861	486.15	485.09	0
256	471.9	483.53	2	487.65	1.431	486.15	485.09	0
260	472.23	483.53	2	487.65	1.337	486.15	485.09	0
264	472.23	483.53	2	487.65	1.664	486.15	485.09	0
268	472.23	483.53	2	487.65	1.628	486.15	485.09	0
272	472.23	483.53	2	487.65	1.611	486.15	485.09	0
276	472.56	483.53	2	487.65	1.443	486.15	485.09	0
280	472.56	483.53	2	487.65	1.928	486.15	485.09	0
284	472.73	483.53	2	487.65	1.35	486.15	485.09	0
288	472.89	483.53	2	487.65	1.921	486.15	485.09	0
292	472.89	483.53	2	487.65	1.671	486.15	485.09	0
296	472.89	483.53	2	487.65	1.394	486.15	485.09	0
300	473.05	483.53	2	487.65	1.539	486.15	485.09	0
304	473.21	483.53	4	487.65	1.375	486.15	485.09	0
308	473.21	483.53	4	487.65	1.561	486.15	485.09	0
312	473.38	483.53	4	487.65	1.608	486.15	485.09	0
316	473.54	483.53	4	487.65	1.453	486.15	485.09	0
320	473.54	483.53	4	487.65	1.341	486.15	485.09	0
324	473.87	483.53	4	487.65	1.682	486.15	485.09	0
328	474.2	483.53	4	487.65	1.628	486.15	485.09	0
332	474.2	483.53	4	487.65	1.183	486.15	485.09	0
336	474.2	483.53	4	487.65	1.432	486.15	485.09	0
340	474.2	483.53	4	487.65	1.597	486.15	485.09	0
344	474.53	483.53	4	487.65	1.701	486.15	485.09	0

348	474.53	483.53	4	487.65	1.461	486.15	485.09	0
352	474.37	483.53	4	487.65	1.498	486.15	485.09	0
356	474.53	483.53	5	487.65	1.458	486.15	485.09	0
360	475.02	483.53	5	487.65	1.688	486.15	485.09	0
364	475.18	483.53	5	487.65	1.597	486.15	485.09	0
368	475.18	483.53	5	487.65	1.571	486.15	485.09	0
372	475.18	483.53	5	487.65	1.839	486.15	485.09	0
376	475.18	483.53	5	487.65	1.63	486.15	485.09	0
380	475.18	483.53	5	487.65	1.493	486.15	485.09	0
384	475.18	483.53	5	487.65	1.36	486.15	485.09	0
388	475.84	483.53	5	487.65	1.544	486.15	485.09	0
392	476.01	483.53	5	487.65	1.096	486.15	485.09	0
396	475.68	483.53	4	487.65	1.566	486.15	485.09	0
400	475.51	483.53	4	487.65	1.362	486.15	485.09	0
404	475.51	483.53	4	487.65	1.492	486.15	485.09	0
408	475.51	483.53	4	487.65	1.189	486.15	485.09	0
412	475.51	483.53	4	487.65	1.445	486.15	485.09	0
416	476.01	483.53	4	487.65	1.296	486.15	485.09	0
420	476.17	483.53	5	487.65	1.627	486.15	485.09	0
424	476.17	483.53	5	487.65	1.512	486.15	485.09	0
428	476.17	483.53	5	487.65	1.823	486.15	485.09	0
432	476.17	483.53	5	487.65	1.269	486.15	485.09	0
436	476.17	483.53	5	487.65	1.345	486.15	485.09	0
440	476.17	483.53	5	487.65	1.674	486.15	485.09	0
444	476.5	483.53	5	487.65	1.439	486.15	485.09	0
448	476.82	483.53	5	487.65	1.402	486.15	485.09	0
452	476.82	483.53	5	487.65	1.536	486.15	485.09	0
456	477.15	483.53	4	487.65	1.561	486.15	485.09	0
460	477.15	483.53	4	487.65	1.562	486.15	485.09	0
464	477.32	483.53	4	487.65	1.003	486.15	485.09	0
468	477.48	483.53	4	487.65	1.022	486.15	485.09	0
472	477.48	483.53	4	487.65	1.722	486.15	485.09	0
476	477.81	483.53	4	487.65	1.588	486.15	485.09	0
480	478.3	483.53	4	487.65	1.119	486.15	485.09	0
484	478.79	483.53	4	487.65	1.521	486.15	485.09	0
488	478.3	483.53	4	487.65	1.653	486.15	485.09	0
492	478.3	483.53	4	487.65	1.658	486.15	485.09	0
496	478.14	483.53	4	487.65	1.365	486.15	485.09	0
500	478.14	483.53	4	487.65	1.591	486.15	485.09	0
504	478.14	483.53	4	487.65	1.192	486.15	485.09	0
508	478.14	483.53	4	487.65	1.421	486.15	485.09	0

512	478.14	483.53	4	487.65	1.144	486.15	485.09	0
516	478.14	483.53	4	487.65	1.228	486.15	485.09	0
520	478.25	483.53	4	487.65	1.391	486.15	485.09	0
524	478.46	483.53	4	487.65	1.328	486.15	485.09	0
528	478.14	483.53	4	487.65	1.355	486.15	485.09	0
532	478.14	483.53	4	487.65	0.996	486.15	485.09	0
536	478.14	483.53	4	487.65	1.244	486.15	485.09	0
540	478.14	483.53	4	487.65	1.312	486.15	485.09	0
544	478.46	483.53	4	487.65	1.242	486.15	485.09	0
548	478.46	483.53	4	487.65	0.812	486.15	485.09	0
552	478.79	483.53	4	487.65	1.314	486.15	485.09	0
556	479.23	483.53	4	487.65	1.001	486.15	485.09	0
560	479.45	483.53	4	487.65	1.576	486.15	485.09	0
564	479.89	483.53	4	487.65	1.263	486.15	485.09	0
568	480.1	483.53	4	487.65	1.255	486.15	485.09	0
572	480.27	483.53	4	487.65	0.934	486.15	485.09	0
576	480.65	483.53	4	487.65	1.337	486.15	485.09	0
580	480.76	483.53	4	487.65	0.926	486.15	485.09	0
584	480.76	483.53	4	487.65	1.283	486.15	485.09	0
588	480.6	483.53	4	487.65	1.069	486.15	485.09	0
592	480.76	483.53	4	487.65	1.096	486.15	485.09	0
596	480.43	483.53	4	487.65	1.239	486.15	485.09	0
600	480.43	483.53	4	487.65	1.178	486.15	485.09	0
604	480.43	483.53	4	487.65	1.134	486.15	485.09	0
608	480.43	483.53	4	487.65	1.077	486.15	485.09	0
612	480.43	483.53	4	487.65	0.875	486.15	485.09	0
616	480.43	483.53	4	487.65	1.171	486.15	485.09	0
620	480.43	483.53	4	487.65	1.089	486.15	485.09	0
624	480.43	483.53	4	487.65	1.167	486.15	485.09	0
628	480.76	483.53	4	487.65	1.198	486.15	485.09	0
632	480.76	483.53	4	487.65	1.24	486.15	485.09	0
636	481.09	483.53	4	487.65	1.386	486.15	485.09	0
640	481.09	483.53	4	487.65	1.125	486.15	485.09	0
644	481.2	483.53	5	487.65	1.364	486.15	485.09	0
648	481.42	483.53	5	487.65	0.835	486.15	485.09	0
652	481.42	483.53	5	487.65	1.316	486.15	485.09	0
656	481.42	483.53	5	487.65	1.152	486.15	485.09	0
660	481.09	483.53	5	487.65	1.033	486.15	485.09	0
664	481.58	483.53	5	487.65	1.602	486.15	485.09	0
668	481.74	483.53	5	487.65	1.243	486.15	485.09	0
672	481.09	483.53	5	487.65	1.402	486.15	485.09	0

676	480.93	483.53	5	487.65	1.092	486.15	485.09	0
680	480.93	483.53	5	487.65	1.245	486.15	485.09	0
684	481.31	483.53	5	487.65	0.896	486.15	485.09	0
688	481.42	483.53	5	487.65	1.167	486.15	485.09	0
692	481.26	483.53	5	487.65	1.133	486.15	485.09	0
696	481.09	483.53	5	487.65	1.203	486.15	485.09	0
700	481.09	483.53	5	487.65	1.304	486.15	485.09	0
704	481.42	483.53	5	487.65	1.149	486.15	485.09	0
708	481.42	483.53	5	487.65	1.023	486.15	485.09	0
712	481.42	483.53	5	487.65	1.179	486.15	485.09	0
716	481.09	483.53	5	487.65	1.134	486.15	485.09	0
720	481.09	483.53	5	487.65	1.367	486.15	485.09	0
724	480.76	483.53	5	487.65	1.051	486.15	485.09	0
728	480.93	483.53	5	487.65	1.164	486.15	485.09	0
732	481.09	483.53	2	487.65	1.003	486.15	485.09	0
736	481.09	483.53	2	487.65	1.149	486.15	485.09	0
740	481.2	483.53	2	487.65	1.147	486.15	485.09	0
744	481.34	483.53	2	487.65	1.014	486.15	485.09	0
748	481.53	483.53	2	487.65	1.029	486.15	485.09	0
752	481.74	483.53	2	487.65	1.063	486.15	485.09	0
756	481.74	483.53	2	487.65	0.902	486.15	485.09	0
760	481.85	483.53	2	487.65	0.955	486.15	485.09	0
764	482.07	483.53	4	487.65	0.964	486.15	485.09	0
768	482.07	483.53	4	487.65	0.884	486.15	485.09	0
772	482.07	483.53	4	487.65	0.854	486.15	485.09	0
776	482.07	483.53	4	487.65	1.061	486.15	485.09	0
780	482.18	483.53	4	487.65	0.837	486.15	485.09	0
784	482.4	483.53	2	487.65	0.91	486.15	485.09	0
788	482.95	483.53	5	487.65	0.736	486.15	485.09	0
792	483.06	483.53	5	487.65	0.564	486.15	485.09	0
796	483.38	483.53	3	487.65	0.417	486.15	485.09	0
800	483.55	0	3	487.65	0.594	486.15	485.09	0
804	483.88	0	3	487.65	0.666	486.15	485.09	0
807	484.25	0	3	487.65	0.42	486.15	485.09	0
810	484.55	0	3	487.65	0.35	486.15	485.09	0
813	485.25	0	3	487.65	0.04	486.15	0	0
816	485.95	0	17	487.65	-0.04	486.15	0	0
819	487.05	0	17	487.65	-0.03	0	0	0
823	488.65	0	17	0	0	0	0	0
827	489.6	0	17	0	0	0	0	0
831	492.86	0	17	0	0	0	0	0

Cross-section: P_12					High	Middle		Low
Station	Elevation	SZF	Substrate/Cover	WSEL	Velocity	WSEL	Stage 3	WSEL
-12	492	0	4	0	0	0	0	0
-8	490.5	0	4	0	0	0	0	0
-4	489	0	4	0	0	0	0	0
0	487.84	0	4	487.95	0	0	0	0
4	486.68	0	4	487.95	0	0	0	0
8	485.71	0	4	487.95	0	486.45	0	0
12	484.8	0	4	487.95	0	486.45	485.4	0
16	484.7	0	3	487.95	0	486.45	485.4	0
20	484.1	0	3	487.95	0	486.45	485.4	0
24	483.7	0	3	487.95	0	486.45	485.4	0
28	483.59	0	3	487.95	0	486.45	485.4	0.302
32	483.4	483.53	3	487.95	0	486.45	485.4	0.695
36	483.19	483.53	3	487.95	0	486.45	485.4	0.635
40	482.98	483.53	3	487.95	0	486.45	485.4	0.416
44	482.6	483.53	3	487.95	0	486.45	485.4	0.764
48	481.92	483.53	3	487.95	0	486.45	485.4	1.431
52	481.27	483.53	3	487.95	0	486.45	485.4	1.13
56	480.92	483.53	3	487.95	0	486.45	485.4	0.54
60	480.41	483.53	3	487.95	0	486.45	485.4	0.933
64	480.36	483.53	3	487.95	0	486.45	485.4	1.423
68	480.32	483.53	3	487.95	0	486.45	485.4	1.001
72	480.38	483.53	3	487.95	0	486.45	485.4	0.612
76	480.47	483.53	3	487.95	0	486.45	485.4	0.924
80	480.56	483.53	3	487.95	0	486.45	485.4	1.185
84	480.68	483.53	3	487.95	0	486.45	485.4	1.115
88	480.95	483.53	3	487.95	0	486.45	485.4	0.877
92	481.31	483.53	3	487.95	0	486.45	485.4	0.873
96	481.44	483.53	3	487.95	0	486.45	485.4	0.854
100	481.68	483.53	4	487.95	0	486.45	485.4	1.049
104	481.81	483.53	4	487.95	0	486.45	485.4	1.247
108	482.36	483.53	4	487.95	0	486.45	485.4	1.31
112	482.49	483.53	4	487.95	0	486.45	485.4	1.067
116	482.62	483.53	4	487.95	0	486.45	485.4	0.74
120	482.82	483.53	4	487.95	0	486.45	485.4	1.019
124	482.71	483.53	4	487.95	0	486.45	485.4	-0.011
128	482.29	483.53	4	487.95	0	486.45	485.4	-0.219
132	482.11	483.53	4	487.95	0	486.45	485.4	1.159
136	482.21	483.53	4	487.95	0	486.45	485.4	1.049

140	482.2	483.53	4	487.95	0	486.45	485.4	0.838
144	481.96	483.53	4	487.95	0	486.45	485.4	0.519
148	481.87	483.53	4	487.95	0	486.45	485.4	0.592
152	481.83	483.53	4	487.95	0	486.45	485.4	0.657
156	482.16	483.53	4	487.95	0	486.45	485.4	0.496
160	482.49	483.53	4	487.95	0	486.45	485.4	0.698
164	482.28	483.53	4	487.95	0	486.45	485.4	0.374
168	482.6	483.53	4	487.95	0	486.45	485.4	0.049
172	483.5	483.53	4	487.95	0	486.45	485.4	0.355
176	483.68	0	13	487.95	0	486.45	485.4	1.455
180	483.71	0	13	487.95	0	486.45	485.4	1.466
184	483.85	0	13	487.95	0	486.45	485.4	1.095
188	483.17	483.53	13	487.95	0	486.45	485.4	1.318
192	482.9	483.53	13	487.95	0	486.45	485.4	1.034
196	482.84	483.53	13	487.95	0	486.45	485.4	0.478
200	483.02	483.53	13	487.95	0	486.45	485.4	0.064
204	483.05	483.53	13	487.95	0	486.45	485.4	0.827
208	482.99	483.53	13	487.95	0	486.45	485.4	0.603
212	483.01	483.53	13	487.95	0	486.45	485.4	0.521
216	483.19	483.53	13	487.95	0	486.45	485.4	0.586
220	483.24	483.53	13	487.95	0	486.45	485.4	0.605
224	483.19	483.53	13	487.95	0	486.45	485.4	1.693
228	483.03	483.53	13	487.95	0	486.45	485.4	0.982
232	482.73	483.53	13	487.95	0	486.45	485.4	0.136
236	482.96	483.53	13	487.95	0	486.45	485.4	0.354
240	483.1	483.53	13	487.95	0	486.45	485.4	0.68
244	483.43	483.53	13	487.95	0	486.45	485.4	1.424
248	483.28	483.53	13	487.95	0	486.45	485.4	0.688
252	483.16	483.53	13	487.95	0	486.45	485.4	0.799
256	482.91	483.53	13	487.95	0	486.45	485.4	1.261
260	482.83	483.53	13	487.95	0	486.45	485.4	0.816
264	482.75	483.53	13	487.95	0	486.45	485.4	0.602
268	482.86	483.53	13	487.95	0	486.45	485.4	0.008
272	482.69	483.53	13	487.95	0	486.45	485.4	-0.017
276	482.59	483.53	13	487.95	0	486.45	485.4	0.457
280	482.44	483.53	13	487.95	0	486.45	485.4	0.312
284	482.28	483.53	13	487.95	0	486.45	485.4	0.664
288	482.55	483.53	13	487.95	0	486.45	485.4	0.737
292	482.19	483.53	13	487.95	0	486.45	485.4	-0.176
296	481.88	483.53	13	487.95	0	486.45	485.4	0.093
300	481.74	483.53	13	487.95	0	486.45	485.4	0.337

304	481.37	483.53	13	487.95	0	486.45	485.4	0.059
308	481.3	483.53	13	487.95	0	486.45	485.4	0.062
312	481.3	483.53	4	487.95	0	486.45	485.4	0.431
316	481.15	483.53	4	487.95	0	486.45	485.4	0.791
320	481	483.53	4	487.95	0	486.45	485.4	0.85
324	480.72	483.53	4	487.95	0	486.45	485.4	0.839
328	480.6	483.53	4	487.95	0	486.45	485.4	0.557
332	480.5	483.53	4	487.95	0	486.45	485.4	0.344
336	480.37	483.53	4	487.95	0	486.45	485.4	0.499
340	480.27	483.53	4	487.95	0	486.45	485.4	0.718
344	480.49	483.53	4	487.95	0	486.45	485.4	0.537
348	480.29	483.53	4	487.95	0	486.45	485.4	0.457
352	480.41	483.53	4	487.95	0	486.45	485.4	0.21
356	480.46	483.53	4	487.95	0	486.45	485.4	0.671
360	480.32	483.53	4	487.95	0	486.45	485.4	1.129
364	480.33	483.53	4	487.95	0	486.45	485.4	1.053
368	480.39	483.53	4	487.95	0	486.45	485.4	0.542
372	480.49	483.53	4	487.95	0	486.45	485.4	0.737
376	481.06	483.53	4	487.95	0	486.45	485.4	1.056
380	481.16	483.53	4	487.95	0	486.45	485.4	0.836
384	481.19	483.53	4	487.95	0	486.45	485.4	0.514
388	481.31	483.53	4	487.95	0	486.45	485.4	0.251
392	481.07	483.53	4	487.95	0	486.45	485.4	0.794
396	480.82	483.53	4	487.95	0	486.45	485.4	1.144
400	480.96	483.53	4	487.95	0	486.45	485.4	1.287
404	481.3	483.53	4	487.95	0	486.45	485.4	1.721
408	480.75	483.53	4	487.95	0	486.45	485.4	1.364
412	480.53	483.53	4	487.95	0	486.45	485.4	1.035
416	480.61	483.53	4	487.95	0	486.45	485.4	0.932
420	480.54	483.53	4	487.95	0	486.45	485.4	1.261
424	480.51	483.53	4	487.95	0	486.45	485.4	1.464
428	480.43	483.53	4	487.95	0	486.45	485.4	1.121
432	480.54	483.53	5	487.95	0	486.45	485.4	0.985
436	480.73	483.53	5	487.95	0	486.45	485.4	0.997
440	480.56	483.53	5	487.95	0	486.45	485.4	0.934
444	480.55	483.53	5	487.95	0	486.45	485.4	1.054
448	480.46	483.53	5	487.95	0	486.45	485.4	1.286
452	480.59	483.53	5	487.95	0	486.45	485.4	1.052
456	480.54	483.53	5	487.95	0	486.45	485.4	1.116
460	480.54	483.53	5	487.95	0	486.45	485.4	1.056
464	480.52	483.53	5	487.95	0	486.45	485.4	1.026

468	480.43	483.53	5	487.95	0	486.45	485.4	1.153
472	480.22	483.53	5	487.95	0	486.45	485.4	0.961
476	479.9	483.53	5	487.95	0	486.45	485.4	1.176
480	479.96	483.53	5	487.95	0	486.45	485.4	1.256
484	480.18	483.53	5	487.95	0	486.45	485.4	0.899
488	480.35	483.53	5	487.95	0	486.45	485.4	1.331
492	480.14	483.53	5	487.95	0	486.45	485.4	1.239
496	479.87	483.53	5	487.95	0	486.45	485.4	0.633
500	479.78	483.53	5	487.95	0	486.45	485.4	0.646
504	479.8	483.53	3	487.95	0	486.45	485.4	1.338
508	479.74	483.53	3	487.95	0	486.45	485.4	1.275
512	479.7	483.53	3	487.95	0	486.45	485.4	0.939
516	479.67	483.53	3	487.95	0	486.45	485.4	1.27
520	479.6	483.53	3	487.95	0	486.45	485.4	1.216
524	479.57	483.53	3	487.95	0	486.45	485.4	1.128
528	479.66	483.53	3	487.95	0	486.45	485.4	0.759
532	479.76	483.53	3	487.95	0	486.45	485.4	0.707
536	479.83	483.53	3	487.95	0	486.45	485.4	0.94
540	480.03	483.53	3	487.95	0	486.45	485.4	0.971
544	480.16	483.53	3	487.95	0	486.45	485.4	1.134
548	480.24	483.53	4	487.95	0	486.45	485.4	1.209
552	480.25	483.53	4	487.95	0	486.45	485.4	0.934
556	480.47	483.53	4	487.95	0	486.45	485.4	0.956
560	480.6	483.53	4	487.95	0	486.45	485.4	1.078
564	480.69	483.53	4	487.95	0	486.45	485.4	1.152
568	480.67	483.53	4	487.95	0	486.45	485.4	1.321
572	480.77	483.53	4	487.95	0	486.45	485.4	1.099
576	481.01	483.53	4	487.95	0	486.45	485.4	1.115
580	481.1	483.53	4	487.95	0	486.45	485.4	1.13
584	481.17	483.53	4	487.95	0	486.45	485.4	0.965
588	481.33	483.53	4	487.95	0	486.45	485.4	0.602
592	481.54	483.53	4	487.95	0	486.45	485.4	0.551
596	481.65	483.53	4	487.95	0	486.45	485.4	0.701
600	481.78	483.53	4	487.95	0	486.45	485.4	1.243
604	481.92	483.53	4	487.95	0	486.45	485.4	1.188
608	482.15	483.53	4	487.95	0	486.45	485.4	0.843
612	482.39	483.53	4	487.95	0	486.45	485.4	0.649
616	482.57	483.53	5	487.95	0	486.45	485.4	0.414
620	482.67	483.53	5	487.95	0	486.45	485.4	0.367
624	482.63	483.53	5	487.95	0	486.45	485.4	-0.004
628	482.76	483.53	5	487.95	0	486.45	485.4	0.14

632	482.78	483.53	5	487.95	0	486.45	485.4	0.829
636	482.75	483.53	5	487.95	0	486.45	485.4	0.749
640	482.73	483.53	5	487.95	0	486.45	485.4	0.778
644	482.6	483.53	5	487.95	0	486.45	485.4	0.171
648	482.54	483.53	5	487.95	0	486.45	485.4	0.256
652	482.6	483.53	5	487.95	0	486.45	485.4	0.511
656	482.6	483.53	5	487.95	0	486.45	485.4	-0.074
660	482.61	483.53	5	487.95	0	486.45	485.4	0.51
664	482.76	483.53	5	487.95	0	486.45	485.4	0.654
668	482.75	483.53	5	487.95	0	486.45	485.4	0.69
672	482.82	483.53	5	487.95	0	486.45	485.4	0.951
676	482.83	483.53	13	487.95	0	486.45	485.4	0.903
680	483.14	483.53	13	487.95	0	486.45	485.4	0.84
684	483.07	483.53	13	487.95	0	486.45	485.4	0.405
688	483.49	483.53	13	487.95	0	486.45	485.4	-1.107
692	483.87	0	13	487.95	0	486.45	485.4	0.326
696	483.9	0	13	487.95	0	486.45	485.4	1.043
700	483.9	0	13	487.95	0	486.45	485.4	0.172
704	483.73	0	4	487.95	0	486.45	485.4	0.708
708	483.7	0	4	487.95	0	486.45	485.4	-0.469
712	483.71	0	4	487.95	0	486.45	485.4	-1.207
716	483.64	0	4	487.95	0	486.45	485.4	0.193
720	483.68	0	4	487.95	0	486.45	485.4	0.822
724	483.67	0	4	487.95	0	486.45	485.4	0.829
728	483.63	0	4	487.95	0	486.45	485.4	1.67
732	483.62	0	4	487.95	0	486.45	485.4	1.616
736	483.58	0	4	487.95	0	486.45	485.4	0.745
740	483.53	483.53	4	487.95	0	486.45	485.4	-0.292
744	483.5	483.53	4	487.95	0	486.45	485.4	0.131
748	483.53	483.53	4	487.95	0	486.45	485.4	1.125
752	483.46	483.53	4	487.95	0	486.45	485.4	0.546
756	483.39	483.53	4	487.95	0	486.45	485.4	0.41
760	483.44	483.53	4	487.95	0	486.45	485.4	0.232
764	483.51	483.53	4	487.95	0	486.45	485.4	-0.334
768	483.56	0	14	487.95	0	486.45	485.4	0.313
772	483.5	483.53	14	487.95	0	486.45	485.4	0.814
776	483.38	483.53	14	487.95	0	486.45	485.4	1.329
780	483.43	483.53	14	487.95	0	486.45	485.4	1.332
784	483.38	483.53	14	487.95	0	486.45	485.4	0.95
788	483.38	483.53	14	487.95	0	486.45	485.4	0.496
792	483.27	483.53	14	487.95	0	486.45	485.4	-0.12

796	483.31	483.53	16	487.95	0	486.45	485.4	-0.46
800	483.23	483.53	16	487.95	0	486.45	485.4	0.274
804	483.45	483.53	16	487.95	0	486.45	485.4	0.416
808	483.2	483.53	16	487.95	0	486.45	485.4	-0.271
812	483.32	483.53	16	487.95	0	486.45	485.4	0.278
816	483.27	483.53	16	487.95	0	486.45	485.4	0.955
820	483.4	483.53	16	487.95	0	486.45	485.4	0.988
824	483.64	0	16	487.95	0	486.45	485.4	1.104
828	483.46	483.53	16	487.95	0	486.45	485.4	1.332
832	483.43	483.53	16	487.95	0	486.45	485.4	1.207
833	483.6	0	4	487.95	0	486.45	485.4	0
837	483.8	0	13	487.95	0	486.45	485.4	0
841	483.7	0	4	487.95	0	486.45	485.4	0
845	483.8	0	4	487.95	0	486.45	485.4	0
849	483.8	0	4	487.95	0	486.45	485.4	0
853	483.7	0	4	487.95	0	486.45	485.4	0
857	483.8	0	4	487.95	0	486.45	485.4	0
861	484	0	4	487.95	0	486.45	485.4	0
865	483.9	0	4	487.95	0	486.45	485.4	0
869	484.1	0	4	487.95	0	486.45	485.4	0
873	483.9	0	4	487.95	0	486.45	485.4	0
877	483.9	0	4	487.95	0	486.45	485.4	0
881	483.9	0	4	487.95	0	486.45	485.4	0
885	484	0	3	487.95	0	486.45	485.4	0
889	484	0	3	487.95	0	486.45	485.4	0
893	484	0	3	487.95	0	486.45	485.4	0
897	484.2	0	3	487.95	0	486.45	485.4	0
901	484.2	0	16	487.95	0	486.45	485.4	0
905	484.3	0	17	487.95	0	486.45	485.4	0
909	484.8	0	17	487.95	0	486.45	485.4	0
913	485.1	0	17	487.95	0	486.45	485.4	0
917	484.7	0	17	487.95	0	486.45	485.4	0
921	484.3	0	17	487.95	0	486.45	485.4	0
925	484.6	0	17	487.95	0	486.45	485.4	0
927.2	485.4	0	17	487.95	0	486.45	485.4	0
929	485.94	0	1	487.95	0	486.45	0	0
933	488.73	0	1	0	0	0	0	0
937	490	0	1	0	0	0	0	0
941	491	0	1	0	0	0	0	0
944	492	0	1	0	0	0	0	0

Cross-section: P_1					High	Middle		Low
Station	Elevation	SZF	Substrate/Cover	WSEL	Velocity	WSEL	Stage 3	WSEL
-4	492	0	10	0	0	0	0	0
0	490.67	0	10	0	0	0	0	0
4	490.37	0	10	0	0	0	0	0
6	487.17	0	10	487.97	-0.243	0	0	0
8	486.12	0	10	487.97	-0.21	486.35	0	0
10	484.77	0	10	487.97	0.128	486.35	485.24	0
12	484.07	0	10	487.97	0.19	486.35	485.24	0
16	484.43	0	10	487.97	0.557	486.35	485.24	0
20	484.03	0	10	487.97	1.141	486.35	485.24	0
24	483.7	0	10	487.97	1.045	486.35	485.24	0
28	483.7	0	10	487.97	0.672	486.35	485.24	0
32	483.38	483.53	10	487.97	0.828	486.35	485.24	0
36	483.38	483.53	10	487.97	0.68	486.35	485.24	0
40	483.54	0	17	487.97	1.058	486.35	485.24	0
44	483.87	0	17	487.97	0.951	486.35	485.24	0
48	483.54	0	17	487.97	1.195	486.35	485.24	0
52	483.38	483.53	17	487.97	0.459	486.35	485.24	0
56	482.83	483.53	17	487.97	1.156	486.35	485.24	0
60	482.39	483.53	17	487.97	1.26	486.35	485.24	0
64	480.92	483.53	17	487.97	1.317	486.35	485.24	0
68	480.1	483.53	17	487.97	1.186	486.35	485.24	0
72	479.77	483.53	2	487.97	1.343	486.35	485.24	0
76	479.77	483.53	2	487.97	1.399	486.35	485.24	0
80	479.77	483.53	2	487.97	1.734	486.35	485.24	0
84	479.28	483.53	2	487.97	1.432	486.35	485.24	0
88	478.46	483.53	2	487.97	1.434	486.35	485.24	0
92	477.31	483.53	2	487.97	1.419	486.35	485.24	0
96	476.98	483.53	2	487.97	1.288	486.35	485.24	0
100	476.82	483.53	2	487.97	1.281	486.35	485.24	0
104	476.82	483.53	2	487.97	1.319	486.35	485.24	0
108	476.82	483.53	2	487.97	1.367	486.35	485.24	0
112	476.66	483.53	2	487.97	1.147	486.35	485.24	0
116	476.82	483.53	2	487.97	1.175	486.35	485.24	0
120	474.69	483.53	2	487.97	1.33	486.35	485.24	0
124	474.52	483.53	2	487.97	1.323	486.35	485.24	0
128	473.86	483.53	2	487.97	1.2	486.35	485.24	0
132	473.86	483.53	2	487.97	1.115	486.35	485.24	0
136	473.86	483.53	2	487.97	1.396	486.35	485.24	0
140	473.86	483.53	2	487.97	1.361	486.35	485.24	0

144	473.53	483.53	2	487.97	1.327	486.35	485.24	0
148	473.53	483.53	17	487.97	1.341	486.35	485.24	0
152	473.53	483.53	17	487.97	1.481	486.35	485.24	0
156	473.21	483.53	17	487.97	1.454	486.35	485.24	0
160	473.21	483.53	17	487.97	1.662	486.35	485.24	0
164	473.21	483.53	17	487.97	1.841	486.35	485.24	0
168	472.88	483.53	1	487.97	1.842	486.35	485.24	0
172	472.88	483.53	1	487.97	1.672	486.35	485.24	0
176	472.88	483.53	1	487.97	1.569	486.35	485.24	0
180	472.88	483.53	1	487.97	1.41	486.35	485.24	0
184	472.88	483.53	1	487.97	1.62	486.35	485.24	0
188	472.88	483.53	1	487.97	1.411	486.35	485.24	0
192	472.88	483.53	1	487.97	1.504	486.35	485.24	0
196	472.88	483.53	1	487.97	1.495	486.35	485.24	0
200	472.88	483.53	1	487.97	1.427	486.35	485.24	0
204	472.88	483.53	1	487.97	1.624	486.35	485.24	0
208	472.72	483.53	1	487.97	1.608	486.35	485.24	0
212	472.55	483.53	1	487.97	1.6	486.35	485.24	0
216	472.55	483.53	1	487.97	1.585	486.35	485.24	0
220	472.55	483.53	1	487.97	1.596	486.35	485.24	0
224	472.44	483.53	1	487.97	1.486	486.35	485.24	0
228	472.22	483.53	1	487.97	1.807	486.35	485.24	0
232	472.22	483.53	1	487.97	1.555	486.35	485.24	0
236	472.22	483.53	1	487.97	1.761	486.35	485.24	0
240	472.22	483.53	1	487.97	1.763	486.35	485.24	0
244	471.89	483.53	1	487.97	1.755	486.35	485.24	0
248	471.89	483.53	1	487.97	1.665	486.35	485.24	0
252	471.89	483.53	1	487.97	1.495	486.35	485.24	0
256	471.89	483.53	1	487.97	1.794	486.35	485.24	0
260	471.89	483.53	1	487.97	1.583	486.35	485.24	0
264	471.89	483.53	1	487.97	1.551	486.35	485.24	0
268	471.89	483.53	1	487.97	1.502	486.35	485.24	0
272	471.89	483.53	1	487.97	1.429	486.35	485.24	0
276	471.89	483.53	1	487.97	1.263	486.35	485.24	0
280	471.89	483.53	1	487.97	1.442	486.35	485.24	0
284	472.22	483.53	1	487.97	1.414	486.35	485.24	0
288	472.22	483.53	1	487.97	1.689	486.35	485.24	0
292	472.55	483.53	1	487.97	1.625	486.35	485.24	0
296	472.55	483.53	1	487.97	1.502	486.35	485.24	0
300	472.88	483.53	1	487.97	1.369	486.35	485.24	0
304	472.88	483.53	1	487.97	1.365	486.35	485.24	0

308	473.05	483.53	2	487.97	1.536	486.35	485.24	0
312	473.21	483.53	2	487.97	1.514	486.35	485.24	0
316	473.21	483.53	2	487.97	1.501	486.35	485.24	0
320	473.21	483.53	2	487.97	1.638	486.35	485.24	0
324	473.37	483.53	2	487.97	1.529	486.35	485.24	0
328	473.53	483.53	2	487.97	1.454	486.35	485.24	0
332	473.53	483.53	2	487.97	1.496	486.35	485.24	0
336	473.53	483.53	2	487.97	1.35	486.35	485.24	0
340	473.53	483.53	2	487.97	1.403	486.35	485.24	0
344	473.86	483.53	2	487.97	1.369	486.35	485.24	0
348	473.86	483.53	2	487.97	1.371	486.35	485.24	0
352	473.86	483.53	2	487.97	1.406	486.35	485.24	0
356	473.86	483.53	2	487.97	1.442	486.35	485.24	0
360	474.19	483.53	2	487.97	1.267	486.35	485.24	0
364	474.19	483.53	2	487.97	1.345	486.35	485.24	0
368	474.19	483.53	2	487.97	1.321	486.35	485.24	0
372	474.19	483.53	2	487.97	1.25	486.35	485.24	0
376	474.19	483.53	2	487.97	1.279	486.35	485.24	0
380	474.52	483.53	2	487.97	1.335	486.35	485.24	0
384	474.3	483.53	2	487.97	1.285	486.35	485.24	0
388	474.52	483.53	2	487.97	1.22	486.35	485.24	0
392	474.85	483.53	2	487.97	1.205	486.35	485.24	0
396	474.85	483.53	2	487.97	1.281	486.35	485.24	0
400	474.85	483.53	2	487.97	1.232	486.35	485.24	0
404	475.01	483.53	2	487.97	1.398	486.35	485.24	0
408	475.17	483.53	2	487.97	1.293	486.35	485.24	0
412	475.17	483.53	2	487.97	1.192	486.35	485.24	0
416	475.17	483.53	2	487.97	1.106	486.35	485.24	0
420	475.28	483.53	2	487.97	1.13	486.35	485.24	0
424	475.5	483.53	3	487.97	1.076	486.35	485.24	0
428	475.5	483.53	3	487.97	1.166	486.35	485.24	0
432	475.67	483.53	3	487.97	0.932	486.35	485.24	0
436	475.83	483.53	3	487.97	1.07	486.35	485.24	0
440	475.83	483.53	3	487.97	1.14	486.35	485.24	0
444	476.16	483.53	3	487.97	0.976	486.35	485.24	0
448	476.16	483.53	3	487.97	1.091	486.35	485.24	0
452	476.16	483.53	3	487.97	0.985	486.35	485.24	0
456	476.33	483.53	3	487.97	1.148	486.35	485.24	0
460	476.49	483.53	3	487.97	1.023	486.35	485.24	0
464	476.49	483.53	3	487.97	0.897	486.35	485.24	0
468	476.82	483.53	3	487.97	0.913	486.35	485.24	0

472	476.82	483.53	3	487.97	0.687	486.35	485.24	0
476	476.82	483.53	3	487.97	0.918	486.35	485.24	0
480	476.98	483.53	3	487.97	1.028	486.35	485.24	0
484	477.14	483.53	3	487.97	0.989	486.35	485.24	0
488	477.14	483.53	3	487.97	0.972	486.35	485.24	0
492	477.31	483.53	3	487.97	0.769	486.35	485.24	0
496	477.31	483.53	3	487.97	0.835	486.35	485.24	0
500	477.47	483.53	3	487.97	0.968	486.35	485.24	0
504	477.47	483.53	2	487.97	1.014	486.35	485.24	0
508	477.8	483.53	2	487.97	0.845	486.35	485.24	0
512	477.8	483.53	2	487.97	0.843	486.35	485.24	0
516	478.13	483.53	2	487.97	0.875	486.35	485.24	0
520	478.13	483.53	2	487.97	0.951	486.35	485.24	0
524	478.13	483.53	2	487.97	0.783	486.35	485.24	0
528	478.13	483.53	2	487.97	0.764	486.35	485.24	0
532	478.13	483.53	2	487.97	0.725	486.35	485.24	0
536	478.13	483.53	2	487.97	0.56	486.35	485.24	0
540	478.46	483.53	2	487.97	0.521	486.35	485.24	0
544	478.78	483.53	2	487.97	0.69	486.35	485.24	0
548	478.62	483.53	2	487.97	0.661	486.35	485.24	0
552	478.78	483.53	2	487.97	0.706	486.35	485.24	0
556	478.78	483.53	2	487.97	0.57	486.35	485.24	0
560	479.11	483.53	2	487.97	0.59	486.35	485.24	0
564	479.11	483.53	2	487.97	0.452	486.35	485.24	0
568	479.11	483.53	2	487.97	0.805	486.35	485.24	0
572	479.28	483.53	2	487.97	0.669	486.35	485.24	0
576	479.44	483.53	2	487.97	0.698	486.35	485.24	0
580	479.44	483.53	2	487.97	0.574	486.35	485.24	0
584	479.44	483.53	2	487.97	0.637	486.35	485.24	0
588	479.77	483.53	2	487.97	0.833	486.35	485.24	0
592	479.77	483.53	2	487.97	0.641	486.35	485.24	0
596	479.77	483.53	2	487.97	0.777	486.35	485.24	0
600	480.1	483.53	2	487.97	0.592	486.35	485.24	0
604	480.26	483.53	2	487.97	0.562	486.35	485.24	0
608	480.42	483.53	2	487.97	0.645	486.35	485.24	0
612	480.42	483.53	2	487.97	0.715	486.35	485.24	0
616	480.42	483.53	2	487.97	0.489	486.35	485.24	0
620	480.42	483.53	2	487.97	0.603	486.35	485.24	0
624	480.75	483.53	2	487.97	0.435	486.35	485.24	0
628	480.75	483.53	2	487.97	0.426	486.35	485.24	0
632	480.75	483.53	2	487.97	0.6	486.35	485.24	0

636	480.75	483.53		2	487.97	0.743	486.35	485.24	0
640	480.75	483.53		2	487.97	0.604	486.35	485.24	0
644	481.08	483.53		2	487.97	0.783	486.35	485.24	0
648	481.08	483.53		2	487.97	0.686	486.35	485.24	0
652	481.08	483.53		2	487.97	0.647	486.35	485.24	0
656	481.08	483.53		3	487.97	0.551	486.35	485.24	0
660	481.08	483.53		3	487.97	0.802	486.35	485.24	0
664	481.08	483.53		3	487.97	0.507	486.35	485.24	0
668	481.41	483.53		3	487.97	0.61	486.35	485.24	0
672	481.41	483.53		3	487.97	0.483	486.35	485.24	0
676	481.58	483.53		3	487.97	0.578	486.35	485.24	0
680	481.74	483.53		3	487.97	0.527	486.35	485.24	0
684	481.74	483.53		3	487.97	0.63	486.35	485.24	0
688	481.74	483.53		3	487.97	0.605	486.35	485.24	0
692	481.9	483.53		3	487.97	0.941	486.35	485.24	0
696	482.06	483.53		3	487.97	0.726	486.35	485.24	0
700	482.06	483.53		3	487.97	0.698	486.35	485.24	0
704	482.23	483.53		3	487.97	0.756	486.35	485.24	0
708	482.39	483.53		3	487.97	0.757	486.35	485.24	0
712	482.39	483.53		3	487.97	0.803	486.35	485.24	0
716	482.39	483.53		3	487.97	0.623	486.35	485.24	0
720	482.39	483.53		17	487.97	0.53	486.35	485.24	0
724	482.39	483.53		17	487.97	0.685	486.35	485.24	0
728	482.56	483.53		17	487.97	0.71	486.35	485.24	0
732	482.72	483.53		17	487.97	0.939	486.35	485.24	0
736	482.72	483.53		17	487.97	0.496	486.35	485.24	0
740	482.72	483.53		17	487.97	0.989	486.35	485.24	0
744	483.05	483.53		17	487.97	0.781	486.35	485.24	0
748	483.05	483.53		17	487.97	0.664	486.35	485.24	0
752	483.71	0		17	487.97	0.624	486.35	485.24	0
756	484.03	0		17	487.97	0.497	486.35	485.24	0
760	484.03	0		17	487.97	0.439	486.35	485.24	0
764	483.54	0		17	487.97	-0.1	486.35	485.24	0
768	483.38	483.53		17	487.97	0.611	486.35	485.24	0
772	483.38	483.53		17	487.97	0.537	486.35	485.24	0
776	483.54	0		17	487.97	0.463	486.35	485.24	0
780	484.03	0		17	487.97	0.435	486.35	485.24	0
784	483.92	0		17	487.97	0.357	486.35	485.24	0
788	484.14	0		17	487.97	0.288	486.35	485.24	0
792	484.14	0		17	487.97	0.193	486.35	485.24	0
796	484.11	0		17	487.97	0.321	486.35	485.24	0

800	484.93	0	17	487.97	0.226	486.35	485.24	0
806.1	484.87	0	17	487.97	0.208	486.35	485.24	0
809.1	485.22	0	17	487.97	0.21	486.35	485.24	0
812.1	485.77	0	18	487.97	0.21	486.35	0	0
815.1	486.07	0	18	487.97	0.13	486.35	0	0
818.1	486.97	0	18	487.97	0.11	0	0	0
821.1	487.67	0	18	487.97	-0.01	0	0	0
823.1	487.86	0	18	487.97	0	0	0	0
827.1	489.07	0	1	0	0	0	0	0
831.1	489.64	0	1	0	0	0	0	0
835.1	489.97	0	1	0	0	0	0	0
839.1	490.73	0	1	0	0	0	0	0
843	492	0	1	0	0	0	0	0